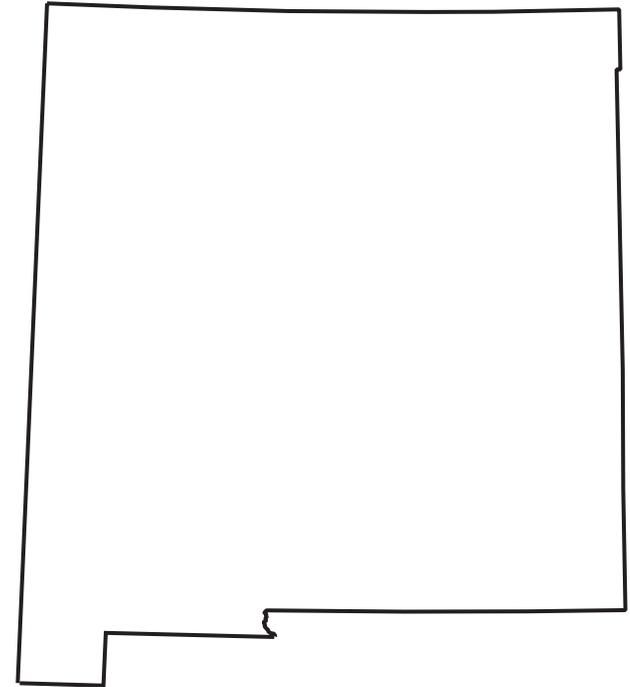


Water Resources Data New Mexico Water Year 2003



Water-Data Report NM-03-1

Dave Byrd, Harriet R. Allen, and Mary Montañño—Water Resources Data, New Mexico, Water Year 2003—NM-03-1

1879–2004

CALENDAR FOR WATER YEAR 2003

2002

OCTOBER							NOVEMBER							DECEMBER						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
		1	2	3	4	5						1	2	1	2	3	4	5	6	7
6	7	8	9	10	11	12	3	4	5	6	7	8	9	8	9	10	11	12	13	14
13	14	15	16	17	18	19	10	11	12	13	14	15	16	15	16	17	18	19	20	21
20	21	22	23	24	25	26	17	18	19	20	21	22	23	22	23	24	25	26	27	28
27	28	29	30	31			24	25	26	27	28	29	30	29	30	31				

2003

JANUARY							FEBRUARY							MARCH						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
			1	2	3	4							1							1
5	6	7	8	9	10	11	2	3	4	5	6	7	8	2	3	4	5	6	7	8
12	13	14	15	16	17	18	9	10	11	12	13	14	15	9	10	11	12	13	14	15
19	20	21	22	23	24	25	16	17	18	19	20	21	22	16	17	18	19	20	21	22
26	27	28	29	30	31		23	24	25	26	27	28		23	24	25	26	27	28	29
														30	31					

APRIL							MAY							JUNE						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
			1	2	3	4					1	2	3	1	2	3	4	5	6	7
6	7	8	9	10	11	12	4	5	6	7	8	9	10	8	9	10	11	12	13	14
13	14	15	16	17	18	19	11	12	13	14	15	16	17	15	16	17	18	19	20	21
20	21	22	23	24	25	26	18	19	20	21	22	23	24	22	23	24	25	26	27	28
27	28	29	30				25	26	27	28	29	30	31	29	30					

JULY							AUGUST							SEPTEMBER						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
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6	7	8	9	10	11	12	3	4	5	6	7	8	9	7	8	9	10	11	12	13
13	14	15	16	17	18	19	10	11	12	13	14	15	16	14	15	16	17	18	19	20
20	21	22	23	24	25	26	17	18	19	20	21	22	23	21	22	23	24	25	26	27
27	28	29	30	31			24	25	26	27	28	29	30	28	29	30				

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Water Resources Data New Mexico Water Year 2003

By Dave Byrd, Harriet R. Allen, and Mary Montañó

Water-Data Report NM-03-1

Prepared in cooperation with the State of New Mexico and other agencies

**U.S. Department of the Interior
U.S. Geological Survey**

U.S. Department of the Interior

Gale A. Norton, Secretary

U.S. Geological Survey

Charles G. Groat, Director

2004

U.S. Geological Survey

5338 Montgomery Blvd. NE, Suite 400

Albuquerque, New Mexico 87109-1311

505-830-7900

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PREFACE

This annual hydrologic data report of New Mexico is one of a series of annual reports that documents hydrologic data gathered from the U.S. Geological Survey's surface- and ground-water data-collection networks in each State, Puerto Rico, and the Trust Territories. These records of streamflow, ground-water levels, and quality of water provide the hydrologic information needed by Federal, State, and local agencies and the private sector for developing and managing our Nation's land and water resources.

This report is the culmination of a concerted effort by dedicated personnel of the U.S. Geological Survey of the New Mexico District who collected, compiled, analyzed, verified, and organized the data, and who typed, edited, and assembled the report. The authors had primary responsibility for assuring that the information contained herein is accurate, complete, and adheres to U.S. Geological Survey policies and guidelines.

The following personnel are recognized for their significant contributions to this report:

S.K. Anderholm	B.A. Hayhurst	D.R. Rankin
L.V. Beal	M. Jimenez	D.M. Roark
K.J. Burnley	T.M. Kelly	O.C. Romero
M.D. Carlson	J. Langman	R.D. Ross
B.J. Carr	S.H. Lewandowski	P.D. Seaton
A.R. Cox	D.W. Lutz	M.L. Shewmake
R.R. Cruz	L.C. Madrid	G.H. Sieber
R.K. Dewees	R.M. McBreen	J.A. Stiles
L.C. Donohoe	J.A. Medina	J.R. Summers
W.T. Evans	L.K. Miller	P.J. Swift
S.E. Falk	R.L. Moquino	E.B. Turner
R.G. Garcia	E.L. Nickerson	J.E. Veenhuis
B.R. Goddard	R.Y. Ochoa	S.D. Waltemeyer
R.L. Gold	T.J. Quintana	R.W. Wilcox
A.E. Gregory		

This report was prepared under the general supervision of Dave Byrd, Supervisory Hydrologic Technician, and Linda S. Weiss, District Chief, New Mexico, and in cooperation with the State of New Mexico and with other agencies.

REPORT DOCUMENTATION PAGE*Form Approved
OMB No. 0704-0188*

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE April 2004	3. REPORT TYPE AND DATES COVERED Annual: October 1, 2002, through Sept. 30, 2003	
4. TITLE AND SUBTITLE Water resources data, New Mexico, water year 2003			5. FUNDING NUMBERS	
6. AUTHOR(S) Dave Byrd, Harriet R. Allen, and Mary Montaña				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Geological Survey, Water Resources Division 5338 Montgomery Blvd. NE, Suite 400 Albuquerque, New Mexico 87109-1311			8. PERFORMING ORGANIZATION REPORT NUMBER USGS-WDR-NM-03-1	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Geological Survey, Water Resources Division 5338 Montgomery Blvd. NE, Suite 400 Albuquerque, New Mexico 87109-1311			10. SPONSORING / MONITORING AGENCY REPORT NUMBER USGS-WDR-NM-03-1	
11. SUPPLEMENTARY NOTES Prepared in cooperation with the State of New Mexico and with other agencies				
12a. DISTRIBUTION / AVAILABILITY STATEMENT No restrictions on distributions. This report may be purchased from: National Technical Information Service, Springfield, Virginia 22161			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) Water-resources data for the 2003 water year for New Mexico consist of records of discharge and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality in wells and springs. This report contains discharge records for 182 gaging stations; stage and contents for 24 lakes and reservoirs; water quality for 34 gaging stations, 83 wells, and 7 partial-record stations and miscellaneous sites; and water levels at 141 observation wells. Also included are 80 crest-stage, partial-record stations. Additional water data were collected at various sites not involved in the systematic data-collection program and are published as miscellaneous measurements. Two seepage investigations were made during the year. These data represent that part of the National Water Data System collected by the U.S. Geological Survey and cooperating Federal, State, and local agencies in New Mexico.				
14. SUBJECT TERMS *New Mexico, *Hydrologic data, *Surface water, *Water quality, Lakes, Reservoirs, Sediments, Water levels, Flow rates, Gaging stations, Chemical analyses, Water analyses, Water temperature, Sampling sites			15. NUMBER OF PAGES 437	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT UL	

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(r) radiochemical, (s) sediment, (t) daily water temperature, (e) elevation, (v) contents]

Station
number Page

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ARKANSAS RIVER BASIN

ARKANSAS RIVER:

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The following continuous-record surface-water discharge stations (gaging stations) in New Mexico have been discontinued. Daily streamflow records were collected and published for the period of record, expressed in water years, shown for each station. Those stations with an asterisk (*) after the station number are currently operated as crest-stage partial-record stations. Discontinued project stations with less than 3 years of record have not been included. Information regarding these stations may be obtained from the District Office at the address given on the back side of the title page of this report.

Station name	Station number	Drainage area (mi ²)	Period of record
ARKANSAS RIVER BASIN			
Bennett Spring near Capulin, NM	07153410	--	1977-81
Dry Cimarron River near Guy, NM	07153500	545	1942-73
Dry Cimarron River near Folsom, NM	07154000	895	1927-33
Canadian River near Hebron, NM	07199000	229	1946-86
Chicorica Creek below Lake Maloya, NM	07199500	26	1945-51
Chicorica Creek near Yankee, NM	07199600	32.5	1975-79, 1984-87
East Fork Chicorica Creek near Yankee, NM	07199650	23.9	1984-87
Vermejo River at Vermejo Park, NM	07202400	36.7	1985-93
Vermejo River near Maxwell, NM	07203525	486	1983-94
Chicorica Creek below East Fork near Raton, NM	07200000	71	1945-51
Chicorica Creek near Raton, NM	07200500	87	1910-14, 1984-87
Una de Gato Creek near Raton, NM	07201400	80	1910
Una de Gato Creek below Throttle Dam near Raton, NM	07201420	49.5	1975-83
Una de Gato Creek near Hebron, NM	07201500	224	1946-50
Chicorica Creek near Hebron, NM	07202000	381	1945-52, 1983-87
Vermejo River near Colfax, NM	07203500	--	1945-50
McEvoy Creek near Eagle Nest, NM	07206200	1.95	1961-68
Tolby Creek near Eagle Nest, NM	07206300	8.5	1961-68
Clear Creek near Ute Park, NM	07206400*	7.44	1961-68
Cimarron Creek at Ute Park, NM	07206500	260	1907-50
Rayado Creek below Abreu's Ranch, near Cimarron, NM	07209000	75	1912-13
Rayado Creek near Miami, NM	07209500	76	1939-55
Rayado Creek near Springer, NM	07210000	--	1907-09
Uracca Creek near Cimarron, NM	07210500	6.3	1912-15
East Fork Ocate Creek at Ocate, NM	07212000	35	1914-28
Ocate Creek near Ocate, NM	07212500	--	1914
Colmor intake canal near Ocate, NM	07213000	--	1933-51
Sweetwater Creek near Colmor, NM	07213500	--	1914
Canadian River near Roy, NM	07214000	4,066	1936-65
Mora River near Holman, NM	07214500	57	1953-74

DISCONTINUED SURFACE-WATER DISCHARGE STATIONS--Continued

Station name	Station number	Drainage area (mi ²)	Period of record
ARKANSAS RIVER BASIN--Continued			
Vigil Canyon near Holman, NM	07214600	2.8	1956-63
Agua Fria Creek near Holman, NM	07214700	9.2	1956-63
Rio la Casa near Cleveland, NM	07214800	23	1956-70
La Cueva Canal at La Cueva, NM	07215000	--	1906-11
Cebolla River near Golondrinas, NM	07215600	64	1956-63
Mora River at Weber, NM	07216000	--	1903-04
Coyote Creek below Black Lake, NM	07217000	48	1952-63
Coyote Creek above Guadalupita, NM	07217100	71	1956-74
Coyote Creek at Guadalupita, NM	07217500	90	1920-23
Mora River near Watrous, NM	07218100	521	1956-63
Sapello River at Sapello, NM	07218500	--	1903-04
Sapello canal at Sapello, NM	07218600	--	1956-70
Manuelitas Creek near Rociada, NM	07218700	52	1956-63
Sapello River at Sapello, NM	07220000	132	1915-21
Lake Isabel feeder canal near Sapello, NM	07220100	--	1956-75
Sapello River at Los Alamos, NM	07220500	144	1905-11
Sapello River near Watrous, NM	07220600	213	1956-63
Mora River near Shoemaker, NM	07221000	6,015	1912-14, 1935-96
Canadian River near Bell Ranch, NM	07222000	6,200	1915-17, 1927-39
Bell Ranch Canal near Conchas Dam, NM	07223000	--	1942-84
Canchos Canal below Conchas Dam, NM	07223300	--	1961-82, 1984-92
Canadian River below Conchas Dam, NM	07224500	7,417	1936-38, 1942-72
Conchas River at Variadero, NM	07225000	523	1936-96
Pajarito Creek near Hanley, NM	07225100	310	1911-12
Pajarito Creek near Vigil Creek, near Hanley, NM	07225200	350	1912-13
Ute Creek near Bueyeros, NM	07226000	620	1949-54
Canadian River above New Mexico-Texas State line	072271401	2,616	1969-73
Tramperos Creek near Stead, NM	07227200*	556	1966-73
BRAZOS RIVER BASIN			
Running Water Draw near Clovis, NM	08080600*	109	1956-64
RIO GRANDE BASIN			
Latir Creek Outflow Lake #2 near Amalia, NM	08254425	--	1986-88
Costilla Creek near Amalia, NM	08254500	152	1949-59, 1961-81

Station name	Station number	Drainage area (mi ²)	Period of record
RIO GRANDE BASIN--Continued			
Ute Creek near Amalia, NM	08255000	12	1949-59
Acequia Madre at Costilla, NM	08256000	--	1944-92
Mesa ditch near Garcia, CO	08256500	--	1944-65, 1969-83
Middle ditch at Garcia, CO	08257000	--	1944-56
Cerro Canal at Costilla, NM	08258000	--	1944-92
Association ditch at Costilla, NM	08258500	--	1955-71
Cerro Canal below Association Ditch at Costilla, NM	08258600	--	1972-92
Cerro Canal near Jaroso, CO	08259000	--	1944-72
Cerro Canal at State line near Jaroso, CO	08259600	--	1973-92
Penasquito ditch at Costilla, NM	08260000	--	1955-61
Costilla Creek below diversion dam, at Costilla, NM	08260500	197	1952-86
Alire ditch at Garcia, CO	08261500	--	1944-59
Costilla Creek near Jaroso, CO (near mouth, NM)	08262500	290	1912-13, 1948-61
Latir Creek near Cerro, NM	08263000	10	1937-70
Red River near Red River, NM	08264000	19.1	1940-64
Red River below Zwergle Damsite, near Red River, NM	08264500	25.7	1963-73
Cabresto Creek near Questa, NM	08266000	36.7	1943-96
Red River below Questa, NM	08266500	180	1910-22
Red River at mouth, near Questa, NM	08267000	190	1950-78
Rio Hondo at Valdez, NM	08268000	38	1916-34
Rio Hondo at Damsite at Valdez, NM	08268200	40.3	1963-66
Arroyo Hondo at Arroyo Hondo, NM	08268500	65.6	1912-28, 1932-85
Rio Grande near Arroyo Hondo, NM	08268700	8,760	1963-96
Acequia Madre at Taos, NM	08269500	--	1940-41
North channel of Rio Pueblo de Taos at Taos, NM	08270000	80	1936-41
Rio Pueblo de Taos at Taos, NM	08270500	80	1936-41
Tenorio ditch near Arroyo Seco, NM	08271500	--	1935-50
Rio Lucero diversions near Arroyo Seco, NM	08272000	--	1932-33
Indian ditch near Arroyo Seco, NM	08272500	--	1934-50
Seco ditch near Arroyo Seco, NM	08273000	--	1934-50
Juan Manuel ditch near Arroyo Seco, NM	08273500	--	1935-50
Prado ditch near Arroyo Seco, NM	08274000	--	1934-50
Rio Lucero below diversions, near Arroyo Seco, NM	08274500	25	1934-41

DISCONTINUED SURFACE-WATER DISCHARGE STATIONS--Continued

Station name	Station number	Drainage area (mi ²)	Period of record
RIO GRANDE BASIN--Continued			
Rio Fernando de Taos near Taos, NM	08275000	71.7	1912-17, 1927-28, 1962-80
Rio Pueblo de Taos near Ranchito, NM	08275300	199	1957-80
Rio Chiquito near Talpa, NM	08275600	37.0	1957-80
Rio Pueblo de Taos at Los Cordovas, NM	08276000	359	1910-65
Carson Reservoir near Carson, NM	08277000	190	1940-60
Picuris ditch near Penasco, NM	08277500	--	1936-41
Pueblo Creek near Penasco, NM	08278000	--	1936-41
Alcalde ditch at Chamita, NM	08280000	--	1936-41
San Rafael ditch at Alcalde, NM	08280500	--	1936-41
Acequia Madre at Alcalde, NM	08281000	--	1936-41
Rio Grande above San Juan Pueblo, NM	08281100	10,530	1963-87
Rio Chama near Chama, NM	08281500	--	1912-16
Rio Brazos near Brazos, NM	08282000	--	1913-17
Chavez Creek near Brazos, NM	08282500	--	1914-15
Rio Brazos at Brazos, NM	08283000	--	1912-13
Rio Chama at Park View, NM	08283500	405	1912-15, 1916, 1924-55
Rito de Tierra Amarilla at Tierra Amarilla, NM	08284000	49.7	1914-15
Willow Creek near Park View, NM	08284500	193	1936-71
Rio Nutrias near Cebolla, NM	08286000	--	1914-15
Canjilon Creek near Canjilon, NM	08286600	--	1911-12, 1913
Rio Chama at Abiquiu, NM	08287100	--	1895-97
Rio Chama near Abiquiu, NM	08287500	2,284	1941-67
El Rito Creek near El Rito, NM	08288000	50.5	1931-51
Rio Vallecitos at Vallecitos, NM	08288500	--	1911-14
Santa Clara ditch near Espanola, NM	08290500	--	1936-41
Santa Cruz River at Riverside, NM	08291500	188	1942-51
Santa Clara Creek near Espanola, NM	08292000	34.5	1936-41, 1949-50, 1984-94
Hill Acequia at head, near Espanola, NM	08292500	--	1940-41
Hill Acequia near Espanola, NM	08293000	--	1940
Guachupangue ditch near Espanola, NM	08293500	--	1936-41
San Ildefonso ditch near Espanola, NM	08294000	--	1940-41

Station name	Station number	Drainage area (mi ²)	Period of record
RIO GRANDE BASIN--Continued			
Rio Nambe at Nambe Falls, NM	08294300	25.1	1963-78
Nambe Canal near Nambe, NM	08294500	--	1932-51
Rio Nambe near Nambe, NM	08295000*	38.2	1932-51
Rio En Medio near Santa Fe, NM	08295200	0.63	1963-73
Llano Frio ditch near Nambe, NM	08295500	--	1936-50
Llano ditch near Nambe, NM	08296000	--	1936-50
Mioses Pena ditch near Nambe, NM	08296500	--	1936-38
Mocha ditch at Nambe, NM	08297000	--	1936-50
Comunidad ditch at Nambe, NM	08297500	--	1936-50
Ortiz ditch at Nambe, NM	08298000	--	1936-50
Canyon ditch near Nambe, NM	08298500	--	1936-50
Acequia Rincon near Nambe, NM	08299000	--	1936-50
Las Joyas ditch near Nambe, NM	08299500	--	1936-50
Trujillo ditch near Nambe, NM	08300000	--	1936-45
Barranco Alto ditch near Nambe, NM	08300500	--	1936-50
Pojoaque River at Pojoaque Bridge, near Nambe, NM	08301000	--	1936-41
Jacona ditch near Nambe, NM	08301500	--	1936-39
Jacona ditch near San Ildefonso, NM	08302000	--	1940-48
North Fork Tesuque Creek near Santa Fe, NM	08302200	1.60	1962-73
Middle Fork Tesuque Creek near Santa Fe, NM	08302300	0.43	1961-73
South Fork Tesuque Creek near Santa Fe, NM	08302400	0.47	1962-73
Tesuque Creek above diversions near Santa Fe, NM	08302500	11.7	1936-52
Cajon Grande ditch near Santa Fe, NM	08303000	--	1936-41
De La Cruz ditch near Santa Fe, NM	08303500	--	1936-41
Acequia Madre near Santa Fe, NM	08304000	--	1936-41
Acequia Madre at head, near Santa Fe, NM	08304050	--	1936-41
Little Tesuque Creek near Santa Fe, NM	08304100	0.64	1962-73
Little Tesuque Creek tributary No. 4 near Santa Fe, NM	08304200	0.69	1964-73
Little Tesuque Creek tributary No. 3 near Santa Fe, NM	08304300	0.65	1963-73
Little Tesuque Creek tributary No. 2 near Santa Fe, NM	08304400	0.45	1962-73
Little Tesuque Creek near Santa Fe, NM	08305000	7.06	1936-41
Rio Tesuque at Tesuque, near Santa Fe, NM	08305500	--	1938-41
Acequia Medio near Santa Fe, NM	08306000	--	1936-46
Acequia Medio at waste, near Santa Fe, NM	08306500	--	1936-38
Hubbard ditch near Santa Fe, NM	08307500	--	1938-41
Mitchell ditch near Santa Fe, NM	08308000	--	1936-51

DISCONTINUED SURFACE-WATER DISCHARGE STATIONS--Continued

Station name	Station number	Drainage area (mi ²)	Period of record
RIO GRANDE BASIN--Continued			
Rio Tesuque at Grant Boundary at Tesuque, NM	08308025	12	1998-99
Post ditch near Tesuque Pueblo, NM	08308500	--	1936-41
Qwiyo ditch near Tesuque Pueblo, NM	08309000	--	1936-41
Corral ditch near Tesuque Pueblo, NM	08309500	--	1936-41
Acequia Indios near San Ildefonso, NM	08310000	--	1936-41
Acequia de la Otra Banda near San Ildefonso, NM	08310500	--	1936-41
El Rancho ditch near San Ildefonso, NM	08311000	--	1936-41
San Antonio ditch near San Ildefonso, NM	08311500	--	1936-41
Well ditch at San Ildefonso, NM	08312000	--	1937, 1938-51
Ortiz ditch at San Ildefonso, NM	08312500	--	1936-41
Pojoaque River near San Ildefonso Pueblo, NM	08312600	184	1972-79
Los Alamos Canyon near Los Alamos, NM	08313042	9.1	1970-71 , 1991-95
Rito de los Frijoles near Los Alamos, NM	08313300	8.9	1959-63
Rito de los Frijoles in Bandelier National Monument, NM	08313350	18.1	1963-69, 1977-82, 1983-96
Rio Grande at Cochiti, NM	08314500	14,600	1924-70
Santa Fe River at Monument Rock, near Santa Fe, NM	08315000	14	1910
Santa Fe River below Nichols Reservoir near Santa Fe, NM	08316505	--	1998-99
Santa Fe River above St. Francis Dr. at Santa Fe, NM	08316530	--	1998-99
Santa Fe River at Ricardo Road at Santa Fe, NM	08316535	--	1998-99
Santa Fe River above Cochiti Lake, NM	08317200	232	1970-99
Galisteo Creek above Galisteo Reservoir, NM	08317850	567	1970-76
Galisteo Creek at Domingo, NM	08318000	640	1941-71
San Felipe east side acequia near Domingo, NM	08318500	--	1936-41
Rito San Antonio near Los Alamos, NM	08319500	--	1949-50
Redondo Creek near Jemez Springs, NM	08319945	12.1	1982-85
Sulfur Creek near Jemez Springs, NM	08319950	38.0	1982-85
Jemez River near Jemez Springs, NM	08320000	--	1949-50
East Fork Jemez River near Los Alamos, NM	08320500	--	1949-50
East Fork Jemez River near Jemez Springs, NM	08321000	--	1949-50
Jemez River below East Fork, near Jemez Springs, NM	08321500	173	1951-90
Rio del las Vacas near Cuba, NM	08322000	--	1939-41
Rio Cebolla near Jemez Springs, NM	08322500	--	1939
Rio Guadalupe at Box Canyon near Jemez, NM	08323000	235	1938-42

Station name	Station number	Drainage area (mi ²)	Period of record
RIO GRANDE BASIN--Continued			
Rio Guadalupe near Jemez Springs, NM	08323500	230	1938-42, 1949-50
Jemez east side ditch near Jemez, NM	08324500	--	1936-41
Jemez west side ditch near Jemez, NM	08325000	--	1936-41
Antonio Pecos ditch near Jemez, NM	08325500	--	1936-41
San Ysidro ditch near San Ysidro, NM	08326000	--	1936-41
Jemez River at San Ysidro, NM	08326500	854	1937-41
Zia ditch near San Ysidro, NM	08327000	--	1936-41
Zia Reservoir near San Ysidro, NM	08327500	2.4	1954-60
Jemez River above Jemez Canyon Dam, NM	08328000	961	1953-58
Piedra Lisa Arroyo near Bernalillo, NM	08329100	4.1	1955-74
Rio Grande near Bernalillo, NM	08329500	17,300	1941-69
Grant Line Arroyo at Villa del Oso at Albuquerque, NM	08329860	0.052	1976-98
Grant Line Arroyo at Albuquerque, NM	08329865	0.052	1987-91
Pino Arroyo at Ventura Blvd. at Albuquerque, NM	08329872	5.40	1990-2000
Hoffmantown Church Outlet No. 1 at Albuquerque, NM	08329873	0.859	1990-97
Hoffmantown Church Outlet No. 2 at Albuquerque, NM	08329874	0.413	1990-97
Cherry Hills Arroyo No. 1 at Albuquerque, NM	08329875	0.147	1990-97
Cherry Hills Arroyo No. 2 at Albuquerque, NM	08329876	0.796	1990-97
Pino Arroyo at Wyoming Blvd at Albuquerque, NM	08329877	5.80	1990-97
Taylor Ranch Drain at Albuquerque, NM	08329936	0.132	1978-98
Rio Grande near Alameda, NM	08329928	17,263	1989-95
Corrales Riverside Drain near Corrales, NM	08329930	--	1996-99
Corrales Main Canal outflow at Albuquerque, NM	08329931	--	1996-99
Rio Grande at Rio Bravo Bridge near Albuquerque, NM	08330150	17,500	1991-95
Tijeras Arroyo at Albuquerque, NM	08330500*	75.3	1921-22, 1943-49
Tijeras Arroyo above Four Hills Bridge at Albuquerque, NM	08330505	77.0	1989-91
Tijeras Arroyo at Kirtland Air Force Base, NM	08330560	80.6	1987-88
Arroyo Del Coyote near Albuquerque, NM	08330565	35	1989-95
Arroyo Del Coyote at mouth near Albuquerque, NM	08330567	39	1989-95
Tijeras Arroyo below Arroyo del Coyote near Albuquerque, NM	08330569	121	1989-95
Tijeras Arroyo at Montessa Park near Albuquerque, NM	08330580	122	1987-95
Tijeras Arroyo below South Diversion Channel inlet near Albuquerque, NM	08330800	--	1974-88
Albuquerque Riverside Drain near Isleta, NM	08330915	--	1997-99
Atrisco Riverside Drain at Isleta, NM	08330940	--	1997-99

DISCONTINUED SURFACE-WATER DISCHARGE STATIONS--Continued

Station name	Station number	Drainage area (mi ²)	Period of record
RIO GRANDE BASIN--Continued			
Rio Grande near Isleta, NM	08331000	17,900	1925-29, 1936-38
Barr/Chical diversion at Isleta, NM	08331105	--	1997-99
North Pajarito Arroyo at Albuquerque, NM	08331130	0.58	1979-87
North Pajarito Arroyo at Albuquerque, NM	08331140	0.81	1979-83
Rio Grande near Belen, NM	08331500	18,230	1941-57
Abo Arroyo near Blue Springs, NM	08331660	242	1996-2000
Rio Grande near Bernardo, NM	08332000	19,230	1936-39, 1941-64
Lower San Juan Riverside drain near Bernardo, NM	08332030	--	1954-75
La Jara Creek near La Jara, NM	08332500	--	1932-33
Rio Puerco near Cabezon, NM	08333000	360	1943-51
Rio Puerco at Cabezon, NM	08333500	397	1944-51
Papers Wash near Star Lake Trading Post, NM	08334300	20.3	1978-82
Arroyo Chico near Guadalupe, NM	08340500	1,390	1943-86
Rio Puerco near Guadalupe, NM	08341000	1,860	1943
Bluewater Creek above Bluewater Dam, near Bluewater, NM	08341300	75.0	1953-78, 1989-2001
Cottonwood Creek near Thoreau, NM	08341365	77.0	1989-2001
Bluewater Creek below Bluewater Dam, NM	08341500	201	1951-60, 1989-2001
Bluewater Creek near Bluewater, NM	08342000	209	1912-19, 1927-72
San Mateo Creek near San Mateo, NM	08342600	75.6	1977-82
Arroyo del Puerto near San Mateo, NM	08342700	96.8	1980-82
Rio San Jose at Grants	08343000	1,020	1949-66, 1968-94
Grants Canyon at Grants	08343100	13	1961-95
McCarty's south side ditch near San Fidel, NM	08344000	--	1940-42, 1950-51
McCarty's north side ditch near San Fidel, NM	08344500	--	1940-42, 1950-51
Acomita Reservoir outlet near San Fidel, NM	08345000	--	1938-41
Rio San Jose near San Fidel, NM	08345500	2,310	1936-42, 1950-51
Seama-Paraje ditch near Casa Blanca, NM	08346000	--	1937-41
Casa Blanca ditch at Casa Blanca, NM	08346500	--	1937-41
New Laguna ditch wasteway near Casa Blanca, NM	08347000	--	1937-41
New Laguna ditch near New Laguna, NM	08347500	--	1937-41

Station name	Station number	Drainage area (mi ²)	Period of record
RIO GRANDE BASIN--Continued			
Rio San Jose near Casa Blanca, NM	08348000	--	1936-41
Encinal Creek near Casa Blanca, NM	08348500*	6.19	1937-39
Laguna ditch at New Laguna, NM	08349000	--	1936-41
Paguete Creek near Laguna, NM	08349500	--	1937-41
Rio Paguate below Jackpile Mine near Laguna, NM	08349800	107	1976-93
Paguete Reservoir outlet near Laguna, NM	08350000	--	1940-41
Rio San Jose near Laguna, NM	08350500	3,040	1937-41, 1973-76
Mesita ditch near Laguna, NM	08351000	--	1936-41
Rio San Jose at Correo, NM	08351500	3,660	1943-94
Rio Puerco at Rio Puerco, NM	08352500	6,590	1909-12, 1934-76
Alamo Creek near Alamo, NM	08353130	22.4	1983-85
Rio Salado near Alamo, NM	08353150	540	1983-85
Rio Salado near San Acacia, NM	08354000	1,380	1947-84
Rio Grande at San Acacia, NM	08355000	26,770	1936-64
Nogal Arroyo Floodway near Socorro, NM	08355200	--	1969-77
Arroyo de la Matanza near Socorro, NM	08355300	46.0	1969-77
Rio Grande at San Antonio, NM	08355500	27,400	1951-57
Socorro Main Canal South near San Antonio, NM	08356000	--	1937-38, 1948-71
San Antonio Riverside Drain near San Antonio, NM	08356500	--	1948-71
Elmendorf Interior Drain near San Antonio, NM	08357000	--	1936-38, 1948-71
San Antonio Riverside Drain near San Marcial, NM	08357500	--	1948-71
Rio Grande Conveyance Channel below heading, near San Marcial, NM	08358000	--	1953-57
Rio Grande at San Marcial, NM	08358500	27,700	1895-1964
Milligan Gulch near San Marcial, NM	08358550	413	1968-78
Rio Grande Conveyance Channel at mouth of Nogal Canyon, near Truth or Consequences, NM	08359000	--	1953-57
Rio Grande at the narrows, in Elephant Butte Reservoir, NM	08359500	28,500	1951-57
Alamosa Creek near Monticello, NM	08360000*	403	1931-42
Las Cruces Arroyo near Las Cruces, NM	08363600	13.5	1958-66
Tortugas Arroyo near Las Cruces, NM	08363700	20.7	1962-74
Rio Grande at Vinton Bridge near Anthony, TX	08363840	28,680	1970-74
Pecos River near Cowles, NM	08378000	189	1910-19
Pecos River near San Jose, NM	08379000	539	1939-40

Station name	Station number	Drainage area (mi ²)	Period of record
RIO GRANDE BASIN--Continued			
Tecolote Creek below Wright Canyon near El Porvenir, NM	08379187	5.42	1987-92
Tecolote Creek near San Pablo, NM	08379200	83	1960-65
South Fork Gallinas Creek near El Porvenir, NM	08380000	25	1911-20
Gallinas Creek at Montezuma, NM	08381000	87	1903, 1904-66
Storrie feeder canal near Las Vegas, NM	08381500	--	1949-52
Gallinas River near Lourdes, NM	08382000	313	1951-63
Pecos River near Fort Sumner, NM	08385500	5,600	1957-58, 1912-13, 1921-23
Pecos River below Fort Sumner, NM	08385520	5,600	1957-58, 1962-70
Pecos River below Yeso Arroyo, near Fort Sumner, NM	08385620	7,000	1965-68
Pecos River above Huggins Creek, near Roswell, NM	08385640	7,800	1965-68
Pecos River above Acme, NM	08385648	--	1992-2000
F. Herrera ditch S. at Hollywood, NM	08386900	--	1960-68, 1970-83
Rio Ruidoso near Glencoe, NM	08387500	--	1910-11
Eagle Creek near Alto, NM	08387800	15.7	1969-80
Rio Ruidoso at Hondo, NM	08388000	290	1930-55
Rio Bonito at Angus, NM	08388500	45.5	1930-31
Rio Bonito near Lincoln, NM	08389055	--	1999-2002
Rio Bonito at Hondo, NM	08389500	295	1930-55
Rio Hondo at Hondo, NM	08390000	1,000	1930-31
Rio Hondo at Picacho, NM	08390100	715	1908-09, 1956-62
Rio Hondo at Hondo Reservoir site, near Roswell, NM	08392500	970	1903-05
Rio Hondo below reservoir outlet, near Roswell, NM	08393000	--	1908
Taylor-Moore ditch near Roswell, NM	08393100	--	1905
Rocky Arroyo above Two Rivers Reservoir near Roswell, NM	08393200	31	1963-80
Rocky Arroyo below Rocky Dam, near Roswell, NM	08393300	65	1963-80
Rio Hondo at Roswell, NM	08393500	--	1903-06, 1981-97
North Spring River at Roswell, NM	08393600	19.5	1958-77
Pecos River near Roswell, NM	08394000	--	1903-06
Pecos River near Hagerman, NM	08394100	13,360	1968-90
Rio Felix at old highway bridge near Hagerman, NM	08394500	932	1939-87
Rio Felix near Hagerman, NM	08395000	934	1932-39

Station name	Station number	Drainage area (mi ²)	Period of record
RIO GRANDE BASIN--Continued			
Cottonwood Creek near Lake Arthur, NM	08396000	199	1932-65
Rio Penasco at Elk, NM	08397450	--	1910-11
Rio Penasco near Elk, NM	08397500	--	1911
Rio Penasco near Dunken, NM	08397600*	583	1956-62
Pecos River below McMillan Dam, NM	08401000	16,990	1906-09, 1910-11, 1939-40, 1946-88
Pecos River above Seven Rivers near Lakewood, NM	08401100	17,000	1974-87
Pecos River below Avalon Dam, NM	08404500	--	1940
Pecos River at Carlsbad, NM	08405000	8,100	1903-09, 1907-08, 1914-15, 1920-69
Rattlesnake Springs near White City, NM	08405300	--	1961-62
Black River at Malaga, NM	08406000	360	1939-40
MIMBRES RIVER BASIN			
Mimbres River at McKnight Dam Site, near Mimbres, NM	08476300	97.3	1963-72
Bear Canyon near Mimbres, NM	08476500	14.5	1937-55
Mimbres River near Mimbres, NM	08477000	152	1921-76
Mimbres River near Faywood, NM	08477500	440	1909-11, 1912-14, 1916-17, 1920-21, 1927-55, 1963-68
Mimbres River near Spalding, NM	08477530	472	1963-68
San Vicente Arroyo at Silver City, NM	08477600	26.5	1953-65
TULAROSA VALLEY BASIN			
Rio de Arena near Hurley, NM	08477700	16	1913-14
Stevens Creek near Fort Bayard, NM	08478004	--	1907-12, 1912-14
Cameron Creek at Fort Bayard, NM	08478008	--	1911-13
Cameron Creek near Hurley, NM	08478012	46	1913-14
Whitewater Creek at Hurley, NM	08478016	35	1913-14
Wamel Canal at head, near Deming, NM	08478300	--	1963-68
Mimbres River below Wamel heading near Deming, NM	08478400	1,101	1963-68
Three Rivers near Three Rivers, NM	08480600	6.9	1956-58
Indian Creek near Three Rivers, NM	08480700*	6.8	1956-58
Indian Creek flume near Three Rivers, NM	08480800	--	1956-58

Station name	Station number	Drainage area (mi ²)	Period of record
TULAROSA VALLEY BASIN--Continued			
Indian Creek at mouth, near Three Rivers, NM	08480900	10.9	1956-58
Rio Tularosa at Mescalero, NM	08481300	--	1910-11
Tularosa Creek near Bent, NM	08481500	120	1947-96
Rio Tularosa near Tularosa, NM	08482000	--	1938-47
Rio La Luz near La Luz, NM	08483000	30	1911-12
Rio Fresnoal near Mountain Park, NM	08484000	44	1911-12
Rio La Luz at La Luz, NM	08484500	74	1910-13
Alamogordo-La Luz ditch at La Luz, NM	08485000	--	1934-49
Alamo Creek at Woods Ranch, near Alamogordo, NM	08485500	--	1931-37
Alamogordo water supply near Alamogordo, NM	08486000	--	1932-51
Tularosa Valley tributary near White Sands, NM	08486250	17.2	1965-74
Tularosa Valley tributary at White Sands, NM	08486260	21.0	1965-74
SALT CREEK BASIN			
Sacramento River near Sunspot, NM	08492900	12.8	1984-89
SAN JUAN BASIN			
San Juan River at Rosa, NM	09350500	1,990	1895-99, 1910-65
Los Pinos River at Ignacio, CO	09354000	--	1910-61
Martinez ditch near Archuleta, NM	09355200	--	1955-57
Citizens ditch near Turley, NM	09356000	--	1938, 1951-58
San Juan River near Blanco, NM	09356500	3,560	1907-09, 1910, 1927-55
Canon Largo near Blanco, NM	09356565	1,700	1977-81
San Juan River at Bloomfield, NM	09357000	5,410	1909, 1910-11, 1927-31, 1955-63
San Juan River at Hammond Bridge near Bloomfield, NM	09357100	5,540	1978-81
Gallegos Canyon near Farmington, NM	09357250	290	1978-81
Animas River at Aztec, NM	09364000	1,270	1904, 1907-15
La Plata River near Farmington, NM	09367500	583	1938-2002
Shumway Arroyo near Fruitland, NM	09367555	62.8	1975-82
Chaco Wash near Star Lake Trading Post, NM	09367660	59.0	1978-82
Chaco Wash at east boundary at Chaco Canyon National Monument, NM	09367676	364	1980-82
Fajada Wash at Chaco Canyon National Monument, NM	09367678	199	1980-83

Station name	Station number	Drainage area (mi ²)	Period of record
SAN JUAN BASIN--Continued			
Chaco Wash at Chaco Culture National Monument, NM	09367800*	578	1976-90
Gallo Wash at Chaco National Monument, NM	09367682	36.2	1978-81
Chaco Wash near Pueblo Bonito at bridge at Chaco Canyon National Monument, NM	09367683	619	1980-83
Ah-shi-sle-pah Wash near Kimbeto, NM	09367685	8.2	1977-84
Kim-me-ni-oli Wash near Crownpoint, NM	09367687	228	1982-83
Kim-me-ni-oli Wash near Lake Valley, NM	09367689	400	1982-83
De-na-zin Wash near Bisti Trading Post, NM	09367710	184	1975-82
Black Springs Wash near Mexican Springs, NM	09367900*	7.55	1979-
Hunter Wash at Bisti Trading Post, NM	09367930*	45.6	1975-82
Teec-ni-di-tso Wash near Burnham Trading Post, NM	09367934	7.2	1978-82
Burnham Wash near Burnham, NM	09367936	8.6	1978-82
Chaco River near Burnham, NM	09367938	3,640	1978-82
Chaco River near Waterflow, NM	09367950	4,350	1975-94
LITTLE COLORADO RIVER BASIN			
Largo Creek near Mangas, NM	09386050	63	1959-66
Zuni River at Black Rock, NM	09387000	828	1910-30
Zuni River at New Mexico-Arizona State line	09387300	1,314	1985-87, 1987-89, 1990-94
Puerco River near Church Rock, NM	09395350	193	1978-82, 1989-91
Puerco River at Gallup, NM	09395500*	558	1940-46, 1977-82
Puerco River near Manuelito, NM	09395630	990	1989-93
Whitewater Arroyo near Cheechilgeetho, NM	09395700	78.5	1964-67
GILA RIVER BASIN			
Gila River near Silver City, NM	09430000	1,600	1912-19
Sapello Creek below Lake Roberts, near Silver City, NM	09430150	78	1964-71
Gila River near Cliff, NM	09431000	2,435	1942-51
Trout Creek near Luna, NM	09442653	27.1	1968-86
Tularosa River above Aragon, NM	09442692	94	1966-96
San Francisco River near Alma, NM	09443000	1,546	1904-07, 1909-10, 1912-14, 1964-86
Whitewater Creek near Mogollon, NM	09443500	34	1909-23

DISCONTINUED SURFACE-WATER-QUALITY STATIONS

The following stations were discontinued as continuous-record surface-water-quality stations prior to the 2003 water year. Records of (c) chemical, (b) biological, (m) microbiological, (s) sediment, or (t) daily water temperature were collected and published for the record shown for each station.

An inventory of chemical data analyzed prior to 1962 can be found in U.S. Geological Survey Water-Supply Paper 1786, "Inventory of Published and Unpublished Chemical Analyses of Surface Water in the Continental United States and Puerto Rico, 1961."

Station name	Station number	Drainage area (mi ²)	Type of record	Period of record
Dry Cimarron River near Guy, NM	07153500	545	c,s,t	1964-74
Canadian River near Hebron, NM	07199000	229	c	1966-81
Chicorica Creek near Yankee, NM	07199600	32.5		1975-79
Una de Gato Creek below Throttle Dam near Raton, NM	07201420	49.5	c,s	1975-84
Chicorica Creek near Hebron, NM	07202000	381	c	1975-81
Vermejo River near Dawson, NM	07203000	301	c,s	1964-84
Cimarron River below Eagle Nest Dam, NM	07206000	167	c,s	1975-84
Ponil Creek near Cimarron, NM	07207500	171	c	1981-95
Rayado Creek at Sauble Ranch, near Cimarron, NM	07208500	85	c	1981-95
Canadian River near Taylor Springs, NM	07211500	2,850	b,c,s	1966-75
Mora River at La Cueva, NM	07215500	173	c	1981-95
Conchas Canal below Conchas Dam, NM	07223300	--	c	1964-77
Plaza Largo canal below Barranca Creek near Tucumcari, NM	07227073	602	c	1965-66
Revuelto Creek below Plaza Largo Creek near Tucumcari, NM	07227080	672	c	1965-66
Canadian River near Glenrio, NM	07227125	--	c,s,t	1965-66
Rio Grande above Culebra Creek near Lobatos, CO	08249200	--	b,c,t	1962-69
Costilla Creek near Costilla, NM	08255500	195	c,s	1966-76
Rio Grande near Cerro, NM	08263500	8,440	c,m,s	1977, 1979-87
Rio Grande above Red River near Cerro, NM	08263510	--	c,m,s	1979-81
Red River near Red River, NM	08264000	19.1	s	1963
Red River below Zwergle Damsite near Red River, NM	08264500	28.9	c,m,s	1962-65 1979-82
Red River at Molycorp Mine near Red River, NM	08264970	78.3	c,m,s	1979-82
Red River near Questa, NM	08265000	113	c,m,s	1979-87
Cabresto Creek near Questa, NM	08266000	36.7	c,m,s	1979-82
Red River below Questa, NM	08266500	160	c,m,s	1979-87
Red River above State Fish Hatchery near Questa, NM	08266790	175	c,m,s	1979-87 1994
Red River at Fish Hatchery near Questa, NM	08266800	185	c,k,s,t	1966-77

DISCONTINUED SURFACE-WATER-QUALITY STATIONS--Continued

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Station name	Station number	Drainage area (mi ²)	Type of record	Period of record
Red River below Fish Hatchery, near Questa, NM	08266820	185	c,m,s	1978-87
Red River at mouth, near Questa, NM	08267000	190	c,m,s	1966-68, 1979-85
Rio Grande above Rio Hondo at Dunn Bridge, NM	08267400	8,690	c,m,s	1979-87
Rio Hondo at damsite at Valdez, NM	08268200	40.3	s	1962-65
Arroyo Hondo at Arroyo Hondo, NM	08268500	65.6	c,m,s	1979-82
Rio Grande del Rancho near Talpa, NM	08275500	83	s	1962-65
Rio Pueblo De Taos below Los Cordovas, NM	08276300	380	b,c,t	1981, 1986-98
Embudo Creek at Dixon, NM	08279000	305	c	1970-97
Rio Grande above San Juan Pueblo, NM	08281100	10,550	c,m,s	1987-88
Willow Creek above Azotea Creek near Park View, NM	08284150	42	c,s	1973
Azotea Tunnel at outlet near Chama, NM	08284160	--	c,s	1974-75
Willow Creek above Heron Reservoir near Park View, NM	08284200	112	c,s	1973-74
Horse Lake Creek above Heron Reservoir near Los Ojos, NM	08284300	0 45	c,s	1973
Willow Creek near Park View, NM	08284500	193	c,s	1962-65
Rio Chama below Heron Dam, NM	08284540	--	c,s	1973-74
El Vado Reservoir near Tierra Amarilla, NM	08285000	873	c	1973
Rio Chama Seep below El Vado Dam, NM	08285100	873	c	1973-74
Rio Chama below El Vado Dam, NM	08285500	877	c,s	1974
Rio Chama above Abiquiu Reservoir, NM	08286500	1,600	c,k,s,t	1963-85
Rio Chama below Abiquiu Dam, NM	08287000	2,147	c,k,s,t	1963-85
Rio Ojo Caliente at La Madera, NM	08289000	419	c	1976-77
Rio Grande at Santa Clara, NM	08291600	--	c,m,s	1987-94
Rio Nambe at Nambe Falls, near Nambe, NM	08294300	25.1	s	1962-65
Rito de los Frijoles in Bandelier National Monument, NM	08313350	18.1	b,c,m,s,t	1977-82
Cochiti Lake near Cochiti Pueblo, NM	08317300	--	c,s	1981-98
Rio Grande below Cochiti Dam, NM	08317400	14,900	c,s,t	1974-84, 1985-88
Galisteo Creek below Galisteo Dam, NM	08317950	597	c,k,s,t	1971-78
Galisteo Creek at Domingo, NM	08318000	640	c,s,t	1962-71
Jemez River below East Fork near Jemez Springs, NM	08321500	173	c,s	1963-67
Jemez River below Jemez Canyon Dam, NM	08329000	1,038	c,s	1966-88
Piedra Lisa Arroyo near Bernalillo, NM	08329100	4.1	c,s	1962-74
Rio Grande near Bernalillo, NM	08329500	17,300	c,s,t	1962-69
Campus Wash at Albuquerque, NM	08329700	3.80	c,m,s	1991-94

DISCONTINUED SURFACE-WATER-QUALITY STATIONS--Continued

Station name	Station number	Drainage area (mi ²)	Type of record	Period of record
Tijeras Arroyo near Albuquerque, NM	08330600	133	c	1979
Rio Grande Conveyance Channel near Bernardo, NM	08331990	--	c,k,s,t	1962-75
Rio Grande near Bernardo, NM	08332000	19,230	c,s,t	1962-64
Bernardo Interior Drain near Bernardo, NM	08332050	--	c,s,t	1965-68
San Pablo Creek near Cuba, NM	08332700	12.8	c,s	1982
Papers Wash near Star Lake Trading Post, NM	08334300		c,m,s	1978-82
Arroyo Chico near Guadalupe, NM	08340500	1,390	c,s	
Bluewater Lake near Bluewater, NM	08341400	201	c	1966-69
Rio San Jose at Grants, NM	08343000	1,020	c,s	1980
Rio Paguete below Jackpile Mine near Luguna, NM	08349800	107	c	1977-93
Rio Salado near San Acacia, NM	08354000	1,380	c,s	1962-84
Socorro Main Canal North at San Acacia, NM	08354500	--	s	1985
Rio Grande Conveyance Channel at San Marcial, NM	08358300	--	c,m,s,t	1954-94
Rio Grande below Elephant Butte Dam, NM	08361000	29,450		1975-82
Rio Grande below Caballo Dam, NM	08362500	30,700	c	1966-68
Rio Grande at Leasburg Dam, NM	08363500	--	b,c,m	1975-79
Tortugas Arroyo at Las Cruces, NM	08363700	20.7	c,s	1963-74
Rio Grande at Vinton Bridge near Anthony, TX	08363840	28,680	b,c,m,s	1975-78
Rio Grande below Old Fort Quintman, TX	08370500	31,990	c,m,s	1930-93
Pecos River near Pecos, NM	08378500	189	c	1970-73
Pecos River near Anton Chico, NM	08379500	1,050	b,c,m,s	1967-77
Gallinas Creek near Montezuma, NM	08380500	84	c	1964-67
Pecos River at Santa Rosa, NM	08383000	2,650	c,t	1905-07 1959-98
Pecos River below Sumner Dam, NM	08384500	4,390	b,c,m,s,t	1962-66, 1972-87
Pecos River below Taiban Creek near Fort Sumner, NM	08385522	--	c,t	1937-98
Pecos River near Acme, NM	08386000	11,380	b,c,s,t	1937-98
Rio Ruidoso at Hollywood, NM	08387000	120	c	1963-67, 1987-97
Rio Hondo at Diamond A Ranch near Roswell, NM	08390500	947	c,s	1962
Hagerman Canal at Dexter, NM	08393800	--	c	1964-67
Rio Penasco at Dayton, NM	08398500	1,060	s	1962-72
Pecos River (Kaiser Channel) near Lakewood, NM	08399500	--	c	1968-70, 1978-79
Lake McMillan near Lakewood, NM	08400500	16,990	c	1962-67, 1978-79

DISCONTINUED SURFACE-WATER-QUALITY STATIONS--Continued

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Station name	Station number	Drainage area (mi ²)	Type of record	Period of record
Pecos River below McMillan Dam, NM	08401000	16,990	c	1962-66, 1978-79
Pecos River at Ford Crossing above Major Johnson Springs, NM	08401300	16,990	c	1962-67
Pecos River at Damsite 3 near Carlsbad, NM	08402000	17,980	c,t	1962-67
Pecos River at Carlsbad, NM	08405000	18,100	c,k,t	1962-87
Pecos River below Sixmile Dam near Carlsbad, NM	08405260	18,650	b,c,m,s	1975-77
Black River at Harkey Crossing near Malaga, NM	08405400	343	c	1947-66
Pecos River below Red Bluff Dam, near Orla, TX	08410100	--	c,t	1962-63
Mimbres River at McKnight Damsite near Mimbres, NM	08476300	97.3	c,s	1967-72
Mimbres River at Mimbres, NM	08477110	184	b,c,m,s	1978-86
Tularosa Creek near Bent, NM	08481500	120	c	1963-95
Rio Blanco near Pagosa Springs, CO	09343000	58		1962-65
Rio Blanco at U.S. Highway 84 near Pagosa Springs, NM	09343400	--	c,s	1972-74
Navajo River above Chromo, CO	09344300	96.4	s	1962-65
Navajo River below Oso Diverson Dam near Chromo, CO	09344450	--	c,s	1972-75
Navajo River at Edith, CO	09346000	172	b,c,s	1969-74
San Juan River near Carracas, CO	09346400	1,230	b,c,s	1969-73
Piedra River near Arboles, CO	09349800	629	b,c,s	1969-73
Los Pinos River at La Boca, CO	09354500	510	b,c,s	1969-73
Canon Largo near Blanco, NM	09356565	1,700	c,m,s	1978-81
San Juan River at Bloomfield, NM	09357000	5,410	s,t	1962-64
San Juan River at Hammond Bridge near Bloomfield, NM	09357100	5,540	b,c,m,s	1978-81
Gallegos Canyon near Farmington, NM	09357250	290	c,m,s	1978-81
San Juan River above Animas River at Farmington, NM	09357300	5,800	c	1966-79
Animas River near Cedar Hill, NM	09363500	1,090	c,m,s,t	1943-45, 1958-59, 1969-73, 1975, 1987-98
San Juan River at Farmington, NM	09365000	7,240	c,s,t	1962-82
La Plata River at Colorado-New Mexico State line	09366500	331	b,c,m,s	1970-73
La Plata River near Farmington, NM	09367500	583	c,s	1970-73, 1978-81

DISCONTINUED SURFACE-WATER-QUALITY STATIONS--Continued

Station name	Station number	Drainage area (mi ²)	Type of record	Period of record
Shumway Arroyo near Fruitland, NM	09367555	62.8	b,c,m,s	1976, 1978-82
Shumway Arroyo near Waterflow, NM	09367561	73.8	b,c,m,s	1974-84, 1986
Chaco Wash near Star Lake Trading Post, NM	09367660	59	c,s	1978-82
Chaco Wash at east boundary at Chaco Canyon National Monument, NM	09367676	364	c,s	1981-82
Fajada Wash at Chaco Canyon National Monument, NM	09367678	199	c,s	1981-84
Chaco Wash at Chaco Canyon National Monument, NM	09367680	578	c,s	1976-84
Gallo Wash at Chaco Canyon National Monument, NM	09367682	36.2	c,s	1979
Chaco Wash near PB at bridge at Chaco Canyon National Monument, NM	09367683	619	c,s	1981-84
Ah-shi-sle-pah Wash near Kimbeto, NM	09367685	8.21	c,s	1977-83
Kim-me-ni-oli Wash near Crownpoint, NM	09367687	228	b,c,s	1981-83
Kim-me-ni-oli Wash near Lake Valley, NM	09367689	400	b,c,s	1981-83
San Juan River near Fruitland, NM	09367540	8,010	c	1978-95
De-na-zin Wash near Bisti Trading Post, NM	09367710	184	c,s	1975-82
Black Springs Wash near Mexican Springs, NM	09367900	7.05	c,s	1981-82
Hunter Wash at Bisti Trading Post, NM	09367930	45.6	c,s	1975-82
Teec-ni-di-tso Wash near Burnham, NM	09367934	7.2	c,m,s,t	1978-82
Burnham Wash near Burnham, NM	09367936	8.6	c,m,s,t	1978-82
Chaco River near Burnham, NM	09367938	3,640	c,m,s,t	1978-82
Chaco River near Waterflow, NM	09367950	4,350	c,s	1976-89
San Juan River near Bluff, UT	09379500	23,000	c,s,t	1962-68
Puerco River near Church Rock, NM	09395350	193	c,s	1979
Foster Canyon near Continental Divide, NM	09395381	16.8	c	1988
Puerco River at Gallup, NM	09395500	558	c,k,s,t	1975-77, 1979-84
Puerco River near Manuelito, NM	09395630	990	c,s	1989-93
Gila River near Gila, NM	09430500	1,864	c,s,t	1963-67
Mangas Creek below Mangas Springs, NM	09431100	--	c,m,s	1970-86
San Francisco River at Clifton, AZ	09445000	2,766	s	1963-67
Dry Beaver Creek near Rimrock, AZ	09505350	139	s	1964-65
Sunset Canal above New Mexico-Arizona State line	09433500	--	b,c,s	1969-72
New Model Canal above New Mexico- Arizona State line	09436500	--	b,c,s	1969-72
Gila River at New Mexico-Arizona State line	09438000	3,349	b,c,s	1968-73
San Francisco River at Clifton, AZ	09445000	2,766	s	1963-67
Dry Beaver Creek near Rimrock, AZ	09505350	139	s	1964-65

INTRODUCTION

The Water Resources Division of the U.S. Geological Survey, in cooperation with Federal, State, and local agencies, obtains a large quantity of data pertaining to the water resources of New Mexico each water year. These data, accumulated during many water years, constitute a valuable database for developing an improved understanding of the water resources of the State. To make these data readily available to interested parties outside the Geological Survey, the data are published annually in this report series entitled "Water Resources Data - New Mexico."

This report include records of discharge and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of ground water. This report contains discharge records for 182 gaging stations and contents for 24 lakes and reservoirs; water quality for 34 gaging stations, 83 wells, and 7 partial-record stations and miscellaneous sites, and water levels at 141 observation wells. Also included are 80 crest-stage, partial-record stations. Additional water data were collected at various sites not involved in the systematic data-collection program and are published as miscellaneous measurements. Two seepage investigations were made during the year. These data represent that part of the National Water Data System collected by the U.S. Geological Survey and cooperating Federal, State, and local agencies in New Mexico.

Data on stream discharge and stage, and on lake or reservoir contents and stage were first published in a series of U.S. Geological Survey Water-Supply Papers entitled "Surface Water Supply of the United States." Through September 30, 1960, these Water-Supply Papers were in an annual series, then in a 5-year series for 1961-65 and 1966-70. Records of chemical quality, water temperature, and suspended sediment were published from 1941 to 1970 in an annual series of Water-Supply Papers entitled "Quality of Surface Waters of the United States." Records of ground-water levels were published from 1935 to 1974 in a series of Water-Supply Papers entitled "Ground-Water Levels in the United States." Water-Supply Papers generally are available in the libraries of the principal cities of the United States or may be purchased from U.S. Geological Survey, Information Services Center, Box 25286, Denver, Colorado 80225.

For water years 1961 through 1974, streamflow data were released by the Geological Survey in annual reports for each State. Water-quality records for water years

1964 through 1974 were similarly released in separate reports published annually for each State.

These reports have an identification number consisting of the two-letter State beginning with water year 1975; data for streamflow, water quality, and ground water were combined in reports abbreviation, the last two digits of the water year, and the volume number. For example, this volume is identified as "U.S. Geological Survey Water-Data Report NM-03-1." These Water-Data Reports are for sale by the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161.

COOPERATION

The U.S. Geological Survey and State and local agencies have had joint-funding agreements for the collection of streamflow records since 1930 and for water-quality records since 1940. Organizations that assisted in collecting the data in this report through joint-funding agreements with the Survey are:

New Mexico Office of State Engineer,
New Mexico Interstate Stream Commission,
Pecos River Commission,
New Mexico State Highway and Transportation
Department,
Canadian River Municipal Water Authority,
Costilla Creek Compact Commission,
Albuquerque Metropolitan Arroyo Flood Control
Authority,
City of Albuquerque,
City of Santa Fe,
City of Santa Rosa,
City of Raton,
Pueblo of Zuni,
Pecos Valley Artesian Conservancy District,
Lea County Water User's Association,
Red Bluff Water and Power District,
Village of Ruidoso, and
New Mexico Environment Department, Surface Water
Quality Bureau.

Financial assistance for the collection of water-resources data published in this report was provided by the U.S. Army Corps of Engineers, the Bureau of Reclamation, the Bureau of Indian Affairs, and the Bureau of Land Management.

Assistance in the form of services was provided by the Carlsbad Irrigation District. Organizations that provided data are recognized in the station description.

SUMMARY OF HYDROLOGIC CONDITIONS

Streamflow

Perennial streams in New Mexico generally are in mountainous regions in the north-central, south-central, and southwestern parts of the State. Other perennial streams include the San Juan and Animas Rivers in northwestern New Mexico, which originate in the San Juan Mountains of southwestern Colorado. When flow is not regulated by releases from dams, several reaches of the Pecos River south of Santa Rosa have perennial flow that is maintained by relatively large spring runoff. Large discharges in perennial streams normally are the result of spring snowmelt in the mountains, which may last several months.

Ephemeral streams are present in the remainder of the State. Some of these streams, such as the Rio Puerco, have deeply incised channels, whereas others, especially those on the eastern plains, are swales without any well-defined channel. Large discharges in ephemeral streams generally are caused by intense, short-duration thunderstorms (normally occurring from mid-June to mid-October); the runoff usually lasts for only a few hours.

The quantity of water in the hydrologic system, as evidenced by precipitation records, was generally near normal in most areas of the State at the beginning of water year 2003. Rainfall decreased somewhat in November to below normal in most areas of the State. Rainfall at the end of the calendar year was generally below normal in all but the southern areas of the State. In January most sites recorded no precipitation. Winter precipitation during February and March rebounded to just below normal levels with several exceptions where precipitation was well above normal. For example, precipitation in March was 180 percent of normal in Albuquerque in contrast to 73 percent of normal in Las Vegas and 73 percent of normal in Carlsbad. Snowpack at the beginning of January was 95 percent of normal statewide, which was significantly better than the year before. Snowpack levels continued to be the same through the end of January. However, January was the

warmest and driest in 100 years. This resulted in predicted spring runoff significantly below normal amounts. In contrast, cooler and wetter conditions occurred in February and March, but predicted runoff amounts continued to be well below normal. This resulted in a call for water conservation measures to make use of limited surface-water supplies. Precipitation, with a few exceptions, continued at below-normal levels from April through the end of water year 2003.

The quantity of water stored in New Mexico's reservoirs often does not represent natural hydrologic conditions because operators of those reservoirs need to meet demands for such uses as irrigation, flood control, legal compacts, endangered species, and recreation. During periods of heavy storm activity, for example, reservoir operators can reduce the amount of water in storage. A review of water storage during water year 2003 indicates various trends. Storage at several reservoirs varied only slightly; for example, storage at Brantley ranged from 0 to 2 percent of capacity, Abiquiu ranged from 3 to 6 percent of capacity, Conchas varied from 23 percent to 28 percent of capacity, Ute varied from 65 percent to 71 percent of capacity, and Cochiti stayed at 10 percent of capacity. Storage in other reservoirs, however, represented operating schedules that resulted in a general decline in storage throughout the year with a small increase during March to June. For example, storage in El Vado Reservoir at the beginning of water year 2003 was 4 percent of capacity in October, peaked at 54 percent of capacity in May, then declined to 21 percent of capacity at the end of the water year. Other reservoirs experienced steady decreases in storage throughout most of the year. The combined storage in Lake Sumner and Santa Rosa Reservoir capacity ranged from 9 percent of capacity in December to 5 percent in April, declining to 1 percent of capacity from June through September. The combined storage in Elephant Butte-Caballo Reservoirs closely reflected this trend. Storage in Elephant Butte-Caballo was 18 percent of normal in January, 17 percent of normal in May, 11 percent of normal in July, and 7 percent of normal at the end of September. Reservoir storage in most of the State's reservoirs at the end of water year 2003 generally was at lower levels than at the beginning of the water year. Specifically, the combined storage of 13 major reservoirs in the State decreased by 358,000 acre-feet during water year 2003, totaling 1,461,000 acre-feet by

September 30, 2003. The combined capacity of these 13 reservoirs is 8,530,000 acre-feet.

Streamflow in New Mexico varied greatly at the end of water year 2002. Recorded flows were well below normal at index stations in the Rio Grande, Pecos, and Animas River Basins. In contrast, recorded streamflows were well above normal in the Gila and Delaware River Basins at the end of the water year. However, by December all index stations recorded below-normal flows. Spring runoff was below normal at all sites with the exception of the Pecos River. Streamflow recorded in April at Rio Grande below Taos Junction Bridge (station 08276500) was 41 percent of normal, streamflow at Gila River near Gila (station 09430500) was 72 percent of normal, and streamflow at Delaware River near Red Bluff (station 08408500) was 19 percent of normal. In contrast, the April streamflow at Pecos River near Pecos (station 08378500) was 108 percent of normal. Streamflow was generally well below normal at all the index stations for the balance of the year with the exception of Delaware River near Red Bluff, which was 229 percent of normal in May. These flows reflected the lower than normal precipitation recorded throughout the State.

Ground-Water Levels

Ground-water levels are measured periodically in a network of about 6,000 observation wells in order to record changes in ground-water storage. Water levels in about 1,200 wells are measured annually and the

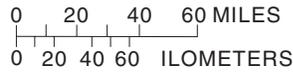
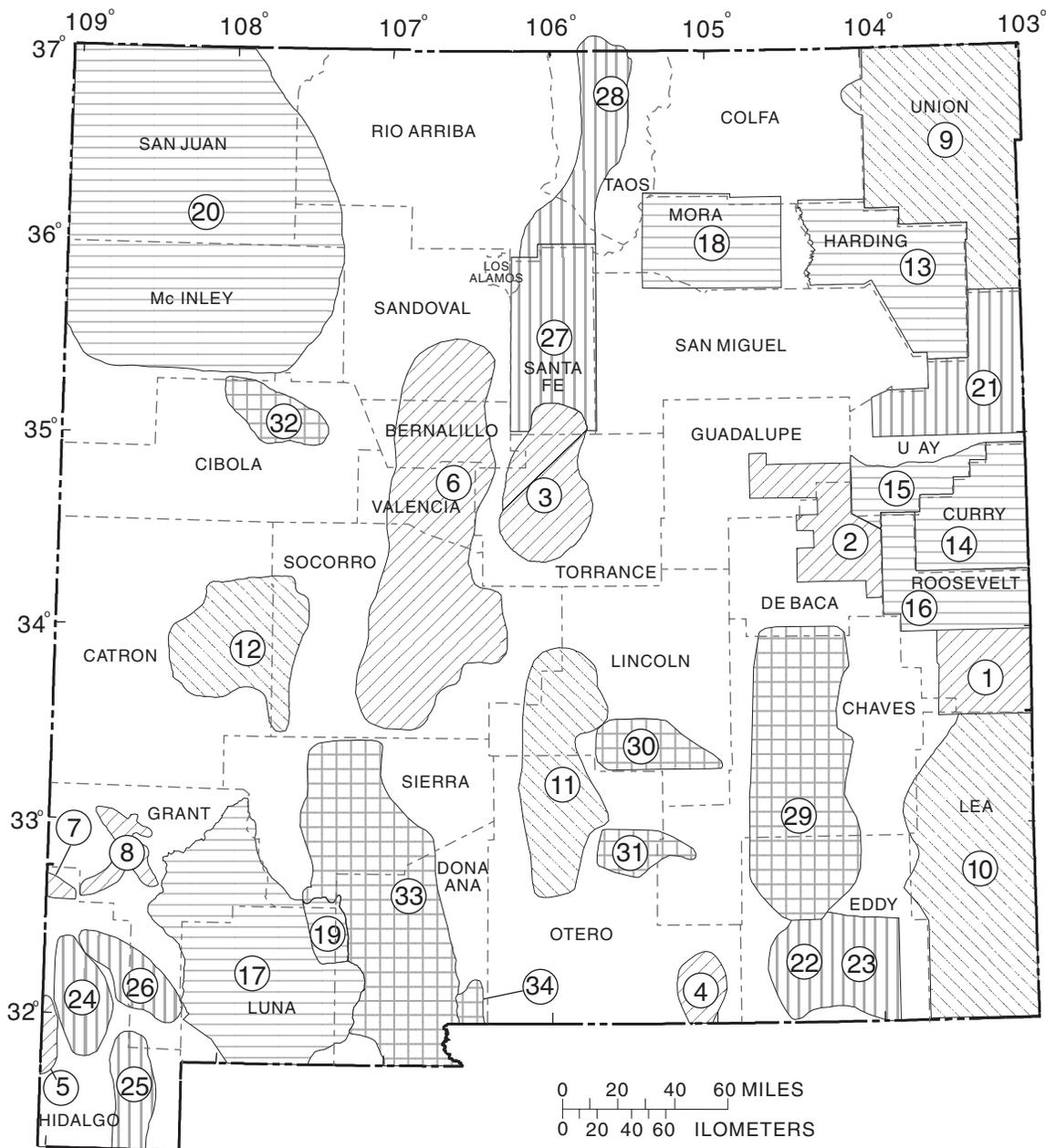
remaining 4,800 wells are scheduled for measurement at 5-year intervals, so that wells in different areas are measured each year (fig. 1). The areas of water-level measurements are in eight of the nine major surface-water drainage basins; most are in areas where ground water is used in large quantities for irrigation, municipal, or industrial purposes. Seventeen selected wells in various parts of the State are equipped with continuous water-level recorders.

Hydrographs of water levels in wells (fig. 2) in the four quadrants of the State illustrate the water-level trends for the last 20 years. A decrease in ground-water withdrawals for agriculture and mining operations may be responsible for the general rise in water levels in the well in Cibola County since 1979. The current decrease in the water level in the Cibola County well may be a result of recent withdrawals for industrial use and drought. The wells in Luna, Union, and Chaves Counties are in areas of intensive irrigation. The water level in the Luna County well (Mimbres Valley) decreased from water year 1991, but continued to be higher than average for the past 20 years. The water level in the well in Union County continued to decline, which is typical of wells on the High Plains of northeastern New Mexico. The water level in the well in Chaves County has yearly fluctuations that are typical of water levels in wells in the Roswell artesian basin. The water levels in the vicinity of this well have also risen since the mid-1970's, probably resulting from both a decrease in withdrawals for irrigation and an increase in recharge to the aquifer.

Discharges for water year 2003 at four index streamflow-gaging stations compared to median annual discharge for water years 1972-2002 at the same stations are listed below:

Station number	Station name	Median annual discharge in acre-ft water years 1972-2002	Annual mean discharge in acre-ft water year 2003	2003 discharge as a percentage of median
08276500	Rio Grande below Taos Junction Bridge	576,900	220,300	38
08378500	Pecos River near Pecos	75,380	46,710	62
08408500	Delaware River near Red Bluff	3,680	1,600	43
09430500	Gila River near Gila	127,900	48,160	38

WATER RESOURCES DATA – NEW MEXICO, 2003



E P A N A T I O N

2000/2005	2001/2006	1997/2002	1998/2003	1999/2004
CAUSEY-LINGO FT. SUMNER ESTANCIA SALT BASIN SAN SIMON MIDDLE RIO GRANDE VIRDEN GILA RIVER	09. NORTHERN HIGH PLAINS 10. LEA COUNTY 11. TULAROSA BASIN 12. SAN AGUSTIN PLAINS	13. HARDING COUNTY 14. CURRY COUNTY 15. HOUSE 16. PORTALES 17. MIMBRES BASIN 18. MORA 19. NUTT-HOC ETT 20. SAN JUAN BASIN	21. LOWER CANADIAN 22. CARLSBAD 23. CAPITAN REEF 24. ANIMAS 25. PLAYAS 26. LORDSBURG 27. SANTA FE COUNTY 28. UPPER RIO GRANDE	29. ROSWELL BASIN 30. RIO HONDO 31. RIO PENASCO 32. GRANTS-BLUEWATER 33. LOWER RIO GRAND 34. HUECO

Figure 1.--Areas of 5-year ground-water-level monitoring and years measured or scheduled for measurement.

WATER RESOURCES DATA-NEW MEXICO, 2003

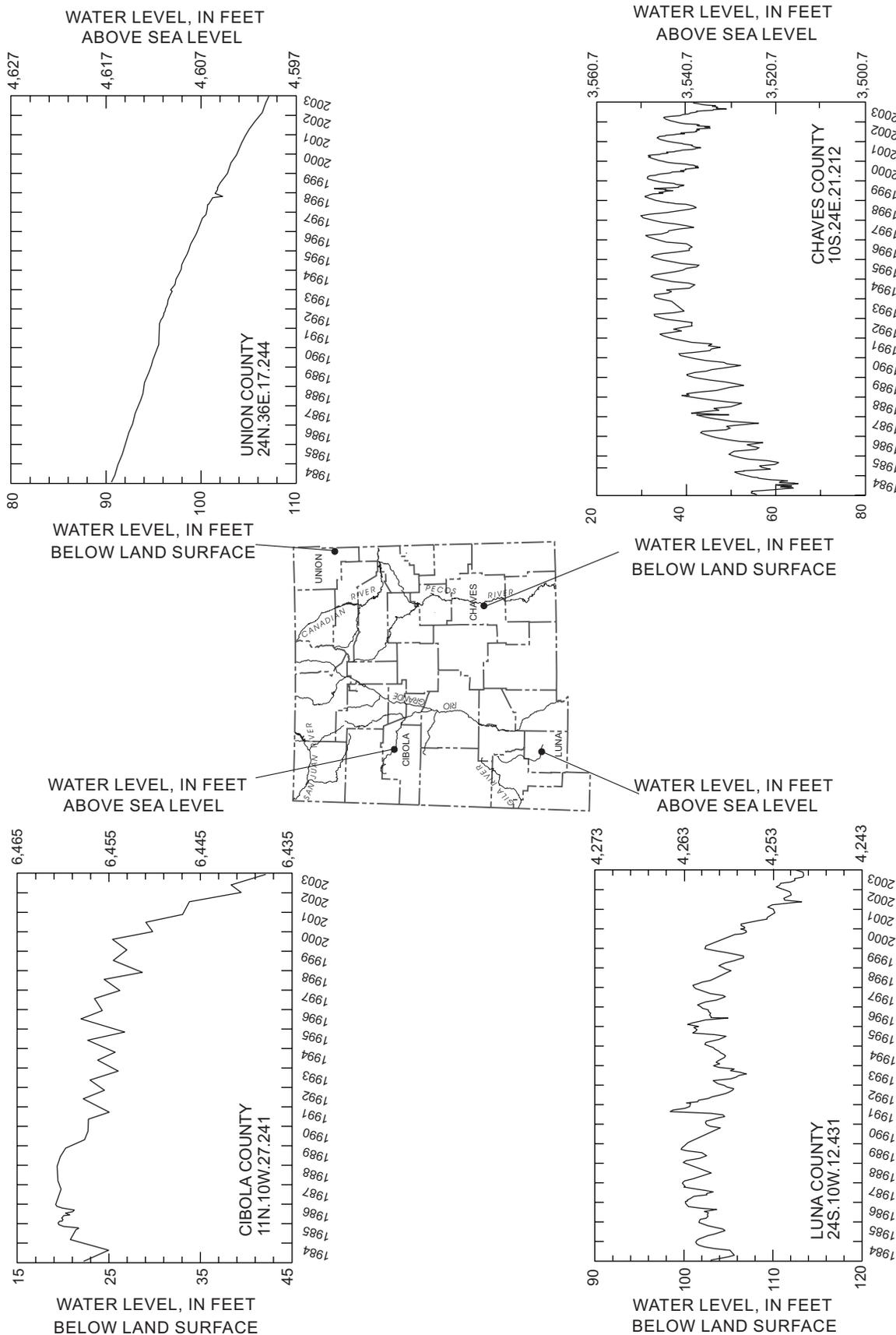


Figure 2.--Ground-water-level trends for the last 20 years.

DOWNSTREAM ORDER AND STATION NUMBER

Since October 1, 1950, hydrologic-station records in USGS reports have been listed in order of downstream direction along the main stream. All stations on a tributary entering upstream from a main-stream station are listed before that station. A station on a tributary entering between two main-stream stations is listed between those stations. A similar order is followed in listing stations on first rank, second rank, and other ranks of tributaries. The rank of any tributary on which a station is located with respect to the stream to which it is immediately tributary is indicated by an indention in that list of stations in the front of this report. Each indentation represents one rank. This downstream order and system of indentation indicates which stations are on tributaries between any two stations and the rank of the tributary on which each station is located.

As an added means of identification, each hydrologic station and partial-record station has been assigned a station number. These station numbers are in the same downstream order used in this report. In assigning a station number, no distinction is made between partial-record stations and other stations; therefore, the station number for a partial-record station indicates downstream-order position in a list composed of both types of stations. Gaps are consecutive. The complete 8-digit (or 10-digit) number for each station such as

09004100, which appears just to the left of the station name, includes a 2-digit part number "09" plus the 6-digit (or 8-digit) downstream order number "004100." In areas of high station density, an additional two digits may be added to the station identification number to yield a 10-digit number. The stations are numbered in downstream order as described above between stations of consecutive 8-digit numbers.

NUMBERING SYSTEM FOR WELLS AND MISCELLANEOUS SITES

The USGS well and miscellaneous site-numbering system is based on the grid system of latitude and longitude. The system provides the geographic location of the well or miscellaneous site and a unique number for each site. The number consists of 15 digits. The first six digits denote the degrees, minutes, and seconds of latitude, and the next seven digits denote degrees, minutes, and seconds of longitude; the last two digits are a sequential number for wells within a 1-second grid. In the event that the latitude-longitude coordinates for a well and miscellaneous site are the same, a sequential number, such as "01," "02," and so forth, would be assigned as one would for wells (see fig. 3). The eight-digit, downstream order station numbers are not assigned to wells and miscellaneous sites where only random water-quality samples or discharge measurements are taken.

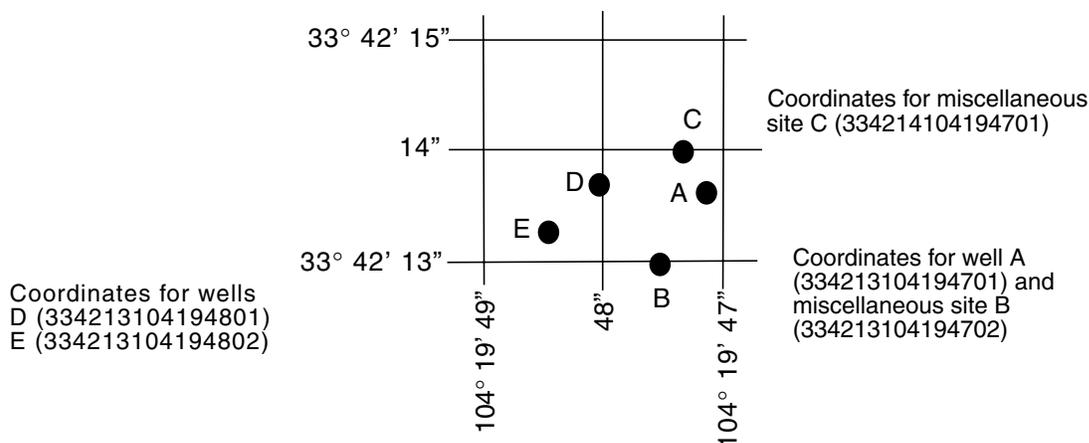


Figure 3.--System for assigning latitude-longitude numbers to wells, springs, and miscellaneous sites.

In addition to the well number that is based on latitude and longitude given for each well, another well number is given that is based on the U.S. Bureau of Land Management's system of land subdivision. This well number is familiar to the water users of New Mexico and shows the location of the well by quadrant, township, range section, and position within the section (see fig. 4). The letters N or S locate the township north or south of the New Mexico base line. The letters E or W locate the range east or west of the New Mexico principal meridian. Four quadrants are formed by the intersection of the base line and the principal meridian—1 indicates the northwest quadrant, 2 the northeast, 3 the southwest, and 4 the southeast. A zero in a tract number indicates that the well or spring is centrally positioned or has not been located accurately enough to be placed within a tract or quarter section. Three digits in a tract number will locate a well or spring to the nearest 10-acre tract, and six digits will locate a site to the nearest 0.16-acre tract.

The well numbering system in Texas was developed by the Texas Water Development Board for use throughout the State. Under this system, each 1-degree quadrangle is given a number consisting of two digits. These are the first two digits in the well number. Each 1-degree quadrangle is divided into 7-1/2-minute quadrangles, which are given two digit numbers from 01 to 64. These are the third and fourth digits of the well number. Each 7-1/2-minute quadrangle is divided into 2-1/2-minute quadrangles, which are given a single-digit number from 1 to 9. This is the fifth digit of the well number. Finally, each well within a 2-1/2-minute quadrangle is given a two-digit number in the order in which it was inventoried, starting with 01. These are the last two digits of the well number. In addition to this seven-digit well number, a two-letter prefix is used to identify the county. An example of the Texas well-numbering system is provided in figure 5.

SPECIAL NETWORKS AND PROGRAMS

Hydrologic Benchmark Network is a network of 61 sites in small drainage basins in 39

States that was established in 1963 to provide consistent streamflow data representative of undeveloped watersheds nationwide, and from which data could be analyzed on a continuing basis for use in comparison and contrast with conditions observed in basins more obviously affected by human activities. At selected sites, water-quality information is being gathered on major ions and nutrients, primarily to assess the effects of acid deposition on stream chemistry. Additional information on the Hydrologic Benchmark Program may be accessed from <http://water.usgs.gov/hbn/>.

National Stream-Quality Accounting Network (NASQAN) is a network of sites used to monitor the water quality of large rivers within the Nation's largest river basins. From 1995 through 1999, a network of approximately 40 stations was operated in the Mississippi, Columbia, Colorado, and Rio Grande River Basins. For the period 2000 through 2004, sampling was reduced to a few index stations on the Colorado and Columbia Rivers so that a network of five stations could be implemented on the Yukon River. Samples are collected with sufficient frequency that the flux of a wide range of constituents can be estimated. The objective of NASQAN is to characterize the water quality of these large rivers by measuring concentration and mass transport of a wide range of dissolved and suspended constituents, including nutrients, major ions, dissolved and sediment-bound heavy metals, common pesticides, and inorganic and organic forms of carbon. This information will be used (1) to describe the long-term trends and changes in concentration and transport of these constituents; (2) to test findings of the National Water-Quality Assessment (NAWQA) Program; (3) to characterize processes unique to large-river systems such as storage and re-mobilization of sediments and associated contaminants; and (4) to refine existing estimates of off-continent transport of water, sediment, and chemicals for assessing human effects on the world's oceans and for determining global cycles of carbon, nutrients, and other chemicals. Additional information about the NASQAN Program may be accessed from <http://water.usgs.gov/nasqan/>.

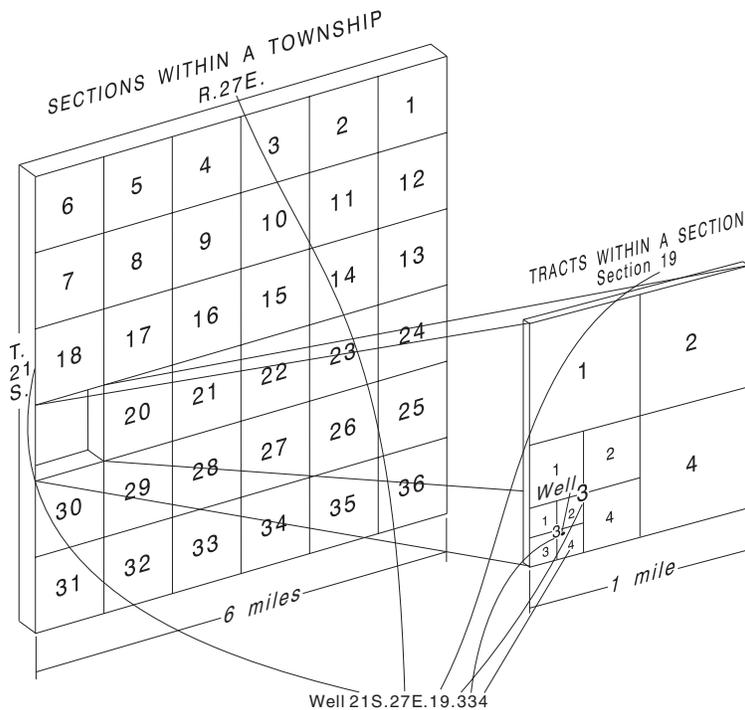


Figure 4.--New Mexico well-numbering system.

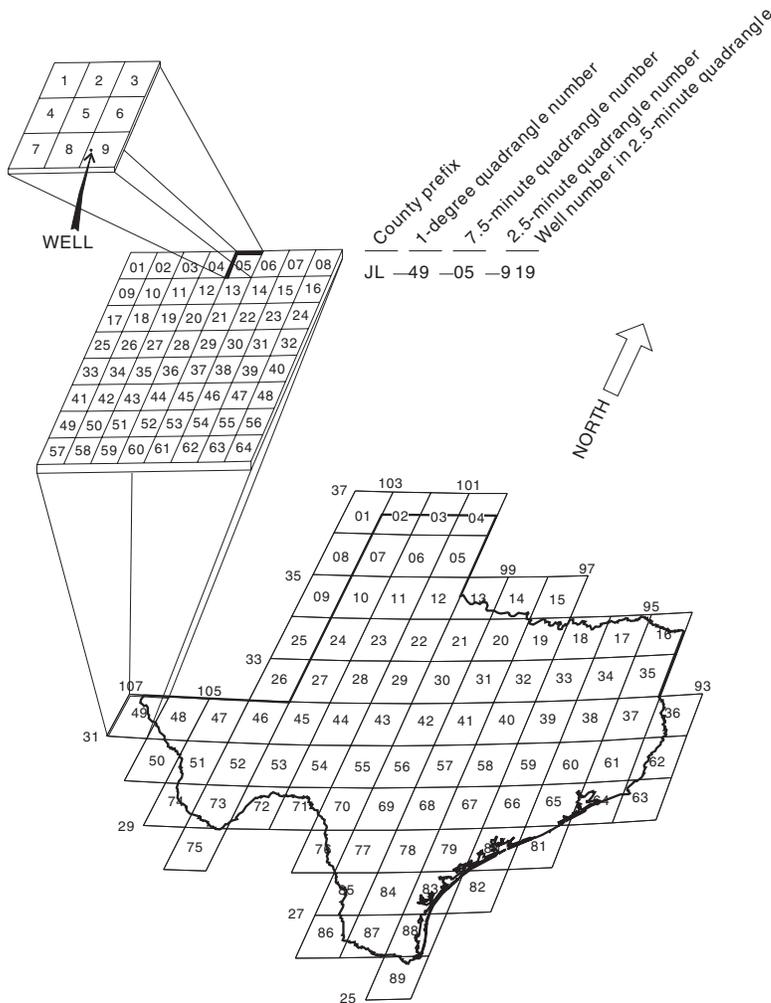


Figure 5.--Texas well-numbering system.

The National Atmospheric Deposition Program/National Trends Network (NADP/NTN) is a network of monitoring sites that provide continuous measurement and assessment of the chemical constituents in precipitation throughout the United States. As the lead Federal agency, the USGS works together with over 100 organizations to provide a long-term, spatial and temporal record of atmospheric deposition generated from this network of 250 precipitation-chemistry monitoring sites. The USGS supports 74 of these 250 sites. This long-term, nationally consistent monitoring program, coupled with ecosystem research, provides critical information toward a national scorecard to evaluate the effectiveness of ongoing and future regulations intended to reduce atmospheric emissions and subsequent impacts to the Nation's land and water resources. Reports and other information on the NADP/NTN Program, as well as data from the individual sites, may be accessed from <http://bqs.usgs.gov/acidrain/>.

The USGS National Water-Quality Assessment (NAWQA) Program is a long-term program with goals to describe the status and trends of water-quality conditions for a large, representative part of the Nation's ground- and surface-water resources; to provide an improved understanding of the primary natural and human factors affecting these observed conditions and trends; and to provide information that supports development and evaluation of management, regulatory, and monitoring decisions by other agencies.

Assessment activities are being conducted in 42 study units (major watersheds and aquifer systems) that represent a wide range of environmental settings nationwide and that account for a large percentage of the Nation's water use. A wide array of chemical constituents is measured in ground water, surface water, streambed sediments, and fish tissues. The coordinated application of comparative hydrologic studies at a wide range of spatial and temporal scales will provide information for water-resources managers to use in making decisions and a foundation for aggregation and comparison of findings to address water-quality issues of regional and national interest.

Communication and coordination between USGS personnel and other local, State, and Federal interests are critical components of the NAWQA Program. Each study unit has a local liaison committee consisting of representatives from key Federal, State, and local water-resources agencies, Indian nations, and universities in the study unit. Liaison committees typically meet semiannually to discuss their information needs, monitoring plans and progress, desired information products, and opportunities to collaborate efforts among the agencies. Additional information about the NAWQA Program may be accessed from <http://water.usgs.gov/nawqa/>.

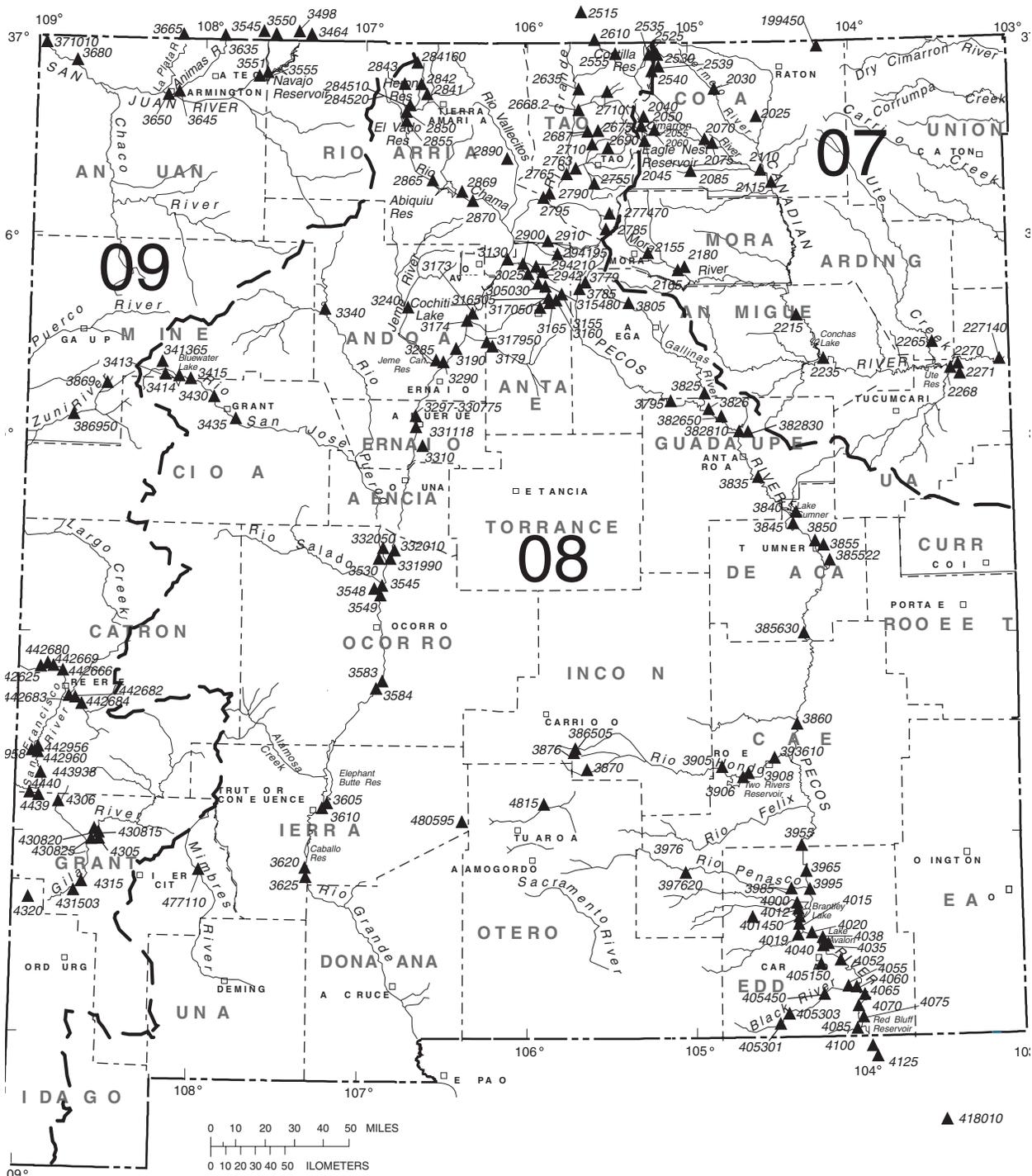
The USGS National Streamflow Information Program (NSIP) is a long-term program with goals to provide framework streamflow data across the Nation. Included in the program are creation of a permanent Federally funded streamflow network, research on the nature of streamflow, regional assessments of streamflow data and databases, and upgrades in the streamflow information delivery systems. Additional information about NSIP may be accessed from <http://water.usgs.gov/nsip/>.

EXPLANATION OF STAGE- AND WATER-DISCHARGE RECORDS

Data Collection and Computation

The base data collected at gaging stations (fig. 6) consist of records of stage and measurements of discharge of streams or canals, and stage, surface area, and volume of lakes or reservoirs. In addition, observations of factors affecting the stage-discharge relation or the stage-capacity relation, weather records, and other information are used to supplement base data in determining the daily flow or volume of water in storage. Records of stage are obtained from a water-stage recorder that is either downloaded electronically in the field to a laptop computer or similar device or is transmitted using telemetry such as GOES satellite, land-line or cellular-phone modems, or by radio transmission. Measurements of discharge are made with a current meter or acoustic Doppler current profiler, using the general methods adopted by the USGS. These methods are

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J.S. Geological Survey base

EXPLANATION

- 07 LOWER MISSISSIPPI RIVER BASIN NUMBER
- 08 WESTERN GULF OF MEXICO BASIN NUMBER
- 09 COLORADO RIVER BASIN NUMBER

— RIVER BASIN BOUNDARY

▲ GAGING STATION AND NUMBER--
 Number by symbol is abbreviated station number. Complete national station number is 08 401450
 Basin number station number

Figure 6.--Location of surface-water gaging stations.

described in standard textbooks, USGS Water-Supply Paper 2175, and the Techniques of Water-Resources Investigations of the United States Geological Survey (TWRIs), Book 3, Chapters A1 through A19 and Book 8, Chapters A2 and B2. The methods are consistent with the American Society for Testing and Materials (ASTM) standards and generally follow the standards of the International Organization for Standards (ISO).

For stream-gaging stations, discharge-rating tables for any stage are prepared from stage-discharge curves. If extensions to the rating curves are necessary to express discharge greater than measured, the extensions are made on the basis of indirect measurements of peak discharge (such as slope-area or contracted-opening measurements, or computation of flow over dams and weirs), step-backwater techniques, velocity-area studies, and logarithmic plotting. The daily mean discharge is computed from gage heights and rating tables, then the monthly and yearly mean discharges are computed from the daily values. If the stage-discharge relation is subject to change because of frequent or continual change in the physical features of the stream channel, the daily mean discharge is computed by the shifting-control method in which correction factors based on individual discharge measurements and notes by engineers and observers are used when applying the gage heights to the rating tables. If the stage-discharge relation for a station is temporarily changed by the presence of aquatic growth or debris on the controlling section, the daily mean discharge is computed by the shifting-control method.

The stage-discharge relation at some stream-gaging stations is affected by backwater from reservoirs, tributary streams, or other sources. Such an occurrence necessitates the use of the slope method in which the slope or fall in a reach of the stream is a factor in computing discharge. The slope or fall is obtained by means of an auxiliary gage at some distance from the base gage.

An index velocity is measured using ultrasonic or acoustic instruments at some stream-gaging stations and this index velocity is used to calculate an average velocity for the flow in the stream. This

average velocity along with a stage-area relation is then used to calculate average discharge.

At some stations, stage-discharge relation is affected by changing stage. At these stations, the rate of change in stage is used as a factor in computing discharge.

At some stream-gaging stations in the northern United States, the stage-discharge relation is affected by ice in the winter; therefore, computation of the discharge in the usual manner is impossible. Discharge for periods of ice effect is computed on the basis of gage-height record and occasional winter-discharge measurements. Consideration is given to the available information on temperature and precipitation, notes by gage observers and hydrologists, and comparable records of discharge from other stations in the same or nearby basins.

For a lake or reservoir station, capacity tables giving the volume or contents for any stage are prepared from stage-area relation curves defined by surveys. The application of the stage to the capacity table gives the contents, from which the daily, monthly, or yearly changes are computed.

If the stage-capacity curve is subject to changes because of deposition of sediment in the reservoir, periodic resurveys of the reservoir are necessary to define new stage-capacity curves. During the period between reservoir surveys, the computed contents may be increasingly in error due to the gradual accumulation of sediment.

For some stream-gaging stations, periods of time occur when no gage-height record is obtained or the recorded gage height is faulty and cannot be used to compute daily discharge or contents. Such a situation can happen when the recorder stops or otherwise fails to operate properly, the intakes are plugged, the float is frozen in the well, or for various other reasons. For such periods, the daily discharges are estimated on the basis of recorded range in stage, prior and subsequent records, discharge measurements, weather records, and comparison with records from other stations in the same or nearby basins. Likewise, lake or reservoir volumes may be estimated on the basis of

operator's log, prior and subsequent records, inflow-outflow studies, and other information.

Data Presentation

The records published for each continuous-record surface-water discharge station (stream-gaging station) consist of five parts: (1) the station manuscript or description; (2) the data table of daily mean values of discharge for the current water year with summary data; (3) a tabular statistical summary of monthly mean flow data for a designated period, by water year; (4) a summary statistics table that includes statistical data of annual, daily, and instantaneous flows as well as data pertaining to annual runoff, 7-day low-flow minimums, and flow duration; and (5) a hydrograph of discharge.

Station Manuscript

The manuscript provides, under various headings, descriptive information, such as station location; period of record; historical extremes outside the period of record; record accuracy; and other remarks pertinent to station operation and regulation. The following information, as appropriate, is provided with each continuous record of discharge or lake content. Comments follow that clarify information presented under the various headings of the station description.

LOCATION.—Location information is obtained from the most accurate maps available. The location of the gaging station with respect to the cultural and physical features in the vicinity and with respect to the reference place mentioned in the station name is given. River mileages, given for only a few stations, were determined by methods given in "River Mileage Measurement," Bulletin 14, Revision of October 1968, prepared by the Water Resources Council or were provided by the U.S. Army Corps of Engineers.

DRAINAGE AREA.—Drainage areas are measured using the most accurate maps available. Because the type of maps available varies from one drainage basin to another, the accuracy of drainage

areas likewise varies. Drainage areas are updated as better maps become available.

PERIOD OF RECORD.—This term indicates the time period for which records have been published for the station or for an equivalent station. An equivalent station is one that was in operation at a time that the present station was not and whose location was such that its flow reasonably can be considered equivalent to flow at the present station.

REVISED RECORDS.—If a critical error in published records is discovered, a revision is included in the first report published following discovery of the error.

GAGE.—The type of gage in current use, the datum of the current gage referred to a standard datum, and a condensed history of the types, locations, and datums of previous gages are given under this heading.

REMARKS.—All periods of estimated daily discharge either will be identified by date in this paragraph of the station description for water-discharge stations or flagged in the daily discharge table. (See section titled Identifying Estimated Daily Discharge.) Information is presented relative to the accuracy of the records, to special methods of computation, and to conditions that affect natural flow at the station. In addition, information may be presented pertaining to average discharge data for the period of record; to extremes data for the period of record and the current year; and, possibly, to other pertinent items. For reservoir stations, information is given on the dam forming the reservoir, the capacity, the outlet works and spillway, and the purpose and use of the reservoir.

COOPERATION.—Records provided by a cooperating organization or obtained for the USGS by a cooperating organization are identified here.

EXTREMES OUTSIDE PERIOD OF RECORD.—Information here documents major floods or unusually low flows that occurred outside the stated period of record. The information may or may not have been obtained by the USGS.

REVISIONS.—Records are revised if errors in published records are discovered. Appropriate updates are made in the USGS distributed data system, NWIS, and subsequently to its Web-based National data system, NWISWeb (<http://water.usgs.gov/nwis/nwis>). Users are encouraged to obtain all required data from NWIS or NWISWeb to ensure that they have the most recent data updates. Updates to NWISWeb are made on an annual basis.

Although rare, occasionally the records of a discontinued gaging station may need revision. Because no current or, possibly, future station manuscript would be published for these stations to document the revision in a REVISED RECORDS entry, users of data for these stations who obtained the record from previously published data reports may wish to contact the District Office (address given on the back of the title page of this report) to determine if the published records were revised after the station was discontinued. If, however, the data for a discontinued station were obtained by computer retrieval, the data would be current. Any published revision of data is always accompanied by revision of the corresponding data in computer storage.

Manuscript information for lake or reservoir stations differs from that for stream stations in the nature of the REMARKS and in the inclusion of a stage-capacity table when daily volumes are given.

Peak Discharge Greater than Base Discharge

Tables of peak discharge above base discharge are included for some stations where secondary instantaneous peak discharge data are used in flood-frequency studies of highway and bridge design, flood-control structures, and other flood-related projects. The base discharge value is selected so an average of three peaks a year will be reported. This base discharge value has a recurrence interval of approximately 1.1 years or a 91-percent chance of exceedence in any 1 year.

Data Table of Daily Mean Values

The daily table of discharge records for stream-gaging stations gives mean discharge for each day

of the water year. In the monthly summary for the table, the line headed TOTAL gives the sum of the daily figures for each month; the line headed MEAN gives the arithmetic average flow in cubic feet per second for the month; and the lines headed MAX and MIN give the maximum and minimum daily mean discharges, respectively, for each month. Discharge for the month is expressed in cubic feet per second per square mile (line headed CF5M); or in inches (line headed IN); or in acre-feet (line headed AC-FT). Values for cubic feet per second per square mile and runoff in inches or in acre-feet may be omitted if extensive regulation or diversion is in effect or if the drainage area includes large noncontributing areas. At some stations, monthly and (or) yearly observed discharges are adjusted for reservoir storage or diversion, or diversion data or reservoir volumes are given. These values are identified by a symbol and a corresponding footnote.

Statistics of Monthly Mean Data

A tabular summary of the mean (line headed MEAN), maximum (MAX), and minimum (MIN) of monthly mean flows for each month for a designated period is provided below the mean values table. The water years of the first occurrence of the maximum and minimum monthly flows are provided immediately below those values. The designated period will be expressed as FOR WATER YEARS __-__, BY WATER YEAR (WY), and will list the first and last water years of the range of years selected from the PERIOD OF RECORD paragraph in the station manuscript. The designated period will consist of all of the station record within the specified water years, including complete months of record for partial water years, and may coincide with the period of record for the station. The water years for which the statistics are computed are consecutive, unless a break in the station record is indicated in the manuscript.

Summary Statistics

A table titled SUMMARY STATISTICS follows the statistics of monthly mean data tabulation. This table consists of four columns with the first column containing the line headings of the statistics being reported. The table provides a

statistical summary of yearly, daily, and instantaneous flows, not only for the current water year but also for the previous calendar year and for a designated period, as appropriate. The designated period selected, WATER YEARS __-__, will consist of all of the station records within the specified water years, including complete months of record for partial water years, and may coincide with the period of record for the station. The water years for which the statistics are computed are consecutive, unless a break in the station record is indicated in the manuscript. All of the calculations for the statistical characteristics designated ANNUAL (see line headings below), except for the ANNUAL 7-DAY MINIMUM statistic, are calculated for the designated period using complete water years. The other statistical characteristics may be calculated using partial water years.

The date or water year, as appropriate, of the first occurrence of each statistic reporting extreme values of discharge is provided adjacent to the statistic. Repeated occurrences may be noted in the REMARKS paragraph of the manuscript or in footnotes. Because the designated period may not be the same as the station period of record published in the manuscript, occasionally the dates of occurrence listed for the daily and instantaneous extremes in the designated-period column may not be within the selected water years listed in the heading. When the dates of occurrence do not fall within the selected water years listed in the heading, it will be noted in the REMARKS paragraph or in footnotes. Selected streamflow duration-curve statistics and runoff data also are given. Runoff data may be omitted if extensive regulation or diversion of flow is in effect in the drainage basin.

The following summary statistics data are provided with each continuous record of discharge. Comments that follow clarify information presented under the various line headings of the SUMMARY STATISTICS table.

ANNUAL TOTAL.—The sum of the daily mean values of discharge for the year.

ANNUAL MEAN.—The arithmetic mean for the individual daily mean discharges for the year noted or for the designated period.

HIGHEST ANNUAL MEAN.—The maximum annual mean discharge occurring for the designated period.

LOWEST ANNUAL MEAN.—The minimum annual mean discharge occurring for the designated period.

HIGHEST DAILY MEAN.—The maximum daily mean discharge for the year or for the designated period.

LOWEST DAILY MEAN.—The minimum daily mean discharge for the year or for the designated period.

ANNUAL 7-DAY MINIMUM.—The lowest mean discharge for 7 consecutive days for a calendar year or a water year. Note that most low-flow frequency analyses of annual 7-day minimum flows use a climatic year (April 1-March 31). The date shown in the summary statistics table is the initial date of the 7-day period. This value should not be confused with the 7-day 10-year low-flow statistic.

MAXIMUM PEAK FLOW.—The maximum instantaneous peak discharge occurring for the water year or designated period. Occasionally the maximum flow for a year may occur at midnight at the beginning or end of the year, on a recession from or rise toward a higher peak in the adjoining year. In this case, the maximum peak flow is given in the table and the maximum flow may be reported in a footnote or in the REMARKS paragraph in the manuscript.

MAXIMUM PEAK STAGE.—The maximum instantaneous peak stage occurring for the water year or designated period. Occasionally the maximum stage for a year may occur at midnight at the beginning or end of the year, on a recession from or rise toward a higher peak in the adjoining year. In this case, the maximum peak stage is given in the table and the maximum stage may be reported in the REMARKS paragraph in the

manuscript or in a footnote. If the dates of occurrence of the maximum peak stage and maximum peak flow are different, the REMARKS paragraph in the manuscript or a footnote may be used to provide further information.

INSTANTANEOUS LOW FLOW.—The minimum instantaneous discharge occurring for the water year or for the designated period.

ANNUAL RUNOFF.—Indicates the total quantity of water in runoff for a drainage area for the year. Data reports may use any of the following units of measurement in presenting annual runoff data:

Acre-foot (AC-FT) is the quantity of water required to cover 1 acre to a depth of 1 foot and is equivalent to 43,560 cubic feet or about 326,000 gallons or 1,233 cubic meters.

Cubic feet per square mile (CFSM) is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming the runoff is distributed uniformly in time and area.

Inches (INCHES) indicate the depth to which the drainage area would be covered if all of the runoff for a given time period were uniformly distributed on it.

10 PERCENT EXCEEDS.—The discharge that has been exceeded 10 percent of the time for the designated period.

50 PERCENT EXCEEDS.—The discharge that has been exceeded 50 percent of the time for the designated period.

90 PERCENT EXCEEDS.—The discharge that has been exceeded 90 percent of the time for the designated period.

Data collected at partial-record stations (fig. 7) follow the information for continuous-record sites. Data for partial-record discharge stations are presented in two tables. The first table lists annual maximum stage and discharge at crest-stage stations, and the second table lists discharge measurements at low-flow partial-record stations. The tables of partial-record stations are followed by a listing of discharge measurements made at sites other than continuous-record or partial-record stations. These measurements are often made in times of drought or flood to give better areal coverage to those events. Those measurements and others collected for a special reason are called measurements at miscellaneous sites.

Identifying Estimated Daily Discharge

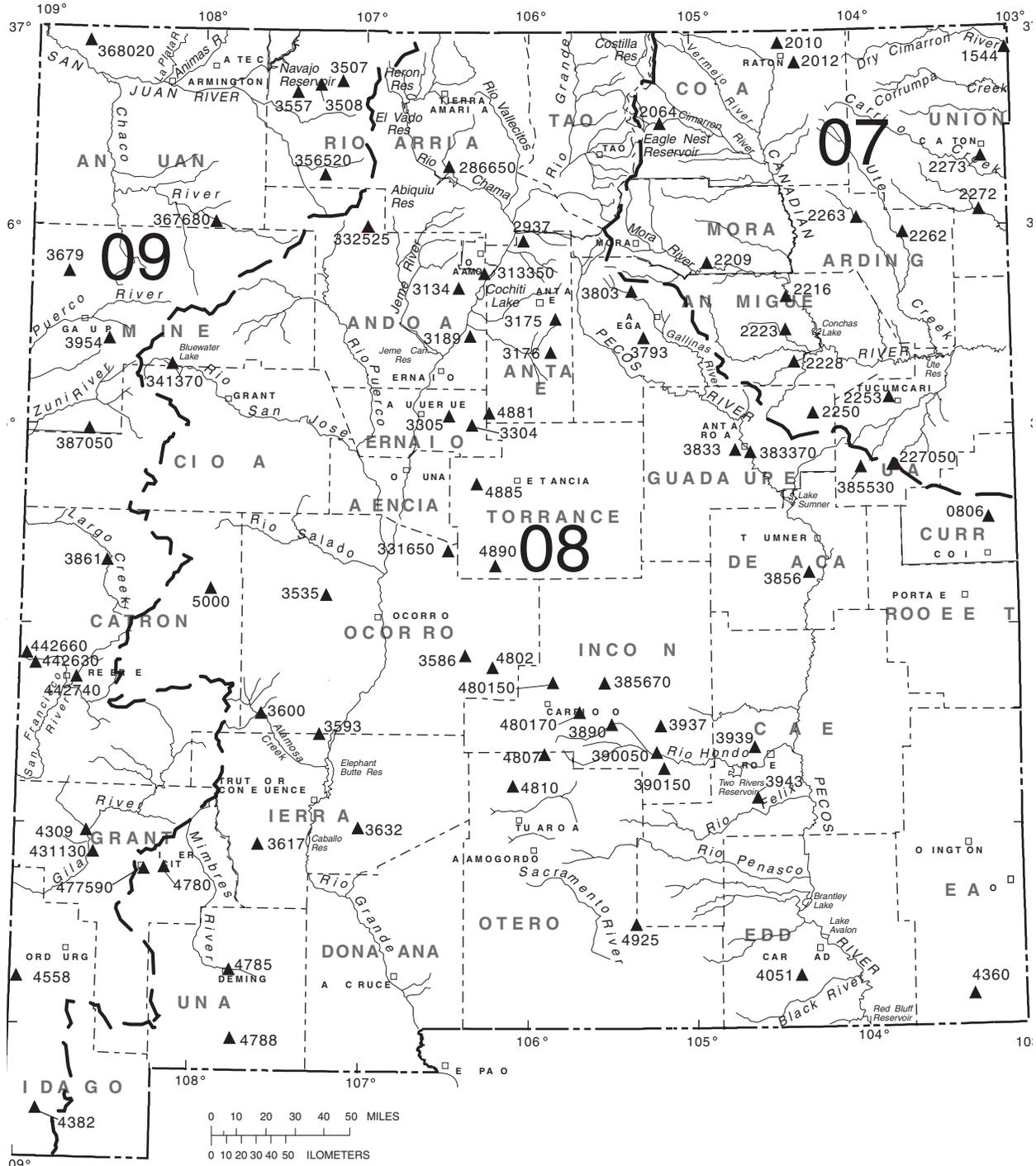
Estimated daily-discharge values published in the water-discharge tables of annual State data reports are identified. This identification is shown either by flagging individual daily values with the letter “e” and noting in a table footnote, “e—Estimated,” or by listing the dates of the estimated record in the REMARKS paragraph of the station description.

Rating classifications for continuous water-quality records

[≤, less than or equal to; ±, plus or minus value shown; °C, degree Celsius; >, greater than; %, percent; mg/L, milligram per liter; pH unit, standard pH unit]

Measured physical property	Rating			
	Excellent	Good	Fair	Poor
Water temperature	≤ ±0.2 °C	> ±0.2 to 0.5 °C	> ±0.5 to 0.8 °C	> ±0.8 °C
Specific conductance	≤ ±3%	> ±3 to 10%	> ±10 to 15%	> ±15%
Dissolved oxygen	≤ ±0.3 mg/L	> ±0.3 to 0.5 mg/L	> ±0.5 to 0.8 mg/L	> ±0.8 mg/L
pH	≤ ±0.2 unit	> ±0.2 to 0.5 unit	> ±0.5 to 0.8 unit	> ±0.8 unit
Turbidity	≤ ±5%	> ±5 to 10%	> ±10 to 15%	> ±15%

WATER RESOURCES DATA – NEW MEXICO, 2003



J.S. Geological Survey base

EXPLANATION

- 07 LOWER MISSISSIPPI RIVER BASIN NUMBER
- 08 WESTERN GULF OF MEXICO BASIN NUMBER
- 09 COLORADO RIVER BASIN NUMBER
- RIVER BASIN BOUNDARY
- 477590 ▲ GAGING STATION AND NUMBER--
Number by symbol is abbreviated station number. Complete national station number is 08 477590
- Basin number station number

Figure 7.--Location of partial-record stations.

Accuracy of Field Data and Computed Results

The accuracy of streamflow data depends primarily on (1) the stability of the stage-discharge relation or, if the control is unstable, the frequency of discharge measurements, and (2) the accuracy of observations of stage, measurements of discharge, and interpretations of records.

The degree of accuracy of the records is stated in the REMARKS in the station description. “Excellent” indicates that about 95 percent of the daily discharges are within 5 percent of the true value; “good” within 10 percent; and “fair” within 15 percent. “Poor” indicates that daily discharges have less than “fair” accuracy. Different accuracies may be attributed to different parts of a given record.

Values of daily mean discharge in this report are shown to the nearest hundredth of a cubic foot per second for discharges of less than 1 ft³/s; to the nearest tenths between 1.0 and 10 ft³/s; to whole numbers between 10 and 1,000 ft³/s; and to 3 significant figures above 1,000 ft³/s. The number of significant figures used is based solely on the magnitude of the discharge value. The same rounding rules apply to discharge values listed for partial-record stations.

Discharge at many stations, as indicated by the monthly mean, may not reflect natural runoff due to the effects of diversion, consumption, regulation by storage, increase or decrease in evaporation due to artificial causes, or to other factors. For such stations, values of cubic feet per second per square mile and of runoff in inches are not published unless satisfactory adjustments can be made for diversions, for changes in contents of reservoirs, or for other changes incident to use and control. Evaporation from a reservoir is not included in the adjustments for changes in reservoir contents, unless it is so stated. Even at those stations where adjustments are made, large errors in computed runoff may occur if adjustments or losses are large in comparison with the observed discharge.

Other Data Records Available

Information of a more detailed nature than that published for most of the stream-gaging stations such as discharge measurements, gage-height records, and rating tables is available from the District office. Also, most stream-gaging station records are available in computer-usable form and many statistical analyses have been made.

Information on the availability of unpublished data or statistical analyses may be obtained from the District office (see address that is shown on the back of the title page of this report).

EXPLANATION OF PRECIPITATION RECORDS

Data Collection and Computation

Rainfall data generally are collected using electronic data loggers that measure the rainfall in 0.01-inch increments every 15 minutes using either a tipping-bucket rain gage or a collection well gage. Twenty-four hour rainfall totals are tabulated and presented. A 24-hour period extends from just past midnight of the previous day to midnight of the current day. Snowfall-affected data can result during cold weather when snow fills the rain-gage funnel and then melts as temperatures rise. Snowfall-affected data are subject to errors. Missing values are indicated by this symbol “---” in the table.

Data Presentation

Precipitation records collected at surface-water gaging stations are identified with the same station number and name as the stream-gaging station. Where a surface-water daily-record station is not available, the precipitation record is published with its own name and latitude-longitude identification number.

Information pertinent to the history of a precipitation station is provided in descriptive headings preceding the tabular data. These descriptive headings give details regarding location, period of record, and general remarks.

The following information is provided with each precipitation station. Comments that follow clarify information presented under the various headings of the station description.

LOCATION.—See Data Presentation in the EXPLANATION OF STAGE- AND WATER-DISCHARGE RECORDS section of this report (same comments apply).

PERIOD OF RECORD.—See Data Presentation in the EXPLANATION OF STAGE- AND WATER-DISCHARGE RECORDS section of this report (same comments apply).

INSTRUMENTATION.—Information on the type of rainfall collection system is given.

REMARKS.—Remarks provide added information pertinent to the collection, analysis, or computation of records.

EXPLANATION OF WATER-QUALITY RECORDS

Collection and Examination of Data

Surface-water samples for analysis usually are collected at or near stream-gaging stations. The quality-of-water records are given immediately following the discharge records at these stations.

The descriptive heading for water-quality records gives the period of record for all water-quality data; the period of daily record for parameters that are measured on a daily basis (specific conductance, water temperature, sediment discharge, and so forth); extremes for the current year; and general remarks.

For ground-water records, no descriptive statements are given; however, the well number, depth of well, sampling date, or other pertinent data are given in the table containing the chemical analyses of the ground water.

Water Analysis

Most of the methods used for collecting and analyzing water samples are described in the TWRIs. A list of TWRIs is provided in this report.

One sample can define adequately the water quality at a given time if the mixture of solutes throughout the stream cross-section is homogeneous. However, the concentration of solutes at different locations in the cross section may vary widely with different rates of water discharge, depending on the source of material and the turbulence and mixing of the stream. Some streams must be sampled at several verticals to obtain a representative sample needed for an accurate mean concentration and for use in calculating load.

Chemical-quality data published in this report are considered to be the most representative values available for the stations listed. The values reported represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis. In the rare case where an apparent inconsistency exists between a reported pH value and the relative abundance of carbon dioxide species (carbonate and bicarbonate), the inconsistency is the result of a slight uptake of carbon dioxide from the air by the sample between measurement of pH in the field and determination of carbonate and bicarbonate in the laboratory.

For chemical-quality stations equipped with digital monitors, the records consist of daily maximum and minimum values (and sometimes mean or median values) for each constituent measured, and are based on 15-minute or 1-hour intervals of recorded data beginning at 0000 hours and ending at 2400 hours for the day of record.

SURFACE-WATER-QUALITY RECORDS

Records of surface-water quality ordinarily are obtained at or near stream-gaging stations because discharge data is useful in the interpretation of surface-water quality. Records of surface-water quality in this report involve a variety of types of data and measurement frequencies.

Classification of Records

Water-quality data for surface-water sites are grouped into one of three classifications. A *continuous-record station* is a site where data are collected on a regularly scheduled basis. Frequency may be one or more times daily, weekly, monthly, or quarterly. A *partial-record station* is a site where limited water-quality data are collected systematically over a period of years. Frequency of sampling is usually less than quarterly. A *miscellaneous sampling site* is a location other than a continuous- or partial-record station, where samples are collected to give better areal coverage to define water-quality conditions in the river basin.

A careful distinction needs to be made between *continuous records* as used in this report and *continuous recordings* that refer to a continuous graph or a series of discrete values recorded at short intervals. Some records of water quality, such as temperature and specific conductance, may be obtained through continuous recordings; however, because of costs, most data are obtained only monthly or less frequently. Locations of stations for which records on the quality of surface water appear in this report are shown in figure 8.

Accuracy of the Records

One of four accuracy classifications is applied for measured physical properties at continuous-record stations on a scale ranging from poor to excellent. The accuracy rating is based on data values recorded before any shifts or corrections are made. Additional consideration also is given to the amount of publishable record and to the amount of data that have been corrected or shifted.

Arrangement of Records

Water-quality records collected at a surface-water daily record station are published immediately following that record, regardless of the frequency of sample collection. Station number and name are the same for both records. Where a surface-water daily record station is not available or where the water quality differs significantly from that at the nearby surface-water station, the

continuing water-quality record is published with its own station number and name in the regular downstream-order sequence. Water-quality data for partial-record stations and for miscellaneous sampling sites appear in separate tables following the table of discharge measurements at miscellaneous sites.

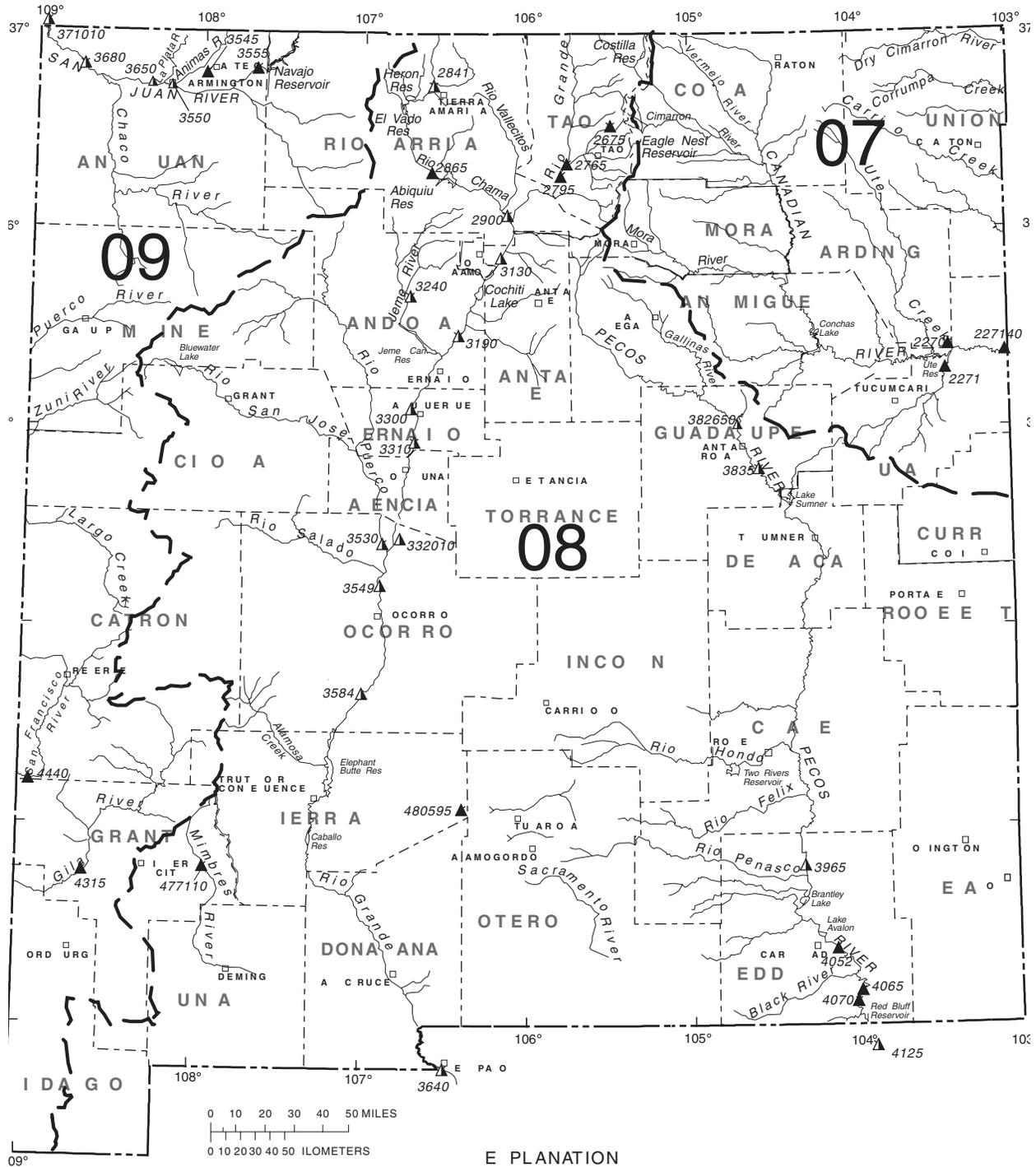
On-Site Measurements and Sample Collection

In obtaining water-quality data, a major concern is assuring that the data obtained represent the naturally occurring quality of the water. To ensure this, certain measurements, such as water temperature, pH, and dissolved oxygen, must be made on site when the samples are taken. To assure that measurements made in the laboratory also represent the naturally occurring water, carefully prescribed procedures must be followed in collecting the samples, in treating the samples to prevent changes in quality pending analysis, and in shipping the samples to the laboratory. Procedures for on-site measurements and for collecting, treating, and shipping samples are given in TWRI Book 1, Chapter D2; Book 3, Chapters A1, A3, and A4; and Book 9, Chapters A1-A9. These TWRI are listed in this report. Also, detailed information on collecting, treating, and shipping samples can be obtained from the USGS District office (see address that is shown on the back of title page in this report).

Water Temperature

Water temperatures are measured at most of the water-quality stations. In addition, water temperatures are taken at the time of discharge measurements for water-discharge stations. For stations where water temperatures are taken manually once or twice daily, the water temperatures are taken at about the same time each day. Large streams have a small diurnal temperature change; shallow streams may have a daily range of several degrees and may follow closely the changes in air temperature. Some streams may be affected by waste-heat discharges.

WATER RESOURCES DATA – NEW MEXICO, 2003



S. Geological Survey base

BASIN AND STATION NUMBER		STATION AND SAMPLING FREQUENCY		
07	LOWER MISSISSIPPI RIVER BASIN NUMBER	CHEMICAL QUALITY	▲ Daily	▲ Other than daily
08	WESTERN GULF OF MEXICO BASIN NUMBER	SUSPENDED SEDIMENT	△ Daily	△ Other than daily
09	COLORADO RIVER BASIN NUMBER	CHEMICAL QUALITY AND SUSPENDED SEDIMENT	▲ Both daily	▲ Both other than
—	RIVER BASIN BOUNDARY	▲	▲ Daily chemical quality and other than daily suspended sediment	▲ Daily suspended sediment and other than daily chemical quality
480595 ▲	STATION AND NUMBER--Number by symbol is abbreviated station number. Complete national station number is 08 480595			
	Basin number		station number	

Figure 8.--Location of active surface-water-quality gaging stations.

At stations where recording instruments are used, either mean temperatures or maximum and minimum temperatures for each day are published. Water temperatures measured at the time of water-discharge measurements are on file in the District office.

Sediment

Suspended-sediment concentrations are determined from samples collected by using depth-integrating samplers. Samples usually are obtained at several verticals in the cross section, or a single sample may be obtained at a fixed point and a coefficient applied to determine the mean concentration in the cross section.

During periods of rapidly changing flow or rapidly changing concentration, samples may be collected more frequently (twice daily or, in some instances, hourly). The published sediment discharges for days of rapidly changing flow or concentration were computed by the subdivided-day method (time-discharge weighted average). Therefore, for those days when the published sediment discharge value differs from the value computed as the product of discharge times mean concentration times 0.0027, the reader can assume that the sediment discharge for that day was computed by the subdivided-day method. For periods when no samples were collected, daily discharges of suspended sediment were estimated on the basis of water discharge, sediment concentrations observed immediately before and after the periods, and suspended-sediment loads for other periods of similar discharge.

At other stations, suspended-sediment samples are collected periodically at many verticals in the stream cross section. Although data collected periodically may represent conditions only at the time of observation, such data are useful in establishing seasonal relations between quality and streamflow and in predicting long-term sediment-discharge characteristics of the stream.

In addition to the records of suspended-sediment discharge, records of the periodic measurements of the particle-size distribution of

the suspended sediment and bed material are included for some stations.

Laboratory Measurements

Samples for biochemical oxygen demand (BOD) and indicator bacteria are analyzed locally. All other samples are analyzed in the USGS laboratory in Lakewood, Colorado, unless otherwise noted. Methods used in analyzing sediment samples and computing sediment records are given in TWRI, Book 5, Chapter C1. Methods used by the USGS laboratories are given in the TWRI, Book 1, Chapter D2; Book 3, Chapter C2; and Book 5, Chapters A1, A3, and A4. These methods are consistent with ASTM standards and generally follow ISO standards.

Data Presentation

For continuing-record stations, information pertinent to the history of station operation is provided in descriptive headings preceding the tabular data. These descriptive headings give details regarding location, drainage area, period of record, type of data available, instrumentation, general remarks, cooperation, and extremes for parameters currently measured daily. Tables of chemical, physical, biological, radiochemical data, and so forth, obtained at a frequency less than daily, are presented first. Tables of "daily values" of specific conductance, pH, water temperature, dissolved oxygen, and suspended sediment then follow in sequence.

In the descriptive headings, if the location is identical to that of the discharge gaging station, neither the LOCATION nor the DRAINAGE AREA statements are repeated. The following information is provided with each continuous-record station. Comments that follow clarify information presented under the various headings of the station description.

LOCATION.—See Data Presentation information in the EXPLANATION OF STAGE- AND WATER-DISCHARGE RECORDS section of this report (same comments apply).

DRAINAGE AREA.—See Data Presentation information in the EXPLANATION OF STAGE-AND WATER-DISCHARGE RECORDS section of this report (same comments apply).

PERIOD OF RECORD.—This indicates the time periods for which published water-quality records for the station are available. The periods are shown separately for records of parameters measured daily or continuously and those measured less than daily. For those measured daily or continuously, periods of record are given for the parameters individually.

INSTRUMENTATION.—Information on instrumentation is given only if a water-quality monitor temperature record, sediment pumping sampler, or other sampling device is in operation at a station.

REMARKS.—Remarks provide added information pertinent to the collection, analysis, or computation of the records.

COOPERATION.—Records provided by a cooperating organization or obtained for the USGS by a cooperating organization are identified here.

EXTREMES.—Maximums and minimums are given only for parameters measured daily or more frequently. For parameters measured weekly or less frequently, true maximums or minimums may not have been obtained. Extremes, when given, are provided for both the period of record and for the current water year.

REVISIONS.—Records are revised if errors in published water-quality records are discovered. Appropriate updates are made in the USGS distributed data system, NWIS, and subsequently to its Web-based National data system, NWISWeb (<http://waterdata.usgs.gov/nwis>). Users of USGS water-quality data are encouraged to obtain all required data from NWIS or NWISWeb to ensure that they have the most recent updates. Updates to the NWISWeb are made on an annual basis.

The surface-water-quality records for partial-record stations and miscellaneous sampling sites are published in separate tables following the table

of discharge measurements at miscellaneous sites. No descriptive statements are given for these records. Each station is published with its own station number and name in the regular downstream-order sequence.

Remark Codes

The following remark codes may appear with the water-quality data in this section:

Printed Output	Remark
E or e	Estimated value.
>	Actual value is known to be greater than the value shown.
<	Actual value is known to be less than the value shown.
K	Results based on colony count outside the acceptance range (non-ideal colony count).
L	Biological organism count less than 0.5 percent (organism may be observed rather than counted).
D	Biological organism count equal to or greater than 15 percent (dominant).
V	Analyte was detected in both the environmental sample and the associated blanks.
&	Biological organism estimated as dominant.

Water-Quality Control Data

The USGS National Water Quality Laboratory collects quality-control data on a continuing basis to evaluate selected analytical methods to determine long-term method detection levels (LT-MDLs) and laboratory reporting levels (LRLs). These values are re-evaluated each year on the basis of the most recent quality-control data and, consequently, may change from year to year.

This reporting procedure limits the occurrence of false positive error. Falsely reporting a concentration greater than the LT-MDL for a sample in which the analyte is not present is 1 percent or less. Application of the LRL limits the occurrence of false negative error. The chance of falsely reporting a non-detection for a sample in which the analyte is present at a concentration

equal to or greater than the LRL is 1 percent or less.

Accordingly, concentrations are reported as less than LRL for samples in which the analyte was either not detected or did not pass identification. Analytes detected at concentrations between the LT-MDL and the LRL and that pass identification criteria are estimated. Estimated concentrations will be noted with a remark code of "E." These data should be used with the understanding that their uncertainty is greater than that of data reported without the E remark code.

Data generated from quality-control (QC) samples are a requisite for evaluating the quality of the sampling and processing techniques as well as data from the actual samples themselves. Without QC data, environmental sample data cannot be adequately interpreted because the errors associated with the sample data are unknown. The various types of QC samples collected by this District office are described in the following section. Procedures have been established for the storage of water-quality-control data within the USGS. These procedures allow for storage of all derived QC data and are identified so that they can be related to corresponding environmental samples. These data are not presented in this report but are available from the District office.

Blank Samples

Blank samples are collected and analyzed to ensure that environmental samples have not been contaminated in the overall data-collection process. The blank solution used to develop specific types of blank samples is a solution that is free of the analytes of interest. Any measured value signal in a blank sample for an analyte (a specific component measured in a chemical analysis) that was absent in the blank solution is believed to be due to contamination. Many types of blank samples are possible; each is designed to segregate a different part of the overall data-collection process. The types of blank samples collected in this district are:

Field blank—A blank solution that is subjected to all aspects of sample collection, field processing

preservation, transportation, and laboratory handling as an environmental sample.

Trip blank—A blank solution that is put in the same type of bottle used for an environmental sample and kept with the set of sample bottles before and after sample collection.

Equipment blank—A blank solution that is processed through all equipment used for collecting and processing an environmental sample (similar to a field blank but normally done in the more controlled conditions of the office).

Sampler blank—A blank solution that is poured or pumped through the same field sampler used for collecting an environmental sample.

Filter blank—A blank solution that is filtered in the same manner and through the same filter apparatus used for an environmental sample.

Splitter blank—A blank solution that is mixed and separated using a field splitter in the same manner and through the same apparatus used for an environmental sample.

Preservation blank—A blank solution that is treated with the sampler preservatives used for an environmental sample.

Reference Samples

Reference material is a solution or material prepared by a laboratory. The reference material composition is certified for one or more properties so that it can be used to assess a measurement method. Samples of reference material are submitted for analysis to ensure that an analytical method is accurate for the known properties of the reference material. Generally, the selected reference material properties are similar to the environmental sample properties.

Replicate Samples

Replicate samples are a set of environmental samples collected in a manner such that the samples are thought to be essentially identical in

composition. Replicate is the general case for which a duplicate is the special case consisting of two samples. Replicate samples are collected and analyzed to establish the amount of variability in the data contributed by some part of the collection and analytical process. Many types of replicate samples are possible, each of which may yield slightly different results in a dynamic hydrologic setting, such as a flowing stream. The types of replicate samples collected in this district are:

Concurrent samples—A type of replicate sample in which the samples are collected simultaneously with two or more samplers or by using one sampler and alternating the collection of samples into two or more compositing containers.

Sequential samples—A type of replicate sample in which the samples are collected one after the other, typically over a short time.

Split sample—A type of replicate sample in which a sample is split into subsamples, each subsample contemporaneous in time and space.

Spike Samples

Spike samples are samples to which known quantities of a solution with one or more well-established analyte concentrations have been added. These samples are analyzed to determine the extent of matrix interference or degradation on the analyte concentration during sample processing and analysis.

EXPLANATION OF GROUND-WATER-LEVEL RECORDS

Generally, only ground-water-level data from selected wells with continuous recorders from a basic network of observation wells are published in this report. This basic network contains observation wells located so that the most significant data are obtained from the fewest wells in the most important aquifers.

Site Identification Numbers

Each well is identified by means of (1) a 15-digit number that is based on latitude and longitude and (2) a local number that is produced for local needs. (See NUMBERING SYSTEM FOR WELLS AND MISCELLANEOUS SITES in this report for a detailed explanation.)

Data Collection and Computation

Measurements are made in many types of wells, under varying conditions of access and at different temperatures; hence, neither the method of measurement nor the equipment can be standardized. At each observation well, however, the equipment and techniques used are those that will ensure that measurements at each well are consistent.

Most methods for collecting and analyzing water samples are described in the TWRI's referred to in the On-site Measurements and Sample Collection and the Laboratory Measurements sections in this report. In addition, TWRI Book 1, Chapter D2, describes guidelines for the collection and field analysis of ground-water samples for selected unstable constituents. Procedures for on-site measurements and for collecting, treating, and shipping samples are given in TWRI's Book 1, Chapter D2; Book 3, Chapters A1, A3, and A4; and Book 9, Chapters A1 through A9. The values in this report represent water-quality conditions at the time of sampling, as much as possible, and that are consistent with available sampling techniques and methods of analysis. These methods are consistent with ASTM standards and generally follow ISO standards. Trained personnel collected all samples. The wells sampled were pumped long enough to ensure that the water collected came directly from the aquifer and had not stood for a long time in the well casing where it would have been exposed to the atmosphere and to the material, possibly metal, comprising the casings.

Water-level measurements in this report are given in feet with reference to land-surface datum (lsd). Land-surface datum is a datum plane that is approximately at land surface at each well. If

known, the elevation of the land-surface datum above sea level is given in the well description. The height of the measuring point (MP) above or below land-surface datum is given in each well description. Water levels in wells equipped with recording gages are reported for every fifth day and the end of each month (EOM).

Water levels are reported to as many significant figures as can be justified by the local conditions. For example, in a measurement of a depth of water of several hundred feet, the error in determining the absolute value of the total depth to water may be a few tenths of a foot, whereas the error in determining the net change of water level between successive measurements may be only a hundredth or a few hundredths of a foot. For lesser depths to water the accuracy is greater. Accordingly, most measurements are reported to a hundredth of a foot, but some are given only to a tenth of a foot or a larger unit.

Data Presentation

Water-level data are presented in alphabetical order by county. The primary identification number for a given well is the 15-digit site identification number that appears in the upper left corner of the table. The secondary identification number is the local or county well number. Well locations are shown in figure 9; each well is identified on the map by its local well or county well number.

Each well record consists of three parts: the well description, the data table of water levels observed during the water year, and, for most wells, a hydrograph following the data table. Well descriptions are presented in the headings preceding the tabular data.

The following comments clarify information presented in these various headings.

LOCATION.—This paragraph follows the well-identification number and reports the hydrologic-unit number and a geographic point of reference. Latitudes and longitudes used in this report are reported as North American Datum of 1927 unless otherwise specified.

AQUIFER.—This entry designates by name and geologic age the aquifer that the well taps.

WELL CHARACTERISTICS.—This entry describes the well in terms of depth, casing diameter and depth or screened interval, method of construction, use, and changes since construction.

INSTRUMENTATION.—This paragraph provides information on both the frequency of measurement and the collection method used, allowing the user to better evaluate the reported water-level extremes by knowing whether they are based on continuous, monthly, or some other frequency of measurement.

DATUM.—This entry describes both the measuring point and the land-surface elevation at the well. The altitude of the land-surface datum is described in feet above the altitude datum; it is reported with a precision depending on the method of determination. The measuring point is described physically (such as top of casing, top of instrument shelf, and so forth), and in relation to land surface (such as 1.3 ft above land-surface datum). The elevation of the land-surface datum is described in feet above National Geodetic Vertical Datum of 1929 (NGVD 29); it is reported with a precision depending on the method of determination.

REMARKS.—This entry describes factors that may influence the water level in a well or the measurement of the water level, when various methods of measurement were begun, and the network (climatic, terrane, local, or areal effects) or the special project to which the well belongs.

PERIOD OF RECORD.—This entry indicates the time period for which records are published for the well, the month and year at the start of publication of water-level records by the USGS, and the words “to current year” if the records are to be continued into the following year. Time periods for which water-level records are available, but are not published by the USGS, may be noted.

EXTREMES FOR PERIOD OF RECORD.—This entry contains the highest and lowest instantaneously recorded or measured water levels of the period of published record, with respect to land-surface datum or sea level, and the dates of occurrence.

Water-Level Tables

A table of water levels follows the well description for each well. Water-level measurements in this report are given in feet with reference to either sea level or land-surface datum (lsd). Missing records are indicated by dashes in place of the water-level value.

For wells not equipped with recorders, water-level measurements were obtained periodically by steel or electric tape. Tables of periodic water-level measurements in these wells show the date of measurement and the measured water-level value.

Hydrographs

Hydrographs are a graphic display of water-level fluctuations over a period of time. In this report, current water year and, when appropriate, period-of-record hydrographs are shown. Hydrographs that display periodic water-level measurements show points that may be connected with a dashed line from one measurement to the next. Hydrographs that display recorder data show a solid line representing the mean water level recorded for each day. Missing data are indicated by a blank space or break in a hydrograph. Missing data may occur as a result of recorder malfunctions, battery failures, or mechanical problems related to the response of the recorder's float mechanism to water-level fluctuations in a well.

GROUND-WATER-QUALITY DATA

Data Collection and Computation

The ground-water-quality data in this report were obtained as a part of special studies in specific areas. Consequently, a number of chemical analyses are presented for some wells within a county but not for others. As a result, the records for this year, by themselves, do not provide a balanced view of ground-water quality Statewide.

Most methods for collecting and analyzing water samples are described in the TWRIs. Procedures for on-site measurements and for

collecting, treating, and shipping samples are given in TWRI, Book 1, Chapter D2; Book 3, Chapter C2; and Book 5, Chapters A1, A3, and A4. Also, detailed information on collecting, treating, and shipping samples may be obtained from the USGS District office (see address shown on back of title page in this report).

Laboratory Measurements

Analysis for sulfide and measurement of alkalinity, pH, water temperature, specific conductance, and dissolved oxygen are performed on site. All other sample analyses are performed at the USGS laboratory in Lakewood, Colorado, unless otherwise noted. Methods used by the USGS laboratory are given in TWRI, Book 1, Chapter D2; Book 3, Chapter C2; and Book 5, Chapters A1, A3, and A4.

ACCESS TO USGS WATER DATA

The USGS provides near real-time stage and discharge data for many of the gaging stations equipped with the necessary telemetry and historic daily-mean and peak-flow discharge data for most current or discontinued gaging stations through the World Wide Web (WWW). These data may be accessed from <http://water.usgs.gov>.

Water-quality data and ground-water data also are available through the WWW. In addition, data can be provided in various machine-readable formats on various media. Information about the availability of specific types of data or products, and user charges, can be obtained locally from each Water Discipline District Office (see address that is shown on the back of the title page of this report).

DEFINITION OF TERMS

Specialized technical terms related to streamflow, water-quality, and other hydrologic data, as used in this report, are defined below. Terms such as algae, water level, and precipitation are used in their common everyday meanings, definitions of which are given in standard dictionaries. Not all terms defined in this alphabetical list apply to every State. See also table for converting English units to International System (SI) Units. Other glossaries that also define water-related terms are accessible from <http://water.usgs.gov/glossaries.html>.

Acid neutralizing capacity (ANC) is the equivalent sum of all bases or base-producing materials, solutes plus particulates, in an aqueous system that can be titrated with acid to an equivalence point. This term designates titration of an “unfiltered” sample (formerly reported as alkalinity).

Acre-foot (AC-FT, acre-ft) is a unit of volume, commonly used to measure quantities of water used or stored, equivalent to the volume of water required to cover 1 acre to a depth of 1 foot and equivalent to 43,560 cubic feet, 325,851 gallons, or 1,233 cubic meters. (See also “Annual runoff”)

Adenosine triphosphate (ATP) is an organic, phosphate-rich compound important in the transfer of energy in organisms. Its central role in living cells makes ATP an excellent indicator of the presence of living material in water. A measurement of ATP therefore provides a sensitive and rapid estimate of biomass. ATP is reported in micrograms per liter.

Adjusted discharge is discharge data that have been mathematically adjusted (for example, to remove the effects of a daily tide cycle or reservoir storage).

Algal growth potential (AGP) is the maximum algal dry weight biomass that can be produced in a natural water sample under standardized laboratory conditions. The growth potential is the algal biomass present at stationary phase and is expressed as milligrams dry weight of algae produced per liter of sample. (See also “Biomass” and “Dry weight”)

Alkalinity is the capacity of solutes in an aqueous system to neutralize acid. This term designates titration of a “filtered” sample.

Annual runoff is the total quantity of water that is discharged (“runs off”) from a drainage basin in a year. Data reports may present annual runoff data as volumes in acre-feet, as discharges per unit of drainage area in cubic feet per second per square mile, or as depths of water on the drainage basin in inches.

Annual 7-day minimum is the lowest mean value for any 7-consecutive-day period in a year. Annual 7-day minimum values are reported herein for the calendar year and the water year (October 1 through September 30). Most

low-flow frequency analyses use a climatic year (April 1-March 31), which tends to prevent the low-flow period from being artificially split between adjacent years. The date shown in the summary statistics table is the initial date of the 7-day period. (This value should not be confused with the 7-day, 10-year low-flow statistic.)

Aroclor is the registered trademark for a group of polychlorinated biphenyls that were manufactured by the Monsanto Company prior to 1976. Aroclors are assigned specific 4-digit reference numbers dependent upon molecular type and degree of substitution of the biphenyl ring hydrogen atoms by chlorine atoms. The first two digits of a numbered aroclor represent the molecular type, and the last two digits represent the percentage weight of the hydrogen-substituted chlorine.

Artificial substrate is a device that purposely is placed in a stream or lake for colonization of organisms. The artificial substrate simplifies the community structure by standardizing the substrate from which each sample is collected. Examples of artificial substrates are basket samplers (made of wire cages filled with clean streamside rocks) and multi-plate samplers (made of hardboard) for benthic organism collection, and plexiglass strips for periphyton collection. (See also “Substrate”)

Ash mass is the mass or amount of residue present after the residue from a dry-mass determination has been ashed in a muffle furnace at a temperature of 500 °C for 1 hour. Ash mass of zooplankton and phytoplankton is expressed in grams per cubic meter (g/m^3), and periphyton and benthic organisms in grams per square meter (g/m^2). (See also “Biomass” and “Dry mass”)

Aspect is the direction toward which a slope faces with respect to the compass.

Bacteria are microscopic unicellular organisms, typically spherical, rodlike, or spiral and threadlike in shape, often clumped into colonies. Some bacteria cause disease, whereas others perform an essential role in nature in the recycling of materials; for example, by decomposing organic matter into a form available for reuse by plants.

Bankfull stage, as used in this report, is the stage at which a stream first overflows its natural banks formed by floods with 1- to 3-year recurrence intervals.

Base discharge (for peak discharge) is a discharge value, determined for selected stations, above which peak discharge data are published. The base discharge at each station is selected so that an average of about three peak flows per year will be published. (See also "Peak flow")

Base flow is sustained flow of a stream in the absence of direct runoff. It includes natural and human-induced streamflows. Natural base flow is sustained largely by ground-water discharge.

Bed material is the sediment mixture of which a streambed, lake, pond, reservoir, or estuary bottom is composed. (See also "Bedload" and "Sediment")

Bedload is material in transport that primarily is supported by the streambed. In this report, bedload is considered to consist of particles in transit from the bed to the top of the bedload sampler nozzle (an elevation ranging from 0.25 to 0.5 foot). These particles are retained in the bedload sampler. A sample collected with a pressure-differential bedload sampler also may contain a component of the suspended load.

Bedload discharge (tons per day) is the rate of sediment moving as bedload, reported as dry weight, that passes through a cross section in a given time. NOTE: Bedload discharge values in this report may include a component of the suspended-sediment discharge. A correction may be necessary when computing the total sediment discharge by summing the bedload discharge and the suspended-sediment discharge. (See also "Bedload," "Dry weight," "Sediment," and "Suspended-sediment discharge")

Benthic organisms are the group of organisms inhabiting the bottom of an aquatic environment. They include a number of types of organisms, such as bacteria, fungi, insect larvae and nymphs, snails, clams, and crayfish. They are useful as indicators of water quality.

Biochemical oxygen demand (BOD) is a measure of the quantity of dissolved oxygen, in milligrams per liter, necessary for the decomposition of organic matter by microorganisms, such as bacteria.

Biomass is the amount of living matter present at any given time, expressed as mass per unit area or volume of habitat.

Biomass pigment ratio is an indicator of the total proportion of periphyton that are autotrophic (plants). This also is called the Autotrophic Index.

Blue-green algae (*Cyanophyta*) are a group of phytoplankton and periphyton organisms with a blue pigment in addition to a green pigment called chlorophyll. Blue-green algae can cause nuisance water-quality conditions in lakes and slow-flowing rivers; however, they are found commonly in streams throughout the year. The abundance of blue-green algae in phytoplankton samples is expressed as the number of cells per milliliter (cells/mL) or biovolume in cubic micrometers per milliliter ($\mu\text{m}^3/\text{mL}$). The abundance of blue-green algae in periphyton samples is given in cells per square centimeter (cells/cm²) or biovolume per square centimeter ($\mu\text{m}^3/\text{cm}^2$). (See also "Phytoplankton" and "Periphyton")

Bottom material (See "Bed material")

Bulk electrical conductivity is the combined electrical conductivity of all material within a doughnut-shaped volume surrounding an induction probe. Bulk conductivity is affected by different physical and chemical properties of the material including the dissolved-solids content of the pore water, and the lithology and porosity of the rock.

Canadian Geodetic Vertical Datum 1928 is a geodetic datum derived from a general adjustment of Canada's first order level network in 1928.

Cell volume (biovolume) determination is one of several common methods used to estimate biomass of algae in aquatic systems. Cell members of algae are used frequently in aquatic surveys as an indicator of algal production. However, cell numbers alone cannot represent true biomass because of considerable cell-size variation among the algal species. Cell volume (μm^3) is determined by obtaining critical cell measurements or cell dimensions (for example, length, width, height, or radius) for 20 to 50 cells of each important species to obtain an average biovolume per cell. Cells are categorized according to the correspondence of their cellular shape to the nearest geometric solid or combinations of simple solids (for example, spheres, cones, or cylinders). Representative formulae used to compute biovolume are as follows:

$$\text{sphere } \frac{4}{3} \pi r^3 \quad \text{cone } \frac{1}{3} \pi r^2 h \quad \text{cylinder } \pi r^2 h.$$

pi (π) is the ratio of the circumference to the diameter of a circle; $\pi = 3.14159\dots$

From cell volume, total algal biomass expressed as biovolume ($\mu\text{m}^3/\text{mL}$) is thus determined by multiplying the number of cells of a given species by its average cell volume and then summing these volumes for all species.

Cells/volume refers to the number of cells of any organism that is counted by using a microscope and grid or counting cell. Many planktonic organisms are multicelled and are counted according to the number of contained cells per

sample volume, and generally are reported as cells or units per milliliter (mL) or liter (L).

Cfs-day (See “Cubic foot per second-day”)

Channel bars, as used in this report, are the lowest prominent geomorphic features higher than the channel bed.

Chemical oxygen demand (COD) is a measure of the chemically oxidizable material in the water and furnishes an approximation of the amount of organic and reducing material present. The determined value may correlate with BOD or with carbonaceous organic pollution from sewage or industrial wastes. [See also “Biochemical oxygen demand (BOD)”]

Clostridium perfringens (*C. perfringens*) is a spore-forming bacterium that is common in the feces of human and other warmblooded animals. Clostridial spores are being used experimentally as an indicator of past fecal contamination and the presence of microorganisms that are resistant to disinfection and environmental stresses. (See also “Bacteria”)

Coliphages are viruses that infect and replicate in coliform bacteria. They are indicative of sewage contamination of water and of the survival and transport of viruses in the environment.

Color unit is produced by 1 milligram per liter of platinum in the form of the chloroplatinate ion. Color is expressed in units of the platinum-cobalt scale.

Confined aquifer is a term used to describe an aquifer containing water between two relatively impermeable boundaries. The water level in a well tapping a confined aquifer stands above the top of the confined aquifer and can be higher or lower than the water table that may be present in the material above it. In some cases, the water level can rise above the ground surface, yielding a flowing well.

Contents is the volume of water in a reservoir or lake. Unless otherwise indicated, volume is computed on the basis of a level pool and does not include bank storage.

Continuous-record station is a site where data are collected with sufficient frequency to define daily mean values and variations within a day.

Control designates a feature in the channel that physically affects the water-surface elevation and thereby determines the stage-discharge relation at the gage. This feature may be a constriction of the channel, a bedrock outcrop, a gravel bar, an artificial structure, or a uniform cross section over a long reach of the channel.

Control structure, as used in this report, is a structure on a stream or canal that is used to regulate the flow or stage of the stream or to prevent the intrusion of saltwater.

Cubic foot per second (CFS, ft³/s) is the rate of discharge representing a volume of 1 cubic foot passing a given point in 1 second. It is equivalent to approximately 7.48 gallons per second or approximately 449 gallons per minute, or 0.02832 cubic meters per second. The term “second-foot” sometimes is used synonymously with “cubic foot per second” but is now obsolete.

Cubic foot per second-day (CFS-DAY, Cfs-day, [(ft³/s)/d]) is the volume of water represented by a flow of 1 cubic foot per second for 24 hours. It is equivalent to 86,400 cubic feet, 1.98347 acre-feet, 646,317 gallons, or 2,446.6 cubic meters. The daily mean discharges reported in the daily value data tables numerically are equal to the daily volumes in cfs-days, and the totals also represent volumes in cfs-days.

Cubic foot per second per square mile [CFSM, (ft³/s)/mi²] is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming the runoff is distributed uniformly in time and area. (See also “Annual runoff”)

Daily mean suspended-sediment concentration is the time-weighted mean concentration of suspended sediment passing a stream cross section during a 24-hour day. (See also “Sediment” and “Suspended-sediment concentration”)

Daily record station is a site where data are collected with sufficient frequency to develop a record of one or more data values per day. The frequency of data collection can range from continuous recording to data collection on a daily or near-daily basis.

Data collection platform (DCP) is an electronic instrument that collects, processes, and stores data from various sensors, and transmits the data by satellite data relay, line-of-sight radio, and/or landline telemetry.

Data logger is a microprocessor-based data acquisition system designed specifically to acquire, process, and store data. Data usually are downloaded from onsite data loggers for entry into office data systems.

Datum is a surface or point relative to which measurements of height and/or horizontal position are reported. A vertical datum is a horizontal surface used as the zero point for measurements of gage height, stage, or elevation; a horizontal datum is a reference for positions given in terms of latitude-longitude, State Plane coordinates, or Universal Transverse Mercator (UTM) coordinates. (See also “Gage datum,” “Land-surface datum,” “National Geodetic Verti-

cal Datum of 1929,” and “North American Vertical Datum of 1988”)

Diatoms (*Bacillariophyta*) are unicellular or colonial algae with a siliceous cell wall. The abundance of diatoms in phytoplankton samples is expressed as the number of cells per milliliter (cells/mL) or biovolume in cubic micrometers per milliliter ($\mu\text{m}^3/\text{mL}$). The abundance of diatoms in periphyton samples is given in cells per square centimeter (cells/cm^2) or biovolume per square centimeter ($\mu\text{m}^3/\text{cm}^2$). (See also “Phytoplankton” and “Periphyton”)

Diel is of or pertaining to a 24-hour period of time; a regular daily cycle.

Discharge, or flow, is the rate that matter passes through a cross section of a stream channel or other water body per unit of time. The term commonly refers to the volume of water (including, unless otherwise stated, any sediment or other constituents suspended or dissolved in the water) that passes a cross section in a stream channel, canal, pipeline, and so forth, within a given period of time (cubic feet per second). Discharge also can apply to the rate at which constituents, such as suspended sediment, bedload, and dissolved or suspended chemicals, pass through a cross section, in which cases the quantity is expressed as the mass of constituent that passes the cross section in a given period of time (tons per day).

Dissolved refers to that material in a representative water sample that passes through a 0.45-micrometer membrane filter. This is a convenient operational definition used by Federal and State agencies that collect water-quality data. Determinations of “dissolved” constituent concentrations are made on sample water that has been filtered.

Dissolved oxygen (DO) is the molecular oxygen (oxygen gas) dissolved in water. The concentration in water is a function of atmospheric pressure, temperature, and dissolved-solids concentration of the water. The ability of water to retain oxygen decreases with increasing temperature or dissolved-solids concentration. Photosynthesis and respiration by plants commonly cause diurnal variations in dissolved-oxygen concentration in water from some streams.

Dissolved solids concentration in water is the quantity of dissolved material in a sample of water. It is determined either analytically by the “residue-on-evaporation” method, or mathematically by totaling the concentrations of individual constituents reported in a comprehensive chemical analysis. During the analytical determination, the bicarbonate (generally a major dissolved component of water) is converted to carbonate. In the mathematical calculation, the bicarbonate value, in milligrams per liter, is multiplied by 0.4926 to convert it to carbonate. Alterna-

tively, alkalinity concentration (as mg/L CaCO_3) can be converted to carbonate concentration by multiplying by 0.60.

Diversity index (H) (Shannon index) is a numerical expression of evenness of distribution of aquatic organisms. The formula for diversity index is:

$$\bar{d} = - \sum_{i=1}^s \frac{n_i}{n} \log_2 \frac{n_i}{n},$$

where n_i is the number of individuals per taxon, n is the total number of individuals, and s is the total number of taxa in the sample of the community. Index values range from zero, when all the organisms in the sample are the same, to some positive number, when some or all of the organisms in the sample are different.

Drainage area of a stream at a specific location is that area upstream from the location, measured in a horizontal plane, that has a common outlet at the site for its surface runoff from precipitation that normally drains by gravity into a stream. Drainage areas given herein include all closed basins, or noncontributing areas, within the area unless otherwise specified.

Drainage basin is a part of the Earth’s surface that contains a drainage system with a common outlet for its surface runoff. (See “Drainage area”)

Dry mass refers to the mass of residue present after drying in an oven at 105 °C, until the mass remains unchanged. This mass represents the total organic matter, ash and sediment, in the sample. Dry-mass values are expressed in the same units as ash mass. (See also “Ash mass,” “Biomass,” and “Wet mass”)

Dry weight refers to the weight of animal tissue after it has been dried in an oven at 65 °C until a constant weight is achieved. Dry weight represents total organic and inorganic matter in the tissue. (See also “Wet weight”)

Embeddedness is the degree to which gravel-sized and larger particles are surrounded or enclosed by finer-sized particles. (See also “Substrate embeddedness class”)

Enterococcus bacteria commonly are found in the feces of humans and other warmblooded animals. Although some strains are ubiquitous and not related to fecal pollution, the presence of enterococci in water is an indication of fecal pollution and the possible presence of enteric pathogens. Enterococcus bacteria are those bacteria that produce pink to red colonies with black or reddish-brown precipitate after incubation at 41 °C on mE agar (nutrient medium for bacterial growth) and subsequent transfer to EIA medium. Enterococci include *Streptococcus fecalis*, *Streptococcus*

faecium, *Streptococcus avium*, and their variants. (See also “Bacteria”)

EPT Index is the total number of distinct taxa within the insect orders Ephemeroptera, Plecoptera, and Trichoptera. This index summarizes the taxa richness within the aquatic insects that generally are considered pollution sensitive; the index usually decreases with pollution.

***Escherichia coli* (*E. coli*)** are bacteria present in the intestine and feces of warmblooded animals. *E. coli* are a member species of the fecal coliform group of indicator bacteria. In the laboratory, they are defined as those bacteria that produce yellow or yellow-brown colonies on a filter pad saturated with urea substrate broth after primary culturing for 22 to 24 hours at 44.5 °C on mTEC medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample. (See also “Bacteria”)

Estimated (E) value of a concentration is reported when an analyte is detected and all criteria for a positive result are met. If the concentration is less than the method detection limit (MDL), an E code will be reported with the value. If the analyte is identified qualitatively as present, but the quantitative determination is substantially more uncertain, the National Water Quality Laboratory will identify the result with an E code even though the measured value is greater than the MDL. A value reported with an E code should be used with caution. When no analyte is detected in a sample, the default reporting value is the MDL preceded by a less than sign (<). For bacteriological data, concentrations are reported as estimated when results are based on non-ideal colony counts.

Euglenoids (*Euglenophyta*) are a group of algae that usually are free-swimming and rarely creeping. They have the ability to grow either photosynthetically in the light or heterotrophically in the dark. (See also “Phytoplankton”)

Extractable organic halides (EOX) are organic compounds that contain halogen atoms such as chlorine. These organic compounds are semivolatile and extractable by ethyl acetate from air-dried streambed sediment. The ethyl acetate extract is combusted, and the concentration is determined by microcoulometric determination of the halides formed. The concentration is reported as micrograms of chlorine per gram of the dry weight of the streambed sediment.

Fecal coliform bacteria are present in the intestines or feces of warmblooded animals. They often are used as indicators of the sanitary quality of the water. In the laboratory, they are defined as all organisms that produce blue colonies within 24 hours when incubated at 44.5 °C plus or minus 0.2 °C on M-FC medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample. (See also “Bacteria”)

Fecal streptococcal bacteria are present in the intestines of warmblooded animals and are ubiquitous in the environment. They are characterized as gram-positive, cocci bacteria that are capable of growth in brain-heart infusion broth. In the laboratory, they are defined as all the organisms that produce red or pink colonies within 48 hours at 35 °C plus or minus 1.0 °C on KF-streptococcus medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample. (See also “Bacteria”)

Fire algae (*Pyrrhophyta*) are free-swimming unicells characterized by a red pigment spot. (See also “Phytoplankton”)

Flow-duration percentiles are values on a scale of 100 that indicate the percentage of time for which a flow is not exceeded. For example, the 90th percentile of river flow is greater than or equal to 90 percent of all recorded flow rates.

Gage datum is a horizontal surface used as a zero point for measurement of stage or gage height. This surface usually is located slightly below the lowest point of the stream bottom such that the gage height is usually slightly greater than the maximum depth of water. Because the gage datum is not an actual physical object, the datum is usually defined by specifying the elevations of permanent reference marks such as bridge abutments and survey monuments, and the gage is set to agree with the reference marks. Gage datum is a local datum that is maintained independently of any national geodetic datum. However, if the elevation of the gage datum relative to the national datum (North American Vertical Datum of 1988 or National Geodetic Vertical Datum of 1929) has been determined, then the gage readings can be converted to elevations above the national datum by adding the elevation of the gage datum to the gage reading.

Gage height (G.H.) is the water-surface elevation, in feet above the gage datum. If the water surface is below the gage datum, the gage height is negative. Gage height often is used interchangeably with the more general term “stage,” although gage height is more appropriate when used in reference to a reading on a gage.

Gage values are values that are recorded, transmitted, and/or computed from a gaging station. Gage values typically are collected at 5-, 15-, or 30-minute intervals.

Gaging station is a site on a stream, canal, lake, or reservoir where systematic observations of stage, discharge, or other hydrologic data are obtained.

Gas chromatography/flame ionization detector (GC/FID) is a laboratory analytical method used as a screening tech-

nique for semivolatile organic compounds that are extractable from water in methylene chloride.

Geomorphic channel units, as used in this report, are fluvial geomorphic descriptors of channel shape and stream velocity. Pools, riffles, and runs are types of geomorphic channel units considered for National Water-Quality Assessment (NAWQA) Program habitat sampling.

Green algae (*Chlorophyta*) are unicellular or colonial algae with chlorophyll pigments similar to those in terrestrial green plants. Some forms of green algae produce mats or floating “moss” in lakes. The abundance of green algae in phytoplankton samples is expressed as the number of cells per milliliter (cells/mL) or biovolume in cubic micrometers per milliliter ($\mu\text{m}^3/\text{mL}$). The abundance of green algae in periphyton samples is given in cells per square centimeter (cells/cm²) or biovolume per square centimeter ($\mu\text{m}^3/\text{cm}^2$). (See also “Phytoplankton” and “Periphyton”)

Habitat, as used in this report, includes all nonliving (physical) aspects of the aquatic ecosystem, although living components like aquatic macrophytes and riparian vegetation also are usually included. Measurements of habitat typically are made over a wider geographic scale than are measurements of species distribution.

Habitat quality index is the qualitative description (level 1) of instream habitat and riparian conditions surrounding the reach sampled. Scores range from 0 to 100 percent with higher scores indicative of desirable habitat conditions for aquatic life. Index only applicable to wadable streams.

Hardness of water is a physical-chemical characteristic that commonly is recognized by the increased quantity of soap required to produce lather. It is computed as the sum of equivalents of polyvalent cations (primarily calcium and magnesium) and is expressed as the equivalent concentration of calcium carbonate (CaCO₃).

High tide is the maximum height reached by each rising tide. The high-high and low-high tides are the higher and lower of the two high tides, respectively, of each tidal day. See NOAA Web site:
<http://www.co-ops.nos.noaa.gov/tideglos.html>

Hilsenhoff’s Biotic Index (HBI) is an indicator of organic pollution that uses tolerance values to weight taxa abundances; usually increases with pollution. It is calculated as follows:

$$HBI = \sum \frac{(n)(a)}{N},$$

where n is the number of individuals of each taxon, a is the tolerance value of each taxon, and N is the total number of organisms in the sample.

Horizontal datum (See “Datum”)

Hydrologic index stations referred to in this report are continuous-record gaging stations that have been selected as representative of streamflow patterns for their respective regions. Station locations are shown on index maps.

Hydrologic unit is a geographic area representing part or all of a surface drainage basin or distinct hydrologic feature as defined by the former Office of Water Data Coordination and delineated on the State Hydrologic Unit Maps by the USGS. Each hydrologic unit is identified by an 8-digit number.

Inch (IN., in.), in reference to streamflow, as used in this report, refers to the depth to which the drainage area would be covered with water if all of the runoff for a given time period were distributed uniformly on it. (See also “Annual runoff”)

Instantaneous discharge is the discharge at a particular instant of time. (See also “Discharge”)

International Boundary Commission Survey Datum refers to a geodetic datum established at numerous monuments along the United States-Canada boundary by the International Boundary Commission.

Island, as used in this report, is a mid-channel bar that has permanent woody vegetation, is flooded once a year, on average, and remains stable except during large flood events.

Laboratory reporting level (LRL) generally is equal to twice the yearly determined long-term method detection level (LT-MDL). The LRL controls false negative error. The probability of falsely reporting a nondetection for a sample that contained an analyte at a concentration equal to or greater than the LRL is predicted to be less than or equal to 1 percent. The value of the LRL will be reported with a “less than” (<) remark code for samples in which the analyte was not detected. The National Water Quality Laboratory (NWQL) collects quality-control data from selected analytical methods on a continuing basis to determine LT-MDLs and to establish LRLs. These values are reevaluated annually on the basis of the most current quality-control data and, therefore, may change. The LRL replaces the term ‘non-detection value’ (NDV).

Land-surface datum (lsd) is a datum plane that is approximately at land surface at each ground-water observation well.

Latent heat flux (often used interchangeably with latent heat-flux density) is the amount of heat energy that converts water from liquid to vapor (evaporation) or from vapor to liquid (condensation) across a specified cross-

sectional area per unit time. Usually expressed in watts per square meter.

Light-attenuation coefficient, also known as the extinction coefficient, is a measure of water clarity. Light is attenuated according to the Lambert-Beer equation:

$$I = I_o e^{-\lambda L},$$

where I_o is the source light intensity, I is the light intensity at length L (in meters) from the source, λ is the light-attenuation coefficient, and e is the base of the natural logarithm. The light-attenuation coefficient is defined as

$$\lambda = -\frac{1}{L} \log_e \frac{I}{I_o}.$$

Lipid is any one of a family of compounds that are insoluble in water and that make up one of the principal components of living cells. Lipids include fats, oils, waxes, and steroids. Many environmental contaminants such as organochlorine pesticides are lipophilic.

Long-term method detection level (LT-MDL) is a detection level derived by determining the standard deviation of a minimum of 24 method detection limit (MDL) spike-sample measurements over an extended period of time. LT-MDL data are collected on a continuous basis to assess year-to-year variations in the LT-MDL. The LT-MDL controls false positive error. The chance of falsely reporting a concentration at or greater than the LT-MDL for a sample that did not contain the analyte is predicted to be less than or equal to 1 percent.

Low tide is the minimum height reached by each falling tide. The high-low and low-low tides are the higher and lower of the two low tides, respectively, of each tidal day. See NOAA Web site:
<http://www.co-ops.nos.noaa.gov/tideglos.html>

Macrophytes are the macroscopic plants in the aquatic environment. The most common macrophytes are the rooted vascular plants that usually are arranged in zones in aquatic ecosystems and restricted in the area by the extent of illumination through the water and sediment deposition along the shoreline.

Mean concentration of suspended sediment (Daily mean suspended-sediment concentration) is the time-weighted concentration of suspended sediment passing a stream cross section during a given time period. (See also "Daily mean suspended-sediment concentration" and "Suspended-sediment concentration")

Mean discharge (MEAN) is the arithmetic mean of individual daily mean discharges during a specific period. (See also "Discharge")

Mean high or low tide is the average of all high or low tides, respectively, over a specific period.

Mean sea level is a local tidal datum. It is the arithmetic mean of hourly heights observed over the National Tidal Datum Epoch. Shorter series are specified in the name; for example, monthly mean sea level and yearly mean sea level. In order that they may be recovered when needed, such datums are referenced to fixed points known as benchmarks. (See also "Datum")

Measuring point (MP) is an arbitrary permanent reference point from which the distance to water surface in a well is measured to obtain water level.

Megahertz is a unit of frequency. One megahertz equals one million cycles per second.

Membrane filter is a thin microporous material of specific pore size used to filter bacteria, algae, and other very small particles from water.

Metamorphic stage refers to the stage of development that an organism exhibits during its transformation from an immature form to an adult form. This developmental process exists for most insects, and the degree of difference from the immature stage to the adult form varies from relatively slight to pronounced, with many intermediates. Examples of metamorphic stages of insects are egg-larva-adult or egg-nymph-adult.

Method detection limit (MDL) is the minimum concentration of a substance that can be measured and reported with 99-percent confidence that the analyte concentration is greater than zero. It is determined from the analysis of a sample in a given matrix containing the analyte. At the MDL concentration, the risk of a false positive is predicted to be less than or equal to 1 percent.

Method of Cubatures is a method of computing discharge in tidal estuaries based on the conservation of mass equation.

Methylene blue active substances (MBAS) indicate the presence of detergents (anionic surfactants). The determination depends on the formation of a blue color when methylene blue dye reacts with synthetic anionic detergent compounds.

Micrograms per gram (UG/G, $\mu\text{g/g}$) is a unit expressing the concentration of a chemical constituent as the mass (micrograms) of the element per unit mass (gram) of material analyzed.

Micrograms per kilogram (UG/KG, $\mu\text{g/kg}$) is a unit expressing the concentration of a chemical constituent as the mass (micrograms) of the constituent per unit mass

(kilogram) of the material analyzed. One microgram per kilogram is equivalent to 1 part per billion.

Micrograms per liter (UG/L, $\mu\text{g/L}$) is a unit expressing the concentration of chemical constituents in water as mass (micrograms) of constituent per unit volume (liter) of water. One thousand micrograms per liter is equivalent to 1 milligram per liter. One microgram per liter is equivalent to 1 part per billion.

Microsiemens per centimeter (US/CM, $\mu\text{S/cm}$) is a unit expressing the amount of electrical conductivity of a solution as measured between opposite faces of a centimeter cube of solution at a specified temperature. Siemens is the International System of Units nomenclature. It is synonymous with mhos and is the reciprocal of resistance in ohms.

Milligrams per liter (MG/L, mg/L) is a unit for expressing the concentration of chemical constituents in water as the mass (milligrams) of constituent per unit volume (liter) of water. Concentration of suspended sediment also is expressed in milligrams per liter and is based on the mass of dry sediment per liter of water-sediment mixture.

Minimum reporting level (MRL) is the smallest measured concentration of a constituent that may be reliably reported by using a given analytical method.

Miscellaneous site, miscellaneous station, or miscellaneous sampling site is a site where streamflow, sediment, and/or water-quality data or water-quality or sediment samples are collected once, or more often on a random or discontinuous basis to provide better areal coverage for defining hydrologic and water-quality conditions over a broad area in a river basin.

Most probable number (MPN) is an index of the number of coliform bacteria that, more probably than any other number, would give the results shown by the laboratory examination; it is not an actual enumeration. MPN is determined from the distribution of gas-positive cultures among multiple inoculated tubes.

Multiple-plate samplers are artificial substrates of known surface area used for obtaining benthic invertebrate samples. They consist of a series of spaced, hardboard plates on an eyebolt.

Nanograms per liter (NG/L, ng/L) is a unit expressing the concentration of chemical constituents in solution as mass (nanograms) of solute per unit volume (liter) of water. One million nanograms per liter is equivalent to 1 milligram per liter.

National Geodetic Vertical Datum of 1929 (NGVD 29) is a fixed reference adopted as a standard geodetic datum for

elevations determined by leveling. It formerly was called "Sea Level Datum of 1929" or "mean sea level." Although the datum was derived from the mean sea level at 26 tide stations, it does not necessarily represent local mean sea level at any particular place. See NOAA Web site: <http://www.ngs.noaa.gov/faq.shtml#WhatVD29VD88> (See "North American Vertical Datum of 1988")

Natural substrate refers to any naturally occurring immersed or submersed solid surface, such as a rock or tree, upon which an organism lives. (See also "Substrate")

Nekton are the consumers in the aquatic environment and consist of large, free-swimming organisms that are capable of sustained, directed mobility.

Nephelometric turbidity unit (NTU) is the measurement for reporting turbidity that is based on use of a standard suspension of formazin. Turbidity measured in NTU uses nephelometric methods that depend on passing specific light of a specific wavelength through the sample.

North American Datum of 1927 (NAD 27) is the horizontal control datum for the United States that was defined by a location and azimuth on the Clarke spheroid of 1866.

North American Datum of 1983 (NAD 83) is the horizontal control datum for the United States, Canada, Mexico, and Central America that is based on the adjustment of 250,000 points including 600 satellite Doppler stations that constrain the system to a geocentric origin. NAD 83 has been officially adopted as the legal horizontal datum for the United States by the Federal government.

North American Vertical Datum of 1988 (NAVD 88) is a fixed reference adopted as the official civilian vertical datum for elevations determined by Federal surveying and mapping activities in the United States. This datum was established in 1991 by minimum-constraint adjustment of the Canadian, Mexican, and United States first-order terrestrial leveling networks.

Open or screened interval is the length of unscreened opening or of well screen through which water enters a well, in feet below land surface.

Organic carbon (OC) is a measure of organic matter present in aqueous solution, suspension, or bottom sediment. May be reported as dissolved organic carbon (DOC), particulate organic carbon (POC), or total organic carbon (TOC).

Organic mass or **volatile mass** of a living substance is the difference between the dry mass and ash mass and represents the actual mass of the living matter. Organic mass is expressed in the same units as for ash mass and dry mass. (See also "Ash mass," "Biomass," and "Dry mass")

Organism count/area refers to the number of organisms collected and enumerated in a sample and adjusted to the number per area habitat, usually square meter (m²), acre, or hectare. Periphyton, benthic organisms, and macrophytes are expressed in these terms.

Organism count/volume refers to the number of organisms collected and enumerated in a sample and adjusted to the number per sample volume, usually milliliter (mL) or liter (L). Numbers of planktonic organisms can be expressed in these terms.

Organochlorine compounds are any chemicals that contain carbon and chlorine. Organochlorine compounds that are important in investigations of water, sediment, and biological quality include certain pesticides and industrial compounds.

Parameter code is a 5-digit number used in the USGS computerized data system, National Water Information System (NWIS), to uniquely identify a specific constituent or property.

Partial-record station is a site where discrete measurements of one or more hydrologic parameters are obtained over a period of time without continuous data being recorded or computed. A common example is a crest-stage gage partial-record station at which only peak stages and flows are recorded.

Particle size is the diameter, in millimeters (mm), of a particle determined by sieve or sedimentation methods. The sedimentation method uses the principle of Stokes Law to calculate sediment particle sizes. Sedimentation methods (pipet, bottom-withdrawal tube, visual-accumulation tube, sedigraph) determine fall diameter of particles in either distilled water (chemically dispersed) or in native water (the river water at the time and point of sampling).

Particle-size classification, as used in this report, agrees with the recommendation made by the American Geophysical Union Subcommittee on Sediment Terminology. The classification is as follows:

Classification	Size (mm)	Method of analysis
Clay	>0.00024 - 0.004	Sedimentation
Silt	>0.004 - 0.062	Sedimentation
Sand	>0.062 - 2.0	Sedimentation/sieve
Gravel	>2.0 - 64.0	Sieve
Cobble	>64 - 256	Manual measurement
Boulder	>256	Manual measurement

The particle-size distributions given in this report are not necessarily representative of all particles in transport in the stream. For the sedimentation method, most of the organic matter is removed, and the sample is subjected to mechani-

cal and chemical dispersion before analysis in distilled water. Chemical dispersion is not used for native water analysis.

Peak flow (peak stage) is an instantaneous local maximum value in the continuous time series of streamflows or stages, preceded by a period of increasing values and followed by a period of decreasing values. Several peak values ordinarily occur in a year. The maximum peak value in a year is called the annual peak; peaks lower than the annual peak are called secondary peaks. Occasionally, the annual peak may not be the maximum value for the year; in such cases, the maximum value occurs at midnight at the beginning or end of the year, on the recession from or rise toward a higher peak in the adjoining year. If values are recorded at a discrete series of times, the peak recorded value may be taken as an approximation of the true peak, which may occur between the recording instants. If the values are recorded with finite precision, a sequence of equal recorded values may occur at the peak; in this case, the first value is taken as the peak.

Percent composition or percent of total is a unit for expressing the ratio of a particular part of a sample or population to the total sample or population, in terms of types, numbers, weight, mass, or volume.

Percent shading is a measure of the amount of sunlight potentially reaching the stream. A clinometer is used to measure left and right bank canopy angles. These values are added together, divided by 180, and multiplied by 100 to compute percentage of shade.

Periodic-record station is a site where stage, discharge, sediment, chemical, physical, or other hydrologic measurements are made one or more times during a year but at a frequency insufficient to develop a daily record.

Periphyton is the assemblage of microorganisms attached to and living upon submerged solid surfaces. Although primarily consisting of algae, they also include bacteria, fungi, protozoa, rotifers, and other small organisms. Periphyton are useful indicators of water quality.

Pesticides are chemical compounds used to control undesirable organisms. Major categories of pesticides include insecticides, miticides, fungicides, herbicides, and rodenticides.

pH of water is the negative logarithm of the hydrogen-ion activity. Solutions with pH less than 7.0 standard units are termed "acidic," and solutions with a pH greater than 7.0 are termed "basic." Solutions with a pH of 7.0 are neutral. The presence and concentration of many dissolved chemical constituents found in water are affected, in part, by the hydrogen-ion activity of water. Biological processes including growth, distribution of organisms, and toxicity of

the water to organisms also are affected, in part, by the hydrogen-ion activity of water.

Phytoplankton is the plant part of the plankton. They usually are microscopic, and their movement is subject to the water currents. Phytoplankton growth is dependent upon solar radiation and nutrient substances. Because they are able to incorporate as well as release materials to the surrounding water, the phytoplankton have a profound effect upon the quality of the water. They are the primary food producers in the aquatic environment and commonly are known as algae. (See also "Plankton")

Picocurie (PC, pCi) is one-trillionth (1×10^{-12}) of the amount of radioactive nuclide represented by a curie (Ci). A curie is the quantity of radioactive nuclide that yields 3.7×10^{10} radioactive disintegrations per second (dps). A picocurie yields 0.037 dps, or 2.22 dpm (disintegrations per minute).

Plankton is the community of suspended, floating, or weakly swimming organisms that live in the open water of lakes and rivers. Concentrations are expressed as a number of cells per milliliter (cells/mL) of sample.

Polychlorinated biphenyls (PCBs) are industrial chemicals that are mixtures of chlorinated biphenyl compounds having various percentages of chlorine. They are similar in structure to organochlorine insecticides.

Polychlorinated naphthalenes (PCNs) are industrial chemicals that are mixtures of chlorinated naphthalene compounds. They have properties and applications similar to polychlorinated biphenyls (PCBs) and have been identified in commercial PCB preparations.

Pool, as used in this report, is a small part of a stream reach with little velocity, commonly with water deeper than surrounding areas.

Primary productivity is a measure of the rate at which new organic matter is formed and accumulated through photosynthetic and chemosynthetic activity of producer organisms (chiefly, green plants). The rate of primary production is estimated by measuring the amount of oxygen released (oxygen method) or the amount of carbon assimilated (carbon method) by the plants.

Primary productivity (carbon method) is expressed as milligrams of carbon per area per unit time [$\text{mg C}/(\text{m}^2/\text{time})$] for periphyton and macrophytes or per volume [$\text{mg C}/(\text{m}^3/\text{time})$] for phytoplankton. The carbon method defines the amount of carbon dioxide consumed as measured by radioactive carbon (carbon-14). The carbon-14 method is of greater sensitivity than the oxygen light- and dark-bottle method and is preferred for use with unenriched water samples.

Unit time may be either the hour or day, depending on the incubation period. (See also "Primary productivity")

Primary productivity (oxygen method) is expressed as milligrams of oxygen per area per unit time [$\text{mg O}/(\text{m}^2/\text{time})$] for periphyton and macrophytes or per volume [$\text{mg O}/(\text{m}^3/\text{time})$] for phytoplankton. The oxygen method defines production and respiration rates as estimated from changes in the measured dissolved-oxygen concentration. The oxygen light- and dark-bottle method is preferred if the rate of primary production is sufficient for accurate measurements to be made within 24 hours. Unit time may be either the hour or day, depending on the incubation period. (See also "Primary productivity")

Radioisotopes are isotopic forms of elements that exhibit radioactivity. Isotopes are varieties of a chemical element that differ in atomic weight but are very nearly alike in chemical properties. The difference arises because the atoms of the isotopic forms of an element differ in the number of neutrons in the nucleus; for example, ordinary chlorine is a mixture of isotopes having atomic weights of 35 and 37, and the natural mixture has an atomic weight of about 35.453. Many of the elements similarly exist as mixtures of isotopes, and a great many new isotopes have been produced in the operation of nuclear devices such as the cyclotron. There are 275 isotopes of the 81 stable elements, in addition to more than 800 radioactive isotopes.

Reach, as used in this report, is a length of stream that is chosen to represent a uniform set of physical, chemical, and biological conditions within a segment. It is the principal sampling unit for collecting physical, chemical, and biological data.

Recoverable from bed (bottom) material is the amount of a given constituent that is in solution after a representative sample of bottom material has been digested by a method (usually using an acid or mixture of acids) that results in dissolution of readily soluble substances. Complete dissolution of all bottom material is not achieved by the digestion treatment and thus the determination represents less than the total amount (that is, less than 95 percent) of the constituent in the sample. To achieve comparability of analytical data, equivalent digestion procedures would be required of all laboratories performing such analyses because different digestion procedures are likely to produce different analytical results. (See also "Bed material")

Recurrence interval, also referred to as return period, is the average time, usually expressed in years, between occurrences of hydrologic events of a specified type (such as exceedances of a specified high flow or nonexceedance of a specified low flow). The terms "return period" and "recurrence interval" do not imply regular cyclic occurrence. The actual times between occurrences vary randomly, with most of the times being less than the average and a few

being substantially greater than the average. For example, the 100-year flood is the flow rate that is exceeded by the annual maximum peak flow at intervals whose average length is 100 years (that is, once in 100 years, on average); almost two-thirds of all exceedances of the 100-year flood occur less than 100 years after the previous exceedance, half occur less than 70 years after the previous exceedance, and about one-eighth occur more than 200 years after the previous exceedance. Similarly, the 7-day, 10-year low flow ($7Q_{10}$) is the flow rate below which the annual minimum 7-day-mean flow dips at intervals whose average length is 10 years (that is, once in 10 years, on average); almost two-thirds of the nonexceedances of the $7Q_{10}$ occur less than 10 years after the previous nonexceedance, half occur less than 7 years after, and about one-eighth occur more than 20 years after the previous nonexceedance. The recurrence interval for annual events is the reciprocal of the annual probability of occurrence. Thus, the 100-year flood has a 1-percent chance of being exceeded by the maximum peak flow in any year, and there is a 10-percent chance in any year that the annual minimum 7-day-mean flow will be less than the $7Q_{10}$.

Replicate samples are a group of samples collected in a manner such that the samples are thought to be essentially identical in composition.

Return period (See “Recurrence interval”)

Riffle, as used in this report, is a shallow part of the stream where water flows swiftly over completely or partially submerged obstructions to produce surface agitation.

River mileage is the curvilinear distance, in miles, measured upstream from the mouth along the meandering path of a stream channel in accordance with Bulletin No. 14 (October 1968) of the Water Resources Council and typically is used to denote location along a river.

Run, as used in this report, is a relatively shallow part of a stream with moderate velocity and little or no surface turbulence.

Runoff is the quantity of water that is discharged (“runs off”) from a drainage basin during a given time period. Runoff data may be presented as volumes in acre-feet, as mean discharges per unit of drainage area in cubic feet per second per square mile, or as depths of water on the drainage basin in inches. (See also “Annual runoff”)

Sea level, as used in this report, refers to one of the two commonly used national vertical datums (NGVD 1929 or NAVD 1988). See separate entries for definitions of these datums.

Sediment is solid material that originates mostly from disintegrated rocks; when transported by, suspended in, or deposited from water, it is referred to as “fluvial sediment.” Sediment includes chemical and biochemical precipitates and decomposed organic material, such as humus. The quantity, characteristics, and cause of the occurrence of sediment in streams are affected by environmental and land-use factors. Some major factors are topography, soil characteristics, land cover, and depth and intensity of precipitation.

Sensible heat flux (often used interchangeably with latent sensible heat-flux density) is the amount of heat energy that moves by turbulent transport through the air across a specified cross-sectional area per unit time and goes to heating (cooling) the air. Usually expressed in watts per square meter.

Seven-day, 10-year low flow ($7Q_{10}$) is the discharge below which the annual 7-day minimum flow falls in 1 year out of 10 on the long-term average. The recurrence interval of the $7Q_{10}$ is 10 years; the chance that the annual 7-day minimum flow will be less than the $7Q_{10}$ is 10 percent in any given year. (See also “Annual 7-day minimum” and “Recurrence interval”)

Shelves, as used in this report, are streambank features extending nearly horizontally from the flood plain to the lower limit of persistent woody vegetation.

Sodium adsorption ratio (SAR) is the expression of relative activity of sodium ions in exchange reactions within soil and is an index of sodium or alkali hazard to the soil. Sodium hazard in water is an index that can be used to evaluate the suitability of water for irrigating crops.

Soil heat flux (often used interchangeably with soil heat-flux density) is the amount of heat energy that moves by conduction across a specified cross-sectional area of soil per unit time and goes to heating (or cooling) the soil. Usually expressed in watts per square meter.

Soil-water content is the water lost from the soil upon drying to constant mass at 105 °C; expressed either as mass of water per unit mass of dry soil or as the volume of water per unit bulk volume of soil.

Specific electrical conductance (conductivity) is a measure of the capacity of water (or other media) to conduct an electrical current. It is expressed in microsiemens per centimeter at 25 °C. Specific electrical conductance is a function of the types and quantity of dissolved substances in water and can be used for approximating the dissolved-solids content of the water. Commonly, the concentration of dissolved solids (in milligrams per liter) is from 55 to 75 percent of the specific conductance (in microsiemens). This relation is not constant from stream to stream, and it

may vary in the same source with changes in the composition of the water.

Stable isotope ratio (per MIL) is a unit expressing the ratio of the abundance of two radioactive isotopes. Isotope ratios are used in hydrologic studies to determine the age or source of specific water, to evaluate mixing of different water, as an aid in determining reaction rates, and other chemical or hydrologic processes.

Stage (See “Gage height”)

Stage-discharge relation is the relation between the water-surface elevation, termed stage (gage height), and the volume of water flowing in a channel per unit time.

Streamflow is the discharge that occurs in a natural channel. Although the term “discharge” can be applied to the flow of a canal, the word “streamflow” uniquely describes the discharge in a surface stream course. The term “streamflow” is more general than “runoff” as streamflow may be applied to discharge whether or not it is affected by diversion or regulation.

Substrate is the physical surface upon which an organism lives.

Substrate embeddedness class is a visual estimate of riffle streambed substrate larger than gravel that is surrounded or covered by fine sediment (<2 mm, sand or finer). Below are the class categories expressed as the percentage covered by fine sediment:

0	no gravel or larger substrate	3	26-50 percent
1	> 75 percent	4	5-25 percent
2	51-75 percent	5	< 5 percent

Surface area of a lake is that area (acres) encompassed by the boundary of the lake as shown on USGS topographic maps, or other available maps or photographs. Because surface area changes with lake stage, surface areas listed in this report represent those determined for the stage at the time the maps or photographs were obtained.

Surficial bed material is the upper surface (0.1 to 0.2 foot) of the bed material that is sampled using U.S. Series Bed-Material Samplers.

Surrogate is an analyte that behaves similarly to a target analyte, but that is highly unlikely to occur in a sample. A surrogate is added to a sample in known amounts before extraction and is measured with the same laboratory procedures used to measure the target analyte. Its purpose is to monitor method performance for an individual sample.

Suspended (as used in tables of chemical analyses) refers to the amount (concentration) of undissolved material in a water-sediment mixture. It is defined operationally as the material retained on a 0.45-micrometer filter.

Suspended, recoverable is the amount of a given constituent that is in solution after the part of a representative suspended water-sediment sample that is retained on a 0.45-micrometer membrane filter has been digested by a method (usually using a dilute acid solution) that results in dissolution of only readily soluble substances. Complete dissolution of all the particulate matter is not achieved by the digestion treatment, and, thus, the determination represents something less than the “total” amount (that is, less than 95 percent) of the constituent present in the sample. To achieve comparability of analytical data, equivalent digestion procedures are required of all laboratories performing such analyses because different digestion procedures are likely to produce different analytical results. Determinations of “suspended, recoverable” constituents are made either by directly analyzing the suspended material collected on the filter or, more commonly, by difference, on the basis of determinations of (1) dissolved and (2) total recoverable concentrations of the constituent. (See also “Suspended”)

Suspended sediment is the sediment maintained in suspension by the upward components of turbulent currents or that exists in suspension as a colloid. (See also “Sediment”)

Suspended-sediment concentration is the velocity-weighted concentration of suspended sediment in the sampled zone (from the water surface to a point approximately 0.3 foot above the bed) expressed as milligrams of dry sediment per liter of water-sediment mixture (mg/L). The analytical technique uses the mass of all of the sediment and the net weight of the water-sediment mixture in a sample to compute the suspended-sediment concentration. (See also “Sediment” and “Suspended sediment”)

Suspended-sediment discharge (tons/d) is the rate of sediment transport, as measured by dry mass or volume, that passes a cross section in a given time. It is calculated in units of tons per day as follows: concentration (mg/L) x discharge (ft³/s) x 0.0027. (See also “Sediment,” “Suspended sediment,” and “Suspended-sediment concentration”)

Suspended-sediment load is a general term that refers to a given characteristic of the material in suspension that passes a point during a specified period of time. The term needs to be qualified, such as “annual suspended-sediment load” or “sand-size suspended-sediment load,” and so on. It is not synonymous with either suspended-sediment discharge or concentration. (See also “Sediment”)

Suspended solids, total residue at 105 °C concentration is the concentration of inorganic and organic material retained on a filter, expressed as milligrams of dry material per liter of water (mg/L). An aliquot of the sample is used for this analysis.

Suspended, total is the total amount of a given constituent in the part of a water-sediment sample that is retained on a 0.45-micrometer membrane filter. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent determined. Knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to determine when the results should be reported as “suspended, total.” Determinations of “suspended, total” constituents are made either by directly analyzing portions of the suspended material collected on the filter or, more commonly, by difference, on the basis of determinations of (1) dissolved and (2) total concentrations of the constituent. (See also “Suspended”)

Synoptic studies are short-term investigations of specific water-quality conditions during selected seasonal or hydrologic periods to provide improved spatial resolution for critical water-quality conditions. For the period and conditions sampled, they assess the spatial distribution of selected water-quality conditions in relation to causative factors, such as land use and contaminant sources.

Taxa (Species) richness is the number of species (taxa) present in a defined area or sampling unit.

Taxonomy is the division of biology concerned with the classification and naming of organisms. The classification of organisms is based upon a hierarchical scheme beginning with Kingdom and ending with Species at the base. The higher the classification level, the fewer features the organisms have in common. For example, the taxonomy of a particular mayfly, *Hexagenia limbata*, is the following:

Kingdom:	Animal
Phylum:	Arthropoda
Class:	Insecta
Order:	Ephemeroptera
Family:	Ephemeridae
Genus:	<i>Hexagenia</i>
Species:	<i>Hexagenia limbata</i>

Thalweg is the line formed by connecting points of minimum streambed elevation (deepest part of the channel).

Thermograph is an instrument that continuously records variations of temperature on a chart. The more general term “temperature recorder” is used in the table descriptions and refers to any instrument that records temperature whether on a chart, a tape, or any other medium.

Time-weighted average is computed by multiplying the number of days in the sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the total number of days. A time-weighted average represents the composition of water resulting from the mixing of flow proportionally to the duration of the concentration.

Tons per acre-foot (T/acre-ft) is the dry mass (tons) of a constituent per unit volume (acre-foot) of water. It is computed by multiplying the concentration of the constituent, in milligrams per liter, by 0.00136.

Tons per day (T/DAY, tons/d) is a common chemical or sediment discharge unit. It is the quantity of a substance in solution, in suspension, or as bedload that passes a stream section during a 24-hour period. It is equivalent to 2,000 pounds per day, or 0.9072 metric ton per day.

Total is the amount of a given constituent in a representative whole-water (unfiltered) sample, regardless of the constituent’s physical or chemical form. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent present in both the dissolved and suspended phases of the sample. A knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to judge when the results should be reported as “total.” (Note that the word “total” does double duty here, indicating both that the sample consists of a water-suspended sediment mixture and that the analytical method determined at least 95 percent of the constituent in the sample.)

Total coliform bacteria are a particular group of bacteria that are used as indicators of possible sewage pollution. This group includes coliforms that inhabit the intestine of warmblooded animals and those that inhabit soils. They are characterized as aerobic or facultative anaerobic, gram-negative, nonspore-forming, rod-shaped bacteria that ferment lactose with gas formation within 48 hours at 35 °C. In the laboratory, these bacteria are defined as all the organisms that produce colonies with a golden-green metallic sheen within 24 hours when incubated at 35 °C plus or minus 1.0 °C on M-Endo medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 milliliters of sample. (See also “Bacteria”)

Total discharge is the quantity of a given constituent, measured as dry mass or volume, that passes a stream cross section per unit of time. When referring to constituents other than water, this term needs to be qualified, such as “total sediment discharge,” “total chloride discharge,” and so on.

Total in bottom material is the amount of a given constituent in a representative sample of bottom material. This

term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent determined. A knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to judge when the results should be reported as “total in bottom material.”

Total length (fish) is the straight-line distance from the anterior point of a fish specimen’s snout, with the mouth closed, to the posterior end of the caudal (tail) fin, with the lobes of the caudal fin squeezed together.

Total load refers to all of a constituent in transport. When referring to sediment, it includes suspended load plus bed load.

Total organism count is the number of organisms collected and enumerated in any particular sample. (See also “Organism count/volume”)

Total recoverable is the amount of a given constituent in a whole-water sample after a sample has been digested by a method (usually using a dilute acid solution) that results in dissolution of only readily soluble substances. Complete dissolution of all particulate matter is not achieved by the digestion treatment, and thus the determination represents something less than the “total” amount (that is, less than 95 percent) of the constituent present in the dissolved and suspended phases of the sample. To achieve comparability of analytical data for whole-water samples, equivalent digestion procedures are required of all laboratories performing such analyses because different digestion procedures may produce different analytical results.

Total sediment discharge is the mass of suspended-sediment plus bed-load transport, measured as dry weight, that passes a cross section in a given time. It is a rate and is reported as tons per day. (See also “Bedload,” “Bedload discharge,” “Sediment,” “Suspended sediment,” and “Suspended-sediment concentration”)

Total sediment load or **total load** is the sediment in transport as bedload and suspended-sediment load. The term may be qualified, such as “annual suspended-sediment load” or “sand-size suspended-sediment load,” and so on. It differs from total sediment discharge in that load refers to the material, whereas discharge refers to the quantity of material, expressed in units of mass per unit time. (See also “Sediment,” “Suspended-sediment load,” and “Total load”)

Transect, as used in this report, is a line across a stream perpendicular to the flow and along which measurements are taken, so that morphological and flow characteristics along the line are described from bank to bank. Unlike a cross section, no attempt is made to determine known elevation points along the line.

Turbidity is the reduction in the transparency of a solution because of the presence of suspended and some dissolved substances. The measurement technique records the collective optical properties of the solution that cause light to be scattered and attenuated rather than transmitted in straight lines; the higher the intensity of scattered or attenuated light, the higher the value of the turbidity. Turbidity is expressed in nephelometric turbidity units (NTU). Depending on the method used, the turbidity units as NTU can be defined as the intensity of light of a specified wavelength scattered or attenuated by suspended particles or absorbed at a method specified angle, usually 90 degrees, from the path of the incident light. Currently approved methods for the measurement of turbidity in the USGS include those that conform to USEPA Method 180.1, ASTM D1889-00, and ISO 7027. Measurements of turbidity by these different methods and different instruments are unlikely to yield equivalent values.

Ultraviolet (UV) absorbance (absorption) at 254 or 280 nanometers is a measure of the aggregate concentration of the mixture of UV absorbing organic materials dissolved in the analyzed water, such as lignin, tannin, humic substances, and various aromatic compounds. UV absorbance (absorption) at 254 or 280 nanometers is measured in UV absorption units per centimeter of path length of UV light through a sample.

Unconfined aquifer is an aquifer whose upper surface is a water table free to fluctuate under atmospheric pressure. (See “Water-table aquifer”)

Vertical datum (See “Datum”)

Volatile organic compounds (VOCs) are organic compounds that can be isolated from the water phase of a sample by purging the water sample with inert gas, such as helium, and, subsequently, analyzed by gas chromatography. Many VOCs are human-made chemicals that are used and produced in the manufacture of paints, adhesives, petroleum products, pharmaceuticals, and refrigerants. They often are components of fuels, solvents, hydraulic fluids, paint thinners, and dry-cleaning agents commonly used in urban settings. VOC contamination of drinking-water supplies is a human-health concern because many are toxic and are known or suspected human carcinogens.

Water table is that surface in a ground-water body at which the water pressure is equal to the atmospheric pressure.

Water-table aquifer is an unconfined aquifer within which the water table is found.

Water year in USGS reports dealing with surface-water supply is the 12-month period October 1 through September 30. The water year is designated by the calendar year in which it ends and which includes 9 of the

12 months. Thus, the year ending September 30, 2002, is called the “2002 water year.”

Watershed (See “Drainage basin”)

WDR is used as an abbreviation for “Water-Data Report” in the REVISED RECORDS paragraph to refer to State annual hydrologic-data reports. (WRD was used as an abbreviation for “Water-Resources Data” in reports published prior to 1976.)

Weighted average is used in this report to indicate discharge-weighted average. It is computed by multiplying the discharge for a sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the sum of the discharges. A discharge-weighted average approximates the composition of water that would be found in a reservoir containing all the water passing a given location during the water year after thorough mixing in the reservoir.

Wet mass is the mass of living matter plus contained water. (See also “Biomass” and “Dry mass”)

Wet weight refers to the weight of animal tissue or other substance including its contained water. (See also “Dry weight”)

WSP is used as an acronym for “Water-Supply Paper” in reference to previously published reports.

Zooplankton is the animal part of the plankton. Zooplankton are capable of extensive movements within the water column and often are large enough to be seen with the unaided eye. Zooplankton are secondary consumers feeding upon bacteria, phytoplankton, and detritus. Because they are the grazers in the aquatic environment, the zooplankton are a vital part of the aquatic food web. The zooplankton community is dominated by small crustaceans and rotifers. (See also “Plankton”)

TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS OF THE U.S. GEOLOGICAL SURVEY

The USGS publishes a series of manuals, the Techniques of Water-Resources Investigations, describing procedures for planning and conducting specialized work in water-resources investigations. The material is grouped under major subject headings called books and is further divided into sections and chapters. For example, section A of book 3 (Applications of Hydraulics) pertains to surface water. The chapter, the unit of publication, is limited to a narrow field of subject matter. This format permits flexibility in revision and publication as the need arises.

Reports in the Techniques of Water-Resources Investigations series, which are listed below, are online at <http://water.usgs.gov/pubs/twri/>. Printed copies are for sale by the USGS, Information Services, Box 25286, Federal Center, Denver, Colorado 80225 (authorized agent of the Superintendent of Documents, Government Printing Office), telephone 1-888-ASK-USGS. Please telephone 1-888-ASK-USGS for current prices, and refer to the title, book number, chapter number, and mention the "U.S. Geological Survey Techniques of Water-Resources Investigations." Products can then be ordered by telephone, or online at <http://www.usgs.gov/sales.html>, or by FAX to (303) 236-469 of an order form available online at <http://mac.usgs.gov/isb/pubs/forms/>. Prepayment by major credit card or by a check or money order payable to the "U.S. Geological Survey" is required.

Book 1. Collection of Water Data by Direct Measurement

Section D. Water Quality

- 1–D1. *Water temperature—Influential factors, field measurement, and data presentation*, by H.H. Stevens, Jr., J.F. Ficke, and G.F. Smoot: USGS–TWRI book 1, chap. D1. 1975. 65 p.
- 1–D2. *Guidelines for collection and field analysis of ground-water samples for selected unstable constituents*, by W.W. Wood: USGS–TWRI book 1, chap. D2. 1976. 24 p.

Book 2. Collection of Environmental Data

Section D. Surface Geophysical Methods

- 2–D1. *Application of surface geophysics to ground-water investigations*, by A.A.R. Zohdy, G.P. Eaton, and D.R. Mabey: USGS–TWRI book 2, chap. D1. 1974. 116 p.

- 2–D2. *Application of seismic-refraction techniques to hydrologic studies*, by F.P. Haeni: USGS–TWRI book 2, chap. D2. 1988. 86 p.

Section E. Subsurface Geophysical Methods

- 2–E1. *Application of borehole geophysics to water-resources investigations*, by W.S. Keys and L.M. MacCary: USGS–TWRI book 2, chap. E1. 1971. 126 p.
- 2–E2. *Borehole geophysics applied to ground-water investigations*, by W.S. Keys: USGS–TWRI book 2, chap. E2. 1990. 150 p.

Section F. Drilling and Sampling Methods

- 2–F1. *Application of drilling, coring, and sampling techniques to test holes and wells*, by Eugene Shuter and W.E. Teasdale: USGS–TWRI book 2, chap. F1. 1989. 97 p.

Book 3. Applications of Hydraulics

Section A. Surface-Water Techniques

- 3–A1. *General field and office procedures for indirect discharge measurements*, by M.A. Benson and Tate Dalrymple: USGS–TWRI book 3, chap. A1. 1967. 30 p.
- 3–A2. *Measurement of peak discharge by the slope-area method*, by Tate Dalrymple and M.A. Benson: USGS–TWRI book 3, chap. A2. 1967. 12 p.
- 3–A3. *Measurement of peak discharge at culverts by indirect methods*, by G.L. Bodhaine: USGS–TWRI book 3, chap. A3. 1968. 60 p.
- 3–A4. *Measurement of peak discharge at width contractions by indirect methods*, by H.F. Matthai: USGS–TWRI book 3, chap. A4. 1967. 44 p.
- 3–A5. *Measurement of peak discharge at dams by indirect methods*, by Harry Hulsing: USGS–TWRI book 3, chap. A5. 1967. 29 p.
- 3–A6. *General procedure for gaging streams*, by R.W. Carter and Jacob Davidian: USGS–TWRI book 3, chap. A6. 1968. 13 p.
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- 3–A8. *Discharge measurements at gaging stations*, by T.J. Buchanan and W.P. Somers: USGS–TWRI book 3, chap. A8. 1969. 65 p.
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- Wilson, Jr.: USGS–TWRI book 3, chap. A9. 1989. 27 p.
- 3–A10. *Discharge ratings at gaging stations*, by E.J. Kennedy: USGS–TWRI book 3, chap. A10. 1984. 59 p.
- 3–A11. *Measurement of discharge by the moving-boat method*, by G.F. Smoot and C.E. Novak: USGS–TWRI book 3, chap. A11. 1969. 22 p.
- 3–A12. *Fluorometric procedures for dye tracing*, Revised, by J.F. Wilson, Jr., E.D. Cobb, and F.A. Kilpatrick: USGS–TWRI book 3, chap. A12. 1986. 34 p.
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- 3–A19. *Levels at streamflow gaging stations*, by E.J. Kennedy: USGS–TWRI book 3, chap. A19. 1990. 31 p.
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- Section B. Ground-Water Techniques**
- 3–B1. *Aquifer-test design, observation, and data analysis*, by R.W. Stallman: USGS–TWRI book 3, chap. B1. 1971. 26 p.
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- 3–B4. *Regression modeling of ground-water flow*, by R.L. Cooley and R.L. Naff: USGS–TWRI book 3, chap. B4. 1990. 232 p.
- 3–B4. *Supplement 1. Regression modeling of ground-water flow—Modifications to the computer code for nonlinear regression solution of steady-state ground-water flow problems*, by R.L. Cooley: USGS–TWRI book 3, chap. B4. 1993. 8 p.
- 3–B5. *Definition of boundary and initial conditions in the analysis of saturated ground-water flow systems—An introduction*, by O.L. Franke, T.E. Reilly, and G.D. Bennett: USGS–TWRI book 3, chap. B5. 1987. 15 p.
- 3–B6. *The principle of superposition and its application in ground-water hydraulics*, by T.E. Reilly, O.L. Franke, and G.D. Bennett: USGS–TWRI book 3, chap. B6. 1987. 28 p.
- 3–B7. *Analytical solutions for one-, two-, and three-dimensional solute transport in ground-water systems with uniform flow*, by E.J. Wexler: USGS–TWRI book 3, chap. B7. 1992. 190 p.
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- Section C. Sedimentation and Erosion Techniques**
- 3–C1. *Fluvial sediment concepts*, by H.P. Guy: USGS–TWRI book 3, chap. C1. 1970. 55 p.
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- 4–A1. *Some statistical tools in hydrology*, by H.C. Riggs: USGS–TWRI book 4, chap. A1. 1968. 39 p.
- 4–A2. *Frequency curves*, by H.C. Riggs: USGS–TWRI book 4, chap. A2. 1968. 15 p.

- 4–A3. *Statistical methods in water resources*, by D.R. Helsel and R.M. Hirsch: USGS–TWRI book 4, chap. A3. 1991. Available only online at <http://water.usgs.gov/pubs/twri/twri4a3/>. (Accessed August 30, 2002.)

Section B. Surface Water

- 4–B1. *Low-flow investigations*, by H.C. Riggs: USGS–TWRI book 4, chap. B1. 1972. 18 p.
- 4–B2. *Storage analyses for water supply*, by H.C. Riggs and C.H. Hardison: USGS–TWRI book 4, chap. B2. 1973. 20 p.
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Section D. Interrelated Phases of the Hydrologic Cycle

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Book 5. Laboratory Analysis

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- 5–A1. *Methods for determination of inorganic substances in water and fluvial sediments*, by M.J. Fishman and L.C. Friedman, editors: USGS–TWRI book 5, chap. A1. 1989. 545 p.
- 5–A2. *Determination of minor elements in water by emission spectroscopy*, by P.R. Barnett and E.C. Mallory, Jr.: USGS–TWRI book 5, chap. A2. 1971. 31 p.
- 5–A3. *Methods for the determination of organic substances in water and fluvial sediments*, edited by R.L. Wershaw, M.J. Fishman, R.R. Grabbe, and L.E. Lowe: USGS–TWRI book 5, chap. A3. 1987. 80 p.
- 5–A4. *Methods for collection and analysis of aquatic biological and microbiological samples*, by L.J. Britton and P.E. Greeson, editors: USGS–TWRI book 5, chap. A4. 1989. 363 p.
- 5–A5. *Methods for determination of radioactive substances in water and fluvial sediments*, by L.L. Thatcher, V.J. Janzer, and K.W. Edwards: USGS–TWRI book 5, chap. A5. 1977. 95 p.
- 5–A6. *Quality assurance practices for the chemical and biological analyses of water and fluvial sediments*, by L.C. Friedman and D.E. Erdmann: USGS–TWRI book 5, chap. A6. 1982. 181 p.

Section C. Sediment Analysis

- 5–C1. *Laboratory theory and methods for sediment analysis*, by H.P. Guy: USGS–TWRI book 5, chap. C1. 1969. 58 p.

Book 6. Modeling Techniques

Section A. Ground Water

- 6–A1. *A modular three-dimensional finite-difference ground-water flow model*, by M.G. McDonald and A.W. Harbaugh: USGS–TWRI book 6, chap. A1. 1988. 586 p.
- 6–A2. *Documentation of a computer program to simulate aquifer-system compaction using the modular finite-difference ground-water flow model*, by S.A. Leake and D.E. Prudic: USGS–TWRI book 6, chap. A2. 1991. 68 p.
- 6–A3. *A modular finite-element model (MODFE) for areal and axisymmetric ground-water-flow problems, Part 1: Model Description and User's Manual*, by L.J. Torak: USGS–TWRI book 6, chap. A3. 1993. 136 p.
- 6–A4. *A modular finite-element model (MODFE) for areal and axisymmetric ground-water-flow problems, Part 2: Derivation of finite-element equations and comparisons with analytical solutions*, by R.L. Cooley: USGS–TWRI book 6, chap. A4. 1992. 108 p.
- 6–A5. *A modular finite-element model (MODFE) for areal and axisymmetric ground-water-flow problems, Part 3: Design philosophy and programming details*, by L.J. Torak: USGS–TWRI book 6, chap. A5. 1993. 243 p.
- 6–A6. *A coupled surface-water and ground-water flow model (MODBRANCH) for simulation of stream-aquifer interaction*, by Eric D. Swain and Eliezer J. Wexler: USGS–TWRI book 6, chap. A6. 1996. 125 p.
- 6–A7. *User's guide to SEAWAT: A computer program for simulation of three-dimensional variable-density ground-water flow*, by Weixing Guo and Christian D. Langevin: USGS–TWRI book 6, chap. A7. 2002. 77 p.

Book 7. Automated Data Processing and Computations

Section C. Computer Programs

- 7–C1. *Finite difference model for aquifer simulation in two dimensions with results of numerical experiments*, by P.C. Trescott, G.F. Pinder, and

S.P. Larson: USGS–TWRI book 7, chap. C1. 1976. 116 p.

- 7–C2. *Computer model of two-dimensional solute transport and dispersion in ground water*, by L.F. Konikow and J.D. Bredehoeft: USGS–TWRI book 7, chap. C2. 1978. 90 p.
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Book 8. Instrumentation

Section A. Instruments for Measurement of Water Level

- 8–A1. *Methods of measuring water levels in deep wells*, by M.S. Garber and F.C. Koopman: USGS–TWRI book 8, chap. A1. 1968. 23 p.
- 8–A2. *Installation and service manual for U.S. Geological Survey manometers*, by J.D. Craig: USGS–TWRI book 8, chap. A2. 1983. 57 p.

Section B. Instruments for Measurement of Discharge

- 8–B2. *Calibration and maintenance of vertical-axis type current meters*, by G.F. Smoot and C.E. Novak: USGS–TWRI book 8, chap. B2. 1968. 15 p.

Book 9. Handbooks for Water-Resources Investigations

Section A. National Field Manual for the Collection of Water-Quality Data

- 9–A1. *National field manual for the collection of water-quality data: Preparations for water sampling*, by F.D. Wilde, D.B. Radtke, Jacob Gibs, and R.T. Iwatsubo: USGS–TWRI book 9, chap. A1. 1998. 47 p.
- 9–A2. *National field manual for the collection of water-quality data: Selection of equipment for water sampling*, edited by F.D. Wilde, D.B. Radtke, Jacob Gibs, and R.T. Iwatsubo: USGS–TWRI book 9, chap. A2. 1998. 94 p.
- 9–A3. *National field manual for the collection of water-quality data: Cleaning of equipment for water sampling*, edited by F.D. Wilde, D.B. Radtke, Jacob Gibs, and R.T. Iwatsubo: USGS–TWRI book 9, chap. A3. 1998. 75 p.
- 9–A4. *National field manual for the collection of water-quality data: Collection of water samples*, edited by F.D. Wilde, D.B. Radtke, Jacob Gibs, and R.T. Iwatsubo: USGS–TWRI book 9, chap. A4. 1999. 156 p.

- 9–A5. *National field manual for the collection of water-quality data: Processing of water samples*, edited by F.D. Wilde, D.B. Radtke, Jacob Gibs, and R.T. Iwatsubo: USGS–TWRI book 9, chap. A5. 1999. 149 p.
- 9–A6. *National field manual for the collection of water-quality data: Field measurements*, edited by F.D. Wilde and D.B. Radtke: USGS–TWRI book 9, chap. A6. 1998. Variously paginated.
- 9–A7. *National field manual for the collection of water-quality data: Biological indicators*, edited by D.N. Myers and F.D. Wilde: USGS–TWRI book 9, chap. A7. 1997 and 1999. Variously paginated.
- 9–A8. *National field manual for the collection of water-quality data: Bottom-material samples*, by D.B. Radtke: USGS–TWRI book 9, chap. A8. 1998. 48 p.
- 9–A9. *National field manual for the collection of water-quality data: Safety in field activities*, by S.L. Lane and R.G. Fay: USGS–TWRI book 9, chap. A9. 1998. 60 p.