THE STATE OF OKLAHOMA

WATER QUALITY ASSESSMENT

REPORT

1998 ed.

OKLAHOMA

DEPARTMENT OF ENVIRONMENTAL QUALITY

MISSION STATEMENT

The Department of Environmental Quality is dedicated to providing quality service to the people of Oklahoma through comprehensive environmental protection and management programs. Those programs are designed to assist the people of the state in sustaining a clean, sound environment and in preserving and enhancing our natural surroundings where Oklahomans, today and tomorrow, may prosper and enjoy life.

The Department, as the state's environmental guardian, will honor the people's trust by providing:

- **Rapid response to environmental concerns;**
- **Quality public information and environmental education;**
- **Innovative and effective programs to minimize waste, recycle our resources and prevent pollution;**
- **Fair, consistent and effective compliance with environmental laws.**

GOALS

Goal I	**Develop human resources and implement procedures and activities to cause the new agency to be effective.**
Goal II	**Develop a standardized, effective, timely permit review process.**
Goal III	**Facilitate a culture wherein DEQ employees view individuals needing services as valued customers.**
Goal IV	**Develop and implement an automated information handling system.**
Goal V	**Institute a responsive, accurate, and timely system to handle complaints and emergency response.**
Goal VI	**Minimize citizen frustration and societal cost of environmental regulation by obtaining authority to operate all appropriate federal laws duplicating state authority.**
Goal VII	**Sponsor activities which encourage enhancement of the environment.**
Goal VIII	**Monitor and assess the environment and regulatory compliance, and seek compliance with applicable laws and rules.**

THE STATE OF OKLAHOMA

WATER QUALITY ASSESSMENT

REPORT

1998 ed.

Prepared Pursuant to Section 305(b)

of the Federal Clean Water Act

Prepared by the

Oklahoma Department of Environmental Quality

GOVERNOR	Frank Keating
SECRETARY OF ENVIRONMENT	Brian C. Griffin
ENVIRONMENTAL QUALITY BOARD	Herschel J. Roberts, Chairman Lee Paden, Vice-Chairman John Coakley Cheryl Cohenour Frank H. Condon Jennifer Galvin Jerry Johnston Phil Klutts Lew Meibergen Roger Miner Karol Terri Savage Richard Wuerflein
DEPARTMENT OF ENVIRONMENTAL QUALITY	Mark S. Coleman, Executive Director Steven A. Thompson, Deputy Executive Director
WATER QUALITY DIVISION	Jon L. Craig, Division Director Glen W. Jones, Assistant Division Director

ACKNOWLEDGEMENTS	This report was prepared through the coordinated efforts of many people who provided extensive information and assistance.
305(b) Coordinator and Author/Editor:	Christy D. Day
Contributors:	Oklahoma Conservation Commission Oklahoma Corporation Commission Oklahoma Department of Environmental Quality Oklahoma Department of Wildlife Conservation Oklahoma State Department of Agriculture Oklahoma State Department of Mines Oklahoma Water Resources Board

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ABSTRACT

The *Oklahoma Water Quality Assessment Report* (305(b)) is prepared by the Oklahoma Department of Environmental Quality in accordance with § 305(b)(1) of the Clean Water Act of 1972 (Pub. L. 92-500, as amended, et al seq.). This process was established as a means for the U. S. Environmental Protection Agency (EPA) and the U. S. Congress to determine the status of the nation's waters. Provisions for this requirement can be found in the CWA § 106(e), 204(a), 305(b), and 314(a).

On June 12, 1992, Governor David Walters signed into law HB 2227, the Oklahoma Environmental Quality Act. HB 2227 consolidated the environmental responsibilities of the Department of Pollution Control, the Oklahoma Water Resources Board, and the Oklahoma Department of Health into the Oklahoma Department of Environmental Quality.

During the 1997/1998 reporting cycle, there were a total of 4021 waterbodies delineated into the Waterbody System Program. These waters include approximately 78,778 river and stream miles, 175 canal and lateral miles, 1,041,884 lake acres, and 733,985 wetland acres. Of the river miles, approximately 517 miles form the border with the State of Texas. Of the 4021 waterbodies, approximately 520 waterbodies were assessed using ambient monitoring data, professional evaluation, and citizen input. The general trend for Oklahoma's surface waters has been one of improvement.

The goals of the Clean Water Act establish that the nation's surface waters be fishable and swimmable. The achievement of this goal takes a consorted effort of all the citizens of the state. The following four Tables list the overall support and the attainment of the goals of the Act. In Tables I and II, the overall support and attainment of goals of the act is based on those waters that were assessed. There is agreement among the Oklahoma environmental agencies that this is the most accurate portrayal of the conditions of our waters.

TABLE I. CLEAN WATER ACT GOALS FOR ASSESSED RIVER AND STREAM MILES

	FISHABLE AND SWIMMABLE GOALS	
	MILES	PERCENT
CWA GOAL SUPPORTED		
Fully Supported	923.21	8.21
Fully Supported but Threatened	2,983.96	26.54
Subtotal	3,907.17	34.75
CWA GOAL NOT SUPPORTED		
Partially Supported	5,585.06	49.67
Not Supported	1,750.82	15.57
Subtotal	7,335.80	65.24
NOT ATTAINABLE	0.00	0.00
TOTAL	11,243.05	100.00

TABLE II. CLEAN WATER ACT GOALS FOR ASSESSED LAKE ACRES

	FISHABLE AND SWIMMABLE GOALS	
	ACRES	PERCENT
CWA GOAL SUPPORTED		
Fully Supported	100,430.00	16.41
Fully Supported but Threatened	252,275.00	41.23
Subtotal	352,705.00	57.64
CWA GOAL NOT SUPPORTED		
Partially Supported	142,522.00	23.29
Not Supported	116,624.00	19.06
Subtotal	259,146.00	42.35
TOTAL	611,851.00	100.00

For Tables III and IV, the overall support and attainment of the goals of the Act is based upon "total waters." The Environmental Protection Agency requires all states to report their attainment of the goals of the Act based on total waters. However, Oklahoma's environmental agencies do not agree with total water reporting because of the under representation of the status of its waters. It would be too cost prohibitive to assess all of the waters within the state. Therefore, all assessment work performed in the state is conducted in a manner that will best utilize available funding resources. For lake total water reporting, the acreage includes the Soil Conservation Service assisted farm ponds. These farm ponds are not included in the Environmental Protection Agency's accounting of total waters due to their size. Most of these farm ponds are usually under ten acres in size and therefore not digitized into EPA's total water database. Although not considered as "significant lakes," the state considers them as important natural resources for the agricultural and rural communities. These farm ponds provide a significant amount of water for livestock, are a source of primary recreation for many, and add to the recharge of groundwater aquifers.

TABLE III. CLEAN WATER ACT GOALS FOR TOTAL RIVER AND STREAM MILES

	FISHABLE AND SWIMMABLE GOALS	
	MILES	PERCENT
CWA GOAL SUPPORTED		
Fully Supported	923.21	1.17
Fully Supported but Threatened	2,983.96	3.78
Subtotal	3,907.17	4.95
CWA GOAL NOT SUPPORTED		
Partially Supported	5,585.06	7.08
Not Supported	1,750.82	2.22
Subtotal	7,335.80	9.31
NOT ATTAINABLE	0.00	0.00
UNASSESSED WATERS	67,535.03	85.72
TOTAL	78,778.00	100.00

TABLE IV. CLEAN WATER ACT GOALS FOR TOTAL LAKE ACRES

	FISHABLE AND SWIMMABLE GOALS	
	ACRES	PERCENT
CWA GOAL SUPPORTED		
Fully Supported	100,430.00	9.64
Fully Supported but Threatened	252,275.00	24.21
Subtotal	352,705.00	33.85
CWA GOAL NOT SUPPORTED		
Partially Supported	142,522.00	13.68
Not Supported	116,624.00	11.19
Subtotal	259,146.00	24.87
UNASSESSED WATERS	430,033.00	41.27
TOTAL	1,041,884.00	100.00

Table v. lists the percent of waters assessed within the state.

Canals, laterals and most all of the wetlands have not been assessed for the goals of the Clean Water Act nor have they been assessed for their beneficial uses. Canals and laterals are manmade water courses and have not been included in the Appendix A of the *Oklahoma Water Quality Standards*. By default, these waters would be assigned primary protection under the revised 1994 *Oklahoma Water Quality Standards* (OWRB, 1994). Due to a lack of funding, no assessment projects have been initiated on these types of waterbodies. Wetlands have not been assigned water quality standards and therefore fall under the same scenario as canals and laterals. There have been several projects and ventures initiated to inventory the wetlands within the state, but little or no assessment work done.

TABLE V. PERCENT OF ASSESSED WATERBODIES WITHIN THE STATE

SUPPORT STATUS	RIVER AND STREAMS		LAKES	
	MILES	PERCENT	ACRES	PERCENT
Fully Supported	923.21	8.21	100,430.00	16.41
Fully Supported but Threatened	2,983.96	26.54	252,275.00	41.23
Partially Supported	5,585.06	49.67	142,522.00	23.29
Not Supported	1,750.82	15.57	116,624.00	19.06
TOTAL	11,243.05	100.00	611,851.00	100.00

The water quality data used in this report was collected by the Conservation Commission, Department of Environmental Quality (formerly the Department of Health), Department of Wildlife Conservation, Water Resources Board, United States Geological Survey, and citizens of the state. The data used in this report came from the *Toxics Monitoring Survey of Oklahoma Reservoirs* (OSDH, 1995), *Nonpoint Source Pollution Assessment Report (Section 319(h))* (OCC, 1988, 1994), Clean Lakes Programs (Section 314) (OCC & OWRB), *Lake Water Quality Assessment Report* (OCC & OWRB, 1994), 1990 *Oklahoma Water Quality Assessment Report* (Section 305(b)) (ODEQ, 1994), Oklahoma Corporation Commission, statewide ambient trend monitoring network, intensive and rapid bio-assessment surveys, fish and wildlife kill reports, spill reports, citizen complaints, and citizens of the state.

ACRONYMS AND DEFINITIONS

AGENCIES

OSDA	Oklahoma Department of Agriculture
OCC	Oklahoma Conservation Commission
Corporation Commission	Oklahoma Corporation Commission
Health Department or OSDH	Oklahoma State Department of Health
OSE	Office of the Secretary of Environment
The Department	Oklahoma Department of Environmental Quality
The Water Board or OWRB	Oklahoma Water Resources Board
Wildlife Department	Oklahoma Department of Wildlife Conservation

TERMINOLOGY

303(d) This section of the Clean Water Act requires each state to identify waters that do not or are not expected to meet applicable Water Quality Standards with technology-based controls alone. States are required to establish a priority ranking for the waters, taking into account the pollution severity and designated uses of the waters. Once identification and priority ranking are completed, states are to develop Total Maximum Daily Loads at a level necessary to achieve the applicable state Water Quality Standards.

304(l) This section of the Clean Water Act requires each state to identify those waters that fail to meet Water Quality Standards due to toxic pollutants and other sources of toxicity. It also requires the preparation of individual control strategies that will reduce point source discharges of toxic pollutants.

305(b) This section of the Clean Water Act requires each state to report its water quality on a biennial cycle.

314 This section of the Clean Water Act requires each state to establish a Lake Water Quality Assessment Report. This section provides federal funds for the state to submit a classification of lakes according to trophic condition, develop processes and methods to control sources of pollution and to work with other agencies in restoring the quality of those lakes. Section 314 establishes the guidelines for conducting Clean Lake Studies Phase I and II.

319(h) This section of the Clean Water Act requires each state to develop a State Assessment Report and a Management Program for Nonpoint Source pollution problems. The Assessment Report is to describe the nature, extent, and effects of Nonpoint Source pollution, the causes and sources of such pollution, and programs and methods used for controlling this pollution.

BMPs Best Management Practices: A technique that is determined to be the most effective, practical means of preventing or reducing pollutants from nonpoint sources in order to achieve water quality goals.

BOD_5 Biochemical Oxygen Demand (5-Day): The oxygen used in meeting the metabolic needs of aerobic microorganisms in water rich in organic matter -- called also biological oxygen demand; the test requires five days of laboratory time and results may vary when toxic substances are present which effect bacteria.

$CBOD_5$ Carbonaceous Biochemical Oxygen Demand (5-Day): That portion of the BOD that is not due to oxidation of nitrogenous compounds.

CTSI Carlson's Trophic State Index ($CTSI = 9.81 \ln[chl\text{-}\alpha] + 30.6$).

CWA

	Clean Water Act: Public Law 92-500 enacted in 1972 provides for a comprehensive program of water pollution control; two goals are proclaimed in this Act: (1) to achieve swimmable, fishable waters wherever attainable by July 1, 1983, and (2) by 1985 eliminate the discharge of pollutants into navigable waters.
DDT	Dichlorodiphenyltrichloroethane: A colorless odorless water-insoluble crystalline insecticide C14H9Cl5 that tends to accumulate in ecosystems and has toxic effects on many vertebrates.
DO	Dissolved Oxygen: The amount of oxygen dissolved in water. DO concentrations range from a few parts per million up to about 10 ppm for most Oklahoma streams. A level of DO around 7 ppm is essential to sustain desired species of game fish. If DO drops below 5 ppm the danger of a fish kill is present and malodorous conditions will result. The major factors determining DO levels in water are temperature, atmospheric pressure, plant photosynthesis, rate of aeration and the presence of oxygen demanding substances such as organic wastes. In addition to its affect on aquatic life, DO also prevents the chemical reduction and subsequent movement of iron and manganese from the sediments and thereby reduces the cost of water treatment.
µg/l	Microgram/liter.
NPDES	National Pollutant Discharge Elimination System: A permit program established by Section 402 of the Clean Water Act. This program regulates discharges into the nation's water from point sources, including municipal, industrial, commercial and certain agricultural sources.
NTU	Nephelometric Turbidity Units: The measurement of the extent or degree of cloudiness by means of a nephelometer (an instrument for determining the concentration or particle size of suspensions by means of transmitted or reflected light).
PCB(s)	Polychlorinated Biphenyl(s): Any of several compounds that are produced by replacing hydrogen atoms in biphenyl with chlorine, have various industrial applications, and are poisonous environmental pollutants which tend to accumulate in animal tissues.
pH	The negative logarithm of the effective hydrogen ion concentration or hydrogen-ion activity in gram equivalents per liter used in expressing both acidity and alkalinity on a scale whose values run from 0 to 14 with 7 representing neutrality, numbers less than 7 increasing acidity, and numbers greater that 7 increasing alkalinity.
PL	Public Law: Law concerned with regulating relations of individuals with the government and the organization and conduct of the government itself.
Playa Lakes / Prairie Potholes	Shallow, small, ephemeral to permanent closed basin lake, typically found in high plains and deserts.
TDS	Total Dissolved Solids: The complete amount of solid matter dissolved in water or wastewater.
TMDL	

WLA Total Maximum Daily Load: The sum of individual wasteload allocations for point sources, safety, reserves, and loads from nonpoint source and natural backgrounds.

Wasteload Allocation: The assignment of target loads to point sources so as to achieve Water Quality Standards in the most efficient manner. The wasteload allocation is designed to allocate or allow certain quantities, rates or concentration of pollutants discharged from contributing point sources which empty their effluent into the same river segment. The purpose of the wasteload allocation is to eliminate an undue "wasteload burden" on a given stream segment.

WQS Water Quality Standards: Standards established to serve as goals for the water quality management plans (Section 208) and as benchmark criteria for the NPDES (Section 402) permit process. State Water Quality Standards at a minimum consist of beneficial use classification for navigable water, water quality criteria to support those uses and a statement of policy which prevents the degradation of waters no matter what the beneficial use.

TABLE OF CONTENTS

PAGE

PART I: EXECUTIVE SUMMARY / OVERVIEW 1
BACKGROUND 1
SURFACE WATER QUALITY 1
GROUNDWATER QUALITY 6

PART II: BACKGROUND 7
DIVERSITY & ECOLOGY 7
CLIMATE 7
WATER POLLUTION CONTROL PROGRAMS 13
WATERSHED APPROACH DEVELOPMENT 13
WATER QUALITY STANDARDS PROGRAM 14
POINT SOURCE CONTROL PROGRAM 15
NONPOINT SOURCE CONTROL PROGRAM 17
SUPERFUND PROGRAM 19
BACKGROUND 19
OKLAHOMA'S SUPERFUND PROGRAM 19
COST/BENEFIT ASSESSMENT 22
COST INFORMATION 22
BENEFIT INFORMATION 25
SPECIAL STATE CONCERNS AND RECOMMENDATIONS 25

PART III: SURFACE WATER ASSESSMENT 26
CHAPTER ONE: SURFACE WATER MONITORING PROGRAM 26
CHAPTER TWO: ASSESSMENT METHODOLOGY AND SUMMARY DATA 31
WATER QUALITY STANDARDS 31
USES FOR LISTED WATERBODIES 35
USES FOR UNLISTED RIVERS AND STREAMS 35
AQUATIC LIFE USE SUPPORT 35
SWIMMING USE 36
DRINKING WATER USE 38
FISH CONSUMPTION USE 38
WATER QUALITY SUMMARY FOR RIVERS AND STREAMS 39
SECTION 303(D) WATERS 39
METHODOLOGY AND DATABASE USED TO DEVELOP THE TMDL LIST 42
CHAPTER THREE: RIVERS / STREAMS WATER QUALITY ASSESSMENT 45
DESIGNATED USE SUPPORT 45
SPECIAL SUMMARY FOR ALUS 47
CAUSES AND SOURCES OF NONSUPPORT OF DESIGNATED USES 47
MAJOR IMPACTS 47
MINOR IMPACTS 47
CHAPTER FOUR: LAKE WATER QUALITY ASSESSMENT 53
BACKGROUND 53
SUMMARY STATISTICS 53
CAUSES AND SOURCES OF NONSUPPORT OF DESIGNATED USES 55
MAJOR IMPACTS 55
MINOR IMPACTS 55
CLEAN LAKES PROGRAM 59
TROPHIC STATUS [314(A)(1)(A)] 59

Control Methods [314(a)(1)(B)] . . . 70
Water Quality Standards for Lakes . . . 71
Water Quality Standards for Temperature . . . 71
Water Quality Standards for Toxics . . . 71
Water Quality Standards for Coliform . . . 72
Water Quality Standards for Turbidity . . . 73
Restoration Efforts [314(a)(1)(C)] . . . 73
Impaired and Threatened Lakes [314(a)(1)(E)] . . . 76
Acid Effects on Lakes [314(a)(1)(D); 314(a)(1)(E)] . . . 83
Toxic Effects on Lakes [314(a)(1)(E)] . . . 84
Trends in Lake Water Quality [314(a)(1)(E)] . . . 86
CHAPTER FIVE: WETLANDS ASSESSMENTS . . . 87
Background . . . 87
404/401 Program . . . 89
Designated Use Support . . . 90
Extent of Wetland Resources . . . 92
Development of Wetland Water Quality Standards . . . 94
Additional Wetland Protection Activities . . . 95
CHAPTER SIX: PUBLIC HEALTH/AQUATIC LIFE CONCERNS . . . 96
Size of Waters Affected By Toxicants . . . 96
Public Health: Aquatic Life Impacts . . . 96
Public Health: Drinking Water . . . 101

PART IV: GROUNDWATER QUALITY . . . 103
OVERVIEW . . . 103
GROUNDWATER QUALITY . . . 103
Major Aquifers with Anthropogenic Water Quality Problems or Concerns . . . 108
Alluvium and Terrace Deposits of the Salt Fork of the Arkansas River . . . 108
Alluvium and Terrace Deposits of the Arkansas River . . . 108
Alluvium and Terrace Deposits of the Enid Isolated Terrace Deposits . . . 108
Alluvium and Terrace Deposits of the Cimarron River . . . 108
Alluvium and Terrace Deposits of the Beaver-North Canadian River . . . 108
Alluvium and Terrace Deposits of the Canadian River . . . 109
Alluvium and Terrace Deposits of the Washita River . . . 109
Alluvium and Terrace Deposits of the North Fork of the Red River . . . 109
Alluvium and Terrace Deposits of the Red River . . . 109
Ogallala Formation . . . 109
Antlers Sandstone . . . 109
Rush Springs Sandstone . . . 109
Garber Sandstone and Wellington Formation . . . 110
Vamoosa Formation . . . 110
The Arbuckle Formation . . . 110
Non-major Aquifers with Anthropogenic Water Quality Problems or Concerns . . . 111
The Boone Formation/Boone Chert/Keokuk and Reeds Springs Formation . . . 111
The Oscar "A" Formation . . . 111
McAlester and Hartshorne Formation-Savanna Formation/McAlester Formation/Hartshorne Sandstone Formation . . . 111
Walnut Creek Alluvium Deposits . . . 111
Tillman Terrace Deposits . . . 111
Little Sandy Creek Alluvium Deposits . . . 111
West Cache Creek Terrace . . . 112
Major Sources of Contamination . . . 112

OVERVIEW OF STATE GROUNDWATER PROTECTION PROGRAMS 113
OKLAHOMA'S WELLHEAD PROTECTION PROGRAM 114
GROUNDWATER INDICATORS 114
CITIZEN MONITORING 121
SUMMARY OF GROUNDWATER QUALITY 123

TABLE OF TABLES

PAGE

TABLE 1. CLEAN WATER ACT GOALS FOR ASSESSED RIVER AND STREAM MILES 2
TABLE 2. CLEAN WATER ACT GOALS FOR ASSESSED LAKE ACRES 2
TABLE 3. CLEAN WATER ACT GOALS FOR TOTAL RIVER AND STREAM MILES 3
TABLE 4. CLEAN WATER ACT GOALS FOR TOTAL LAKE ACRES 4
TABLE 5. PERCENT OF ASSESSED WATERBODIES WITHIN THE STATE 4
TABLE 6. ATLAS OF OKLAHOMA 13
TABLE 7. SUPERFUND, NPL, AND NON-NPL SITES IMPACTING ON GROUNDWATER AND SURFACE WATER. 20
TABLE 8. FEDERAL CLEAN WATER ACT AND STATE MATCHED FUNDING RECEIVED DURING FISCAL YEAR 1996 AND 1997 23
TABLE 9. UPGRADED OR NEW INSTALLATION OF WASTEWATER TREATMENT PLANTS DURING FY 1996 AND 1997 24
TABLE 10. NONPOINT SOURCE IMPACTS/MODELING EFFORT FOR STREAMS 40
TABLE 11. MODELING EFFORT/TMDL SAFETY FACTOR 41
TABLE 12. OVERALL USE SUPPORT SUMMARY FOR RIVERS AND STREAMS, IN MILES 45
TABLE 13. INDIVIDUAL USE SUPPORT SUMMARY FOR RIVERS AND STREAMS, IN MILES 46
TABLE 14. TOTAL SIZES OF WATERS NOT FULLY SUPPORTING USES, AFFECTED BY VARIOUS CAUSE CATEGORIES FOR RIVERS AND STREAMS, IN MILES 48
TABLE 15. TOTAL SIZES OF WATERS NOT FULLY SUPPORTING USES AFFECTED BY VARIOUS SOURCE CATEGORIES FOR RIVERS AND STREAMS, IN MILES 49
TABLE 16. OVERALL USE SUPPORT SUMMARY FOR LAKES, IN ACRES 53
TABLE 17. INDIVIDUAL USE SUPPORT SUMMARY FOR LAKES, IN ACRES 54
TABLE 18. TOTAL SIZES OF WATERS NOT FULLY SUPPORTING USES, AFFECTED BY VARIOUS CAUSE CATEGORIES FOR LAKES, IN ACRES 56
TABLE 19. TOTAL SIZES OF WATERS NOT FULLY SUPPORTING USES AFFECTED BY VARIOUS SOURCE CATEGORIES FOR LAKES, IN ACRES 57
TABLE 20. LISTING OF PHASE I, II, AND III CLEAN LAKE PROJECTS 59
TABLE 21. TROPHIC STATUS OF SIGNIFICANT PUBLICLY OWNED LAKES ASSESSED OR MONITORED BY THE WATER BOARD AND/OR OCC. 64
TABLE 22. SUMMARY OF TROPHIC STATUS OF SIGNIFICANT PUBLICLY OWNED LAKES 70
TABLE 23. LAKE REHABILITATION TECHNIQUES FUNDED UNDER SECTION 314 OF THE CWA 74
TABLE 24. LIST OF LAKES WITH RECREATION CONCERNS. 76
TABLE 25. LIST OF LAKES WITH NONPOINT SOURCE CONCERNS. 79
TABLE 26. LIST OF HYPEREUTROPHIC/EUTROPHIC LAKES 80
TABLE 27. ACID EFFECTS ON LAKES 84
TABLE 28. SOURCE OF HIGH ACIDITY IN LAKES 84
TABLE 29. RESERVOIRS WITH TOXICITY CONCERNS 85
TABLE 30. TRENDS IN SIGNIFICANT PUBLIC LAKES 86
TABLE 31. OVERALL USE SUPPORT SUMMARY FOR WETLANDS 90
TABLE 32. INDIVIDUAL USE SUPPORT SUMMARY FOR WETLANDS, IN ACRES 91
TABLE 33. ESTIMATES OF THE PERCENT OF CHANGE IN OKLAHOMA WETLANDS 93
TABLE 34. ADDITIONAL WETLAND PROTECTION ACTIVITIES AND PROJECTS 95
TABLE 35. TOTAL SIZE AFFECTED BY TOXICANTS 96
TABLE 36. TOXIC CONTAMINATION / PUBLIC HEALTH IMPACTS: FISH TISSUE CONTAMINATION ABOVE FOOD AND DRUGADMINISTRATION / NATIONAL ACADEMY OF SCIENCE / LEVELS OF CONCERN -- SAME AS THE DEPARTMENT'S LEVELS OF ALERT 96
TABLE 37. TOXIC CONTAMINATION / PUBLIC HEALTH IMPACTS: FISH TISSUE CONTAMINATION ABOVE THE DEPARTMENT'S LEVELS OF CONCERN (HALF OF THE FOOD AND DRUG ADMINISTRATION CONCERN LEVEL) 98
TABLE 38. TOXIC CONTAMINATION / PUBLIC HEALTH IMPACTS: RESTRICTED CONSUMPTION ADVISORY, GENERAL POPULATION 99

TABLE 39. TOXIC CONTAMINATION / PUBLIC HEALTH IMPACTS: "NO CONSUMPTION" ADVISORY OR BAN, GENERAL POPULATION 99
TABLE 40. TOXIC CONTAMINATION / PUBLIC HEALTH IMPACTS: BATHING AREA CLOSURE OCCURRED DURING REPORTING PERIOD 99
TABLE 41. TOXIC CONTAMINATION / PUBLIC HEALTH IMPACTS: POLLUTION-RELATED FISH AND WILDLIFE KILLS OBSERVED DURING REPORTING PERIOD 100
TABLE 42. TOXIC CONTAMINATION / PUBLIC HEALTH IMPACTS: SEDIMENT CONTAMINATION 101
TABLE 43. TOXIC CONTAMINATION / PUBLIC HEALTH IMPACTS: SURFACE DRINKING WATER SUPPLY CLOSURE OCCURRED DURING REPORTING PERIOD 101
TABLE 44. TOXIC CONTAMINATION / PUBLIC HEALTH IMPACTS: SURFACE DRINKING WATER SUPPLY ADVISORY OCCURRED DURING REPORTING PERIOD 101
TABLE 45. TOXIC CONTAMINATION / PUBLIC HEALTH IMPACTS: WATERBORNE DISEASE INCIDENT OCCURRED DURING REPORTING PERIOD 101
TABLE 46. SUMMARY OF WATERBODIES FULLY SUPPORTING DRINKING WATER USE 101
TABLE 47. SUMMARY OF WATERBODIES NOT FULLY SUPPORTING DRINKING WATER USE 101
TABLE 48. STATE-LEVEL SUMMARY OF DRINKING WATER USE ASSESSMENTS FOR RIVERS AND STREAMS 102
TABLE 49. STATE-LEVEL SUMMARY OF DRINKING WATER USE ASSESSMENTS FOR LAKES 102
TABLE 50. MAJOR POTENTIAL SOURCES OF GROUNDWATER CONTAMINATION 112
TABLE 51. SUMMARY OF STATE GROUNDWATER PROTECTION PROGRAMS 115
TABLE 52. PUBLIC WATER SUPPLY STANDARDS VIOLATIONS: NITRATE (NO_2-NO_3), MAXIMUM ALLOWABLE LIMIT - 10 MG/L (PPM). 116
TABLE 53. PUBLIC WATER SUPPLY STANDARDS VIOLATIONS: GROSS ALPHA ACTIVITY, (INCLUDING RADIUM-226 BUT EXCLUDING RADON AND URANIUM), MAXIMUM ALLOWABLE LIMIT-15 PCI/L 118
TABLE 54. PUBLIC WATER SUPPLY STANDARDS VIOLATIONS: RADIUM-226 ACTIVITY, MAXIMUM ALLOWABLE LIMIT-5 PCI/L 118
TABLE 55. PUBLIC WATER SUPPLY STANDARDS VIOLATIONS: FLUORIDE (F), MAXIMUM ALLOWABLE LIMIT-4.0 MG/L (PPM) 119
TABLE 56. PUBLIC WATER SUPPLY STANDARDS VIOLATIONS: SELENIUM (SE), MAXIMUM ALLOWABLE LIMIT-0.01 MG/L (PPM) 119
TABLE 57. PUBLIC WATER SUPPLY STANDARDS VIOLATIONS: ARSENIC (AS), MAXIMUM ALLOWABLE LIMIT-0.05 MG/L (PPM) 119
TABLE 58. NON-COMMUNITY, PUBLIC WATER SUPPLIES STANDARDS VIOLATIONS: NITRATE (NO_2-NO_3), MAXIMUM ALLOWABLE LIMIT-20 MG/L (PPM) 121
TABLE 59. NON-TRANSIENT NON-COMMUNITY, PUBLIC WATER SUPPLIES STANDARDS VIOLATIONS: NITRATE (NO_2-NO_3), MAXIMUM ALLOWABLE LIMIT-10 MG/L (PPM)* 121
TABLE 60. CITIZEN MONITORING FOR NITRATE 121
TABLE 61. SUMMARY LIST OF VOLATILE ORGANIC COMPOUND VIOLATIONS 122

TABLE OF FIGURES

PAGE

FIGURE 1. MAJOR GEOLOGIC AND TECTONIC PROVINCES OF OKLAHOMA 11
FIGURE 2. MAP OF OKLAHOMA SHOWING COUNTY BOUNDARIES 12
FIGURE 3. MAP OF OKLAHOMA SHOWING SELECTED LAKES 34
FIGURE 4. TMDL ELEMENTS 40
FIGURE 5. MAJOR BEDROCK AQUIFERS IN OKLAHOMA 106
FIGURE 6. ALLUVIUM AND TERRACE DEPOSITS IN OKLAHOMA 107

PART I: EXECUTIVE SUMMARY / OVERVIEW

The *Oklahoma Water Quality Assessment Report* (305(b)) is prepared by the Oklahoma Department of Environmental Quality (Department) in accordance with § 305(b)(1) of the Clean Water Act (CWA) of 1972 (Public Law 92-500, as amended by the Water Quality Act of 1987, et seq.). This process was established as a means for the U. S. Environmental Protection Agency (EPA) and the U. S. Congress to determine the status of the nation's waters. Provisions for this requirement can be found in the CWA § 106(e), 204(a), 305(b), and 314(a). The EPA requires each state to develop a monitoring program for its surface and groundwaters and to prepare a report every two years describing the quality of such waters. This report enables EPA, U. S. Congress, and the general public to evaluate the state's water quality, determine what progress has been made in restoration and maintenance of these waters, and the extent to which water quality problems remain (EPA, 1987).

BACKGROUND

On June 12, 1992, Governor David Walters signed into law HB 2227, the Oklahoma Environmental Quality Act. HB 2227 consolidated the environmental responsibilities of three state agencies into the Department. This bill also created the Office of the Secretary of Environment (OSE). From January 1 to July 1, 1993, the Department and OSE were staffed entirely from personnel from the former Department of Pollution Control. After July 1, 1993, the OSE's staff remained the same and the Department's staff became made up of personnel from the following: the former Department of Pollution Control, all of the environmental sections from the Oklahoma State Department of Health, and the Water Pollution Control Division (comprising the compliance, enforcement, and permitting sections) of the Oklahoma Water Resources Board (Water Board). The purpose of the OSE is to act as the administrator for CWA grants. The mission of the Department is to enhance and protect the environment, to set environmental priorities, and promote environmental awareness and education. It is an instrument of opportunity for citizens, cities, business and industry to participate in environmental decision making.

SURFACE WATER QUALITY

Oklahoma's Water Quality Standards (WQS) are set forth under statutory authority of the Water Board authorized under 82 O.S. 1981, § 926.1 through 926.13. Under these statutes, the Water Board "is required to set water quality standards which are practical and in the best public interest and to classify the state's waters with respect to their best present and future uses. These WQS are designed to enhance the quality of the waters, to protect their beneficial uses, and to aid in the prevention, control and abatement of water pollution in the State of Oklahoma" (OWRB, 1994). The WQS have established standards for all of Oklahoma's waters. Certain waters, such as lakes and waters named in Appendix A of the WQS, receive protection through designated beneficial uses.

Surface Water Quality Standards are designed to enhance the quality of the waters, to protect their beneficial uses, and to aid in the prevention, control and abatement of water pollution.

For the 1998 reporting cycle, there were a total of 4021 waterbodies that have been delineated into the Waterbody System (WBS) Program. These waters include, but are not limited to, approximately 78,778 river and stream miles, 175 canal and lateral miles, 1,041,884 lake acres, and 733,987 wetland acres. Of the lake acres, 89,000 acres form the border with the State of Texas. Of the 89,000 acres, 62,300 acres (70%) are on the Oklahoma side and 26,700 acres (30%) are on the Texas side. Of the river miles, approximately 517 miles of the Red River form the border with the State of Texas. Of the 4021 waterbodies, approximately 520 waterbodies were assessed using ambient monitoring data, professional evaluation, and citizen input. The general trend for Oklahoma's surface waters has been one of improvement.

The goals of the CWA establish that the nation's surface waters be fishable and swimmable.

The goals of the CWA establish that the nation's surface waters be fishable and swimmable. The achievement of this goal takes a consorted effort of all the citizens of the state. The following four Tables list the overall support and the attainment of the goals of

the Act. In Tables 1 and 2, the overall support and attainment of goals of the act is based on those waters that were assessed. There is agreement amount the Oklahoma environmental agencies that this is the most accurate portrayal of the conditions of our waters.

TABLE 1. CLEAN WATER ACT GOALS FOR ASSESSED RIVER AND STREAM MILES

	FISHABLE AND SWIMMABLE GOALS	
	MILES	PERCENT
CWA GOAL SUPPORTED		
Fully Supported	923.21	8.21
Fully Supported but Threatened	2,983.96	26.54
Subtotal	3,907.17	34.75
CWA GOAL NOT SUPPORTED		
Partially Supported	5,585.06	49.67
Not Supported	1,750.82	15.57
Subtotal	7,335.80	65.24
NOT ATTAINABLE	0.00	0.00
TOTAL	11,243.05	100.00

TABLE 2. CLEAN WATER ACT GOALS FOR ASSESSED LAKE ACRES

	FISHABLE AND SWIMMABLE GOALS	
	ACRES	PERCENT
CWA GOAL SUPPORTED		
Fully Supported	100,430.00	16.41
Fully Supported but Threatened	252,275.00	41.23
Subtotal	352,705.00	57.64
CWA GOAL NOT SUPPORTED		
Partially Supported	142,522.00	23.29
Not Supported	116,624.00	19.06
Subtotal	259,146.00	42.35
TOTAL	611,851.00	100.00

For Tables 3 and 4, the overall support and attainment of the goals of the Act is based upon "total waters." The EPA requires all states to report their attainment of the goals of the Act based on total waters. However, Oklahoma's environmental agencies do not agree with total water reporting because of the under representation of the status of its waters. It would be too cost prohibitive to assess all of the waters within the state. Therefore, all assessment work performed in the state is conducted in a manner that will best utilize available funding resources. For lake total water reporting, the acreage includes Natural

Resource Conservation Service (NRCS) (formally the Soil Conservation Service) assisted farm ponds. Oklahoma lists approximately 1,041,884 total lake acres for the state. Of this number, 330,000 acres comprise approximately 220,000 NRCS assisted farm ponds. These farm ponds are not included in EPA's total water database. Although not considered as "significant lakes," the state considers them as important natural resources for the agricultural and rural communities. These farm ponds provide a significant amount of water for livestock, a source of primary recreation for many, used as flood control devices, sediment catchments, and add to the recharge of groundwater aquifers.

Canals, laterals and wetlands

Canals, laterals and most all of the wetlands have not been assessed for the goals of the CWA nor have they been assessed for their beneficial uses. Canals and laterals are manmade water courses and have not been included in the Appendix A of the WQS. By default, these waters would be assigned primary protection under the 1994 WQS (OWRB, 1994). Due to a lack of funding, no assessment projects have been initiated on these types of waterbodies. Wetlands have not been assigned WQS and therefore fall under the same scenario as canals and laterals. There have been several projects and ventures initiated to inventory the wetlands within the state, but little or no assessment work done.

Percent of Assessed Water in the State

Table 5 lists the percent of waters assessed within the state.

TABLE 3. CLEAN WATER ACT GOALS FOR TOTAL RIVER AND STREAM MILES

	FISHABLE AND SWIMMABLE GOALS	
	MILES	PERCENT
CWA GOAL SUPPORTED		
Fully Supported	923.21	1.17
Fully Supported but Threatened	2,983.96	3.78
Subtotal	3,907.17	4.95
CWA GOAL NOT SUPPORTED		
Partially Supported	5,585.06	7.08
Not Supported	1,750.82	2.22
Subtotal	7,335.80	9.31
NOT ATTAINABLE	0.00	0.00
UNASSESSED WATERS	67,535.03	85.72
TOTAL	78,778.00	100.00

TABLE 4. CLEAN WATER ACT GOALS FOR TOTAL LAKE ACRES

	FISHABLE AND SWIMMABLE GOALS	
	ACRES	PERCENT
CWA GOAL SUPPORTED		
Fully Supported	100,430.00	9.64
Fully Supported but Threatened	252,275.00	24.21
Subtotal	352,705.00	33.85
CWA GOAL NOT SUPPORTED		
Partially Supported	142,522.00	13.68
Not Supported	116,624.00	11.19
Subtotal	259,146.00	24.87
UNASSESSED WATERS	430,033.00	41.27
TOTAL	1,041,884.00	100.00

TABLE 5. PERCENT OF ASSESSED WATERBODIES WITHIN THE STATE

SUPPORT STATUS	RIVER AND STREAMS		LAKES	
	MILES	PERCENT	ACRES	PERCENT
Fully Supported	923.21	8.21	100,430.00	16.41
Fully Supported but Threatened	2,983.96	26.54	252,275.00	41.23
Partially Supported	5,585.06	49.67	142,522.00	23.29
Not Supported	1,750.82	15.57	116,624.00	19.06
TOTAL	11,243.05	100.00	611,851.00	100.00

The water quality data used in this report was collected by the Department, the Conservation Commission, the Department of Wildlife Conservation, the Water Board, the United States Geological Survey, the Corporation Commission, and citizens of the state. The data used in this report came from the *Toxics Monitoring Survey of Oklahoma Reservoirs* (OSDH, 1995), *Nonpoint Source Pollution Assessment Report (Section 319(h))* (OCC, 1988, 1991), Clean Lakes Programs (Section 314) (OCC & OWRB), *Lake Water Quality Assessment Report* (OCC & OWRB, 1994), statewide ambient trend monitoring network, intensive and rapid bio-assessment surveys, fish and wildlife kill reports, spill reports, citizen complaints, and citizens of the state.

Major factors affecting overall use support

The major factors affecting the overall use support of the waters of the state were from the following causes: impacts from treated and untreated domestic wastewater discharges (e.g., lowering of dissolved oxygen levels and elevated levels of total suspended solids); impacts from treated and untreated industrial wastewater discharges (e.g., heavy metals, acids, and toxic chemicals); runoff from agricultural practices (e.g., pesticides, herbicides, fertilizers, soil erosion, and animal waste); runoff from construction (e.g., soil erosion); runoff from urban dwellings (e.g., fertilizers, herbicides, pesticides, soil erosion, and trash); oil field activities (e.g., crude oil and saltwater spills, mud, and soil erosion);

hydromodification projects; and illegal dumping of trash, saltwater from oil production, toxic waste chemicals, and other deleterious substances into the environment.

All unlisted waters, not included in Appendix A of the WQS, are assumed to have the beneficial uses consistent with the CWA's primary protection requirements. Under § 785:45-5-3.(a)(3) and (4) of the WQS, an Use Attainability Analysis (UAA) is performed on an unlisted stream to determine its beneficial uses "prior to regulatory activity which affects the water quality of a specific unlisted water." All "beneficial use determinations are subject to administrative proceedings including the public hearing process" (OWRB, 1994). Appendix A of the 1994 WQS added an additional 134 waterbodies to its list.

After an UAA has been performed on a selected stream, a Wasteload Allocation (WLA) or a Total Maximum Daily Load (TMDL) can be determined for permitting purposes. Currently, the Department develops draft National Pollutant Discharge Elimination System (NPDES) permits for the control and abatement of municipal and industrial pollution. EPA Region 6, jointly with the Department, issues the final NPDES permit for municipalities and industrial dischargers. Permit compliance is monitored by both the discharger and inspectors for the Department.

The Department is in the final stages of obtaining authority, from EPA, to administer the industrial and municipal wastewater discharge programs. This will help contribute to further economic development by benefiting businesses, industries and municipalities by eliminating duplicative programs and rules effecting their wastewater discharges. In addition, having these programs will aid in the efforts to attract new industry to the state by simplifying the process for obtaining industrial wastewater discharge permits.

The Department has been actively pursuing and preparing for the assumption of the National Pollutant Discharge Elimination System (NPDES) program since 1993. After two years of written revisions to required program documents, rule and statue changes, the Department submitted its formal application to EPA Region 6 office in Dallas, Texas, on June 10, 1996.

Since the inception of the CWA and amendments to it in 1972, EPA has administered the NPDES program. Previously, functions related to wastewater management were found in the OSDH and Water Board. This scattering of similar programs across the two agencies was not conductive to the State taking over the federal NPDES program. The OSDH had jurisdiction over municipal wastewater discharges while the Water Board administered the industrial facilities. Although both agencies considered pursuing NPDES program assumption for their respective programs, it was not until the DEQ's formation that the program assumption could actually be perused.

Once final approval is given, Oklahoma will assume the following programs from EPA: industrial and municipal wastewater discharges, sewage sludge, pretreatment, toxics reduction and by July 1997, storm water. The DEQ will permit, review for compliance and enforce the requirements related to these programs.

GROUNDWATER QUALITY

The goals of the CWA and the Safe Drinking Water Act (SDWA) establish that the nation's groundwater be free of harmful levels of contaminates and sets national standards for drinking water. Several state agencies are involved in the protection of Oklahoma's groundwater. These include the Department, Oklahoma State Department of Agriculture (Agriculture Department), the Corporation Commission, Conservation Commission, and the Water Board. The Department is designated as the lead agency for the Wellhead Protection Program (WHPP).

There are instances of man induced groundwater pollution in the state. Thus far they appear to be isolated instances and not general contamination of groundwater drinking water supplies.

PART II: BACKGROUND

DIVERSITY & ECOLOGY

Oklahoma is a diverse state in its ecology, geology, hydrology, and its rainfall. Oklahoma is comprised of the following ecoregions: Arkansas Valley, Boston Mountains, Central Great Plains, Central Irregular Plains, Central Oklahoma/Texas Plains, Flint Hills, Ouachita Mountains, Ozark Highlands, South Central Plains, Southwestern Tablelands, and Western High Plains. These ecoregions range from short grass prairies to Loblolly Pine (*Pinus taeda*)/Short-leaf Pine (*P. echinata*)/Oak (*Quercus spp.*) mixed community.

The latitude and longitude coordinate for the corners of the state, excluding the Panhandle are: Southeast 033°38'15"/ 094°29'08"; Northeast 036°59'54"/094°37'04"; Southwest 034°33'38"/100°00'00"; and Northwest 037°00'00"/100°00'00". The coordinates for the Panhandle are: Southeast 036°30'00"/ 100°00'00"; Northeast 037°00'00"/100°00'00"; Southwest 036°30'00"/103°00'00"; and Northwest 037°00'00"/103°00'00". Oklahoma runs approximately 481.51 miles east to west and 230.16 miles north to south. The surface area of Oklahoma occupies approximately 69,919 square miles or 44,000,000 acres. Oklahoma varies in its elevation from its lowest point of 287 feet above sea level on the Little River in Mc Curtain County on the border with Arkansas to its highest point of 4,973 feet above sea level, near Black Mesa in Cimarron County on the border with New Mexico. There are ten major geologic provinces in Oklahoma with the Northern Shelf Areas being the largest (Figure 1) (Oklahoma Geological Survey, 1972). Oklahoma is composed of 77 counties with Osage being the largest (Figure 2). Basic statistics on Oklahoma can be found in Table 6.

Oklahoma runs approximately 481.51 miles east to west and 230.16 miles north to south ... and occupies approximately 69,919 square miles or 44,000,000 acres

CLIMATE

Oklahoma has a continental type of climate. There are pronounced seasonal and geographical ranges in both temperature and precipitation. Average annual temperature varies from 53.6°F in the western part of the Panhandle up to 63.8°F in the southeast part of the state. Annual rainfall varies from approximately 17 inches in the far western part of the Panhandle to over 55 inches per year near the LeFlore County/McCurtain County/Arkansas border. The average growing season varies from 180 days in the Panhandle to 240 days in the southeast corner. Typically, 75% of Oklahoma's annual precipitation falls during the growing season.

Much of Oklahoma's original plant and some animal species are either extinct or are greatly reduced in their distribution. The reduction in native vegetation is mainly due to cultivation, overgrazing, timber cutting, and erosion (Gray, 1959). There are approximately 2,540 species of plants (Taylor, 1991), 81 species of reptiles (Secor, 1984), 53 species of amphibians, 101 species of mammals (ONHI, 1992), 400 species of birds (Wood, 1984), and 175 species of fish (Cashner, 1988). Agriculture is the number one land use business in the state. Wheat is the number one cash grain crop grown in Oklahoma. Wheat is valuable during the winter as pasture feed for cattle, sheep and dairy stock. Other important grain crops for the state include fall and spring oats, barley, rye, sorghum and corn. In addition, fruits, vegetables, cotton, and timber all constitute a significant source of income for the state (Gray, 1959). Other important agricultural land use practices include cattle, dairy stock, sheep, poultry, and select exotics (e.g., llamas and ostriches).

Wheat is the number one cash grain crop grown in Oklahoma.

Information contained in Table 6 came from a variety of sources including the 1990 Oklahoma Census, United States Geological Survey data, the Water Board data, Oklahoma Water Atlas, Reach File 3/Digital Line Graph Data, ground surveys, the Wildlife Department, United States Fish and Wildlife Service, and planimeter data. For the lakes information, Oklahoma uses the information from the *Oklahoma Water Atlas*. Oklahoma's environmental agencies feel that the information contained in the *Oklahoma Water Atlas* better represents the total of lakes and lake acres contained within the state. For the

remaining rivers, creeks, canals and laterals we will be using a combination of sources for our data.

The total of fresh-water wetland acres was derived from information obtained from the Wildlife Department and United States Fish and Wildlife Service reports *Riparian Areas of Western Oklahoma* and *Bottomland Hardwoods of Eastern Oklahoma*. These reports contain information on 58 of the 77 counties in the state. The information in Table 6 was derived from taking the total of the largest most recent estimate for each county listed in the two reports. This total underestimates the actual number of wetland acres for the state and should be used with extreme caution when making comparison or trend analysis on Oklahoma's loss of wetlands.

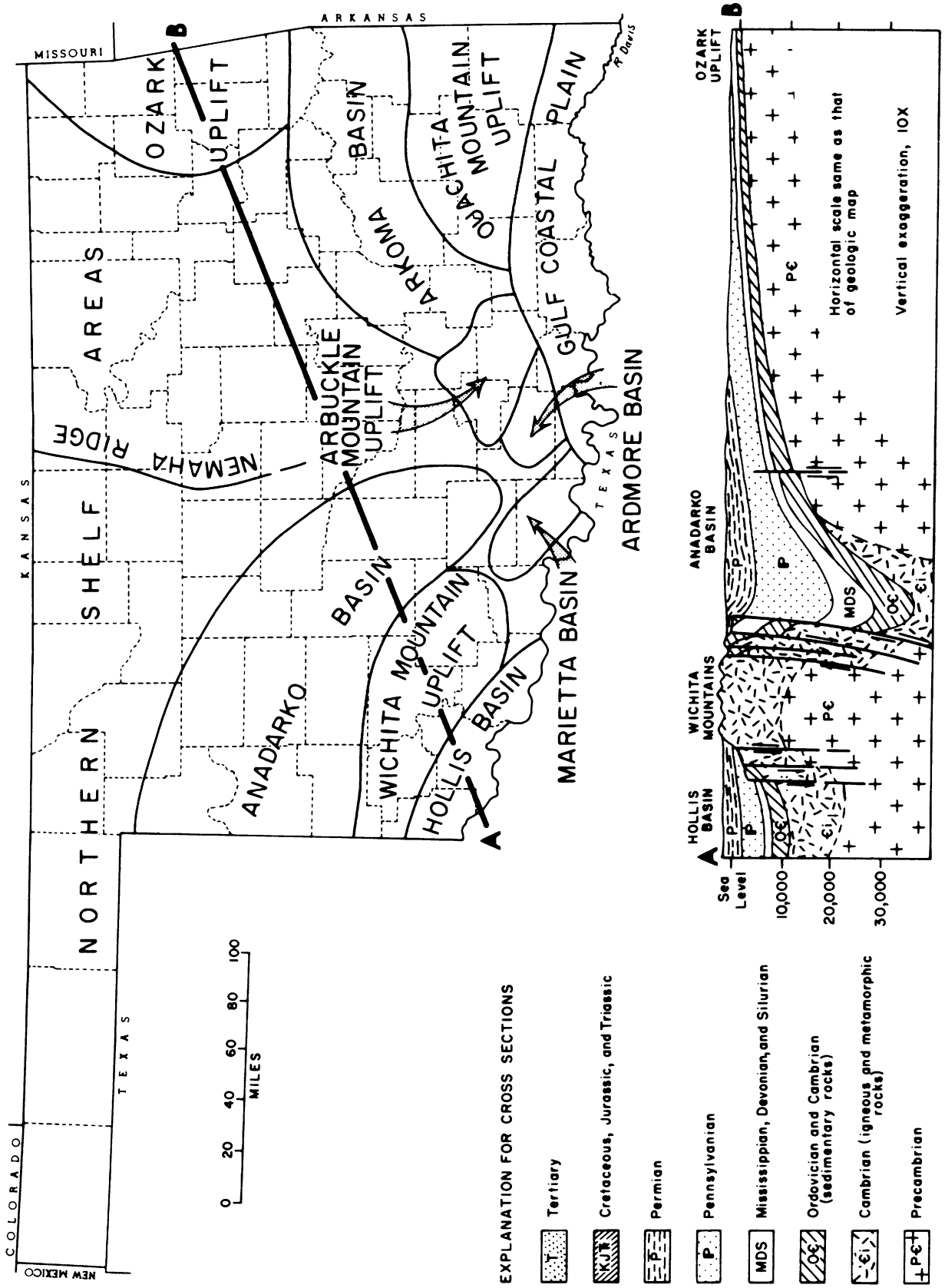

FIGURE 1. MAJOR GEOLOGIC AND TECTONIC PROVINCES OF OKLAHOMA

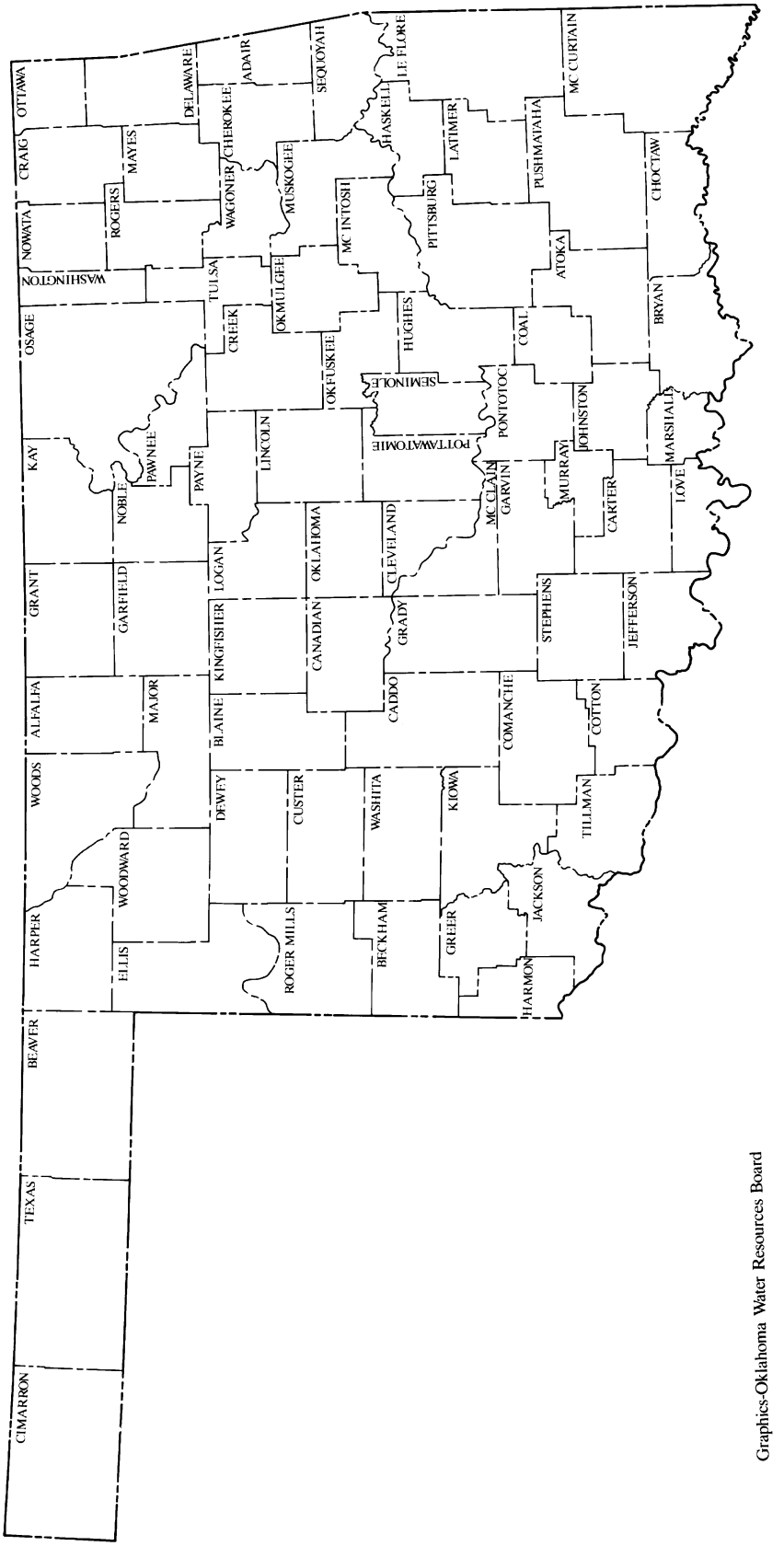

FIGURE 2. MAP OF OKLAHOMA SHOWING COUNTY BOUNDARIES

TABLE 6. ATLAS OF OKLAHOMA

State Population†	3,145,585
State Surface Area††	69,919
Number of Major Watershed Basins	7
Total Number of River and Stream Miles‡	78,778
Number of Perennial River and Stream Miles‡	22,386
Number of Intermittent Stream Miles‡	55,413
Number of Canals or Ditches‡	175
Number of River Border Miles†††	517
Total Number of Lakes/Reservoirs/Playa/Ponds‡‡	224,948
Number of Major Lakes‡‡	34
Number of Public & Private Lakes‡‡	2,303
Number of Watershed Protection Lakes‡‡	1,964
Number of Playa Lakes (wet season only)‡‡	585
Number of Oxbow Lakes (≥ 10 Acres)‡‡	62
Number of Farm Ponds (Soil Conservation Service assisted)‡‡	220,000
Total Number of Lakes/Reservoirs/Playa/Ponds Acres‡‡	1,041,884
Major Lake Acres‡‡	555,450
Public & Private Lake Acres‡‡	89,836
Watershed Protection Lake Acres‡‡	54,261
Playa Lakes Acres‡‡	9,572
Oxbow Lake Acres‡‡	2,765
Farm Pond Acres‡‡	330,000
Total Number of Freshwater Wetland Acres‡‡‡	733,895

† 1990 Census
†† Based upon United States Geological Survey information
††† Water Board Data
‡ Reach File 3/Digital Line Graph Data
‡‡ Oklahoma Water Atlas, 1990
‡‡‡ Estimates compiled from the Wildlife Department & U.S. Fish & Wildlife Service

WATER POLLUTION CONTROL PROGRAMS

Watershed Approach Development

The myriad and complex water quality problems remaining today require a more comprehensive approach to find workable and effective solutions. As we continue to have success reducing impacts from point sources, pollution from nonpoint sources takes on more significance. Non-traditional concerns such as habitat degradation and conservation of biological diversity also call for a comprehensive approach.

The watershed approach provides such a management framework. Utilizing support from the 104(b)(3) program, Oklahoma has taken the first steps to implement the watershed approach for water quality management in the state. The following accomplishments have been achieved:

- A Whole Basin Planning Approach Working Group has been established to coordinate planning and implementation of the watershed approach in Oklahoma. Representatives of the various state and federal agencies with a role in water quality management are represented on the Working Group. Six technical committees have been established to concentrate on specific tasks.
- A cooperative project with USGS produced a new digital elevation model and digital watershed maps for the state. Existing 8-digit cataloging units were subdivided into 11-digit watersheds. These watershed maps will be the basis for the

state program. The maps have been published on CD-ROM and are available to all agencies and the public.

- Utilizing the new watershed boundaries, the Working Group has delineated 11 Watershed Management Units that will be used to implement the watershed approach. The intent is that planning, monitoring, permitting, and other water quality programs will be coordinated and organized at this scale when the watershed approach is fully implemented. See appendix 10
- Accurate locational data on all dischargers has been gathered using the Global Positioning System. These data have been built into a GIS-compatible format for analysis. Links to permitting and monitoring data in the PCS system have been established for analysis and assessment purposes.
- A survey of government entities represented on the Working Group has been distributed to identify existing water quality related data in a format that can be used in a GIS system. A directory of these data sources will be established.
- A technical committee has been established to develop an implementation plan to utilize the new Watershed Management Units and watershed boundaries in the various reporting and planning programs. Water Quality Standards, the 303(d) list, the 208 Plan, and the 305(b) Report have been targeted for this effort.
- The Whole Basin Planning Approach Working Group is continuing to develop the framework document and coordinate other tasks leading up to the production of the first watershed management plans.

Water Quality Standards Program

Oklahoma's WQS are set forth under statutory authority of the Water Board authorized under 82 O. S. 1981, § 926.1 through 926.13. Under these statutes, the Water Board "is required to set water quality standards which are practical and in the best public interest and to classify the state's waters with respect to their best present and future uses. These WQS are designed to enhance the quality of the waters, to protect their beneficial uses, and to aid in the prevention, control and abatement of water pollution in the State of Oklahoma" (OWRB, 1994). The WQS have established standards for all of Oklahoma's waters. Certain waters, such as lakes and waters named in Appendix A of the WQS, receive protection through designated beneficial uses. Appendix A of the 1994 WQS added an additional 134 waterbodies to its list.

Oklahoma defines all waters of the state to mean "all streams, lakes, ponds, marshes, watercourses, waterways, wells, springs, irrigation systems, drainage systems, and all other bodies or accumulations of water, surface and underground, natural or artificial, public or private, which are contained within, flow through, or border upon this state or any portion thereof [O.S. 82: § 926.1(6)]. Publicly owned lakes are considered waters of the state, but public access is required before federal Clean Lakes funds are pursued.

During the 1993 interim WQS revision, Oklahoma recommended that primary protection uses be assumed for all unlisted surface waters and that waters once classified as "industrial cooling waters" also be included in the definition of waters of the state.

The latest revisions to the WQS includes modification of aquatic life standards to allow determination of site specific acute and chronic criteria. Translators for metalloids and metals to convert Oklahoma’s statewide total criteria to statewide dissolved criteria are provided in OAC 785;45-5-12(e)(6). Appendix E of WQS specifies how water effects ratios and dissolved to total translators will be used to obtain site specific criteria.

Arsenic and mercury criteria have recently been revised. The water column numerical criterion for arsenic to protect human health was changed to 205μg/L. The water column

numerical criterion to protect human health for fish and water consumption was revoked. Human health criteria for mercury were also revised. Both the raw water numerical criterion for the consumption of fish flesh and water and the criterion for the consumption of fish flesh were lowered by about an order of magnitude.

Minimum criteria for chlorides, sulfates, and total dissolved solids were included in Oklahoma's WQS. This allowed for implementation to protect the Agriculture beneficial use.

Progress has been made toward the inclusion of biocriteria into Oklahoma's WQS. Candidate reference streams have been selected in the Ouachita Mountain ecoregion. Previous work has determined reference taxa for this ecoregion and these lists are currently being validated through thorough stream assessments. It is anticipated that, after consultation with the Biocriteria Technical Working group and completion of the stream assessments, some form of biological criteria will be in place for this ecoregion. Plans are being formulated for the development of biocriteria for the remainder of the state over the next several years. It is anticipated that enforceable biocriteria will not be incorporated into the standards before the year 2010.

Point Source Control Program

Oklahoma's point source pollution control programs are administered and carried out by the Department. The Department is responsible for developing draft permits which are then sent to the EPA Region 6 for final permit issuance. The Department administers both municipal and industrial dischargers and issues permits jointly with EPA. The Department is responsible for monitoring the dischargers to ensure compliance with permit limitations and conditions as well as to receive and review the permittee's self-monitoring data.

For industrial dischargers, the Department relies on a two-step process for permit development. In the first step, minimum treatment level standards, based on the industry type, are established. These are termed "technology-based limits." The technology-based limits are evaluated to determine if a potential exists to violate the WQS. If the potential exist to violate the WQS, then more stringent "water quality" based limits will be selected for use in the permit.

Each permit specifies both monitoring and reporting requirements for the facility. The permit gives the effective dates of limits, parameters to be tested, applicable limits for each parameter, frequency of analysis, and sample type of monitoring. Monitoring results are summarized on a monitoring report form and submitted to the Department according to the schedule in the permit. All Discharge Monitoring Reports (DMR) and reports from the permittee are reviewed and violations noted. The permittee's compliance is tracked using the Permit Compliance System (PCS). The administrative staff utilize violation review criteria to screen for significant violations. This screening process assures that limited enforcement resources concentrate on the most significant violations. The following criteria are used to identify significant violations:

- Two or more excursions of 40% or more for inorganic and oxygen demanding pollutants during a six-month period.
- Two or more excursions of 20% or more for toxic pollutants during a six-month period.
- Non-reporting violations.
- Chronic violations, any violation of any monthly effluent limit for any four or more months in a six month period.
- Any effluent violation that causes or has potential to cause a water quality or human health problem.

- Permit schedule violations.
- Violations of enforcement orders
- Any unauthorized bypass, unpermitted discharge, or pass through of pollutants which may cause a water quality or human health problem.
- Construction or modification of sewage treatment works, Publicly Owned Treatment Works conveyance system or industrial wastewater impoundment, without a permit.

The criteria used for determining significant violations is based on the EPA's current policy used to evaluate all major and minor permits under the Department's jurisdiction.

Quality assurance strategies are used by the Department to ensure that industries comply with their permit. Field inspections are conducted on a regular basis with samples of the discharge collected for analyses. The Customer Assistance Division maintains the laboratory certification program. This program assures that industries follow all Quality Assurance and Quality Control methods when analyzing their effluent samples. All permits require that all analyses used to determine permit compliance be performed by a DEQ certified lab.

The Department routinely downloads ambient trend monitoring data from EPA's STORET database. The data values are compared to the WQS numerical criteria to determine if any violations have occurred. If a violation is detected, then all upstream discharger(s) is/are identified and a review of their DMR(s) is conducted to find if there is any correlation(s) to the violation.

The Department issues permits through a joint permitting venture with the EPA Region 6. The permits are written by the Department and sent to the EPA for approval. The limits for the permits are "water quality based" and are designed to protect the beneficial uses of the receiving stream. All permits are tracked through the state's Water Quality Management Plan. The plan is updated as needed. The updates to the Plan occur on a regular basis with the last full annual update to the Plan being in 1984.

Each permit is written for a single facility. Most facilities have only one discharge; however, some do have multiple discharges. The information found in each permit includes: latitude and longitude or legal description for the facility and/or its point of discharge; effective date(s) of the permit; limits; self-monitoring frequency and sampling type for each discharge point; etc.. In addition, the permit also requires the permittee to prepare and submit monthly Discharge Monitoring Reports which gives a summary of the results of the self-monitoring. The Discharge Monitoring Reports are submitted to both the EPA and the Department.

All Discharge Monitoring Reports from the permittee are reviewed with violations being noted. The permittee's compliance is then tracked using the PCS (an EPA computer database system). The Department screens the DMR for significant violations. This screening process allows the Department to concentrate its funding where it is needed most.

Quality Assurance/Quality Control practices are used by the Department to ensure that publicly owned treatment works are complying with permit conditions. Regular inspections of publicly owned treatment works facilities are conducted by the Department and/or the EPA inspectors with samples of a facility discharge collected for analysis. The

Department requires that all operators and laboratory technicians of publicly owned treatment works be properly trained and certified.

Nonpoint Source Control Program

The Conservation Commission serves as the lead technical agency for the nonpoint source control program. The program is a cooperative effort of state, federal and local agencies. Some of these agencies include the Conservation Commission, the Department, the Agriculture Department, the Water Board, local conservation districts, and local land owners. The management programs identify the state, federal and local agencies with responsibilities relative to the nonpoint source of pollution in question and outline a plan of action to reduce or eliminate those source.

There are two basic classes of BMPs: 1) practices that reduce the pollutants available for transport by the normal rainfall/runoff process (management practices), and 2) devices that reduce the amount of pollutants in the runoff before it is discharged to a surface water body (structural practices).

The NRCS maintains a list of codes which are widely recognized when referring to specific BMPs and those which are applicable to the various categories are included as a reference base. BMPs contained in the NRCS list are primarily directed towards the prevention of erosion in agricultural areas; however, they are also applicable to many other NPS areas. There are a number of BMPs which are not contained in the NRCS listing and the fact they are not listed here does not preclude them from use in NPS projects.

The two main categories of BMPs can be broken down into the following seven general categories:

1. Detention Basins -- The term detention applies when the runoff is temporarily stored, and apart from relatively minor incidental losses due to evaporation or percolation, is subsequently discharged to a surface water. Control results from a reduction in pollutant concentrations due to settling during the period that the runoff is detained.
2. Retention Devices -- The term retention applies when runoff is permanently captured so that it is never discharged directly to a surface water. The usual mechanism by which storm-water controls permanently capture surface runoff is by infiltration. These techniques are often referred to as infiltration BMPs.
3. Vegetative Controls -- Vegetative controls provide contact between storm-water runoff and vegetated areas and accomplish pollutant removal by combination of filtration, sedimentation and biological uptake that reduce pollutant concentrations, and/or by a reduction in runoff volume due to infiltration or evapo-transpiration. Vegetative controls are particularly effective in reducing erosion from runoff across disturbed sites or road bar ditches.
4. Source Controls -- Source control techniques include any practice that either 1) reduce the amount of accumulated pollutants on the land surface available for runoff by rainfall, or 2) regulate the amount of impervious area to reduce the portion of rainfall that will appear as runoff, or 3) exclude inappropriate discharges to storm drains.
5. Discharge Management -- This BMP category refers specifically to the hydrostructure/tailwater category. Under this BMP, impoundment discharge is managed so that the power of discharge water is kept to a minimum and the quality of water is kept at a maximum. This includes aeration of tailwater or other measures which increases dissolved oxygen levels in tailwater areas.
6. Grade Stabilization -- Grade stabilization refers to any of several different practices used to stabilize areas where rapid runoff of storm-water results in erosion. These

can be either temporary or permanent and are generally used in drainage ways where the slope exceeds five percent.

7. Stream Bank Protection -- Stream bank protection refers to the practices used to maintain banks by preventing bank scouring, caving, and gullying. This category includes stream channel stabilization and in-stream structure for water quality control.(OCC, 1993)

The Conservation Commission will perform pre- and post-implementation monitoring to gauge the success of its projects. The Conservation Commission is working toward a goal of 70 percent cooperative participation by local landowners.

The Conservation Commission is working toward solving the nonpoint source pollution problems in the Illinois River Basin. The agencies involved in this project are the Conservation Commission, the Agriculture Department, the Scenic Rivers Commission, the Cooperative Extension Service, the NRCS, and the Agricultural Stabilization and Conservation Service. The project objectives are to 1) implement BMPs in those watersheds with the most significant water quality problems, 2) identify control measures to decrease nutrient loading in the watershed, 3) transfer information from successful demonstration projects to other watersheds, and 4) create a management program to coordinate all aspects of watershed remediation. The goal of this project is to improve the water quality of the Illinois River Basin. The Implementation Program will be divided into five working components. These five components are 1) development of a comprehensive watershed management program, 2) demonstration projects, 3) education, 4) monitoring, and 5) technical assistance.

The Agriculture Department has authorities under the Oklahoma Feed Yard Act to enforce regulations governing the owners and/or operators of concentrated confined animal feeding operations. This Act requires all animal wastes and wastewaters from such operations be held in a total retention system preventing its discharge to the waters of the state and that waste generated in these operations be disposed of in a proper manner. This Act was designed to prevent and abate pollution from entering and contaminating any surface or groundwater. Under this Act, the Agriculture Department is required to conduct inspections of these operations as well as investigate any complaint filed against an operations. The Agriculture Department can take regulatory action against a violator as deemed necessary.

The Agriculture Department has authorities under the Oklahoma Fertilizer Law to enforce the proper handling and storage of commercial fertilizers. The Agriculture Department licenses all bulk fertilizer storage facilities and oversees the application of bulk fertilizer use. This law is designed to prevent and abate the pollution of surface and groundwater within the state. Under this law, the Agriculture Department has the authority to conduct routine inspections of bulk storage facilities as well as investigate complaint received on a facility. The Agriculture Department can take regulatory action against a violator as deemed necessary.

The Agriculture Department has authorities under the Oklahoma Pesticide Applicator Law and the Oklahoma Pesticide Law to enforce the proper handling, storage, and use of commercial pesticides. These laws give the Agriculture Department authority to mandate regulations for the use of pesticides, how they are to be stored, and who can purchase them for application. These laws are designed to prevent or abate pollution of the waters of the state. Under these laws, the Agriculture Department must conduct routine inspections and investigates complaints on all facilities or individuals who store, sell, or apply pesticides.

The Agriculture Department can take regulatory action against a violator as deemed necessary.

There are other nonpoint source projects which effect either a specific watershed area or are statewide projects which will effect several waterbodies. In addition, there are projects planned in other areas of concern other than agriculturally related problems. Continuation of this program is dependent largely on federal grant support.

Superfund Program

The Resource Conservation and Recovery Act (RCRA) of 1976 was the nation's first comprehensive hazardous waste management law. This law created a regulatory system that governed the treatment, storage, and disposal of hazardous waste. During the early phases of implementation, it became apparent that RCRA lacked the mechanism necessary to address historical hazardous waste problems.

Background

The lack of ability to address historical hazardous waste problems resulted in the formation of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund) of 1980. This act created a large scale national program to identify and clean up sites contaminated from historical hazardous waste problems and whose owners were no longer available or financially solvent to pay for the clean up, or whose owners where no longer around. The term "Superfund" was coined to describe the source of funding for this program. Funding for remedial action is obtained from a national revolving fund. The fund obtained its monies through taxes paid on chemical feedstocks used in the manufacture of chemical products which are likely to become hazardous waste. Superfund also established a mechanism to recover cleanup costs from potentially responsible parties. CERCLA was last amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986.

Oklahoma's Superfund Program

The Department's Superfund Program conducts and oversees pre-remedial and remedial activities on several Superfund sites. The Oklahoma Superfund Program relies on federal monies awarded through a cooperative agreement with EPA. There are ten sites in Oklahoma which are on the EPA National Priority List (NPL). The NPL ranks sites for clean-up based on the actual or potential risks posed to human or the environment. Additional pre-remedial and remedial activities at non-NPL sites are being addressed by the Department’s Voluntary Cleanup Program (Brownfields). Refer to Table 7, "Superfund, NPL, and Non-NPL Sites Impacting on Groundwater and Surface Water" for a complete listing of the sites within Oklahoma.

TABLE 7. SUPERFUND, NPL, AND NON-NPL SITES IMPACTING ON GROUNDWATER AND SURFACE WATER.

SITES	LEGAL	COUNTY	CONTAMINANT OF CONCERN	GROUNDWATER IMPACTED (YES/NO)	SURFACE WATER IMPACTED (YES/NO)
Tar Creek Mining Activities	R24E T29N S16-21 R24E T29N S28-32 R23E T28N S06-07 R23E T28N S18-19 R23E T28N S30 R22E T28N S01 R22E T28N S12-13 R22E T28N S24-25 R22E T28N S30	Ottawa	Acid Water Cadmium Iron Lead Sulfates Zinc	Boone Aquifer Yes Roubidoux Aquifer, (to be determined)	Tar Creek Yes
Sand Springs Petrochemical Complex Refinery/Solvent Recycling	R11E T19N S13-14	Tulsa	Volatile Organic Compounds	Arkansas River Alluvium Yes	Arkansas River (receives discharges but no identifiable impacts)
Compass Municipal Landfill	R12E T19N S18	Tulsa	Benzene Bleaches Caustics Jet Fuel PCBs Pesticides Solvents	Not Applicable	Arkansas River No
Hardage-Criner Industrial Landfill	R04W T06N S24	McClain	Acids Alcohols Caustics Metals Pesticides Solvents	North Criner Creek Alluvium Yes	North Criner Creek Yes
Tenth Street Salvage Yard	R02W T12N S31	Oklahoma	PCBs	North Canadian Alluvium No	Not Applicable
Tinker AFB Aircraft Maintenance	R02W T11N S14 R02W T11N S23	Oklahoma	Organic Solvents (TCE) Chromium Petroleum Fuels	Garber-Wellington Aquifer Yes	Soldier Creek Yes
Fourth Street Refinery	R03W T12N S36	Oklahoma	Lead Oily Sludges BTEX	Garber-Wellington Aquifer Yes North Canadian Alluvium Yes	Not Applicable

SITES	LEGAL	COUNTY	CONTAMINANT OF CONCERN	GROUNDWATER IMPACTED (YES/NO)	SURFACE WATER IMPACTED (YES/NO)
Mosley Road Landfill Municipal Landfill	R02W T12N S21	Oklahoma	Volatile Organic Compounds	Garber-Wellington Aquifer Yes North Canadian Alluvium Yes	North Canadian River (receives discharges from alluvial aquifer but discharges are cleaner than river)
Double Eagle Refinery Refinery	R03W T12N S35	Oklahoma	Lead Oily Sludges BTEX	Garber-Wellington Aquifer Yes North Canadian Alluvium Yes	Not Applicable
Oklahoma Refining Co Refinery	R09W T05N S18-19	Caddo	Metals VOCs Petroleum Organics Aromatic Hydrocarbons	Rush Springs Aquifer Yes	Gladys Creek Yes
Kerr-McGee Cushing Refinery Refinery	R05W T18N S22&27	Payne	Acid Oil Sludge Heavy Hydrocarbons	Unconfined Aquifer Yes Vamoosa-Ada Aquifer No	Skull Creek Yes
Kerr-McGee Cleveland Refinery Refinery	R08E T21N S18	Pawnee	Petroleum Coke Asbestos Acid Sludges	Cedar Creek Alluvium Yes Vamoosa-Ada Aquifer Yes	Cedar Creek Yes
Blackwell Zinc Smelter	R01W T27N S21	Kay	Metals	Chikaskia River Alluvium Yes	Not Applicable
National Zinc	R12E T26N S11	Washington	Metals	Not Applicable	Unnamed tributary of Eliza Creek Yes
Federated Metals Smelter	R11E T19N S10	Tulsa	Metals	No	No
Ozark Mahoning Company Manufacturing	R12E T19N S08	Tulsa	Phospho-gypsum	No	Arkansas River

SITES	LEGAL	COUNTY	CONTAMINANT OF CONCERN	GROUNDWATER IMPACTED (YES/NO)	SURFACE WATER IMPACTED (YES/NO)
Duncan Refinery Refinery	R7W T1S S32	Stephens	Hydrocarbons	Garber-Wellington Yes	Claridy Creek Yes
Sinclair Topping Plant	R5E T22N S23	Payne	Metals Semi-volatiles	Vanoss Yes	Skull Creek
Collinsville Smelter Smelter	R14E T22N S32	Tulsa	Metals	No	No
U.S. Zinc Company Smelter	R13E T11N S6	Okmulgee	Metals	No	No
Kusa Smelter Smelter	R13E T11N S3	Okmulgee	Metals	No	No
National Institute for Petroleum Research Research Laboratory	R12E T26N S2,11,12	Washington	Metals Hydrocarbons	No	No
Coltec, Inc. Manufacturing	R13E T11N S3	Sequoyah	Solvent (PCE)	Boggy Formation	No
Oklahoma Ordinance Works Authority	R19E T20N S3	Mayes	NA	NA	NA
Clinton-Sherman Industrial Airpark Airbase	R19W T10N S10-11 R19W T10N S14-15	Washita	Trichloro-ethane (TCE)	Elk City Sandstone Aquifer Yes	Not Applicable

COST/BENEFIT ASSESSMENT

The citizens of this state demand a safe environment in which to live. We take for granted the availability of clean, safe, adequate drinking water, clean air, inexpensive and convenient solid waste disposal, adequately maintained wastewater treatment facilities, and an aesthetically pleasing natural environment for recreation. The mechanisms for providing a clean and safe environment are divided among the federal, state, and municipal/local governments. It is therefore difficult to obtain an accurate estimate of the cost of water pollution control efforts.

Cost Information

A portion of the costs of water pollution control, on an annual basis, can be obtained by looking at funding received under the CWA. Table 8 provides this information for Fiscal Years 1996 and 1997:

TABLE 8. FEDERAL CLEAN WATER ACT AND STATE MATCHED FUNDING RECEIVED DURING FISCAL YEAR 1996 AND 1997

GRANTS	FEDERAL MONIES	STATE MONIES
FY 1996		
104(b)(3) Special Projects	$301,175.00	$15,853.00
106 Water Pollution Control - Surface	$716,475.00	$257,652.00
106 Water Pollution Control - Ground	$173,458.00	$0.00
205(g) Construction Management Assistance	$0.00	$0.00
314 Water Pollution Control - Lakes Restoration	$0.00	$0.00
319(h) Nonpoint Source Implementation	$1,569,600.00	$1,046,400.00
604(b) Water Quality Management Planning	$100,000.00	$0.00
Wetlands Protection	$277,000.00	$92,334.00
Total	$3,137,708.00	$1,412,239.00
Combined State/Federal Total		$4,549,947.00
FY 1997		
104(b)(3) Special Projects	$217,500.00	$11,447.00
106 Water Pollution Control - Surface	$721,040.00	$257,652.00
106 Water Pollution Control - Ground	$174,539.00	$0.00
205(g) Construction Management Assistance	$0.00	$0.00
314 Water Pollution Control - Lakes Restoration	$0.00	$0.00
319(h) Nonpoint Source Implementation	$1,569,600.00	$1,046,400.00
604(b) Water Quality Management Planning	$159,020.00	$0.00
Wetlands Protection	$284,855.00	$94,952.00
Total	$3,126,554.00	$1,410,451.00
Combined State/Federal Total		$4,537,005.00
Combined State/Federal Grand Total		$9,086,952.00

Table 9 list the cost of upgrades or installation of new municipal wastewater treatment systems. For the calendar years 1996 and 1997, there have been twenty (20) loan funding commitments for upgrades and or new systems for a total wastewater project cost of $76,353,839.77. This figure is inclusive of EPA funds and state funds provided through the State Revolving Fund (SRF) and does not include local dollars spent on operations cost, nor does it include financing through other state grant and loan funds.

TABLE 9. UPGRADED OR NEW INSTALLATION OF WASTEWATER TREATMENT PLANTS AND COLLECTION SYSTEMS DURING FY 1996 AND 1997

FACILITY/PROJECT	FEDERAL SHARE 83.33%	STATE SHARE	TOTAL COST
Upgraded Facilities			
Fairfax	$0.00	$882,000.00	$882,000.00
Owasso	$1,261,600.00	$258,400.00	$1,520,000.00
Ponca City	$15,504,400.00	$3,175,600.00	$18,680,000.00
Tulsa	$14,027,000.00	$2,873,000.00	$16,900,000.00
Rush Springs	$0.00	$605,150.00	$605,150.00
Broken Arrow	$2,340,600.00	$479,400.00	$2,820,000.00
Vinita	$0.00	$1,900,000.00	$1,900,000.00
Inola	$0.00	$625,000.00	$625,000.00
Muskogee	$11,712,960.00	$2,399,040.00	$14,112,000.00
Beaver	$0.00	$376,673.77	$376,673.77
Poteau	$0.00	$2,335,000.00	$2,335,000.00
Total	$44,846,560.00	$15,909,263.77	$60,755,823.77
New Facilities			
Pittsburg	$0.00	$105,000.00	$105,000.00
Helena	$0.00	$440,000.00	$440,000.00
Chandler	$0.00	$721,000.00	$721,000.00
Enid	$6,806,000.00	$1,394,000.00	$8,200,000.00
Locust Grove	$0.00	$1,835,000.00	$1,835,000.00
Geronimo	$0.00	$395,000.00	$395,000.00
Warner	$0.00	$177,016.00	$177,016.00
Checotah	$0.00	$3,025,000.00	$3,025,000.00
Perry	$0.00	$700,000.00	$700,000.00
Total	$6,806,000.00	$8,792,016.00	$15,598,016.00
Grand Total	$51,652,560.00	$24,701,279.77	$76,353,839.77

Benefit Information

Prior to the formation of the Department, the Pollution Control Coordinating Board had been assessing claims for wildlife or fish kills caused by known spills of pollutants. The Wildlife Department has and continues to use values set by the American Fisheries Society for assessing dollar amounts for all fish and/or wildlife kills. In most cases, the entity or

responsible party(ies) pays the state for all damages. For a complete listing of all fish and wildlife kills associated with pollution incidents refer to Appendix 1.

Special State Concerns and Recommendations

One of the primary concerns for the state is the contribution to water quality problems by nonpoint source of pollution. Oklahoma has an extensive and creative approach to nonpoint source of pollution control. Many of the sources of nonpoint source pollution are not considered hazardous by the majority of the population. The sources can be erosion of stream banks yielding excess sedimentation to streams and lakes, runoff from over fertilized croplands or pastures, runoff from lawns containing pesticides and fertilizers, and street runoff containing oil and grease. In addition, eastern Oklahoma has increasing numbers of poultry and swine production operations. There is concern regarding the generation of waste and its management. The nonpoint source Chapter describes some of the demonstration projects which are addressing these concerns. The agricultural and silvicultural nonpoint source management component required for 319 grant funding have been developed, approved by the EPA and implementation has begun. Additional management program components covering broader areas of concern have been developed and are currently under review. Once these management program components are approved, additional implementation projects can be started. Other nonpoint source concerns include acid mine drainage impacts on surface and groundwater, runoff from oilfield activities, abandoned refineries, rural roads, hydrostructures tailwaters, in place contaminants (i.e. underground storage tanks), industrial parks, on-site wastewater disposal systems, pollutants associated with recreation, and the effects of urban runoff.

Oklahoma has an active Wellhead Protection Program and the state has performed and is performing delineation of Wellhead Protection Areas for several municipalities. As a priority for the future, the state realizes the need to work closely with the municipalities to carry out source inventory surveys and assist with management and contingency plans for their groundwater based drinking water supplies.

The state has had a Water Quality Management Plan for several years, although it has been several years since its last update. Another of the state's priorities for the future is to develop an innovative and workable Water Quality Management Plan.

Many of the problems associated with point source of pollution have been addressed through the National Pollutant Discharge Elimination System. As a result, the majority of point source dischargers have been identified and are monitored for their permit compliance. The Department is working on refining its Total Maximum Daily Load process. This process will enable the state to better address pollution problems wile permitting future growth of industry.

PART III:

SURFACE WATER ASSESSMENT

CHAPTER ONE: SURFACE WATER MONITORING PROGRAM

Oklahoma's surface water quality monitoring programs are conducted by the Department, the Conservation Commission, United States Geological Survey, and the Water Board.

The Department monitors the waters of the state for toxic contaminants through the Ambient/Bio-trend Monitoring program and the Toxic Monitoring in Reservoirs program. The Ambient/Bio-trend Monitoring Program consist of 22 core and 78 rotating stations and has been in place since 1979. Since that time, there have been an average of 80 to 100 monitoring stations in place at all times. The core stations are part of the National Water Quality Assessment Network established by EPA. The core stations sample the water column biannually, once for metals and organics in sediments and once for organic and mercury in fish tissue. The other 78 rotating stations are used to determine current conditions on various streams and rivers throughout the state and to determine what trends might exist. The rotating stations sample the water column biannually and sample the sediments once ever three years for metals and organics. If a problem with metals or organics is detected in the sediments, then further sampling is done with fish tissue to determine the extent of the problem. Appendix 2 contains a list of ambient/bio-trend monitoring stations. The Toxic Monitoring in Reservoirs began in 1980. Since that time, they have monitored over 50 different lakes in the state. Each lake selected for study is monitored on a 5 to 7 year basis. The monitoring involves studying fish tissue for the presence of mercury or organics.

The rotating stations sample the water column biannually and sample the sediments once ever three years for metals and organics.

The results of the Ambient/Bio-trend Monitoring program and the Toxics Monitoring in Reservoirs programs are inconclusive at this time, and therefore no trend can be derived. The current conditions of waters monitored under these programs is, however good. Over the last 20 years, Oklahoma has focused on controlling point sources of pollution through the construction of municipal wastewater plants. These plants have dramatically reduced the oxygen demanding substances in these waters allowing for a more productive and health aquatic life.

Oklahoma also participates in the EPA Region 6 Ambient Bio-toxicity Network which began sampling during the calendar year 1990. During this time, the EPA Toxicity Testing Laboratory in Houston has performed 110 individual toxicity tests doing quarterly testing of two species from 11 sites in Oklahoma. Those sampling sites and results of the toxicity testing are listed in Appendix 3. The agencies involved in collecting water and sediment samples are the Department, the Conservation Commission, the Water Board, and the Indian Nation Council of Government. The sites selected were considered to be likely to show toxicity. The tests are run on the following organisms:

Daphnia pulex	A 48 hour tests for mortality is run on undiluted water samples or laboratory culture water exposed to sediment samples.
Ceriodaphnia dubia	A 7 day test for toxic effects is run on undiluted water samples. Toxicity is determined by either mortality or reduction in number of young produced.
Pimaphales promelus	(fathead minnow) - A 7 day test for toxic effects is run on undiluted water samples or laboratory culture water exposed to sediment samples. Toxicity is determined by either mortality or reduction in the number of young produced.

The Department works with the citizens of the state through our emergency spill and complaint system. Appendix 4 contains a list of pollution complaints and spills reported through our office for the period of January 1996 to December 1997.

While most point sources of pollution have been brought under control, nonpoint sources of pollution are still a problem. Through the CWA § 319(h) funding mechanism, assessment work is being conducted to address the nonpoint sources of pollution within the state. Part of the 319(h) program is in the implementation of practices that will best address and control those nonpoint sources of pollution.

The Conservation Commission monitors water quality through the Nonpoint Source Program. The *Nonpoint Source Pollution Assessment Report (319(h) Report)* provided a significant portion of the information used in this report. The small lakes monitoring program performed quarterly sampling for turbidity, conductivity, temperature and chlorophyll-a on over 100 lakes throughout the state. The Conservation Commission also participates in the Clean Lakes Program conducting Phase I studies. The Conservation Commission is performing studies on five large watershed areas: the Illinois River Basin, the Little River Basin, the Neosho (Grand) River Basin, the Southeast Oklahoma Multiple Basin, and a cooperative effort involving the LeFlore Conservation District, the Water Board and USGS on the Poteau River/Wister Lake project. The objective of these projects is to (1) provide a data base on water quality and (2) to develop an understanding of the relationship between land uses and water quality. For all five projects there are 385 sampling sites, all of which are sampled for chemical quality and approximately a third are sampled for biological integrity.

The United States Geological Survey works closely with and coordinates activities with the state agencies. Their monitoring program gathers water quality, sediment, flow rate and stream gaging data. United States Geological Survey has approximately 32 water quality monitoring stations in the state.

Improvements in Oklahoma's water quality monitoring programs are being developed and implemented in order to better provide consistent and reliable information related to the condition of aquatic resources, including quality habitat alteration, and impacts of polluted runoff and point source discharges. Much of the monitoring information in Oklahoma is fragmentary and incompatible because it is collected through programs that are designed and conducted for differing objectives.

The State of Oklahoma is in the process of developing a State Comprehensive Monitoring Strategy to help achieve the goals and objectives of the Clean Water Act, the Safe Drinking Water Act, and other environmental initiatives. In doing so a mix of approaches will be used that provide for the design, collection, measurement, storage, retrieval, assessment, and presentation of physical, chemical/toxicological, and biological/ecological water quality data necessary to implement a comprehensive water quality monitoring strategy efficiently and effectively, making best use of multiple agency resources. Such a comprehensive monitoring strategy will help establish trends in the State, prevent duplication of efforts by water quality agencies, and present a fair assessment of the State's Waters.

While Oklahoma's state agencies have several diverse water quality monitoring programs, each is generally designed to collect information for a narrow purpose defined by the collecting agency's responsibilities (e.g. development of Total Maximum Daily Loads, lake trophic status determination, success of best management practice implementation, impacts of confined animal feeding operations, source water protection, etc.) and is often limited to a relatively small geographic area. The following water quality related monitoring is being performed in Oklahoma:

- Oklahoma Department of Agriculture
    - Monitoring wells at Confined Animal Feeding Operations
    - Monitoring for nurseries
- Oklahoma Department of Conservation Commission
    - Nonpoint Source Management Plan
    - Blue Thumb Volunteer Monitoring
    - Clean Lakes Program- Watershed water quality
- Oklahoma Corporation Commission
    - Monitoring wells at Class II Injection Wells
    - Monitoring wells at commercial oilfields
    - Monitoring wells at Underground Storage Tanks
- Oklahoma Department of Environmental Quality
    - Public Water Supplies Compliance Monitoring
    - Toxics and Reservoirs
    - Ambient groundwater monitoring
    - Biotrend monitoring
    - Monitoring wells at landfills
    - Monitoring wells at Class I and III Injection Wells
    - Monitoring wells at hazardous waste landfill
    - Superfund sites
    - Land application sites
    - Refineries
- Oklahoma Department of Wildlife Conservation
    - Canton Lake surface and groundwater
- Oklahoma Scenic Rivers Commission
    - Stream Monitoring Program
- Oklahoma Water Resources Board
    - Clean Lakes Program- Lake Water Quality
    - Water Quantity- surface and groundwater
    - Streamline Baseline Water Quality Assessments
    - Water Watch Volunteer Monitoring
- United States Geological Survey
    - Stream level gauging stations
    - NASQUAN Stream Water Quality Monitoring
    - Ozark Plateau NAWQA

There is a general recognition that Oklahoma needs a coordinated statewide comprehensive water quality monitoring program that will provide data to support the water quality standards setting process, answer questions about changes in water quality, provide a baseline from which to judge the effects of changes within a watershed, to identify existing water quality problems, and on which to make decisions related to future undertakings. Oklahoma's water quality agencies also need to address those issues that have prevented coordination, data sharing, and the general lack of consistency between agencies. With unified support from each agency, the recently formed Oklahoma Water Quality Monitoring Council (OWQMC) is the vehicle from which these changes can be made.

The Oklahoma Water Quality Monitoring Council (OWQMC) was created in the Fall of 1997 to develop and implement a comprehensive state water quality monitoring strategy. The OWQMC organization is to foster cooperation among groups involved in all types of water quality monitoring and associated mapping activities. The OWQMC membership is interested in physical, chemical, and biological monitoring, as well as the evaluation of those land use factors that affect changes in aquatic habitat quality and quantity. The

OWQMC serves as a collaborative body to help achieve issues, policies, and resource management involving water quality monitoring. The OWQMC addresses the full range of aquatic resources, including ground and surface waters for the State of Oklahoma.

Any agency which is actively involved in water quality monitoring or the analysis of the associated data is encouraged to participate in the OWQMC committees, technical working groups, or other forums. The OWQMC membership consists of the following: (8) State Environmental Agency Representatives including Oklahoma Conservation Commission, Oklahoma Department of Environmental Quality, Office of the Secretary of Environment, Oklahoma Department of Agriculture, Oklahoma Corporation Commission, Oklahoma Department of Wildlife Conservation, Oklahoma Water Resources Board, and Oklahoma Scenic Rivers Commission; (5) Federal Agency Representatives including U.S. Army Corps of Engineers, U.S. Geological Survey, U.S. Fish and Wildlife Service, USDA Natural Resouces Conservation Service, and U.S. Bureau of Reclamation; (3) Local Government Representatives including Oklahoma Association of Conservation Districts, Association of Central Oklahoma Governments, and Indian Nation Council of Governments; (2) Tribal Government Representatives including Caddo Indian Tribe of Oklahoma, and Quapaw Tribe of Oklahoma; (2) Academia Representatives including Oklahoma State University and the University of Oklahoma; (2) Volunteer Group Representatives including Oklahoma Wildlife Federation and Oklahoma Chapter of the Sierra Club; and (3) at large members representing consultants and/or industry.

The OWQMC will (1) convene meetings and symposia for the purpose of achieving collaboration, communication, and information exchange among those engaged in water quality monitoring activities; (2) encourage cooperative efforts to evaluate existing sampling and analytical methods to determine those most appropriate for water monitoring programs and for the water types found in Oklahoma; (3) identify environmental measures necessary and appropriate for each monitoring program's purpose; and (4) develop an Oklahoma Water Monitoring Plan which includes (a) development of recommended procedures for data management and quality assurance; and (b) identifies and promotes the use of appropriate statistical and interpretative procedures for the presentation of findings in both technical and non-technical formats.

The general goals of the OWQMC are as follows:

- develop and implement collaborative watershed based monitoring strategies
- provide a forum for effective communication, cooperation, and collaboration among individuals and organizations involved in monitoring
- document monitoring activities in Oklahoma using state of the art tools such as GIS based mapping techniques
- promote the use of quality assured procedures for sample collection, analytical methods, assessment, and data mangement

A comprehensive statewide monitoring strategy should provide the data and analysis necessary to protect and preserve Oklahoma's water resources. The development of a statewide water quality monitoring strategy will have the following short-term and long-term goals:

- develop a near-term plan to provide a way for cooperating agencies to share data and coordinate monitoring activities to the maximum benefit

- develop a longer-term monitoring strategy to assess the State's water quality (both surface and ground water), detect trends and changes in water quality, and provide a sound understanding of the natural and human factors that affect these resources

Currently, the framework of the strategy is for the OWRB to perform the ambient monitoring of surface water to identify trends and water quality standards violations within the state. The State Legislature has appropriated the sum of $1,000,000 to the OWRB for the purpose of water quality monitoring. The OWQMC will recommend which agency would conduct follow-up sampling and investigations on identified pollution problems. The Department will serve as the primary groundwater monitoring agency in the state. The Clean Water Act Section 106 Groundwater grant will be used to fund the ambient groundwater monitoring by the Department. Samples collected by agencies will be sent to the State Environmental Laboratory which will serve as the state lab in the monitoring strategy. Available funds from the CWA Section 106 and 319(h) grants could be used to support ambient surface water monitoring.

CHAPTER TWO: ASSESSMENT METHODOLOGY AND SUMMARY DATA

In Oklahoma, use support determinations are made by using established criteria from EPA's 1998 305(b) guidelines. EPA breaks use support determination into the following categories: fully supported, partially supported, not supported, not attainable, or unassessed. In Oklahoma, we have added one additional use support status, that of fully supported but threatened.

All of Oklahoma's waters have multiple use support designations. Waterbodies are classified as follows:

- fully supporting, if all assigned beneficial uses are classified as "fully supporting";
- fully supporting but threatened, if one or more assigned beneficial uses are classified as "fully supporting but threatened" and none of the other assigned beneficial uses are worse than "fully supporting but threatened";
- partially supporting, if one or more assigned beneficial uses are classified as "partially supporting" and none of the other assigned beneficial uses are worse than "partially supporting";
- not supporting, if one or more assigned beneficial use are classified as "not supporting";
- unassessed, if no assessment information is available.

For this report, waters were assessed using, wherever possible, a minimum of three years worth of data. For an assessment to be considered monitored, it must have a frequency of at least quarterly sampling; monthly or more frequent data sampling are considered abundant. An exception from the guidelines is data received from the Water Board and the Conservation Commission Lake Water Quality Assessments Report (LWQAR). These lakes were classified as monitored if they had been "ground truthed" after the initial LANDSAT data had been collected. If no "ground truthing" had been conducted after the initial LANDSAT data, then the assessments were considered to be evaluated. The Water Board utilized LANDSAT data up until the end of the 93 fiscal year. This program has since been abandoned due to lack of funding. See Figure 3 for a map of Oklahoma's selected lakes.

The water quality data used in this report was collected by the Conservation Commission, the Department, the Water Board, the Wildlife Department, Corporation Commission, various federal agencies, and individual citizens of the state. The data used in this report came from the Toxics Monitoring Survey of Oklahoma Reservoirs (OSDH, 1995), Nonpoint Source Pollution Assessment (OCC, 1988, and updated in 1990), Clean Lakes Program (OWRB, 1996), LWQAR (OCC & OWRB, 1996), 1996 Water Quality Assessment Report (305(b)) (ODEQ, 1996), statewide ambient trend monitoring network, Ambient Toxicity Monitoring program (data from this program is included in the Nonpoint Source Assessment Report), EPA STORET, intensive and rapid bio-assessment surveys, fish and wildlife kill reports, spill reports, citizen complaints, and individual citizens of the state.

Water Quality Standards

The criteria for use support of the waters of the state are based upon the Water Board's WQS set forth in 1982, (et al seq.) (OWRB, 1995). For waters with multiple uses, all such uses must be protected. Permits for point sources and nonpoint sources "Best Management Practices" (BMPs) are methods of protecting the waters of the state.

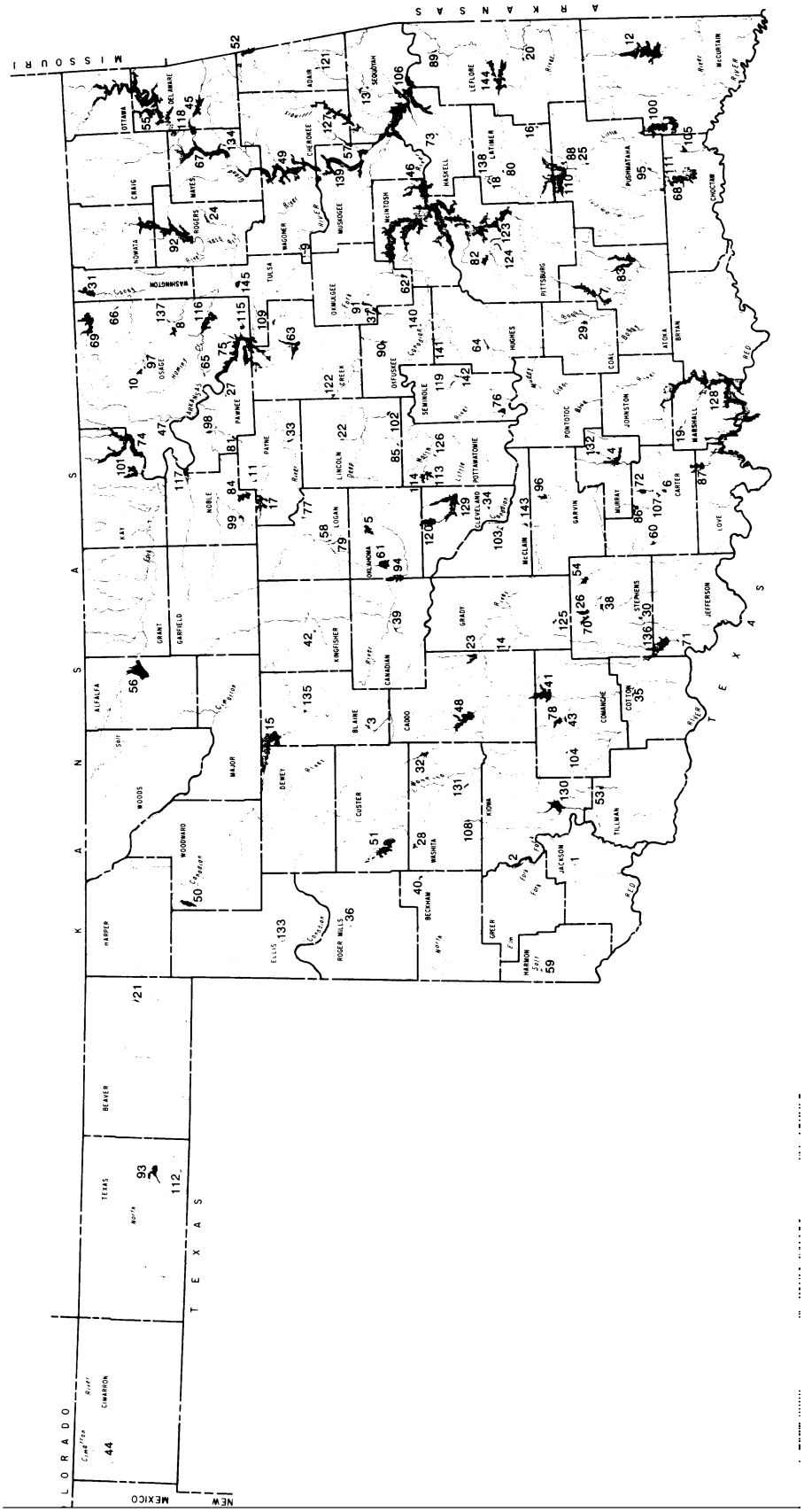

FIGURE 3. MAP OF OKLAHOMA SHOWING SELECTED LAKES

Uses for Listed Waterbodies

For surface waters listed in Appendix A of the WQS, some of the following beneficial uses have been assigned:

1. aesthetics;
2. agriculture, including both livestock and irrigation;
3. emergency water supply;
4. hydroelectric power;
5. industrial and municipal process and cooling waters;
6. navigation;
7. primary body contact recreation;
8. public and private water supply;
9. secondary body contact recreation;
10. warm water aquatic community:
    - cool water aquatic community,
    - habitat limited aquatic community,
    - trout fishery.

Uses for Unlisted Rivers and Streams

For rivers and streams not listed in Appendix A of the WQS, the following "assumed" beneficial uses are applied:

1. aesthetics;
2. agriculture, including both livestock and irrigation;
3. industrial and municipal process and cooling waters;
4. primary body contact recreation;
5. warm water aquatic community.

Aquatic Life Use Support

Aquatic Life Use Support (ALUS) is made up of the following subcategories: Warm Water Aquatic Community, Habitat Limited Aquatic Community, Cool Water Aquatic Community, and Trout Fishery. For a status of "fully supporting," the following criteria apply:

1. no evidence of habitat or community modification;
2. no point or nonpoint sources present on the waterbody or where point or nonpoint sources are present, their contribution to the waterbody does not affect the habitat or community;
3. no toxicants (including chlorine and ammonia) or for any one pollutant, no violations of acute toxicity within a three year period, if data abundant (i.e., monthly or more frequent) then a once in three year violation permitted;
4. no conventionals (Dissolved Oxygen, pH, temperature) exceeding criteria in all measurements;
5. no algal blooms, surface scum, mats, nuisance macrophyte growth (noxious aquatic plants) or periphyton growth present during reporting cycle;
6. no mean Nephelometric Turbidity Units (NTU) value $\geq$ 20 with peaks occurring over 25 NTUs recorded in only one quarter (season), no sign of degradation present;
7. no siltation problems.

For a status of "fully supporting but threatened," the above criteria apply with the following exceptions:

1. habitat or community modification is slight;
2. impact from point or nonpoint sources is slight;
3. conventionals not exceeding criteria in > ten percent of the samples;
4. mean of NTUs value $\geq$ 20 but $\leq$ 25 with peaks over 25 NTUs recorded in only one quarter (season), signs of degradation present;
5. siltation problems slight.

For the status of "partially supporting," the following criteria apply:

1. evidence of moderate habitat or community modification;
2. contribution from point source and nonpoint source moderate, complaints on record;
3. conventionals exceeding criteria in > ten but < twenty-five percent of the samples;
4. algal blooms, surface scum, mats, nuisance macrophyte growth or periphyton growth present during < ten percent of the reporting cycle;
5. mean of NTUs value ≥ 20 but ≤ 25 with peaks over 25 NTUs recorded in only two quarters (seasons), signs of degradation present;
6. siltation problem moderate.

For the status of "not supporting," the following criteria apply:

1. evidence of severe habitat or community modification;
2. contribution from point source and nonpoint source severe, complaints on record;
3. presence of toxics or pollutant in violation of acute toxicity occurring one or more times in a three year period, or if data abundant, then two or more violations per three year period;
4. conventionals exceeding criteria in > twenty-five percent of the samples;
5. algal blooms, surface scum, mats, nuisance macrophyte growth or periphyton growth present during > 10 percent of the reporting cycle;
6. mean of NTUs value ≥ 20 but ≤ 25 with peaks over 25 NTUs recorded in three or more quarters (seasons), or mean of NTUs value is > 25, signs of degradation present;
7. siltation problem severe.

Swimming Use

Swimming use is Oklahoma's beneficial use of primary body contact recreation. The use of primary body contact recreation applies to waters where direct contact with the water is possible and where ingestion of the water exist. The criteria for such waters shall apply only during the period of May 1 to September 30. After and before such time the assignment of Secondary Body Contact Recreation shall apply. For the status of "fully supporting," the following criteria apply:

1. the water shall be free of any chemical, physical or biological substances which can cause irritations to the skin or sense organs, or if ingested does not cause a toxic reaction or cause illness;
2. no bathing area closures or restrictions in effect during reporting period;
3. any of the following three criteria can be used to determine support status as long as one and only one method is used during a reporting cycle:
   - coliform bacteria of the fecal coliform group shall not exceed a monthly geometric mean of 200/100 ml in ≥ 5 samples per 30 day period, or
   - *Escherichia coli* not exceeding a monthly geometric mean of 126/100 ml in ≥ 5 samples per 30 day period, or
   - *Enterococci spp*. not exceeding a monthly geometric mean of 33/100 ml in ≥ 5 samples per 30 day period and with all samples not exceeding a 90 percent one-sided confidence level of 108/100 ml, for lakes and for high use waterbodies all samples shall not exceed a 75 percent one-sided confidence level of 61/100 ml;
4. no point or nonpoint sources present or if present, their impact clearly does not affect the quality of the water, no complaints on record.

For the status of "fully supporting but threatened," the above criteria apply with the following exceptions:

1. any of the following three criteria can be used to determine support status as long as one and only one method is used during a reporting cycle:

- coliform bacteria of the fecal coliform group exceeding a monthly geometric mean of 200/100 ml in ≥ 5 samples per 30 day period in ≤ 10 percent of measurements, or
- *Escherichia coli* exceeding a monthly geometric mean of 126/100 ml in ≥ 5 samples per 30 day period in ≤ 10 percent of measurements, or
- *Enterococci spp*. exceeding a monthly geometric mean of 33/100 ml in ≥ 5 samples per 30 day period and with all samples not exceeding a 90 percent one-sided confidence level of 108/100 ml, for lakes and high use waterbodies all samples shall not exceed a 75 percent one-sided confidence level of 61/100 ml in ≤ 10 percent of measurements;

2. point or nonpoint sources present, their impact on water quality is slight, complaints on record.

For the status of "partially supporting," the following criteria apply:

1. chemical, physical or biological substances present in ≤ 10 percent of the samples;
2. no more than one bathing area closure per year of < one week duration;
3 any of the following three criteria can be used to determine support status as long as one and only one method is used during a reporting cycle:
   - coliform bacteria of the fecal coliform group exceeding a monthly geometric mean of 200/100 ml in ≥ 5 samples per 30 day period in > 10 but ≤ 25 percent of measurements, or
   - *Escherichia coli* exceeding a monthly geometric mean of 126/100 ml in ≥ 5 samples per 30 day period in > 10 but ≤ 25 percent of measurements, or
   - *Enterococci spp*. exceeding a monthly geometric mean of 33/100 ml in ≥ 5 samples per 30 day period or with some samples exceeding a 90 percent one-sided confidence level of 108/100 ml, for lakes and high use waterbodies, or for one or more samples exceeding a 75 percent one-sided confidence level of 61/100 ml in > 10 but ≤ 25 percent of measurements;
4. point or nonpoint sources present, their impact on water quality is moderate, complaints on record.

For the status of "not supporting," the following criteria apply:

1. chemical, physical or biological substances present in ≥ 10 percent of the samples;
2. two or more bathing area closure per year of < one week duration, or one or more bathing area closure per year of ≥ one week duration;
3. any of the following three criteria can be used to determine support status as long as one and only one method is used during a reporting cycle:
   - coliform bacteria of the fecal coliform group exceeding a monthly geometric mean of 200/100 ml in ≥ 5 samples per 30 day period in ≥ 25 percent of measurements, or
   - *Escherichia coli* exceeding a monthly geometric mean of 126/100 ml in ≥ 5 samples per 30 day period in ≥ 25 percent of measurements, or
   - *Enterococci spp*. exceeding a monthly geometric mean of 33/100 ml in ≥ 5 samples per 30 day period or with some samples exceeding a 90 percent one-sided confidence level of 108/100 ml, for lakes and high use waterbodies, or for one or more samples exceeding a 75 percent one-sided confidence level of 61/100 ml in ≥ 25 percent of measurements;
4. point or nonpoint sources present, their impact on water quality is severe, complaints on record.

Drinking Water Use

Public & Private Water Supply and Emergency Water Supply are Oklahoma's beneficial uses assigned to Drinking Water Use. An additional limitation of Sensitive Water Supply may also be placed on waterbodies with the beneficial use of public and private water supply. For the status of "fully supporting," the following criteria apply:

1. no discharge of radioactive materials in excess of the criteria found in *Oklahoma Radiation Protection Regulations*, 1969 (et al seq.);
2. no concentration of gross alpha particles in excess of the criteria found in sections (i) through (iv) of the WQS or the naturally occurring background levels, whichever is higher;
3. coliform bacteria shall not exceed a monthly geometric mean of 5,000/100 ml at a point of intake for public or private water supplies, based upon a total of $\geq$ 5 samples taken over a period of $\leq$ 30 days, in $\leq$ 5 percent of the samples shall the bacteria be permitted to exceed 20,000/100 ml, if the water is also assigned the beneficial use of primary body contact recreation, then the criteria for primary body contact recreation will apply in place of these criteria;
4. no oil, grease, taste or odor problems;
5. no toxics, carcinogenic, mutagenic, or teratogenic compounds to humans;
6. no excess of the criteria found in § 785:45-5-10.6(B) of the WQS.

For the status of "fully supporting but threatened," the above criteria apply with the following exceptions:

1. taste and odor problem slight, not requiring any additional treatment process;
2. exceedance of the criteria found in § 785:45-5-10.6(B) of the WQS for any one pollutant, mean or median < criterion;

For the status of "partially supporting," the following criteria apply:

1. one drinking water supply advisory lasting $\leq$ 30 day;
2. problems, such as taste and odor, color, excessive turbidity, high dissolved solids, pollutants requiring activated charcoal filters, etc., not requiring closures or advisories but adversely affecting treatment costs.

For the status of "not supporting," the following criteria apply:

1. one or more drinking water supply advisory lasting > 30 day;
2. exceedance of the criteria found in § 785:45-5-10.6(B) of the WQS for any one pollutant, mean or median $\geq$ criterion.

Oklahoma does not currently have protocols to assess drinking water use attainment. Oklahoma is currently trying to develop these protocols, along with expanding ambient monitoring.

Fish Consumption Use

Fish Consumption Use is a use not specifically assigned by the WQS but is inferred through other uses such as drinking water and aquatic life uses. For the status of "fully supporting," the following criteria apply:

1. no fish/shellfish advisories or bans in effect;
2. conditions which make the uses of drinking water and aquatic life fully supported;

For the status of "fully supporting but threatened," the above criteria apply with the following exceptions:

1. any condition which would make the uses of drinking water and aquatic life fully supported but threatened, or partially supported.

For the status of "partially supporting," the following criteria apply:

1. any "restricted consumption" fish advisory or ban in effect for general population or a subpopulation that could be at potentially greater risk.

For the status of "not supporting," the following criteria apply:

1. any "no consumption" fish/shellfish advisory or ban in effect for the general population or subpopulation that could be at potentially greater risk, for one or more fish species;
2. any commercial fishing/shellfishing ban in effect.

Water Quality Summary for Rivers and Streams

Approximately 14.28 percent of the state's total river and stream miles were assessed. For total waters, 1.17 percent of the river and stream miles assessed supported their designated uses, 3.78 percent supported their designated uses but were threatened, 7.08 percent partially supported their designated uses, and 2.22 percent did not support their designated uses.

For assessed waters, 8.21 percent of the river and stream miles assessed supported their designated uses, 26.54 percent supported their designated uses but were threatened, 49.67 percent partially supported their designated uses, and 15.57 percent did not support their designated uses.

Section 303(d) Waters

The CWA § 303(d) requires Oklahoma to "identify, establish a priority ranking, and develop TMDLs for its waters that do not achieve or are not expected to achieve WQS after the implementation of existing required controls" (EPA, 1994). Appendix 5 contains the list of waters identified in Oklahoma that meet this criteria.

The methodology used in developing the TMDL list is derived from assessing the various sources of pollution found within the watershed and comparing that with the natural background conditions of the receiving waters. Figure 4 shows pictorially the relationship between these elements. The TMDL is the total pollutant loading for a segment of a waterbody that results in an instream concentration equal to a numerical limit required by a numerical or narrative criteria in the water quality standards.

Determination of the TMDL requires delineation of the stream segment impacted by point and nonpoint source and background conditions. This stream segment is defined as the "zone of impact." The zone of impact is specific to the TMDL and also the degree of sophistication of the model used. The zone of impact for each point source discharge or group of point source discharges is identified in the wasteload evaluation.

A TMDL for a particular stream segment is dependent on specific stream flow characteristics, stream water quality standards, and in-stream reactions. The TMDL is based on specific critical conditions, stream water quality standards, and the degree of sophistication of the model used in developing the TMDL. The TMDL is equivalent to the assimilative capacity of a particular stream, for a particular pollutant, under critical stream conditions.

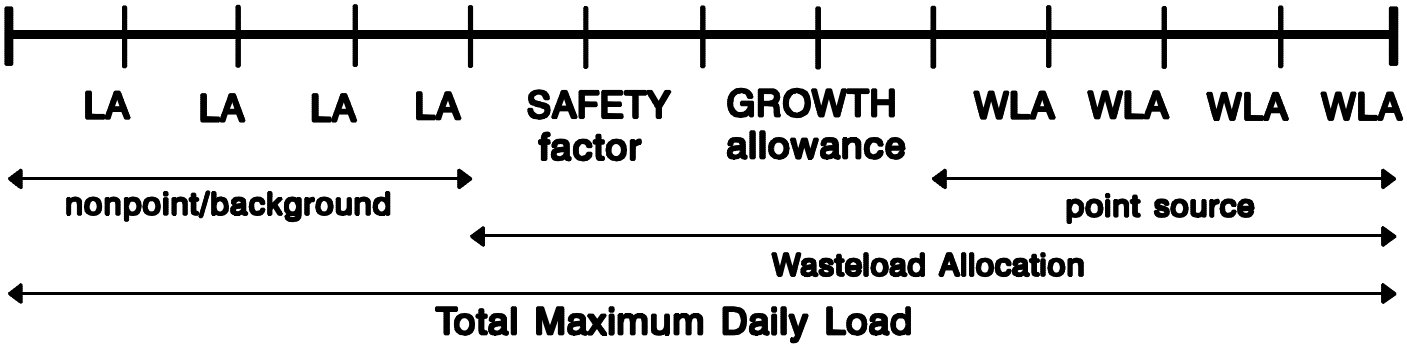

FIGURE 4. TMDL ELEMENTS

The assessment of nonpoint sources of pollution and background conditions is a necessary initial step in the wasteload evaluation process. Table 10 illustrates the conditions under which nonpoint sources of pollution are important and the minimum level of effort needed to model the impact. If a known or suspected nonpoint source problem for a constituent has been documented, then the level of effort expended to quantify the problem is increased.

TABLE 10. NONPOINT SOURCE IMPACTS/MODELING EFFORT FOR STREAMS

STREAM TYPE	CRITICAL CONDITIONS LOW FLOW	NON-CRITICAL CONDITIONS	
		MODERATE FLOW	INTENSE FLOW
Intermittent	Negligible Impact	Moderate Impact	Highest Impact
	No model required	Calibrated SS*	Calibrated Dynamic
Perennial	Minimal Impact	Moderate Impact	Highest Impact
	Calibrated SS*	Calibrated SS*	Calibrated Dynamic

*SS - steady state model

For analysis of an intermittent stream, assessment of nonpoint source impacts are not usually required. Likewise, for a perennial stream, nonpoint source impacts would be difficult to estimate without site specific data. If the nonpoint source impacts the stream above the zone of impact, it would be difficult to separate it from naturally occurring background conditions. For uncalibrated models, the background loading is assumed to account for any nonpoint source impact above the zone of impact and therefore are not usually taken into account. If sufficient data is available, they may be modeled at this level. In most cases, nonpoint source assessment will be performed only at the calibrated model level.

Both growth allowances and safety factors are included in determining a TMDL. Growth allowances are based upon a 20 year population projection. They are dependent upon the type and number of dischargers, as well as other regulatory considerations. They are incorporated into a facility's design flow and are therefore based upon 20 year population projections. If a watershed has multiple dischargers, then the combined effects of all facilities must be taken into consideration. Addition(s) or deletion(s) of facility(s) is/are also include in the growth allowance.

Safety factors are dependent on the total uncertainty in the model. They include the number and type of discharger(s), the wastes generated by these discharger(s), and the level of modeling performed. The criteria given in the Table 11 is recommended for determining the magnitude of the safety factor. Other factors, such as the degree of impact and the degree of uncertainty in the model are also important. In addition, various other safety factor could be deemed "more appropriate" under differing circumstances.

TABLE 11. MODELING EFFORT/TMDL SAFETY FACTOR

MODEL	MODEL COMPLEXITY	SAFETY FACTOR
Uncalibrated	Multiple Source/Complex Waste	25 %
	Single Source/Uniform Waste	20 %
Calibrated	Multiple Source/Complex Waste	15 %
	Single Source/Uniform Waste	10 %
Confirmed	-----	5 %

Safety factors, based on residual uncertainties in the model, will preempt a significant portion of an allocatable load. Uncertainties in the model, addressed by the wasteload evaluation, will tend to be greater when data and data acquisition are limited. In cases where the economic impact of providing treatment is substantially influenced by the magnitude of such factors, then additional modeling efforts will be necessary.

A final step in the wasteload evaluation process involves assessing the uncertainty level of a particular TMDL or wasteload allocation (WLA). Results of an uncertainty analysis are reviewed within the context of the effluent quality expected. If a required treatment level is heavily sensitive to the selection of an input value, then further study is necessary. At a minimum, sensitivity analysis is performed on any of four levels of analysis.

TMDLs require an initial assessment of the expected loading from point source discharge(s). If the waterbody is not water quality limited, the TMDL is calculated by increasing the point source loading to its maximum capacity. For the calibrated model, this is done by increasing either the flow rate or a parameter concentration from one or more point sources. For the uncalibrated model, the point source flow rate is held constant while the concentrations of the parameter(s) is increased by multiples of the initial loading. In cases where technology based limits preclude increasing the concentration above a certain level, the TMDL is determined by using the maximum concentration and increasing the effluent flow rate.

Once the TMDL has been determined, it is divided or allocated among the various discharges. The primary method of allocating wasteloads is determined by priority of application and demonstration of need. Date of receipt of an application or modification of a discharge permit shall establish the facility's priority. Subsequent applications for permit or modification of a permit, will be allocated a wasteload based upon available remaining assimilative capacity. New dischargers or increases in loadings from existing dischargers can only be allowed if the existing TMDL is redistributed among all the dischargers. Priority of application shall not be considered the sole basis for allocating wasteloads. Other factors include technical, socio-economic, institutional, and political constraints.

The wasteload evaluation process takes into consideration nonpoint sources of pollution. The allocation process provides for nonpoint source control tradeoffs. Best management practices (BMPs) can include, but are not limited to, structural and nonstructural controls and operating and maintenance procedures. BMP's can be applied before, during and after pollution producing activities to reduce or eliminate pollutant loading into a receiving water. BMP's can be incorporated into a discharge's permit on a case-by-case basis; or, they can be issued as a separate stand-alone plan.

Methodology and Database Used to Develop the TMDL List

In developing the 303(d) list of waterbodies needing a TMDL, best professional judgement or a two stepped approach was used. The first step involves identifying those waters which are not meeting or expected to not meet their assigned beneficial use. The first step involves the following factors:

1. Waters identified in past Water Quality Assessment Reports as either "partially supporting" or "not supporting" assigned beneficial uses.
2. Waters listed under sections 304(l) and 319 of the Clean Water Act.
3. Waters identified in past Oklahoma Priority Waterbody List as having a standards violation.
4. Waters identified as impaired in the most recent Lake Water Quality Assessment Report funded through section 314 of the Clean Water Act.
5. Waters where fishing bans and/or advisories are currently in effect or are anticipated.
6. Waters where there have been confirmed reports of fish kills, wildlife kills, or where abnormalities have been observed in fish or other aquatic life during the last ten years.
7. Waters where there are restrictions on water sports or recreational contact.
8. Waters where ambient data indicate potential or actual exceedances of water quality criteria.
9. Waters for which effluent toxicity test results indicate possible or actual exceedances of state water quality standards.
10. Waters with industrial, municipal, or other dischargers where dilution analyses indicate exceedances of numerical or narrative water quality criteria.

11. Waters where ambient toxicity or adverse water quality conditions have been documented by local, state, EPA, or other federal agencies, the private sector, public interest groups, universities, or other organizations and groups.
12. Waters with point source discharges which have a need for WLA determination due to a new stream classification as a result of use attainability analysis, or due to increased flow or load of the discharge.
13. Waters where new point source discharges are proposed to be located.

The second step involves evaluating monitoring data to determine if adequate controls are in place. This can involve a simple comparison of effluent and permitted concentrations to instream chemical specific concentrations; or, it could involve an in-depth study of several inter-dependent chemical, physical, and biological factors. In some cases, sufficient data may be available to make a definitive determination. The second step could be an interactive process when more than one pollutant/factor causes a problem. Water quality modeling may be used in either the first (screening mode) or second step (assessment mode) in this identification process.

The priority ranking factor takes into account the severity of the pollution and the assigned uses of those waters. In addition, programmatic needs such as permit renewal, revision scheduling, and other public concerns are also considered.

The following formula is used to calculate the priority points (P) used in ranking waters for which a TMDL is to be developed:

$$P = U + M + A$$

where:

U = Use Factor
M = Magnitude Factor
A = Additional Concern or Need Factor

The Use Factor (U) is calculated using Oklahoma's Water Quality Standards and consists of the sum of the points for a pollutant which has the potential to impair the following beneficial uses:

Beneficial Use	Points
Public and Private Water Supply	15
Emergency Water Supply	10
Fish and Wildlife Propagation	10
Agriculture	5
Hydroelectric Power	1*
M & I Process & Cooling Water	1*
Primary Recreation	10
Secondary Recreation	5
Navigation	1*
Aesthetics	5
Outstanding Resource Water	20
High Quality Water	15
Sensitive Water Supply	10

*These beneficial uses are not generally dependent upon water quality.

In those cases where more than one pollutant is identified as threatening a beneficial use, the use factor is calculated as the total of the sum of the points for each individual pollutant.

The magnitude factor (M) is calculated as the distance (in river miles) for which a use is impaired times the greater of 0.646 MGD (1 CFS) or the seven day two year low flow (in MGD), rounded to the nearest whole point. If more than one use is impaired, then M is calculated as the sum of the individual uses's M times the distance.

As with step one, water quality modeling may also be used in determination of the Magnitude Factor.

The Additional Concern Factor (A) is calculated using the following criteria:

- Those waters for which there is significant public concern, interest, or support will receive an additional 1000 points.

- Those waters which have a programmatic needs such as a WLA needed for permitting, or court orders will receive an additional 1000 points.

CHAPTER THREE: RIVERS / STREAMS WATER QUALITY ASSESSMENT

Designated Use Support

Table 12 list the overall use support summary and Table 13 list the individual use support summary for all of the rivers and streams within the state.

TABLE 12. OVERALL USE SUPPORT SUMMARY FOR RIVERS AND STREAMS, IN MILES

Total Number of Rivers Assessed: 3299
Total Number of River Segments Monitored: 420
Total Number of River Segments Evaluated: 2878

DEGREE OF USE SUPPORT	ASSESSMENT BASIS		TOTAL ASSESSED	PERCENT
	EVALUATED	MONITORED		
Fully Supporting	269.50	653.71	923.21	8.21
Fully Supporting but Threatened	1,630.36	1,353.60	2,983.96	26.54
Partially Supporting	1,174.47	4,410.59	5,585.06	49.67
Not Supporting	565.60	1,185.22	1,750.82	15.57
TOTAL	3,639.93	7,603.12	11,243.05	100.00

TABLE 13. INDIVIDUAL USE SUPPORT SUMMARY FOR RIVERS AND STREAMS, IN MILES

USE	FULLY SUPPORTED	FULLY SUPPORTED BUT THREATENED	PARTIAL SUPPORT	NOT SUPPORTED	NOT ATTAINABLE	NOT ASSESSED
OVERALL USE SUPPORT	923.50	2,983.96	5,585.06	1,750.82	0.00	21,985.18
STATE DEFINED:						
AQUATIC COMMUNITIES						
Aquatic Life Use Support	1,468.38	2,628.28	1,659.92	5,331.77	0.00	0.00
Trout Fishery	0.00	0.00	0.00	9.57	0.00	9.87
Cool Water	32.76	268.70	410.09	52.22	0.00	71.28
Warm Water	306.30	2,500.37	1,778.19	664.44	0.00	194.95
Habitat Limited	0.00	0.00	0.00	0.00	0.00	0.00
Unlisted Warm Water	7.30	32.68	69.79	34.89	0.00	0.00
CONTACT RECREATION						
Primary	702.09	2,145.87	1,139.41	694.69	0.00	997.50
Secondary	0.00	22.59	2.48	0.00	0.00	701.18
Unlisted Primary	13.71	26.27	63.42	34.89	0.00	0.00
DRINKING WATER SUPPLY	383.82	93.95	34.32	110.09	0.00	15.02
Public and Private	0.00	0.00	0.00	0.00	0.00	0.00
Emergency	39.83	0.00	0.00	0.00	0.00	0.00
NONDEGRADATION						
Outstanding Resource Water	0.00	0.00	0.00	0.00	0.00	0.00
High Quality Water	31.22	9.57	0.00	12.85	0.00	43.67
Sensitive Water Supply	125.71	361.09	109.73	36.92	0.00	15.02
AESTHETICS	923.02	7,098.43	931.49	561.37	0.00	105.78
AGRICULTURE	360.02	70.60	95.13	5.24	0.00	73.24
HYDROELECTRIC POWER	0.00	0.00	0.00	0.00	0.00	50.92
INDUSTRIAL	323.90	87.63	0.00	0.00	0.00	16,271.04
INDUSTRIAL/HYDROPOWER	0.00	0.00	0.00	0.00	0.00	339.65
NAVIGATION	0.00	0.00	0.00	0.00	0.00	229.22

Special Summary for ALUS

Aquatic Live Use Support (ALUS) is a relative new issue being requested by EPA for inclusion in the 1998 305(b) process. ALUS assessments are broken down into the following categories: miles assessed using biological/habitat (B/H); physical/chemical (P/C) data; or both B/H and P/C.

Causes and Sources of Nonsupport of Designated Uses

The causes and sources of impairment have been identified for rivers and streams which have been assessed as less than fully supporting. The term "cause" is defined as any pollutant or other stressors which can contribute to an impairment of an assigned beneficial use of a waterbody. The term stressors is further defined as any factor or condition, other than a specific pollutant, which can cause or contribute to an impairment of a waterbody. The term "source" is defined as the origin from which a particular cause (pollutant or stressors) originated. The categories of sources are hierarchical in nature and go from general to specific in their description of where the cause of impairment originated. For example, if the cause of pollution was from nitrates, the source could be generally listed as agriculture or it could be more specifically listed as crop lands used in agriculture.

Table 14 list all of the major causes of pollution contributing to the impairment of rivers and streams in the state and Table 15 list all of the sources of those impairments.

The guidelines in determining relative impacts of causes and sources of pollution are as follows:

major impacts

- Any cause or source whose impact results in the waterbody being classified for its uses as "not supporting";

minor impacts

- Any cause or source whose impact results in the waterbody being classified for its uses as "partially supporting" but not "not supporting."

The following are the leading causes of nonsupport of designated uses as identified in Tables 14 and 15:

- Siltation, with 4,415.13 miles
- Pesticides, with 4,012.16 miles
- Nutrients, with 3,949.70 miles
- Suspended Solids, with 3,743.35 miles

The following are the leading sources of nonsupport of designated uses as identified in Tables 14 and 15:

- Agriculture and Agriculture activities, with 26,036.97 miles
- Source Unknown, with 12,832.57 miles
- Hydromodification and Hydromodification activities, with 5,176.05 miles
- Resource Extraction and related activities, with 3,478.02 miles

TABLE 14. TOTAL SIZES OF WATERS NOT FULLY SUPPORTING USES, AFFECTED BY VARIOUS CAUSE CATEGORIES FOR RIVERS AND STREAMS, IN MILES

CAUSE CATEGORY	CONTRIBUTION TO IMPAIRMENT	
	MAJOR	MODERATE/MINOR
0000 - Cause Unknown	0.00	0.00
0100 - Unknown Toxicity	157.06	1,121.49
0200 - Pesticides	267.90	3,744.26
0300 - Priority Organics	16.02	153.12
0400 - Nonpriority Organics	0.00	16.97
0500 - Metals	74.39	1,219.24
0600 - Ammonia	13.85	113.71
0700 - Chlorine	14.69	102.96
0800 - Other Inorganics	11.06	105.39
0900 - Nutrients	164.98	3,784.72
1000 - pH	11.06	759.57
1100 - Siltation	898.56	3,516.57
1200 - Organic Enrichment/Low Dissolved Oxygen	108.71	1,701.35
1300 - Salinity/TDS/Chlorides	401.95	1,283.35
1400 - Thermal Stratification	0.00	0.00
1500 - Flow Alteration	26.50	150.21
1600 - Other Habitat Alterations	336.07	749.17
1700 - Pathogen Indicators	161.72	475.26
1800 - Radiation	0.00	0.00
1900 - Oil and Grease	309.17	253.23
2000 - Taste and Odor	0.00	99.66
2100 - Suspended Solids	897.60	2,845.75
2200 - Noxious Aquatic Plants	29.41	153.47
2300 - Filling and Draining	0.00	0.00
2400 - Total Toxics	0.00	11.76
2500 - Turbidity	0.00	100.77
2600 - Exotic Species	0.00	110.69

TABLE 15. TOTAL SIZES OF WATERS NOT FULLY SUPPORTING USES AFFECTED BY VARIOUS SOURCE CATEGORIES FOR RIVERS AND STREAMS, IN MILES

SOURCE CATEGORY	CONTRIBUTION TO IMPAIRMENT	
	MAJOR	MODERATE/MINOR
0100 - Industrial Point Source	0.00	0.00
0110 - Major Industrial Point Source	0.00	0.00
0120 - Minor Industrial Point Source	0.00	0.00
0200 - Municipal Point Source	0.00	0.00
0210 - Major Municipal Point Source	0.00	0.00
0220 - Minor Municipal Point Source	0.00	0.00
0230 - Package Plants (Small Flows)	0.00	0.00
0400 - Combined Sewer Overflow	0.00	0.00
0900 - Domestic Wastewater Lagoon	0.00	244.00
1000 - Agriculture	590.89	4,509.54
1100 - Non-Irrigated Crop Production	590.89	3,941.19
1200 - Irrigated Crop Production	560.30	2,100.21
1300 - Specialty crops (e.g., Horticulture, Citrus, Nuts, Fruits)	110.38	1,945.01
1400 - Pastureland	394.09	3,842.21
1500 - Rangeland	394.09	3,893.72
1510 - Riparian Grazing	0.00	0.00
1520 - Upland Grazing	0.00	0.00
1600 - Feedlots - all types	203.35	894.69
1620 - Concentrated Animal Feeding Operations (Permitted, Point Source)	0.00	0.00
1640 - Confined Animal Feeding Operations (NPS)	0.00	0.00
1700 - Aquaculture	0.00	0.00
1800 - Animal Holding/Management Areas	298.77	1,768.41
1900 - Manure Lagoons	0.00	0.00
2000 - Silviculture	0.00	217.97
2100 - Harvesting, Restoration, Residue Management	0.00	0.00
2200 - Forest Management	0.00	91.90
2300 - Logging Road Construction/Maintenance	0.00	25.11
3000 - Construction	0.00	280.49
3100 - Highway/Road/Bridge Construction	0.00	95.15
3200 - Land Development	0.00	269.74
4000 - Urban Runoff/Storm Sewers	79.67	866.88
4100 - Nonindustrial Permitted	79.67	692.08

SOURCE CATEGORY	CONTRIBUTION TO IMPAIRMENT	
	MAJOR	MODERATE/MINOR
4200 - Industrial Permitted	0.00	0.00
4300 - Other Urban Runoff	79.67	790.45
5000 - Resource Extraction/Exploration/Development	430.20	1,331.83
5100 - Surface Mining	0.00	371.87
5200 - Subsurface Mining	0.00	0.00
5300 - Placer Mining	0.00	0.00
5400 - Dredge Mining	0.00	33.95
5500 - Petroleum Activities	392.66	771.68
5600 - Mill Tailings	12.02	0.00
5700 - Mine Tailings	12.02	121.79
5800 - Acid Mine Drainage	0.00	0.00
6000 - Land Disposal (Runoff/Leachate from Permitted Areas)	12.85	491.30
6100 - Sludge	0.00	0.00
6200 - Wastewater	12.85	684.06
6300 - Landfills	0.00	160.72
6400 - Industrial Land Treatment	0.00	0.00
6500 - Onsite Wastewater Systems (Septic Tanks)	0.00	368.12
6600 - Hazardous Waste	0.00	0.00
6700 - Septage Disposal	0.00	0.00
7000 - Hydromodification	79.84	908.24
7100 - Channelization	29.65	656.98
7200 - Dredging	0.00	22.23
7300 - Dam Construction	0.00	101.72
7350 - Upstream Impoundment	0.00	0.00
7400 - Flow Regulation/Modification	50.19	268.15
7500 - Bridge Construction	0.00	19.58
7550 - Habitat Modification (Other than Hydromod.)	320.31	1,013.68
7600 - Removal of Riparian Vegetation	320.31	921.65
7700 - Stream Bank Modification/Destabilization	125.34	338.17
7800 - Drainage/Filling of Wetlands	0.00	0.00
7900 - Marinas	0.00	0.00
8000 - Other	0.00	1.38
8100 - Atmospheric Deposition (Acid Rain)	0.00	270.76
8200 - Waste Storage/Storage Tank Leaks	0.00	17.66
8300 - Highway Maintenance and Runoff	301.69	561.68

Source Category	Contribution to Impairment	
	Major	Moderate/Minor
8400 - Spills	415.45	362.66
8500 - Contaminated Sediments	151.50	441.98
8600 - Natural Sources	82.75	21.60
8700 - Recreational Activities	0.00	12.79
8900 - Salt Storage Sites	0.00	0.00
8910 - Groundwater Loadings	0.00	0.00
8920 - Groundwater Withdrawal	0.00	0.00
8950 - Other	0.00	52.68
9000 - Unknown Source	290.60	12,541.97

CHAPTER FOUR: LAKE WATER QUALITY ASSESSMENT

Oklahoma's Water Atlas lists approximately 224,948 lakes in the state. Approximately 220,000 of these lakes, are NRCS assisted farm ponds. Of the 4,948 remaining lakes, over 400 lakes and reservoirs have been included in Oklahoma's Waterbody System. All publicly owned lakes and reservoirs as well as lakes and reservoirs used as public drinking water supplies are considered significant by the Water Quality Standards. Additionally, publicly owned lakes (often under 50 acre feet in volume) where there are water quality concerns, have also been included as significant lakes.

Background

The CWA § 314(a)(2) (as amended by the Water Quality Act of 1987), requires each state to submit a biennial assessment of its lake water quality as part of Section 305(b) reporting process. This assessment forms the basis for determining priority projects and for directing program implementation for significant publicly owned lakes. Significant publicly owned lakes are defined in the WQS to be "(any) impoundment of waters of the state over 50 acre-feet in volume which is either (i) owned or operated by federal, state, county, or local government; or (ii) appears in Oklahoma's Clean Lakes Inventory" (OWRB, 1994). The majority of lakes in the state are man-made. The natural lakes in the state are playa (found mostly in the Panhandle) and oxbow lakes (found mostly along major rivers and creeks in low lying alluvium terraces).

Summary Statistics

Table 16 lists the overall use support summary and Table 17 lists the individual use support summary for all of the lakes within the state.

TABLE 16. OVERALL USE SUPPORT SUMMARY FOR LAKES, IN ACRES

Total Number of Lake Segments Assessed: 234
Total Number of Lake Segments Monitored: 213
Total Number of Lake Segments Evaluated: 21

DEGREE OF USE SUPPORT	ASSESSMENT BASIS		TOTAL ASSESSED	PERCENT
	EVALUATED	MONITORED		
Fully Supporting	1,689.00	98,741.00	100,430.00	16.41
Fully Supported but Threatened	370.00	251,905.00	252,275.00	41.23
Partially Supporting	0.00	142,522.00	142,522.00	23.29
Not Supporting	1,029.00	115,595.00	116,624.00	19.06
TOTAL	3,088.00	608,763.00	611,851.00	100.00

TABLE 17. INDIVIDUAL USE SUPPORT SUMMARY FOR LAKES, IN ACRES

USE	FULLY SUPPORTED	FULLY SUPPORTED BUT THREATENED	PARTIALLY SUPPORTED	NOT SUPPORTED	NOT ATTAINABLE	NOT ASSESSED
OVERALL USE SUPPORT	100,430.00	252,275.00	142,522.00	116,624.00	0.00	2,047.00
STATE DEFINED:						
AQUATIC COMMUNITIES						
Aquatic Life Use Support	125,489.00	231,919.00	210,131.00	32,369.00	0.00	6,260.00
Trout Fishery	0.00	0.00	0.00	0.00	0.00	0.00
Cool Water	8,194.00	12,900.00	14,200.00	5,813.00	0.00	0.00
Warm Water	121,233.00	200,608.00	210,225.00	26,559.00	0.00	6,389.00
Habitat Limited	0.00	0.00	0.00	0.00	0.00	0.00
Unlisted Warm Water	0.00	0.00	0.00	0.00	0.00	0.00
CONTACT RECREATION						
Primary	39,643.00	282,707.00	108,829.00	119,408.00	0.00	0.00
Secondary	0.00	0.00	0.00	0.00	0.00	0.00
Unlisted Primary	0.00	0.00	0.00	0.00	0.00	0.00
DRINKING WATER SUPPLY						
Public and Private	56,320.00	6,131.00	8,800.00	0.00	0.00	0.00
Emergency	159.00	0.00	0.00	0.00	0.00	0.00
NONDEGRADATION	0.00	0.00	0.00	0.00	0.00	0.00
Outstanding Resource Water	0.00	0.00	0.00	0.00	0.00	0.00
High Quality Water	64.00	10.00	0.00	5,813.00	0.00	0.00
Sensitive Water Supply	19,228.00	52,698.00	51,020.00	2,002.00	0.00	129.00
AESTHETICS	31,767.00	177,969.00	134,919.00	18,485.00	0.00	0.00
AGRICULTURE	57,192.00	236.00	0.00	0.00	0.00	129.00
HYDROELECTRIC POWER	0.00	0.00	0.00	0.00	0.00	8,975.00
INDUSTRIAL	37,695.00	236.00	0.00	0.00	0.00	129.00
INDUSTRIAL/HYDROPOWER	17,759.00	0.00	0.00	0.00	0.00	274,602.00
NAVIGATION	0.00	0.00	0.00	0.00	0.00	110,764.00

Causes and Sources of Nonsupport of Designated Uses

The causes and sources of impairment have been identified for lakes which have been assessed as less than fully supporting. Table 18 lists all of the major causes of pollution contributing to the impairment of lakes in the state and Table 19 lists all of the sources of those impairments.

The causes and sources of impairment have been identified for lakes which have been assessed as less than fully supporting. The term "cause" is defined as any pollutant or other stressors which can contribute to an impairment of an assigned beneficial use of a waterbody. The term stressors is further defined as any factor or condition, other than a specific pollutant, which can cause or contribute to an impairment of a waterbody. The term "source" is defined as the origin from which a particular cause (pollutant or stressors) originated. The categories of sources are hierarchical in nature and go from general to specific in their description of where the cause of impairment originated. For example, if the cause of pollution was from nitrates, the source could be generally listed as agriculture or it could be more specifically listed as crop lands used in agriculture.

The guidelines in determining relative impacts of causes and sources of pollution are as follows:

major impacts

- Any cause or source whose impact results in the waterbody being classified for its uses as "not supporting";

minor impacts

- Any cause or source whose impact results in the waterbody being classified for its uses as "partially supporting" but not "not supporting."

The following are the leading causes of nonsupport of designated uses as identified in Tables 18 and 19:

- Siltation, with 405,707.00 lake acres
- Suspended Solids, with 357,647. 00 lake acres
- Nutrients, with 266,853.00 lake acres
- Pesticides, with 242,686.00 lake acres

The following are the leading sources of nonsupport of designated uses as identified in Tables 18 and 19:

- Agriculture and Agriculture activities, with 2,127,576 lake acres
- Hydromodification and hydromodification activities, with 438,228 lake acres
- Resource Extraction and related activities, with 309,294 lake acres
- Urban Runoff/Storm Sewers and related activities, with 256,788 lake acres

TABLE 18. TOTAL SIZES OF WATERS NOT FULLY SUPPORTING USES, AFFECTED BY VARIOUS CAUSE CATEGORIES FOR LAKES, IN ACRES

CAUSE CATEGORY	CONTRIBUTION TO IMPAIRMENT	
	MAJOR	MODERATE/MINOR
0000 - Cause Unknown	0.00	0.00
0100 - Unknown Toxicity	0.00	45,177.00
0200 - Pesticides	0.00	242,686.00
0300 - Priority Organics	11,805.00	26,686.50
0400 - Nonpriority Organics	0.00	0.00
0500 - Metals	5,813.00	122,334.00
0600 - Ammonia	0.00	40,618.00
0700 - Chlorine	0.00	0.00
0800 - Other Inorganics	0.00	17,600.00
0900 - Nutrients	26,799.00	240,054.00
1000 - pH	0.00	63,142.00
1100 - Siltation	74,279.00	331,428.00
1200 - Organic Enrichment/Low Dissolved Oxygen	29,300.00	150,944.00
1300 - Salinity/TDS/Chlorides	29,290.00	40,990.00
1400 - Thermal Stratification	29,290.00	17,620.00
1500 - Flow Alteration	40,116.50	42,063.00
1600 - Other Habitat Alterations	17,916.00	25,199.00
1700 - Pathogen Indicators	0.00	1,820.00
1800 - Radiation	0.00	0.00
1900 - Oil and Grease	11,805.00	17,609.00
2000 - Taste and Odor	8,430.00	27,983.00
2100 - Suspended Solids	68,874.00	288,773.00
2200 - Noxious Aquatic Plants	5,680.00	42,320.00
2300 - Filling and Draining	0.00	0.00
2400 - Total Toxics	0.00	64,231.00
2500 - Turbidity	0.00	352.00
2600 - Exotic Species	0.00	9,780.00

TABLE 19. TOTAL SIZES OF WATERS NOT FULLY SUPPORTING USES AFFECTED BY VARIOUS SOURCE CATEGORIES FOR LAKES, IN ACRES

SOURCE CATEGORY	CONTRIBUTION TO IMPAIRMENT	
	MAJOR	MODERATE/MINOR
0100 - Industrial Point Source	0.00	0.00
0110 - Major Industrial Point Source	0.00	0.00
0120 - Minor Industrial Point Source	0.00	0.00
0200 - Municipal Point Source	0.00	0.00
0210 - Major Municipal Point Source	0.00	0.00
0220 - Minor Municipal Point Source	0.00	0.00
0230 - Package Plants (Small Flows)	0.00	0.00
0400 - Combined Sewer Overflow	0.00	0.00
0600 - Urban and Rural Runoff	0.00	13,906.00
0900 - Domestic Wastewater Lagoon	0.00	32,073.00
1000 - Agriculture	50,078.00	404,709.00
1100 - Non-Irrigated Crop Production	45,698.00	364,978.00
1200 - Irrigated Crop Production	32,300.00	127,027.00
1300 - Specialty crops (e.g., Horticulture, Citrus, Nuts, Fruits)	0.00	114,486.00
1400 - Pastureland	45,698.00	345,094.00
1500 - Rangeland	45,698.00	329,821.00
1510 - Riparian Grazing	0.00	0.00
1520 - Upland Grazing	0.00	0.00
1600 - Feedlots - all types	2,860.00	90,736.00
1620 - Concentrated Animal Feeding Operations (Permitted, Point Source)	0.00	0.00
1640 - Confined Animal Feeding Operations (NPS)	0.00	0.00
1700 - Aquaculture	0.00	0.00
1800 - Animal Holding/Management Areas	0.00	128,393.00
1900 - Manure Lagoons	0.00	0.00
2000 - Silviculture	0.00	31,200.00
2100 - Harvesting, Restoration, Residue Management	0.00	0.00
2200 - Forest Management	0.00	0.00
2300 - Logging Road Construction/Maintenance	0.00	13,250.00
3000 - Construction	0.00	144,472.00
3100 - Highway/Road/Bridge Construction	0.00	6,822.00
3200 - Land Development	0.00	7,690.00
4000 - Urban Runoff/Storm Sewers	0.00	120,073.00

Source Category	Contribution to Impairment	
	Major	Moderate/Minor
4100 - Nonindustrial Permitted	0.00	51,948.00
4200 - Industrial Permitted	0.00	0.00
4300 - Other Urban Runoff	0.00	84,767.00
5000 - Resource Extraction/Exploration/Development	29,290.00	136,998.00
5100 - Surface Mining	0.00	54,702.00
5200 - Subsurface Mining	0.00	0.00
5300 - Placer Mining	0.00	0.00
5400 - Dredge Mining	0.00	0.00
5500 - Petroleum Activities	29,290.00	44,184.00
5600 - Mill Tailings	0.00	0.00
5700 - Mine Tailings	0.00	0.00
5800 - Acid Mine Drainage	0.00	14,830.00
6000 - Land Disposal (Runoff/Leachate from Permitted Areas)	0.00	30,197.00
6100 - Sludge	0.00	0.00
6200 - Wastewater	0.00	6,040.00
6300 - Landfills	0.00	0.00
6400 - Industrial Land Treatment	0.00	0.00
6500 - Onsite Wastewater Systems (Septic Tanks)	0.00	30,282.00
6600 - Hazardous Waste	0.00	0.00
6700 - Septage Disposal	0.00	0.00
7000 - Hydromodification	46,019.00	108,563.00
7100 - Channelization	11,805.00	19,420.00
7200 - Dredging	0.00	0.00
7300 - Dam Construction	0.00	49,082.00
7350 - Upstream Impoundment	0.00	0.00
7400 - Flow Regulation/Modification	46,019.00	54,043.00
7500 - Bridge Construction	0.00	10,790.00
7550 - Habitat Modification (Other than Hydromod.)	12,236.00	32,390.00
7600 - Removal of Riparian Vegetation	12,236.00	32,390.00
7700 - Stream Bank Modification/Destabilization	0.00	3,235.00
7800 - Drainage/Filling of Wetlands	0.00	0.00
7900 - Marinas	0.00	0.00
8000 - Other	0.00	41.00
8100 - Atmospheric Deposition (Acid Rain)	0.00	0.00
8200 - Waste Storage/Storage Tank Leaks	0.00	2,350.00

Source Category	Contribution to Impairment	
	Major	Moderate/Minor
8300 - Highway Maintenance and Runoff	38,230.00	15,476.00
8400 - Spills	29,290.00	22,749.00
8500 - Contaminated Sediments	17,628.00	95,856.00
8600 - Natural Sources	12,055.00	6,654.00
8700 - Recreational Activities	0.00	20,355.00
8900 - Salt Storage Sites	0.00	0.00
8910 - Groundwater Loadings	0.00	0.00
8920 - Groundwater Withdrawal	0.00	0.00
8950 - Other	0.00	0.00
9000 - Unknown Source	11,837.00	238,707.50

Clean Lakes Program

Table 20 lists all of the Phase I (Investigatory), Phase II (Remediation) and Phase III (Follow-up Monitoring) projects that either have occurred, are ongoing, or are expected to be initiated in the near future:

Table 20. Listing of Phase I, II, and III Clean Lake Projects

Name of Project	Type	Year	Agency	Federal Funding	Problem Addressed	Management Measures Proposed or Undertaken
Pauls Valley Lake	Phase II	1978	OCC		Suspended Solids	BMP
Lake Carl Blackwell	Phase I	1980	OWRB		Suspended Solids	
Lake Liberty/ Guthrie	Phase I	1980	OSDH			
Lake Overholser	Phase I	1980	OWRB		Sedimentation	BMP, Dredging
Northeast Lake	Phase I	1980	OWRB		Sedimentation, Hypereutrophication	Dredging, Sewage Lift Station
Sunset Lake	Phase II	1980	ODPC/ City of Guymon			
Atoka Lake	Phase I	1981	OWRB		Suspended Solids	
Lake Frances	Phase I	1981	OWRB		Eutrophication	Point and Nonpoint Source Controls
Lake Lawtonka	Phase I	1981	OWRB		Eutrophication, Fecal Contamination	Transfer Waste out of Basin
Ada Lake	Phase II	1981	OWRB		Eutrophication, Sedimentation	Dredging
Northeast Lake	Phase II Part I	1983	OWRB	149613	Hypereutrophication, Sedimentation	Dredging and Sewage Lift Station
Northeast Lake	Phase II Part II	1983	OWRB	155184	Hypereutrophication, Sedimentation	Dredging and Sewage Lift Station

NAME OF PROJECT	TYPE	YEAR	AGENCY	FEDERAL FUNDING	PROBLEM ADDRESSED	MANAGEMENT MEASURES PROPOSED OR UNDERTAKEN
Lake Lawtonka	Phase II	1986	OWRB	210816	Fecal Contamination	Transfer Waste out of Basin
Grand Lake	Phase I	1987	OWRB	100000	Eutrophication, Toxics	Point and Nonpoint Source Controls
Lake Ellsworth	Phase I	1987	OWRB	100000	Eutrophication, Sedimentation	BMP and Point Source Controls
Lake Hefner	Phase I	1990	OWRB	100000		
Gaines Creek Arm of Lake Eufaula	Phase I	1990	OCC	100000		
Meadow Lake	Phase I	1990	OWRB	62730	Sedimentation, Toxics	
Lake Chickasha	Phase I	1990	OCC	93286	Suspended Solids	
Tenkiller	Phase I	1991	OWRB	99750	Eutrophication	
Newkirk Country Club Lake	Phase I	1991	OWRB	75020	Sedimentation, Eutrophication, Macrophytes	
Pauls Valley City Lake	Phase III	1991	OCC	65674		
Skipout Lake	Phase I	1991	OCC	100000		
Perry City Lake	Phase I	1991	OWRB	74653	Suspended Solids	
Lake Wister	Phase I	1992	OWRB	100000	Eutrophication	
Lake Tenkiller Deviation	Phase I	1992	OWRB	100000		
Lake Claremore	Phase I	1992	OCC	80000		
Lake Eucha	Phase I	1992	OCC	100000	Eutrophication	
Carmen Lake	Phase I	1992	OWRB	59500	Sedimentation	
Hunter Lake	Phase I	1992	OWRB	71500	Eutrophication	
Taylor (Marlow City) Lake	Phase I	1993	OCC	62000	Suspended Solids	
Lake Henryetta	Phase I	1993	OWRB	100000	Suspended Solids	
Lake Arcadia	Phase I	1994	OWRB	200000	Suspended Solids, Toxics	

Trophic Status [314(a)(1)(A)]

Trophic state is defined as the degree of eutrophication to a lake and provides insight into the lakes productivity. In natural lakes, there is a correlation between the age of a lake and its trophic status. Reservoirs do not function in the same manner as natural lakes, but determining their trophic status does assist in understanding water quality problems affecting them.

Data used for trophic status determination was obtained from the Conservation Commission and the Water Board. Each agency utilizes different sampling methods. The Conservation Commission's lake sampling program is aimed at lakes with a small surface area and a well defined main pool. The Water Board's lake sampling program is aimed at larger lakes. In addition, the Water Board has an Urban Lakes and volunteer monitoring

program, "Oklahoma Water Watch," which monitors lakes owned and operated by an incorporated city. Most of these lakes are used for recreational purposes. The Water Board developed a rotating lakes sampling program to sample the major lakes across the state. The program is designed to sample approximately 30 waterbodies each year with repeat sampling ever fifth year. In cases where lakes are of significant public interest or have serious water quality concerns, waterbodies are sampled on a more frequent basis. For further explanation of the Water Board and Conservation Commission's lakes programs and their methodology used therein, please contact their Clean Lakes Coordinators at their Oklahoma City offices.

The trophic status of lakes falls along a continuum which can be divided into discrete levels: Oligotrophic, Mesotrophic, Eutrophic, and Hypereutrophic. These levels are described below:

Trophic Status	**Description**
Oligotrophic	A lake or reservoir characterized by low nutrient concentration, low productivity, relatively little sedimentation, high clarity and water quality.
Mesotrophic	A lake or reservoir with increased levels of nutrients and sedimentation.
Eutrophic	A lake or reservoir exhibiting relatively high nutrient concentrations and sedimentation rates, increased productivity, and reduced water clarity. Anthropogenic effects such as accelerated nutrient loading or sedimentation rates can often hasten the eutrophication process.
Hypereutrophic	Very high levels of nutrients present. Potential problems associated with hypereutrophication (and to a lesser degree with eutrophication) include fish kills, excessive aquatic weed and algal growth, loss of game fish, loss of recreation and other water quality related problems.

The trophic status determinations used are the same as those used in the 1990 *Lake Water Quality Assessment Report* with supplementation from data collected for the 1994 and 1995 reports. The two most important parameters sampled are turbidity (a measure of water clarity) and chlorophyll-a (a measure of algae standing crop and primary productivity). In some parts of the United States, measures of water clarity like Secchi depth or turbidity will often correlate strongly with the levels of chlorophyll-a. Algae will usually be the main constituent reducing water clarity and accounts for the bulk of measured turbidity. Since Secchi depth or turbidity is much less labor intensive to measure than chlorophyll-a, they are often used as an indication of the algal determinations. For many lakes in the Midwest, trophic state indices (e.g., Carlson Trophic State Index) can be set up based on Secchi depths. Carlson Trophic State Index is equal to 9.81 ln[chl-a] + 30.6. When there is a strong correlation between water transparency and algae, then the water clarity parameter provides a convenient indirect measure of the degree of lake trophic status.

The Conservation Commission determined, based upon five years of monitoring data, that measurements of water clarity parameters, turbidity, etc. are not highly reliable for the associated levels of algae as measured through chlorophyll-a. For low turbidity values (< 5 NTUs) and for high turbidity values (> 100 NTUs), the chlorophyll-a values are generally less than 10 ppb. Over most of the range of turbidity values encountered in Oklahoma, a

given level of turbidity occurring on different lakes could correspond to widely divergent levels of algae.

The turbidity values are of considerable importance for the overall 305(b) assessment process. A clear indication is that turbidity characterizations are better suited for beneficial use attainment, especially for such uses as aquatic life or recreation, than for trophic status determinations. For most lakes, runoff water introduces significant amounts of suspended solids. This affects the degree of water clarity independent of the levels of algae. Except at high turbidity levels, reservoirs do not show pronounced light limitation effects; therefore, high concentration of algae can be present if adequate supplies of nutrients are available. Usually, nutrients are present in soluble forms that would not appreciably impact water clarity. As a result, lakes have been encountered showing typically "high" and also typically "low" concentrations of chlorophyll-a for most levels of turbidity in the range of 5 to 100 NTUs.

Since chlorophyll-a data is collected directly, it is possible to use this information to make assessments of the trophic status of the main pool areas of lakes. The idea behind trophic state characterization is to document the effects of available nutrients on algae production. Algae data converted to Carlson Trophic State Index numbers yields the following:

Relationship Between Carlson Trophic State Index and Trophic State

Range of Carlson Trophic State Index Values	Trophic State
less than or equal to 40	**Oligotrophic**
41 to 50	**Mesotrophic**
51 to 60	**Eutrophic**
greater than 60	**Hypereutrophic**

Oklahoma's lakes are unusual with respect to their colloidal clay content. Re-suspension of colloidal clays can produce very high levels of inorganic turbidity, a condition found in many Oklahoma lakes. In addition, most of Oklahoma's larger lakes are characterized by a large degree of horizontal heterogeneity.

The Water Board generally studies only those lakes identified as "major" lakes. The criterion for major lake is a surface area greater than 100 acres and/or a high degree of public patronage. Table 21 lists those lakes which have been surveyed for their trophic status by the Water Board, and are considered to be significant publicly owned lakes. Table 22 gives a summary of the trophic status of all significant publicly owned lakes which have been assessed. Numerous smaller waterbodies are also studied by the Water Board as part of their volunteer monitoring program. For more details on the specific methodology used by the Water Board to determine trophic status please contact them directly.

TABLE 21. TROPHIC STATUS OF SIGNIFICANT PUBLICLY OWNED LAKES ASSESSED OR MONITORED

RESERVOIR	COUNTY	TROPHIC STATUS	LAST ASSESSED	IMPAIRMENT	SURFACE ACRES IMPAIRED
Ada (Wintersmith Park)	Pontotoc				
Altus City	Jackson	E	1990	E, RC, NP	140.00
Altus-Lugert	Greer/Kiowa	E	1996	E, RC, NP	6,260.00
American Horse	Blaine	E	1996	E	100.00
Arbuckle	Murray	E	1996	E, NP	2,350.00
Arcadia	Oklahoma	E	1996	E, NP	1,820.00
Ardmore	Carter	E	1997	E	
Ardmore City	Carter	M	1997		
Atoka	Atoka	O	1997	TX, RC	5,700.00
Avant Utilities	Osage	M	1990		
Baker/Sandstone Creek 16	Roger Mills	E	1992/93	E, RC	118.00
Bar-Dew	Osage	M	1990		
Beggs, New	Okmulgee	M	1990		
Beggs	Okmulgee	E	1990	E	17.00
Bell Cow	Lincoln	E	1997	E	1,153.00
Birch	Osage	M	1996	TX	1,137.00
Bixhoma	Wagoner	O	1997		
Blackwell	Kay	H	1990	HY, RC	53.00
Blackwell City	Kay	H	1990	HY	2.00
Bluestem	Osage	E	1995	E, RC	762.00
Boomer*	Payne	M	1997	RC	260.00
Boren	Creek	M	1990		
Boynton	Muskogee	E	1992/93	E	33.00
Broken Bow	McCurtain	O	1997	NP, TX	14,200.00
Brown	Pittsburg		1990	RC	139.00
Brushy Creek	Sequoyah	O	1997		
Burtschi, Louis	Grady	H	1997	H, RC	180.00
Byars	McClain	M	1997	RC	67.00
Canton	Blaine	E	1995	RC, E, TX, NP	7,910.00
Carl Albert	Latimer	M	1997		
Carl Blackwell	Payne	M	1995	RC, NP	3,370.00
Carlton	Latimer				
Carmen	Alfalfa	H	1994	H	7.00
Carter	Marshall	M	1995		
Cedar (Mena)	LeFlore	M	1997		
Chandler	Lincoln	E	1995	E, RC, NP	129.00
Checotah City East	McIntosh				
Checotah City West	McIntosh	M	1990		
Chelsea No. 1	Rogers	H	1990	H	22.00

RESERVOIR	COUNTY	TROPHIC STATUS	LAST ASSESSED	IMPAIRMENT	SURFACE ACRES IMPAIRED
Chelsea No. 2	Rogers	H	1990	H	28.00
Chickasha	Caddo	H	1994	H, NP, RC	820.00
Church, Lloyd (Wilburton)	Latimer	E	1997	E	160.00
Claremore	Rogers	H	1997	H, NP	470.00
Clayton	Pushmataha	M	1992/93		
Clear Creek	Stephens	M	1997		
Clearview	Okfuskee	M	1990		
Cleveland	Pawnee	E	1997	E, RC	159.00
Clinton	Washita	E	1995	NP, E	335.00
Clinton-Sherman	Washita	E	1990	E, RC	6.00
Coalgate	Coal	M	1997	RC	352.00
Collinsville	Rogers	H	1990	H	10.00
Comanche	Stephens	M	1995		
Copan	Washington	E	1996	E, NP, RC	4,850.00
Cordell	Washita	H	1990	H	7.00
Crowder	Washita	H	1995	H, NP	158.00
Crowder	Pittsburg		1990		
Crystal Beach	Woodward	M	1992/93		
Cushing	Payne	E	1997	E, RC, NP	591.00
Dahlgren	Cleveland				
Davenport	Lincoln	M	1990		
Dead Indian	Roger Mills	M	1992/93		
Dow	Pittsburg	O	1990		
Dripping Springs	Okmulgee	M	1997		
Duncan	Stephens	M	1995	RC	500.00
Dustin	Hughes	E	1990	E	5.00
El Reno	Canadian	M	1995	RC, NP	170.00
Elk City	Beckham	H	1997	H, NP	240.00
Ellsworth	Comanche	E	1995	E, NP, RC	5,600.00
Elmer	Kingfisher	H	1992/93	H, RC	60.00
Elmer Thomas	Comanche	M	1996		
Elmore City (Brewer)	Garvin	M	1992/93	RC	69.00
Etling, Carl	Cimarron	E	1997	E	159.00
Eucha	Delaware	H	1995	H	2,860.00
Eufaula	Haskell	E	1995	E, RC, NP	105,500.00
Evans Chambers	Beaver	M	1992/93		
Fairfax	Osage	E	1995	E	111.00
Field Station	Woodward	E	1992/93	E, RC	10.00
Fort Cobb	Caddo	H	1995	H, RC, NP	4,100.00

RESERVOIR	COUNTY	TROPHIC STATUS	LAST ASSESSED	IMPAIRMENT	SURFACE ACRES IMPAIRED
Fort Gibson	Cherokee	E	1995	TX, E, NP	14,900.00
Fort Supply	Woodward	E	1995	TX, E, RC	1,820.00
Foss	Custer	M	1996	TX, NP	8,800.00
Frederick	Tillman	M	1997	RC, NP	925.00
Fugate	Atoka				
Fuqua	Stephens	M	1997		
Grama	Comanche	M	1992/93		
Lake O' The Cherokee (Grand)	Mayes	E	1995	T, NP,E	46,500.00
Great Salt Plains	Alfalfa	H	1995	H, RC, NP	8,690.00
Greenleaf	Muskogee	E	1997	E	920.00
Guthrie Country Club	Logan	E	1990	E	97.00
Guthrie	Logan	E	1997	E	274.00
Hall	Harmon	H	1992/93	H	50.00
Hartshorne	Pittsburg	M	1992/93	RC	83.00
Hauani (Madill)	Marshall	E	1992/93	E	270.00
Healdton	Carter	M	1997	RC	370.00
Hefner	Oklahoma	E	1996	E, TX	2,500.00
Henryetta	Okmulgee	O	1996	RC	450.00
Heyburn	Creek	M	1996	NP, T, RC	880.00
Holdenville	Hughes	M	1997		
Holdenville Waterworks	Hughes	E	1990	E	20.00
Hominy	Osage	M	1997		
Hudson	Osage	E	1997	E	250.00
Hudson	Mayes	E	1996	E	10,900.00
Hugo	Choctaw	E	1996	E, NP, TX	13,250.00
Hulah	Osage	E	1996	TX, E, RC, NP	3,570.00
Humphreys	Stephens	E	1997	E	882.00
Hunter Park	Kiowa	E	1993	RC, E	14.00
Jap Beaver	Jefferson	E	1992/93	E, RC	65.00
Jean Neustadt	Carter	E	1997	E, RC	462.00
John Wells	Haskell	O	1995		
Kaw	Kay	M	1996	RC	17,040.00
Kellyville	Creek				
Kerr, Robert S.	Sequoyah	E	1996	E, NP	43,380.00
Keystone	Tulsa	E	1995	E, TX, RC, NP	20,068.00
Kitchen	Cleveland	H	1990	H	80.00
Konowa**	Seminole	M	1997	M	
Krebs	Pittsburg				
Langston	Logan	M	1997		

RESERVOIR	COUNTY	TROPHIC STATUS	LAST ASSESSED	IMPAIRMENT	SURFACE ACRES IMPAIRED
Lawtonka	Comanche	M	1995		
Liberty	Logan	M	1995	NP	167.00
Lone Chimney	Pawnee	E	1997	E	550.00
Longmire	Garvin	E	1997	E	918.00
Lynn Lane	Tulsa				
Madill City (Hauani)	Marshall	M	1990		
Mannford	Creek	M	1992/93		
Massena	Creek	M	1990		
Maysville (Wiley Post)	McClain	M	1997	RC	302.00
McAlester	Pittsburg	M	1995	TX, RC	1,521.00
McGee Creek	Atoka	M	1996	TX	3,810.00
McMurtry	Noble	O	1995		
Meadow	Garfield		1995	TX	10.00
Meeker	Lincoln	M	1994	RC	250.00
Morris	Okmulgee	E	1992/93	E	36.00
Mountain	Carter	O	1994		
Muldrow	Sequoyah	O	1990		
Mulvey Pond	Canadian	H	1990	H	4.00
Murray	Love	M	1995		
Nanih Waiya	Pushmataha	E	1996	E	131.00
Newkirk	Kay				
Newkirk Country Club	Kay	M	1992	RC	41.00
Nichols	Okmulgee	M	1990		
Northeast (Zoo)	Oklahoma	E	1993	TX, E	29.00
Okemah	Okfuskee	M	1997		
Okmulgee	Okmulgee	M	1995		
Onapa	McIntosh	M	1992/93		
Oologah*	Rogers	M	1996	RC	29,460.00
Optima	Texas	H	1992/93	H, RC, NP	5,340.00
Overholser	Oklahoma	E	1997	E, RC	1,500.00
Ozzie Cobb*	Pushmataha	M	1996	RC	116.00
Pauls Valley	Garvin	O	1995	NP	750.00
Pawhuska	Osage	M	1994		
Pawnee	Pawnee	E	1997	E	257.00
Perry	Noble	M	1996	RC, NP	614.00
Pine Creek	McCurtain	M	1997	TX, NP	3,750.00
Pittsburg	Pittsburg	M	1990		
Ponca	Kay	M	1992/92/96	RC	805.00
Ponca City	Kay				

RESERVOIR	COUNTY	TROPHIC STATUS	LAST ASSESSED	IMPAIRMENT	SURFACE ACRES IMPAIRED
Porum	Muskogee	E	1990	E	9.00
Prague	Lincoln	M	1994	RC	225.00
Pretty Water	Creek	E	1990	E	16.00
Purcell	McClain	E	1997	E	150.00
Quanah Parker	Comanche				
Raymond Gary	Choctaw	E	1996	E	263.00
Recreation	Tulsa	H	1990	H, RC	63.00
Rock Creek	Carter	E	1997	E	248.00
Rocky (Hobart)	Washita	M	1995	RC, NP	347.00
Roebuck	Choctaw	E	1990	E	140.00
Sahoma	Creek	E	1997	E	312.00
Sallisaw City	Sequoyah	M	1990		
Sallisaw Park	Sequoyah	M	1990		
Sand Springs	Tulsa	M	1990		
Sapulpa	Creek				
Sardis	Pushmataha	M	1996	NP	13,610.00
Scarbow	Mayes				
Schooler	Choctaw				
Schultz	Texas				
Sgt. Major Creek Site # 4	Roger Mills	M	1990		
Shawnee Twin No.1	Pottawatomie	M	1995	TX	1,336.00
Shawnee Twin No.2	Pottawatomie	E	1995	E, TX	1,100.00
Shell Creek	Osage	E	1997	E	573.00
Skiatook	Osage	M	1996	TX	10,190.00
Skipout	Roger Mills	H	1992/93	H	47.00
Sooner**	Pawnee	M	1995		
Spavinaw	Mayes	E	1996	E	1,584.00
Spiro (New)	LeFlore	E	1995	E	254.00
Spiro (Old)	LeFlore	M	1989/90		
Sportsmans	Seminole	M	1995		
Spring Creek	Johnston	M	1992/93		
Stanley Draper	Cleveland	O	1997	TX, RC	2,900.00
Stigler	Haskell	E	1990	E	22.00
Stilwell	Adair	M	1995		
Stroud	Creek	M	1997		
Sunset (Guymon)	Texas	E	1992/93	E	10.00
Talawanda No.1	Pittsburg	M	1995		
Talawanda No.2	Pittsburg	M	1995		
Talihina	Latimer	E	1990	E	23.00

RESERVOIR	COUNTY	TROPHIC STATUS	LAST ASSESSED	IMPAIRMENT	SURFACE ACRES IMPAIRED
Taylor (Marlow)	Grady	H	1994	H, RC, NP	227.00
Taylor (Sandstone)	Roger Mills	M	1992/93		
Tecumseh	Pottawatomie	E	1995	E, RC	127.00
Temple	Cotton	E	1990	E, RC	26.00
Ten-Acre	Oklahoma	E	1990	E	6.00
Tenkiller	Sequoyah	E	1996	E, NP	12,900.00
Texoma	Bryan	E	1996	TX, E, NP	88,000.00
Thunderbird	Cleveland	E	1995	E, RC, NP	6,070.00
Tom Steed	Kiowa	E	1996	E, RC	6,400.00
Troly	Atoka				
Vanderwork	Washita	H	1997	H	135.00
Veterans	Murray	M	1992/93		
Vincent, Loyd	Ellis	M	1992/93		
W.R. Holway	Mayes	E	1992/93	E	712.00
Walters (Dave Boyer)	Cotton	M	1995	RC, NP	148.00
Wapanucka	Johnston	H	1990	RC, H	16.00
Watonga	Blaine				
Waurika	Jefferson	E	1996	E	10,100.00
Waxhoma	Osage	M	1995		
Wayne Wallace	Latimer	O	1992/93		
Webbers Falls	Muskogee	H	1997	H, NP, RC	11,600.00
Weleetka	Okfuskee	E	1992/93	E	59.00
Wetumka	Hughes	E	1995	E, RC	169.00
Wewoka	Seminole	M	1997	NP	371.00
Wister	LeFlore	E	1990/91/92	E, TX, NP	7,333.00
Yahola	Tulsa				
Youth	Pittsburg	O	1990		
Total					**598,951.00**

Legend:

Trophic State
O = Oligotrophic
M = Mesotrophic
E = Eutrophic
HY = Hypereutrophic

E/M
E = Evaluated
M = Monitored

Impairments
E = Eutrophic
HY = Hypereutrophic
NP = Nonpoint Source
R = Recreational
SD = Silt Dominated
T = Toxicity Concerns

TABLE 22. SUMMARY OF TROPHIC STATUS OF SIGNIFICANT PUBLICLY OWNED LAKES

	NUMBER OF LAKES	ACREAGE OF LAKES
TOTAL	2,337	645,286.00
ASSESSED	201	630,362.00
OLIGOTROPHIC	14	10,568.00
MESOTROPHIC	69	105,325.00
EUTROPHIC	77	342,706.00
HYPEREUTROPHIC	39	165,744.00
DYSTROPHIC	0	0.00
UNKNOWN (SILT DOMINATED)	2	6,019.00

Control Methods [314(a)(1)(B)]

Oklahoma's environmental agencies use a variety of methods to control sources of pollution from entering lakes. There are only a few direct discharge to lakes from municipal point source dischargers, all of which are considered minor dischargers. For dischargers that discharge into a watershed of a lake, these facilities are being looked at to insure that their discharge does not violate the water quality of both the receiving stream and the lake.

All point source dischargers are required to have National Pollution Discharge Elimination System and state Pollutant Discharger permits. All permits require the discharger to meet the Oklahoma WQS. Most all of the lakes have the designated use assignment for primary drinking water supplies which adds additional protection requirements for the Sensitive Water Supply (SWS) limitation. All lakes have the additional requirement that there be no new or any increase in loading from any point source discharger. In addition, municipal regulation require more stringent limits for conventional pollutants.

For nonpoint sources of pollution, BMP's are the most effective control for preventing pollution into lakes. On those lake's with the designation of SWS, implementation of BMP's in the lakes watershed are an essential part of the lake's protection. In those watershed where land application of wastewater from industrial or municipal facilities is utilized, additional controls must be employed to control the runoff. Selection of appropriate BMPs should be done on a site-specific basis and as an integrated system. There are several methods and procedures which can be utilized to control nonpoint sources of pollutants to lakes. The following two listings of BMPs were taken from the 319 Agricultural and Silviculture Management Program Components of the *Nonpoint Source Assessment Report 319(h)*. These control methods are not intended to be an all inclusive list. For a complete listing, consult the *Nonpoint Source Assessment Report 319(h)*.

Practices for forestry management include:

- pursuing a harvesting regimen which reduces soil loss,
- filter strips,
- disposal of logging debris,
- terracing,
- storm water diversion, and
- construction of ditches.

Practices for agriculture include the following:

- buffer strips,
- conservation tillage,
- contouring,

contour strip cropping,
crop rotation,
graded rows,
integrated pest management,
range management,
prevention of over fertilization, and
terracing.

Additional practices for reducing urban nonpoint pollution to lakes include the following:

proper maintenance of sewer systems,
public education,
riparian placement in sensitive areas,
storm water detention ponds,
street sweeping, and
wetland construction.

Water Quality Standards for Lakes

The *Lake Water Quality Assessment Report* provides a complete listing of the impaired lakes in the state. This report aids in the development of lake WQS and assists in the control of both point and nonpoint sources of pollution. The beneficial uses for Oklahoma's lakes are summarized in Oklahoma's WQS. These beneficial uses include:

Aesthetics,
Agriculture,
Cooling Water,
Fish and Wildlife Propagation,
Industrial and Municipal Processing,
Primary Body Contact Recreation,
Public and Private Water Supplies, and
Warm Water Aquatic Community.

Water Quality Standards for Temperature

Temperature standards for lakes requires that the temperature shall not be raised, from artificial sources, more than 1.7°F above background conditions. Background conditions are based on the average temperature of a lake taken from the surface to the bottom of the lake, or if the lake is stratified, from the surface to the bottom of the epilimnion.

Water Quality Standards for Toxics

Toxics criteria are based on the United States Food and Drug Administration's alert levels. The concern levels are set at 50% of the alert level. The standards are as follows:

1. Surface waters of the state shall be maintained to prevent bio-concentration of toxic substances in fish, shellfish, or other aquatic organisms.
2. Concentrations of substances in fish tissue (fillets) in excess of the listed concern levels shall be cause for further investigation by the appropriate regulatory agency.
3. Concentrations of substances in fish tissue (fillets) in excess of the listed alert levels shall be cause for evaluation of discharge permits to determine if point source discharges are causing or contributing to the alert level exceedance.
4. Waste discharge permit limits shall be modified or established as necessary to restrict the discharge of the exceeded substance where an evaluation determines that point source discharge(s) are causing or contributing to the alert level exceedance.
5. Nonpoint sources of these substances should be restricted by application of best management practices in areas where concern or alert levels are exceeded.

SUBSTANCE	ALERT LEVEL (MG/KG)	CONCERN LEVEL (MG/KG)
ALDRIN	0.3	0.15
CHLORDANE	0.3	0.15
DDT	5.0	2.5
DIELDRIN	0.3	0.15
ENDRIN	0.3	0.15
HEPTACHLOR	0.3	0.15
MERCURY	1.0	0.5
PCBS	2.0	1.0
TOXAPHENE	5.0	2.5

Water Quality Standards for Coliform

The following coliform bacterial standards apply to lakes in the state which are designated for public and private water supplies:

1. Bacteria, of the total coliform group, shall not exceed a monthly geometric mean of 5,000/100 ml at the point of intake for public or private water supply.
2. The geometric mean is determined by multiple-tube fermentation or membrane filter procedures based on a minimum of not less than five samples taken over a period of not more than 30 days.
3. In no more than ten percent of the total samples taken during any 30 day period shall the bacteria of the fecal coliform group exceed 20,000/100 ml.
4. For lakes with both public and private water supply and primary body contact recreation designated uses, the more stringent criteria, usually the primary body contact, will apply.

For the designated use of primary body contact recreation, the limits for bacteria apply only during the period of May 1 to September 30. For the remainder of the year, the criteria for the designated use of secondary body contact recreation applies. Compliance with § 785:45-5-16 of the WQS is based upon meeting one of three options. Once an optional test method is selected, this method must be used exclusively for that 30 day period. These test methods are:

1. For bacteria of the fecal coliform group, the monthly geometric mean shall not exceed 200/100 ml. The geometric mean shall be determined by multiple-tube fermentation or membrane filter procedures based on a minimum of not less than five samples taken over a period of not more than 30 days. In no more than ten percent of the total samples taken during any 30 day period shall the bacteria of the fecal coliform group exceed 400/100 ml.
2. For *Escherichia coli*, the monthly geometric mean shall not exceed 126/100 ml. The geometric mean shall be determined by multiple-tube fermentation or membrane filter procedures based on a minimum of not less than five samples taken over a period of not more than 30 days. None of the samples shall exceed a 75 percent one-sided confidence level of 235/100 ml and a 90 percent one-sided confidence level of 406/100 ml.
3. For *Enterococci spp.*, the monthly geometric mean shall not exceed 33/100 ml. The geometric mean shall be determined by multiple-tube fermentation or membrane filter procedures based on a minimum of not less than five samples taken over a period of not more than 30 days. None of the samples shall exceed a 75 percent

one-sided confidence level of 61/100 ml and a 90 percent one-sided confidence level of 108/100 ml.

Water Quality Standards for Turbidity

A turbidity standard of 25 NTUs has been established for all Oklahoma lakes.

Point Sources of pollution are addressed for lakes in a similar manner as rivers and creeks. Please reference Part II, for further information on Point Source pollution controls. For further explanation of Point Source control methods, or fines associated with violation of permits, please contact the Department's Oklahoma City office.

Restoration Efforts [314(a)(1)(C)]

There are numerous techniques which may be used to restore lake water quality. Some of the techniques available include:

advanced wastewater treatment processes,
alum treatment (phosphorous precipitation and inactivation),
aquatic plant control (harvesting),
hypolimnetic aeration,
hypolimnetic withdrawal,
lake dredging,
macrophyte harvesting.
Sediment oxidation,
storm water diversion,
water draw-down.

The technique(s) selected should be based upon site specific criteria and monetary constraints. Whichever techniques is selected, its effectiveness will be influenced by the pollution control procedures in place in the watershed.

Advanced wastewater treatment processes are usually the most effective technique in cases where lakes receive high nutrient input from a wastewater treatment plant. However, the costs of upgrading a wastewater treatment plant can sometimes be prohibitive. No federal dollars have been spent specifically for this lake restoration technique.

Dredging is the most popular and effective method for lake restoration. Lake dredging not only deepens the lake, it also removes toxics and other nutrients found in the sediment. Some problems associated with lake dredging are in finding a proper location for the catchment basin, re-suspension of sediment, and loss of aquatic habitat. Dredging has been conducted on Northeast (Zoo) Lake in Oklahoma City, Wintersmith Park Lake in Ada, and Sunset Lake in Guymon. Dredging has been preformed on other lakes within the state that have utilized funding sources other than federal monies.

Alum treatments (phosphorous precipitation and inactivation) are an effective means of controlling releases of phosphorous from the sediments. Aluminum sulfate and sodium aluminate are the two most commonly used compounds in alum treatments. Alum treatments have proven to be a successful short term remedy to water quality problems. However, the long-term effectiveness of this approach has yet to be determined. No federal dollars have been spent specifically for this lake restoration technique.

Hypolimnetic aeration involves the injection of air, or oxygen, in to the lake sediment. Its purpose is to aerate or oxygenate the hypolimnion to preclude the development of anoxic conditions. Anoxic conditions can result in the release of phosphorous and metals from the sediments. This procedure is not as popular as hypolimnetic withdrawal. Individual

municipalities do employ this technique to improve or maintain water quality. However, no federal monies were used in system installation or maintenance for this technique.

Hypolimnetic withdrawal involves the removal of hypolimnetic water. This withdrawal decreases the residence time of the water resulting in a decrease in anoxic conditions. This technique also aids in reducing the release of nutrients and metals from the sediments. The cost of this technique is relatively low. However, there is a possibility of degrading the water quality of the receiving stream. No lakes have had this technique utilized at this time.

Macrophyte harvesting is a treatment for aquatic macrophyte control. The principals involved are simple and well established. This technique is use on a site specific basis utilizing federal and or state monies other than section 314 monies.

Sediment oxidation is an effective technique for reducing phosphorous loading in a lake. The technique involves the injection of chemicals into the sediment to facilitate the denitrification process. Denitrification will normally decrease the release of phosphorous from the sediments. No lakes have had this technique utilized at this time.

Storm water diversion is an effective technique for improving lake water quality. This technique reduces the suspended solid and nutrient input into a lake. However, diversion might better be considered a control methodology rather than a lake treatment technique. This technique was utilized for Northeast (Zoo) Lake project to control pollution (sediment loading) inputs to the lake.

Water draw-down is a treatment for aquatic macrophyte control. The principals involved are simple and well established. This technique is not currently utilized by the state.

Table 23 lists the various lake rehabilitation techniques utilized by the state. For more information on lake restoration techniques, consolute "*Lake and Reservoir Restoration*" (Cooke, G. D. et. al.). For a listing of Clean Lakes Program Projects, refer to Table 20.

TABLE 23. LAKE REHABILITATION TECHNIQUES FUNDED UNDER SECTION 314 OF THE CWA

REHABILITATION TECHNIQUE	NUMBER OF LAKES WHERE TECHNIQUE HAS BEEN USED	ACRES OF LAKES WHERE TECHNIQUE HAS BEEN USED
IN-LAKE TREATMENTS		
Phosphorus Precipitations/Inactivation		
Sediment Removal/Dredging	4	805
Artificial Circulation to Increase Oxygen		
Aquatic Macrophyte Harvesting	1	150
Application of Aquatic Plant Herbicides	1	2,500
Drawdown to Desiccate and/or Remove Macrophytes		

REHABILITATION TECHNIQUE	NUMBER OF LAKES WHERE TECHNIQUE HAS BEEN USED	ACRES OF LAKES WHERE TECHNIQUE HAS BEEN USED
Hypolimnetic Aeration		
Sediment Oxidation		
Hypolimnetic Withdrawal of Low DO Water		
Dilution/Flushing		
Shading/Sediment Covers or Barriers		
Destratification	1	2,500
Sand or Other Filters Used to Clarify Water		
Food Chain Manipulation		
Biological Controls		
Other In-lake Treatment (Specify)		
WATERSHED TREATMENTS		
Sediment Traps/Detention Basins		
Shoreline Erosion Controls/Bank Stabilization		
Diversion of Nutrient Rich In-flow	1	2,398
Conservation Tillage Used		
Integrated Pest Management Practices Applied		
Animal Waste Management Practices Installed		
Porous Pavement Used		
Redesign of Streets/Parking Lots to Reduce Runoff		
Road or Skid Trail Management		
Land Surface Roughening for Erosion Control		
Riprapping Installed		
Unspecified Type of BMPs Installed		
Other Watershed Controls (Specify)		
OTHER LAKE PROTECTION/RESTORATION CONTROLS		
Local Lake Management Program In-place		
Public Information/Education Program/Activities		
Local Ordinances/Zoning/Regulations to Protect Lake		
Point Source Controls		
Other (Specify)		

* numbers and acres were estimated

Impaired and Threatened Lakes [314(a)(1)(E)]

An average Trophic State Index (TSI), derived from multiple sample stations, was utilized to compute an overall lake-wide TSI value. Examination of a lake's TSI on a station-by-station basis revealed the presence of problem areas within the lake; however, a single TSI value was reported for each lake. Because of differences in TSI values between sample stations on the same lake, multiple samples should be collected over the entire lake and an average of the summer chlorophyll-a values and subsequent trophic state determinations should be used to accurately identify the trophic status of the waterbody. Temporal fluctuations on a seasonal basis cannot be determined from the collected data and is considered a serious weakness in the monitoring program. Oklahoma is currently working to address this program with the monitoring program.

Table 24 lists those lakes which had recreation concerns. Total lake acres impaired was 158,912.00 acres.

TABLE 24. LIST OF LAKES WITH RECREATION CONCERNS.

RESERVOIR	USE SUPPORT	TYPE OF CONCERN	YEAR IMPAIRMENT DOCUMENTED	SURFACE ACRES AFFECTED
Altus-Lugert	Threatened	Suspended Solids	1992/93/96 LWQA	6,260.00
Atoka	Not Supporting	Suspended Solids	1997 LWQA	5,643.00
Blackwell	Not Supporting	Siltation, Nutrients, Eutrophication	1990 319 Report	51.00
Bluestem	Not Supporting	Suspended Solids	1995 LWQA	762.00
Boomer	Threatened	Suspended Solids	1997 LWQA	260.00
Brown	Not Supporting	Suspended Solids	1990 319 Report	139.00
Byars	Not Supporting	Suspended Solids, Siltation, Macrophytes	1990 LWQA	67.00
Canton	Not Supporting	Suspended Solids	1995 LWQA	7,910.00
Carl Blackwell	Threatened	Suspended Solids	1990 LWQA	169.00
Chambers (Evans)	Not Supporting	Suspended Solids	OCC Sampling	80.00
Chandler	Not Supporting	Suspended Solids	1995 LWQA	129.00
Chickasha	Threatened	Taste/Odor	1990 319 Report	820.00
Cleveland	Not Supporting	Siltation	OCC Sampling	161.00
Clinton	Not Supporting	Suspended Solids, Siltation	1995 LWQA	335.00
Clinton-Sherman	Threatened	Siltation, Macrophytes	1990 LWQA	6.00
Coalgate	Not Supporting	Suspended Solids	1997 LWQA	352.00
Copan	Not Supporting	Suspended Solids	1992/93/96 LWQA	4,850.00
Cushing	Not Supporting	Suspended Solids	1997 LWQA	591.00
El Reno	Not Supporting	Suspended Solids	1995 LWQA	170.00
Ellsworth	Threatened	Suspended Solids	1994/95 LWQA	1,338.00
Elmer	Not Supporting	Suspended Solids	OCC Sampling	60.00
Elmore City	Not Supporting	Suspended Solids, Nutrients	OCC Sampling	69.00
Fort Cobb	Threatened	Suspended Solids, Siltation	1995 LWQA	4,100.00
Fort Supply	Not Supporting	Suspended Solids	1995 LWQA	1,820.00

RESERVOIR	USE SUPPORT	TYPE OF CONCERN	YEAR IMPAIRMENT DOCUMENTED	SURFACE ACRES AFFECTED
Frederick	Not Supporting	Suspended Solids	1997 LWQA	925.00
Great Salt Plains	Not Supporting	Suspended Solids	1995 LWQA	8,690.00
Hartshorne	Not Supporting	Suspended Solids, Nutrients	OCC Sampling	84.00
Headlton	Not Supporting	Suspended Solids	1997 LWQa	370.00
Henryetta	Not Supporting	Suspended Solids	314 Study, 1996 LWQA	423.00
Heyburn	Not Supporting	Suspended Solids	1992/93/96 LWQA	880.00
Hulah	Not Supporting	Suspended Solids	1992/93/96 LWQA	3,534.00
Hunter Park Lake	Not Supporting	Suspended Solids	1993 LWQA	15.00
Jap Beaver	Not Supporting	Suspended Solids	OCC Sampling	65.00
Jean Neustadt	Not Supporting	Suspended Solids	1997 LWQA	462.00
Kaw	Threatened	Suspended Solids	1992/93/96	17,040.00
Keystone	Not Supporting	Suspended Solids	1995 LWQA	23,610.00
Liberty	Not Supporting	Suspended Solids	1995 LWQA	167.00
Madill City Lake	Threatened	Siltation, Macrophytes	1990 LWQA	23.00
Mannford	Not Supporting	Suspended Solids	OCC Sampling	191.00
Maysville (Wiley Post)	Not Supporting	Suspended Solids	1997 LWQA	299.00
McAlester	Not Supporting	Suspended Solids	1995 LWQA	1,521.00
Meadow Lake	Not Supporting	Siltation	1993 Phase I	10.00
Meeker	Not Supporting	Suspended Solids	1994 LWQA	213.00
Morris	Not Supporting	Suspended Solids	OCC Sampling	36.00
Mulvey Pond	Not Supporting	Siltation, Nutrients	1990 LWQA	5.00
Newkirk Country Club Lake	Not Supporting	Macrophytes	314 Phase I	45.00
Oologah	Threatened	Suspended Solids	1996 LWQA	29,460.00
Optima	Not Supporting	Suspended Solids	OCC Sampling	5,340.00
Overholser	Not Supporting	Suspended Solids	1997 LWQA	1,500.00
Ozzie Cobb	Threatened	Suspended Solids	OCC Sampling	116.00
Pauls Valley	Not Supporting	Suspended Solids	1995 LWQA	750.00
Perry	Not Supporting	Suspended Solids, Siltation, Taste/Odor	314 Phase I	614.00
Ponca	Not Supporting	Suspended Solids	1992/93 LWQA	805.00
Prague	Not Supporting	Suspended Solids	OCC Sampling	225.00
Recreation	Not Supporting	Siltation	1990 LWQA	3.00
Rocky (Hobart)	Not Supporting	Suspended Solids	1995 LWQA	347.00
Shawnee Twin #1	Not Supporting	Suspended Solids	1995 LWQA	1,336.00
Shawnee Twin #2	Not Supporting	Suspended Solids	1995 LWQA	1,100.00
Sportsmans	Not Supporting	Suspended Solids	1995 LWQA	354.00
Stanley Draper	Not Supporting	Suspended Solids	1997 LWQA	2,900.00

RESERVOIR	USE SUPPORT	TYPE OF CONCERN	YEAR IMPAIRMENT DOCUMENTED	SURFACE ACRES AFFECTED
Taylor(Sandstone)	Threatened	Suspended Solids	OCC Sampling	227.00
Tecumseh	Not Supporting	Suspended Solids, Siltation, Taste/Odor	1995 LWQA	127.00
Temple	Threatened	Suspended Solids, Nutrients	1990 LWQA	35.00
Thunderbird	Not Supporting	Suspended Solids, Taste/Odor	1995 LWQA	6,070.00
Tom Steed	Not Supporting	Suspended Solids	1992/93/96 LWQA	603.00
Walters	Not Supporting	Suspended Solids, Siltation, Taste/Odor	1995 LWQA	148.00
Wapanucka	Not Supporting	Siltation	1990 LWQA	23.00
Wayne Wallace	Not Supporting	Suspended Solids	OCC Sampling	94.00
Webbers Falls	Not Supporting	Suspended Solids	1997 LWQA	11,600.00
Wewoka	Not Supporting	Siltation	1994 LWQA	371.00
Youth	Not Supporting	Suspended Solids, Siltation	1990 LWQA	14.00
TOTAL				**158,912.00**

Table 25 list those lakes which were experiencing nonpoint source concerns. Many of these lakes also exceed the Oklahoma WQS for turbidity. Total lake acres impaired was 473,649.00 acres. This list was derived from the state's 319 Report and the Oklahoma Lake Water Quality Assessment Report.

TABLE 25. LIST OF LAKES WITH NONPOINT SOURCE CONCERNS.

RESERVOIR	WATER QUALITY CONCERN	SAMPLE YEAR IMPAIRMENT DOCUMENTED	SURFACE ACRES AFFECTED
Altus	Agriculture, Construction	1990	6,260.00
Arbuckle	Petroleum Activity, Urban Runoff	1990	2,350.00
Arcadia	Urban Runoff, Septic System, In-place Contamination	1990	1,820.00

RESERVOIR	WATER QUALITY CONCERN	SAMPLE YEAR IMPAIRMENT DOCUMENTED	SURFACE ACRES AFFECTED
Broken Bow	Silviculture	1990	14,200.00
Canton	Agriculture	1990	2,373.00
Carl Blackwell	Agriculture	1990	843.00
Chandler	Agriculture	1990	129.00
Chickasha	Agriculture	1990	820.00
Claremore	Acid Mine Discharge, Source Unknown	1990	61.00
Clinton	Agriculture	1990	335.00
Copan	Agriculture	1990	4,850.00
Crowder	Agriculture	1990	158.00
Cushing	Agriculture	1990	591.00
El Reno	Agriculture	1990	165.00
Elk City	Agriculture, Oil Fields Spills	1990	240.00
Ellsworth	Agriculture	1990	5,600.00
Eufaula	Agriculture, Urban Runoff, Strip Mining	1990	105,500.00
Fort Cobb	Agriculture	1990	4,100.00
Fort Gibson	Urban Runoff, In-place Contamination	1990	19,900.00
Fort Supply	Agriculture	1990	1,820.00
Foss	Agriculture	1990	8,800.00
Frederick	Agriculture	1990	925.00
Gary	Unknown	1990	263.00
Grand (Lake of the Cherokees)	Urban Runoff, Septic Seepage, Agriculture, Acid Mine Drainage, Construction, In-Place Contaminant	1990	46,500.00
Great Salt Plains	Agriculture	1990	8,690.00
Heyburn	Agriculture, Oil Field Runoff	1990	880.00
Hugo	Agriculture, Silviculture	1990	13,250.00
Hulah	Agriculture	1990	3,570.00
Kerr	Agriculture, Urban Runoff, Mining	1990	43,800.00
Keystone	Agriculture, Road Maintenance	1990	23,610.00
Liberty	Urban Runoff	1990	124.00
Meadow Lake	Urban Runoff, In-Place Contaminant	1990	10.00
Optima	Agriculture	1990	5,340.00
Pauls Valley	Agriculture, Construction	1990	750.00
Perry	Agriculture	1990	614.00
Pine Creek	Silviculture	1990	3,750.00
Rocky (Hobart)	Agriculture	1990	347.00
Sardis	Agriculture, Acid Mine Discharge	1990	13,610.00
Taylor (Marlow)	Agriculture, Source Unknown (toxicity)	1990	227.00
Tenkiller	Agriculture	1990	12,900.00
Texoma	Agriculture, Construction	1990	88,000.00

RESERVOIR	WATER QUALITY CONCERN	SAMPLE YEAR IMPAIRMENT DOCUMENTED	SURFACE ACRES AFFECTED
Thunderbird	Agriculture, Urban Runoff	1990	6,070.00
Walters	Agriculture	1990	200.00
Webbers Falls	Agriculture, Urban Runoff, Flow Alteration	1990	11,600.00
Wewoka	Agriculture, Oil Field Runoff	1990	371.00
Wister	Agriculture	1990	7,333.00
TOTAL			**473,649.00**

Table 26 lists lakes which were classified as eutrophic or hypereutrophic. Lakes which were classified as eutrophic or hypereutrophic are considered to be threatened or impaired respectively. Total lake acres impaired was 486,846.00 acres.

TABLE 26. LIST OF HYPEREUTROPHIC/EUTROPHIC LAKES

RESERVOIR	CARLSON'S TROPHIC STATE INDEX	SURFACE ACRES AFFECTED	SAMPLE YEAR IMPAIRMENT DOCUMENTED
Altus City	56	110.00	1990 LWQA
Altus Lugert	52	6,260.00	1996 LWQA
American Horse	52	100.00	1996 LWQA
Arbuckle	52	2,350.00	1996 LWQA
Arcadia	55	1,820.00	1996 LWQA
Ardmore City	52	122.00	1995 LWQA
Baker	58	118.00	OCC 1992/93 Sampling
Beggs	54	17.00	1990 LWQA
Bell Cow	55	1,153.00	1997 LWQA
Blackwell	63	51.00	1990 LWQA
Blackwell City	60	1.00	1990 LWQA
Bluestem	55	762.00	1995 LWQA
Boynton	57	33.00	OCC 1992/93 Sampling
Burtschi (Louis)	61	180.00	1997 LWQA
Canton	57	5,537.00	1995 LWQA
Carl Etling	54	159.00	1992/93 LWQA
Carmen	64	7.00	1994 LWQA
Chandler	57	129.00	1995 LWQA
Chelsea No. 1	66	17.00	1990 LWQA
Chelsea No. 2	62	28.00	1990 LWQA
Chickasha	68	820.00	1994 LWQA
Claremore	68	470.00	1997 LWQA
Cleveland	56	159.00	1997 LWQA

RESERVOIR	CARLSON'S TROPHIC STATE INDEX	SURFACE ACRES AFFECTED	SAMPLE YEAR IMPAIRMENT DOCUMENTED
Clinton	55	335.00	1995 LWQA
Clinton-Sherrman	51	6.00	1990 LWQA
Collinsville	65	10.00	1990 LWQA
Copan	52	4,850.00	1996 LWQA
Cordell	68	7.00	1990 LWQA
Crowder	73	158.00	1995 LWQA
Cushing	57	591.00	1997 LWQA
Dustin	58	27.00	1990 LWQA
Elk City	64	240.00	1997 LWQA
Ellsworth	59	5,600.00	1995 LWQA
Elmer	65	60.00	OCC 1992/93 Sampling
Etling, Carl	55	1,717.00	1997 LWQA
Eucha	62	2,860.00	1995 LWQA
Eufaula	53	88,620.00	1995 LWQA
Fairfax	51	111.00	1995 LWQA
Fort Cobb	73	4,100.00	1995 LWQA
Fort Gibson	60	19,900.00	1995 LWQA
Fort Supply	55	1,820.00	1995 LWQA
Grand (Lake of The Cherokees)	57	46,500.00	1995 LWQA
Great Salt Plains	66	8,690.00	1995 LWQA
Greenleaf	52	14,720.00	1997 LWQA
Guthrie	56	274.00	1997 LWQA
Guthrie County Club	57	57.00	1990 LWQA
Hall	61	50.00	OCC 1992/93 Sampling
Hauani (Big)	57	270.00	OCC 1992/93 Sampling
Hefner	52	2,500.00	1996 LWQA
Holdenville Waterworks	57	20.00	1990 LWQA
Hudson	55	10,900.00	1996 LWQA
Hudson	53	250.00	1997 LWQA
Hugo	52	13,250.00	1997 LWQA
Hulah	66	3,570.00	1996 LWQA
Humphreys	55	882.00	1997 LWQA
Hunter Park Lake	55	14.00	1994 314 Phase I Study
Jap Beaver	54	65.00	OCC 1992/93 Sampling
Jean Neustadt	52	462.00	1997 LWQA
Kerr, Robert S.	55	43,800.00	1996 LWQA
Keystone	56	20,068.00	1995 LWQA
Kitchen	71	25.00	1990 LWQA
Lloyd Church	52	160.00	1997 LWQA

RESERVOIR	CARLSON'S TROPHIC STATE INDEX	SURFACE ACRES AFFECTED	SAMPLE YEAR IMPAIRMENT DOCUMENTED
Lone Chimney	57	550.00	1997 LWQA
Longmire, R.C.	57	918.00	1997 LWQA
Morris	51	36.00	OCC 1992/93 Sampling
Mulvey Pond	74	5.00	1990 LWQA
Nanih Waiya	55	131.00	1996 LWQA
Northeast (Zoo)	--	29.00	1991 314 Phase I Study
Optima	93	5,340.00	OCC 1992/93 Sampling
Overholser	56	5,100.00	1997 LWQA
Pawnee	53	257.00	1997 LWQA
Porum	69	10.00	1990 LWQA
Pretty Water	57	45.00	1990 LWQA
Purcell	55	158.00	1997 LWQA
Raymond Gary	58	260.00	1996 LWQA
Recreation	72	3.00	1990 LWQA
Rock Creek	52	3,588.00	1997 LWQA
Roebuck	Satellite	350.00	1990 LWQA
Sahoma	51	484.00	1997 LWQA
Shawnee Twin 2	52	1,100.00	1995 LWQA
Shell Creek	56	573.00	1997 LWQA
Skipout	66	47.00	OCC 1992/93 Sampling
Spavinaw	51	1,584.00	1996 LWQA
Spiro (New)	60	254.00	1995 LWQA
Stigler	58	24.00	1990 LWQA
Sunset (Guymon)	57	10.00	OCC 1992/93 Sampling
Talihina	50	25.00	1990 LWQA
Taylor (Marlow)	61	227.00	1994 LWQA
Tecumseh	58	127.00	1995 LWQA
Temple	58	35.00	1990 LWQA
Ten Acre	56	6.00	1990 LWQA
Tenkiller	54	12,900.00	1996 LWQA
Texoma	59	88,000.00	1996 LWQA
Thunderbird	57	6,070.00	1995 LWQA
Tom Steed	51	6,400.00	1996 LWQA
Vanderwork	62	135.00	1997 LWQA
Wapanucka	79	23.00	1990 LWQA
Waurika	56	10,100.00	1996 LWQA
Webbers Falls	61	11,600.00	1997 LWQA
Weleetka	56	59.00	OCC 1992/93 Sampling
Wetumka	54	169.00	1995 LWQA
Wister	56	12,172.00	1995 Phase I Study

RESERVOIR	CARLSON'S TROPHIC STATE INDEX	SURFACE ACRES AFFECTED	SAMPLE YEAR IMPAIRMENT DOCUMENTED
TOTAL		486,846.00	

The volunteer monitoring program "Oklahoma Water Watch" was designed to collect information on lakes where little or no previous water quality data existed and/or to monitor lakes which have intensive economic or recreational value. The state of Oklahoma does not currently have a specific state funded program for lake water quality monitoring. Due to the scarcity of long term data, currently it is not possible to determine trends on Oklahoma's lakes.

For additional information on lake impairment, consult the *Oklahoma Lake Water Quality Assessment Report* and the *Nonpoint Source Pollution Assessment Report (319)*.

Acid Effects on Lakes [314(a)(1)(D); 314(a)(1)(E)]

The EPA, United States Geological Survey, and other national level investigatory agencies have documented the presence of acid precipitation in the eastern portion of the state. Soils in the southeastern portion of the state lack sufficient buffering capacity and are therefore vulnerable to the effects of acid precipitation. However, there have not been any documented cases of impairment, to any of its waters, due to acid precipitation. Monitoring conducted by the state agencies do not specifically sample for acid precipitation; however, they do sample for pH. Acceptable pH values range from 6.5 to 9.0. The few cases of pH problems (which have been documented) were not attributed to acid precipitation.

The Department, the Conservation Commission, the Water Board, and the EPA have documented impacts to water quality from acid mine drainage. The Gaines Creek arm of Lake Eufaula is one such example. It is estimated that as much as 100,000 gallons per day of acid mine drainage seep into Gaines Creek. The Conservation Commission has preformed a Phase I diagnostic study of this waterbody.

Another example would be the Lake O' the Cherokees. Most of the acid problems, in this area, originates from the upper portion of the lake and its watershed. Some of the areas are located around the old Pitcher mining sites. Seeps have formed from water migrating throughout the old mine shafts and tunnels and then finding its way to the surface. Many of the old mine tunnels have collapsed forming sinkholes on the surface. Some of these sinkholes have provide additional avenues for the acidified waters to be released. Studies, being conducted in the watershed, have found pH values to be as low or lower than 3.3. Many of these seeps have been seeping acidic water for several decades.

The large number of abandoned mine lands in Oklahoma has created a significant threat to both surface and groundwater. The most serious of these sites have been identified and through the help of the federally funded Abandoned Mine Land Program have been reclaimed. Reclamation generally consisted of filling in the surface pits and vegetating the site. Most of the sites are then converted into range or pasture lands. The Dorsey RAMP is one such site. This site was initiated due to water quality problems. The reclamation is being performed by the Soil Conservation Service through the Rural Abandoned Mine Program. This project is located on a tributary of Dog Creek in Rogers county.

TABLE 27. ACID EFFECTS ON LAKES

	NUMBER OF LAKES	ACREAGE OF LAKES
Assessed for Acidity	22	57,315.00
Impacted by High Acidity	10	23,163.00
Vulnerable to Acidity	12	34,152.00

TABLE 28. SOURCE OF HIGH ACIDITY IN LAKES

	NUMBER OF LAKES	ACREAGE OF LAKES
Acid Deposition	0	0.00
Acid Mine Drainage	21	57,167.00
Natural Source	1	148.00
Other (list)	0	0.00

Toxic Effects on Lakes [314(a)(1)(E)]

The Department monitors lakes for elevated levels of toxic heavy metal and organic compounds in fish tissue. Lakes are monitored on a rotating basis. Fish tissue is the preferred media to analyze instead of the water, due to the transient nature of toxic compounds in the water column. Analysis of fish tissue serves as an effective indicator of the long term accumulation of pollution in the ecosystem.

The Department also monitors lakes used as primary drinking water supplies. These lakes are monitored on a yearly basis for toxic compounds. The initial survey completed in 1981, with follow-up sampling in 1982, formed the basis for sampling in FY 1983 through 1986. A second round of sampling was initiated in 1987. Of the original 49 reservoirs sampled, seven were sampled in 1987, seven were sampled in 1988, six were sampled in 1989, six were sampled in 1990, and eight were sampled in 1991. Additional reservoirs sampled during this time period were: Arcadia (annually, 1987-1991); A. B. Jewell and Yahola (1988 and 1990); McGee Creek Lake (annually 1989-1991); Copan, Forked, Sardis and Skiatook (1990); Arbuckle and Fugate (1991). In addition, the Water Board also conducts "one-shot" monitoring for toxics on all Phase I Clean Lakes projects. If the Water Board detects problems during their "one-shot" monitoring, then they may conduct additional sampling.

In the past, evaluations of toxic data had no criteria for seriousness of toxic residues at less than Food and Drug Administration action levels. To clarify and delineate the evaluation of lower levels of toxic residues, the Department developed "Warning" levels. The Department's "Warning" levels are set at 75 percent of the Food and Drug Administration action levels. The "Warning" level was developed to alert the Department to any potential problems before they reached the Food and Drug Administration action level. This level is used as an environmental indicator of potential problems and not as a health warning. When toxic substances exceed the "Warning" level, the Department will initiate an intensive survey to determine the extent of the problem.

The Department has also developed "Concern" level. These levels are set at 50 percent of the Food and Drug Administration action level. The "Concern" level is also used as an environmental indicator of potential problems and not as a health warning. The Department's "Concern" levels are used to determine where evidence exists. Areas which

exceed the Department's "Concern" levels are monitored closely to determine whether an upward trend exist.

Table 29 list those lakes in the state which have been found to have toxicity levels at or above the Department's "Concern" level. Total lake acres impaired was 269,699.00 acres. This table was generated from the Department's "Toxics and Reservoirs Report." Monitoring, on the lakes for the "Toxics and Reservoirs Report" is conducted on a rotating basis. However, this information is updated on an annual basis.

TABLE 29. RESERVOIRS WITH TOXICITY CONCERNS

RESERVOIR	SAMPLE YEAR	TOXICANT EXCEEDING ODEQ CONCERN LEVEL	LAKE SURFACE ACRES
Atoka*	1985	Mercury	5,643.0
Birch	1995, 1996	Mercury	1,137.0
Broken Bow	1995	Mercury	14,200.0
Canton	1992	Mercury	7,910.0
Fort Gibson*	1987	PCB, Chlordane	19,900.0
Fort Supply*	1985	Mercury	1,820.0
Foss	1988	Mercury	8,800.0
Grand*	1986	Chlordane	46,500.0
Hefner	1994	Mercury	2,500.0
Heyburn	1995, 1996	Mercury	880.0
Hugo	1994	Mercury	13,250.0
Hulah*	1985	Mercury	3,570.0
Keystone	1,991.0	Mercury	23,610.0
McAlester	1996	Mercury	1,521.0
McGee Creek	1995, 1996	Mercury	3,810.0
Meadow	1994	Chlordane	10.0
Northeast (Zoo)	1993	Chlordane	29.0
Pine Creek	1992	Mercury	3,750.0
Shawnee Twin Lakes	1985	Mercury	2,436.0
Skiatook	1990	Mercury	10,190.0
Stanley Draper	1994	Mercury	2,900.0
Texoma	1993	Mercury	88,000.0
Wister	1992	Mercury	7,333.0
TOTAL			269,699.0

Trends in Lake Water Quality [314(a)(1)(E)]

Currently, due to the scarcity of long term data, it is not possible to determine trends on Oklahoma's lakes. Oklahoma is beginning to preform trend analysis on some of its lake data for which data is available. The Water Board is examining the feasibility of performing trend analysis on collected data. Water Board is also performing lake surveys on many of the larger lakes in the state, as well as smaller municipally owned waterbodies, on a continuing basis. The Water Board volunteer monitoring program will also be used to examine trend in lake water quality across the state (Oklahoma Water Watch).

In the short term, by comparing the trophic state of lakes reported in the 1990, 1992, 1994, and 1996 305(b) Reports, there appears to be a trend of degradation to the state's lakes. The data would indicate that the primary sources of concern are from nonpoint sources. These sources are contributing both nutrients and sediments to the lakes. However, there has been ongoing work to try and alleviate these problems.

TABLE 30. TRENDS IN SIGNIFICANT PUBLIC LAKES

	NUMBER OF LAKES	ACREAGE OF LAKES
Assessed for Trends	Unknown	Unknown
Improving	Unknown	Unknown
Stable	Unknown	Unknown
Degrading	Unknown	Unknown
Trend Unknown	Unknown	Unknown

CHAPTER FIVE: WETLANDS ASSESSMENTS

Background

The primary state agencies involved in wetlands management are the Conservation Commission, the Department, the Water Board, and the Wildlife Department. The Conservation District Act of 1971 gave the Conservation Commission the responsibility for the conservation of renewable natural resources. The 89 conservation districts, located throughout the entire state, are responsible for this effort. In 1990, the Oklahoma Legislature designated the Conservation Commission as the agency responsible for developing "Oklahoma's Comprehensive Wetlands Conservation Plan" (CWCP). The goal of the CWCP is to "conserve, enhance, and restore the quantity and biological diversity of all wetlands in the state." (CWCP, 1996) The purpose of the CWCP is to:

1. define wetlands,
2. enumerate the functional uses of wetlands,
3. identify and inventory wetlands within the state,
4. recommend standards for wetlands,
5. measures to ensure the protection of property rights of landowners.
6. recommend measures to mitigate losses and to protect wetlands
7. evaluation of wetland protection measures

There are many different definitions for wetlands; however, most are alike in that they address the following three principals: 1) hydric soils, 2) hydrology, and 3) hydrophytic vegetation. The CWCP recommends the use of the National Academy of Science's definition of wetlands as the states definition for wetlands. The CWCP further recommends that, when dealing with regulatory issues related to wetlands, the state support the use of the U. S. Army Corps of Engineers 1987 wetlands delineation manual (Technical Report Y-87-1). The CWCP list the following wetland types for Oklahoma:

- riparian corridor wetlands,
- swamps,
- bogs,
- marshes,
- oxbow lakes,
- closed depressions,
- playa lakes,
- forested wetlands, and
- shoreline zones.

The functional uses of wetlands are related to where they are found and how they are used. The CWCP defines the functions of wetlands to be:

- water quality enhancement,
- reduction of flood impacts,
- biological productivity,
- groundwater influences,
- recreation,
- education,
- timber production, and
- agricultural production.

There are two statewide wetland inventories in Oklahoma. They are the U. S. Fish and Wildlife Service's (USF&WS) National Wetlands Inventory and the NRCS Wetland Inventory. The USF&WS and NRCS both developed their inventories with different purposes in mind. The USF&WS was looking at those areas that benefited migratory water fowl and other wildlife; whereas, the NRCS was looking at those areas that feel under the jurisdiction of the swampbuster provisions of the 1985 Farm Bill. The CWCP

recommends that a comprehensive inventory be developed and maintained in a Geographical Information System (GIS).

The Water Board is responsible for developing the WQS for wetlands. Currently, there are no specific WQS for wetlands, although progress is underway towards the inclusion of wetlands WQS into the OWQS. Selection of candidate reference wetlands is underway. Assessment protocols are being finalized with the assistance of the Wetlands Technical Advisory Group. Finalization of the protocols, associated forms and metrics is anticipated to be complete by the end of the year. An extension has been granted by EPA Region VI in order to complete the project. Development of a monitoring strategy and network has proven to be more difficult than anticipated. Incorporation of Water Watch personnel and volunteer groups into the process has been initiated. After completion of the selection of reference wetlands and associated metrics, the monitoring program will be used to validate the metrics and proposed standards. A form of enforceable wetlands WQS is anticipated to be in place by the year 2001.

private land owner are the states most important resource in wetland protection and management.

Under the statutory definition of waters of the state, marshes are included and are therefore provided primary protection as an "unlisted" waterbody. The Water Board is responsible for maintaining the National Wetlands Inventory (NWI) maps produced by the United States Fish and Wildlife Service. They are also responsible for the administration of the National Flood Insurance Program (NFIP). The majority of Oklahoma's wetlands occur within floodplain areas, and with effective administration of the NFIP, additional wetland protection can be developed. The NWI maps are available at the Water Board's main office located at:

Oklahoma Water Resources Board
3800 North Classen
Oklahoma City, Oklahoma 73118
(405) 530-8800

The majority of Oklahoma's wetlands are held in private ownership. As such, it is the private land owner how is the states most important resource in wetland protection and management. The CWCP recommends insuring private landowners be willing partners with the state through education, technical assistance, and incentives programs. Such programs as the USF&S Partners for Wildlife Program and the USDA's Wetland Reserve Program have shown the willingness of Oklahoma's private landowners in maintaining and protecting these natural resources.

The CWCP recommend that the state develop a comprehensive monitoring system to tract the gains and losses of wetlands. This will insure a better characterization of the existing functions and values of Oklahoma's wetlands. A relative new concept that Oklahoma is looking into is the development of a wetland bank(s). These wetland bank(s) could help with the financial resources in restoring, enhancing, and creating of wetlands. Currently, the Oklahoma Department of Transportation has been utilizing this concept in mitigating highway construction projects.

Twelve objectives have been identified for the evaluation of wetland protection measures. They are:

- to promote the coordination of wetlands management in Oklahoma through discussion, information exchange, cooperation, and the sharing of resources,
- to establish a net gain wetlands policy for state-owned lands and a no net loss policy on state funded projects to encourage the restoration, enhancement, and creation of wetlands,

- to integrate wetlands management with other related resource issues on a watershed or hydrologic unit basis,
- to characterize the wetlands resource more completely and identify critical functions of the major type of Oklahoma wetlands,
- to adopt a classification system and water quality standards to identify and protect wetland functions and values,
- to provide technical assistance and other initiatives to landowners implementing management practices that conserve, enhance, and restore wetlands on private property,
- to develop information/education programs on Oklahoma's wetlands resources,
- to identify and prioritize unique or scarce wetland types and sites for acquisition or special protection,
- to identify wetland sites for restoration and enhancement; identify and develop funding sources to accomplish this work,
- to integrate wetlands conservation with Oklahoma's floodplain management program and create more wetland/urban riparian areas,
- to establish a comprehensive statewide wetlands mapping program,
- to research and develop techniques for protecting, enhancing, and construction wetlands for pollutant control and/or mitigation; the develop techniques will be implemented to maximize beneficial uses of wetlands pollutant removal and mitigation capabilities.

404/401 Program

The Corps of Engineers processes a dredge and fill permit application as required under § 404 of the CWA. After the application has been processed, the Department must certify, under § 401 of the CWA, that the proposed activity will not violate the WQS of the state. If the Department anticipates that a violation could occur, then the Department will either reject the permit or place additional restrictions which must be met before the permit will be approved.

The Wildlife Department reviews and provides comments on the Corps of Engineer's dredge and fill permit applications and water quality certifications. The Wildlife Department has an advisory role on actions impacting endangered species. The Wildlife Department has no direct regulatory authority for wetlands management. They provide additional service to the public by providing information about state wetlands through the Wildlife Department Information and Education Division.

The Wildlife Department's primary mission is the protection and management of the state's wildlife resources. They have a vested interest in protecting wetlands due to the important role wetlands play in providing critical habitat for a number of wildlife species. The Wildlife Department is actively involved in a number of wetland programs. One such program is the North American Waterfowl Management Plan.

Designated Use Support

Through this program, the Wildlife Department participates in the Playa Lakes Joint Venture and the Eastern Oklahoma Wetlands Plan (part of the Lower Mississippi Valley Joint Venture). The Wildlife Department manages a number of Wildlife Management Areas within the state. As part of the Eastern Oklahoma project, the Wildlife Department began a wetlands acquisition project along the Deep Fork of the Canadian River. These bottom lands are west of the existing Okmulgee Wildlife Management Area. The Wildlife Department has several wetland habitat development projects underway or completed. In addition, they are promoting similar wetland habitat development projects on other public lands (Corps of Engineers reservoirs, National Wildlife Refuge and U. S. Forest Service lands).

There are other state agencies involved in wetland protection programs. The Oklahoma Natural Heritage Inventory, which is a part of the Oklahoma Biological Survey, is developing and maintaining a database on the location and status of rare and endangered plants and animals and significant ecological communities (including wetlands). The database was established for use by governmental agencies, private organizations, and individuals needing this information for land-use planning, permitting procedures, environmental review, and conservation efforts.

During FY 94 and 95, the state received $428,061.00 in funding under § 104(b)3 of the CWA for conducting the various wetland programs. This amount is inclusive of both federal and state dollars.

Table 31 lists the overall use support summary and Table 32 lists the individual use support summary for a small portion of the wetlands within the state.

TABLE 31. OVERALL USE SUPPORT SUMMARY FOR WETLANDS

Total Number of Wetlands Assessed: 0
Total Number of Wetland Segments Monitored: 0
Total Number of Wetland Segments Evaluated: 0

DEGREE OF USE SUPPORT	ASSESSMENT BASIS		TOTAL ASSESSED	PERCENT OF TOTAL
	EVALUATED	MONITORED		
Fully Supporting	0.00	0.00	0.00	0.00
Fully Supported but Threatened	0.00	0.00	0.00	0.00
Partially Supporting	0.00	0.00	0.00	0.00
Not Supporting	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	100.00

TABLE 32. INDIVIDUAL USE SUPPORT SUMMARY FOR WETLANDS, IN ACRES

USE	FULLY SUPPORTED	FULLY SUPPORTED BUT THREATENED	PARTIALLY SUPPORTED	NOT SUPPORTED	NOT ATTAINABLE	NOT ASSESSED
OVERALL USE SUPPORT	--	--	--	--	--	7113.93
CWA Fishable Goal	--	--	--	--	--	5829.95
CWA Swimmable Goal	--	--	--	--	--	5829.93
STATE DEFINED:						
AQUATIC COMMUNITIES						
Trout Fishery	--	--	--	--	--	--
Cool Water	--	--	--	--	--	--
Warm Water	--	--	--	--	--	--
Habitat Limited	--	--	--	--	--	--
Unlisted Warm Water	--	--	--	--	--	5187.96
CONTACT RECREATION						
Primary	--	--	--	--	--	5829.95
Secondary	--	--	--	--	--	--
Unlisted Primary	--	--	--	--	--	5187.96
DRINKING WATER SUPPLY						
Public and Private	--	--	--	--	--	--
Emergency	--	--	--	--	--	--
NONDEGRADATION						
Outstanding Resource Water	--	--	--	--	--	--
High Quality Water	--	--	--	--	--	--
Sensitive Water Supply	--	--	--	--	--	--
AESTHETICS	--	--	--	--	--	5187.96
AGRICULTURE	--	--	--	--	--	5187.96
HYDROELECTRIC POWER	--	--	--	--	--	--
INDUSTRIAL	--	--	--	--	--	5187.96
INDUSTRIAL/HYDROPOWER	--	--	--	--	--	--
NAVIGATION	--	--	--	--	--	--

Extent of Wetland Resources

Oklahoma wetlands fall into three broad classifications under the system used by the United States Fish and Wildlife Service's National Wetland Inventory. They are riverain, lacustrine and palustrine. Riverain wetlands are confined along waterways which are periodically or continuously inundated with moving water. They are stream-like but do not include the trees, shrubs, or emergent vegetation in or adjacent to the stream. Oklahoma riverain wetlands lie along the Arkansas and Red River drainage basins.

Palustrine wetlands are usually vegetated, wet areas inside and outside of floodplains. They include floodplain forests (bottomland hardwoods), stream corridors, marshes, meadows, bogs, swamps, sloughs, ponds, and most of Oklahoma's playa lakes.

Reservoirs and some playa lakes (total area greater than 20 acres), having no more than 30% area cover of trees, shrubs, and emergents, fall into the lacustrine system.

Most of Oklahoma's pre-statehood wetlands have been lost. Causes of wetland loss and degradation include human causes such as drainage for crop and timber production; mosquito control; stream channelization and dredging for navigation, flood protection; reservoir maintenance, construction of dikes, dams, water supply, irrigation, and storm protection; and mining of wetland soils for coal, sand, gravel and other materials. Natural threats to wetlands include subsidence, droughts, storms, and erosion. United States Fish and Wildlife Service estimated in 1985 that approximately 85 percent of Oklahoma's bottomland hardwoods had been cleared.

Tables 33 provides an approximation of the wetlands remaining in Oklahoma. This list was generated from information derived from the "Bottomland Hardwoods of Eastern Oklahoma" and "Riparian Areas of Western Oklahoma" (USF&WS & ODWC, 1985, 1987)

TABLE 33. ESTIMATES OF THE PERCENT OF CHANGE IN OKLAHOMA WETLANDS

COUNTY	PRE-SETTLEMENT	RECENT ESTIMATES	CHANGE FROM PRE-SETTLEMENT TO PRESENT (-% = LOSS)
Adair	19,771.0	3,425.0	-83.0
Alfalfa	45,440.0	994.0	-98.0
Atoka	110,395.0	20,018.0	-82.0
Beaver	43,520.0	29,181.0	-33.0
Beckham	31,360.0	8,510.0	-73.0
Blaine	31,360.0	1,658.0	-95.0
Bryan	121,129.0	9,423.0	-92.0
Caddo	32,000.0	11,317.0	-65.0
Canadian	47,360.0	11,850.0	-75.0
Cherokee	33,935.0	4,892.0	-86.0
Choctaw	103,734.0	26,275.0	-75.0
Cimarron	50,560.0	28,839.0	-43.0
Coal	62,181.0	2,621.0	-96.0
Comanche	10,364.0	8,100.0	-22.0
Cotton	19,998.0	11,900.0	-40.0
Craig	31,938.0	5,643.0	-82.0
Creek	105,900.0	15,692.0	-85.0
Custer	13,440.0	6,500.0	-52.0
Delaware	66,772.0	3,599.0	-95.0
Dewey	22,400.0	41,266.0	84.0
Ellis	37,104.0	29,167.0	-21.0
Garfield	49,622.0	988.0	-98.0
Grady	26,560.0	8,263.0	-69.0
Grant	9,920.0	575.0	-94.0
Greer	26,880.0	4,831.0	-82.0
Harmon	12,160.0	500.0	-96.0
Harper	23,000.0	24,134.0	5.0
Haskell	59,884.0	5,586.0	-91.0
Hughes	67,080.0	3,325.0	-95.0
Jackson	43,520.0	2,992.0	-93.0
Jefferson	40,771.0	18,774.0	-54.0
Kingfisher	14,720.0	Unknown	Unknown
Kiowa	25,400.0	11,151.0	-56.0
Latimer	51,118.0	8,902.0	-83.0
LeFlore	202,183.0	28,104.0	-86.0
Major	25,087.0	1,603.0	-94.0
Mayes	33,388.0	4,082.0	-88.0
McCurtain	237,236.0	41,951.0	-82.0
McIntosh	70,331.0	11,803.0	-83.0
Muskogee	72,352.0	12,658.0	-83.0

COUNTY	PRE-SETTLEMENT	RECENT ESTIMATES	CHANGE FROM PRE-SETTLEMENT TO PRESENT (-% = LOSS)
Nowata	45,861.0	5,239.0	-89.0
Okfuskee	71,309.0	15,153.0	-79.0
Okmulgee	64,337.0	18,974.0	-71.0
Ottawa	40,474.0	7,419.0	-82.0
Pittsburg	100,967.0	6,813.0	-93.0
Pushmataha	95,869.0	19,602.0	-80.0
Roger Mills	37,760.0	16,524.0	-56.0
Rogers	61,230.0	10,803.0	-82.0
Sequoyah	67,992.0	6,717.0	-90.0
Stephens	24,940.0	10,000.0	-60.0
Texas	46,848.0	26,564.0	-43.0
Tillman	39,700.0	8,685.0	-78.0
Tulsa	76,825.0	7,912.0	-90.0
Wagoner	86,587.0	10,994.0	-87.0
Washington	60,830.0	11,074.0	-82.0
Washita	13,440.0	8,383.0	-38.0
Woods	31,360.0	19,749.0	-37.0
Woodward	50,560.0	52,198.0	3.0
TOTAL	3,148,762.0	733,895.0	-77.0

Development of Wetland Water Quality Standards

As mentioned earlier in this chapter, the state has not yet developed a unique set of standards for wetlands, although this process is underway. By default under the existing WQS, marsh (interpreted, using the United States Fish and Wildlife Services definition of a wetland, to include all sites classified as wetlands within the state) can be classified with primary protection on their beneficial uses designation.

Additional Wetland Protection Activities

Oklahoma is working toward a comprehensive approach to protection and management of its existing wetland areas through cooperation of federal, state and local agencies.

The Wetlands of Oklahoma section of the 1987 Oklahoma Statewide Comprehensive Outdoor Recreation Plan identified a list of "areas which should be of high priority for acquisition and/or preservation." The list follows:

TABLE 34. ADDITIONAL WETLAND PROTECTION ACTIVITIES AND PROJECTS

NAME	COUNTY(S)	ACRES
Deep Fork	Okmulgee, Okfuskee, Creek, Lincoln	41,000
Waterfall-Gilford	McCurtain	6,000
Playa Lakes	Cimarron, Texas, Beaver	2,000
Cimarron Terrace	Kingfisher, Garfield	5,000
Little River	McCurtain	4,200
Verdigris River	Rogers	2,500

CHAPTER SIX: PUBLIC HEALTH/AQUATIC LIFE CONCERNS

Size of Waters Affected By Toxicants

Table 36 contains a list of waters potentially affected by toxic substances. This list was developed in conjunction with requirements of the CWA § 304(l)(A)(ii). The data used for this section came from the various surface water quality monitoring programs conducted by the Conservation Commission, the Department, United States Geological Survey, and the Water Board, as well as information from fish kill reports, citizen complaints and spill information. Elevated levels of toxics are values in excess of the numeric criteria set forth by the WQS, 304(a) criteria, and/or Food and Drug Administration action levels or levels of concern. Testing for elevated levels of toxics is conducted on the water column, fish tissue, or in the sediments. If an elevated level of toxics was noted at a sampling site, then the entire waterbody was listed.

TABLE 35. TOTAL SIZE AFFECTED BY TOXICANTS

WATERBODY TYPE	SIZE MONITORED FOR TOXICANTS	SIZE WITH ELEVATED LEVELS OF TOXICANTS
Rivers and Streams (miles)	Unknown	Unknown
Lakes (acres)	Unknown	Unknown
Freshwater Wetlands (acres)	Unknown	Unknown

Public Health: Aquatic Life Impacts

Information on public health/aquatic life impacts can be found in Tables 37 through 46.

TABLE 36. TOXIC CONTAMINATION / PUBLIC HEALTH IMPACTS: FISH TISSUE CONTAMINATION ABOVE FOOD AND DRUG ADMINISTRATION / NATIONAL ACADEMY OF SCIENCE / LEVELS OF CONCERN -- SAME AS THE DEPARTMENT'S LEVELS OF ALERT

WATERBODY ID/NAME	SIZE	DATE SAMPLE(S) TAKEN YY/MM/DD	POLLUTANT	SOURCE	COMMENTS
Heyburn	980.0	95/06/22	Mercury 1.0 mg/kg	Unknown	Spotted Gar @ 1.12 mg/kg Mercury based on a composite sample of 5 individuals
McGee Creek Lake	3,580.0	94/06/15	Mercury	Unknown	Large Mouth Bass @ 1.18 mg/kg Mercury based on a composite sample of 5 individuals and Large Mouth Bass @ 1.12 mg/kg Mercury based on a composite sample of 5 individuals
		94/02/11 95/03/17 (Recd) 95/06/28	Mercury	Unknown	Large Mouth Bass @ 1.10 mg/kg Mercury based on a composite sample of 2 individuals
Total	4,560.0				

TABLE 37. TOXIC CONTAMINATION / PUBLIC HEALTH IMPACTS: FISH TISSUE CONTAMINATION ABOVE THE DEPARTMENT'S LEVELS OF CONCERN (HALF OF THE FOOD AND DRUG ADMINISTRATION CONCERN LEVEL)

WATERBODY ID/NAME	SIZE	DATE SAMPLE(S) TAKEN YY/MM/DD	POLLUTANT MAX. ALLOWED	SOURCE	COMMENTS
Birch Lake	2,339.0	93/12/13	Mercury 0.50 mg/kg	Unknown	Large Mouth Bass @ 0.74 mg/kg Mercury based on a composite sample of 5 individuals and Large Mouth Bass @ 0.78 mg/kg Mercury based on a composite sample of 3 individuals
		95/07/18	Mercury 0.50 mg/kg	Unknown	White Bass @ 0.80 mg/kg Mercury based on a composite sample of 5 individuals and Channel Catfish @ 0.60 mg/kg Mercury based on a composite sample of 5 individuals
Broken Bow Lake	14,200.0	95/06/27 95/08/01	Mercury 0.50 mg/kg	Unknown	Channel Catfish @ 0.64 mg/kg Mercury based on a composite sample of 3 individuals and Spotted Gar @ 0.76 mg/kg Mercury based on a composite sample of 3 individuals
Draper	2,800.0	94/06/21 through 94/06/23	Mercury 0.50 mg/kg	Unknown	Blue Catfish @ 0.56 mg/kg Mercury based on a composite sample of 5 individuals
Hefner	2,580.0	94/04/08	Mercury 0.50 mg/kg	Unknown	Walleye @ 0.50 mg/kg Mercury based on a composite sample of 5 individuals
Heyburn	980.0	95/06/22	Mercury 0.50 mg/kg	Unknown	White Crappie @ 0.60 mg/kg Mercury based on a composite sample of 5 individuals and Spotted Gar @ 1.12 mg/kg Mercury based on a composite sample of 5 individuals
Meadow Lake	10.0	94/08/24	Chlordane 0.15 μg/kg	Unknown	Carp@ 175 μg/kg Chlordane based on a composite sample of 5 individuals
McGee Creek Lake	3,580.0	94/06/15	Mercury 0.50 mg/kg	Unknown	Large Mouth Bass @ 1.18 mg/kg Mercury based on a composite sample of 5 individuals and Large Mouth Bass @ 1.12 mg/kg Mercury based on a composite sample of 5 individuals and Large Mouth Bass @ 0.96 mg/kg Mercury based on a composite sample of 5 individuals
		94/02/11 95/03/17 (Recd) 95/06/28	Mercury 0.50 mg/kg	Unknown	Large Mouth Bass @ 1.10 mg/kg Mercury based on a composite sample of 2 individuals
Hugo	13,250.0	94/06/10 94/07/28	Mercury 0.50 mg/kg	Unknown	Channel Catfish @ 0.56 mg/kg Mercury based on a composite sample of 5 individuals and Short Nose Gar @ 0.50 mg/kg Mercury based on a composite sample of 5 individuals

WATERBODY ID/NAME	SIZE	DATE SAMPLE(S) TAKEN YY/MM/DD	POLLUTANT MAX. ALLOWED	SOURCE	COMMENTS
Total	39,739.0				

TABLE 38. TOXIC CONTAMINATION / PUBLIC HEALTH IMPACTS: RESTRICTED CONSUMPTION ADVISORY, GENERAL POPULATION

WATERBODY ID/NAME	CAUSE(S)	SOURCE(S)	SIZE	COMMENTS
None				

TABLE 39. TOXIC CONTAMINATION / PUBLIC HEALTH IMPACTS: "NO CONSUMPTION" ADVISORY OR BAN, GENERAL POPULATION

WATERBODY ID/NAME	CAUSE(S)	SOURCE(S)	SIZE	COMMENTS
McGee Creek Lake	Mercury	unknown	3,580.0	Exceeding Food and Drug Administration action level

TABLE 40. TOXIC CONTAMINATION / PUBLIC HEALTH IMPACTS: BATHING AREA CLOSURE OCCURRED DURING REPORTING PERIOD

WATERBODY ID/NAME	CAUSES(S)	SOURCE(S)	SIZE	COMMENTS
None				

TABLE 41. TOXIC CONTAMINATION / PUBLIC HEALTH IMPACTS: POLLUTION-RELATED FISH AND WILDLIFE KILLS OBSERVED DURING REPORTING PERIOD

WATERBODY ID/NAME	CAUSES(S)	SOURCE(S)	SIZE	COMMENTS

For a listing of "Pollution-caused" fish kill occurring during this reporting cycle, see Appendix 1.

TABLE 42. TOXIC CONTAMINATION / PUBLIC HEALTH IMPACTS: SEDIMENT CONTAMINATION

WATERBODY ID/NAME	CAUSE(S)	SOURCE(S)	SIZE	COMMENTS
Arkansas River, below Webbers Falls Lock and Dam, Site # U07194600	DDT	Unknown		Value range is < 14.00 to 92.00 mg/kg
Bird Creek, near Avant, Site # U07176500	Heptachlor	Unknown		Value range is < 0.60 to 9.00 mg/kg
Bitter Creek, near Altus, Site # U07301100	DDT	Unknown		Value range is 33.00 to 37.00 mg/kg
Chickaskia River, near Blackwell, Site # U07152000	Cadmium	Unknown		Value range is 0.65 to 8.10 mg/kg
Glover River, near Glover, Site # U07337900	Lead	Unknown		Values range is < 4.50 to 65.00 mg/kg
Little River, Mountain Fork, near Eagletown, Site # U07339000	Lead	Unknown		Values range is 7.20 to 92.00 mg/kg
Neosho River, near Choteau, Site # U07191500	Heptachlor	Unknown		Value range is < 0.60 to 5.00 mg/kg
Neosho River, above Industrial Park, Site # U07191550	Cadmium	Unknown		Value was 10.00 mg/kg
Poteau River, near Wister, Site # U07248500	Arsenic	Unknown		Values range is 5.80 to 7.20 mg/kg
Red River, near Gainesville, Site # U07316000	Arsenic	Unknown		Values range is ≤ 6.00 mg/kg
Red River, near Terral, Site # U07315500	Copper	Unknown		Values range is 1.60 to 89.00 mg/kg
Spring River, near Quapaw, Site # U07188000	Cadmium	Unknown		Values range is 3.10 to 9.40 mg/kg
Stinking Creek, near Humphreys, Site # U07306300	DDT	Unknown		Values range is < 14.00 to 59.00 mg/kg
Verdigris River, near Catoosa, Site # U07178500	Arsenic	Unknown		Value was 6.40 mg/kg
Verdigris River, near Inola, Site # U07178800	Arsenic Heptachlor	Unknown		Arsenic values range is < 6.00 to 6.90 mg/kg Heptachlor values range is < 0.60 to 25.00 mg/kg
Verdigris River, near Keetonville, Site # U07176000	Arsenic	Unknown		value was 7.10 mg/kg

TABLE 43. TOXIC CONTAMINATION / PUBLIC HEALTH IMPACTS: SURFACE DRINKING WATER SUPPLY CLOSURE OCCURRED DURING REPORTING PERIOD

WATERBODY ID/NAME	CAUSE(S)	SOURCE(S)	SIZE	COMMENTS
None				

TABLE 44. TOXIC CONTAMINATION / PUBLIC HEALTH IMPACTS: SURFACE DRINKING WATER SUPPLY ADVISORY OCCURRED DURING REPORTING PERIOD

SYSTEM NAME/MSIS #	CAUSE(S)	SOURCE(S)	SIZE	COMMENTS
Altus/1021501	Trihalomethane	Unknown		4 quarter running average 0.12 mg/l
Sand Springs/1020420	Trihalomethane	Unknown		4 quarter running average 0.11 mg/l

TABLE 45. TOXIC CONTAMINATION / PUBLIC HEALTH IMPACTS: WATERBORNE DISEASE INCIDENT OCCURRED DURING REPORTING PERIOD

WATERBODY ID/NAME	CAUSE(S)	SOURCE(S)	SIZE	COMMENTS
None				

Public Health: Drinking Water

Information on public health / drinking water impacts can be found in Tables 47 through 50. Oklahoma does not currently have WQS protocols to assess drinking water use attainment. Oklahoma is currently trying to develop these protocols, along with expanding ambient monitoring.

TABLE 46. SUMMARY OF WATERBODIES FULLY SUPPORTING DRINKING WATER USE

RIVERS AND STREAMS	CONTAMINANTS INCLUDED IN THE ASSESSMENT	LAKES	CONTAMINANTS INCLUDED IN THE ASSESSMENT
Unknown			

TABLE 47. SUMMARY OF WATERBODIES NOT FULLY SUPPORTING DRINKING WATER USE

WATERBODIES	SOURCES OF DATA			CHARACTERIZATION[1]	MAJOR CAUSES
	AMBIENT	FINISHED	USE RESTRICTIONS		
Unknown					

[1]Characterization: Fully Supporting but Threatened, Partially Supporting, Not Supporting

TABLE 48. STATE-LEVEL SUMMARY OF DRINKING WATER USE ASSESSMENTS FOR RIVERS AND STREAMS

TOTAL MILES DESIGNATED FOR DRINKING WATER USE: UNKNOWN TOTAL MILES ASSESSED FOR DRINKING WATER USE: 622.18				
Miles Fully Supporting Drinking Water Use	383.82	% Fully Supporting Drinking Water Use	61.68%	Major Causes
Miles Fully Supporting but Threatened for Drinking Water Use	93.95	% Fully Supporting but Threatened for Drinking Water Use	15.10%	Unknown
Miles Partially Supporting Drinking Water Use	34.32	% Partially Supporting Drinking Water Use	5.51%	Unknown
Miles Not Supporting Drinking Water Use	110.09	% Not Supporting Drinking Water Use	17.69%	Unknown
Total Miles Assessed for Drinking Water Use	622.18		100.00%	

TABLE 49. STATE-LEVEL SUMMARY OF DRINKING WATER USE ASSESSMENTS FOR LAKES

TOTAL ACRES DESIGNATED FRO DRINKING WATER USE: UNKNOWN TOTAL ACRES ASSESSED FOR DRINKING WATER USE: 71,251.00				
Acres Fully Supporting Drinking Water Use	56,320.00	% Fully Supporting Drinking Water Use	78.91%	Major Causes
Acres Fully Supporting but Threatened for Drinking Water Use	6,131.00	% Fully Supporting but Threatened for Drinking Water Use	8.60%	Unknown
Acres Partially Supporting Drinking Water Use	8,800.00	% Partially Supporting Drinking Water Use	12.35%	Unknown
Acres Not Supporting Drinking Water Use	0.00	% Not Supporting Drinking Water Use	0.00%	
Total Acres Assessed for Drinking Water Use	71,251.00		100.00%	

PART IV: GROUNDWATER QUALITY

OVERVIEW

Groundwater is an important natural resource in Oklahoma. There are twenty-one major groundwater basins in the state and approximately 150 minor basins. These major basins are used as primary source of community drinking water and are estimated to hold over 320 million acre-feet of fresh water. See Figure 5 for a detailed map of the "Major Bedrock Aquifers in Oklahoma" and Figure 6 for the "Alluvium and Terrace Deposits in Oklahoma."

GROUNDWATER QUALITY

The Agriculture Department completed a three year sampling project of private drinking water wells. The project identified those wells potentially at risk from agricultural impacts. Over the three year period, there were approximately 200 well sites surveyed. A detailed background survey was conducted at each well site to determine potential sources of agricultural impacts. Samples were collected from each well site and analyzed for nitrate-nitrogen and specific pesticides known to be used in the area. No well sites were found to be contaminated by pesticides. Of the 67 wells tested, four contained nitrate-nitrogen levels above the recommended limit of 20 mg/l for a non-community water supply.

The key element to any groundwater management program is in the monitoring of available water resources. The Water Board established, in 1983, a groundwater quality monitoring network. The purpose of the network was to provide ambient groundwater quality data. This data provided information to help characterize the current status and identify changes in groundwater quality. In 1986 and 1989, the network was evaluated for accuracy of well locations and completion in the designated aquifer. In 1986, all wells without driller's well logs or found to be completed in an aquifer other than the designated aquifer were dropped from the network. In 1989, a vulnerability assessment was completed for each well. During 1990, the network was expanded to 224 domestic, irrigation, stock and municipal water wells. All wells were sampled each year during July and August. The following information on each well was recorded: depth screened interval, construction, location, and potential sources of contamination. Samples were analyzed by the Department for metals and chemical pollutants.

The ambient groundwater monitoring program is an integral part of Oklahoma's monitoring network. This program monitors the status of groundwater resources for current as well as future uses. This program provides a means of identifying causes and sources of contamination as well as recognizing regional trends in land use. The Department routinely monitors community drinking water wells for nitrates, coliform bacteria and other basic drinking water quality parameters. The Department also samples community drinking water wells for volatile organic compounds (VOC). To date, there are eight public water supplies with confirmed problems associated with VOC contamination. A list of VOC violations is listed further in this chapter.

The current groundwater 106 Grant Workplan involves groundwater quality ambient monitoring at public water supply wells. The Department monitors water quality at PWS wells to protect public health by insuring that the ground water is safe to drink. By adding a few parameters and by checking the water more often than once every three years as is required by the public water supply program regulations, an ambient monitoring program for the State is re-established. This program will be similar in operation to the one operated by the OWRB prior to 1993. Re-establishment of an ambient groundwater monitoring program will allow the State to provide citizens with information about the general water quality in our state, including groundwater.

The proposed groundwater ambient monitoring system of monitoring wells will show the existing quality and trends in the quality of groundwater in all the major confined and

unconfined aquifers in Oklahoma in just a few months. Data sufficient to establish statistically valid levels for metals and other indicators of water quality should be available to compare to historical data within three years.

The Department proposes to sample 200 wells twice per year. Original parameters as well as additions such as carbonate, phosphate, and ammonia will be evaluated. These parameters are needed for purposes of comparison of water origins and quality as it relates to impacts of surface activities, in particular non-point source pollution, on groundwater quality. The monitoring data, once analyzed, verified, and compiled will be made available to State agencies, federal agencies, and the citizens of Oklahoma for their use. Trends established by this ambient monitoring program can be used to identify sources of polluted runoff that potentially could adversely impact vulnerable groundwater resources. The program is currently awaiting QA/QC approval by EPA.

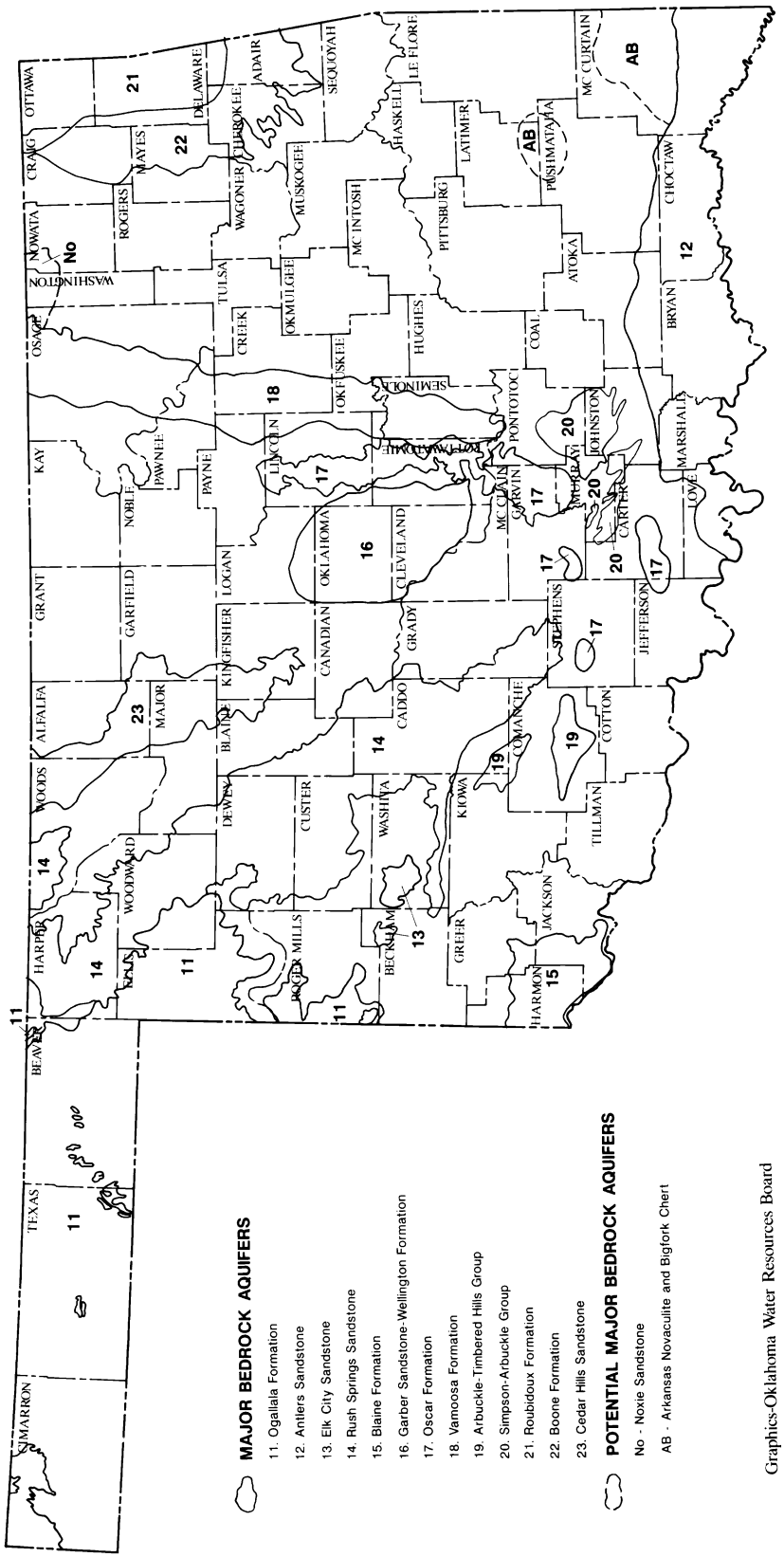

FIGURE 5. MAJOR BEDROCK AQUIFERS IN OKLAHOMA

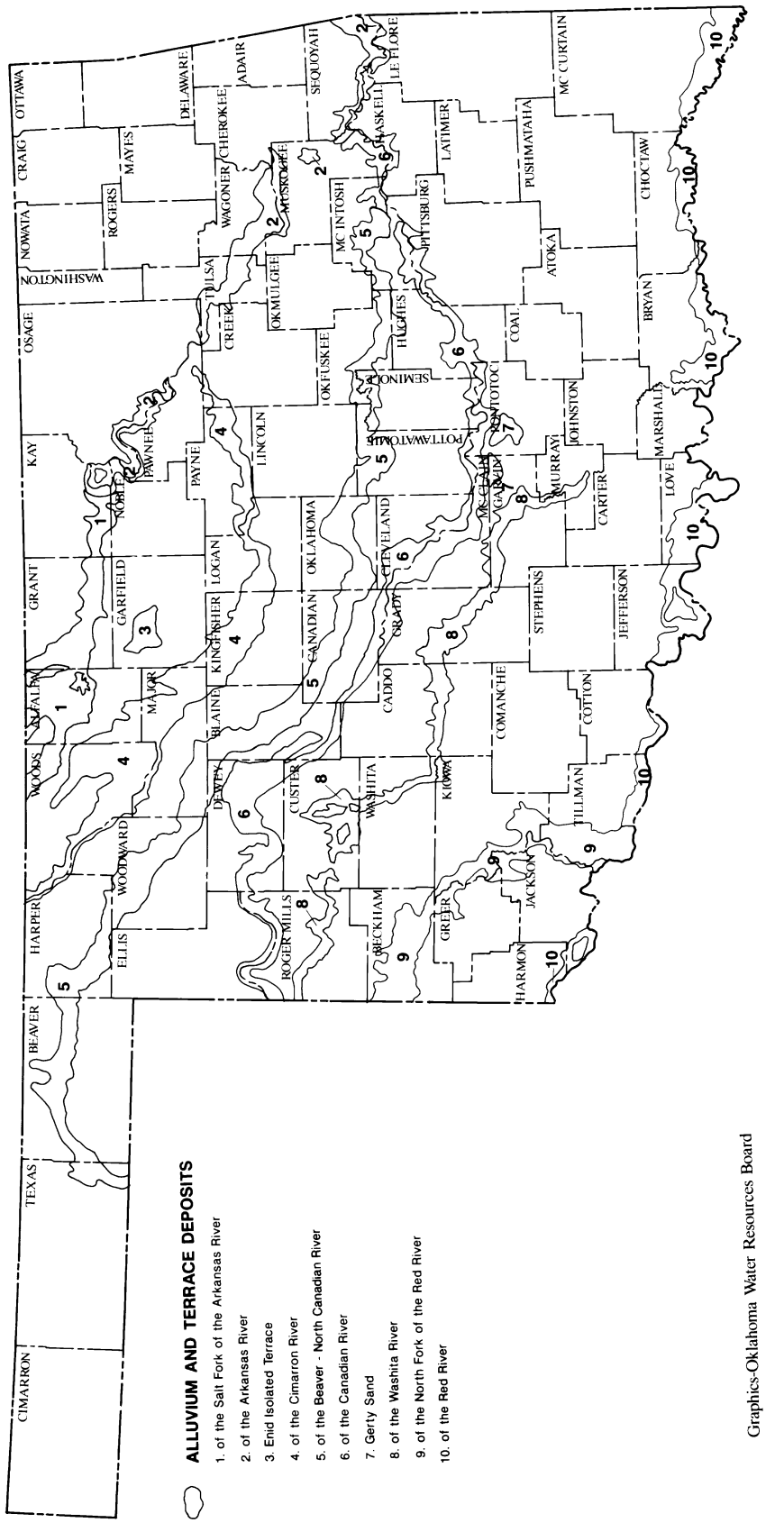

FIGURE 6. ALLUVIUM AND TERRACE DEPOSITS IN OKLAHOMA

Major Aquifers with Anthropogenic Water Quality Problems or Concerns

Major aquifers are defined as aquifers which can effectively yield 150 gallons per minute or greater. The following information is based primarily on individual wells or well fields that were affected by problems. This information is based upon the most recent information provide to this division as of December of 1993. These wells may or may not constitute a public water supply. In most cases, the problem wells are not in use, or have had their water blended with other sources to reduce the contaminant(s) to acceptable level(s). For location of the major aquifers, please refer to the maps "Alluvium and Terrace Deposits in Oklahoma" and "Major Bedrock Aquifers in Oklahoma".

Alluvium and Terrace Deposits of the Salt Fork of the Arkansas River

The Department has identified several wells and well fields in this aquifer with elevated nitrate levels. These include the City of Jet, Alfalfa County Rural Water System & Solid Waste Management District Number 1, Number 1 North in Alfalfa County, Little Sandy Creek Alluvium in Northern Alfalfa County, Byron, and a non-community well for Carrier Mill (and elevator in Garfield County).

Alluvium and Terrace Deposits of the Arkansas River

The Department has identified several wells and well fields in this aquifer with elevated nitrate levels. These include the Riverside Trailer Park public water supply, Gateway Recreational Vehicle Park public water supply, Hoyers Mobile Home Park public water supply, Osage Oaks Trailer Park public water supply, Timberline Mobile Home Park public water supply, and Rolling Hills public water supply in Osage County. The Water Board has identified some well sites with hydrocarbon contamination. These include sites in Kay County near Ponca City and Tulsa County near two refineries. The Department oversees hydrocarbon removal at several refining sites in Kay, Tulsa, Carter, Garfield, Caddo, and Stephens Counties.

Alluvium and Terrace Deposits of the Enid Isolated Terrace Deposits

The Department has identified a well in this aquifer with elevated nitrate levels. This well serves the Winchester West Apartments in Garfield County. The Water Board has identified some well sites with hydro-carbon contamination. These include sites in Garfield County near the upper end of Skeleton Creek.

Alluvium and Terrace Deposits of the Cimarron River

The Department has identified several wells and well fields in this aquifer with elevated nitrate levels. These include the City of Cimarron in Logan County, Dacoma Cooperative non-community public water supply in Woods County and the City of Ames in Major County. The Northern Oklahoma Development Association has identified a well field with elevated nitrate levels. This well field serves the City of Aline in Alfalfa County.

Alluvium and Terrace Deposits of the Beaver-North Canadian River

The Department has identified several wells and well fields in this aquifer with elevated nitrate levels. These include Roman Nose State Park, the towns of Geary and Hitchcock, the City of Greenfield in Blaine County, Okarche Rural Water District and Canadian County Rural Water District #1 in Canadian County, and the NW 16th Trailer Park public water supply in Oklahoma County.

Alluvium and Terrace Deposits of the Canadian River

The Department has identified several wells and well fields in this aquifer with elevated nitrate levels. These include the Douglas Trailer Park and the City of Tuttle in Grady County, the City of Taloga in Dewey County, and the Goldsby Rural Water District #5 in McClain County. The Water Board has identified a well site with controlled industrial wastes contamination. This site is near a landfill in the City of Norman in Cleveland County.

Alluvium and Terrace Deposits of the Washita River

The Department has identified a well field in this aquifer with elevated nitrate levels. This well field is located in the City of Hammon in Roger Mills County. The Water Board has identified a well site with salt water contamination. This well site is located near Anadarko in Caddo County. The Water Board has also identified a well site with hydrocarbon contamination. This well site is located near Wynnewood along the Garvin/Murray County line.

Alluvium and Terrace Deposits of the North Fork of the Red River

The Department has identified several wells and well fields in this aquifer with elevated nitrate levels. These include the Beckham County Rural Water District #1 and the Down Trailer Park in Beckham County, the Oklahoma State Reformatory at Granite, the City of Granite and the City of Willow in Greer County.

Alluvium and Terrace Deposits of the Red River

The Department has identified several wells and well fields in this aquifer with elevated nitrate levels. These include the City of Grandfield and the Tillman County Rural Water District #1 in Tillman County.

Ogallala Formation

The Department has identified a well field in this aquifer with elevated nitrate levels. Some of the wells showed elevated levels of selenium, probably of natural origin. This well field supplies the Woodward County Rural Water District Number 2 in Woodward County.

Antlers Sandstone

The Department has identified several monitoring wells in this aquifer with elevated nitrate levels. Some of the wells showed consistently low pH values. These include the monitoring wells in Bryan and McCurtain Counties.

Rush Springs Sandstone

The Department has identified several wells, monitoring wells and well fields in this aquifer with elevated nitrate levels. The monitoring wells include wells in Caddo, Comanche, Custer, Grady, Stephens and Washita Counties. The Department and the Water Board have identified a well field with hydrocarbon and chloride contaminations. The contamination is the result of historic oil and gas activities (extraction, refinement, and

salt water disposal). This well field is located near the Town of Cyril in Caddo County. The Town of Cyril has discontinued use of its well fields by tying into a rural water district. The site is also on the National Priority List, a listing of Super Fund Sites.

Garber Sandstone and Wellington Formation

The Department has identified several wells in this aquifer with gross alpha activity above the maximum allowable limit of 15 pCi/L. These wells serve the University of Oklahoma, at Norman, in Cleveland County. The Department has also identified several wells and well fields with selenium contamination. These include the wells and well fields serving the City of Moore and the University of Oklahoma in Cleveland County, the cities of Mustang and Piedmont in Canadian County, the Town of Covington in Garfield County, and Blue Stem Lake public water supply and Silverlake Water Association in Oklahoma County. The Water Board has identified localized wells and monitoring wells with industrial solvents contamination. These wells and monitoring wells are located at or around Tinker Air Force Base in eastern Oklahoma County (for additional water quality problems and concerns, please reference the *Nonpoint Source Assessment Report 319(h)* for information on Soldier and Crutcho Creek). The Department and the Water Board have identified additional problems in this aquifer and the North Canadian Alluvium and Terrace Deposit aquifer. Several wells have been detected with elevated levels of nitrates and chlorides. These problems are associated with the highly urbanized nature of Oklahoma County (e.g., septic tanks, over fertilization), as well as historic oil field activities.

Vamoosa Formation

The Department has identified several wells in this aquifer with elevated fluoride levels. These wells serve the City of Maud in Pottawatomie County. The Department, the Water Board, and the United States Geological Survey have identified several wells and well fields with chloride contamination. These wells and well fields are located in and around Pottawatomie County.

The Arbuckle Formation

The Department has identified several monitoring wells in this aquifer with elevated fluoride levels and a tendency towards excessive hardness. There are no known groundwater based community public drinking water systems experiencing water quality problems. The source appears to be natural and has therefore limited the usefulness of this formation as a drinking water source.

Non-major Aquifers with Anthropogenic Water Quality Problems or Concerns

Non-major aquifers are defined as aquifers which effectively yield less than 150 gallons per minute. The following information is based primarily on individual wells or well fields that were affected by problems. These wells may or may not constitute a public water supply. In most cases, the problem wells are not in use, or have had their water blended with other sources to reduce the contaminant(s) to acceptable level(s). For location of the major aquifers, please refer to the maps "Alluvium and Terrace Deposits in Oklahoma" and "Major Bedrock Aquifers in Oklahoma".

The Boone Formation/Boone Chert/Keokuk and Reeds Springs Formation

The Department and the Water Board have identified several monitoring wells in this aquifer with low pH levels and heavy metal contamination. The source of contamination is from historic mining operations. This formation overlays the Roubidoux Formation. The Roubidoux Formation is threatened because of the severity of the contamination in the overlaying formations.

The Oscar "A" Formation

The Department has identified several wells in this aquifer with elevated nitrate levels and gross alpha activity above the maximum allowable limit of 15 pCi/L. These wells serve the Meadow Ridge Mobile Home Park in Pottawatomie County. These concerns are similar to those expressed for the Garber/Wellington Formation.

McAlester and Hartshorne Formation-Savanna Formation/McAlester Formation/Hartshorne Sandstone Formation

The Department and the Water Board have identified several monitoring wells in this aquifer with low pH levels, heavy metal contamination, chlorides, and some controlled industrial wastes. The source of contamination is from historic mining operations and off-site disposal pits for oil field and industrial waste. No community systems are experiencing water quality problems.

Walnut Creek Alluvium Deposits

The Department has identified two well fields in this aquifer with elevated nitrate levels. These include the City of Cole and the City of Washington in McClain County.

Tillman Terrace Deposits

The Department has identified two well fields in this aquifer with elevated nitrate levels. These well fields include the City of Tipton and the City of Manitou in Tillman County. The wells at Tipton also show elevated levels of selenium.

Little Sandy Creek Alluvium Deposits

The Department has identified a well field in this aquifer with elevated nitrate levels. This well field services the Alfalfa County Rural Water District and Solid Waste Management District #1 North, near the City of Byron, in Alfalfa County.

West Cache Creek Terrace

The Department has identified a well field in this aquifer with elevated nitrate levels. This well field services the Town of Faxon in Comanche County.

Major Sources of Contamination

The major sources of contamination within the state are listed in Table 50. The relative priority of each source is ranked from one to five with one being the most severe. The basis used for establishing the priority ranking system was based upon information collected from the various monitoring programs (e.g. the monitoring network, the ambient monitoring program and the wellhead protection program).

TABLE 50. MAJOR POTENTIAL SOURCES OF GROUNDWATER CONTAMINATION

CONTAMINANT SOURCE	TEN HIGHEST PRIORITY SOURCES	FACTORS CONSIDERED IN SELECTING A CONTAMINANT SOURCE[1]	CONTAMINANTS[2]
Agricultural Activities			
Agricultural Chemical Facilities			
Animal Feedlots	✓	C - D - E	E - J
Drainage Wells			
Fertilizer Applications	✓	C - E	E
Irrigation Practices	✓	C - E	E
Pesticide Applications			
Storage and Treatment Activities			
Land Application	✓	C - D - E	D - E - H - J - L
Material Stockpiles			
Storage Tanks (Above Ground)			
Storage Tanks (Underground)	✓	A - C - E	D
Surface Impoundments	✓	A - C - D - E	D - E - G - H - J - L
Waste Piles			
Waste Tailings			
Disposal Activities			
Deep Injection Wells	✓	C - D - E	C - D - G - H
Landfills			
Septic Systems	✓	A - C - D - E	E - J - L
Shallow Injection Wells			
Other			
Hazardous Waste Generators			
Hazardous Waste Sites			
Industrial Facilities			
Material Transfer Operations			
Mining and Mine Drainage			

CONTAMINANT SOURCE	TEN HIGHEST PRIORITY SOURCES	FACTORS CONSIDERED IN SELECTING A CONTAMINANT SOURCE[1]	CONTAMINANTS[2]
Pipelines and Sewer Lines			
Salt Storage and Road Salting			
Salt Water Intrusion	✓	C - D - E	G - D
Spills			
Transportation of Materials			
Urban Runoff			
Other Sources Abandon Wells (Unplugged)	✓	A - C - D - E	A - B - D - E - G - J - L - M

KEY TO TABLE 51

1

- **A** **Human health and/or environmental risk (toxicity)**
- **B** **Size of the population at risk**
- **C** **Location of the sources relative to drinking water sources**
- **D** **Number and/or size of contaminant sources**
- **E** **Hydrogeologic sensitivity**
- **F** **State findings, other findings**
- **G** **Other**

2

- **A** **Inorganic Pesticides**
- **B** **Organic Pesticides**
- **C** **Halogenated Solvents**
- **D** **Petroleum Compounds**
- **E** **Nitrate**
- **F** **Fluoride**
- **G** **Salinity / Brine**
- **H** **Metals**
- **I** **Radionuclides**
- **J** **Bacteria**
- **K** **Protozoa**
- **L** **Viruses**
- **M** **Any Unlisted Surface Contaminate**

OVERVIEW OF STATE GROUNDWATER PROTECTION PROGRAMS

Table 52 contains a summary of the state groundwater protection programs.

The Department received authority under HB 2227 and 1002 and S. B. 361 (clean up bill for HB 1002) to be the lead agency for Oklahoma's Wellhead Protection Program. Due to the variety of potential causes and sources of groundwater contamination, other state environmental agencies are involved in this program. These include the Agriculture Department, the Water Board, Conservation Commission, Corporation Commission, the Wildlife Department, and the Department of Mines.

The Department developed its Wellhead Protection Program in accordance with the EPA guidelines set forth under the Safe Drinking Water Act § 1428 (as amended in 1986). Oklahoma's Wellhead Protection Program is a mechanism to assist local communities in protecting their groundwater based drinking supplies. The goal of the Wellhead Protection Program is to delineate protected areas around a drinking water wellhead. In these

Oklahoma's Wellhead Protection Program

protected areas, potential causes and sources of groundwater contamination can be identified and managed thus reducing or eliminating the risk of well contamination.

Under Oklahoma's Wellhead Protection Program, managers of groundwater based drinking water systems may contact the Department to request technical assistance. The state will also offer technical assistance for such tasks as evaluating the potential for groundwater contamination, determining possible sources of contamination, proposing model ordinances for control of potential sources of contamination, and/or preparing a contingency plan in the event of well contamination. The program advocates land use restrictions around the wellhead. At present, emphasis is placed on educational programs and voluntary implementation of best management practices to reduce or eliminate the need for restrictive regulatory protection.

Groundwater Indicators

The Department routinely monitors public drinking water wells for nitrates, coliform bacteria, volatile organic compounds and other drinking water quality parameters. The Department has regulatory authority for public water supplies under 63 O.S. 1981, § 1-901 *et seq*. The regulations were last amended by the Oklahoma State Board of Health on February 8, 1990 (effective May 25, 1990) and incorporated into the Department on January 1, 1993 (effective July 1, 1993). Under this regulation, a *community water system* is defined as "any public water supply system which serves residents on at least ten service connections or regularly serves twenty-five residents." A *non-transient non-community water system* is "any public water supply system that is not a community water system and that regularly serves at least twenty-five of the same persons over six months per year. This definition includes but may not be limited to schools, day care centers, industries and other places of employment." A *non- community water system* is "any public water supply system which is neither a community water system nor a non-transient non-community water system." Tables 52 through 60 list the various supply systems with standards violations. With the exception of nitrate as nitrogen, most of the contaminants are of natural origin. Note that in the "Date Violation Confirmed" column, some violations are of recent discovery and others have been known for several years.

TABLE 51. SUMMARY OF STATE GROUNDWATER PROTECTION PROGRAMS

PROGRAM OR ACTIVITIES	CHECK IF ACTIVE	IMPLEMENTATION STATUS	RESPONSIBLE AGENCY
Active SARA Title III Program	✓	FE	DEQ
Ambient groundwater monitoring system	✓	CE	OWRB*
Aquifer vulnerability assessment	✓	FE	DEQ*
Aquifer mapping	✓	CE	OWRB*
Aquifer characterization	✓	CE	OWRB*
Comprehensive data management system	✓		GIS Council/Data Managememt
EPA - endorsed Core Comprehensive State Groundwater Protection Program (CSGWPP)	✓	CE	DEQ*
Groundwater discharge permits	✓	FE	DEQ*
Groundwater Best Management Practices	✓	CE - UR	DEQ*
Groundwater legislation	✓	CE	OWRB*
Groundwater classification	✓	CE	OWRB*
Groundwater quality standards	✓	CE	OWRB*
Interagency coordination for groundwater protection initiatives	✓	CE	OSE*
Nonpoint source controls	✓	UD	OCC*
Pesticides State Management Plan	✓	FE	OSDA
Pollution Prevention Program	✓	FE	DEQ
Resource Conservation and Recovery Act (RCRA) Primacy	✓	FE	DEQ
State Superfund			
State RCRA Program incorporating more stringent requirements than RCRA Primacy			
State septic system regulations	✓	FE	DEQ
Underground storage tank installation requirements	✓	FE	Corp. Comm
Underground Storage Tank Remediation Fund	✓	FE	Corp. Comm
Underground Storage Tank Permit Program	✓	FE	Corp. Comm
Underground Injection Control Program	✓	FE	DEQ*
Vulnerability assessment for drinking water / wellhead protection	✓	CE	DEQ
Well abandonment regulations	✓	UD	OWRB*

PROGRAM OR ACTIVITIES	CHECK IF ACTIVE	IMPLEMENTATION STATUS	RESPONSIBLE AGENCY
Wellhead Protection Program (EPA - approved)	✓	CE - FE	DEQ
Well installation regulations	✓	FE	OWRB*

KEY TO TABLE 52

1

CE Continuing Efforts
FE Fully Established
NA Not Applicable
P Pending
UD Under Development
UR Under Revision

2

DEQ Oklahoma Department of Environmental Quality
OCC Oklahoma Conservation Commission
Corp. Comm. Oklahoma Cooperation Commission
OWRB Oklahoma Water Resources Board
*** Indicates multiple agency input into the program**

TABLE 52. PUBLIC WATER SUPPLY STANDARDS VIOLATIONS: NITRATE (NO_2-NO_3), MAXIMUM ALLOWABLE LIMIT - 10 MG/L (PPM).

AQUIFER	COUNTY	SYSTEM NAME	DATE VIOLATION CONFIRMED	CURRENT LEVEL-DATE
Arkansas River Alluvium	Osage	Osage Oaks TP	1987	11-1990
Arkansas River Alluvium	Osage	Shady Acres MHP	Aug 1990	
Arkansas River Alluvium	Osage	Rolling Hills	Jan 1998	13-Feb-1998
Arkansas River, Salt Fork	Alfalfa	Alfalfa Rural Water Supply Solid Waste Management District #1	1979	13-1991
Arkansas River, Salt Fork	Alfalfa	Jet	1979	19-1991
Arkansas River, Salt Fork	Alfalfa	Alfalfa RWSSWMD #1	May 1993	15-Jan-1998
Arkansas River, Salt Fork	Alfalfa	Jet	Aug 1996	21-Feb-1998
Cache Creek, West Terrace	Comanche	Faxon	1988	18-1991
Canadian River, Alluvium	Dewey	Taloga	1979	17-1991
Canadian River, North Alluvium	Blaine	Geary	1985	15-1991
Canadian River, North Alluvium	Kingfisher	Okarche Rural Water District	1988	13-1991
Cimarron River Alluvium	Logan	Cimarron City	1988	12-1990
Cimarron River Alluvium	Payne	Eastside MHP	1990	
Cimarron Terrace	Kingfisher	Dover	May 1991	
Cimarron Terrace	Alfalfa	Carmen	Feb 1998	
Cimarron Terrace	Kingfisher	Hennessey	Feb 1996	13-Jan-1998

AQUIFER	COUNTY	SYSTEM NAME	DATE VIOLATION CONFIRMED	CURRENT LEVEL-DATE
Cimarron Terrace	Kingfisher	Hennessey	May 1993	14-Feb-1998
Enid Terrace	Garfield	Winchester West	1988	13-1991
Enid Terrace	Garfield	Garfield Co. RWD #1	Aug 1997	12-Jan-1998
North Canadian Alluvium	Blaine	U.S. Gypsum	Feb 1998	
North Canadian Alluvium	Blaine	Roman Nose State Park	Apr 1994	14-Mar-1998
North Canadian Alluvium	Blaine	North Blaine Water	Sept 1995	12-Feb-1998
North Canadian Alluvium	Blaine	North Blaine Water	Sept 1995	13-Feb-1998
North Canadian Alluvium	Blaine	Geary	Feb 1998	
North Canadian Alluvium	Canadian	Calumet	Dec 1997	
North Canadian Alluvium	Dewey	Seiling Public Works Authority	Dec 1995	12-Feb-1998
North Canadian Alluvium	Kingfisher	Okarche RWD	May 1993	16-Dec-1997
North Fork Red Alluvium	Kiowa	Lone Wolf	Feb 1997	13-Feb-1998
North Fork Red Terrace	Beckham	Beckham Co. RWD #1	May 1997	11-Feb-1998
North Fork Red Terrace	Beckham	Delhi Water Corp	May 1993	14-Mar-1998
North Fork Red Terrace	Greer	Oklahoma State Reformatory	May 1993	19-Feb-1998
North Fork Red Terrace	Greer	Granite Public Works Authority	May 1993	13-Jan-1998
North Fork Red Terrace	Greer	Granite Public Works Authority	May 1993	18-Jan-1998
Ogallala	Woodward	Woodward Co. Rural Water District #2	1988	13-1991
Ogallala	Woodward	Woodward Co. Rural Water District #2	Dec 1994	13-Feb-1998
Ogallala	Woodward	Woodward Co. Rural Water District #2	Oct 1994	13-Feb-1998
Red River Alluvium	Cotton	Cotton Co. RWD #1	May 1993	15-Aug-1997
Red River, North Fork Alluvium Terrace	Beckham	Carter (Beckham Co. Rural Water District #1)	1979	11-1991
Red River, North Fork Alluvium Terrace	Greer	Granite PWA	1988	11-1991
Red River, North Fork Alluvium Terrace	Greer	OK State Reformatory	1979	19-1991
Red River, Salt Fork Terrace	Jackson	Jackson Co. Water Corp.	May 1991	
Red River, Salt Fork Terrace	Harmon	Hollis	Sept 1993	12-Jan-1998
Red River Terrace	Tillman	Tillman Co. Rural Water District #1	May 1991	
Tillman Terrace	Tillman	Manitou	1988	13-1991
Unknown	Payne	Payne Co. Rural Water District #3	1990	
Unknown	Tillman	Davidson	May 1991	
Unknown	McClain	Children Today Daycare	Jun 1993	13-Nov-1997

AQUIFER	COUNTY	SYSTEM NAME	DATE VIOLATION CONFIRMED	CURRENT LEVEL-DATE
Washita River Terrace	Grady	Verden	Mar 1998	
Walnut Creek Alluvium	McClain	Cole	1984	32-1990

TABLE 53. PUBLIC WATER SUPPLY STANDARDS VIOLATIONS: GROSS ALPHA ACTIVITY, (INCLUDING RADIUM-226 BUT EXCLUDING RADON AND URANIUM), MAXIMUM ALLOWABLE LIMIT-15 PCI/L

AQUIFER	COUNTY	SYSTEM NAME	DATE VIOLATION CONFIRMED	CURRENT LEVEL-DATE
Garber-Wellington	Cleveland	Oklahoma University	April 1991	
Garber-Wellington	Cleveland	Western Homes	1986	20-1990
Garber-Wellington	Oklahoma	Blue Stem Lake	April 1991	
Garber-Wellington	Oklahoma	Deer Creek	April 1991	
Garber-Wellington	Oklahoma	Nichols Hills	Sept. 1990	45-1990
Wellston	Lincoln	Distribution	1983	23-1997
Oscar Alluvium	Lincoln	Wellston	1983	76-1991
Oscar Alluvium	Pottawatomie	Meadowridge TP	Dec. 1990	81-1991

TABLE 54. PUBLIC WATER SUPPLY STANDARDS VIOLATIONS: RADIUM-226 ACTIVITY, MAXIMUM ALLOWABLE LIMIT-5 PCI/L

AQUIFER	COUNTY	SYSTEM NAME	DATE VIOLATION CONFIRMED	CURRENT LEVEL-DATE
Roubidoux	Craig	Welch	1988	5.4-1990
Roubidoux	Delaware	Shangri-La	1988	6.0-1991

TABLE 55. PUBLIC WATER SUPPLY STANDARDS VIOLATIONS: FLUORIDE (F), MAXIMUM ALLOWABLE LIMIT-4.0 MG/L (PPM)

AQUIFER	COUNTY	SYSTEM NAME	DATE VIOLATION CONFIRMED	CURRENT LEVEL-DATE
Roubidoux	Mayes	J&D MHP	1978	10.5-1989
Vamoosa Form	Pottawatomie	Maud	1978	4.4-1990
Vamoosa Form	Seminole	Bowlegs Water	1978	6.6-1990

TABLE 56. PUBLIC WATER SUPPLY STANDARDS VIOLATIONS: SELENIUM (SE), MAXIMUM ALLOWABLE LIMIT-0.01 MG/L (PPM)

AQUIFER	COUNTY	SYSTEM NAME	DATE VIOLATION CONFIRMED	CURRENT LEVEL-DATE
Covington	Garfield	Hartman 1 and 2	Dec 1993	0.09-Feb-98
Garber-Wellington	Canadian	Mustang	1988	0.05-1991
Garber-Wellington	Canadian	Piedmont	1979	0.04-1991
Garber-Wellington	Cleveland	Moore	1982	varies-1991
Garber-Wellington	Cleveland	OU	1978	varies-1991
Garber-Wellington	Garfield	Covington	1988	0.02-1991
Garber-Wellington	Oklahoma	Blue Stem Lake	1982	0.04-1991
Garber-Wellington	Oklahoma	Silverlake Water	1985	0.05-1991
Moore	Cleveland	Well 11	Nov 1997	0.09-Feb 1998
Nichols Hills	Oklahoma	Well 22	Oct 1996	0.04-Feb 1998
Oscar Alluvium	Lincoln	Wellston	Aug. 1990	
Silverlake Water	Oklahoma	Well 1 and 2	1985	0.06-Mar 1998
Tipton	Tillman	Blending Station	Feb 1998	
Tillman Terrace	Tillman	Tipton	June 1991	
Vamoosa Form	Lincoln	Tryon	1978	0.02-1990

TABLE 57. PUBLIC WATER SUPPLY STANDARDS VIOLATIONS: ARSENIC (AS), MAXIMUM ALLOWABLE LIMIT-0.05 MG/L (PPM)

AQUIFER	COUNTY	SYSTEM NAME	DATE VIOLATION CONFIRMED	CURRENT LEVEL-DATE
Norman	Cleveland	Well 23	Jan 1998	0.12-Feb 1998
Nichols Hills	Oklahoma	Well 8	Nov 1997	0.18-Feb 1998
Unknown	Oklahoma	Baptist Children	1985	0.06-1991

TABLE 58. NON-COMMUNITY, PUBLIC WATER SUPPLIES STANDARDS VIOLATIONS: NITRATE (NO_2-NO_3), MAXIMUM ALLOWABLE LIMIT-20 MG/L (PPM)

AQUIFER	COUNTY	SYSTEM NAME	DATE VIOLATION CONFIRMED	CURRENT LEVEL-DATE
Cedar Hills Sandstone	Alfalfa	Grace Cafe	Jan. 1989	
Unknown	Beckham	Bandys Country Corner	Sept. 1985	24
Unknown	McClain	Vrem Day Care	April 1988	33-1991
Unknown	Oklahoma	Bob's BBQ	Oct. 1989	
Unknown	Oklahoma	Yukon Christian Church	Aug. 1988	25

TABLE 59. NON-TRANSIENT NON-COMMUNITY, PUBLIC WATER SUPPLIES STANDARDS VIOLATIONS: NITRATE (NO_2-NO_3), MAXIMUM ALLOWABLE LIMIT-10 MG/L (PPM)*

AQUIFER	COUNTY	SYSTEM NAME	DATE VIOLATION CONFIRMED	CURRENT LEVEL-DATE
Canadian River, North Terrace	Kingfisher	Phillips Petroleum	Jan. 1989	
Unknown	Tillman	Weaver School	May 1988	11-1990
Unknown	Woods	Dacoma School	Aug. 1988	18-1991
Unknown	Woodward	Mooreland Baptist Children's Home	Nov. 1989	

*The maximum allowable limit for these systems is actually 20 mg/l under current regulations, but due to the nature of the populations served by these systems, all levels greater than 10 mg/l will be followed up on.

Citizen Monitoring

The Department Laboratory performs analysis of private water supplies as requested by the citizens of the state. The maximum allowable limit for community public water supplies is 10 mg/l of nitrate as nitrogen. The state has no WQS set for private water supplies; however, the recommended limit is 10 mg/l. Table 61 list is a summary of the number of samples received and analyzed for nitrate as nitrogen (NO_3 as N) . These samples may be private drinking water supplies or utility wells used for irrigation or animal watering.

TABLE 60. CITIZEN MONITORING FOR NITRATE

AQUIFER	TOTAL NO. OF SAMPLES	RANGE OF VALUES NO_3 AS N MG/L	NO. OF SAMPLES ≥ 10 MG/L	PERCENT OF TOTAL
Antlers Sandstone	5	0.5-9.10	0	0.00
Arbuckle Group	2	0.5	0	0.00
Arkansas River Alluvium & Terrace	20	0.5-35.0	8	40.00
Arkansas River, Salt Fork Alluvium & Terrace	170	0.5-87.5	65	38.24
Canadian River Alluvium & Terrace	65	0.5-19.5	11	16.92
Canadian River, North Alluvium & Terrace	359	0.5-43.0	64	17.83

AQUIFER	TOTAL NO. OF SAMPLES	RANGE OF VALUES NO_3 AS N MG/L	NO. OF SAMPLES ≥ 10 MG/L	PERCENT OF TOTAL
Cimarron River Alluvium & Terrace	255	0.5-120	55	21.57
Elk City Sandstone	48	0.5-102.5	12	25.00
Enid Isolated Terrace	178	0.5-65.0	64	35.96
Garber-Wellington	112	0.5-93.5	4	3.57
Ogallala	470	0.2-62.0	25	5.32
Oscar Group	37	0.5-21.3	2	5.41
Red River Alluvium & Terrace	1	0.5	0	0.00
Red River, North Fork Alluvium & Terrace	36	0.5-19.8	15	41.67
Roubidoux Formation	1	1.5	0	0.00
Rush Springs Sandstone	81	0.5-32.6	11	13.58
Vamoosa Formation	18	0.5-7.8	0	0.00
Washita River Alluvium	8	0.5-29.0	1	12.50

TABLE 61. SUMMARY LIST OF VOLATILE ORGANIC COMPOUND VIOLATIONS

AQUIFER	PUBLIC WATER SUPPLY SYSTEM	PRIMARY CONTAMINANT	ACTION
Arbuckle-Simpson	Tupelo	1,1,1 Trichloroethane	Wells out of service, looking for new source
Canadian Alluvium	Calvin	Tetra-chloroethylene	Looking for new source
Elk City Sandstone	Clinton Sherman	Trichloroethylene	Wells currently out of service Industrial Park
Garber Wellington	Jack Griffin MHP	Tetra-chloroethylene	Using Bottled Water
North Canadian Alluvium	Bethany	Trichloroethylene	Wells currently out of service
Red River Terrace	Tillman County Rural Water District #1	1,2 Dichloroethane	Wells currently out of service
Rush Springs Sandstone	Eakley	1,2 Dichloroethane	Looking for new source
Vamoosa	Cushing	Trichloroethylene	Wells currently out of service

SUMMARY OF GROUNDWATER QUALITY

The goals of the CWA and the SDWA establish that the nation's groundwater be free of harmful levels of contaminates and sets national standards for drinking water. Several state agencies are involved in the protection of Oklahoma 's groundwater. These include the Department, OSDA, Corp. Comm., OCC, and the Water Board. Appendix 6 through 9 list the monitoring information that was available from the period of January 1, 1994 through December 31, 1995. Appendix 6 list the aquifer monitoring data, appendix 7 list the groundwater contamination summary data, appendix 8 list the number of CERCLIS sites in each county, and appendix 9 list the citizen monitoring data.

APPENDIX 1

POLLUTION, WILDLIFE AND FISH KILLS REPORTED TO THE ODWC FOR PERIOD JANUARY 01, 1996 TO DECEMBER 31, 1997

WATERBODY NAME	COUNTY	LOCATION	DATE RECEIVED	ODWC NO	COMPLAINT	UPDATE	REFERRED TO
Boomer Lake	Payne	Boomer Lake in Stillwater	01/02/96	W01-01-96	Diesel spill on Boomer Lake by the City of Stillwater No Wildlife kill observed	No update available at this time	
Creeks west of Ratliff City	Carter	2 mi west of Ratliff City	01/04/96	W02-01-96	3 injection well locations are discharging saltwater into creeks--Problem is ongoing Mobil Oil	Warden B. Hale investigated and cause was unconfirmed	
Farm pond near Kremlin	Garfield	Near the town of Kremlin	01/16/96	W03-01-96	Fish kill in a farm pond due to a broken liquid natural gas pipeline operated by Koch	Warden D. Foltz arrived to investigate and clean-up was in progress	
Well location		1 mi south, 1 1/3 mi east of Allen-Boyd Farm	01/18/96	W04-01-96	Improper clean-up of waste materials at well location -CM Exploration Co., Seminole		
Farm pond	Coal	1/4 mi south of Centrahoma	01/18/96	W05-01-96	Oil spill above a farm pond at a work-over rig - Oklahoma Oil and Gas Management, Inc.	Location was investigated. No wildlife damages. Small spill was confirmed, oil was contained with no impacts to wildlife	
Cimarron River	Kingfisher	west of town of Dover	01/12/96	W06-01-96	Fish kill in Cimarron River	Warden D. Foltz donducted investigation. Fish samples indicated elevated levels of toxaphene in 1 fish. Cause of kill inconclusive	
Grand Lake	Delaware	Grand lake area	01/18/96	W07-01-96	Caller has found a total of 6 dead cardinals around feeder on her property	Caller will freeze the next body found	
	Coal	1/2 mi north and 1/4 mi west of Centrahoma	01.29/96	W08-01-96	While observing absence of nets or other covers over salt water tanks, a leak was observed - Stoneridge Oil Inc.	Wardens Harold Scates and Todd Smith worked this case - See original report	OCC Ada office

WATERBODY NAME	COUNTY	LOCATION	DATE RECEIVED	ODWC NO	COMPLAINT	UPDATE	REFERRED TO
Blacksmith Creek	Pottawatomie	2 N 1/2 east of Asher on old 177 highway	02/02/96	W01-2-96	Break in pipeline-releaseof 170 barrels of crude into Blacksmith Creek in Pottawatomie County -NGC Oil trading and Transportation	Warden H. Scates investigated the area and several photos were taken and ph-TDS readings collected wildlife damages assessed as minimal	
Drainage ditch	Cleveland	1/4 mi south of the intersection of Bryant and S.E. 44th Street in OKC/Del City line	02/08/96	W02-2-96	Drainage ditch behind the complainant house is stopped up and has a foul smelling bluish-green liquid in it	No update available at this time	Complaints Coord.-DEQ
Unknown pond		Hwy 74 and 111 St. South, west to dead end sign, curve right to first immediate right (gravel rd)	02/13/96	W03-2-96	Complaintant reported that Energy Oil had an underground leak and her pond is totally polluted. Allk the fish are dead or dying. The oil company is aware of the problem and trying to clean up.	Warden D. Luther investigated with OCC. A buried oil line which ran under the dam of a pond ruptured. Energy Oil was working on the clean-up. Confirmed violation	Referred from DEQ
Unknown Gully		Boundary of Mahard Egg and Washita Arm WMA	02/16/96	W04-2-96	Household/chicken house trash has been seen being dumped into a gully along the boundary of Mahard Egg Farm and Washita WMA	See report	Comp. Coord., DEQ and OSDA
		3.8 mi west of Tecumseh	02/20/96	W05-2-96	Complaintant is finding dead wildlife on his property	See report	
Unknown ponds	Seminole	South of Seminole on hwy 99	02/20/96	W06-2-96	Dead fish and raccoons in 2 ponds	Warden H. Scates investigated and it was determined that low dissolved oxygen conditions existed. No further action is anticipated	Refferred from DEQ

WATERBODY NAME	COUNTY	LOCATION	DATE RECEIVED	ODWC NO	COMPLAINT	UPDATE	REFERRED TO
Verdigris River	Rogers	Main tributary of Verdigris River	02/20/96	W07-02-96	Pollution spill has occurred entering a main tributary of Verdigris River	Warden J. Brown investigated and found that hazardous substances were being illegally stored in a oil tank, flowed out of tank when valves opened by EPA and DEQ--samples taken and turned over to DEQ	DEQ
	Pontotoc	Near town of Francis	02/22/96	W08-02-96	Two owls were reported dead, suspected poisoning	Warden H. Scates investigated and found that the owls could have been poisoned consuming rooster from a game cock operation that have been fed strichnine and discarded	
Unknown stream	Canadian	On hwy 4 south of Piedmont	02/29/96	W09-02-96	Complainant notified the Dept.that the stream he fishes in is polluted--he said that it has a fowl smell and had soap bubbles in it	No update available at this time	Comp. Coord., DEQ
Drilling mud pits	Okfuskee	Near Paden	02/12/96	W10-02-96	Complainant reports that 2 reserver pits filled with drilling mud had been overfilled and that the pits were seeping a grayish liquid from the dikes around them	No update available at this time	OCC Comp.Coord.
Unknown pond	Oklahoma	NW corner of Penn and SW 119th Streets	02/12/96	W11-2-96	Complainant reported that a construction company had broken dam/dike of a pond which stranded and killed 100's of fish	Biologist M. Howry investigated and did not find 100's of fish. Minnows and sunfish were in the mud, other fish could have been covered by construction activity	DEQ
Lake Hefner	Oklahoma	Lake Hefner, south of marina, near playground	02/12/96	W12-2-96	Complaintant reported 100's of dead fish on Lake Hefner	Biologist M. Howry and J. Hoagland investigated and determined the cause a winter kill	DEQ
	Haskell County		03/01/96	W01-03-96	Saltwater pipeline froze and broke, spilling the contents on the ground. Oil company replaced the pipe but did not clean up the area	Warden K. Bailey and OCC inspector investigated the site and found clean up adequate--no immediate danger to wildlife	OCC

WATERBODY NAME	COUNTY	LOCATION	DATE RECEIVED	ODWC NO	COMPLAINT	UPDATE	REFERRED TO
Unknown creek	Noble	7 mi north of Billings then 1/4 mi west to cement bridge	03/13/96	W02-3-96	Warden was contacted about illegal dumping of dead cattle into a creek	No update available at this time	OSDA, Comp. Coord.
Kaw Lake	Kay	2 mi south of the Kaw reservoir on the south side of SH60/SH11	04/03/96	W01-4-96	Complainant notified agency of crop-dusting planes were spraying wheat fields with wind speeds in excess of 15 mph. Pesticides were drifting across the road to houses along SH60/SH11	Information was transferred to OSDA--no wildlife was involved	Comp. Coord., OSDA
Lake Eufaula	McIntosh	Lake Eufaula Marina #9	04/03/96	W02-4-96	Anonymous call reported that houseboats are dumping their holding tanks into the lake weekly	No update available at this time	Comp. Coord., DEQ
	Cherokee	Park Hill Nursery; 2 mi east of hwy 62-82 junct on Murrell Homw rd	04/05/96	W03-4-96	Follow up to Park Hill Nursery B.M.P. compliance--water samples taken	FYI only--test results are for file information only	Comp. Coord. DEQ
Unknown creek, pond		3 mi south of hwy 61-82 junct. then east on gravel rd	04/02/96	W04-4-96	Complaintant reported a strong pungent smell in the spring fed creek at his property. Apparently a gallon of Rotenone was used at a private pond and it flowed into the creek	Warden Brady May talked to the responsible party and a written warning was issued for violation	
Unknown creek	Pittsburg	4 mi east, 4.25 mi north of Stuart	04/10/96	W05-4-96	A private contractor had released a large amount of reserve pit fluids in a dewatering operation. These fluids had flowed into a creek near the location-wildlife impacted	Warden H. Scates investigated and evidence collected for possible criminal action to be pursued in Pittsburg County District Court	254 dead fish
Unknown pond	Oklahoma	On an acreage at 15500 Sunnylane	05/06/96	W01-5-96	Caller complained that his neighbor is dumping trash, tires, and wood into a pond that is shared by their property	No update available at this time	Comp. Coord. DEQ

WATERBODY NAME	COUNTY	LOCATION	DATE RECEIVED	ODWC NO	COMPLAINT	UPDATE	REFERRED TO
Unknown pond	Canadian	El Reno Correctional Facility	05/06/96	W02-5-96	An employee at the facility contacted the Game Warden about a fish kill in one of their ponds	Warden Ron Comer investigated and noticed 100's of dead fish. Due to the condition of the water in the pond and the water level, the kill was determined to be low D.O.	
South Canadian River	Cleveland	3 mi east of Lexington 1/2 mi behind 10350 Box rd	05/08/96	W03-5-96	Caller reported illegal dumping into the South Canadian River	No update available at this time	Comp. Coord. DEQ
Unnamed stream	Murray	1/2 mi south of Davis on US 77	05/13/96	W04-5-96	Complainant observed fish dying in a section of an unnamed stream that flows through his property	Warden H. Scates investigated and determined the kill was caused by low D.O.	DEQ
Unknown pond	Johnston	3 mi NE of Milburn on Converse rd	05/13/96	W05-5-96	Many observed dead and dying fish (catfish and sunfish) in farm pond	Warden H. Scates investigated and found the pond greatly overstocked--determined the cause of the fish kill	
Golf course pond	Le Flore	Page Belcher Golf Course at the 18th fairway-North of 71st and hwy 75	05/15/96	W06-5-96	DEQ was contacted about a fish kill in the golf couse pond	Warden Carlos Gomez investigated and found that a nearby sewage drain had backed up and the runoff was going into the pond	referred by DEQ
Cochahee creek	Osage	Cochahee creek	05/17/96	W07-5-96	Merrimack Industries has alledgedly dumped saltwater into Cochahee Creek at least 12 times in the last 18 months	Warden Jeff Brown--no update available at this time	
Unknown ponds	Hughes or Pittsburg	4 mi west of Stuart	05/20/96	W08-5-96	Telephone line and drilling under highway has produced mud and silt that is being washed into farm ponds	Warden H.Scates investigated and collected samples and took photos--No wildlife damages-DEQ's jurisdiction	DEQ

WATERBODY NAME	COUNTY	LOCATION	DATE RECEIVED	ODWC NO	COMPLAINT	UPDATE	REFERRED TO
	Pontotoc	East of Jct. of state hwys 3 and 1. Ada bypass	05/13/96	W09-5-96	DOT had contacted the OCC Ada office reguarding oil seeping out of the ground near the Ada bypass south of hte Cement Plant--HolmanInc., 1100 W. 18th, Ada	Warden H. Scates submitted samples to the DEQ lab and further action will depend upon the lab analysis	DEQ was notified by OCC
Unknown creek	Carter	250 feet south of the intersection of hwys 76 and 7 (Ratliff City)	05/21/96	W10-5-96	OCC Dickie Welch reported that a oily or greasy substance was being pumped into a creek	Warden Bill Hale investigated and did not find any wildlife damages--it apeared that a sewage drain had backed up and sewage was overlfowing into a empty tributary--The City and the nearby Dog Food Company are working to prevent further problems	
Unknown creek		From Purnell School 1 mi south--hwy 76 and 4-5 mi east and back north to county rd	05/23/96	W11-5-96	Oil Co reworked and old well oil was seen on the ground and oil and saltwater had run down into a creek	No update available at this time	
Private pond	Cherokee	Hwy 62, 1 mi east of Proctor, near Williams Dairy	05/28/96	W12-5-96	Fish kill occurred ina private pond after a rainfall. Suspect runoff from adjsacent pasture that was fertilized with "Triple 17" nitrogen 2 weeks prior	Warden Brady May investigated and as a result of the runoff getting into the pond a heavy algae bloom contributed to oxygen depletion--no further action recommended	OSDA
Cochahee creek	Osage	Approx. 7 1/2 mi west of Barnsdall on hwy 11	05/22/96	W13-5-96	Saltwater from a broken injection well ran in Cochahee Creek killing vegetation and crayfish--Marmac Resources-Bartlesville	Owner, operator Paul Hopkins handled the clean up--EPA was also involved in the investigation. No futher action was anticipated	

WATERBODY NAME	COUNTY	LOCATION	DATE RECEIVED	ODWC NO	COMPLAINT	UPDATE	REFERRED TO
Popshego Stream	Pottawatomie	St. Louis, OK	06/03/96	W01-6-96	Facility had released saltwater that discharged into Popshego Creek. OCC requested a wildlife damage assessment	A wildlife damage assessment showed high conductivity levels. No live minnows, dead crayfish, or snails observed. Status unconfirmed	Refferred from OCC
Salt creek	Garvin	From Eola, 5 mi south and 2 mi west of Elmore City	06/07/96	W02-6-96	Pipe out of creek bank. Oil splattered on creek bank and possible saltwater. Possible coming from oil well nearby--Raymond Lackey-responsible party	Warden D. Steele observed the pipe sticking out of hte bank about 20 yards west of Salt Creek. Possible oil residue was observed on vegetation around pipe and on bank. No dead fish observed. Water samples taken. Status confirmed-no violation	OCC county inspector
Salt Creek	McClain	From hwy 177 and 59, 1 mi east	06/97/96	W03-6-96	100 barrels of oil in Salt Creek	Warden D. Steel observed light oil film in Salt Creek. No dead fish or ther wildlife observed. No action anticipated. Status confirmed-no violation	From OCC
Grand Lake	Delaware	Greenbriar and Holiday Points-sailboat bridge between Grove and Fairland	06/10/96	W04-6-96	Complainant observed a large number of dead fish floating in the water- it appears that they may have been caught in a trot line	Warden D. Deckard--no update available at this time	
Timber Creek Watershed	Beckham	Acreage behind Rt. 4 Box 230-D Sayre, OK	06/10/96	W05-6-96	Complainant says that propane is seeping out of old oil tanks owned by Exxon	Referred to OCC--no wildlife involved	OCC
Dark Hollow Creek	Hughes	North of 71st east and hwy 75	06/11/96	W06-6-96	OCC inspected and discovered oil spill at Dark Hollow Creek	Warden H. Scates conducted the the investigation-- refer to original report	

WATERBODY NAME	COUNTY	LOCATION	DATE RECEIVED	ODWC NO	COMPLAINT	UPDATE	REFERRED TO
Unidentified River	Garvin	Lindsay-hwy 39	06/12/96	W7-6-96	Solid waste dumping is taking place where the lease road meets the river	Referred to DEQ--no wildlife involved	DEQ
South Canadian River	Cleveland	2 mi east, 3 mi south, at Lexington	06/13/96	W08-6-96	Dumping into the South Canadian River--no wildlife affected	Referred to DEQ--no wildlife involved	DEQ
Flat Rock Creek	Osage	Osage expwy to Apache, past VoTech	06/14/96	W09-6-96	Dead fish and turtles in Flat Rock Creek. Salt water was released into the creek. EPA investigating and taking samples--Rougeot Oil and Gas Corp (Pine Oil Co-Sperry, OK)	Warden J. Brown was notified to investigate. Responsible party contained and cleaned up spill within 48 hours	
Golf course creek	Oklahoma	Earlywine Golf Course	06/17/96	W10-6-96	Caller reported that the golf course crew found about 200 dead fish around one of their ponds	Biologist M. Howery spoke with the caller and found that all of the fish were large and no other pond on the course was affected. The situation appears to be a natural kill associated with pond stratification. Confirmed--no violation	
Arkansas RIver	Tulsa	Hwy 64 bridge crossing the Arkansas rvr west of Bixby	06/20/96	W11-6-96	Complainant reported while fishing on the Arkansas River he noticed a turbid plume of water was getting into the water from a sand mining plant on the river	No update available at this time	DEQ
Private pond	Caddo	1/4 mi west of Gibsons Midway store on hwy 62	06/21/96	W12-6-96	Fish kill in private pond	No outside complaints or run-off indicators present. Chronic algae bloom contributing to a high pH and extremely low D.O. Confirmed--no violation	
Unknown Creek	Oklahoma	Near intersection of Britton and Rockwell	06/11/96	W13-6-96	Complainant report that sawage was leaking from a pipe and entering a creek where it was killing fish	Biologist M. Howery investigated and found the leaking pipe. He found no dead fish and the fish that were visible appeared to be healthy--referred to DEQ	DEQ

WATERBODY NAME	COUNTY	LOCATION	DATE RECEIVED	ODWC NO	COMPLAINT	UPDATE	REFERRED TO
Lake Arcadia	Oklahoma	Spring Creek section of Lake Arcadia	06/24/96	W14-6-96	Dead fish floating in Lake Arcadia	Biologist M. Howery talked with Park Naturalist regarding the situation and found that the dead fish was bait that had been discarded (shad). Confirmed--no violation	
Tyner Creek	Cherokee	3 1/2 mi norht of Proctor, 1 mi east of Tyner Creek crossing	06/12/96	W15-6-96	Fish kill on Tyner Creek. Upon arrival approximately 500+ minnow had been killed. Water was normal and no odor was detected. A backhoe had worked in the creek on that day and possibly leaked fluid	Warden B. May contacted the owner of hte backhoe and discussed the possibility of discrepancies. Owner would check the equipment. Job was finished without re-entry into the water	
Unknown pond	Grady	12 mi SW of Chickasha on hwy 92 to Lake Burtschi	06/26/96	W16-6-96	DEQ referred this complaint to our office-fish kill in a small farm pond. DEQ agent had already investigated and the D.O. reading indicated kill was related to low D.O.	Warden B. Hale was made aware of the situation and no further action was anticipated	
Unknown Creek	Carter	Intersection of hwy 76 and 7	06/27/96	W17-6-96	Dog food processing facility land applied grease and other products (unpermitted). Contaminants flowed into concrete-lined channel into a creek. No live fish below the discharged--TreatCO owners Ken and Marge Thomas	Warden B. Hale investigated the creek and found no live or dead fish. The owner was interviewed by the Warden and told him that he would be closing the facility and moving. Kleen Oil Services would be picking up 3000 gal of waste a day	
Cimarron River	Creek	Cimarron rvr from approx. Drumright to near hwy 48 bridge on Keystone	07/01/96	W01-7-96	People fishing in the Cimarron River reported dozens of dead flathead catfish	Several ODWC personnel worked on this incident. Final finding was low D.O. Status confirmed--no violation	DEQ
Unknown pond	Custer	16 mi N of Clinton	07/15/96	W02-7-96	Complainant noticed 100's of dead fish in his pond	No update available at this time	

WATERBODY NAME	COUNTY	LOCATION	DATE RECEIVED	ODWC NO	COMPLAINT	UPDATE	REFERRED TO
Unknown stream	Stephens	2 mi N of countyline, OK, 3 mi W	07/15/96	W03-7-96	Property owner noticed dead fish in a stream	Warden D. Steele spoke with the landowner and they determined the probably cause to be low D.O.--no further actoin anticipated	
Private pond	Garfield	1 mi N, 1 mi E of Drummond	07/15/96	W04-7-96	Dead fish reported in private pond	Warden F. Huebert investigated and found that field parameters indicated low D.O. Confirmed--no violation	
Lake Overholser	Oklahoma	S picnic area at Lake Overholser, W side of dam	07/18/96	W05-7-96	Complainant noticed the clean up crew at the city park dumping trash into the Lake--City of Oklahoma City	No update available at this time	DEQ
Unknown ponds	Woods	Approx. 20 mi W and 11 mi N of Alva	07/18/96	W06-7-96	Landowner contacted Terry Swallow of a fish die-off on 2 of his ponds	Warden T. Swallow investigated and found that the kill seems to be a result of low D.O. and high turbidity	
Apartment complex pond	Oklahoma	Behind Quail Creek Apt. Complex	07/29/96	W07-7-96	A drained pond stranded the fish population	Biologist M. Howery advised the complainant in writing that there was no act of pollution and ODWC had no authority to investigate	Referred from DEQ
Unknown creek	Grady	Within city limits of Ninnekah	07/29/96	W08-7-96	Complainant reported that Brigette Construction out of Ninnekah is dumping a loi and mud mixture into a creek behind his house. Has notified their County Civil Defense director Billy Kreb	Biologist M. Howery contacted the OCC Duncan office and spoke with Jack Geller, Asst. Manager. Clean up is underway. The site is bein monitored nad the spill is a result of a storm run-off from a soil farming operation	OCC
Dolese Park Lake	Oklahoma	NW 50th, Dolese Park Lake	08/06/98	W01-8-96	City of OKC Park personnel investigated a fish die off and took D.O. readings and water temperatures--probably cause is low D.O.	No further action anticipated	From DEQ complaints

WATERBODY NAME	COUNTY	LOCATION	DATE RECEIVED	ODWC NO	COMPLAINT	UPDATE	REFERRED TO
Unknown creek	Ellis	1 mi E from Gage to Service Drilling Rig	08/21/96	W02-8-96	OCC Field inspector L. Fege reported high chloride filling mud is flowing into a creek	No update available at this time	From OCC complaints
Unidentified watershed	Pottowatomie	Swof Pottawatomie County, Red Springs Facility	08/16/96	W03-8-96	OCC personnel discovered pollution related to a saltwater disposal well. Saltwater release through a pipe into the headwaters of a watershed mandated the need for a wildlife damage assessment	Inspection of facility indicated that saltwater releases were being piped into a creek. The absence of a significant water flow prevented an in-depth assessment of impacts to downstream aquatic biota	From OCC complaints
Private pond	Carter	Town of Graham	08/19/96	W04-8-96	Dead fish were discovered in a private pond following a very heavy rainfall the night before. The concern is that the pond has been contaminated by an oil well that had recently been worked over	Warden H. Scates investigated the fish kill and the probably cause is low D.O.	From OCC complaints
Unknown pond	Grady	Private residence, Chickasha	09/06/96	W01-9-96	Complainant reported that 59 goldfish in her yard pond had died. The pond has a pump and generator but is now milky white and foaming	No action anticipated-the species involved is a nonjurisdiction species	From DEQ complaints
Unknown pond	McCurtain	Unnamed pond located at Broken Bow	09/06/98	W02-9-96	Complainant reported dead fish in her pond	The DEQ agent advised the complainant that the kill appeared to be low D.O.	From DEQ complaints
Private pond	Logan	Abell community	09/17/96	W03-9-96	Fish dying in a private pond	Warden J. Champeau was contacted to go out--No update available at this time	
Flood pool	Washita	1mi W of Canute of old 66, then 2 mi	09/17/96	W04-9-96	Breach of dike around drilling platform which is in the flood pool of an NCRS flood structure	No update available at this time	OCC complaints

WATERBODY NAME	COUNTY	LOCATION	DATE RECEIVED	ODWC NO	COMPLAINT	UPDATE	REFERRED TO
Private pond	Cleveland	Gravel drive to pond dam	09/20/96	W05-9-96	Fish dead in a private pond	DEQ inspector Robin Tyree investigated the kill and found low D.O. the cause of the kill. Melynda Hickman, ODWC biologist sent a letter to the complainant explaining the cause	From DEQ complaints
	Seminole	N of town of Vamoosa off hwy 99	09/24/96	W06-9-96	Complainant reported that a pump jack on his property is leaking. See original complaint for more information	M. Howery with the ODWC contacted the complainant and informed him of the statutory limits and recent history in the area	OCC
	Seminole	N of town of Vamoosa off hwy 99	09/24/96	W07-9-96	Complainant reported several on-going problems on his property with a pipeline running to it which has developed 3 leaks in the past year	M Howery advised the complainant of the statutory limits and recent history in the area	OCC
Private pond	Semniole	9 mi N of Sasakwa	10/07/96	W01-10-96	Oil field saltwater spilled into private pond--John L. Lewis Well Service	Warden H. Scates investigated and found that the fish were impacted by the saltwater and OCC is working the landowner	From OCC complaints
Deep Fork	Creek/Okfuskee	1 mi N of Welty on Creek/Okfuskee Co. line	10/07/96	W02-10--96	OCC contacted DEQ about an oil spill into the Deep Fork	No update available at this time	
Lake Murray	Love	Along dam at Lake Murray	10/10/96	W03-10-96	Dead fish were reported along the marina at Lake Murray	Warden D. Steele investigated and found that the dead fish were the result of a natural die off that happens every year	

WATERBODY NAME	COUNTY	LOCATION	DATE RECEIVED	ODWC NO	COMPLAINT	UPDATE	REFERRED TO
Unknown tributary of Surratt Branch		Arkinda Arkansas, on Arkansas hwy 399	10/17/96	W04-10-96	Complainant reported that the creek which runs through her son's property has been polluted with hog waste	No update available at this time	OSDA and DEQ
Rock Creek	Creek	Sapulpa, Main St. and hwy 117	10/21/96	W05-10-96	Dead fish found in Rock Creek	DEQ inspector TomDennis contacted the City of Sapulpa and they had repaired a water line the prior week and an estimated 6,000,000 gallons of chlorinated water had flowed into the creek	DEQ
Flood control lake #38	Seminole	9 mi NW of Konawa	10/07/96	W06-10-96	An oil spill impacted an unnamed stream flood control lake #38 of the Salt Creek Watershed Project--American Capital Corp, San Marcos, CA	Warden H. Scates conducted the investigation and the assessment of wildlife damages. The investigation is still on-going--no further updates available at this time	From OCC Ada District office
Dolese Lake	Oklahoma	Dolese Park at NW 50th and MacArthur, OKC	12/13/96	W01-12-96	Caller complained of strong sewer smell coming from the SE corner of the lake	No update available at this time	DEQ
Unnamed creek	Seminole	Off I-40 at exit 200 in Seminole Co.	12/10/96	W02-12-96	Oil spill from Jessica 23-A well had entered a drainage. Landowner concerned with how the cleanup was being conducted	Warden H. Scates was being contacted to assess the fish and wildlife damages	OCC
Private pond	Grady	Private property near Cox City	01/07/97	W01-1-97	Caller reported that saltwater was discharging into a lake on his property	No update available at this time	OCC
Peter Sandy Creek	Johnston	4 mi E of hwy intersections 99-7	01/23/97	W02-1-97	Complainant reported that a thick scum was covering the surface of Peter Sandy Creek--suspects that the scum may be the result of a dischare from the Mahard Egg Farm	Refer to the original complaint	OSDA Animal Industry Services

WATERBODY NAME	COUNTY	LOCATION	DATE RECEIVED	ODWC NO	COMPLAINT	UPDATE	REFERRED TO
Crutcho Creek	Oklahoma	Near Tinker AFB Golf Course	01/30/97	W03-01-97	Tinker employees reported dead fish in a section of Crutcho Creek	Environmental services from Tinker took D.O. readings and tested the water for contaminants. It appears that the kill was caused when the creek froze over	DEQ
Private lake		Lake on private property	01/31/97	W04-1-97	Caller reported dead fish (38) in the lake	M. Howery and B. Lehman investigated and found approximately 60 dead fish--kill appears to be natural temperature die off	
	Tulsa?	Tulsa? Exact location unknown	02/12/97	W01-2-97	Sinclair Refinery split a line to their reboiler system. Unknown quantity of #6 Fuel (600 F) oil was dumped on the ground. A yellowish cloud enveloped the area	No point source oil contaminants entered a water of the state. No fish/wildlife damages anticipated	DEQ
Longmier Lake	Garvin	1 mi E of Washita river	02/14/97	W02-2-97	Operator cut a dike sending oil and saltwater down a country road. A stream runs near the road and will be impacted. He was working the area--Signal Hill Exploration, Duncan, OK	No update available at this time	OCC
	Stephens	1/2 mi from Rush Creek hwy 81 to E Marlow	02/19/97	W03-2-97	Huge oil and gas leak onto complainants property--incident occurred sometime ago and clean-up is underway. Complainant is unhappy with the clean-up	No update available at this time	OCC
	Creek	East end of Drumwright	03/17/97	W01-3-97	Complainant reported a saltwater discharge into 3 ponds on property he leases SW of Drumwright. 2 ponds have been tested and chloride contents are extremely high--Lamco Drilling-Skiatook, OK	No update available at this time	OCC
	Okfuskee	Property is located N of Pharoah	03/17/97	W02-3-97	Complainant notified Warden C. Sallee of a company pumping saltwater from one well to another area-Carl Starky, landowner	No update available at this time	OCC Bristow office

WATERBODY NAME	COUNTY	LOCATION	DATE RECEIVED	ODWC NO	COMPLAINT	UPDATE	REFERRED TO
Unknown pond	Creek	4 mi S of Depew, S of ONG plant	03/17/97	W03-3-97	Caller reported a fish kill and said that the water was a murky color and smelled foul. He suspects the ONG plant has something to do with it	The incident is being investigated	OCC Bristow office
Sewer lagoon	Oklahoma	1 mi E of NE 23rd and I.M., Choctaw,OK	03/17/97	W04-3-97	Individual is pumping raw sewage from sewage lagoon onto the ground and it is running onto the complainants property	No update available at this time	DEQ
Private pond	Washington	3/4 mi of Vera, 2 mi W of hwy 75	03/18/97	W05-3-97	Saltwater spill with 500 ft of private pond. Second spill within 2 weeks. Complainant has taken soil and water samples	No update available at this time	OCC
Broken Bow, Egypt Creek	McCurtain	Broken Bow Lake,Egypt Creek	03/19/97	W06-3-97	Dead fish found in a cove at Broken Bow Lake	Game Warden K. Lawson investigated and found that people fishing had fillet some fish and left the remains	
Tributary of N. Canadian River	Oklahoma	W of State fairgrounds on General Purshing Blvd.	04/21/97	W01-4-97	Anonymous caller	No wildlife damages reported and little potential for significant fish damages--Primarily a human health issue	DEQ, OSDA
Private Pond	Okmulgee	Henrietta	04/07/97	W02-4-97	Complainant talked to Fish Division about catfish dying in her pond. He suggested low D.O. as cause	No futher problems anticipated	
	Stephens	No exact location given	04/22/97	W03-4-97	Jim Robinson with OCC called Law Enforcement and spoke with D. Maxwell regarding a saltwater spill. He advises us that clean up was already in progress	No update available at this time	
Unknown pond	Grady	Chickasha	04/29/97	W04-4-97	Complainant reported that a dairy lagoon overflow caused pond water to turn green and kill fish	Warden G. Pester investigated and found no dead fish in the pond or the stream upstream to the dairy	Referred from OCC

WATERBODY NAME	COUNTY	LOCATION	DATE RECEIVED	ODWC NO	COMPLAINT	UPDATE	REFERRED TO
Red River	Love	Past Burneyville	04/30/97	W05-4-97	Jack Thompson with OCC reported that 500 barrels of crude spilled into the Red River. Conoco was setting up booms but the river was running too fast	No update available at this time	
Muddy Boggy River	Atoka	Atoka	05/08/97	W01-5-97	Warden L. Luman received a call that raw sewage was overflowing from a pipe running into the Muddy Boggy River	No update available at this time	DEQ
Residential pond	Oklahoma	Wellington Park Addition in Edmond, OK	05/09/97	W02-5-97	The pond is being pumped out by a construction company as part of a remediation process. The pond is being cleaned of silt and runof due to the area construction. Complainant noticed 2 ducks on the pond covered with a black oily substance	No update available at this time	DEQ
Lagoon	Kay	Brown Welding Company in Ponca City	05/12/97	W03-5-97	Caller reported to Warden T. Daniel that periodically there is a discharge from the lagoon	No update available at this time	DEQ
	Okfuskee	2 mi W of Pharaoh, S of I-40	05/13/97	W04-5-97	While a team of Wardens were investigatign tanks for bird kills, they discovered a pump that had been leaking saltwater for sometime	Warden D. Luther contacted the OCC and a citation was written to the operator. Water samples were also collected	OCC
Deep Fork River	Lincoln	Ketchum Refinery near Stroud	05/20/97	W05-5-97	DEQ contacted us because the overflow from the fire was flowing into the Deep Fork River. It was estimated that over 40 different types of chemicals were involved	No update at this time	Referred from DEQ
Unknown creek		North Lake Rd. by Shidler Lakebeginning at entrance to Golf course	05/23/97	W06-5-97	Warden T. Daniel was working Shilder Lake and discovered an oil leak. A valve on the well was leaking oil onto the ground within 100 ft of a creek that feeds into the lake.	Turned over to the BIA Osage Tribe	Mineral Division-BIA Osage Tribe

WATERBODY NAME	COUNTY	LOCATION	DATE RECEIVED	ODWC NO	COMPLAINT	UPDATE	REFERRED TO
Boggy River	Atoka	Atoka	05/07/97	W07-5-97	Anonymous caller reported that the City of Atoka is pumping raw sewage into the Boggy River	No update available at this time	DEQ
Grand Lake	Delaware	Elk River arm of Grand Lake	05/21/97	W08-5-97	Citizens reported a fish kill that stretched upstream from Buffalo Creek to Elk Creek into Missouri	Wardens J. Jenks and B. May went out to investigate and found no dead fish. A Missouri conservation officer investigated both sides OK and MO and found nothing	
	Tulsa	Tulsa City Park, S of Mingo Rd. and 11st. Park is built around a flood control lake	06/04/97	W01-06-97	Caller reported that he was walking his dog at the park and came across 3 dead birds and a dead cat-it appeared that the the grass had been sprayed recently	OSDA investigated the complaint and did not have enough information to document the problem related to a chemical application-complaint is now closed	OSDA Pesticides
Unknown pond	Rogers	3 mi E of Claremore	06/16/97	W02-06-97	Complainant reported that she had an over-night fish kill in her pond	Biologist M. Howery explained to the caller that since all of the fish were very large it appears that the kill could have resulted from low D.O. He referred her to Rogers State College	
Private pond	Payne	Cushing	06/16/97	W03-06-97	A representative from Amoco Inc. reported an oil spill of approximately 20 barells-booms and a vacuum truck was on site conducting clean up. No dead wildlife found	Clean up was already in progress-pond has no connection to waters of the state. Since no dead wildlife was found-no further action anticipated	OCC
Private pond	Seminole	Seminole	06/12/97	W04-06-97	Runoff from a manhole overflowed into complainant pond on 6/10 and 6/11 and caused a large fish kill	Warden D. Howser and DEQ Agent Max Burnett was contacted to investigate	Referred from DEQ

WATERBODY NAME	COUNTY	LOCATION	DATE RECEIVED	ODWC NO	COMPLAINT	UPDATE	REFERRED TO
Birch Creek	Osage	3 mi W of Barndall	07/28/97	W01-97-97	Complainant contacted Warden J. Brown regarding a saltwater line break that happened about 3 weeks ago and the water running into Birch Creek	Warden J. Brown investigated and did not find any dead wildlife only dead vegetation	
Residential pond	Oklahoma	Shadowlake Addition in OKC	07/24/97	W02-07-97	Complainant discovered several dead fish in the pond behind the house in the Shadowlake Addition-fish were small and all different species	Biologist M. Howery investigated the site and confirmed the dead fish. Large amounts of dead algae were on the rocks and floating in the pond. Suspect either an algicide was placed in the pond or chlorinated water from a waterline or swimming pool was released into the pond	DEQ
Unknown creek	Cleveland	Norman	07/25/97	W03-07-97	Oil and saltwater spill occurred 3 or 4 days prior-Great Wester Drilling Co.-clean up was in progress and little dead fish were noticed in creek	Warden Tony Woodruff investigated	OCC
Farm pond	Garfield	Garber	07/16/97	W04-07-97	Complainant contacted Warden D. Foltz regarding fish kill in his pond	Warden Foltz investigated and suspects that the kill appeared to be caused by oxygen depletion due to algae bloom. Pond has returned to normal	
Flood control lake		Bills	07/25/97	W05-07-97	Complainant contacted Warden D. Foltz regarding a fish kill at the flood control lake	Warden Foltz investigated and suspects oxygen depletion due to high water and a lot of dead vegatation around the shoreline	

WATERBODY NAME	COUNTY	LOCATION	DATE RECEIVED	ODWC NO	COMPLAINT	UPDATE	REFERRED TO
Turkey Creek	Garfield	Drummond	07/28/97	W06-07-97	Complainant contacted Warden Foltz regarding distressed fish	Warden Foltz investigated and suspects that high water in Drummond flats killing the vegetation caused the situation	
Unknown pond	Grady	S edge of Chickasha	07/21/97	W07-07-97	Complainant noticed 100's of dead fish on his 8 acre pond while mowing	Biologist M. Howery investigated the kill and took water samples and D.O. readings. No futher update available at this time	
Watershed control lake		3 1/2 mi N of hwy 66 on Milfax exit and 1 mi W	07/28/97	W08-07-97	Complainant noticed fish kill on lake-some small fish swimming without stress-turtles, snakes, are fine	Due to conditions of the fish kill, the probably cause for the kill is low D.O.	
Unknown pond	Garvin	E of Maysville on hwy 29	07/30/97	W09-07-97	Dead fish in pond	Warden D. Steele investigated the kill and took water samples an took D.O. reading as well. Kill cause was probably low D.O.	
Neosho River		Parsons, KS, Waste treatment facility	08/04/97	W01-8-97	We were notified that a waste treatment facility in Parson, KS suffered a power outage and raw sewage by-passed the facility and flowed into the Neosho River	All of the agencies along the river were advised of the situation-no other update available	AG's office, OWRD
Private pond	Carter	Ardmore	08/05/97	W02-8-97	Private pond appear sto be polluted-dead turtles, fish and a possum. Incident occurred on 7/15/97	ODWC Biologist M. Hickman spoke with DEQ agent Debbie Taylor and the lab results from the kill revealed sevin dust. ODWC was not contacted at the time of the event and could not pursue any action	DEQ

WATERBODY NAME	COUNTY	LOCATION	DATE RECEIVED	ODWC NO	COMPLAINT	UPDATE	REFERRED TO
Unknown creek	Tulsa	Broken Arrow	08/11/97	W03-8-97	Saltwater is being intentionally released from a tank battery. Water is running across the ground killing vegetation and trees. Location is also close to a creek	No update available at this time	OCC
Muskogee Creek	Muskoge e	Muskogee	08/15/97	W04-8-97	Complainant reported that over the past week sewage has been running in a spring fed creek behind his house. The creek is usually dry at this time of year	No update available at this time	DEQ
Unknown pond	Carter	Near Wilson OK. E of Rex Rauff Baptist Church	08/28/97	W05-8-97	Dead fish in pond. Lnadowner had been feeding the fish for the past 2 weeks. Suspects a nearby oil well that was recently drilled	Warden D. Steele investigated and with the conditions of the water and the weather and no signs of runoff getting into the pond, probable cause of the kill is low D.O.	
Unknown pond	Murray	E of Davis	08/28/97	W0608097	Saltwater leak into a pond about 1/4 acre in size. Occurred about a week prior	Warden D. Steele worked with David Schmidt with OCC. Clean up was already in progress by Energy Envir Inc. No further update available	

No summaries were available for November 1996, or October, November, or December 1997.

APPENDIX 2

AMBIENT TREND MONITORING STATIONS IN OKLAHOMA

NAME	STATION #	LEGAL LOCATION	COUNTY
Arkansas R	164400	R11E T19N S14 SW/NW	Tulsa
Arkansas R	194600	R21E T12N S18 NW/NE	Muskogee
Arkansas R	165000	R13E T17N S12 SW/SW	Tulsa
Arkansas R	165570	R16E T16N S31 SE/NE	Muskogee
Arkansas R	194500	R19E T15N S07 SE/NW	Muskogee
Arkansas R	148140	R02E T26N S35 SW/SW	Osage
Arkansas R	152500	R05E T23N S01 SW/NW	Osage
Arkansas R	246400	R24E T10N S09 SE/SW	LeFlore
Barren Fork	197000	R23E T17N S27 NW/SE	Cherokee
Beaver Cr	313400	R09W T02S S29 NW/NE	Cotton
Beaver Cr	313500	R08W T04S S16 NW/NW	Jefferson
Bird Cr	178400	R15E T20N S19 NE/NW	Rogers
Bird Cr	176500	R12E T22N S12 SW/SW	Tulsa
Bird Cr	178050	R14E T20N S09 SE/SE	Tulsa
Black Bear Cr	153000	R05E T22N S31 SE/NE	Pawnee
Blue R	332500	R10E T06S S34 NW/NE	Bryan
Brushy Cr	231600	R16E T05N S26 SE/SW	Pittsburg
Buffalo Cr	157960	R20W T26N S04 NW/NW	Harper
Canadian R	231500	R10E T06N S22 NE/SW	Hughes
Canadian R	231700	R13E T08N S23 SE/SW	McIntosh
Canadian R	228500	R11W T12N S01 NW/SE	Caddo
Canadian R	229400	R06E T05N S05 SE/SE	Seminole

NAME	STATION #	LEGAL LOCATION	COUNTY
Canadian R	229200	R01W T06N S07 NW/NW	McClain
Caney R	173000	R11E T28N S02 SW/SE	Osage
Caney R	175500	R14E T23N S05 NE/NW	Washington
Chickaskia R	152000	R01W T27N S14 SW/SW	Kay
Cimarron R	157950	R20W T27N S02 SW/NE	Harper
Cimarron R	159100	R07W T17N S14 SW/NE	Kingfisher
Cimarron R	160000	R02W T17N S29 NE/SE	Logan
Cimarron R	161500	R07E T19N S28 NE/SW	Creek
Cimarron R	161000	R03E T17N S07 SW/SW	Payne
Clear Boggy Cr	335000	R10E T03S S36 NW/SE	Atoka
Cottonwood Cr	159750	R03W T15N S02 SW/SW	Logan
Cow Cr	313600	R08W T04S S26 SE/NE	Jefferson
Canadian R, Deep Fork	242350	R02W T14N S36 SE/NE	Oklahoma
Canadian R, Deep Fork	243500	R12E T14N S20 NW/SW	Okmulgee
Canadian R, Deep Fork	242500	R06E T14N S15 SW/NW	Lincoln
Canadian R, Deep Fork	242400	R02E T14N S11 NW/SW	Lincoln
East Cache Cr	309000	R11W T04N S33 NW/NW	Comanche
East Cache Cr	311000	R10W T02S S19 SE/SE	Cotton
Elk Cr	304500	R18W T05N S09 SW/SW	Kiowa
Elm Fork	303500	R22W T05N S10 SE/NE	Greer
Flint Cr	196000	R24E T20N S24 SW/NW	Delaware
Fourche Maline	247500	R21E T05N S15 SW/NW	Latimer
Glover R	337900	R23E T05S S28 NW/NE	McCurtain
Illinois R	195000	R24E T19N S19 SE/SE	Adair
Illinois R	198000	R21E T12N S16 SE/NW	Sequoyah

NAME	STATION #	LEGAL LOCATION	COUNTY
Illinois R	196500	R22E T17N S26 SE/NE	Cherokee
Illinois R	195500	R26E T19N S18 NW/NE	Adair
Kiamichi R	336200	R16E T03S S35 NW/SW	Pushmataha
Kiamichi R	335700	R25E T02N S14 SW/SW	LeFlore
Kiamichi R	336700	R18E T06S S25 SW/NW	Choctaw
Little Caney R	174200	R13E T28N S31 SW/SE	Washington
Little Lee Cr	249900	R26E T13N S34 NW/NE	Sequoyah
Little R	337100	R20E T03S S03 SE/NW	Pushmataha
Little R	340000	R32E T10S S10 NE	Sevier(Ark)
Little R	338500	R24E T07S S14 SE/SE	McCurtain
Little R	230000	R01E T09N S29 NE/SE	Cleveland
Little R	231000	R07E T06N S22 SW/NE	Seminole
Little R, Mountain Fork	339000	R26E T06N S07 SE/SE	McCurtain
Little R, Mountain Fork	338840	R25E T01S S24 NE/NE	McCurtain
Mud Cr	315700	R03W T07S S14 SE/SE	Love
Muddy Boggy Cr	334000	R13E T03S S26 NE/NW	Atoka
Neosho R	191550	R19E T20N S01 SE/SE	Mayes
Neosho R	191500	R19E T20N S09 NW/NW	Mayes
Neosho R	185000	R22E T28N S05 SW/SE	Ottawa
Neosho R	190500	R21E T23N S23 NW/SE	Mayes
North Canadian R	242200	R13E T10N S29 NW/NE	McIntosh
North Canadian R	239900	R04W T12N S30 SE/SW	Oklahoma
North Canadian R	239000	R13W T18N S10 NW/NW	Blaine
North Canadian R	239500	R07W T13N S33 SW/NW	Canadian
North Canadian R	241550	R01E T12N S23 SE/SE	Oklahoma

NAME	STATION #	LEGAL LOCATION	COUNTY
North Canadian R	241700	R06E T11N S27 SW/NW	Seminole
North Canadian R	238000	R16W T20N S28 SW/NW	Major
North Canadian R	242000	R10E T09N S12 NE/SW	Hughes
Red R, North Fork	301500	R22W T08N S15 NW/SE	Beckham
Red R, North Fork	305000	R18W T02N S21 NW/NE	Tillman
Red R, North Fork	303000	R20W T05N S22 SW/SW	Greer
Poteau R	249440	R27E T10N S09 SE/SW	LeFlore
Poteau R	247350	R25E T05N S35 SE/SE	LeFlore
Poteau R	248500	R25E T05N S06 NW/NW	LeFlore
Pryor Cr	191560	R19E T20N S03 NE/NE	Mayes
Red R	335500	R17E T08S S11 SE/NW	Choctaw
Red R	316000	R01E T09S S36 NW/SW	Love
Red R	315500	R07W T08S S09 NE/NW	Jefferson
Red R	312720	R09W T05S S12 SW/SE	Jefferson
Salt Cr	158400	R11W T18N S25 NE/NE	Blaine
Arkansas R, Salt Fork	148450	R11W T27N S14 SW/NW	Alfalfa
Arkansas R, Salt Fork	150500	R09W T26N S11 NE/NE	Alfalfa
Arkansas R, Salt Fork	152260	R02E T24N S10 NW/NE	Noble
Red R, Salt Fork	300500	R22W T05N S34 SW/SE	Greer
Skeleton Cr	160500	R04W T18N S01 NW/SW	Logan
Spavinaw Cr	191200	R24E T21N S01 SE/SE	Delaware
Spring R	188000	R24E T28N S05 NE/SW	Ottawa
Tar Cr	186500	R23E T29N S31 SW/SE	Ottawa
Verdigris R	178800	R16E T19N S04 NW/NW	Rogers
Verdigris R	176000	R15E T21N S10 SE/SW	Rogers

NAME	STATION #	LEGAL LOCATION	COUNTY
Verdigris R	171000	R16E T27N S03 NW/SE	Nowata
Verdigris R	179000	R19E T16N S29 NW/NW	Wagoner
Verdigris R	171400	R15E T22N S02 SE/NW	Rogers
Walnut Bayou	315900	R01W T07S S26 NW/SW	Love
Washita R	328100	R05W T05N S07 NW/NW	Grady
Washita R	326500	R10W T07N S15 SE/NW	Caddo
Washita R	331000	R03E T04S S03 SE/SW	Carter
Washita R	324400	R19W T12N S01 SW/SW	Custer
Washita R	324200	R20W T14N S26 NW/SW	Custer
Washita R	328500	R01E T03N S04 SE/NE	Garvin
West Cache Cr	311505	R11W T04S S14 NW/SW	Cotton

APPENDIX 3

LIST OF AMBIENT TOXICITY SAMPLING SITES

STREAM	SAMPLING SITES
Bird Cr (sediment)	Near Tulsa
Bird Cr (water)	Near Tulsa
Buckhorn Cr (sediment)	Near Oil Center
Buckhorn Cr (water)	Near Oil Center
Cimarron R (sediment)	Downstream of USPCI facility
Cimarron R (water)	Downstream of USPCI facility
Coal Cr (sediment)	Near Henryetta
Coal Cr (water)	Near Henryetta
Gaines Cr (sediment)	Near Eufaula Lake
Gaines Cr (water)	Near Eufaula Lake
Lake Cr (sediment)	Upstream of Ft. Cobb Lake
Lake Cr (water)	Upstream of Ft. Cobb Lake
Francis Lake (sediment)	Near Arkansas Border
Mingo Cr (sediment)	Near Tulsa
Mingo Cr (water)	Near Tulsa
Red R, North Fork (sediment)	Near Frederick
Red R, North Fork (water)	Near Frederick
Tar Cr (water)	Near Kansas border
Tar Cr (sediment)	Near Miami
Tar Cr (water)	Near Miami

APPENDIX 4

COMPLAINTS ON FILE FOR PERIOD OF JANUARY, 1996 TO DECEMBER, 1997

WATERBODY NAME	DATE	COUNTY	/4	/4	/4	S	T	R	SUSPECTED SOURCE AND POLLUTANT
CANEY RIVER	19960108	WASHINGTON				25	27	12	UNPERMITTED DISPOSAL-SOLID WASTE
SPRING CREEK	19960113	MAYES				19	19N	19E	UNPERMITTED DISPOSAL-SOLID WASTE
CIMARRON RIVER	19960209	LOGAN							UNPERMITTED DISPOSAL-SOLID WASTE
BIRD CREEK	19960219	TULSA							UNPERMITTED DISPOSAL-SOLID WASTE
UNIDENTIFIED POND	19960219	TULSA				25	19N	11E	SELF-REPORTED SPILLS/RELEASES
DOUBLE CREEK	19960221	WASHINGTON							UNPERMITTED DISPOSAL-SOLID WASTE
SALT CREEK	19960223	GRADY				33	8N	7W	UNPERMITTED DISPOSAL-SOLID WASTE
SQUIRREL CREEK	19960223	POTTAWATOMIE				32	10N	4	PRIVATE SEWAGE
NORTH CANADIAN RIVER	19960304	CANADIAN							UNPERMITTED DISPOSAL-SOLID WASTE
LITTLE RIVER	19960304	CLEVELAND				36	10N	3W	SEPTIC TANK CLEANERS
UNIDENTIFIED WATERBODY	19960123	SEMINOLE				10	10N	6E	PRIVATE SEWAGE
STORM WATER CREEK	19960205	TULSA				10	19N	13E	SELF-REPORTED SPILLS/RELEASES
SALT FORK RIVER	19960215	KAY				3	25N	1W	PUBLIC OWNED TREATMENT PLANTS
SAND CREEK	19960306	MCCLAIN				29	5N	2W	UNPERMITTED DISPOSAL-SOLID WASTE
CLEAR BRANCH CREEK	19960306	ATOKA							IMPROPER DISPOSAL-HAZARDOUS WASTE
CIMARRON RIVER	19960306	MAJOR				15	20N	10W	UNPERMITTED DISPOSAL-SOLID WASTE
MILL CREEK	19960311	JOHNSTON				31	2S	5E	UNPERMITTED DISPOSAL-SOLID WASTE
UNIDENTIFIED WATERBODY	19960304	POTTAWATOMIE				10	10N	4E	PRIVATE SEWAGE
UNIDENTIFIED WATERBODY	19960311	SEMINOLE				24	10N	5E	PRIVATE SEWAGE
SOLDIER CREEK	19960315	OKLAHOMA				35	12N	2W	DISCHARGES INTO WATERWAY/STORMWATER
COAL CREEK	19960315	OKMULGEE							PUBLIC OWNED TREATMENT PLANTS

WATERBODY NAME	DATE	COUNTY	/4	/4	/4	S	T	R	SUSPECTED SOURCE AND POLLUTANT
LAKE LOTAWANNA	19960320	LOGAN				3	16N	4W	UNKNOWN
LITTLE DEEP CREEK	19960324	CUSTER				9	12N	14W	PRIVATE SEWAGE
DEEP FORK RIVER	19960329	OKMULGEE							UNPERMITTED DISPOSAL-SOLID WASTE
SOUTH CANADIAN	19960403	MCCLAIN				10	5N	1E	UNPERMITTED DISPOSAL-SOLID WASTE
GAR CREEK	19960403	LOGAN				10	16N	3W	DISCHARGES INTO WATERWAY/STORMWATER
TAHAH CREEK	19960402	CADDO							UNPERMITTED DISPOSAL-SOLID WASTE
HOMINY CREEK	19960409	OSAGE							PUBLIC OWNED TREATMENT PLANTS
LITTLE ELK CREEK	19960414	WASHITA				35	10N	19W	UNPERMITTED DISPOSAL-SOLID WASTE
WILDHORSE CREEK	19960320	GARVIN							PRIVATE SEWAGE
HONEY CREEK	19960410	DELAWARE							UNPERMITTED DISPOSAL-SOLID WASTE
CIMARRON RIVER	19960415	WOODS							UNPERMITTED DISPOSAL-SOLID WASTE
YASHAM CREEK	19960412	MCCURTAIN							PRIVATE SEWAGE
MUDDY BOGGY	19960416	ATOKA				3	3S	2E	UNPERMITTED DISPOSAL-SOLID WASTE
TRIBUTARY OF BLUE RIVER	19960501	PONTOTOC							PUBLIC OWNED TREATMENT PLANTS
LITTLE MOUNTAIN CREEK	19960423	LEFLORE							INDUSTRIAL WASTEWATER DISCHARGE
NORTH CANADIAN RIVER	19960416	OKFUSKEE				22	10N	11E	ROADSIDE DUMPING/DEAD ANIMALS
CIMARRON RIVER	19960501	MAJOR				24	21N	11W	PUBLIC OWNED TREATMENT PLANTS
ILLINOIS RIVER	19960508	ADAIR							PUBLIC OWNED TREATMENT PLANTS
CURL CREEK	19960520	NOWATA							UNKNOWN
SALT CREEK	19960522	POTTAWATOMIE				17	7N	4E	UNKNOWN
BUCK CREEK	19960528	OSAGE				31	27	11	UNKNOWN
CHIKASKIA RIVER	19960514	KAY				5	26N	1E	PRIVATE SEWAGE
ARKANSAS RIVER	19960311	SEQUOYAH							DISCHARGES INTO WATERWAY
LITTLE RIVER	19960311	MCCURTAIN				18	7S	26E	UNPERMITTED DISPOSAL-SOLID WASTE

WATERBODY NAME	DATE	COUNTY	/4	/4	/4	S	T	R	SUSPECTED SOURCE AND POLLUTANT
TAR CREEK	19960317	OTTAWA				19	28N	23E	PUBLIC WATER SUPPLIES
NORTH CANADIAN RIVER	19960322	CANADIAN							UNPERMITTED DISPOSAL-SOLID WASTE
HONEY CREEK	19960329	MURRAY							PRIVATE SEWAGE
GRAND LAKE	19960409	DELAWARE							PRIVATE SEWAGE
FORT GIBSON LAKE	19960508	WAGONER				21	17N	19E	PRIVATE SEWAGE
PRIVATE POND	19960515	TULSA				3	18N	12E	FISH KILLS
CHISOLM CREEK	19960522	OKLAHOMA				29	13N	3W	PUBLIC OWNED TREATMENT PLANTS
DEEP FORK RIVER	19960520	OKMULGEE							UNPERMITTED DISPOSAL-SOLID WASTE
NORTH FORK OF RED RIVER	19960524	TILLMAN							UNPERMITTED DISPOSAL-SOLID WASTE
OOLOGAH LAKE	19960529	ROGERS							UNPERMITTED DISPOSAL-SOLID WASTE
DOG CREEK	19960603	ROGERS							DISCHARGES INTO WATERWAY/ STORMWATER
TRIBUTARY TO MUDDY BOGGY	19960604	ATOKA							DISCHARGES INTO WATERWAY/ STORMWATER
LAKE HUDSON	19960605	MAYES							PUBLIC OWNED TREATMENT PLANTS
CANADIAN RIVER	19960613	OKLAHOMA				10	11N	4W	UNPERMITTED DISPOSAL-SOLID WASTE
COTTONWOOD CREEK	19960617	LOGAN				32	17N	2W	PUBLIC OWNED TREATMENT PLANTS
ARKANSAS RIVER	19960620	TULSA				11	17N	13E	INDUSTRIAL WASTEWATER DISCHARGE
CALIFORNIA CREEK	19960628	NOWATA							UNPERMITTED DISPOSAL-SOLID WASTE
SEWER CREEK	19960701	HUGHES							PUBLIC OWNED TREATMENT PLANTS
DOG CREEK	19960628	WOODS							UNPERMITTED DISPOSAL-SOLID WASTE
CIMARRON RIVER	19960703	PAYNE							FISH KILLS
UPPER WATERSHED	19960618	HUGHES				8	5N	8E	DISCHARGES INTO WATERWAY/ STORMWATER
SOUTH CANADIAN	19960516	DEWEY							UNPERMITTED DISPOSAL-SOLID WASTE

WATERBODY NAME	DATE	COUNTY	/4	/4	/4	S	T	R	SUSPECTED SOURCE AND POLLUTANT
DEER CREEK	19960604	CUSTER				1	12N	14W	DISCHARGES INTO WATERWAY/ STORMWATER
ARKANSAS RIVER	19960708	MUSKOGEE				7	15N	19E	UNPERMITTED DISPOSAL-SOLID WASTE
BEAVER CREEK	19960708	LOGAN				17	18N	2W	UNPERMITTED DISPOSAL-SOLID WASTE
LAKE TEXOMA	19960710	MARSHALL				36	6S	6E	DISCHARGES INTO WATERWAY/ STORMWATER
KUHLMAN CREEK	19960712	OKLAHOMA				14	11N	2W	SELF-REPORTED SPILLS/RELEASES
PONCA LAKE	19960719	KAY				18	26N	3E	UNPERMITTED DISPOSAL-SOLID WASTE
ARKANSAS RIVER	19960725	MUSKOGEE				21	15N	19E	UNPERMITTED DISPOSAL-SOLID WASTE
CLEAR BOGGY CREEK	19960730	CHOCTAW							UNPERMITTED DISPOSAL-SOLID WASTE
ARKANSAS	19960731	PAWNEE				17	21	8	PRIVATE SEWAGE
NAT. WATERWAY TO CIMARRON RIVER	19960802	KINGFISHER							UNPERMITTED DISPOSAL-SOLID WASTE
LAKE HIWASSEE	19960803	OKLAHOMA				33	14N	1W	PRIVATE SEWAGE
BIG CABIN CREEK	19960806	MAYES				23	23N	20E	DISCHARGES INTO WATERWAY/ STORMWATER
BELL COW CREEK/ DEEP FORK RIVER	19960808	LINCOLN							PUBLIC OWNED TREATMENT PLANTS
PECAN CREEK/ LAKE FORT GIBSON	19960809	CHEROKEE							UNPERMITTED DISPOSAL-SOLID WASTE
SANDY CREEK	19960809	MURRAY							UNPERMITTED DISPOSAL-SOLID WASTE
CIMARRON RIVER	19960808	LOGAN				2	16	4	SELF-REPORTED SPILLS/ RELEASES
DEEP FORK RIVER	19960812	LINCOLN					14N	4W	PUBLIC OWNED TREATMENT PLANTS
DOLESE POND	19960812	OKLAHOMA				10	12N	4W	DISCHARGES INTO WATERWAY/ STORMWATER
CHARLIE CREEK	19960807	OSAGE				36	26N	4E	UNPERMITTED DISPOSAL-SOLID WASTE
LAKE KEYSTONE	19960801	PAWNEE				17	21N	8E	PRIVATE SEWAGE
LITTLE RIVER	19960814	HUGHES							PRIVATE SEWAGE
SMALL CREEK INTO BALDY CREEK	19960814	LATIMER							DISCHARGES INTO WATERWAY/ STORMWATER

WATERBODY NAME	DATE	COUNTY	/4	/4	/4	S	T	R	SUSPECTED SOURCE AND POLLUTANT
UNCLE JOHN CREEK	19960710	KINGFISHER				15	16N	7W	PRIVATE SEWAGE
LITTLE DEEP CREEK	19960625	CUSTER				47	12N	14	DISCHARGES INTO WATERWAY/ STORMWATER
WHITE OAK CREEK	19960731	CRAIG				3	24N	19E	UNPERMITTED DISPOSAL-SOLID WASTE
LIGHTENING CREEK	19960805	OKLAHOMA				21	11N	3W	PUBLIC OWNED TREATMENT PLANTS
TOWN BRANCH	19960814	CHEROKEE				29	17N	22E	PUBLIC OWNED TREATMENT PLANTS
BEAR CREEK	19960819	CHEROKEE				29	17N	22E	INDUSTRIAL WASTEWATER DISCHARGE
GRAND RIVER	19960826	DELAWARE							UNPERMITTED DISPOSAL-SOLID WASTE
LITTLE BEAVER CREEK	19960823	COMANCHE							UNPERMITTED DISPOSAL-SOLID WASTE
CLARK'S LAKE	19960829	GRADY							UNPERMITTED DISPOSAL-SOLID WASTE
WASHITA RIVER	19960905	GRADY				31	5N	8W	UNPERMITTED DISPOSAL-SOLID WASTE
GRAND LAKE	19960906	DELAWARE							SELF-REPORTED SPILLS/ RELEASES
NORTH CANADIAN RIVER	19960911	OKLAHOMA				32	12N	2W	SELF-REPORTED SPILLS/ RELEASES
YASHAW CREEK	19960916	MCCURTAIN							PUBLIC OWNED TREATMENT PLANTS
SHELL CREEK	19961002	OSAGE				16	20N	11E	PRIVATE SEWAGE
MILL CREEK	19960903	MCINTOSH				15	10N	15E	PRIVATE SEWAGE
FARM POND	19960917	CLEVELAND							PRIVATE SEWAGE
ARKANSAS RIVER	19960927	TULSA							SELF-REPORTED SPILLS/ RELEASES
LAKE TEXOMA	19960930	BRYAN							PUBLIC OWNED TREATMENT PLANTS
MUSTANG CREEK	19961007	CRAIG				26	24N	21E	PUBLIC OWNED TREATMENT PLANTS
ROCK CREEK/ THUNDERBIRD	19961009	CLEVELAND							PUBLIC OWNED TREATMENT PLANTS
RED RIVER	19961008	TILLMAN				18	2S	17W	UNPERMITTED DISPOSAL-SOLID WASTE
DOG CREEK	19961014	WOODS							PUBLIC OWNED TREATMENT PLANTS
LAKE EUFAULA	19961015	PITTSBURG							UNPERMITTED DISPOSAL-SOLID WASTE
CAVEL CREEK	19961015	GARVIN				34	4N	4W	PRIVATE SEWAGE

WATERBODY NAME	DATE	COUNTY	/4	/4	/4	S	T	R	SUSPECTED SOURCE AND POLLUTANT
PENNINGTON CREEK	19961016	JOHNSTON				4	4S	6E	PUBLIC OWNED TREATMENT PLANTS
ROCK CREEK	19961016	ELLIS				16	21N	25W	PUBLIC OWNED TREATMENT PLANTS
ROCK CREEK	19961021	MURRAY							PUBLIC OWNED TREATMENT PLANTS
BOGGY CREEK	19961021	ATOKA							UNPERMITTED DISPOSAL-SOLID WASTE
TRIBUTARY OF DOG CREEK	19961022	ROGERS				21	22N	17E	PRIVATE SEWAGE
COWBELL CREEK	19961022	OKLAHOMA				4	14N	2W	INDUSTRIAL WASTEWATER DISCHARGE
ARKANSAS RIVER	19961030	TULSA				5	19N	11E	UNPERMITTED DISPOSAL-SOLID WASTE
LAKE EUFAULA	19961106	MCINTOSH				1	9N	16E	SELF-REPORTED SPILLS/ RELEASES
TAR CREEK	19961106	OTTAWA				19	28N	23E	PUBLIC OWNED TREATMENT PLANTS
MORRIS CREEK	19961103	LEFLORE							UNPERMITTED DISPOSAL-SOLID WASTE`
CIMARRON RIVER	19961112	LOGAN				32	17N	2W	DISCHARGES INTO WATERWAY/ STORMWATER
TAHAH CREEK	19960911	CADDO							PRIVATE SEWAGE
TRIBUTARY OF SALT FORK	19961028	WOODS							OPERATION/MAINTENANCE- INCLUDING TRUCKS
UNKNOWN TRIBUTARY OF CADDO CREEK	19961028	CARTER							UNPERMITTED DISPOSAL-SOLID WASTE
ARKANSAS RIVER	19961106	TULSA				10	19N	12E	SELF-REPORTED SPILLS/ RELEASES
BEAR CREEK	19961106	TULSA				24	18N	12E	PRIVATE SEWAGE
GRAND LAKE	19961118	DELAWARE							DISCHARGES INTO WATERWAY/ STORMWATER
GRAND LAKE	19961117	DELAWARE							DISCHARGES INTO WATERWAY/ STORMWATER
MILL CREEK	19961120	TULSA				2	19N	13E	DISCHARGES INTO WATERWAY/ STORMWATER
BRANCH OF BIG SKIN CREEK	19961127	SEQUOYAH							PUBLIC OWNED TREATMENT PLANTS
LINE CREEK	19961203	SEQUOYAH							UNPERMITTED DISPOSAL-SOLID WASTE

WATERBODY NAME	DATE	COUNTY	/4	/4	/4	S	T	R	SUSPECTED SOURCE AND POLLUTANT
TUCKER CREEK	19961203	OSAGE							PRIVATE SEWAGE
POLECAT CREEK	19961207	CREEK							PUBLIC OWNED TREATMENT PLANTS
GUY SANDY CREEK	19961205	MURRAY							DISCHARGES INTO WATERWAY/ STORMWATER
KIOWA CREEK	19961210	HARPER				5	26N	25W	UNPERMITTED DISPOSAL-SOLID WASTE
WASHITA RIVER	19961211	GRADY				18	7N	8	UNPERMITTED DISPOSAL-SOLID WASTE
SANDY CREEK	19961212	JOHNSTON							PUBLIC OWNE TREATMENT PLANTS
DOG CREEK	19961216	ROGERS							PRIVATE SEWAGE
HAIKEY CREEK	19961223	TULSA				31	18N	14E	DISHCARGES INTO WATERWAY/ STORMWATER
ROCK CREEK	19961224	LEFLORE							UNPERMITTED DISPOSAL-SOLID WASTE
GRAND LAKE	19961220	DELAWARE				11	24N	23E	INDUSTRIAL WASTEWATER DISCHARGE
CHIKASKIA RIVER	19961230	KAY				23	27N	1W	UNPERMITTED DISPOSAL-SOLID WASTE
SNAIL CREEK	19961227	DELAWARE				27	24N	24E	PRIVATE SEWAGE
NORTH CANADIAN RIVER	19960403	OKLAHOMA							SELF-REPORTED SPILLS/ RELEASES
WASHITA RIVER	19960828	ROGER MILLS							SELF-REPORTED SPILLS/ RELEASES
DEER CREEK	19961212	LOGAN				36	15N	4W	PUBLIC OWNED TREATMENT PLANTS
WOLFE CREEK	19970103	TULSA				21	18N	14E	PUBLIC OWNED TREATMENT PLANTS
ONE CREEK	19970103	PUSHMATAHA							SEPTIC TANK CLEANERS
BIRD CREEK	19970108	HUGHES				6	6N	9E	UNPERMITTED DISPOSAL-SOLID WASTE
UNNAMED CREEK	19970106	MCCLAIN				8	6N	2W	UNPERMITTED DISPOSAL-SOLID WASTE
SANDY CREEK	19970114	JOHNSTON							PUBLIC OWNED TREATMENT PLANTS
GRAND LAKE	19970121	DELAWARE							DISCHARGES INTO WATERWAY/ STORMWATER
CROW CREEK	19970121	TULSA				18	19N	13E	FISH KILLS
PEACABLE CREEK	19970121	PITTSBURG							UNPERMITTED DISPOSAL-SOLID WASTE

WATERBODY NAME	DATE	COUNTY	/4	/4	/4	S	T	R	SUSPECTED SOURCE AND POLLUTANT
GRAND LAKE	19970122	DELAWARE							PRIVATE SEWAGE
KIAMICHI RIVER	19970128	PUSHMATAHA				30	2N	20E	UNPERMITTED DISPOSAL-SOLID WASTE
POLECAT CREEK	19970127	CREEK							PUBLIC OWNED TREATMENT PLANTS
SALT FORK RIVER	19970204	NOBLE							UNPERMITTED DISPOSAL-SOLID WASTE
KEYSTONE LAKE	19970205	PAWNEE				32	20N	10E	PUBLIC OWNED TREATMENT PLANTS
ARKANSAS RIVER	19970207	TULSA				14	19N	12E	INDUSTRIAL WASTEWATER DISCHARGE
TALEQUAH RIVER	19970213	CHEROKEE							UNPERMITTED DISPOSAL-SOLID WASTE
BOIS D'ARC CREEK	19970214	KAY							PRIVATE SEWAGE
WHISKEY CREEK	19970218	CARTER							PUBLIC OWNED TREATMENT PLANTS
HELL CREEK	19970219	STEPHENS							PUBLIC OWNED TREATMENT PLANTS
ROCK CREEK	19970224	LATIMER							PUBLIC OWNED TREATMENT PLANTS
ARKANSAS RIVER	19970222	TULSA				14	19N	12E	DISCHARGES INTO WATERWAY/ STORMWATER
SPRING LAKE CREEK	19970115	OKLAHOMA				29	13N	2W	UNPERMITTED DISPOSAL-SOLID WASTE
RED BRANCH CREEK	19970122	GARVIN				16	2N	1E	UNPERMITTED DISPOSAL-SOLID WASTE
LIME CREEK	19970131	COMANCHE							DISCHARGES INTO WATERWAY/ STORMWATER
VERDIGRIS RIVER	19970214	ROGERS							UNPERMITTED DISPOSAL-SOLID WASTE
FOSS LAKE	1997018	CUSTER				33	13N	19W	DISCHARGES INTO WATERWAY/ STORMWATER
DEEP FORK RIVER/ GRAY CREEK	19970220	LINCOLN							PUBLIC WATER SUPPLIES
LITTLE RIVER/ LAKE THUNDERBIRD	19970215	CLEVELAND				25	10N	3W	DISCHARGES INTO WATERWAY/ STORMWATER
LITTLE RIVER/ LAKE THUNDERBIRD	19970220	CLEVELAND				25	10N	3W	PUBLIC OWNED TREATMENT PLANTS
CANEY RIVER	19970221	WASHINGTON							UNPERMITTED DISPOSAL-SOLID WASTE
SOUTH CANADIAN RIVER	19970225	SEMINOLE							UNPERMITTED DISPOSAL-SOLID WASTE

WATERBODY NAME	DATE	COUNTY	/4	/4	/4	S	T	R	SUSPECTED SOURCE AND POLLUTANT
TRIBUTARY TO COW CREEK	19970301	STEPHENS				29	2S	7W	PUBLIC OWNED TREATMENT PLANTS
TRIBUTARY TO NORTH CANADIAN	19970303	SEMINOLE				5	10N	8E	UNPERMITTED DISPOSAL-SOLID WASTE
LAKE ARBUCKLE	19970304	MURRAY							UNPERMITTED DISPOSAL-SOLID WASTE
WOLF CREEK	19970303	COMANCHE							PUBLIC OWNED TREATMENT PLANTS
EUCHEE CREEK	19970305	PAYNE				9	17N	6E	PUBLIC OWNED TREATMENT PLANTS
WASHITA RIVER	19970312	GARVIN							UNPERMITTED DISPOSAL-SOLID WASTE
SALT CREEK/ DEEP FORK	19970315	CREEK				30	15N	8E	UNPERMITTED DISPOSAL-SOLID WASTE
NORTH CANADIAN RIVER	19970317	POTTAWATOMIE							UNPERMITTED DISPOSAL-SOLID WASTE
FRONTER HOUSE CREEK	19970318	ATOKA							PUBLIC OWNED TREATMENT PLANTS
THUNDERBIRD LAKE	19970319	CLEVELAND							PUBLIC OWNED TREATMENT PLANTS
POND TO LAKE TEXHOMA	19970321	MARSHALL							UNPERMITTED DISPOSAL-SOLID WASTE
LAKE HUDSON	19970324	MAYES				10	22N	20E	PRIVATE SEWAGE
CIMARRON RIVER	19970325	PAYNE							ROADSIDE DUMPING/ DEAD ANIMALS
LAKE HUMHREYS	19970325	STEPHENS				36	2N	7W	UNPERMITTED DISPOSAL-SOLID WASTE
SOUTH CANADIAN RIVER	19970328	CLEVELAND							PUBLIC OWNED TREATMENT PLANTS
TRIBUTARY OF LITTLE ELK CREEK	19970319	WASHITA				8	9N	18W	PUBLIC OWNED TREATMENT PLANTS
TRIBUTARY OF LITTLE RIVER	19970402	MCCURTAIN							FISH KILLS
FORT GIBSON LAKE	19970404	WAGONER				4	18N	19E	ROADSIDE DUMPING/ DEAD ANIMALS
CREEK/ VERDIGRIS RIVER	19970405	NOWATA							PRIVATE SEWAGE
DRIPPING SPRINGS LAKE	19970408	OKMULGEE							PUBLIC WATER SUPPLIES
LAKE THUNDERBIRD	19970411	CLEVELAND				25	10N	3W	PUBLIC OWNED TREATMENT PLANTS
BATTLE CREEK	19970411	OKFUSKEE				18	11N	10E	PUBLIC OWNED TREATMENT PLANTS
UNKNOWN	19970416	MCCLAIN				31	8N	4W	DISCHARGES INTO WATERWAY/ STORMWATER
SALT FORK	19970422	GREER				34	5N	22W	UNPERMITTED DISPOSAL-SOLID WASTE

WATERBODY NAME	DATE	COUNTY	/4	/4	/4	S	T	R	SUSPECTED SOURCE AND POLLUTANT
POND/CREEK/SPIRO LAKE	19970422	LEFLORE							UNPERMITTED DISPOSAL-SOLID WASTE
COW CREEK	19970424	STEPHENS							FISH KILLS
MEDICINE CREEK	19970424	COMANCHE							PUBLIC OWNED TREATMENT PLANTS
UNNAMED POND	19970421	KAY				34	26N	1E	IMPROPER DISPOSAL-HAZARDOUS WASTE
TRIBUTARY OF CIMARRON RIVER	19970501	PAYNE							PRIVATE SEWAGE
SKELETON CREEK	19970504	LOGAN				34	18N	2W	SELF-REPORTED SPILLS/ RELEASES
LAKE EUFAULA	19970505	PITTSBURG							PRIVATE SEWAGE
BOGGY RIVER	19970507	ATOKA							PUBLIC OWNED TREATMENT PLANTS
MUDDY BOGGY RIVER	19970509	ATOKA							PUBLIC OWNED TREATMENT PLANTS
POTEAU RIVER	19970516	LEFLORE							PUBLIC OWNED TREATMENT PLANTS
UNKNOWN	19970422	MCCLAIN				32	7N	4W	PRIVATE SEWAGE
CLEAR CREEK	19970501	KINGFISHER				11	15N	11W	UNPERMITTED DISPOSAL-SOLID WASTE
TRIBUTARY OF LITTLE DEER CREEK	19970501	CUSTER				36	15N	15W	PRIVATE SEWAGE
COMET CREEK	19970429	CUSTER				2	13N	19W	PUBLIC OWNED TREATMENT PLANTS
UNKNOWN	19970516	MCCLAIN				18	10N	4W	PRIVATE SEWAGE
UNKNOWN	19970521	MCCLAIN				24	5N	2E	PRIVATE SEWAGE
WALNUT CREEK	19970522	MCCLAIN				2	6N	2W	PUBLIC OWNED TREATMENT PLANTS
COAL CREEK	19970527	TULSA				14	17N	12E	PUBLIC OWNED TREATMENT PLANTS
DRAINAGE TO DRIBBLE CREEK	19970527	MCCLAIN				32	7N	4W	PUBLIC OWNED TREATMENT PLANTS
HEALDTON LAKE	19970528	CARTER							IMPROPER DISPOSAL-HAZARDOUS WASTE
SALT FORK RIVER	19970530	NOBLE				2	24N	2E	UNPERMITTED DISPOSAL-SOLID WASTE
TRIBUTARY OF CIMARRON RIVER	19970603	KINGFISHER							UNPERMITTED DISPOSAL-SOLID WASTE
NORTH CANADIAN RIVER	19970603	OKLAHOMA				17	12N	1E	OPEN BURNING
WASHITA RIVER	19970605	GRADY				2	4N	5W	PRIVATE SEWAGE

WATERBODY NAME	DATE	COUNTY	/4	/4	/4	S	T	R	SUSPECTED SOURCE AND POLLUTANT
VERDIGRIS RIVER	19970612	ROGERS				4	20N	15E	IMPROPER DISPOSAL-HAZARDOUS WASTE
MILL CREEK	19970613	MCINTOSH				36	9N	3E	UNPERMITTED DISPOSAL-SOLID WASTE
UNNAMED CREEK TO WALNUT CREEK	19970617	MCCLAIN				35	7N	2W	DISCHARGES INTO WATERWAY/ STORMWATER
STINKING CREEK	19970620	JACKSON							PUBLIC OWNED TREATMENT PLANTS
BIG CABIN CREEK/ LAKE HUDSON	19970620	MAYES				23	23N	20E	PUBLIC OWNED TREATMENT PLANTS
SPRING RIVER	19970623	OTTAWA							OPERATION/ MAINTENANCE INCLUDING TRUCKS
GRAND LAKE	19970623	DELAWARE				32	24N	4E	UNPERMITTED DISPOSAL-SOLID WASTE
UNNAMED STREAM TO SOUTH CANADIAN RIVER	19970623	MCCLAIN				32	10N	4W	UNPERMITTED DISPOSAL-SOLID WASTE
WASHITA RIVER	19970610	CUSTER				14	12N	17W	UNPERMITTED DISPOSAL-SOLID WASTE
DANCING RABBIT	19970624	GARVIN							UNPERMITTED DISPOSAL-SOLID WASTE
CREEK/ FALSE LAKE	19970625	DEWEY							PUBLIC OWNED TREATMENT PLANTS
WHITE SHIELDS CREEK/ FOSS LAKE	19970625	ROGER MILLS							PUBLIC OWNED TREATMENT PLANTS
FOUR MILE CREEK	19970613	CANADIAN				4	12N	7W	PUBLIC OWNED TREATMENT PLANTS
TRIBUTARY OF CHUCKAWA CREEK	19970630	BRYAN							PUBLIC OWNED TREATMENT PLANTS
ARKANSAS RIVER	19970630	ROGERS				5	20N	15E	IMPROPER DISPOSAL/ HAZARDOUS WASTE

APPENDIX 5

SECTION 303(d) WATERS

EPA Cause Codes

Code	Cause
100	Unknown Toxicity
200	Pesticides
300	Priority Organics
400	Nonpriority organics
500	Metals
600	Ammonia
700	Chlorine
800	Other inorganics
900	Nutrients
1000	pH
1100	Siltation
1200	Organic Enrichment/DO
1300	Salinity
1400	Thermal Stratification
1500	Flow Alteration
1600	Other Habitat Alterations
1700	Pathogens
1800	Radiation
1900	Oil and Grease
2000	Taste and Odor
2100	Suspended Solids
2200	Noxious Aquatic Plants
2300	Filling and Draining

EPA Source Codes

Code	Source
0900	Nonpoint Source
1000	Agriculture
1100	Non-irrigated Crop Production
1200	Irrigated Crop Production
1300	Specialty Crops (e.g. truck farming & orchards)
1400	Pasture Land
1500	Range Land
1600	Feedlots-All Types
1700	Aquaculture
1800	Animal Holding / Management Areas
2000	Silviculture
2100	Harvesting, Restoration, Residue Management
2200	Forest Management
2300	Road Construction /Maintenance
3000	Construction
3100	Highway/Road/Bridge
3200	Land Development
4000	Urban Runoff
4100	Storm Sewers (Other than end of pipe)
4200	Combined Sewers
4300	Surface runoff
5000	Resource Extraction / Exploration / Development
5100	Surface Mining
5200	Subsurface Mining
5300	Placer Mining
5400	Dredge Mining
5500	Petroleum Activities
5600	Mill Tailings
5700	Mine Tailings

EPA Source Codes Continued

Code	Source
6000	Land Disposal (Runoff/Leachate from Permitted Areas)
6100	Sludge
6200	Wastewater
6300	Landfills
6400	Industrial Land Treatment
6500	On-Site Wastewater Systems
6600	Hazardous Waste
7000	Hydromodification
7100	Channelization
7200	Dredging
7300	Dam Construction
7400	Flow Regulation/Modification
7500	Bridge Construction
7600	Removal of Riparian Vegetation
7700	Streambank Modification/Destabilization
8000	Other
8100	Atmospheric Deposition (and Acid Rain)
8200	Waste Storage/Storage Tank Leaks
8300	Highway Maintenance and Runoff
8400	Spills
8500	In-place Contaminants
8600	Natural
8700	Recreational Activities
8800	Upstream Impoundment
9000	Source Unknown

APPENDIX 6

AQUIFER MONITORING DATA

Aquifer Description: Ada County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	3	3	2	3	2	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	3	3	0	0	0	0	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	3	0	0	0	0	3	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								1

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Ada Vamoosa County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	0	0	0	0	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	1	1	0	1	0	0	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	1	0	0	0	0	1	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								1

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Alluvial County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	2	2	0	2	0	1	0	1
	SOC	0	0	0	0	0	0	0	
	NO_3	3	0	0	3	1	10	8	
	Metals	3	0	0	0	0	0	0	
	Fluorides	1	0	0	0	0	1	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Alluvial Aquifer County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	0	0	0	0	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	1	0	0	1	0	0	0	
	Metals	1	0	0	0	0	0	0	
	Fluorides	1	0	0	0	0	1	0	
	Cyanides	1	1	0	1	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Antlers Sand County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	22	22	16	22	16	3	1	1
	SOC	5	5	5	5	5	0	0	
	NO_3	47	36	0	32	0	1	35	
	Metals	1	1	1	1	1	0	0	
	Fluorides	3	1	0	1	0	3	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								20

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Arbuckle Group County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	2	2	2	2	2	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	4	4	0	3	0	0	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	1	0	0	0	0	1	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Arbuckle-Simpson County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	2	2	2	2	2	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	12	0	0	9	0	0	0	
	Metals	1	1	1	1	1	0	0	
	Fluorides	1	0	0	0	0	1	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Arkansas River Alluvial County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	10	7	1	7	1	4	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	16	2	0	10	8	28	30	
	Metals	2	0	0	0	0	0	0	
	Fluorides	2	1	0	1	0	1	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Ogallala Formation County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	1	1	0	1	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	1	0	0	0	1	3	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Aquifer Description: Grand Lake County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	0	0	0	0	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	0	0	0	0	0	0	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Aquifer Description: ARK RIV TERRACE County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	3	3	1	3	1	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	3	0	0	3	1	0	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Boggy Creek Alluvial County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	1	1	0	1	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	1	1	0	1	0	0	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Boone Formation County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	5	5	3	5	3	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	8	3	0	6	1	0	0	
	Metals	2	0	0	0	0	0	0	
	Fluorides	4	1	0	1	0	3	0	
	Cyanides	2	1	0	1	0	2	0	
	Other								

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Buffalo Creek Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	0	0	0	0	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	1	0	0	1	0	1	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	1	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Burger SS County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	0	0	0	0	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	1	0	0	1	0	0	1	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Cedar Hills SS County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	4	4	3	4	3	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	6	1	1	6	5	0	4	
	Metals	2	0	0	0	0	0	0	
	Fluorides	1	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Chick-Dun Formation County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	0	0	0	0	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	2	0	0	1	0	2	2	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Chickasha Formation County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	0	0	0	0	0	0	0	
	SOC	1	1	1	1	1	0	0	
	NO_3	2	0	0	2	0	1	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	2	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Chikaskia River Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	1	1	1	1	1	0	0	
	SOC	1	1	1	1	1	0	0	
	NO_3	1	0	0	1	0	0	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	1	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Cimarron River Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	4	3	2	3	2	1	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	5	1	1	2	4	5	6	
	Metals	0	0	0	0	0	0	0	
	Fluorides	1	0	0	0	0	1	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Cimarron River/Cedar Hill Terrace County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	1	1	1	1	1	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	1	0	0	1	1	10	1	
	Metals	0	0	0	0	0	0	0	
	Fluorides	1	0	0	0	0	1	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Cimarron River Terrace County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	18	18	13	18	13	0	0	
	SOC	3	3	3	3	3	0	0	
	NO_3	36	4	3	10	23	79	71	
	Metals	3	0	0	0	0	0	0	
	Fluorides	1	0	0	0	0	1	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Coal Creek Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	0	0	0	0	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	2	0	0	0	0	6	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Corn Tassel Creek Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	0	0	0	0	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	1	0	0	1	0	0	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Cottonwood Creek Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	0	0	0	0	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	1	1	0	1	0	0	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Crooked Creek Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	1	1	1	1	1	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	1	0	0	0	0	5	3	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Deep Fork Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	0	0	0	0	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	1	0	0	1	0	0	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Deep Red Creek Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	1	1	0	1	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	1	0	0	1	0	0	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: El Reno Group County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	0	0	0	0	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	1	0	0	1	0	0	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Elk City SS County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	12	12	7	12	7	1	0	
	SOC	5	5	5	5	5	0	0	
	NO_3	12	1	0	7	3	22	16	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Enid Terrace County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	3	2	2	2	2	1	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	4	0	0	0	3	8	7	
	Metals	1	0	0	0	0	0	0	
	Fluorides	1	0	0	0	0	1	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Garber-Wellington County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	179	169	121	169	121	11	1	13
	SOC	11	11	11	11	11	1	0	0
	NO_3	286	141	0	268	7	29	1	0
	Metals	62	4	4	4	4	7	9	4
	Fluorides	47	2	0	2	0	46	0	2
	Cyanides	24	22	0	22	0	2	0	1
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply	___	Irrigation	___	Commercial	___	Mining	___	Baseflow
	X	Private water supply	___	Thermoelectric	___	Livestock	___	Industrial	___	Maintenance
Uses affected by water quality problems	___	Public water supply	___	Irrigation	___	Commercial	___	Mining	___	Baseflow
	___	Private water supply	___	Thermoelectric	___	Livestock	___	Industrial	___	Maintenance

Aquifer Description: Grand River Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	0	0	0	0	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	1	0	0	1	0	0	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Greenleaf Lake County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	1	1	1	1	1	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	1	1	0	0	0	0	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Hennessey Shale County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	1	1	0	1	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	3	0	0	1	1	5	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Illinois River Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	0	0	0	0	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	2	2	0	2	0	0	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: L Sandy Ck Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	0	0	0	0	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	0	0	0	0	0	0	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Marlow Formation County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	0	0	0	0	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	4	0	0	4	0	0	0	
	Metals	1	1	1	1	1	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: North Canadian River Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	16	16	14	16	14	3	0	
	SOC	3	3	3	3	3	0	0	
	NO_3	27	5	0	13	11	43	67	
	Metals	2	0	0	0	0	0	0	
	Fluorides	6	0	0	0	0	6	0	
	Cyanides	1	1	0	1	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: North Canadian River Terrace County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	9	8	4	8	4	1	1	
	SOC	0	0	0	0	0	0	0	
	NO_3	11	1	0	5	7	16	0	
	Metals	1	0	0	0	0	0	0	
	Fluorides	1	0	0	0	0	1	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: North Fork, Red River Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	0	0	0	0	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	1	0	0	1	1	2	8	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: North Fork, Red River Terrace County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	3	3	1	3	1	1	0	1
	SOC	1	1	1	1	1	0	0	0
	NO_3	20	2	1	6	15	40	67	0
	Metals	4	0	0	0	0	1	0	0
	Fluorides	4	0	0	0	0	4	0	0
	Cyanides	2	2	0	2	0	0	0	0
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Norwood Creek Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	0	0	0	0	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	1	0	0	1	0	0	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Ogallala County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	40	39	18	39	18	2	0	3
	SOC	4	4	4	4	4	0	0	0
	NO_3	60	1	0	53	7	45	25	2
	Metals	8	0	0	0	0	2	0	0
	Fluorides	17	0	0	0	0	17	0	4
	Cyanides	1	1	0	1	0	0	0	0
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Oscar A County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	12	11	3	11	3	1	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	14	4	1	12	2	8	2	
	Metals	2	0	0	0	0	0	0	
	Fluorides	3	0	0	0	0	3	0	
	Cyanides	1	1	0	1	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Oscar B County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	7	7	4	7	4	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	20	19	0	8	0	0	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Red River Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	0	0	0	0	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	1	0	0	0	1	0	11	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Red River Terrace County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	3	3	1	3	1	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	8	1	0	5	6	15	2	
	Metals	1	0	0	0	0	0	0	
	Fluorides	1	0	0	0	0	1	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Red Rock Creek Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	1	1	1	1	1	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	3	3	0	0	0	1	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Roubidoux County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCL	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	17	15	8	15	8	2	0	
	SOC	1	1	1	1	1	0	0	
	NO_3	42	39	0	18	0	0	0	
	Metals	5	1	1	1	1	0	0	
	Fluorides	22	0	0	0	0	23	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Rush Springs SS County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	13	13	9	13	9	0	0	
	SOC	7	7	7	7	7	0	0	
	NO_3	33	4	0	26	2	29	2	
	Metals	5	0	0	0	0	0	0	
	Fluorides	4	0	0	0	0	4	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: South Canadian River Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	12	11	7	11	7	0	3	1
	SOC	2	2	2	2	2	0	0	0
	NO_3	22	11	1	19	1	3	0	1
	Metals	2	0	0	0	0	0	0	0
	Fluorides	3	0	0	0	0	3	0	2
	Cyanides	2	1	0	1	0	1	0	1
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: South Canadian River Terrace County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	1	1	1	1	1	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	3	0	0	3	0	0	0	
	Metals	1	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Salt Fork Arkansas River Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	8	8	6	8	6	0	0	
	SOC	2	2	2	2	2	0	0	1
	NO_3	14	3	1	6	8	12	30	
	Metals	1	0	0	0	0	0	0	
	Fluorides	1	0	0	0	0	1	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Salt Fork Arkansas River Terrace County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	1	1	1	1	1	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	2	0	0	1	0	9	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Salt Fork Red RiverTerrace County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	2	2	0	2	0	1	0	
	SOC	1	1	1	1	1	0	0	
	NO_3	4	0	0	0	4	7	19	
	Metals	1	0	0	0	0	0	0	
	Fluorides	1	0	0	0	0	1	0	
	Cyanides	1	1	0	1	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Sand Creek Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	1	1	1	1	1	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	1	0	0	0	0	0	0	
	Metals	0	0	0	0	0	4	1	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Skeleton Creek Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	1	1	0	1	0	1	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	3	0	0	2	1	1	0	
	Metals	1	0	0	0	0	0	0	
	Fluorides	2	0	0	0	0	2	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Stillwater Creek Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	1	1	0	1	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	1	0	0	1	0	0	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Tallant County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	1	1	0	1	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	1	0	0	0	0	0	0	
	Metals	1	0	0	1	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Tillman Terrace County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	3	3	0	3	0	0	0	
	SOC	2	2	2	2	2	0	0	
	NO_3	3	1	0	2	2	11	1	
	Metals	1	0	0	0	0	0	2	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Turkey Creek Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	2	2	2	2	2	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	3	0	0	2	2	8	2	
	Metals	0	0	0	0	0	0	0	
	Fluorides	1	0	0	0	0	1	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Unknown County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	57	54	24	54	24	8	0	
	SOC	6	6	6	6	6	0	0	
	NO_3	92	27	2	73	13	55	8	1
	Metals	14	2	2	2	2	1	0	
	Fluorides	29	5	0	5	0	25	0	
	Cyanides	6	6	0	6	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Vamoosa County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	58	55	38	55	38	5	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	83	55	0	72	0	6	2	
	Metals	15	0	0	0	0	1	0	
	Fluorides	15	2	0	2	0	18	6	
	Cyanides	4	3	0	3	0	1	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: West Cache Creek Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	0	0	0	0	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	3	0	0	0	0	0	5	
	Metals	3	0	0	2	1	11	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Walnut Creek Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	3	3	3	3	3	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	5	1	0	4	3	0	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides							0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Washita River Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	3	3	1	3	1	0	0	
	SOC	1	1	1	1	1	0	0	
	NO_3	7	3	0	4	3	2	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Washita River Terrace County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	1	1	0	1	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	2	0	0	2	1	0	2	
	Metals	0	0	0	0	0	0	0	
	Fluorides	1	0	0	0	0	1	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Wolf Creek Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	1	1	1	1	1	0	0	1
	SOC	0	0	0	0	0	0	0	
	NO_3	1	0	0	0	0	6	6	
	Metals	0	0	0	0	0	0	0	
	Fluorides	1	0	0	0	0	1	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description: Woodbine County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	0	0	0	0	0	0	0	
	SOC	0	0	0	0	0	0	0	
	NO_3	2	0	0	2	0	0	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

Major uses of the aquifer or hydrologic unit	X	Public water supply		Irrigation		Commercial		Mining		Baseflow
	X	Private water supply		Thermoelectric		Livestock		Industrial		Maintenance
Uses affected by water quality problems		Public water supply		Irrigation		Commercial		Mining		Baseflow
		Private water supply		Thermoelectric		Livestock		Industrial		Maintenance

Aquifer Description:Muddy Boggy Alluvium County:

Aquifer Setting:

Monitoring Data Type	Parameter Groups	Total No. of POE in the Assessment	Number of Points of Entry (POE)						
			No detections of parameters above MDLs or background levels		No detections of parameters above MDLs or background levels and nitrate concentrations range from background levels to less than or equal to 5 mg/l		Parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs and / or nitrate ranges from > 5 to ≤ 10 mg/l	Parameters are detected at concentrations exceeding the MCLs	WELLS Removed from service
			ND	Number of POEs in sensitive or vulnerable areas	ND / Nitrate ≤ 5 mg/l	Number of POEs in sensitive or vulnerable areas			
Finished Water Quality Data from Public Water Supply POE	VOC	0	0	0	0	0	0	0	0
	SOC	0	0	0	0	0	0	0	
	NO_3	1	1	0	1	0	0	0	
	Metals	0	0	0	0	0	0	0	
	Fluorides	0	0	0	0	0	0	0	
	Cyanides	0	0	0	0	0	0	0	
	Other								0

APPENDIX 7

GROUNDWATER CONTAMINATION SUMMARY

Aquifer Description: Antlers (An) County:

Aquifer Setting:

Source Type	Present in reporting area (Y/N)	Number of sites in area	Number of Sites that are listed and/or have confirmed releases	Number with confirmed ground water contamination	Contaminants	Number of site investigations	Number of sites that have been stabilized or have had the source removed	Number of sites with corrective action plans	Number of sites with active remediation	Number of sites with cleanup completed
NPL	N	0								
CERCLIS (non-NPL)	N	0								
DOD/DOE	N	0								
LUST	N	0								
RCRA Corrective Action	N	0								
Underground Injection	N	0								
State Sites	N	0								
Nonpoint Sources	N	0								
Other	N	0								
Total		0								

Aquifer Description: Arkansas Novaculite & Big Fork Chert (AB) County:

Aquifer Setting:

Source Type	Present in reporting area (Y/N)	Number of sites in area	Number of Sites that are listed and/or have confirmed releases	Number with confirmed ground water contamination	Contaminants	Number of site investigations	Number of sites that have been stabilized or have had the source removed	Number of sites with corrective action plans	Number of sites with active remediation	Number of sites with cleanup completed
NPL	N	0								
CERCLIS (non-NPL)	N	0								
DOD/DOE	N	0								
LUST	N	0								
RCRA Corrective Action	N	0								
Underground Injection	N	0								
State Sites	N	0								
Nonpoint Sources	N	0								
Other	N	0								
Total		0								

Aquifer Description: Arbuckle & Timbered Hills (AT) County:

Aquifer Setting:

Source Type	Present in reporting area (Y/N)	Number of sites in area	Number of Sites that are listed and/or have confirmed releases	Number with confirmed ground water contamination	Contaminants	Number of site investigations	Number of sites that have been stabilized or have had the source removed	Number of sites with corrective action plans	Number of sites with active remediation	Number of sites with cleanup completed
NPL	N	0								
CERCLIS (non-NPL)	N	0								
DOD/DOE	N	0								
LUST	N	0								
RCRA Corrective Action	N	0								
Underground Injection	N	0								
State Sites	N	0								
Nonpoint Sources	N	0								
Other	N	0								
Total		0								

Aquifer Description: Blaine Formation (BI) County:

Aquifer Setting:

Source Type	Present in reporting area (Y/N)	Number of sites in area	Number of Sites that are listed and/or have confirmed releases	Number with confirmed ground water contamination	Contaminants	Number of site investigations	Number of sites that have been stabilized or have had the source removed	Number of sites with corrective action plans	Number of sites with active remediation	Number of sites with cleanup completed
NPL	N	0								
CERCLIS (non-NPL)	N	0								
DOD/DOE	N	0								
LUST	N	0								
RCRA Corrective Action	N	0								
Underground Injection	Y	1	0	0						
State Sites	N	0								
Nonpoint Sources	N	0								
Other	N	0								
Total		1	0	0						

Aquifer Description: Cedar Hills (Ce) County:

Aquifer Setting:

Source Type	Present in reporting area (Y/N)	Number of sites in area	Number of Sites that are listed and/or have confirmed releases	Number with confirmed ground water contamination	Contaminants	Number of site investigations	Number of sites that have been stabilized or have had the source removed	Number of sites with corrective action plans	Number of sites with active remediation	Number of sites with cleanup completed
NPL	N	0								
CERCLIS (non-NPL)	N	0								
DOD/DOE	N	0								
LUST	N	0								
RCRA Corrective Action	N	0								
Underground Injection	N	0								
State Sites	N	0								
Nonpoint Sources	N	0								
Other	N	0								
Total		0								

Aquifer Description: Elk City (El) County:

Aquifer Setting:

Source Type	Present in reporting area (Y/N)	Number of sites in area	Number of Sites that are listed and/or have confirmed releases	Number with confirmed ground water contamination	Contaminants	Number of site investigations	Number of sites that have been stabilized or have had the source removed	Number of sites with corrective action plans	Number of sites with active remediation	Number of sites with cleanup completed
NPL	N	0								
CERCLIS (non-NPL)	N	0								
DOD/DOE	N	0								
LUST	N	0								
RCRA Corrective Action	N	0								
Underground Injection	N	0								
State Sites	N	0								
Nonpoint Sources	N	0								
Other	N	0								
Total		0								

Aquifer Description: Garber - Wellington (GW) County:

Aquifer Setting:

Source Type	Present in reporting area (Y/N)	Number of sites in area	Number of Sites that are listed and/or have confirmed releases	Number with confirmed ground water contamination	Contaminants	Number of site investigations	Number of sites that have been stabilized or have had the source removed	Number of sites with corrective action plans	Number of sites with active remediation	Number of sites with cleanup completed
NPL	Y	5	5	5	Chlorinated Solvents, Metals		2	1	3	2
CERCLIS (non-NPL)	N	0								
DOD/DOE	Y	1 DOD is NPL site	1	1	Chlorinated Solvents, Metals					
LUST	N	0								
RCRA Corrective Action	N	0								
Underground Injection	Y	8	0	0						
State Sites	N	0								
Nonpoint Sources	N	0								
Other	N	0								
Total		14	6	6			2	1	3	2

Aquifer Description: Kedkuk & Reed Springs (KR) County:

Aquifer Setting:

Source Type	Present in reporting area (Y/N)	Number of sites in area	Number of Sites that are listed and/or have confirmed releases	Number with confirmed ground water contamination	Contaminants	Number of site investigations	Number of sites that have been stabilized or have had the source removed	Number of sites with corrective action plans	Number of sites with active remediation	Number of sites with cleanup completed
NPL	N	0								
CERCLIS (non-NPL)	N	0								
DOD/DOE	N	0								
LUST	N	0								
RCRA Corrective Action	N	0								
Underground Injection	Y	2	0	0						
State Sites	N	0								
Nonpoint Sources	N	0								
Other	N	0								
Total		2	0	0						

Aquifer Description: Noxie Sandstone (No) County:

Aquifer Setting:

Source Type	Present in reporting area (Y/N)	Number of sites in area	Number of Sites that are listed and/or have confirmed releases	Number with confirmed ground water contamination	Contaminants	Number of site investigations	Number of sites that have been stabilized or have had the source removed	Number of sites with corrective action plans	Number of sites with active remediation	Number of sites with cleanup completed
NPL	N									
CERCLIS (non-NPL)	N									
DOD/DOE	N									
LUST	N									
RCRA Corrective Action	N									
Underground Injection	N									
State Sites	N									
Nonpoint Sources	N									
Other	N									
Total										

Aquifer Description: Ogallala Formation (Og) County:

Aquifer Setting:

Source Type	Present in reporting area (Y/N)	Number of sites in area	Number of Sites that are listed and/or have confirmed releases	Number with confirmed ground water contamination	Contaminants	Number of site investigations	Number of sites that have been stabilized or have had the source removed	Number of sites with corrective action plans	Number of sites with active remediation	Number of sites with cleanup completed
NPL	N	0								
CERCLIS (non-NPL)	N	0								
DOD/DOE	N	0								
LUST	N	0								
RCRA Corrective Action	N	0								
Underground Injection	Y	1	0	0						
State Sites	N	0								
Nonpoint Sources	N	0								
Other	N	0								
Total		1	0	0						

Aquifer Description: Oscar Group (Os - A) County:

Aquifer Setting:

Source Type	Present in reporting area (Y/N)	Number of sites in area	Number of Sites that are listed and/or have confirmed releases	Number with confirmed ground water contamination	Contaminants	Number of site investigations	Number of sites that have been stabilized or have had the source removed	Number of sites with corrective action plans	Number of sites with active remediation	Number of sites with cleanup completed
NPL	N	0								
CERCLIS (non-NPL)	N	0								
DOD/DOE	N	0								
LUST	N	0								
RCRA Corrective Action	N	0								
Underground Injection	N	0								
State Sites	N	0								
Nonpoint Sources	N	0								
Other	N	0								
Total		0								

Aquifer Description: Oscar Group (Os - B) County:

Aquifer Setting:

Source Type	Present in reporting area (Y/N)	Number of sites in area	Number of Sites that are listed and/or have confirmed releases	Number with confirmed ground water contamination	Contaminants	Number of site investigations	Number of sites that have been stabilized or have had the source removed	Number of sites with corrective action plans	Number of sites with active remediation	Number of sites with cleanup completed
NPL	N	0								
CERCLIS (non-NPL)	N	0								
DOD/DOE	N	0								
LUST	N	0								
RCRA Corrective Action	N	0								
Underground Injection	N	0								
State Sites	N	0								
Nonpoint Sources	N	0								
Other	N	0								
Total		0								

Aquifer Description: Roubidoux, Gasconad, & Eminones (GRE) County:

Aquifer Setting:

Source Type	Present in reporting area (Y/N)	Number of sites in area	Number of Sites that are listed and/or have confirmed releases	Number with confirmed ground water contamination	Contaminants	Number of site investigations	Number of sites that have been stabilized or have had the source removed	Number of sites with corrective action plans	Number of sites with active remediation	Number of sites with cleanup completed
NPL	Y	1	1	1	Metals		1		1	
CERCLIS (non-NPL)	N	0								
DOD/DOE	N	0								
LUST	N	0								
RCRA Corrective Action	N	0								
Underground Injection	N	0								
State Sites	N	0								
Nonpoint Sources	N	0								
Other	N	0								
Total		1	1	1			1		1	

Aquifer Description: Rush Springs & Marlow (RM) County:

Aquifer Setting:

Source Type	Present in reporting area (Y/N)	Number of sites in area	Number of Sites that are listed and/or have confirmed releases	Number with confirmed ground water contamination	Contaminants	Number of site investigations	Number of sites that have been stabilized or have had the source removed	Number of sites with corrective action plans	Number of sites with active remediation	Number of sites with cleanup completed
NPL	Y	1	1	1	Refinery Waste	1	0	0	0	0
CERCLIS (non-NPL)	N	0								
DOD/DOE	N	0								
LUST	N	0								
RCRA Corrective Action	N	0								
Underground Injection	Y	1	0	0						
State Sites	N	0								
Nonpoint Sources	N	0								
Other	N	0								
Total		2	1	1		1	0	0	0	0

Aquifer Description: Vamoosa Formation & Ada Group (VA) County:

Aquifer Setting:

Source Type	Present in reporting area (Y/N)	Number of sites in area	Number of Sites that are listed and/or have confirmed releases	Number with confirmed ground water contamination	Contaminants	Number of site investigations	Number of sites that have been stabilized or have had the source removed	Number of sites with corrective action plans	Number of sites with active remediation	Number of sites with cleanup completed
NPL	N	0								
CERCLIS (non-NPL)	N	0								
DOD/DOE	N	0								
LUST	N	0								
RCRA Corrective Action	N	0								
Underground Injection	Y	1	0	0						
State Sites	N	0								
Nonpoint Sources	N	0								
Other	N	0								
Total		1	0	0						

Aquifer Description: Simpson & Arbuckle (SA) County:

Aquifer Setting:

Source Type	Present in reporting area (Y/N)	Number of sites in area	Number of Sites that are listed and/or have confirmed releases	Number with confirmed ground water contamination	Contaminants	Number of site investigations	Number of sites that have been stabilized or have had the source removed	Number of sites with corrective action plans	Number of sites with active remediation	Number of sites with cleanup completed
NPL	N	0								
CERCLIS (non-NPL)	N	0								
DOD/DOE	N	0								
LUST	N	0								
RCRA Corrective Action	N	0								
Underground Injection	N	0								
State Sites	N	0								
Nonpoint Sources	N	0								
Other	N	0								
Total		0								

Aquifer Description: Alluvium County: West Tulsa Co.

Aquifer Setting:

Source Type	Present in reporting area (Y/N)	Number of sites in area	Number of Sites that are listed and/or have confirmed releases	Number with confirmed ground water contamination	Contaminants	Number of site investigations	Number of sites that have been stabilized or have had the source removed	Number of sites with corrective action plans	Number of sites with active remediation	Number of sites with cleanup completed
NPL	Y Arkansas River	2	2	2	Refinery Waste		2			2
CERCLIS (non-NPL)										
DOD/DOE										
LUST										
RCRA Corrective Action										
Underground Injection	Y Canadian River Red River	2	0	0						
State Sites										
Nonpoint Sources										
Other										
Total										

Aquifer Description: State Wide County:

Aquifer Setting: Non-specific

Source Type	Present in reporting area (Y/N)	Number of sites in area	Number of Sites that are listed and/or have confirmed releases	Number with confirmed ground water contamination	Contaminants	Number of site investigations	Number of sites that have been stabilized or have had the source removed	Number of sites with corrective action plans	Number of sites with active remediation	Number of sites with cleanup completed
NPL										
CERCLIS (non-NPL)		133				133	0	0	0	0
DOD/DOE		14				14	0	0	0	0
LUST										
RCRA Corrective Action										
Underground Injection		93								
State Sites										
Nonpoint Sources										
Other										
Total		N/A								

KEY TO APPENDIX 7

NPL	**National Priority List**
CERCLIS (non-NPL)	**Comprehensive Environmental Response, Compensation, and Liability Information System**
DOD/DOE	**U. S. Department of Defense / U. S. Department of Energy**
LUST	**Leaking Underground Storage Tanks**
RCRA	**Resource Conservation and Recovery Act**
Underground Injection	**Underground Injection activities**
State Sites	**State Specific Program (includes all non federally funded programs)**
Nonpoint Sources	**Nonpoint Source pollution sites**
Other	**All other programs not fitting above list**

APPENDIX 8

NUMBER OF CERCLIS SITES IN EACH COUNTY

COUNTY	NUMBER OF CERCLIS SITES
Adair Co	18
Alfalfa Co	0
Atoka Co	6
Beaver Co	3
Beckham Co	11
Blaine Co	4
Bryan Co	5
Caddo Co	13
Canadian Co	9
Carter Co	20
Cherokee Co	8
Choctaw Co	3
Cimarron Co	4
Cleveland Co	5
Coal Co	0
Comanche Co	9
Cotton Co	1
Craig Co	3
Creek Co	13
Custer Co	10
Delaware Co	8
Dewey Co	2
Ellis Co	2

COUNTY	NUMBER OF CERCLIS SITES
Garfield Co	21
Garvin Co	15
Grady Co	6
Grant Co	5
Greer Co	3
Harmon Co	3
Harper Co	0
Haskell Co	1
Hughes Co	4
Jackson Co	13
Jefferson Co	1
Johnston Co	3
Kay Co	18
Kingfisher Co	8
Kiowa Co	8
Latimer Co	2
Le Flore Co	7
Lincoln Co	6
Logan Co	4
Love Co	1
Mc Clain Co	6
Mc Curtain Co	12
Mc Intosh Co	2
Major Co	3
Marshall Co	2
Mayes Co	26

COUNTY	NUMBER OF CERCLIS SITES
Murray Co	2
Muskogee Co	22
Noble Co	2
Nowata Co	4
Okfuskee Co	1
Oklahoma Co	103
Okmulgee Co	10
Osage Co	8
Ottawa Co	8
Pawnee Co	3
Payne Co	25
Pittsburg Co	7
Pontotoc Co	4
Pottawatomie Co	7
Pushmataha Co	1
Roger Mills Co	3
Rogers Co	7
Seminole Co	4
Sequoyah Co	9
Stephens Co	10
Texas Co	3
Tillman Co	4
Tulsa Co	103
Wagoner Co	2
Washington Co	5
Washita Co	5

COUNTY	NUMBER OF CERCLIS SITES
Woods Co	2
Woodward Co	17
TOTAL	**718**

APPENDIX 9

CITIZEN MONITORING FOR PRIVATE DRINKING WATER WELLS FOR PERIOD JANUARY 01, 1996 TO DECEMBER 31, 1998

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
Alfalfa		NITROGEN-NITRATE ASN	4.6900	MG/L		19980420
Alfalfa		SULFATE	35.5000	MG/L		19980420
Beaver		NITROGEN-NITRATE ASN	11.3330	MG/L		19970416
Beaver		NITROGEN-NITRATE ASN	3.2600	MG/L		19970416
Beaver		NITROGEN-NITRATE ASN	4.6900	MG/L		19970416
Beaver		NITROGEN-NITRATE ASN	3.5900	MG/L		19970416
Beaver		NITROGEN-NITRATE ASN	1.1000	MG/L		19970416
Beaver		NITROGEN-NITRATE ASN	7.6900	MG/L		19970416
Beaver		NITROGEN-NITRATE ASN	4.9700	MG/L		19970416
Beaver		NITROGEN-NITRATE ASN	4.1100	MG/L		19970416
Beaver		NITROGEN-NITRATE ASN	9.9700	MG/L		19970416
Beaver		NITROGEN-NITRATE ASN	1.3000	MG/L		19970416
Beaver		NITROGEN-NITRATE ASN	2.4900	MG/L		19970416
Beaver		NITROGEN-NITRATE ASN	6.2000	MG/L		19970416
Beaver		NITROGEN-NITRATE ASN	35.3900	MG/L		19970416
Beaver		NITROGEN-NITRATE ASN	2.2600	MG/L		19970416
Beaver		NITROGEN-NITRATE ASN	4.6300	MG/L		19970416
Beaver		NITROGEN-NITRATE ASN	13.7800	MG/L		19970416
Beaver		NITROGEN-NITRATE ASN	1.7300	MG/L		19970416
Beaver		NITROGEN-NITRATE ASN	2.5400	MG/L		19970430
Beaver		NITROGEN-NITRATE ASN	6.7800	MG/L		19970622
Beaver		NITROGEN-NITRATE ASN	8.3500	MG/L		19970630
Beaver		NITROGEN-NITRATE ASN	6.3900	MG/L		19970630

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
Beaver		NITROGEN-NITRATE ASN	0.0800	MG/L		19970630
Beaver		NITROGEN-NITRATE ASN	2.4700	MG/L		19970630
Beaver		NITROGEN-NITRATE ASN	6.0100	MG/L		19970630
Beaver		NITROGEN-NITRATE ASN	3.1500	MG/L		19970630
Beaver		NITROGEN-NITRATE ASN	4.4500	MG/L		19970630
Beaver		NITROGEN-NITRATE ASN	6.0700	MG/L		19970630
Beaver		NITROGEN-NITRATE ASN	1.4300	MG/L		19970630
Beaver		NITROGEN-NITRATE ASN	3.1600	MG/L		19970714
Beaver		NITROGEN-NITRATE ASN	9.8600	MG/L		19970714
Beaver		NITROGEN-NITRATE ASN	3.4100	MG/L		19970714
Beaver		NITROGEN-NITRATE ASN	3.5500	MG/L		19970714
Beaver		NITROGEN-NITRATE ASN	1.4000	MG/L		19970714
Beaver		NITROGEN-NITRATE ASN	3.1700	MG/L		19970714
Beaver		NITROGEN-NITRATE ASN	17.0700	MG/L		19970714
Beaver		NITROGEN-NITRATE ASN	15.3400	MG/L		19970714
Beaver		NITROGEN-NITRATE ASN	5.3500	MG/L		19970714
Beaver		NITROGEN-NITRATE ASN	1.9300	MG/L		19970714
Beaver		NITROGEN-NITRATE ASN	2.4400	MG/L		19970714
Beaver		NITROGEN-NITRATE ASN	3.1600	MG/L		19970714
Beaver		NITROGEN-NITRATE ASN	2.1400	MG/L		19970722
Beaver		NITROGEN-NITRATE ASN	2.9900	MG/L		19970722
Beaver		NITROGEN-NITRATE ASN	2.3100	MG/L		19970722
Beaver		NITROGEN-NITRATE ASN	4.9700	MG/L		19970722
Beaver		NITROGEN-NITRATE ASN	0.7300	MG/L		19970722
Beaver		NITROGEN-NITRATE ASN	2.5800	MG/L		19970902
Beaver		NITROGEN-NITRATE ASN	2.6600	MG/L		19970902

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
Beaver		NITROGEN-NITRATE ASN	4.1300	MG/L		19971003
Beaver		NITROGEN-NITRATE ASN	3.9800	MG/L		19971003
Beaver		NITROGEN-NITRATE ASN	4.0400	MG/L		19971003
Beaver		NITROGEN-NITRATE ASN	4.5800	MG/L		19971003
Beaver		NITROGEN-NITRATE ASN	4.2000	MG/L		19971003
Beaver		NITROGEN-NITRATE ASN	4.8300	MG/L		19971003
Beaver		NITROGEN-NITRATE ASN	4.4600	MG/L		19971003
Beaver		NITROGEN-NITRATE ASN	4.7700	MG/L		19971003
Beaver		NITROGEN-NITRATE ASN	4.6300	MG/L		19971003
Beaver		NITROGEN-NITRATE ASN	4.9200	MG/L		19971003
Beaver		NITROGEN-NITRATE ASN	6.0800	MG/L		19971003
Beaver		NITROGEN-NITRATE ASN	2.8800	MG/L		19971014
Beaver		NITROGEN-NITRATE ASN	3.5000	MG/L		19971014
Beaver		NITROGEN-NITRATE ASN	4.0800	MG/L		19971014
Beaver		NITROGEN-NITRATE ASN	3.9600	MG/L		19971014
Beaver		NITROGEN-NITRATE ASN	3.7700	MG/L		19971014
Beaver		NITROGEN-NITRATE ASN	4.4100	MG/L		19971014
Beaver		NITROGEN-NITRATE ASN	7.8200	MG/L		19971028
Beaver		NITROGEN-NITRATE ASN	0.8900	MG/L		19971201
Beaver		NITROGEN-NITRATE ASN	0.1900	MG/L		19971218
Beaver		NITROGEN-NITRATE ASN	2.3700	MG/L		19971218
Beaver		NITROGEN-NITRATE ASN	2.0200	MG/L		19971218
Beaver		NITROGEN-NITRATE ASN	4.9900	MG/L		19971219
Beaver		NITROGEN-NITRATE ASN	6.0900	MG/L		19971219
Beaver		NITROGEN-NITRATE ASN	3.6900	MG/L		19971219
Beaver		NITROGEN-NITRATE ASN	4.1100	MG/L		19971219

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
Beaver		NITROGEN-NITRATE ASN	5.3000	MG/L		19971219
Beaver		NITROGEN-NITRATE ASN	3.4900	MG/L		19971219
Beaver		NITROGEN-NITRATE ASN	5.1800	MG/L		19971219
Beaver		NITROGEN-NITRATE ASN	4.8500	MG/L		19971219
Beaver		NITROGEN-NITRATE ASN	4.2500	MG/L		19971219
Beaver		NITROGEN-NITRATE ASN	3.8300	MG/L		19971219
Beaver		NITROGEN-NITRATE ASN	2.9700	MG/L		19971219
Beaver		NITROGEN-NITRATE ASN	3.3700	MG/L		19980404
Beaver		NITROGEN-NITRATE ASN	4.2400	MG/L		19980421
Beaver		NITROGEN-NITRATE ASN	4.6200	MG/L		19980421
Beaver		NITROGEN-NITRATE ASN	4.3400	MG/L		19980421
Beaver		NITROGEN-NITRATE ASN	5.6700	MG/L		19980421
Beaver		NITROGEN-NITRATE ASN	3.9400	MG/L		19980421
Beaver		NITROGEN-NITRATE ASN	8.3100	MG/L		19980421
Beaver		NITROGEN-NITRATE ASN	4.6500	MG/L		19980421
Beaver		SULFATE	66.0000	MG/L		19970722
Beaver		SULFATE	<10.0000	MG/L		19970722
Beaver		SULFATE	52.0000	MG/L		19970722
Beaver		SULFATE	108.6000	MG/L		19970722
Beaver		SULFATE	87.6000	MG/L		19970722
Beaver		SULFATE	<10.0000	MG/L		19970902
Beaver		SULFATE	<10.0000	MG/L		19971028
Beaver		SULFATE	<10.0000	MG/L		19971201
Beckham		NITROGEN-NITRATE ASN	35.9980	MG/L		19960315
Beckham		NITROGEN-NITRATE ASN	6.0540	MG/L		19960502
Beckham		NITROGEN-NITRATE ASN	5.5500	MG/L		19970114

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
Beckham		NITROGEN-NITRATE AS N	11.4800	MG/L		19970123
Beckham		NITROGEN-NITRATE AS N	12.1000	MG/L		19970617
Beckham		NITROGEN-NITRATE AS N	11.3900	MG/L		19970820
Beckham		NITROGEN-NITRATE AS N	5.4200	MG/L		19980301
Beckham		SULFATE	414.8000	MG/L		19960315
Beckham		SULFATE	<20.0000	MG/L		19960502
Beckham		SULFATE	25.1000	MG/L		19970123
Beckham		SULFATE	153.6000	MG/L		19970617
Beckham		SULFATE	1349.0000	MG/L		19980301
Blaine		NITROGEN-NITRATE AS N	1.2840	MG/L		19960321
Blaine		SULFATE	26.5000	MG/L		19960321
Bryan		NITRITE-NITRATE AS N	0.1000	MG/L		19970910
Bryan		NITRITE-NITRATE AS N	0.1000	MG/L		19970910
Bryan		SULFATE	56.4000	MG/L		19970910
Bryan		SULFATE	56.4000	MG/L		19970910
Bryan		FLUORIDE-TOTAL	0.4040	MG/L		19970614
Bryan		IRON-TOTAL	6496.0000	UG/L		19970910
Caddo		NITROGEN-NITRATE ASN	8.7900	MG/L		19970703
Caddo		NITROGEN-NITRATE ASN	10.4400	MG/L		19971119
Caddo		NITROGEN-NITRATE ASN	19.0600	MG/L		19980414
Caddo		SULFATE	<10.0000	MG/L		19970703
Caddo		SULFATE	<10.0000	MG/L		19971119
Caddo		IRON-TOTAL	35.0000	UG/L		19970703
Canadian		NITROGEN-NITRATE ASN	2.1010	MG/L		19960415
Canadian		NITROGEN-NITRATE ASN	7.8180	MG/L		19960415
Canadian		NITROGEN-NITRATE ASN	6.1120	MG/L		19960415

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
Canadian		NITROGEN-NITRATE AS N	7.2600	MG/L		19960415
Canadian		NITROGEN-NITRATE AS N	21.4700	MG/L		19971017
Canadian		NITROGEN-NITRATE AS N	1.4100	MG/L		19971224
Canadian		NITROGEN-NITRATE AS N	<0.0500	MG/L		19980313
Canadian		NITROGEN-NITRATE AS N	0.2900	MG/L		19980325
Canadian		SULFATE	<20.0000	MG/L		19960415
Canadian		SULFATE	183.6000	MG/L		19960415
Canadian		SULFATE	<20.0000	MG/L		19960415
Canadian		SULFATE	47.8000	MG/L		19960415
Canadian		SULFATE	32.9000	MG/L		19971017
Canadian		SULFATE	512.0000	MG/L		19971224
Canadian		SULFATE	365.8000	MG/L		19980313
Canadian		SULFATE	1709.0000	MG/L		19980325
Canadian		SULFATE	0.2000	MG/L		19980121
Canadian		FLUORIDE-TOTAL	18160.0000	UG/L		19980216
Canadian		BARIUM-TOTAL	<0.5000	MG/L		19960227
Carter		NITROGEN-NITRATE ASN	<0.5000	MG/L		19960403
Carter		NITROGEN-NITRATE ASN	<0.5000	MG/L		19960604
Carter		NITROGEN-NITRATE ASN	<0.5000	MG/L		19960621
Carter		NITROGEN-NITRATE ASN	<0.5000	MG/L		19960624
Carter		NITROGEN-NITRATE ASN	<0.5000	MG/L		19960810
Carter		NITROGEN-NITRATE ASN	5.3600	MG/L		19960814
Carter		NITROGEN-NITRATE ASN	4.0700	MG/L		19960814
Carter		NITROGEN-NITRATE ASN	11.2670	MG/L		19960814
Carter		NITROGEN-NITRATE ASN	<0.5000	MG/L		19960814
Carter		NITROGEN-NITRATE ASN	3.1060	MG/L		19960814

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
Carter		NITROGEN-NITRATE ASN	0.8040	MG/L		19960814
Carter		NITROGEN-NITRATE ASN	<0.5000	MG/L		19960814
Carter		NITROGEN-NITRATE ASN	<0.5000	MG/L		19960814
Carter		NITROGEN-NITRATE ASN	0.7300	MG/L		19960819
Carter		NITROGEN-NITRATE ASN	0.2200	MG/L		19970714
Carter		SULFATE	132.1000	MG/L		19960227
Carter		SULFATE	125.9000	MG/L		19960403
Carter		SULFATE	<20.0000	MG/L		19960604
Carter		SULFATE	35.2000	MG/L		19960621
Carter		SULFATE	400.0000	MG/L		19960624
Carter		SULFATE	1248.0000	MG/L		19960810
Carter		SULFATE	37.6000	MG/L		19960814
Carter		SULFATE	<20.0000	MG/L		19960814
Carter		SULFATE	<20.0000	MG/L		19960814
Carter		SULFATE	200.0000	MG/L		19960814
Carter		SULFATE	31.6000	MG/L		19960814
Carter		SULFATE	34.2000	MG/L		19960814
Carter		SULFATE	182.7000	MG/L		19960814
Carter		SULFATE	81.5000	MG/L		19960814
Carter		SULFATE	52.5000	MG/L		19960819
Carter		SULFATE	32.6000	MG/L		19970714
Cherokee		NITROGEN-NITRATE AS N	<0.5000	MG/L		19960501
Cherokee		NITROGEN-NITRATE AS N	<0.5000	MG/L		19961008
Cherokee		NITROGEN-NITRATE AS N	0.4200	MG/L		19980201
Cherokee		SULFATE	<20.0000	MG/L		19960501
Cherokee		SULFATE	21.9000	MG/L		19961008

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
Cherokee		SULFATE	30.4000	MG/L		19980201
Choctaw		FLUORIDE-TOTAL	<0.1000	MG/L		19971222
Cimarron		NITROGEN-NITRATE AS N	2.6440	MG/L		19960625
Cimarron		NITROGEN-NITRATE AS N	2.2680	MG/L		19960625
Cimarron		NITROGEN-NITRATE ASN	1.5300	MG/L		19970317
Cimarron		NITROGEN-NITRATE ASN	3.6400	MG/L		19970317
Cimarron		NITROGEN-NITRATE ASN	7.8400	MG/L		19980405
Cimarron		SULFATE	56.6000	MG/L		19960625
Cimarron		SULFATE	47.8000	MG/L		19960625
Cimarron		SULFATE	36.5000	MG/L		19980405
Cleveland		NITROGEN-NITRATE ASN	0.5850	MG/L		19960508
Cleveland		NITROGEN-NITRATE ASN	<0.5000	MG/L		19960717
Cleveland		NITROGEN-NITRATE ASN	1.4900	MG/L		19960726
Cleveland		NITROGEN-NITRATE ASN	<0.5000	MG/L		19960813
Cleveland		NITROGEN-NITRATE ASN	<0.5000	MG/L		19960816
Cleveland		NITROGEN-NITRATE ASN	0.3400	MG/L		19970601
Cleveland		NITROGEN-NITRATE ASN	0.9000	MG/L		19970708
Cleveland		NITROGEN-NITRATE ASN	0.1500	MG/L		19970903
Cleveland		NITROGEN-NITRATE ASN	<0.0500	MG/L		19970916
Cleveland		NITROGEN-NITRATE ASN	0.3100	MG/L		19971006
Cleveland		NITROGEN-NITRATE ASN	1.1400	MG/L		19971007
Cleveland		NITROGEN-NITRATE ASN	0.7300	MG/L		19971008
Cleveland		NITROGEN-NITRATE ASN	1.2400	MG/L		11971008
Cleveland		NITROGEN-NITRATE ASN	0.9700	MG/L		19971208
Cleveland		NITROGEN-NITRATE AS N	3.3900	MG/L		19971208
Cleveland		NITROGEN-NITRATE AS N	0.2200	MG/L		19980304

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
Cleveland		SODIUM-TOTAL	211.0000	MG/L		19960509
Cleveland		SULFATE	36.3000	MG/L		19960508
Cleveland		SULFATE	<20.0000	MG/L		19960717
Cleveland		SULFATE	<20.0000	MG/L		19960726
Cleveland		SULFATE	<20.0000	MG/L		19960816
Cleveland		SULFATE	11.0000	MG/L		19970601
Cleveland		SULFATE	41.9000	MG/L		19970708
Cleveland		SULFATE	89.3000	MG/L		19970916
Cleveland		SULFATE	748.0000	MG/L		19971006
Cleveland		SULFATE	<10.0000	MG/L		19971007
Cleveland		SULFATE	<10.0000	MG/L		19971008
Cleveland		SULFATE	<10.0000	MG/L		19971008
Cleveland		SULFATE	41.9000	MG/L		19971208
Cleveland		SULFATE	15.2000	MG/L		19971208
Cleveland		SULFATE	<10.0000	MG/L		19980304
Cleveland		ARSENIC-TOTAL	<2.0000	MG/L		19960717
Cleveland		IRON-TOTAL	<11.0000	MG/L		19970601
Cleveland		MAGANESE-TOTAL	<11.0000	MG/L		19970601
Cleveland		SELENIUM-TOTAL	<10.0000	UG/L		19960717
Coal		NITROGEN-NITRATE ASN	<0.0500	MG/L		19970617
Coal		SULFATE	50.5000	MG/L		19970617
Comanche		NITROGEN-NITRATE ASN	<0.5000	MG/L		19960207
Comanche		NITROGEN-NITRATE ASN	8.5470	MG/L		19960403
Comanche		NITROGEN-NITRATE ASN	9.2260	MG/L		19960726
Comanche		NITROGEN-NITRATE ASN	1.4300	MG/L		19970723
Comanche		SULFATE	22.4000	MG/L		19960207

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
Comanche		SULFATE	246.4000	MG/L		19960403
Comanche		SULFATE	49.5000	MG/L		19960726
Comanche		SULFATE	179.0000	MG/L		19970723
Cotton		NITROGEN-NITRATE AS N	0.5010	MG/L		19960715
Creek		NITROGEN-NITRATE AS N	2.2000	MG/L		19961104
Creek		SULFATE	35.0000	MG/L		19961104
Creek		IRON-TOTAL	<10.0000	UG/L		19961104
Creek		MANGANESE-TOTAL	<10.000	UG/L		19961104
Custer		NITROGEN-NITRATE AS N	34.4800	MG/L		19970414
Custer		NITROGEN-NITRATE AS N	0.2300	MG/L		19970923
Custer		NITROGEN-NITRATE AS N	38.0800	MG/L		19971115
Custer		NITROGEN-NITRATE AS N	12.2100	MG/L		19980323
Custer		SULFATE	2990.0000	MG/L		19970414
Custer		SULFATE	1567.0000	MG/L		19970923
Custer		SULFATE	2269.0000	MG/L		19971115
Custer		FLUORIDE-TOTAL	0.4000	MG/L		19971204
Delaware		NITRITE-NITRATE AS N	<0.0500	MG/L		19980218
Delaware		SULFATE	43.8000	MG/L		19980218
Delaware		FLUORIDE-TOTAL	0.6270	MG/L		19960418
Dewey		NITRITE-NITRATE AS N	7.4790	MG/L		19960311
Dewey		SULFATE	606.0000	MG/L		19960311
Ellis		NITROGEN-NITRATE AS N	24.6410	MG/L		19960216
Ellis		NITROGEN-NITRATE AS N	13.5400	MG/L		19971031
Ellis		NITROGEN-NITRATE AS N	4.2700	MG/L		19980108
Ellis		NITROGEN-NITRATE AS N	0.7600	MG/L		19980108
Ellis		SULFATE	<20.0000	MG/L		19960216

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
Ellis		SULFATE	26.8000	MG/L		19980218
Ellis		SULFATE	58.3000	MG/L		19960418
Ellis		SULFATE	28.7000	MG/L		19960311
Garfield		NITROGEN-NITRATE AS N	4.8850	MG/L		19960311
Garfield		NITROGEN-NITRATE AS N	13.9900	MG/L		19960216
Garfield		SULFATE	36.6000	MG/L		19971031
Garvin		NITROGEN-NITRATE AS N	3.5340	MG/L		19980108
Garvin		NITROGEN-NITRATE AS N	<0.5000	MG/L		19980108
Garvin		NITROGEN-NITRATE AS N	7.4300	MG/L		19960216
Garvin		NITROGEN-NITRATE AS N	3.4100	MG/L		19971031
Garvin		NITROGEN-NITRATE AS N	<0.500	MG/L		19980108
Garvin		NITROGEN-NITRATE AS N	2.6100	MG/L		19980108
Garvin		NITROGEN-NITRATE AS N	11.5200	MG/L		19960206
Garvin		NITROGEN-NITRATE AS N	6.5800	MG/L		19980402
Garvin		NITROGEN-NITRATE AS N	3.6400	MG/L		19960206
Garvin		NITROGEN-NITRATE AS N	29.7000	MG/L		19960509
Garvin		NITROGEN-NITRATE AS N	6.0900	MG/L		19961112
Garvin		NITROGEN-NITRATE AS N	7.0800	MG/L		19961112
Garvin		NITROGEN-NITRATE AS N	6.7200	MG/L		19961205
Garvin		NITROGEN-NITRATE AS N	1.2800	MG/L		19961212
Garvin		NITROGEN-NITRATE AS N	0.5000	MG/L		19970115
Garvin		NITROGEN-NITRATE AS N	<0.0500	MG/L		19970502
Garvin		NITROGEN-NITRATE AS N	0.4600	MG/L		19970508
Garvin		SULFATE	<20.0000	MG/L		19960509
Garvin		SULFATE	127.7000	MG/L		19960526
Garvin		SULFATE	79.3000	MG/L		19961001

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
Garvin		SULFATE	21.4000	MG/L		19961112
Garvin		SULFATE	<20.0000	MG/L		19961112
Garvin		SULFATE	33.0000	MG/L		19961112
Garvin		SULFATE	97.7000	MG/L		19961112
Garvin		SULFATE	54.2000	MG/L		19961112
Garvin		SULFATE	<20.0000	MG/L		19961112
Garvin		SULFATE	65.0000	MG/L		19961112
Garvin		SULFATE	<20.0000	MG/L		19961112
Garvin		SULFATE	<20.0000	MG/L		19961112
Garvin		SULFATE	<20.0000	MG/L		19961205
Garvin		SULFATE	<20.0000	MG/L		19961212
Garvin		SULFATE	149.3000	MG/L		19970115
Garvin		SULFATE	92.7000	MG/L		19970502
Garvin		SULFATE	<10.0000	MG/L		19970508
Grady		NITROGEN-NITRATE AS N	3.1310	MG/L		19960524
Grady		NITROGEN-NITRATE AS N	<0.5000	MG/L		19960930
Grady		NITROGEN-NITRATE AS N	0.7500	MG/L		19970521
Grady		NITROGEN-NITRATE AS N	0.9200	MG/L		19970521
Grady		NITROGEN-NITRATE AS N	2.3800	MG/L		19970716
Grady		NITROGEN-NITRATE AS N	1.6200	MG/L		19970716
Grady		NITROGEN-NITRATE AS N	3.7500	MG/L		19970815
Grady		NITROGEN-NITRATE AS N	7.9800	MG/L		19970824
Grady		NITROGEN-NITRATE AS N	1.1200	MG/L		19971003
Grady		NITROGEN-NITRATE AS N	7.2900	MG/L		19971010
Grady		NITROGEN-NITRATE AS N	0.8100	MG/L		19980209
Grady		SULFATE	251.5000	MG/L		19970521

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
Grady		SULFATE	553.0000	MG/L		19970521
Grady		SULFATE	<10.0000	MG/L		19970716
Grady		SULFATE	<10.0000	MG/L		19970716
Grady		SULFATE	10.0000	MG/L		19970815
Grady		SULFATE	<10.0000	MG/L		19970824
Grady		SULFATE	<10.0000	MG/L		19971010
Grady		SULFATE	1764.0000	MG/L		19980209
Greer		NITROGEN-NITRATE AS N	6.6260	MG/L		19960618
Greer		NITROGEN-NITRATE AS N	11.8920	MG/L		19990717
Greer		NITROGEN-NITRATE AS N	0.5700	MG/L		19970916
Greer		SULFATE	127.6000	MG/L		19960618
Greer		SULFATE	<20.0000	MG/L		19960717
Greer		SULFATE	707.5000	MG/L		19970916
Harper		NITROGEN-NITRATE AS N	3.8000	MG/L		19960805
Harper		NITROGEN-NITRATE AS N	1.6300	MG/L		19960805
Harper		NITROGEN-NITRATE AS N	1.5400	MG/L		19960805
Harper		NITROGEN-NITRATE AS N	7.7100	MG/L		19960805
Harper		NITROGEN-NITRATE AS N	7.4100	MG/L		19971020
Harper		NITROGEN-NITRATE AS N	8.8500	MG/L		19971020
Harper		SULFATE	36.8000	MG/L		19960805
Harper		SULFATE	41.6000	MG/L		19960805
Harper		SULFATE	40.0000	MG/L		19960805
Harper		SULFATE	31.4000	MG/L		19960805
Haskell		NITROGEN-NITRATE AS N	<0.5000	MG/L		19970408
Haskell		SULFATE	20.3000	MG/L		19970408
Haskell		IRON-TOTAL	284.0000	UG/L		19971111

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
Haskell		MANGANESE-TOTAL	269.0000	UG/L		19971111
Hughes		NITROGEN-NITRATE AS N	2.3700	MG/L		19970703
Hughes		SODIUM-TOTAL	63.0000	MG/L		19970703
Jackson		NITROGEN-NITRATE AS N	8.9800	MG/L		19960401
Jackson		NITROGEN-NITRATE AS N	8.7360	MG/L		19960515
Jackson		NITROGEN-NITRATE AS N	12.0030	MG/L		19960515
Jackson		NITROGEN-NITRATE AS N	8.0500	MG/L		19970211
Jackson		NITROGEN-NITRATE AS N	10.8800	MG/L		19970630
Jackson		NITROGEN-NITRATE AS N	1.8200	MG/L		19980416
Jackson		SULFATE	640.0000	MG/L		19960401
Jackson		SULFATE	1547.5000	MG/L		19960515
Jackson		SULFATE	1495.5000	MG/L		19960515
Jackson		SULFATE	1322.0000	MG/L		19980416
Jackson		FLUORIDE-TOTAL	1.9000	MG/L		19970630
Jonhston		NITROGEN-NITRATE AS N	<0.5000	MG/L		19960911
Johnston		SULFATE	51.2000	MG/L		19960911
Kingfisher		NITROGEN-NITRATE AS N	16.5060	MG/L		19960426
Kingfisher		NITROGEN-NITRATE AS N	7.8700	MG/L		19970511
Latimer		NITROGEN-NITRATE AS N	<0.5000	MG/L		19960407
Latimer		NITROGEN-NITRATE AS N	<0.5000	MG/L		19960913
Latimer		NITROGEN-NITRATE AS N	1.8400	MG/L		19980317
Latimer		NITROGEN-NITRATE AS N	0.1200	MG/L		19980317
Latimer		SULFATE	43.7000	MG/L		19960407
Latimer		SULFATE	30.0000	MG/L		19960913
Latimer		SULFATE	11.3000	MG/L		19980317
Latimer		SULFATE	43.3000	MG/L		19980317

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
LeFlore		IRON-TOTAL	2757.0000	UG/L		19971114
Lincoln		NITROGEN-NITRATE AS N	<0.5000	MG/L		19960620
Lincoln		NITROGEN-NITRATE AS N	<0.5000	MG/L		19960812
Lincoln		NITROGEN-NITRATE AS N	<0.5000	MG/L		19970129
Lincoln		NITROGEN-NITRATE AS N	2.0100	MG/L		19970710
Lincoln		NITROGEN-NITRATE AS N	0.3200	MG/L		19970714
Lincoln		NITROGEN-NITRATE AS N	0.0900	MG/L		19970917
Lincoln		SODIUM-TOTAL	551.0000	MG/L		19961008
Lincoln		SULFATE	231.0000	MG/L		19960812
Lincoln		SULFATE	<20.0000	MG/L		19970129
Lincoln		SULFATE	47.9000	MG/L		19970710
Lincoln		FLUORIDE-TOTAL	0.7000	MG/L		19970710
Lincoln		BARIUM-TOTAL	113.0000	UG/L		19980406
Lincoln		BARIUM-TOTAL	27.0000	UG/L		19980406
Lincoln		BARIUM-TOTAL	13.0000	UG/L		19980406
OKLAHOMA		NITROGEN-NITRATE AS N	0.5950	MG/L		19960506
OKLAHOMA		NITROGEN-NITRATE AS N	<0.5000	MG/L		19960924
OKLAHOMA		NITROGEN-NITRATE AS N	4.2800	MG/L		19970203
OKLAHOMA		NITROGEN-NITRATE AS N	6.1600	MG/L		19970630
OKLAHOMA		NITROGEN-NITRATE AS N	2.5900	MG/L		19970805
OKLAHOMA		SODIUM-TOTAL	112.0000	MG/L		19970813
OKLAHOMA		SULFATE	863.5000	MG/L		19960506
OKLAHOMA		SULFATE	68.0000	MG/L		19960924
OKLAHOMA		SULFATE	<20.0000	MG/L		19970203
OKLAHOMA		SULFATE	273.8000	MG/L		19970805
OKLAHOMA		FLUORIDE-TOTAL	0.4000	MG/L		19970522

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
OKLAHOMA		FLUORIDE-TOTAL	0.1000	MG/L		19980414
Love		NITROGEN-NITRATE AS N	1.5220	MG/L		19960814
Love		SULFATE	38.2000	MG/L		19960814
Major		NITROGEN-NITRATE AS N	7.7570	MG/L		19960206
Major		NITROGEN-NITRATE AS N	0.2700	MG/L		19971111
Major		NITROGEN-NITRATE AS N	1.1000	MG/L		19971129
Major		SULFATE	784.0000	MG/L		19971111
Major		SULFATE	44.6000	MG/L		19971129
Mayes		NITROGEN-NITRATE AS N	<0.5000	MG/L		19960530
McClain		NITROGEN-NITRATE AS N	<0.5000	MG/L		19960927
McClain		NITROGEN-NITRATE AS N	<0.5000	MG/L		19961121
McClain		NITROGEN-NITRATE AS N	<0.5000	MG/L		19970113
McClain		NITROGEN-NITRATE AS N	<0.5000	MG/L		19970322
McClain		NITROGEN-NITRATE AS N	<0.5000	MG/L		19970410
McClain		NITROGEN-NITRATE AS N	<0.0500	MG/L		19971103
McClain		NITROGEN-NITRATE AS N	0.9000	MG/L		19971129
McClain		SULFATE	<20.0000	MG/L		19961121
McClain		SULFATE	<20.0000	MG/L		19970113
McClain		SULFATE	16.0000	MG/L		19970322
McClain		SULFATE	3268.0000	MG/L		19970410
McClain		SULFATE	207.8000	MG/L		19971103
McClain		SULFATE	<10.0000	MG/L		19971129
McClain		BARIUM-TOTAL	563.0000	UG/L		19961121
McClain		BARIUM-TOTAL	530.0000	UG/L		19970113
McClain		BARIUM-TOTAL	872.0000	UG/L		19970322
McClain		IRON-TOTAL	<10.0000	UG/L		19960927

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
McClain		IRON-TOTAL	44.0000	UG/L		19961121
McClain		IRON-TOTAL	32.0000	UG/L		19970113
McClain		IRON-TOTAL	36.0000	UG/L		19970322
McClain		MANGANESE-TOTAL	3276.0000	UG/L		19961121
McClain		MANGANESE-TOTAL	2894.0000	UG/L		19970113
McClain		MANGANESE-TOTAL	<11.0000	UG/L		19970322
McCurtain		NITROGEN-NITRATE AS N	<0.5000	MG/L		19960429
McCurtain		NITROGEN-NITRATE AS N	0.5600	MG/L		19960729
McCurtain		NITROGEN-NITRATE AS N	<0.5000	MG/L		19960827
McCurtain		SULFATE	<20.0000	MG/L		19960827
McIntosh		NITROGEN-NITRATE AS N	0.0900	MG/L		19970512
McIntosh		SODIUM-TOTAL	1084.0000	MG/L		19970622
McIntosh		SULFATE	<10.0000	MG/L		19970512
OKLAHOMA		NITROGEN-NITRATE ASN	1.4700	MG/L		19960917
OKLAHOMA		NITROGEN-NITRATE ASN	<0.5000	MG/L		19970227
OKLAHOMA		NITROGEN-NITRATE ASN	2.8700	MG/L		19970711
OKLAHOMA		SULFATE	29.0000	MG/L		19960917
OKLAHOMA		SULFATE	29.8000	MG/L		19970227
OKLAHOMA		SULFATE	14.1000	MG/L		19970711
Osage		NITROGEN-NITRATE ASN	6.7000	MG/L		19970630
Osage		SULFATE	26.3000	MG/L		19970630
Osage		FLUORIDE-TOTAL	0.3000	MG/L		19970922
Payne		NITROGEN-NITRATE ASN	1.1100	MG/L		19961008
Payne		SULFATE	<20.0000	MG/L		19961008
Pittsburg		NITROGEN-NITRATE ASN	0.0600	MG/L		19970727
Pittsburg		NITROGEN-NITRATE ASN	2.2200	MG/L		19980330

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
Pittsburg		SULFATE	<10.0000	MG/L		19970727
Pittsburg		SULFATE	<10.0000	MG/L		19980330
Pittsburg		IRON-TOTAL	396.0000	UG/L		19960306
Pittsburg		IRON-TOTAL	2639.0000	UG/L		19970928
Pontotoc		NITROGEN-NITRATE AS N	<0.5000	MG/L		19961008
Pontotoc		SULFATE	105.8000	MG/L		19961008
Pottawatomie		NITROGEN-NITRATE AS N	<0.5000	MG/L		19960121
Pottawatomie		NITROGEN-NITRATE AS N	<0.5000	MG/L		19960225
Pottawatomie		NITROGEN-NITRATE AS N	0.8400	MG/L		19960304
Pottawatomie		NITROGEN-NITRATE AS N	12.7510	MG/L		19960530
Pottawatomie		NITROGEN-NITRATE AS N	<0.5000	MG/L		19960707
Pottawatomie		NITROGEN-NITRATE AS N	7.6700	MG/L		19961002
Pottawatomie		NITROGEN-NITRATE AS N	1.6900	MG/L		19961118
Pottawatomie		NITROGEN-NITRATE AS N	D1.760	MG/L		19970224
Pottawatomie		NITROGEN-NITRATE AS N	0.0320	MG/L		19970610
Pottawatomie		NITROGEN-NITRATE AS N	<0.0500	MG/L		19980120
Pottawatomie		NITROGEN-NITRATE AS N	13.4500	MG/L		19980129
Pottawatomie		NITROGEN-NITRATE AS N	<0.0500	MG/L		19980210
Pottawatomie		NITROGEN-NITRATE AS N	0.2200	MG/L		19980226
Pottawatomie		NITROGEN-NITRATE AS N	0.2600	MG/L		19980304
Pottawatomie		NITROGEN-NITRATE AS N	0.1000	MG/L		19980312
Pottawatomie		NITROGEN-NITRATE AS N	0.1200	MG/L		19980322
Pottawatomie		NITROGEN-NITRATE AS N	0.5400	MG/L		19980427
Pottawatomie		NITROGEN-NITRATE AS N	0.5100	MG/L		19980427
Pottawatomie		SULFATE	39.0000	MG/L		19960121
Pottawatomie		SULFATE	23.7000	MG/L		19961118

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
Pottawatomie		SULFATE	25.2000	MG/L		19970224
Pottawatomie		SULFATE	<10.0000	MG/L		19980120
Pottawatomie		SULFATE	50.3000	MG/L		19980129
Pottawatomie		SULFATE	115.2000	MG/L		19980210
Pottawatomie		SULFATE	<10.0000	MG/L		19980226
Pottawatomie		SULFATE	<10.0000	MG/L		19980304
Pottawatomie		SULFATE	3636.0000	MG/L		19980312
Pottawatomie		SULFATE	1407.0000	MG/L		19980322
Pottawatomie		SULFATE	61.0000	MG/L		19980427
Pottawatomie		SULFATE	35.2000	MG/L		19980427
Pottawatomie		IRON-TOTAL	32.0000	UG/L		19960121
Pottawatomie		MANGANESE-TOTAL	<10.0000	UG/L		19960121
Roger Mills		NITROGEN-NITRATE AS N	5.2520	MG/L		19960221
Roger Mills		NITROGEN-NITRATE AS N	<0.5000	MG/L		19960328
Roger Mills		NITROGEN-NITRATE AS N	1.7600	MG/L		19961029
Roger Mills		NITROGEN-NITRATE AS N	3.3300	MG/L		19970818
Roger Mills		NITROGEN-NITRATE AS N	12.2900	MG/L		19980423
Roger Mills		SULFATE	<20.0000	MG/L		19960221
Roger Mills		SULFATE	241.0000	MG/L		19980423
Roger Mills		FLUORIDE-TOTAL	0.2500	MG/L		19970424
Seminole		NITROGEN-NITRATE AS N	1.3040	MG/L		19960117
Seminole		NITROGEN-NITRATE AS N	<0.5000	MG/L		19960318
Seminole		NITROGEN-NITRATE AS N	<0.5000	MG/L		19960325
Seminole		NITROGEN-NITRATE AS N	0.8100	MG/L		19970106
Seminole		NITROGEN-NITRATE AS N	0.0700	MG/L		19970922
Seminole		NITROGEN-NITRATE AS N	<0.0500	MG/L		19971229

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
Seminole		NITROGEN-NITRATE AS N	0.1100	MG/L		19980217
Seminole		NITROGEN-NITRATE AS N	0.1400	MG/L		19980324
Seminole		SODIUM-TOTAL	170.0000	MG/L		19980217
Seminole		SULFATE	143.0000	MG/L		19960318
Seminole		SULFATE	124.6000	MG/L		19971229
Seminole		SULFATE	28.6000	MG/L		19980217
Seminole		IRON-TOTAL	56.0000	UG/L		19980217
Seminole		MANGANESE-TOTAL	<10.0000	UG/L		19980217
Stephens		NITROGEN-NITRATE AS N	4.4580	MG/L		19960709
Stephens		NITROGEN-NITRATE AS N	1.8200	MG/L		19960930
Stephens		NITROGEN-NITRATE AS N	0.6900	MG/L		19960930
Stephens		NITROGEN-NITRATE AS N	1.5200	MG/L		19970718
Stephens		NITROGEN-NITRATE AS N	0.7700	MG/L		19970718
Stephens		SULFATE	50.3000	MG/L		19960709
Stephens		SULFATE	39.0000	MG/L		19960930
Stephens		SULFATE	30.6000	MG/L		19960930
Stephens		SULFATE	50.7000	MG/L		19970718
Stephens		SULFATE	<10.0000	MG/L		19970718
Stephens		BARIUM-TOTAL	507.0000	UG/L		19960930
Stephens		BARIUM-TOTAL	395.0000	UG/L		19960930
Stephens		BARIUM-TOTAL	536.0000	UG/L		19970718
Stephens		BARIUM-TOTAL	396.0000	UG/L		19970718
Texas		NITROGEN-NITRATE AS N	4.9970	MG/L		19960122
Texas		NITROGEN-NITRATE AS N	1.0830	MG/L		19960213
Texas		NITROGEN-NITRATE AS N	3.9500	MG/L		19960328
Texas		NITROGEN-NITRATE AS N	5.0280	MG/L		19960328

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
Texas		NITROGEN-NITRATE AS N	4.8710	MG/L		19960328
Texas		NITROGEN-NITRATE AS N	4.3190	MG/L		19960328
Texas		NITROGEN-NITRATE AS N	4.1170	MG/L		19960328
Texas		NITROGEN-NITRATE AS N	3.9210	MG/L		19960328
Texas		NITROGEN-NITRATE AS N	3.7900	MG/L		19960328
Texas		NITROGEN-NITRATE AS N	4.6170	MG/L		19960404
Texas		NITROGEN-NITRATE AS N	5.3320	MG/L		19960404
Texas		NITROGEN-NITRATE AS N	3.6720	MG/L		19960404
Texas		NITROGEN-NITRATE AS N	3.3340	MG/L		19960411
Texas		NITROGEN-NITRATE AS N	3.1620	MG/L		19960411
Texas		NITROGEN-NITRATE AS N	3.3810	MG/L		19960411
Texas		NITROGEN-NITRATE AS N	3.2840	MG/L		19960417
Texas		NITROGEN-NITRATE AS N	4.8200	MG/L		19960725
Texas		NITROGEN-NITRATE AS N	1.6460	MG/L		19960725
Texas		NITROGEN-NITRATE AS N	6.6800	MG/L		19960725
Texas		NITROGEN-NITRATE AS N	6.4900	MG/L		19970121
Texas		NITROGEN-NITRATE AS N	2.9900	MG/L		19970327
Texas		NITROGEN-NITRATE AS N	2.7200	MG/L		19970327
Texas		NITROGEN-NITRATE AS N	1.9100	MG/L		19970327
Texas		NITROGEN-NITRATE AS N	6.6900	MG/L		19970713
Texas		NITROGEN-NITRATE AS N	1.8500	MG/L		19970715
Texas		NITROGEN-NITRATE AS N	4.9800	MG/L		19970904
Texas		NITROGEN-NITRATE AS N	1.9300	MG/L		19970923
Texas		NITROGEN-NITRATE AS N	2.0700	MG/L		19971015
Texas		NITROGEN-NITRATE AS N	0.6400	MG/L		19971029
Texas		NITROGEN-NITRATE AS N	3.3000	MG/L		19971108

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
Texas		NITROGEN-NITRATE AS N	2.2400	MG/L		19971216
Texas		NITROGEN-NITRATE AS N	3.4400	MG/L		19980107
Texas		NITROGEN-NITRATE AS N	1.4900	MG/L		19980107
Texas		NITROGEN-NITRATE AS N	2.3800	MG/L		19980107
Texas		NITROGEN-NITRATE AS N	1.8200	MG/L		19960122
Texas		SULFATE	<20.0000	MG/L		19960328
Texas		SULFATE	57.9000	MG/L		19960404
Texas		SULFATE	51.9000	MG/L		19960404
Texas		SULFATE	56.7000	MG/L		19960411
Texas		SULFATE	44.8000	MG/L		19960411
Texas		SULFATE	64.3000	MG/L		19960411
Texas		SULFATE	33.8000	MG/L		19960523
Texas		SULFATE	33.6000	MG/L		19960725
Texas		SULFATE	69.5000	MG/L		19970121
Texas		SULFATE	229.1000	MG/L		19970713
Texas		SULFATE	95.7000	MG/L		19971108
Texas		SULFATE	26.2000	MG/L		19961015
Texas		ARSENIC-TOTAL	6.0000	UG/L		19961015
Texas		BARIUM-TOTAL	53.0000	UG/L		19961015
Texas		CADMIUM-TOTAL	<2.0000	UG/L		19961015
Texas		CHROMIUM-TOTAL	15.0000	UG/L		19961015
Texas		IRON-TOTAL	<10.0000	UG/L		19961015
Texas		MAGANESE-TOTAL	<10.0000	UG/L		19961015
Texas		NICKEL-TOTAL	<10.0000	UG/L		19961015
Texas		SILVER-TOTAL	<10.0000	UG/L		19961015
Texas		ZINC-TOTAL	554.0000	UG/L		19961015

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
Texas		SELENIUM-TOTAL	<10.0000	UG/L		19961015
Texas		MERCURY-TOTAL	<0.5000	UG/L		19961015
Kiowa		NITROGEN-NITRATE AS N	38.4800	MG/L		19970123
Kiowa		SULFATE	1501.0000	MG/L		19970123
Woodward		NITROGEN-NITRATE AS N	4.3080	MG/L		19960122
Woodward		NITROGEN-NITRATE AS N	9.3700	MG/L		19970514
Woodward		NITROGEN-NITRATE AS N	12.5600	MG/L		19970515
Woodward		NITROGEN-NITRATE AS N	1.0500	MG/L		19970515
Woodward		NITROGEN-NITRATE AS N	3.3400	MG/L		19970515
Woodward		NITROGEN-NITRATE AS N	2.7100	MG/L		19970515
Woodward		NITROGEN-NITRATE AS N	2.9800	MG/L		19970515
Woodward		NITROGEN-NITRATE AS N	5.0600	MG/L		19970515
Woodward		NITROGEN-NITRATE AS N	16.9700	MG/L		19970515
Woodward		NITROGEN-NITRATE AS N	23.9100	MG/L		19970515
Woodward		NITROGEN-NITRATE AS N	2.5300	MG/L		19970515
Woodward		NITROGEN-NITRATE AS N	0.2500	MG/L		19970515
Woodward		NITROGEN-NITRATE AS N	2.4200	MG/L		19970515
Woodward		NITROGEN-NITRATE AS N	7.4200	MG/L		19970515
Woodward		NITROGEN-NITRATE AS N	5.3300	MG/L		19970515
Woodward		NITROGEN-NITRATE AS N	0.1600	MG/L		19970521
Woodward		NITROGEN-NITRATE AS N	8.7300	MG/L		19970521
Woodward		NITROGEN-NITRATE AS N	6.4900	MG/L		19970521
Woodward		NITROGEN-NITRATE AS N	0.1900	MG/L		19970521
Woodward		NITROGEN-NITRATE AS N	3.7800	MG/L		19970624
Woodward		NITROGEN-NITRATE AS N	16.7600	MG/L		19970624
Woodward		NITROGEN-NITRATE AS N	63.9400	MG/L		19970624

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
Woodward		NITROGEN-NITRATE AS N	10.7900	MG/L		19970624
Woodward		NITROGEN-NITRATE AS N	4.4900	MG/L		19970624
woodward		NITROGEN-NITRATE AS N	3.1000	MG/L		19970624
Woodward		NITROGEN-NITRATE AS N	4.9200	MG/L		19970626
Woodward		NITROGEN-NITRATE AS N	2.0000	MG/L		19970626
Woodward		NITROGEN-NITRATE AS N	1.2000	MG/L		19970724
Woodward		NITROGEN-NITRATE AS N	4.4600	MG/L		19970724
Woodward		NITROGEN-NITRATE AS N	2.6700	MG/L		19971203
Woodward		NITROGEN-NITRATE AS N	3.8700	MG/L		19971203
Woodward		NITROGEN-NITRATE AS N	4.2000	MG/L		19971203
Woodward		NITROGEN-NITRATE AS N	7.1000	MG/L		19971203
Woodward		NITROGEN-NITRATE AS N	3.6200	MG/L		19971203
Woodward		NITROGEN-NITRATE AS N	1.5200	MG/L		19971203
Woodward		NITROGEN-NITRATE AS N	2.5600	MG/L		19971203
Woodward		NITROGEN-NITRATE AS N	3.0100	MG/L		19971203
Woodward		NITROGEN-NITRATE AS N	15.6200	MG/L		19980323
Woodward		NITROGEN-NITRATE AS N	<0.0500	MG/L		19980323
Woodward		SULFATE	267.2000	MG/L		19970514
Woodward		SULFATE	1383.0000	MG/L		19970515
Woodward		SULFATE	77.6000	MG/L		19970515
Woodward		SULFATE	<10.0000	MG/L		19970515
Woodward		SULFATE	10.9000	MG/L		19970515
Woodward		SULFATE	<10.0000	MG/L		19970515
Woodward		SULFATE	<10.0000	MG/L		19970515
Woodward		SULFATE	47.3000	MG/L		19970515
Woodward		SULFATE	<10.0000	MG/L		19970515

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE
Woodward		SULFATE	21.6000	MG/L		19970515
Woodward		SULFATE	<10.0000	MG/L		19970515
Woodward		SULFATE	21.3000	MG/L		19970515
Woodward		SULFATE	15.4000	MG/L		19970515
Woodward		SULFATE	<10.0000	MG/L		19970515
Woodward		SULFATE	1616.0000	MG/L		19970521
Woodward		SULFATE	<10.0000	MG/L		19970521
Woodward		SULFATE	41.6000	MG/L		19970521
Woodward		SULFATE	1533.0000	MG/L		19970521
Woodward		SULFATE	<10.0000	MG/L		19970624
Woodward		SULFATE	<10.0000	MG/L		19970624
Woodward		SULFATE	38.6000	MG/L		19970624
Woodward		SULFATE	<10.0000	MG/L		19970624
Woodward		SULFATE	<10.0000	MG/L		19970724
Woodward		SULFATE	<10.0000	MG/L		19970724
Woodward		SULFATE	13.7000	MG/L		19971203
Woodward		SULFATE	14.4000	MG/L		19971203
Woodward		SULFATE	14.4000	MG/L		19971203
Woodward		SULFATE	<10.0000	MG/L		19971203
Woodward		SULFATE	10.7000	MG/L		19971203
Woodward		SULFATE	<10.0000	MG/L		19971203
Woodward		SULFATE	<10.0000	MG/L		19971203
Woodward		SULFATE	146.1000	MG/L		19971203
Woodward		SULFATE	50.8000	MG/L		19980323
Woodward		SULFATE	123.6000	MG/L		19980323
Woodward		IRON-TOTAL	56.0000	MG/L		19970306

COUNTY		PARAMETER	VALUE	UNITS	REM	DATE

APPENDIX 10

WATERSHED MANAGEMENT UNITS

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