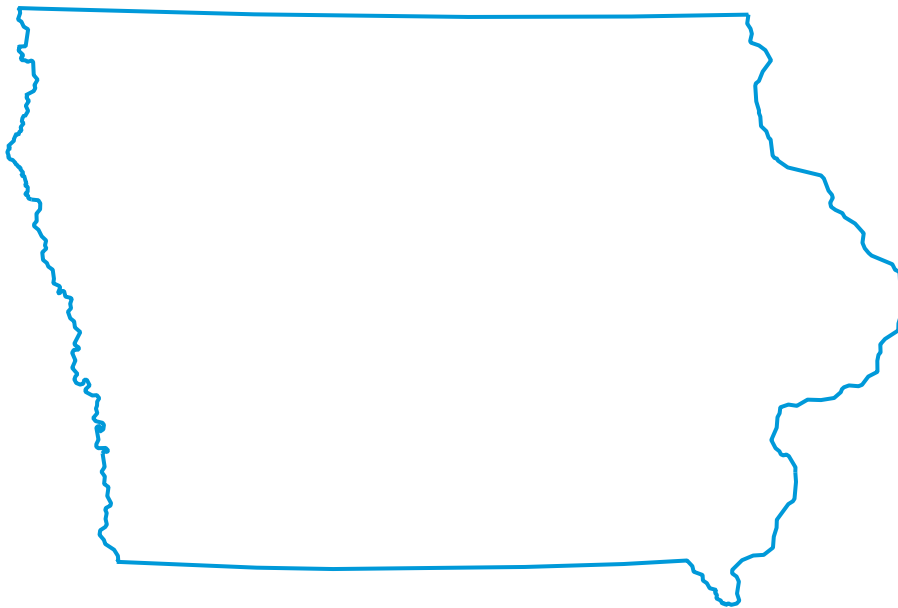


Prepared in cooperation with the Iowa Department of Natural Resources–Geological Survey

Water Resources Data Iowa Water Year 2003

Volume 2 Ground Water and Quality of Precipitation



Water-Data Report IA-03-2

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	7	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
			1	2	3	4						1	2		1	2	3	4	5	6
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				

31

Water Resources Data Iowa Water Year 2003

Volume 2. Ground Water and Quality of Precipitation

By Greg M. Nalley, S. Michael Linhart, Greg R. Littin, and Von E. Miller

Water-Data Report IA-03-2

Prepared in cooperation with the Iowa Department of Natural Resources–Geological Survey

**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

U.S. Geological Survey

P.O. Box 1240

Iowa City, Iowa 52244

(319) 337-4191

Information about the USGS, Iowa District is available on the Internet at <http://ia.water.usgs.gov/>.

Information about all USGS reports and products is available by calling 1-888-ASK-USGS or on the Internet via the World Wide Web at <http://www.usgs.gov/>.

Additional earth science information is available by accessing the USGS home page at <http://www.usgs.gov/>.

Preface

This volume of the annual hydrologic data report of Iowa is one of a series of annual reports that document 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 local, State, and Federal 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 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 Geological Survey policy and established guidelines.

Personnel in charge of the field units are:

Joseph G. Gorman, Western Field Unit

Robert D. Goodrich, Eastern Field Unit

The data were collected, computed and processed by the following personnel:

K.D. Becher	J.S. Hansen	J.A. Nason
J.F. Cerveny	J.W. Harms	M.J. Noon
D.E. Christiansen	K.S. Housel	S.A. Rundquist
D.T. Conell	R.L. Kopish	D.J. Schnoebelen
A.R. Conkling	S.M. Linhart	M.K. Segreto
A.L. Donnelly	G.R. Littin	P.K. Smith
D.A. Eash	J.C. McVay	J.R. Sondag
N.C. Elmendorf	J. J. Moline	S.R. Strader
E.E. Fischer	V.E. Miller	S.A. Thul
A. Grote	J.F. Nania	N.J. VanderZwan

This report was prepared in cooperation with the State of Iowa and with other agencies under the general supervision of Greg M. Nalley, Chief Hydrologic Surveillance Section, and Rob G. Middlemis-Brown, District Chief, Iowa.

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 <i>(Leave blank)</i>	2. REPORT DATE 23 March 2004	3. REPORT TYPE AND DATES COVERED Annual, 1 Oct. 2002 - 30 Sept. 2003	
4. TITLE AND SUBTITLE Water Resources Data, Iowa, Water Year 2003 Volume 2: Ground Water and Quality of Precipitation		5. FUNDING NUMBERS	
6. AUTHOR(S) G.M. Nalley, S.M. Linhart, G.R. Littin, and V.E. Miller		8. PERFORMING ORGANIZATION REPORT NUMBER USGS-WRD-IA-03-2	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Geological Survey, Water Resources Division P.O. Box 1230 Iowa City, IA 52244		10. SPONSORING / MONITORING AGENCY REPORT NUMBER USGS-WRD-IA-03-2	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Geological Survey, Water Resources Division P.O. Box 1230 Iowa City, IA 52244		11. SUPPLEMENTARY NOTES Prepared in cooperation with the Iowa Department of Natural Resources–Geological Survey.	
12a. DISTRIBUTION / AVAILABILITY STATEMENT No restrictions on distribution. This report may be purchased from: National Technical Information Service Springfield, VA 22161		12b. DISTRIBUTION CODE	
13. ABSTRACT <i>(Maximum 200 words)</i> Water resources data for Iowa for the 2003 water year consists of records of ground water levels and water quality of ground-water wells. This report volume contains water-level records for 166 ground-water observation wells; water-quality data for 150 municipal wells; and precipitation-quality data for 2 precipitation sites.			
14. SUBJECT TERMS *Iowa, *Hydrologic data, *Ground water, *Water quality, Flow rates, Chemical analyses, Water temperatures, Sampling sites, Water levels, Water analyses, Data collection.		15. NUMBER OF PAGES 118	16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT

Contents

Preface	iii
Contents	v
Figures	vi
Tables	vi
Ground-Water Wells, by County, for which Records are Published in this Volume	vii
Introduction	1
Cooperation	1
Summary of Hydrologic Conditions	1
Precipitation	1
Ground-Water-Level Observation Network	2
Ground-Water Quality	5
Ground-Water Monitoring Network	5
Special Networks and Programs	6
Explanation of Precipitation Records	8
Data Collection and Computation	8
Data Presentation	8
Explanation of Water-Quality Records	8
Collection and Examination of Data	8
Water Analysis	8
Ground-Water-Quality Records	8
Classification of Records	9
Accuracy of the Records	9
On-Site Measurements and Sample Collection	9
Water Temperature	9
Laboratory Measurements	9
Data Presentation	10
Remark Codes	10
Water-Quality Control Data	10
Blank Samples	11
Reference Samples	11
Replicate Samples	11
Spike Samples	11
Access to USGS Water Data	11
Definition of Terms	12
Techniques of Water-Resources Investigations of the U.S. Geological Survey	26
Ground-Water Levels	29
Quality of Precipitation	112
Index	116

Figures

Figure 1. Water year 2003 precipitation record for the National Weather Service’s designated Climatological Districts	2
2. Location of wells in the ground-water-level observation network, water year 2003.	3
3. Location of active ground-water-quality monitoring wells, water year 2003.	6

Tables

Table 1. Monthly and annual precipitation during the 2003 water year as a percentage of normal precipitation (1971-2000).	2
2. Historical high-water level measured during water year 2003 in wells completed in unconsolidated aquifers.	3
3. Historical high-water level measured during water year 2003 in wells completed in bedrock aquifers.	4
4. Historical low-water level measured during water year 2003 in wells completed in bedrock aquifers.	4
5. Summary of nitrogen species and herbicides detected in samples, water year 2003.	7

Ground-Water Wells, by County, for which Records are Published in this Volume

ADAMS COUNTY	
410247094324801. Local number, 72-32-09 CBCC.	30
410248094324801. Local number, 72-32-09 CCBB.	30
APPANOOSE COUNTY	
404103092404001. Local number, 68-16-15 DDAD.	30
AUDUBON COUNTY	
413044094565601. Local number, 78-36-35 ADCC1.	31
413958094544501. Local number, 79-35-10 CABB.	31
415023094593801. Local number, 81-36-12 CBCA.	31
BENTON COUNTY	
420731092083801. Local number, 85-11-33 CCBC1.	32
420731092083803. Local number, 85-11-33 CCBC3.	32
420731092083802. Local number, 85-11-33 CCBC.	32
BREMER COUNTY	
424224092133901. Local number, 91-12-11 DBB.	33
BUENA VISTA COUNTY	
424023095571401. Local number, 91-35-26 BCCC.	33
425233094545001. Local number, 93-35-13 ADAA.	33
CALHOUN COUNTY	
422812094383501. Local number, 88-32-01 BACD.	34
422339094375101. Local number, 88-33-36 ADAA.	34
CARROLL COUNTY	
420230094455101. Local number, 84-34-35 DAAA.	34
420233094475901. Local number, 83-35-34 BCDC.	35
420643094403701. Local number, 84-33-03 CADA.	35
421058094582701. Local number, 85-35-07 CCCC.	35
CASS COUNTY	
411900094530101. Local number, 75-35-07 BBAB.	36
412832095033501. Local number, 77-37-13 BBBB.	36
CERRO GORDO COUNTY	
430757093131801. Local number, 96-20-17 DAAD.	37
430806093164501. Local number, 96-21-13 BCCB.	37
CHEROKEE COUNTY	
424132095480211. Local number, 91-42-16 DDDD11.	37
424348095231601. Local number, 91-39-01 ADAD1.	38
424348095231602. Local number, 91-39-01 ADAD2.	38
CLAYTON COUNTY	
424023091291201. Local number, 91-05-30 BBBB.	39
425736091260303. Local number, 94-05-31 A.	39
425433091285002. Local number, 94-05-31 DACC2.	39
430156091182901. Local number, 95-04-22 BCBD.	40
CLINTON COUNTY	
414921090450401. Local number, 81-02E-17 ACA.	40
414806090212301. Local number, 81-05E-22 DDD.	40

CRAWFORD COUNTY

415514095312001. Local number, 82-40-17 AABB.	41
420608095111701. Local number, 84-37-08 BCCB.	41
421005095342801. Local number, 85-41-13 CCCC.	41
421031095225601. Local number, 85-39-16 ADDED1.	42
421031095225602. Local number, 85-39-16 ADDED2.	42
421106095125501. Local number, 85-38-12 DCBA.	42

DALLAS COUNTY

413613093530401. Local number, 79-26-33 CDBA.	43
--	----

DECATUR COUNTY

404422093445602. Local number, 69-25-29 DDDD.	43
--	----

DELAWARE COUNTY

422029091144302. Local number, 87-03-18 CBCD2.	44
---	----

DUBUQUE COUNTY

422901090471901. Local number, 89-01-36 ABC.	44
---	----

FLOYD COUNTY

430200092435301. Local number, 95-16-22 BCA1.	45
430200092435303. Local number, 95-16-22 BCA3.	45
430200092435304. Local number, 95-16-22 BCA4.	45
430200092435305. Local number, 95-16-22 BCA5.	46
430200092435306. Local number, 95-16-22 BCA6.	46
430800092540301. Local number, 96-17-18 CDBA.	46

GREENE COUNTY

420116094363001. Local number, 83-32-08 BBBC.	47
420146094272301. Local number, 83-31-04 ADDB.	47
415449094155601. Local number, 82-29-18 DBAA.	47
420149094344701. Local number, 83-32-04 ACCC.	48
420507094141901. Local number, 84-29-16 CBAB.	48

GRUNDY COUNTY

422611092552501. Local number, 88-18-14 BCCB.	48
--	----

GUTHRIE COUNTY

413223094150801. Local number, 78-29-24 CAAB.	49
413248094314301. Local number, 78-32-21 AAAA.	49
414728094385301. Local number, 81-33-26 DDDD.	49
414821094271301. Local number, 81-31-22 CCCC.	50

HAMILTON COUNTY

422610093474202. Local number, 88-25-17BCCA2.	50
422610093474203. Local number, 88-25-17BCCA3.	50

HARDIN COUNTY

423310093032802. Local number, 89-19-02 BDAC2.	51
---	----

HARRISON COUNTY

413024095353901. Local number, 78-41-31 DDDD.	51
413523095483101. Local number, 78-43-05 ACDD.	52
413524095490601. Local number, 78-43-05 BCDD.	52
413838095462001. Local number, 79-42-19 AADB.	52
414700095373001. Local number, 81-41-33 CAAA.	53

HENRY COUNTY

405010091424901. Local number, 70-07-30 BCDD.	53
410852091394301. Local number, 73-07-09 AABD.	53

HOWARD COUNTY

432158092065801. Local number, 99-11-26 BCA.	54
---	----

HUMBOLDT COUNTY

424039094103601. Local number, 91-28-20 CAAA.	54
424539094152401. Local number, 92-29-22CDDD1.	54
424539094152402. Local number, 92-29-22CDDD2.	55
424539094152403. Local number, 92-29-22CDDD3.	55
424539094152404. Local number, 92-29-22CDDD4.	55
424539094152405. Local number, 92-29-22CDDD5.	56

IDA COUNTY

422215095390811. Local number, 87-41-05 CCCC11.	56
423107095383201. Local number, 89-41-13 CCCC.	56

JACKSON COUNTY

420842090165701. Local number, 85-6E-29 ACAD1.	57
420842090165702. Local number, 85-06E-29 ACAD2.	57
420842090165703. Local number, 85-6E-29 ACAD3.	57
420433090502401. Local number, 84-01E 22.	58
420842090165704. Local number, 85-6E-29 ACAD4.	58

JASPER COUNTY

414210092592001. Local number, 80-18-31 ABBB.	58
413908093071100. Local number, 79-19-01 CCCB.	59

JOHNSON COUNTY

413925091324001. Local number, 79-06-09 DDBC.	59
414132091345502. Local number, 80-06-31 ADBC1.	59
414107091322901. Local number, 79-06-04 AAAA.	60
414132091345503. Local number, 80-06-31 ADBD1.	60
414145091350101. Local number, 80-06-31 ADC.	60
414315091252001. Local number, 80-05-22 CBCB1.	61
414221091361101. Local number, 80-07-25 DBAC1.	61
414221091361102. Local number, 80-07-25 DBAC2.	61
413950091322402. Local number, 79-06-10 BCCD.	62
413929091322401. Local number, 79-06-10 CCCB.	62
414221091361103. Local number, 80-07-25 DBAD1.	62
414315091252002. Local number, 80-05-22 CBCB2.	63

JONES COUNTY

415808091160501. Local number, 83-04-25 CBBB.	64
--	----

KEOKUK COUNTY

412030092121601. Local number, 76-12-35 DBDC.	64
--	----

LINN COUNTY

415343091360101. Local number, 82-07-25 AAAB.	65
415422091422601. Local number, 82-07-18 CDCD.	65
415725091410101. Local number, 83-07-32 ACDC.	65
415834091351601. Local number, 83-06-30 ABBA.	66
420300091325801. Local number, 84-06-33 ABBB.	66
420508091395811. Local number, 84-07-16 DBBB.	66
420526091370701. Local number, 84-07-13 BCBB.	67
420730091490401. Local number, 85-08-31 DDCD1.	67
420730091490402. Local number, 85-08-31 DDCD2.	67
421149091403301. Local number, 85-07-04 CCCC.	68
421207091312201. Local number, 85-06-03 DABB.	68

LYON COUNTY

431812096302701. Local number, 98-48-16 DDAD.	68
432140095595301. Local number, 99-44-26 DDDD.	69
432553096105701. Local number, 99-45-05 ABAC.	69
432601096335511. Local number, 100-48-31 CCCC11.	70

MADISON COUNTY	
411727093483001. Local number, 75-26-23 AAAC.	70
MAHASKA COUNTY	
411912092273601. Local number, 75-14-10 BAAC.	70
411914092274701. Local number, 75-14-10 BABC.	71
412020092471002. Local number, 76-17-35 CADB.	71
MARION COUNTY	
411323093142601. Local number, 74-21-11 DBCB1.	71
411328093143503. Local number, 74-21-11 CAAD3.	72
411329093142902. Local number, 74-21-11 DBBB2.	72
MARSHALL COUNTY	
420355092534701. Local number, 84-18-24 CDCA.	72
MILLS COUNTY	
405641095365101. Local number, 71-42-24 AAAA.	73
405813095433201. Local number, 71-42-07 BBCD.	73
MITCHELL COUNTY	
432156092484101. Local number, 95-17-23 DAA1.	73
432156092484102. Local number, 95-17-23 DAA2.	74
432156092484103. Local number, 95-17-23 DAA3.	74
432156092484104. Local number, 95-17-23 DAA4.	74
432156092484105. Local number, 95-17-23 DAA5.	75
MONONA COUNTY	
415456095414101. Local number, 82-42-14 ADCA.	75
420004095451501. Local number, 83-42-17 ACDD.	75
420139095155701. Local number, 83-43-04 CBCB.	76
421018095591301. Local number, 85-44-17 DCAA.	76
MONTGOMERY COUNTY	
405841095012702. Local number, 71-36-06 DADA2.	77
410057095075101. Local number, 72-37-29 BABA.	78
MUSCATINE COUNTY	
412120091080401. Local number, 76-02-30 CBAA1.	79
412120091080402. Local number, 76-02-30 CBAA.	79
412120091080403. Local number, 76-02-30 CBAA.	79
O'BRIEN COUNTY	
425610095250611. Local number, 94-39-26 BADB11.	80
430930095350401. Local number, 96-40-05 DDDA1.	80
OSCEOLA COUNTY	
431613095251801. Local number, 98-39-26 CDCC.	80
431620095250501. Local number, 98-39-26 CDAD1.	81
431620095250511. Local number, 98-39-26 CDAD11.	81
432828095283611. Local number, 100-39-17 DCCB11.	81
PAGE COUNTY	
404257095150801. Local number, 68-38-07 CCAA.	82
PLYMOUTH COUNTY	
424833096324701. Local number, 92-48-06 DDDA.	82
424850096074801. Local number, 92-45-02 CBCB.	83
425249096125001. Local number, 93-46-12 DDDD.	83
POTTAWATTAMIE COUNTY	
411359095171901. Local number, 74-39-01 CCCC.	84
412407095391201. Local number, 76-42-10 ADBC.	84
SCOTT COUNTY	
413544090212901. Local number, 78-5E-03 AADA.	85

SHELBY COUNTY

413255095070401. Local number, 78-37-17 DDDD. 85
413359095182701. Local number, 78-39-11 CCBC. 86
413953095302601. Local number, 79-40-09 DBCA. 86
414624095252301. Local number, 80-39-06 AADC. 86
414856095160101. Local number, 81-38-21 ADAD. 87

SIOUX COUNTY

430140095573101. Local number, 95-43-07 AAAA. 87
430913096033201. Local number, 96-44-08 ADAA. 87

STORY COUNTY

420129093273701. Local number, 83-22-06 CDBD. 88
420137093361501. Local number, 83-24-02 DABC. 88

VAN BUREN COUNTY

404150091483001. Local number, 68-08-08 CDD. 88

WASHINGTON COUNTY

411300091320701. Local number, 74-06-15 BDAC. 89
412750091495201. Local number, 77-09-24 AADA. 89
421829091304701. Local number, 75-06-14 ABBA. 89

WEBSTER COUNTY

421837094083601. Local number, 87-28-29 CCCD. 90
423018094214701. Local number, 89-30-23 CCBB. 90

WOODBURY COUNTY

422058095573701. Local number, 87-44-15 CBBB. 90
422830096000511. Local number, 88-44-16 BAAB11. 91

Water Resources Data, Iowa, Water Year 2003

Volume 2—Ground Water and Quality of Precipitation

By Greg M. Nalley, S. Michael Linhart, Greg R. Littin, and Von E. Miller

Introduction

The Water Resources Division of the U.S. Geological Survey, in cooperation with State, county, municipal, and other Federal agencies, obtains a large amount of data pertaining to the water resources of Iowa each water year. These data, accumulated during many water years, constitute a valuable data base for developing an improved understanding of the water resources of the State. To make this data readily available to interested parties outside of the Geological Survey, the data is published annually in this report series entitled "Water Resources Data - Iowa" as part of the National Water Data System.

Water-resources data for water year 2003 for Iowa consists of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; and water levels and water quality of ground water. This volume of the report contains water levels for 166 ground-water observation wells; water-quality data from 150 municipal wells; and precipitation-quality data from 2 precipitation sites. Additional water data were collected at various sites not included in the systematic data-collection program and are published as miscellaneous measurements and analyses.

Records of discharge or stage of streams, and contents or stage of lakes and reservoirs 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 published in an annual series; during 1961–65 and 1966–70, they were published in 5-year series. Records of chemical quality, water temperatures, 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 may be consulted in the libraries of the principal cities in the United States, or they may be purchased from Books and Open-File Reports Section, Federal Center, Box 25425, Denver, Colorado 80225.

For water years 1961 through 1970, streamflow data were released by the Geological Survey in annual reports on a State-boundary basis. Water-quality records for water years 1964 through 1970 were similarly released either in separate reports or in conjunction with streamflow records.

Beginning with the 1971 water year, water data for streamflow, water quality, and ground water are published in official U.S. Geological Survey reports on a State-boundary basis. These official reports carry an identification number consisting of the two-letter State postal abbreviation, the last two digits of the water year, and the volume number. For example, this report is identified as "U.S. Geological Survey Water-Data Report IA-03-2." These water-data reports are for sale by the National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia 22161.

Additional information for ordering specific reports may be obtained from the District Chief at the address given on the back of the title page or by telephone, (319) 337-4191.

Cooperation

The U.S. Geological Survey has had cooperative agreements with various governmental agencies in the State of Iowa for measuring ground-water levels since 1935 and collecting water-quality records since 1943. During water year 2003, the agencies that assisted through cooperative agreements were:

Iowa Department of Natural Resources—Geological Survey
University of Iowa, Hygienic Laboratory

Summary of Hydrologic Conditions

Precipitation

Precipitation in Iowa during water year 2003 (October 1, 2002 to September 30, 2003) was below normal (table 1). Recorded precipitation ranged from 3.03 inches below normal

2 Water Resources Data, Iowa, Water Year 2003

Table 1. Monthly and annual precipitation during the 2003 water year as a percentage of normal precipitation (1971-2000).

[Source: Harry Hillaker, State Climatologist, Iowa Department of Agriculture and Land Stewardship, written commun., 2003]

National Weather Service Climatological District	2002			2003									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Annual
Northwest	146	9	12	50	122	95	80	112	119	106	28	117	90
North-central	146	10	28	36	59	85	83	118	110	109	26	57	81
Northeast	119	13	32	48	42	62	78	135	86	103	16	86	75
West-central	158	9	4	47	167	55	122	116	95	121	23	91	90
Central	132	10	12	39	78	45	118	124	92	112	18	87	82
East-central	180	10	37	36	36	45	76	93	84	116	22	111	76
Southwest	174	12	1	51	123	42	108	111	78	59	24	58	74
South-central	125	7	4	48	105	41	104	93	120	60	24	124	79
Southeast	132	8	39	38	86	38	104	90	108	103	49	121	83
Statewide	145	10	20	43	87	56	98	111	99	100	25	95	81

in the Northwest Iowa Climatological District to 9.35 inches less than normal in the Southwest Iowa Climatological District (fig. 1). Statewide the average precipitation was 27.66 inches, which was 6.42 inches below normal or 81 percent of the normal 34.08 inches for 1971-2000. Overall, water year 2003 was the 24th driest and 38th coolest for 130 years of record. [In this summary of hydrologic conditions, all data and statistics pertaining to precipitation and temperature in Iowa were provided by Harry Hillaker, State Climatologist, Iowa Department of Agriculture and Land Stewardship, (oral and written commun., 2003)]

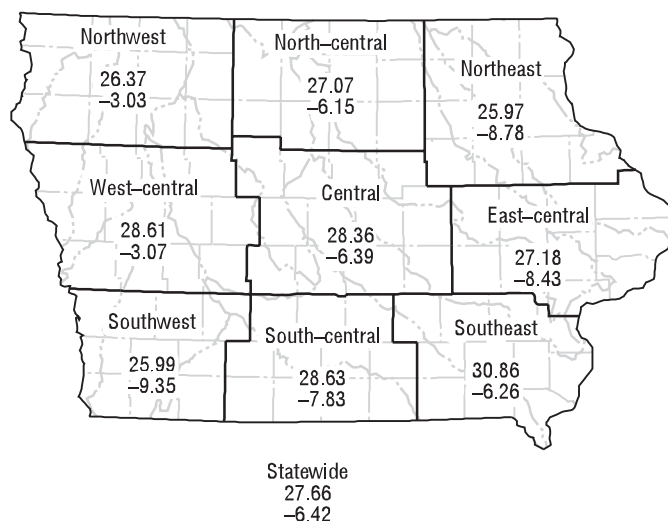


Figure 1. Water year 2003 precipitation record for the National Weather Service's designated Climatological Districts [upper value: average precipitation for the water year, in inches; lower value: deviation from long-term average (1971-2000), in inches; source: Harry Hillaker, State Climatologist, Iowa Department of Agriculture and Land Stewardship, written commun., 2003]

Ground-Water-Level Observation Network

The ground-water monitoring network in Iowa provides a historical record of the water-level changes in the Nation's most important aquifers. The locations of the 166 wells monitored on a quarterly, monthly, or intermittent basis in Iowa during water year 2003 are shown in figure 2.

In this report, records of water levels are presented for a network of observation wells. However, many other water levels are measured through Federal, State, and local agency cooperative projects and entered into computer storage. Information for specific projects may be obtained from the District Chief, Iowa District, or via the world wide web using the following universal resource locator address: <<http://iowa.usgs.gov/>>.

Measurements of water levels are made in many types of wells under varying conditions, but the methods of measurement are standardized to the extent possible. The equipment and measuring techniques used at each observation well ensure that measurements at each well are of consistent accuracy and reliability.

Tables of water-level data are presented by counties arranged in alphabetical order. The principal identification number for a given well is the 15-digit number that appears in the upper left corner of the table. The secondary identification number is the local well number, an alphanumeric number, derived from the township-range location of the well.

Water-level records are obtained from direct measurements with a steel tape or from an airline. The water-level measurements in this report are given in feet with reference to land-surface datum. Land-surface datum is a datum plane that is approximately at land surface at each well. The measuring point is the height above or below the land-surface datum and the point where the water level is measured. Both the measuring point and land-surface datum are provided for each well.

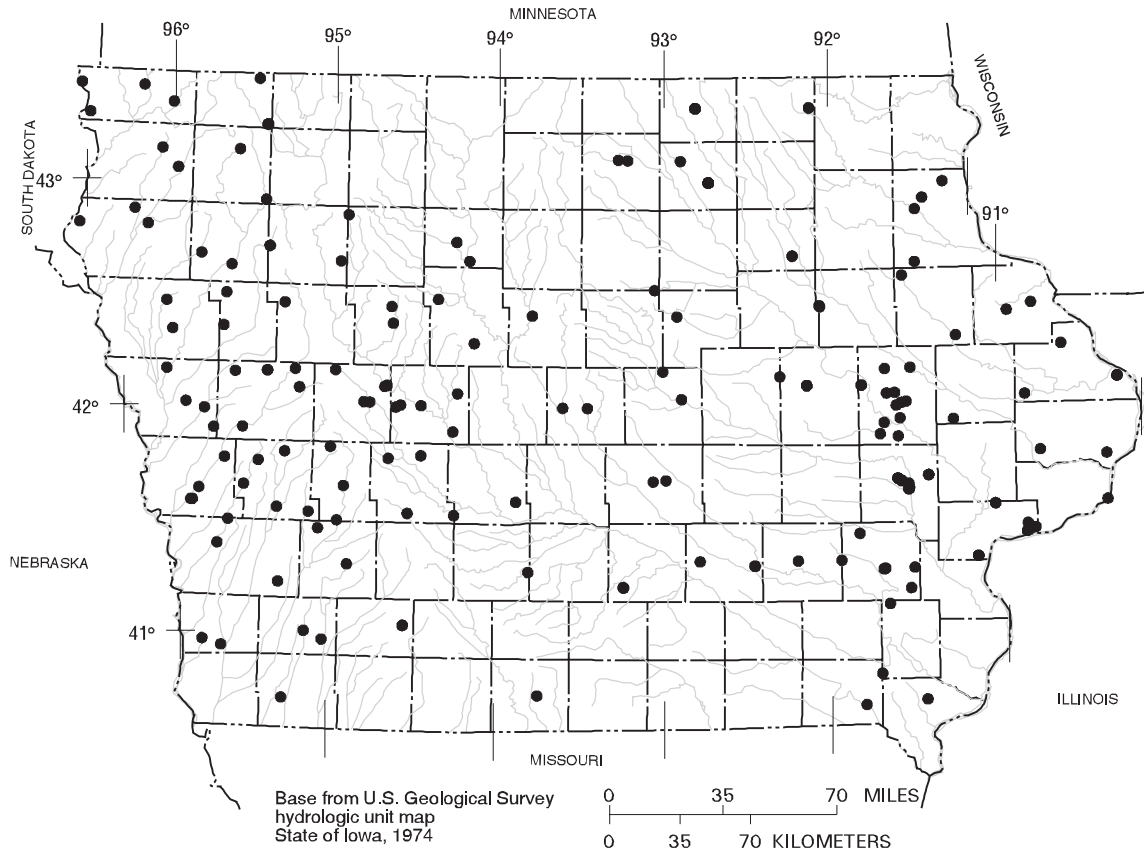


Figure 2. Location of wells in the ground-water-level observation network, water year 2003.

Water levels are reported to as many significant figures as can be justified by the local conditions. For example, in a measurement to a depth of water of several hundred feet, the error of 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 to a tenth of a foot or a larger unit.

Ground-water supplies in Iowa are withdrawn from unconsolidated and bedrock aquifers. There are three types of unconsolidated aquifers: (1) alluvial aquifers, which consist of sand-

and-gravel deposits associated with present-day fluvial systems; (2) glacial-drift aquifers, which consist of shallow, discontinuous, permeable lenses of sand and gravel interbedded with less-permeable glacial drift; and (3) buried-channel aquifers. Buried-channel aquifers are formed in areas where coarse sand and gravel were deposited in bedrock valleys and overlain by a thick layer of glacial drift.

One well completed in an unconsolidated aquifer recorded a new historical water level during the 2003 water year. One well recorded a high historical water level. No wells recorded low historical water levels (table 2).

Table 2. Historical high-water level measured during water year 2003 in wells completed in unconsolidated aquifers.

[Water+ level measurements in feet below land surface.]

County	Well number	Aquifer type	New historical highwater level	Date measured	Previous historical high water level	Date measured
Floyd	430200092435301	Glacial Drift	1.88	05/06/2003	1.98	05/06/1993

4 Water Resources Data, Iowa, Water Year 2003

The five major bedrock-aquifer units in Iowa are the Cambrian-Ordovician, Silurian-Devonian, Mississippian, Pennsylvanian, and Dakota. The Cambrian-Ordovician aquifer system consists of aquifers in sandstone of Early Cambrian age and dolomite and sandstone of Late Cambrian to Early Ordovician age. The Dresbach is the basal aquifer of the Cambrian-Ordovician aquifer system and is present locally in northeastern and east-central Iowa. Overlying the Dresbach aquifer is the more spatially extensive Jordan-St. Peter aquifer. A confining shale unit separates the Jordan-St. Peter aquifer from the Galena aquifer, the uppermost aquifer in the Cambrian-Ordovician aquifer system. Overlying the Cambrian-Ordovician aquifer system is the Silurian-Devonian aquifer, which yields water from frac-

tures in Silurian dolomite and Devonian limestone. Overlying the Silurian-Devonian aquifer is the Mississippian aquifer, which is composed of limestone and dolomite of Mississippian age and underlies about 60 percent of Iowa. Overlying the Mississippian aquifer are discontinuous lenses of sandstone in the Cherokee and Kansas City Groups of Pennsylvanian age, which form small, localized aquifers. The Dakota aquifer is the youngest bedrock-aquifer unit in the State and yields water from sandstone of Cretaceous age in northwest and western Iowa.

Nineteen wells completed in bedrock aquifers recorded new historical water levels during the 2003 water year. Four wells recorded historical high water levels (table 3), and 15 wells recorded historical low water levels (table 4)

Table 3. Historical high-water level measured during water year 2003 in wells completed in bedrock aquifers.

[Water+ level measurements in feet below land surface; readings above land surface indicated by "+"]

County	Well number	Aquifer type	New historical high water level	Date measured	Previous historical high water level	Date measured
Clinton	414921090450401	Silurian	42	11/14/2002	43	08/06/1997
Ida	423107095383201	Mississippian	175.46	05/08/2003	177.06	08/06/2001
Pottawattamie	412407095391201	Cambrian-Ordovician	71.30	05/08/2003	72.17	05/09/2001
Webster	423018094214701	Cretaceous	2.68	05/07/2003	30.36	10/21/1942

Table 4. Historical low-water level measured during water year 2003 in wells completed in bedrock aquifers.

[Water+ level measurements in feet below land surface]

County	Well number	Aquifer type	New historical high water level	Date measured	Previous historical high water level	Date measured
Appanose	404103092404001	Cambrian-Ordovician	392.64	08/11/2003	391.40	11/13/2001
Clayton	425736091260303	Cambrian-Ordovician	189.20	08/06/2003	185.60	02/20/2001
Dubuque	422901090471901	Cambrian-Ordovician	254.17	05/20/2003	248.02	05/04/1999
Johnson	414107091322901	Silurian	166.59	06/17/2003	153.24	07/30/1998
Johnson	414132091345502	Silurian	266.96	06/17/2003	253.83	07/09/2001
Johnson	414132091345503	Silurian	328	09/17/2003	314	08/13/2001
Johnson	414221091361101	Silurian	248.96	09/17/2003	245.93	07/26/1991
Johnson	414221091361102	Devonian	227.29	09/17/2003	227.09	08/28/1991
Linn	420300091325801	Silurian	50.49	02/06/2003	50.26	12/01/1989
Mitchell	432156092484102	Devonian	13.52	02/11/2003	12.44	02/14/2000
Mitchell	432156092484103	Devonian	14.69	02/11/2003	13.32	02/14/2000
Mitchell	432156092484104	Devonian	18.80	02/11/2003	16.52	05/09/2000
Mitchell	432156092484105	Devonian	24.46	02/11/2003	22.16	05/09/2000
Osceola	431620095250511	Cretaceous	200.42	08/14/2003	197.03	05/05/1999
Osceola	431613095251801	Cretaceous	198.38	08/14/2003	196.85	09/06/1984

Ground-Water Quality

The Iowa ground-water-quality monitoring program has been operated since 1982 by the U.S. Geological Survey in cooperation with the Iowa Department of Natural Resources, Iowa Geological Survey. The purpose of the program is two-fold: (1) provide consistent and representative data describing the chemical water quality of the principal aquifers of the State; and (2) determine possible trends in both water quality and spatial distribution of water quality.

The ground-water-quality monitoring program was initiated to continue a program begun in 1950 by the State Health Department that consisted of periodic, nonspecific sampling of untreated water from municipal supply wells. Each year, approximately 250 wells, primarily municipal supply, were randomly-selected for sampling between April and November. Between 1985 and 1989, the emphasis of the program was on the analysis of nitrate and herbicide concentrations in samples from wells less than 200 feet in depth. Because of the random pattern of sampling both spatially (different wells each year) and seasonally (different times during the year), trends in ground-water quality were difficult to determine from the data. Therefore, in 1990, to provide year-to-year continuity of data and a more statistically sound basis for the study of long-term water-quality trends, a sampling strategy based on a random selection of wells weighted by aquifer vulnerability was implemented. Aquifer vulnerability was determined by the frequency of atrazine detections in water samples collected from wells in the respective aquifers. In 1990 and 1991, a fixed network of 50 wells was selected to be sampled annually, and approximately 200 wells continued to be selected on a rotational basis.

In 1992, the investigation of water-quality trends became the primary focus of the program, and a 10-year work plan was designed to eliminate spatial and seasonal variance, yet allow flexibility within the schedule to address additional data needs. For sampling-site selection in 1992, the well inventory was divided into categories based on aquifer type and again on well depth for surficial aquifers, and into categories designated "vulnerable to contamination" and "not vulnerable to contamination" based on the map Groundwater Vulnerability Regions of Iowa (Hoyer, B.E., and Hallberg, G.R., 1991, Special Map Series 11: Iowa Department of Natural Resources, scale 1:500,000) for bedrock aquifers. Vulnerability was determined by the combination and interpretation of factors including geologic and soil data, thickness of Quaternary cover, proximity to agricultural injection wells and sinkholes through which contaminants can be introduced to the aquifer, and evaluation of historical ground-water and well contamination. A total of 90 sites were selected for sampling from a well inventory comprising approximately 1,640 public supply wells. From the 90 sites in the fixed network, 45 wells from two surficial aquifer types were selected to be sampled annually. The other 45 wells (from the bedrock aquifers) were selected to be sampled on a rotational schedule based on aquifer vulnerability to contamination. The wells determined to be vulnerable to contamination would be sampled every 2 years and those wells categorized as not vul-

nerable to contamination would be sampled every 4 years. All 90 wells were sampled in the first 2 years (1992 and 1993) and the sampling rotation began in 1994. In 2001, the sampling rotation was suspended in favor of sampling all 90 wells annually. The sampling effort during the 2003 water year is the twelfth year of this program to determine possible ground-water-quality trends.

Ground-Water Monitoring Network

During the 2003 water year, a total of 150 ground-water samples were collected from municipal wells located throughout the State (fig. 3). These wells were sampled as part of the Iowa ground-water-quality monitoring (GWM) program to determine water-quality trends. The surficial aquifers include: (1) alluvial aquifers comprising sand and gravel associated with present-day fluvial systems and (2) glacial drift and buried-channel aquifers associated with previous glaciation. The bedrock aquifers include: (1) Cretaceous aquifers comprised of fine- to coarse-grained sandstones of the Dakota Group (2) Mississippian aquifers composed primarily of porous limestones and dolomites (3) Silurian-Devonian aquifers composed of porous and fractured limestones and dolomites; and (4) Cambrian-Ordovician aquifers comprised of sandstones and dolomitic sandstones of the Jordan Formation. Samples were collected during July through early September 2003. All samples were analyzed by the University of Iowa Hygienic Laboratory for common ions, nutrients, and herbicides. All but one sample were analyzed for trace metals. In addition, most samples were analyzed for volatile organic compounds (VOCs) and radiochemistry. However, in a few cases only samples from wells less than 300 feet deep were analyzed for VOCs and those from wells deeper than 300 feet were analyzed for radiochemistry. Results for all constituent analyses are published in this report. Discussion of analytical results will be limited to the nitrogen species nitrate and ammonia, and herbicides.

A summary of results for nutrient and herbicide analyses are listed by compound in table 5. Nitrate was detected in 59 of the 146 samples and ammonia was detected in 87 of the 101 samples analyzed for these compounds. One or more herbicides were detected in 49 of the 101 samples. The laboratory minimum reporting level (MRL) for ammonia is 0.05 mg/L and nitrate is 0.10 mg/L. The MRL's for the herbicides listed below are 0.05 mg/L. The MRL is the lowest concentration reliably measured by the laboratory

Concentrations of nitrate greater than or equal to 3.0 mg/L generally can be attributed to human activities, whereas concentrations less than 3.0 mg/L may indicate ambient concentrations from naturally occurring soil nitrogen or geologic deposits (Madison, R.J., and Brunett, J.O., 1984, Overview of the occurrence of nitrate in ground water of the United States, in National Water Summary 1984 -- Water quality trends: U.S. Geological Survey Water-Supply Paper 2275, p. 93-105). Nitrate concentrations were greater than or equal to 3.0 mg/L in 42 of 146 samples. The median concentration for the 42 samples with detec-

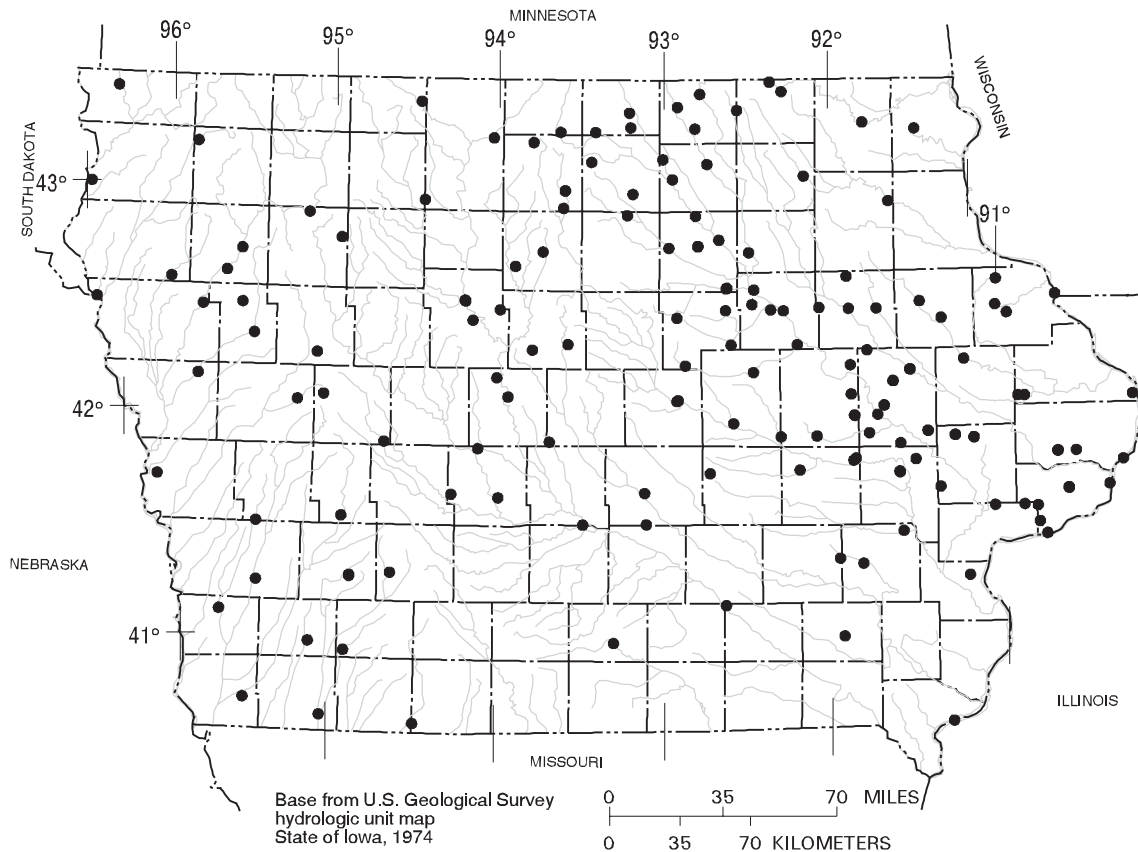


Figure 3. Location of active ground-water-quality monitoring wells, water year 2003.

tions above 3.0 mg/L was 4.2 mg/L. Concentrations in four samples exceeded 10 mg/L, which is the U.S. Environmental Protection Agency (USEPA) Maximum Contaminant Level (MCL) for public drinking water. The median nitrate concentration for all samples was less than 0.10 mg/L. The maximum nitrate concentration detected was 17 mg/L. Of the 59 samples with detectable nitrate concentrations, 48 percent were from wells less than 100 ft. deep and 19 percent were from wells greater than 300 ft. deep.

Nine commonly used herbicides and two atrazine degradation products (deethylatrazine and deisopropylatrazine) were analyzed during the 2003 water year. Atrazine and deethylatrazine were the most commonly detected herbicides (42 percent each), followed by metolachlor (10 percent). No sample contained herbicide concentrations that exceeded the MCL or proposed MCL of any of the analytes. The largest concentration of any herbicide compound detected was a metolachlor concentration of 3.1 $\mu\text{g/L}$. No detectable amounts of deisopropylatrazine, butylate, metribuzin, or trifluralin were found in any of the samples.

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 2005, sampling was reduced to 27 index stations so that a network of 5 sta-

Table 5. Summary of nitrogen species and herbicides detected in samples from the Ground-Water -Quality Monitoring project, water year 2003.

[µg/L, micrograms per liter; mg/L, milligrams per liter; <, less than detection limit]

Compound	Number of samples analyzed	Number of samples in which compound was detected	Median value	Maximum concentration detected
Acetochlor	101	1	< 0.05 µg/L	1.2 µg/L
Ammonia	146	87	0.21 mg/L	8.6 mg/L
Alachlor	101	1	< 0.05 µg/L	0.20 µg/L
Atrazine	101	20	< 0.05 µg/L	0.60 µg/L
Butylate	101	0	< 0.05 µg/L	< 0.10 µg/L
Cyanazine	101	1	< 0.05 µg/L	0.10 µg/L
Deethylatrazine	101	20	< 0.05 µg/L	0.20 µg/L
Deisopropylatrazine	101	0	< 0.05 µg/L	< 0.10 µg/L
Metolachlor	101	5	< 0.05 µg/L	3.1 µg/L
Metribuzin	101	0	< 0.05 µg/L	< 0.05 µg/L
Nitrate	146	59	< 0.10 mg/L	17.0 mg/L
Prometone	101	1	< 0.05 µg/L	0.1 µg/L
Trifluralin	101	0	< 0.05 µg/L	0.10 µg/L

tions 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/>.

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.

8 Water Resources Data, Iowa, Water Year 2003

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 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

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, 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 TWRIIs. A list of TWRIIs is provided in this report.

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.

Ground-Water-Quality Records

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

Classification of Records

Water-quality data for ground-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 aquifer.

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 ground water appear in this report are shown in figure 4.

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.

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%

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 TWRIs Book 1, Chapter D2; Book 3, Chapters A1, A3, and A4; and Book 9, Chapters A1-A9. These TWRIs 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. For stations where water temperatures are taken manually once or twice daily, the water temperatures are taken at about the same time each day. 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.

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 by the USGS laboratories are given in the TWRIs, Book 1, Chapter D2; Book 3, Chapter C2;

10 Water Resources Data, Iowa, Water Year 2003

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.

Remark Codes

The following remarks 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 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.

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

12 Water Resources Data, Iowa, Water Year 2003

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 multiplate 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 stream-bed, 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/cm^2) 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.

14 Water Resources Data, Iowa, Water Year 2003

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 Vertical 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/cm²) 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. Alternatively, alkalinity concentration (as

mg/L CaCO₃) 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

16 Water Resources Data, Iowa, Water Year 2003

include *Streptococcus fecalis*, *Streptococcus feacium*, *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 technique

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/ cm^2) 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 (CaCO_3).

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:

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

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 sta-

tions, 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 num-

20 Water Resources Data, Iowa, Water Year 2003

ber 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 mechanical 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

22 Water Resources Data, Iowa, Water Year 2003

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

24 Water Resources Data, Iowa, Water Year 2003

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 warm-blooded 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 speci-

fied 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.
- 3–A7. *Stage measurement at gaging stations*, by T.J. Buchanan and W.P. Somers: USGS–TWRI book 3, chap. A7. 1968. 28 p.
- 3–A8. *Discharge measurements at gaging stations*, by T.J. Buchanan and W.P. Somers: USGS–TWRI book 3, chap. A8. 1969. 65 p.
- 3–A9. *Measurement of time of travel in streams by dye tracing*, by F.A. Kilpatrick and J.F. 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.
- 3–A13. *Computation of continuous records of streamflow*, by E.J. Kennedy: USGS–TWRI book 3, chap. A13. 1983. 53 p.
- 3–A14. *Use of flumes in measuring discharge*, by F.A. Kilpatrick and V.R. Schneider: USGS–TWRI book 3, chap. A14. 1983. 46 p.
- 3–A15. *Computation of water-surface profiles in open channels*, by Jacob Davidian: USGS–TWRI book 3, chap. A15. 1984. 48 p.
- 3–A16. *Measurement of discharge using tracers*, by F.A. Kilpatrick and E.D. Cobb: USGS–TWRI book 3, chap. A16. 1985. 52 p.
- 3–A17. *Acoustic velocity meter systems*, by Antonius Laenen: USGS–TWRI book 3, chap. A17. 1985. 38 p.
- 3–A18. *Determination of stream reaeration coefficients by use of tracers*, by F.A. Kilpatrick, R.E. Rathbun, Nobuhiro Yotsukura, G.W. Parker, and L.L. DeLong: USGS–TWRI book 3, chap. A18. 1989. 52 p.
- 3–A19. *Levels at streamflow gaging stations*, by E.J. Kennedy: USGS–TWRI book 3, chap. A19. 1990. 31 p.
- 3–A20. *Simulation of soluble waste transport and buildup in surface waters using tracers*, by F.A. Kilpatrick: USGS–TWRI book 3, chap. A20. 1993. 38 p.
- 3–A21. *Stream-gaging cableways*, by C. Russell Wagner: USGS–TWRI book 3, chap. A21. 1995. 56 p.

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.
- 3–B2. *Introduction to ground-water hydraulics, a programmed text for self-instruction*, by G.D. Bennett: USGS–TWRI book 3, chap. B2. 1976. 172 p.
- 3–B3. *Type curves for selected problems of flow to wells in confined aquifers*, by J.E. Reed: USGS–TWRI book 3, chap. B3. 1980. 106 p.
- 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.
- 3–B8. *System and boundary conceptualization in ground-water flow simulation*, by T.E. Reilly: USGS–TWRI book 3, chap. B8. 2001. 29 p.

Section C. Sedimentation and Erosion Techniques

- 3–C1. *Fluvial sediment concepts*, by H.P. Guy: USGS–TWRI book 3, chap. C1. 1970. 55 p.
- 3–C2. *Field methods for measurement of fluvial sediment*, by T.K. Edwards and G.D. Glysson: USGS–TWRI book 3, chap. C2. 1999. 89 p.
- 3–C3. *Computation of fluvial-sediment discharge*, by George Porterfield: USGS–TWRI book 3, chap. C3. 1972. 66 p.

Book 4. Hydrologic Analysis and Interpretation

Section A. Statistical Analysis

- 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.
- 4–B3. *Regional analyses of streamflow characteristics*, by H.C. Riggs: USGS–TWRI book 4, chap. B3. 1973. 15 p.

Section D. Interrelated Phases of the Hydrologic Cycle

- 4–D1. *Computation of rate and volume of stream depletion by wells*, by C.T. Jenkins: USGS–TWRI book 4, chap. D1. 1970. 17 p.

Book 5. Laboratory Analysis

Section A. Water Analysis

- 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. Greenson, 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.

7–C3. *A model for simulation of flow in singular and interconnected channels*, by R.W. Schaffranek, R.A. Baltzer, and D.E. Goldberg: USGS–TWRI book 7, chap. C3. 1981. 110 p.

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 Gibbs, 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 Gibbs, 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 Gibbs, 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 Gibbs, 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 Gibbs, 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.

Ground-Water Levels

GROUND-WATER LEVELS

ADAMS COUNTY

410247094324801. Local number, 72-32-09 CBCC.

LOCATION.--Lat 41°02'48", long 94°32'48", Hydrologic Unit 10240010, on the east side of county road, approximately 4 mi northeast of the City of Prescott.

Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Glacial drift of Pleistocene age (might be in Albany buried-channel).

WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 2 in., depth 276 ft, screened 266-276 ft, gravel packed.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,220 ft above sea level, from topographic map. Measuring point: Top of casing, 1.40 ft above land-surface datum.

REMARKS.--Well SW-78.

PERIOD OF RECORD.--October 1987 to November 1987, June 1990, and November 1992 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 2.30 feet below land-surface datum, May 08, 2001; lowest measured, 3.08 ft below land-surface datum, December 06, 1996.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	2.61	FEB 03	2.54	MAY 01	2.39	AUG 06	2.77
WATER YEAR 2003 HIGHEST		2.39	MAY 01, 2003 LOWEST		2.77	AUG 06, 2003	

410248094324801. Local number, 72-32-09 CCBB.

LOCATION.--Lat 41°02'48", long 94°32'48", Hydrologic Unit 10240010, on the east side of county road, approximately 4 mi northeast of the City of Prescott.

Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 2 in., depth 136 ft, screened 130-136 ft, gravel packed.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,220 ft above sea level, from topographic map. Measuring point: Top of casing, 2.65 ft above land-surface datum.

REMARKS.--Well SW-83.

PERIOD OF RECORD.--August 1988, June 1990, and November 1992 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.72 feet below land-surface datum, February 3, 1994; lowest measured, 5.75 ft below land-surface datum, August 6, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	5.54	FEB 03	5.53	MAY 01	5.39	AUG 06	5.75
WATER YEAR 2003 HIGHEST		5.39	MAY 01, 2003 LOWEST		5.75	AUG 06, 2003	

APPANOOSE COUNTY

404103092404001. Local number, 68-16-15 DDAD.

LOCATION.--Lat 40°41'03", long 92°40'29", Hydrologic Unit 10280201, located approximately 4 mi south of State Highway 2 on State Highway 202 beneath water tower in the Town of Moulton. Owner: Town of Moulton.

AQUIFER.--Cambrian/Ordovician.

WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 8 and 12.75 in., depth 2377 ft, screened 1713-1736 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 992.00 ft above sea level, by unknown method. Measuring point: Top of well cover, 1.07 ft above land-surface datum.

REMARKS.-- Moulton Town Well.

PERIOD OF RECORD.--October 1961 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 355.00 feet below land surface datum, March 10, 1961; lowest measured, 392.64 feet below land-surface datum August 11, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 12	391.26	FEB 04	391.98	MAY 21	392.41	AUG 11	392.64
WATER YEAR 2003 HIGHEST		391.26	NOV 12, 2002 LOWEST		392.64	AUG 11, 2003	

AUDUBON COUNTY

413044094565601. Local number, 78-36-35 ADCC1.

LOCATION.--Lat 41°30'44", long 94°56'56", Hydrologic Unit 10240003, 2.5 mi south of the Town of Brayton on Highway 71, and 0.3 mi west on the north side of County Road F-67. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 115 ft, screened 94-101 ft, open hole 101-115 ft., gravel-packed.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,230 ft above sea level, from topographic map. Measuring point: Top of casing, 2.37 ft above land-surface datum.

REMARKS.-- Well WC-69.

PERIOD OF RECORD.--June 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 29.43 ft below land-surface datum, August 11, 1993; lowest measured, 54.06 ft below land-surface datum, November 20, 2002.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	54.06	MAY 07	53.84	AUG 06	53.96
WATER YEAR 2003		HIGHEST	53.84	MAY 07, 2003	LOWEST
54.06		NOV 20, 2002			

413958094544501. Local number, 79-35-10 CABB.

LOCATION.--Lat 41°39'59", long 94°54'45", Hydrologic Unit 10240003, approximately 0.3 mi west of the Town of Hamlin, on the south side of Highway 44. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 221 ft, screened 168-188 ft, open hole 210-221 ft, gravel-packed.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,280 ft above sea level, from topographic map. Measuring point: Top of casing, 5.37 ft above land-surface datum.

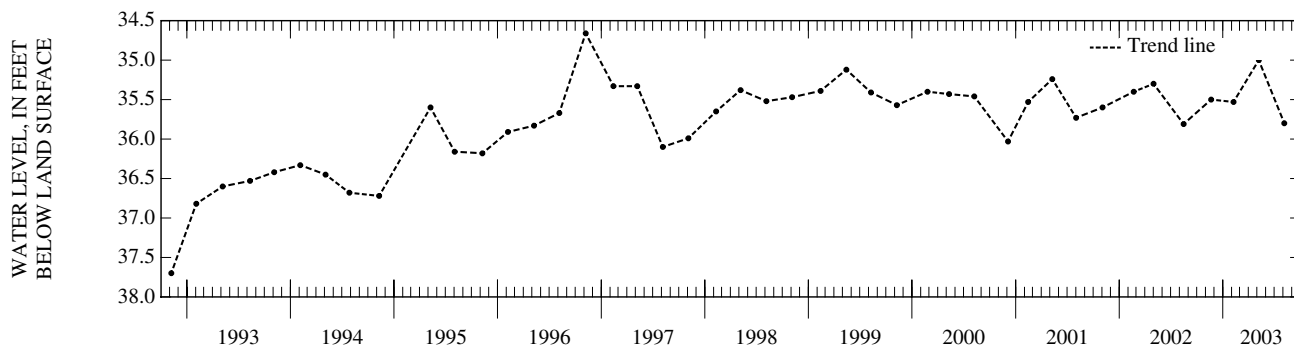
REMARKS.-- Well WC-17.

PERIOD OF RECORD.--August 1981 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 34.66 ft below land-surface datum, November 6, 1997 and May 09, 1995; lowest measured, 40.73 ft below land-surface datum, November 8, 1991.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	35.50	FEB 07	35.53	MAY 07	35.00	AUG 05	35.80
WATER YEAR 2003		HIGHEST	35.00	MAY 07, 2003	LOWEST	35.80	AUG 05, 2003



415023094593801. Local number, 81-36-12 CBCA.

LOCATION.--Lat 41°50'23", long 94°59'38", Hydrologic Unit 10240002, approximately 0.5 mi west of the Town of Gray on the east side of County Road N-14, south of the Gray Cemetery. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 315 ft, screened 279-295 ft, gravel-packed.

INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,393 ft above sea level, from topographic map. Measuring point: Top of casing, 1.40 ft above land-surface datum.

REMARKS.-- Well WC-18.

PERIOD OF RECORD.--August 1981 to current year.

REVISION.--Measuring point revised February 13, 1990 to August 4, 1992.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 159 ft below land-surface datum, August 05, 1998; lowest measured, 168.52 ft below land-surface datum, October 6, 1987.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	164.68	FEB 07	164.62	MAY 07	164.52	AUG 05	165.02
WATER YEAR 2003		HIGHEST	164.52	MAY 07, 2003	LOWEST	165.02	AUG 05, 2003

GROUND-WATER LEVELS

BENTON COUNTY

420731092083801. Local number, 85-11-33 CCBC1.

LOCATION.--Lat 42°07'31", long 92°08'38", Hydrologic Unit 07080205, approximately 1 mi south of the Town of Garrison, just east of County Road V-56.

Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Devonian: Cedar Valley limestone of Middle Devonian age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 0.75 in., depth 237 ft, cement plug 97-100 ft, screened below cement plug, open hole 170-237 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 905 ft above sea level, from topographic map. Measuring point: Top of 6 in. casing, 2.20 ft above land-surface datum.

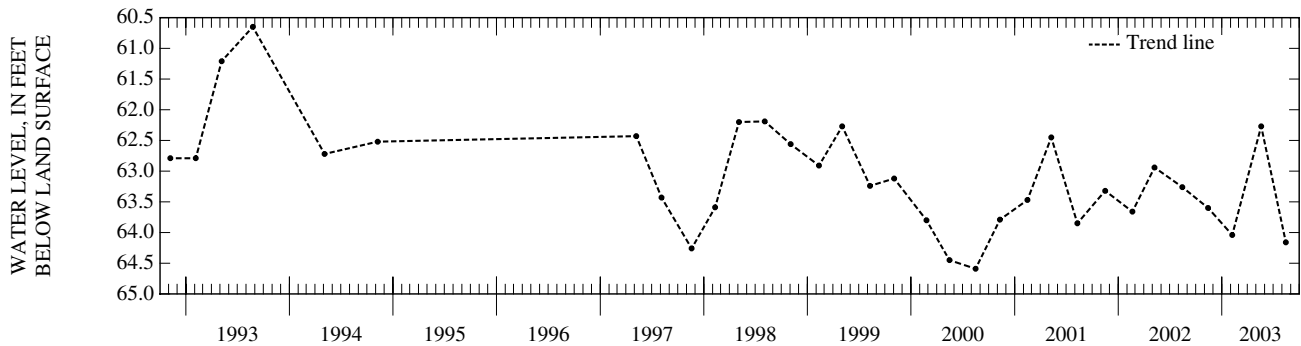
REMARKS.-- Garrison 170 well; Garrison wells 109 and 340 also in this hole.

PERIOD OF RECORD.--June 1977 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 60.18 ft below land-surface datum, April 19, 1983; lowest measured, 64.96 ft below land-surface datum, August 2, 1994.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 13	63.60	FEB 06	64.04	MAY 19	62.27	AUG 14	64.16
WATER YEAR 2003 HIGHEST		62.27	MAY 19, 2003		LOWEST		64.16
						AUG 14, 2003	



420731092083803. Local number, 85-11-33 CCBC3.

LOCATION.--Lat 42°07'31", long 92°08'38", Hydrologic Unit 07080205, approximately 1 mi south of the Town of Garrison, just east of County Road V-56.

Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Devonian: Cedar Valley limestone of Middle Devonian age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 6 in., depth 97 ft, open hole 90-97 ft, cement plug 97-100 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 905 ft above sea level, from topographic map. Measuring point: Top of 6 in. casing, 2.20 ft above land-surface datum.

REMARKS.-- Garrison 109 well; Garrison wells 170 and 340 also in this hole.

PERIOD OF RECORD.--June 1977 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 60.63 ft below land-surface datum, March 23, 1979; lowest measured, 66.87 ft below land-surface datum, August 4, 1997.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 13	63.61	FEB 06	64.08	MAY 19	62.28	AUG 14	64.18
WATER YEAR 2003 HIGHEST		62.28	MAY 19, 2003		LOWEST		64.18
						AUG 14, 2003	

420731092083802. Local number, 85-11-33 CCBC.

LOCATION.--Lat 42°07'31", long 92°08'38", Hydrologic Unit 07080205, approximately 1 mi south of the Town of Garrison, just east of County Road V-56.

Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Silurian.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 6 in., depth 538 ft, casing information unknown

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 905 ft above sea level, from topographic map. Measuring point: Top of 6 in. casing, 2.20 ft above land-surface datum.

REMARKS.-- Garrison 340 well; Garrison wells 170 and 109 also in this hole.

PERIOD OF RECORD.--October 1975 to March 1981; November 1982 to November 1990; November 1993 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 67.50 ft below land-surface datum, August 4 1997; lowest measured, 104.94 ft below land-surface datum, August 21, 1985.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 13	85.83	FEB 06	83.92	MAY 19	87.34	AUG 14	88.27
WATER YEAR 2003 HIGHEST		83.92	FEB 06, 2003		LOWEST		88.27
						AUG 14, 2003	

BREMER COUNTY

424224092133901. Local number, 91-12-11 DBB.

LOCATION.--Lat 42°42'15", long 92°13'29", Hydrologic Unit 07080102, located in the town of Readlyn, approximately 0.5 mi south of State Highway 3, in the northwest corner of town limits. Owner: Town of Readlyn.

AQUIFER.--Silurian, Alexanderian Series dolomite.

WELL CHARACTERISTICS.--Drilled public-use well, diameter 16 in, depth 154 ft, casing open from 99-154 ft.

INSTRUMENTATION.--Quarterly measurement with airline by USGS personnel.

DATUM.--Elevation of land-surface is 1038 feet above sea level, by topographic map.

REMARKS.-- Readlyn No. 2.

PERIOD OF RECORD.--August 1997 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 86 feet below land-surface datum, November 05, 1998, lowest measured, 92 feet below land-surface datum, May 05, 1998.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	88	FEB 12	89	MAY 08	90	AUG 13	89
WATER YEAR 2003 HIGHEST		88	NOV 20, 2002	LOWEST		90	MAY 08, 2003

BUENA VISTA COUNTY

424023095571401. Local number, 91-35-26 BCCC.

LOCATION.--Lat 42°40'09", long 94°57'15", Hydrologic Unit 07100006, approximately 2.7 mi west and 0.5 mi north of the village of Varina. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: in sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 2 in., depth 357 ft, cased tp 357 ft. screened interval 338-347 ft. Paleozoic rock present at 347 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by U.S.G.S. personnel.

DATUM.--Elevation of land-surface datum is 1,291 ft above sea level, from topographic map. Measuring point: Top of casing, 2.00 ft above land-surface datum.

REMARKS.-- Well D-24.

PERIOD OF RECORD.--December 1978 to August 1994, November 1996 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 18.04 ft below land-surface datum, January 7, 1980; lowest measured, 100.14 ft below land-surface datum, August 14, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	98.49	FEB 13	99.70	MAY 07	99.46	AUG 14	100.14
WATER YEAR 2003 HIGHEST		98.49	NOV 21, 2002	LOWEST		100.14	AUG 14, 2003

425233094545001. Local number, 93-35-13 ADA.

LOCATION.--Lat 42°52'33", long 94°54'49", Hydrologic Unit 07100006, south of the Chicago, Rock Island and Pacific Railroad track, approximately 3.5 mi east and 0.75 mi north of the Town of Marathon. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 1.50 in., depth 381 ft, screened 350-360 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,330 ft above sea level, from topographic map. Measuring point: Top of casing, 3.00 ft above land-surface datum.

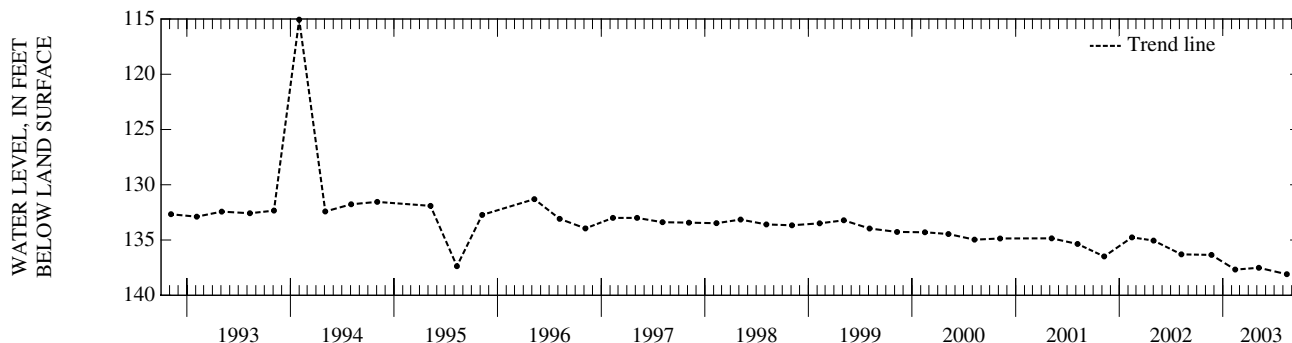
REMARKS.-- Well D-36.

PERIOD OF RECORD.--February 1980 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 115.06 ft below land-surface datum, January 31, 1994; lowest measured, 138.10 ft below land-surface datum, August 14, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	136.35	FEB 13	137.68	MAY 07	137.51	AUG 14	138.10
WATER YEAR 2003 HIGHEST		136.35	NOV 21, 2002	LOWEST		138.10	AUG 14, 2003



GROUND-WATER LEVELS

CALHOUN COUNTY

422812094383501. Local number, 88-32-01 BACD.

LOCATION.--Lat 42°28'12", long 94°38'35", Hydrologic Unit 07100006, located approximately 4.5 mi north of Rockwell City, in a trailer park at the south end of North Twin Lake in Twin Lakes State Park. Owner: Pauline Goins.

AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Dug unused water-table well, diameter 24 in., depth 35 ft, casing interval unknown.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,222 ft above sea level, from topographic map. Measuring point: Top of casing, 1.12 ft above land-surface datum.

REMARKS.-- Twin Lakes (33F2) well.

PERIOD OF RECORD.--May 1989 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 1.86 ft below land-surface datum, April 19, 1991; lowest measured, 16.96 ft below land-surface datum, February 28, 1990.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	9.06	FEB 13	10.71	MAY 07	3.36	AUG 14	8.93
WATER YEAR 2003 HIGHEST		3.36	MAY 07, 2003 LOWEST		10.71	FEB 13, 2003	

422339094375101. Local number, 88-33-36 ADAA.

LOCATION.--Lat 42°23'46", long 94°37'56", Hydrologic Unit 07100006, located at the corner of main and 3rd street, three blocks south of U.S. Highway 20. Owner: City of Rockwell.

AQUIFER.--Cambrian/Ordovician: Prairie du Chen Formation dolomite.

WELL CHARACTERISTICS.--Drilled public supply well, diameter 16 in., depth 1970 ft., casing interval 1592-1970? ft, gravel packed.

INSTRUMENTATION.--Quarterly measurements with airline by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,227 ft above sea level, from topographic map.

REMARKS.-- Rockwell City Well No. 4.

PERIOD OF RECORD.--February 1997 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 199 ft below land-surface datum, Oct. 07, 1997 and Feb. 10, 1998; lowest measured, 296 ft below land-surface datum, August 09, 2000.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	207	FEB 28	252	MAY 09	200	AUG 14	247
WATER YEAR 2003 HIGHEST		200	MAY 09, 2003 LOWEST		252	FEB 28, 2003	

CARROLL COUNTY

420230094455101. Local number, 84-34-35 DAAA.

LOCATION.--Lat 42°02'31", long 94°45'51", Hydrologic Unit 07100007, on the south side of county road, approximately 1 mi east of Arthur N. Neu County Airport. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Alluvial and glacial drift: Middle Raccoon River sand and gravel and glacial drift of Quaternary age.

WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 2 in., depth 40 ft, screened 28-40 ft, gravel packed. Glacial till 31-36 ft and 37-40 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,185 ft above sea level, from topographic map. Measuring point: Top of casing, 2.35 ft above land-surface datum.

REMARKS.-- Well WC-146.

PERIOD OF RECORD.--August 1992 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 1.50 feet below land-surface datum, May 10, 1995; lowest measured, 8.27 ft below land-surface datum, November 07, 1995.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	4.32	FEB 13	5.39	MAY 07	2.01	AUG 07	5.09
WATER YEAR 2003 HIGHEST		2.01	MAY 07, 2003 LOWEST		5.39	FEB 13, 2003	

CARROLL COUNTY—Continued

420233094475901. Local number, 83-35-34 BCDC.

LOCATION.--Lat 42°02'33", long 94°47'59", Hydrologic Unit 07100007, approximately 3.5 mi west and 1.5 mi south of the Town of Glidden near the airport, west of County Road N-38. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 100 ft, screened 72-76 ft; gravel packed, open hole 99-100 ft. Pennsylvanian rock 80-100 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,225 ft above sea level, from topographic map. Measuring point: Top of casing, 2.54 ft above land-surface datum. Measuring point changed to 1.67 ft above land-surface datum on August 7, 2003.

REMARKS.-- Well WC-148.

PERIOD OF RECORD.--October 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 10.96 ft below land-surface datum, September 27, 1982; lowest measured, 24.85 ft below land-surface datum, November 08, 2000.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	19.35	FEB 13	20.33	MAY 07	17.95	AUG 07	19.50
WATER YEAR 2003 HIGHEST		17.95	MAY 07, 2003 LOWEST		20.33	FEB 13, 2003	

420643094403701. Local number, 84-33-03 CADA.

LOCATION.--Lat 42°06'43", long 94°40'37", Hydrologic Unit 07100006, 3.5 mi north and 2.5 mi east of the Town of Glidden, on the west side of County Road N-50. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Alluvial: North Raccoon River sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 2 in., depth 15 ft, screened 13-15 ft, gravel-packed.

INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,090 ft above sea level, from topographic map. Measuring point: Top of casing, 2.31 ft above land-surface datum.

REMARKS.--Well WC-131.

PERIOD OF RECORD.--September 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 7.06 ft below land-surface datum, July 10, 1990; lowest measured, 12.53 ft below land-surface datum, February 12, 2001.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	9.95	FEB 13	10.93	MAY 07	9.74	AUG 07	9.10
WATER YEAR 2003 HIGHEST		9.10	AUG 07, 2003 LOWEST		10.93	FEB 13, 2003	

421058094582701. Local number, 85-35-07 CCCC.

LOCATION.--Lat 42°10'58", long 94°58'29", Hydrologic Unit 07100006, approximately 1 block north of Iowa Highway 217, next to the town maintenance building, Breda. Owner: Town of Breda.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled municipal artesian water well, diameter 10 in., depth 340 ft, screened 320-340 ft. Original depth 349 ft.

INSTRUMENTATION.--Quarterly measurement with chalked taped by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,362 ft above sea level, from topographic map. Measuring point: Vent pipe, 1.60 ft above land-surface datum.

REMARKS.--City of Breda Well No. 3, previously referred to as Town Well No. 2.

PERIOD OF RECORD.--March 1942 to August 1966, March 1968 to November 1971, June 1975 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 179.65 ft below land-surface datum, August 08, 2000; lowest measured, 250.40 ft below land-surface datum, May 24, 1977.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 18	207	JAN 13	205	FEB 13	205	MAY 07	207	AUG 07	214
WATER YEAR 2003 HIGHEST		205	JAN 13, 2003 FEB 13, 2003 LOWEST		214	AUG 07, 2003			

GROUND-WATER LEVELS

CASS COUNTY

411900094530101. Local number, 75-35-07 BBAB.

LOCATION.--Lat 41°19'00", long 94°55'30", Hydrologic Unit 10240003, approximately 3 mi north and 2.9 mi west of the Town of Cumberland, 2 mi south of County Road G-35 and 2.9 mi west of County Road N-28. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 2 in., depth 218 ft, screened 189-209 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,295 ft above sea level, from topographic map. Measuring point: Top of casing, 2.35 ft above land-surface datum.

REMARKS.--Well SW-17.

PERIOD OF RECORD.--July 1986 to October 1987, February 1990 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 111.65 ft below land-surface datum, August 5, 1993; lowest measured, 125.75 ft below land-surface datum, March 14, 1990.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	122.66	FEB 03	123.01	MAY 02	123.20	AUG 06	122.09
WATER YEAR 2003 HIGHEST		122.09	AUG 06, 2003 LOWEST		123.20	MAY 02, 2003	

412832095033501. Local number, 77-37-13 BBBB.

LOCATION.--Lat 41°28'32", long 95°03'35", Hydrologic Unit 10240003, approximately 1 mi south of U.S. Interstate 80, and east of Highway 173.

Approximately 2 mi north and 3 mi east of the Town of Marne. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Pennsylvanian: limestone of Pennsylvanian age.

WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 2 in., depth 201 ft, screened 196-201 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,298 ft above sea level, from topographic map. Measuring point: Top of casing, 2.20 ft above land-surface datum.

REMARKS.--Well SW-18.

PERIOD OF RECORD.--July 1986 to October 1987, February 1990 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 113.50 ft below land-surface datum, November 4, 1993; lowest measured, 128.40 ft below land-surface datum, March 14, 1990.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	124.74	FEB 07	126.02	MAY 07	125.33	AUG 06	124.32
WATER YEAR 2003 HIGHEST		124.32	AUG 06, 2003 LOWEST		126.02	FEB 07, 2003	

CERRO GORDO COUNTY

430757093131801. Local number, 96-20-17 DAAD.

LOCATION.--Lat 43°07'57", long 93°13'18", Hydrologic Unit 07080203, in southwest Mason City, 1 mi west of Highway 65 and south of the Iowa Terminal Rail-yard. Owner: AMPI Creamery (formerly State Brand Creameries).

AQUIFER.--Cambrian-Ordovician: sandstone of Late Cambrian age and sandy dolomite of Early Ordovician age.

WELL CHARACTERISTICS.--Unused drilled industrial artesian water well, diameter 10 to 6 in. from 0-1080 ft, depth 1,336 ft, open hole from 1,080-1,336 ft.

INSTRUMENTATION.--Quarterly measurement with electric line by USGS personnel.

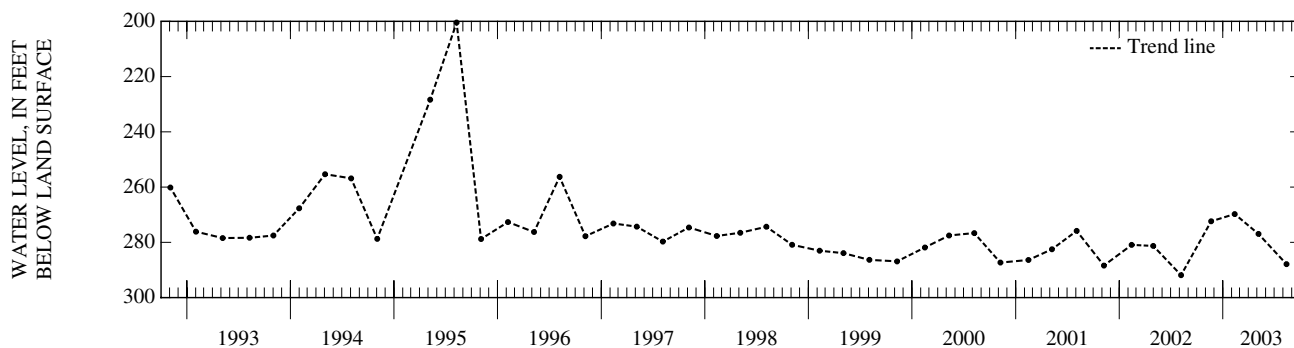
DATUM.--Elevation of land-surface datum is 1,162 ft above sea level, from topographic map. Measuring point: Top of casing, 1.50 ft above land-surface datum.

REMARKS.-- State Brand Creameries Well #1. Records for 1968-1971 and 1973-1989 are unpublished and available in the files of the Iowa District Office. PERIOD OF RECORD.--October 1968 to March 1971, and March 1973 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 170.80 ft below land-surface datum, August 4, 1977; lowest measured, 298.80 ft below land-surface datum, October 22, 1968.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	272.39	FEB 11	269.75	MAY 06	276.97	AUG 13	287.92
WATER YEAR 2003 HIGHEST		269.75 FEB 11, 2003		LOWEST		287.92 AUG 13, 2003	



430806093164501. Local number, 96-21-13 BCCB.

LOCATION.--Lat 43°08'04", long 93°16'46", Hydrologic Unit 07080203, south of the County Home, just north of Iowa Highway 106, east of the City of Clear Lake. Owner: Mason City and Clear Lake Railroad.

AQUIFER.--Devonian: Cedar Valley limestone of Middle Devonian age.

WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 5 in., depth 198 ft. Casing information is not available.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,165 ft above sea level, from topographic map. Measuring point: Top of well curb, 1.30 ft above land-surface datum.

PERIOD OF RECORD.--November 1940 to August 1971, March 1973 to current year.

REMARKS.-- Mason City and Clear Lake Railroad well.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 1.44 ft below land-surface datum, February 12, 1982; lowest measured, 17.26 ft below land-surface datum, November 18, 1955.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	6.47	FEB 11	7.36	MAY 06	5.61	AUG 13	6.80
WATER YEAR 2003 HIGHEST		5.61 MAY 06, 2003		LOWEST		7.36 FEB 11, 2003	

CHEROKEE COUNTY

424132095480211. Local number, 91-42-16 DDDD11.

LOCATION.--Lat 42°41'32", long 95°48'02", Hydrologic Unit 10230004, approximately 2 mi north of the Village of Fielding at the junction of County Roads L-36 and C-44. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 390 ft, screened 386-390 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,320 ft above sea level, from topographic map. Measuring point: Top of casing, 1.50 ft above land-surface datum.

REMARKS.--Well D-11.

PERIOD OF RECORD.--March 1980 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 141.67 ft below land-surface datum, May 5, 1993; lowest measured, 158.04 ft below land-surface datum, August 04, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 18	157.81	FEB 13	157.51	MAY 07	157.36	AUG 04	158.04
WATER YEAR 2003 HIGHEST		157.36 MAY 07, 2003		LOWEST		158.04 AUG 04, 2003	

GROUND-WATER LEVELS

CHEROKEE COUNTY—Continued

424348095231601. Local number, 91-39-01 ADAD1.

LOCATION.--Lat 42°43'48", long 95°23'15", Hydrologic Unit 10230005, approximately 2 mi east and 0.5 mi north of the Town of Aurelia at the Larson Lake County Park. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Cambrian-Ordovician: sandstone of Cambrian age and dolomite of Ordovician age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 6 in. to 236 ft, 5 in. to 486 ft, 2 in. to 1,126 ft, depth 1,545 ft, open hole 1,126 to 1,545 ft.

INSTRUMENTATION.--Quarterly measurement with electric line or chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,370 ft above sea level, from topographic map. Measuring point: Top of casing, 1.55 ft above land-surface datum.

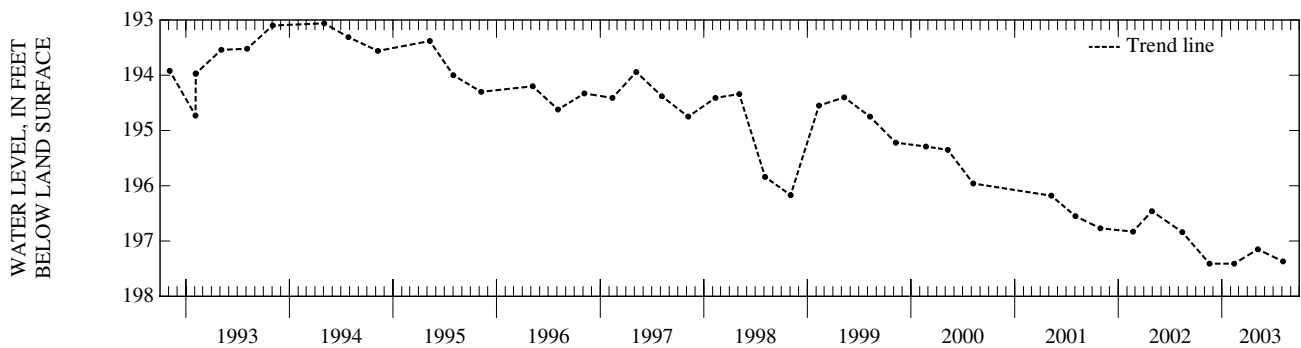
REMARKS.--Well D-28.

PERIOD OF RECORD.--September 1979 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 189.65 ft below land-surface datum, December 19, 1984; lowest measured, 197.41 ft below land-surface datum, November 18, 2002 and February 13, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 18	197.41	FEB 13	197.41	MAY 07	197.15	AUG 04	197.37
WATER YEAR 2003 HIGHEST		197.15	MAY 07, 2003		LOWEST		197.41
							NOV 18, 2002 FEB 13, 2003



424348095231602. Local number, 91-39-01 ADAD2.

LOCATION.--Lat 42°43'48", long 95°23'15", Hydrologic Unit 10230005, approximately 2 mi east and 0.5 mi north of the Town of Aurelia at the Larson Lake County Park. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 4 in., depth 340 ft, screened 235-240 ft.

INSTRUMENTATION.--Quarterly measurement with electric line or chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,370 ft above sea level, from topographic map. Measuring point: Top of casing, 1.75 ft above land-surface datum.

REMARKS.--Well D-29.

PERIOD OF RECORD.--September 1979 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 188.65 ft below land-surface datum, April 20, 1988; lowest measured, 194.15 ft below land-surface datum, August 24, 1982.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 18	193.98	FEB 13	194.16	MAY 07	194.03	AUG 04	194.16
WATER YEAR 2003 HIGHEST		193.98	NOV 18, 2002		LOWEST		194.16
							FEB 13, 2003 AUG 04, 2003

CLAYTON COUNTY

424023091291201. Local number, 91-05-30 BBBB.

LOCATION.--Lat 42°40'23", long 91°29'12", Hydrologic Unit 07060006, 5 mi northwest of the City of Edgewood, or 2 mi northwest of the junction of Iowa Highways 3 and 13, east of Strawberry Point. Owner: Harold Knight.

AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Dug unused water-table well, diameter 36 in., depth 36 ft. Casing information not available.

INSTRUMENTATION.--Intermittent measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,233 ft above sea level, from topographic map. Measuring point: Hole in pump base at land-surface datum.

PERIOD OF RECORD.--June 1957 to current year.

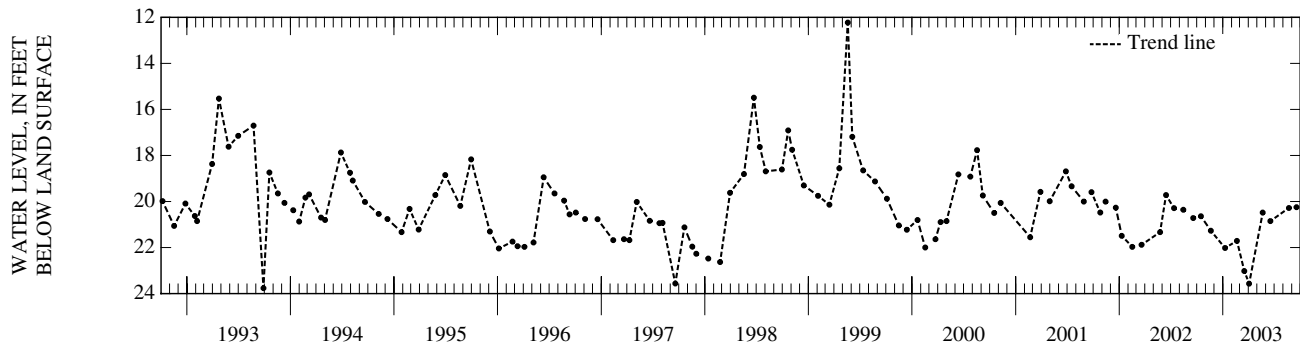
REMARKS.-- Harold Knight well.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 11.68 ft below land-surface datum, August 7, 1991; lowest measured, 30.68 ft below land-surface datum, January 12, 1959.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 15	20.64	JAN 08	22.02	MAR 17	23.02	MAY 21	20.48	AUG 21	20.28
NOV 19	21.27	FEB 19	21.71	APR 03	23.57	JUN 17	20.85	SEP 17	20.25

WATER YEAR 2003 HIGHEST 20.25 SEP 17, 2003 LOWEST 23.57 APR 03, 2003



425736091260303. Local number, 94-05-31 A.

LOCATION.--Lat 42°57'36", long 91°26'03", Hydrologic Unit 07060004, approximately 100 feet south of Robert's Creek on County Highway X16.

AQUIFER.--Cambrian-Ordovician: St. Peter Sandstone.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1030 ft above sea level, from topographic map. Measuring point: Top of casing, 2.50 ft above land-surface datum.

REMARKS.--Well BS2-G.

PERIOD OF RECORD.--January 1989 to April 1989, May 1997 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 182.82 ft above land-surface datum, August 25, 1999, lowest water level recorded 189.20 ft below land-surface datum, August 6, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	185.37	FEB 19	186.90	MAY 20	186.90	AUG 06	189.2

WATER YEAR 2003 HIGHEST 185.37 NOV 19, 2002 LOWEST 189.2 AUG 06, 2003

425433091285002. Local number, 94-05-31 DACC2.

LOCATION.--Lat 42°54'38", long 91°28'25", Hydrologic Unit 07060004, located at entrance to Big Spring Fish Hatchery 4.5 mi west and 1.25 mi south of the Town of St. Olaf. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Cambrian-Ordovician: Galena dolomite of Middle Ordovician age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 5 in., depth 85 ft, open hole 61-85 ft.

INSTRUMENTATION.--Intermittent measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 855 ft above sea level, from topographic map. Measuring point: Top of recorder platform, 2.23 ft above land-surface datum.

REMARKS.--Well BS1-B. Historical water-level data published in OFR 91-63 and OFR 92-67.

PERIOD OF RECORD.--December 1988 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 0.62 ft above land-surface datum, August 20, 1993 (revised); lowest water level recorded 13.37 ft below land-surface datum, February 15, 2000.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	6.89	FEB 19	8.11	MAY 20	2.29	AUG 06	8.51

WATER YEAR 2003 HIGHEST 2.29 MAY 20, 2003 LOWEST 8.51 AUG 06, 2003

GROUND-WATER LEVELS

CLAYTON COUNTY—Continued

430156091182901. Local number, 95-04-22 BCBD.

LOCATION.--Lat 43°01'56", long 91°18'29", Hydrologic Unit 07060001, approximately 2 mi north of the junction of U.S. Highway 18 and U.S. Highway 52-Iowa Highway 13, near Spook Cave. Owner: Gerald Mielke.

AQUIFER.--Cambrian-Ordovician: St. Peter sandstone of Middle Ordovician age.

WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 6 in., depth 49 ft. Casing information not available.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 940 ft above sea level, from topographic map. Measuring point: Top of casing, 1.00 ft above land-surface datum.

PERIOD OF RECORD.--October 1957 to current year.

REMARKS.-- USGS 22E1.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 13.98 ft below land-surface datum, December 7, 1983; lowest measured, 27.88 ft below land-surface datum, March 4, 1968.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	24.11	FEB 19	24.53	MAY 20	21.93	AUG 06	24.86
WATER YEAR 2003 HIGHEST		21.93	MAY 20, 2003 LOWEST		24.86	AUG 06, 2003	

CLINTON COUNTY

414921090450401. Local number, 81-02E-17 ACA.

LOCATION.--Lat 41°49'32", long 90°45'08", Hydrologic Unit 07080103, located below water tower near sub-station in the Town of Claims. Owner: Town of Calamus.

AQUIFER.--Silurian.

WELL CHARACTERISTICS.--Drilled pumping well, diameter 12 in. to 90 ft, 10 in. to 190 ft, depth 278 ft.

INSTRUMENTATION.--Quarterly measurements with airline by USGS personnel.

DATUM.--Elevation of land-surface datum is 712 feet above sea level, by topographic map.

PERIOD OF RECORD.--August 1997 to current year.

REMARKS.-- Calamus No.1.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 42 feet below land-surface datum, November 14, 2002; lowest measured, 125 ft below land-surface datum, August 13, 2002.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 14	42	FEB 05	47	MAY 20	105	AUG 13	45
WATER YEAR 2003 HIGHEST		42	NOV 14, 2002 LOWEST		105	MAY 20, 2003	

414806090212301. Local number, 81-05E-22 DDD.

LOCATION.--Lat 41°48'03", long 90°21'26", Hydrologic Unit 07080101, approximately 1 mile south of the intersection of U.S. Interstate 30 and county road 36, on the northwest corner of intersection. Owner: Town of Low Moor.

AQUIFER.--Silurian, Alexanderian Series.

WELL CHARACTERISTICS.--Drilled public-use well, diameter 12 in. to 62 ft, 8 in. to 62 ft, depth 322 ft, open hole from 85- 322 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 651 feet above sea level, by topographic map.

PERIOD OF RECORD.--August 1997 to current year.

REMARKS.-- Low Moor No.2.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 19.99 feet below land-surface datum, February 09, 1999; lowest measured, 30.50 ft below land-surface datum, May 03, 1999.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 14	22.47	FEB 05	23.59	MAY 20	21.80	AUG 14	24.68
WATER YEAR 2003 HIGHEST		21.80	MAY 20, 2003 LOWEST		24.68	AUG 14, 2003	

CRAWFORD COUNTY

415514095312001. Local number, 82-40-17 AABB.

LOCATION.--Lat 41°55'14", long 95°31'20", Hydrologic Unit 10230007, approximately 1.5 mi west of the Town of Dow City on the south side of U.S.

Highway 30. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 141 ft, screened 123-141 ft, gravel- packed.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,150 ft above sea level, from topographic map. Measuring point: Top of casing, 2.50 ft above land-surface datum.

REMARKS.--Well WC-9.

PERIOD OF RECORD.--June 1981 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 38.15 ft below land-surface datum, May 3, 1983; lowest measured, 43.86 ft below land-surface datum, June 11, 1981.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 18	42.91	FEB 07	42.70	MAY 07	41.07	AUG 05	42.24
WATER YEAR 2003 HIGHEST		41.07	MAY 07, 2003 LOWEST		42.91	NOV 18, 2002	

42060809511701. Local number, 84-37-08 BCCB.

LOCATION.--Lat 42°06'08", long 95°11'14", Hydrologic Unit 10230007, approximately 3 mi north of the Town of Vail on the east side of County Road E-

25. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Fremont buried channel: sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 541 ft, screened 527-541 ft, gravel- packed.

INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,380 ft above sea level, from topographic map. Measuring point: Top of casing, 1.65 ft above land-surface datum.

REMARKS.--Well WC-226.

PERIOD OF RECORD.--August 1983 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 208.35 ft below land-surface datum, July 17, 1988; lowest measured, 217.70 ft below land-surface datum, February 11, 1999.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 18	215.62	FEB 11	215.73	MAY 08	215.45	AUG 21	216.36
WATER YEAR 2003 HIGHEST		215.45	MAY 08, 2003 LOWEST		216.36	AUG 21, 2003	

421005095342801. Local number, 85-41-13 CCCC.

LOCATION.--Lat 42°10'05", long 95°34'28", Hydrologic Unit 10230001, approximately 7 mi west of the Town of Schleswig, northeast of the junction of

County Roads L-51 and E-16. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota and glacial drift: sandstone of Cretaceous age and sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 361 ft, screened 307-322 ft, gravel-packed. Open to Dakota 320-361 ft.

INSTRUMENTATION.--Quarterly measurement with electric line or chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,375 ft above sea level, from topographic map. Measuring point: Top of casing, 3.49 ft above land-surface datum.

REMARKS.--Well WC-6.

PERIOD OF RECORD.--May 1981 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 244.23 ft below land-surface datum, July 28, 1981; lowest measured, 249.36 ft below land-surface datum, August 5, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 18	249.29	FEB 11	249.14	MAY 08	248.85	AUG 05	249.36
WATER YEAR 2003 HIGHEST		248.85	MAY 08, 2003 LOWEST		249.36	AUG 05, 2003	

GROUND-WATER LEVELS
CRAWFORD COUNTY—Continued

421031095225601. Local number, 85-39-16 ADDD1.

LOCATION.--Lat 42°10'31", long 95°22'56", Hydrologic Unit 10230007, approximately 2.5 mi east and 0.5 mi north of the Town of Schleswig on the west side of County Road M-27. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 5 in., depth 351 ft, screened 315-330 ft, gravel-packed. Open to Pennsylvanian rock 344-351 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,370 ft above sea level, from topographic map. Measuring point: Top of casing, 3.14 ft above land-surface datum.

REMARKS.--Well WC-7A.

PERIOD OF RECORD.--June 1981 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 232.61 ft below land-surface datum, October 7, 1986; lowest measured, 239.65 ft below land-surface datum, August 2, 1995.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 18	236.76	FEB 11	236.91	MAY 08	237.00	AUG 05	237.01
WATER YEAR 2003		HIGHEST	236.76	NOV 18, 2002	LOWEST	237.01	AUG 05, 2003

421031095225602. Local number, 85-39-16 ADDD2.

LOCATION.--Lat 42°10'31", long 95°22'56", Hydrologic Unit 10230007, approximately 2.5 mi east and 0.5 mi north of the Town of Schleswig on the west side of County Road M-27. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Mississippian: limestone of Mississippian age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 561 ft, screened 543-561 ft, gravel-packed.

INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,370 ft above sea level, from topographic map. Measuring point: Top of casing, 3.14 ft above land-surface datum.

REMARKS.--Well WC-7B.

PERIOD OF RECORD.--June 1981 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 296.63 ft below land-surface datum, May 07, 1996, lowest measured, 307.64 ft below land-surface datum, October 4, 1983.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 18	304.17	FEB 11	303.89	MAY 08	303.77	AUG 05	303.93
WATER YEAR 2003		HIGHEST	303.77	MAY 08, 2003	LOWEST	304.17	NOV 18, 2002

421106095125501. Local number, 85-38-12 DCBA.

LOCATION.--Lat 42°11'06", long 95°12'55", Hydrologic Unit 10230007, approximately 5.5 mi east of the Town of Kiron on the south side of County Road E-16 near the Town of Boyer. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Fremont buried channel: sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 341 ft, screened 300-310 ft, open hole from 315-341 ft., gravel packed. Open to Pennsylvanian limestone and shale 331-341 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,225 ft above sea level, from topographic map. Measuring point: Top of casing, 3.70 ft above land-surface datum.

REMARKS.--Well WC-14.

PERIOD OF RECORD.--July 1981 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 62.76 ft below land-surface datum, April 16, 1987; lowest measured, 69.23 ft below land-surface datum, August 05, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 18	68.86	FEB 11	68.98	MAY 08	68.60	AUG 05	69.23
WATER YEAR 2003		HIGHEST	68.60	MAY 08, 2003	LOWEST	69.23	AUG 05, 2003

DALLAS COUNTY

413613093530401. Local number, 79-26-33 CDBA.

LOCATION.--Lat 40°36'13", long 93°53'05", Hydrologic Unit 07100006, approximately 0.5 miles south of the Town of Waukee on county road R-22, 100 ft east of roadway, well located inside 48 in concrete culvert. Owner: Town of Waukee.

AQUIFER.--Cambrian/Ordovician, Jordan sandstone.

WEL CHARACTERISTICS.--Drilled public use well, diameter 16 in., depth 2730 ft, casing interval unknown, gravel packed.

INSTRUMENTATION.--Quarterly measurement with airline by USGS personnel.

DATUM.--Elevation of land-surface datum is 1012 ft above sea level, from topographic map.

REMARKS.-- Waukee Well No. 2.

PERIOD OF RECORD.--May 1996 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 389 ft below land-surface datum, May 9, 1997; lowest measured 428 ft below land-surface datum, February 09, 1998.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
FEB 12	404	MAY 07	402	AUG 03	411
WATER YEAR 2003 HIGHEST		402	MAY 07, 2003 LOWEST		411
		AUG 03, 2003			

DECATUR COUNTY

404422093445602. Local number, 69-25-29 DDDD.

LOCATION.--Lat 40°44'24", long 93°44'58", Hydrologic Unit 10280102, approximately 7 mi east of Interstate 35 in the City of Leon, within open field between Iowa Highway 2 and NW 2nd Ave. on NW School St. Owner: City of Leon.

AQUIFER.--Cambrian/Ordovician: Jordan sandstone.

WELL CHARCTREISTICS.--Drilled public use well, diameter 8 in, depth 2853 ft, screened 2740-2790 ft, gravel packed.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1105.60 ft above sea level, from levels. MEasuring point: Top of casing, 3.70 ft above land-surface datum.

REMARKS.-- Leon City Well No. 4.

PERIOD OF RECORD.--May 1996 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 439.80 ft below land-surface datum, May 30, 1996; lowest measured, 448.85 ft below land-surface datum, August 6, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	446.77	FEB 04	447.74	MAY 02	448.48	AUG 06	448.85
WATER YEAR 2003 HIGHEST		446.77	NOV 21, 2002 LOWEST		448.85	AUG 06, 2003	

GROUND-WATER LEVELS

DELAWARE COUNTY

422029091144302. Local number, 87-03-18 CBCD2.

LOCATION.--Lat 42°20'37", long 91°14'47", Hydrologic Unit 07060006, behind the municipal utilities building in downtown Hopkinton. Owner: Town of Hopkinton.

AQUIFER.--Silurian: dolomite of Silurian age.

WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 8 in., depth 86 ft. Casing information not available.

INSTRUMENTATION.--Quarterly measurement with chalked tape by observer.

DATUM.--Elevation of land-surface datum is 863 ft above sea level, from topographic map. Measuring point: Nipple welded to plate on top of casing, 2.46 ft above land-surface datum.

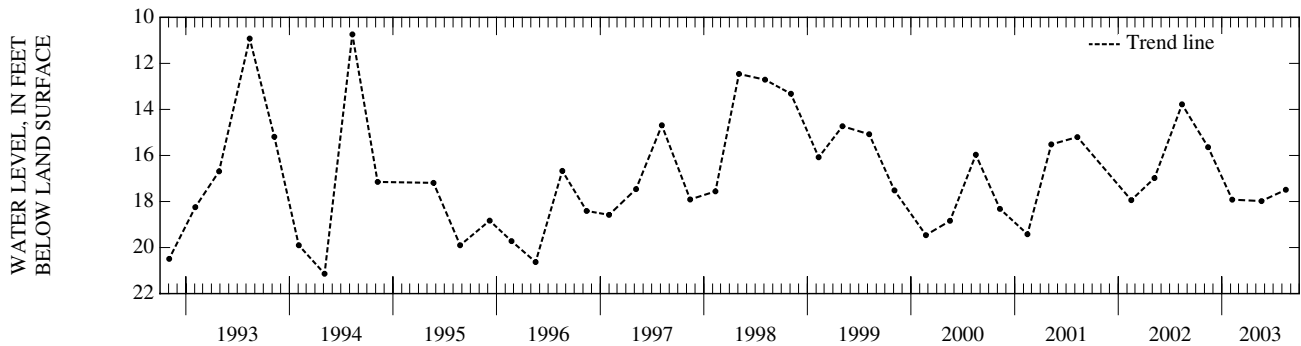
REMARKS.-- Hopkinton #1 well. Water levels affected by pumping of a nearby well.

PERIOD OF RECORD.--December 1984 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 10.74 ft below land-surface datum, August 10, 1994; lowest measured, 27.19 ft below land-surface datum, December 30, 1989.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 13	15.64	FEB 06	17.92	MAY 20	17.98	AUG 14	17.49
WATER YEAR 2003 HIGHEST 15.64		NOV 13, 2002		LOWEST 17.98		MAY 20, 2003	



DUBUQUE COUNTY

422901090471901. Local number, 89-01-36 ABC.

LOCATION.--Lat 42°28'55", long 90°47'18", Hydrologic Unit 07060005, located within white shed northeast of Amoco plant main office on Old Fairground Road, 4 mi east of Centralia on County Highway 966. Owner: Julien Standard Oil.

AQUIFER.--Cambrian/Ordovician.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 13 in., depth 1230 ft, casing open 499-1230 ft, gravel packed.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 899.00 ft above sea level, from levels. Measuring point: Top of vent cap, 2.90 above land-surface datum.

REMARKS.-- Standard Oil No.2.

PERIOD OF RECORD.--January 1997 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 240.38 ft below land-surface datum, January 31, 1997; lowest measured, 254.17 ft below land-surface datum, May 20, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 14	243.82	FEB 06	243.51	MAY 20	254.17	AUG 14	246.69
WATER YEAR 2003 HIGHEST 243.51		FEB 06, 2003		LOWEST 254.17		MAY 20, 2003	

FLOYD COUNTY

430200092435301. Local number, 95-16-22 BCA1.

LOCATION.--Lat 43°02'02", long 92°43'55", Hydrologic Unit 07080201, approximately 2 mi southwest of Charles City, 1.7 mi south of Highway 14 on County Road T47. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 2 in., depth 29 ft, screened 10-29 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,105 ft above sea level, from topographic map. Measuring point: Top of casing, 1.92 ft above land-surface datum.

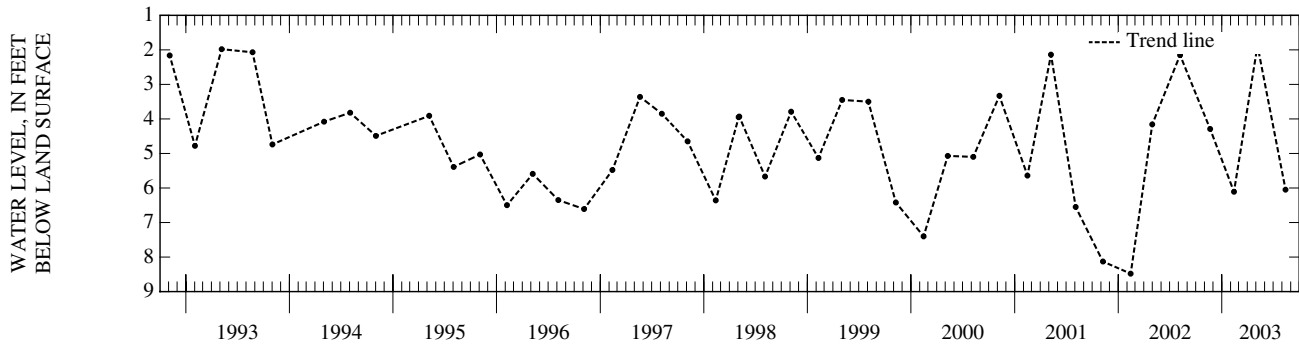
REMARKS.-- Well FM-3 (T).

PERIOD OF RECORD.--August 1992 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 1.88 ft above land-surface datum, May 6, 2003; lowest measured, 6.11 ft below land-surface datum, February 12, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	4.29	FEB 12	6.11	MAY 06	1.88	AUG 13	6.05
WATER YEAR 2003 HIGHEST		1.88	MAY 06, 2003		LOWEST	6.11	FEB 12, 2003



430200092435303. Local number, 95-16-22 BCA3.

LOCATION.--Lat 43°02'02", long 92°43'55", Hydrologic Unit 07080201, approximately 2 mi southwest of Charles City, 1.7 mi south of Highway 14 on County Road T47. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Devonian: dolomite of Devonian age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1 in., depth 103 ft, screened 91-103 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,105 ft above sea level, from topographic map. Measuring point: Top of casing, 2.94 ft above land-surface datum.

REMARKS.-- Well FM-3 (1).

PERIOD OF RECORD.--August 1992 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 36.01 ft above land-surface datum, November 01, 1994; lowest measured, 85.93 ft below land-surface datum, February 12, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	77.66	FEB 12	85.93	MAY 06	80.46	AUG 13	75.92
WATER YEAR 2003 HIGHEST		75.92	AUG 13, 2003		LOWEST	85.93	FEB 12, 2003

430200092435304. Local number, 95-16-22 BCA4.

LOCATION.--Lat 43°02'02", long 92°43'55", Hydrologic Unit 07080201, approximately 2 mi southwest of Charles City, 1.7 mi south of Highway 14 on County Road T47. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Devonian: dolomite of Devonian age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.5 in., depth 207 ft, screened 167-207 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,105 ft above sea level, from topographic map. Measuring point: Top of casing, 2.77 ft above land-surface datum.

REMARKS.-- Well FM-3 (2).

PERIOD OF RECORD.--August 1992 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 56.05 ft above land-surface datum, August 23, 1993; lowest measured, 91.86 ft below land-surface datum, February 12, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	83.23	FEB 12	91.86	MAY 06	83.42	AUG 13	81.35
WATER YEAR 2003 HIGHEST		81.35	AUG 13, 2003		LOWEST	91.86	FEB 12, 2003

GROUND-WATER LEVELS
FLOYD COUNTY—Continued

430200092435305. Local number, 95-16-22 BCA5.

LOCATION.--Lat 43°02'02", long 92°43'55", Hydrologic Unit 07080201, approximately 2 mi southwest of Charles City, 1.7 mi south of Highway 14 on County Road T47. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Devonian: dolomite of Devonian age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.5 in., depth 297 ft, screened 257-297 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,105 ft above sea level, from topographic map. Measuring point: Top of casing, 2.73 ft above land-surface datum.

REMARKS.-- Well FM-3 (3).

PERIOD OF RECORD.--August 1992 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 55.21 ft above land-surface datum, August 23, 1993; lowest measured, 83.13 ft below land-surface datum, February 14, 2001.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	77.56	FEB 12	85.17	MAY 06	81.23	AUG 13	75.80
WATER YEAR 2003		HIGHEST	75.80	AUG 13, 2003	LOWEST	85.17	FEB 12, 2003

430200092435306. Local number, 95-16-22 BCA6.

LOCATION.--Lat 43°02'02", long 92°43'55", Hydrologic Unit 07080201, approximately 2 mi southwest of Charles City, 1.7 mi south of Highway 14 on County Road T47. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Devonian: dolomite of Devonian age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.5 in., depth 360 ft, screened 340-360 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,105 ft above sea level, from topographic map. Measuring point: Top of casing, 2.53 ft above land-surface datum.

REMARKS.-- Well FM-3 (4).

PERIOD OF RECORD.--August 1992 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 56.23 ft above land-surface datum, August 23, 1993; lowest measured, 91.87 ft below land-surface datum, February 12, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	83.16	FEB 12	91.87	MAY 06	83.55	AUG 13	81.34
WATER YEAR 2003		HIGHEST	81.34	AUG 13, 2003	LOWEST	91.87	FEB 12, 2003

430800092540301. Local number, 96-17-18 CDBA.

LOCATION.--Lat 43°07'47", long 92°54'06", Hydrologic Unit 07080202, on the north side of city street approximately 0.5 miles east of county road T-26 in the Town of Rude. Owner: Town of Rude.

AQUIFER.--Cambrian/Ordovician: Jordan sandstone and Prairie du Chien Formation dolomite.

WELL CHARACTERISTICS.--Drilled public well, diameter 8 in., depth 1290 ft, screened 846-855 ft, gravel-packed.

INSTRUMENTATION.--Quarterly measurement by airline by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,123 ft above sea level, by altimeter.

REMARKS.-- Rudd Town Well No.2.

PERIOD OF RECORD.--February 1997 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 161 ft below land surface datum, August 5, 1997; lowest measured 198 ft below land-surface datum, August 03, 1999.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	189	FEB 11	186	MAY 06	190	AUG 13	191
WATER YEAR 2003		HIGHEST	186	FEB 11, 2003	LOWEST	191	AUG 13, 2003

GROUND-WATER LEVELS

47

GREENE COUNTY

420116094363001. Local number, 83-32-08 BBBC.

LOCATION.--Lat 42°01'16", long 94°36'33", Hydrologic Unit 07100006, approximately 3 mi west of the Town of Scranton, south of U.S. Highway 30.

Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Hardin Creek buried channel: sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 181 ft, screened 161-171 ft, gravel-packed. Open to Pennsylvanian shale and siltstone 171-181 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,135 ft above sea level, from topographic map. Measuring point: Top of casing, 2.20 ft above land-surface datum.

REMARKS.-- Well WC-229.

PERIOD OF RECORD.--September 1983 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 39.44 ft below land-surface datum, August 19, 1993; lowest measured, 51.03 ft below land-surface datum, July 8, 1985.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	42.45	FEB 13	42.57	MAY 07	42.58	AUG 07	42.00
WATER YEAR 2003 HIGHEST		42.00	AUG 07, 2003 LOWEST		42.58	MAY 07, 2003	

420146094272301. Local number, 83-31-04 ADDB.

LOCATION.--Lat 42°01'47", long 94°27'23", Hydrologic Unit 07100006, approximately 4 mi west of the City of Jefferson and 0.5 mi south of U.S. Highway 30, on the west side of County Road P-14. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 54 ft, screened 40-51 ft, gravel-packed. Open to Pennsylvanian shale 51-54 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,000 ft above sea level, from topographic map. Measuring point: Top of casing, 2.10 ft above land-surface datum.

REMARKS.-- Well WC-120.

PERIOD OF RECORD.--August 1982 to July 1987, February 1990 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 6.39 ft below land-surface datum, July 5, 1983; lowest measured, 19.57 ft below land-surface datum, November 06, 1997.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	17.96	FEB 13	18.53	MAY 07	10.89	AUG 07	16.55
WATER YEAR 2003 HIGHEST		10.89	MAY 07, 2003 LOWEST		18.53	FEB 13, 2003	

415449094155601. Local number, 82-29-18 DBAA.

LOCATION.--Lat 41°54'49", long 94°15'56", Hydrologic Unit 07100006, approximately 3.25 mi west and 1.5 mi south of the Town of Rippey, south of County Road E-57. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 90 ft, screened 65-75 ft, gravel-packed; open hole from 75-90 ft. Pleistocene glacial till 75-86 ft, and Pennsylvanian shale and siltstone 86-90 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,005 ft above sea level, from topographic map. Measuring point: Top of casing, 1.85 ft above land-surface datum.

REMARKS.-- Well WC-117.

PERIOD OF RECORD.--August 1982 to November 1995.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 32.20 ft below land-surface datum, August 17, 1993; lowest measured, 40.13 ft below land-surface datum, February 13, 1990.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	37.21	FEB 13	38.61	MAY 07	35.94	AUG 07	36.63
WATER YEAR 2003 HIGHEST		35.94	MAY 07, 2003 LOWEST		38.61	FEB 13, 2003	

GROUND-WATER LEVELS

GREENE COUNTY—Continued

420149094344701. Local number, 83-32-04 ACCC.

LOCATION.--Lat 42°01'49", long 94°34'47", Hydrologic Unit 07100006, 1.5 mi west of the Town of Scranton south of U.S. Highway 30, adjacent to the Scranton Cemetery. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 240 ft, screened 220-240 ft, gravel-packed. Open to Pennsylvanian shale 234-240 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,202 ft above sea level, from topographic map. Measuring point: Top of casing, 2.10 ft above land-surface datum.

REMARKS.-- Well WC-228.

PERIOD OF RECORD.--July 1983 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 151.44 ft below land-surface datum, February 8, 1996; lowest measured, 155.48 ft below land-surface datum, April 17, 1991.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	152.97	FEB 13	153.19	MAY 07	152.83	AUG 07	153.02
WATER YEAR 2003 HIGHEST		152.83	MAY 07, 2003 LOWEST		153.19	FEB 13, 2003	

420507094141901. Local number, 84-29-16 CBAB.

LOCATION.--Lat 42°05'07", long 94°14'19", Hydrologic Unit 07100006, approximately 1.5 mi south of the Town of Dana, east of Iowa Highway 144 near the Chicago and Northwestern Railroad. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Beaver buried channel: sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 181 ft, screened 161-176 ft, gravel-packed. Open to Pennsylvanian shale 177-181 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,075 ft above sea level, from topographic map. Measuring point: Top of casing, 1.80 ft above land-surface datum.

REMARKS.-- Well WC-233.

PERIOD OF RECORD.--August 1983 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 38.63 ft below land-surface datum, April 2, 1985; lowest measured, 43.28 ft below land-surface datum, October 2, 1989.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	41.21	FEB 13	40.61	MAY 07	40.56	AUG 07	40.92
WATER YEAR 2003 HIGHEST		40.56	MAY 07, 2003 LOWEST		41.21	NOV 19, 2002	

GRUNDY COUNTY

422611092552501. Local number, 88-18-14 BCCB.

LOCATION.--Lat 42°26'07", long 92°55'27", Hydrologic Unit 07080205, located on county road T-19, 0.5 miles north of county road D-25, in the City of Wellsburg. Owner: City of Wellsburg.

AQUIFER.--Cambrian: Jordan Formation sandstone.

WELL CHARACTERISTICS.--Drilled public artesian water well, diameter 12 in., depth 2050 ft, casing open 1536-2050 ft.

INSTRUMENTATION.--Quarterly measurement with airline by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,094 ft above sea level, from topographic map.

REMARKS.-- Wellsburg Well No. 1.

PERIOD OF RECORD.--November 1996 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 273 ft below land-surface datum, November 20, 2002; lowest measured, 296 ft below land-surface datum, August 02, 1999.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	273	FEB 12	275	MAY 08	294	AUG 12	275
WATER YEAR 2003 HIGHEST		273	NOV 20, 2002 LOWEST		294	MAY 08, 2003	

GUTHRIE COUNTY

413223094150801. Local number, 78-29-24 CAAB.

LOCATION.--Lat 41°32'23", long 94°15'08", Hydrologic Unit 07100007, approximately 0.5 mi west and 1.5 north of the Town of Dexter. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drill observation artesian water well, diameter 2 in., depth 72 ft, screened 60-68 ft, gravel- packed. Open to Pennsylvanian shale 65-72 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,020 ft above sea level, from topographic map. Measuring point: Top of casing, 2.10 ft above land-surface datum.

REMARKS.-- Well WC-238.

PERIOD OF RECORD.--August 1983 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 38.20 ft below land-surface datum, May 10, 1995; lowest measured, 48.82 ft below land-surface datum, April 10, 1986.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	40.90	FEB 12	40.81	MAY 07	39.80	AUG 03	40.50
WATER YEAR 2003 HIGHEST		39.80	MAY 07, 2003 LOWEST		40.90	NOV 19, 2002	

413248094314301. Local number, 78-32-21 AAAA.

LOCATION.--Lat 41°32'48", long 94°31'43", Hydrologic Unit 07100008, approximately 2.25 mi north of the Town of Casey. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 161 ft, cased to 135 ft, slotted 125-135 ft, gravel-packed. Open to Pennsylvanian shale and siltstone 158-161 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,250 ft above sea level, from topographic map. Measuring point: Top of casing, 1.90 ft above land-surface datum.

REMARKS.-- Well WC-239.

PERIOD OF RECORD.--August 1983 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 70.50 ft below land-surface datum, January 12, 1988; lowest measured, 74.38 ft below land-surface datum, January 9, 1985.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	73.25	FEB 12	73.42	MAY 07	73.09	AUG 07	73.59
WATER YEAR 2003 HIGHEST		73.09	MAY 07, 2003 LOWEST		73.59	AUG 07, 2003	

414728094385301. Local number, 81-33-26 DDDD.

LOCATION.--Lat 41°47'29", long 94°38'54", Hydrologic Unit 07100007, approximately 5 mi south and 1.25 mi east of the Town of Coon Rapids on the north side of County Road F-24. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 80 ft, screened 60-65 ft, gravel- packed, open hole 67-80 ft. Open to Pennsylvanian shale 67-80 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,205 ft above sea level, from topographic map. Measuring point: Top of casing, 2.20 ft above land-surface datum.

REMARKS.-- Well WC-93.

PERIOD OF RECORD.--July 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 36.76 ft below land-surface datum, May 4, 1994; lowest measured, 40.98 ft below land-surface datum, January 3, 1983.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	40.36	FEB 12	40.46	MAY 07	40.52	AUG 07	40.29
WATER YEAR 2003 HIGHEST		40.29	AUG 07, 2003 LOWEST		40.52	MAY 07, 2003	

GROUND-WATER LEVELS
GUTHRIE COUNTY—Continued

414821094271301. Local number, 81-31-22 CCCC.

LOCATION.--Lat 41°48'21", long 94°27'12", Hydrologic Unit 07100007, approximately 2.5 mi south and 1 mi west of the Town of Bagley, north of Spring Brook State Park. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 153 ft, screened 143-153 ft, gravel-packed. Open to Pennsylvanian shale 149-153 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,190 ft above sea level, from topographic map. Measuring point: Top of casing, 1.45 ft above land-surface datum. Measuring point changed to 3.55 ft above land-surface datum on August 7, 2003.

REMARKS.-- Well WC-105.

PERIOD OF RECORD.--August 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 46.84 ft below land-surface datum, August 3, 1994; lowest measured, 69.88 ft below land-surface datum, December 9, 1982.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	63.83	FEB 13	64.15	MAY 07	64.64	AUG 07	63.99
WATER YEAR 2003 HIGHEST		63.83	NOV 19, 2002 LOWEST		64.64	MAY 07, 2003	

HAMILTON COUNTY

422610093474202. Local number, 88-25-17BCCA2.

LOCATION.--Lat 42°26'10", long 93°47'42", Hydrologic Unit 07100005, 1 mi east and 1.5 mi south of Webster City. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Mississippian: Limestone with shale of Mississippian age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 4 in., depth 110 ft, screened 80-110 ft.

INSTRUMENTATION.--Monthly measurement with chalked or electric tape by USGS personnel. Submersible pressure transducer with logger installed May, 2003.

DATUM.--Elevation of land-surface datum is 1,085 ft above sea level, from topographic map. Measuring point: Top of sleeve used to hang pressure transducer, 2.26 ft above land-surface datum.

REMARKS.-- Briggs Woods 2. Part of well nest.

PERIOD OF RECORD.--May 2003 to September 30, 2003.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 52.18 ft below land-surface datum, July 14, 2003; lowest measured, 53.28 ft below land-surface datum, September 17, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAY 29	52.33	JUL 14	52.18	AUG 04	52.69	SEP 17	53.28
WATER YEAR 2003 HIGHEST		52.18	JUL 14, 2003 LOWEST		53.28	SEP 17, 2003	

422610093474203. Local number, 88-25-17BCCA3.

LOCATION.--Lat 42°26'10", long 93°47'42", Hydrologic Unit 07100005, 1 mi east and 1.5 mi south of Webster City. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Mississippian.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 4 in., depth 410 ft, screened 370-410 ft.

INSTRUMENTATION.--Monthly measurement with chalked or electric tape by USGS personnel. Submersible pressure transducer with logger installed May, 2003.

DATUM.--Elevation of land-surface datum is 1,085 ft above sea level, from topographic map. Measuring point: Top of sleeve used to hang pressure transducer, 2.04 ft above land-surface datum.

REMARKS.-- Briggs Woods 3. Part of well nest.

PERIOD OF RECORD.--May 2003 to September 30, 2003.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 63.48 ft below land-surface datum, July 14, 2003; lowest measured, 66.27 ft below land-surface datum, September 17, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAY 29	64.47	JUL 14	63.48	AUG 04	65.14	SEP 17	66.27
WATER YEAR 2003 HIGHEST		63.48	JUL 14, 2003 LOWEST		66.27	SEP 17, 2003	

HARDIN COUNTY

423310093032802. Local number, 89-19-02 BDAC2.

LOCATION.--Lat 42°33'08", long 93°03'31", Hydrologic Unit 07080205, 0.35 south and 0.10 mi west of the intersection of U.S. Highway 20 and County Road S-56. Well is in a shed at the west end of 2nd Avenue adjacent to railroad tracks. Owner: City of Ackley.

AQUIFER.--Mississippian: limestone and dolomite of Mississippian age.

WELL CHARACTERISTICS.--Drilled unused public-supply artesian well, diameter 10 in., depth 134 ft, screened 57-60 ft, open hole 68-134 ft. Open to Devonian rock 131-134 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel. Analog digital water-level recorder, 60 minute punch, to October, 1992.

DATUM.--Elevation of land-surface datum is 1,085 ft above sea level, from topographic map. Measuring point: Top of recorder base, 0.8 ft above land-surface datum.

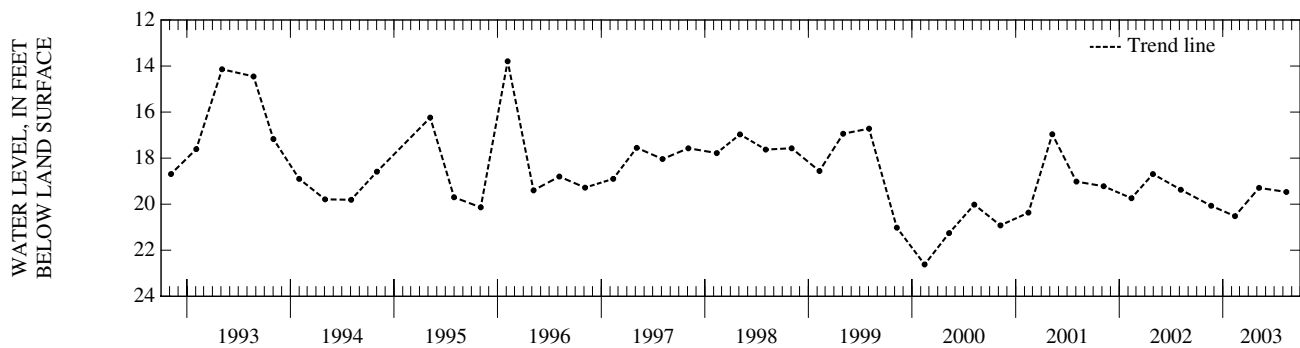
REMARKS.-- Ackley No. 5 well.

PERIOD OF RECORD.--September 1988 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 13.79 ft below land-surface datum, February 5, 1996; lowest measured, 27.20 ft below land-surface datum, February 25, 1990.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	20.07	FEB 12	20.52	MAY 08	19.29	AUG 12	19.47
WATER YEAR 2003		HIGHEST	19.29	MAY 08, 2003	LOWEST	20.52	FEB 12, 2003



HARRISON COUNTY

413024095353901. Local number, 78-41-31 DDDD.

LOCATION.--Lat 41°30'24", long 95°35'39", Hydrologic Unit 10230006, approximately 4.5 mi south of the Town of Persia and west of Iowa Highway 191 to the north of the Tri-County High School. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Glacial drift: sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 129 ft, screened 109-119 ft, gravel-packed. Open to Pennsylvanian shale and limestone 118-129 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,158 ft above sea level, from topographic map. Measuring point: Top of casing, 2.05 ft above land-surface datum.

REMARKS.-- Well WC-27.

PERIOD OF RECORD.--January 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 55.26 ft below land-surface datum, July 7, 1982; lowest measured, 60.54, July 5, 1989.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	58.76	FEB 06	58.90	MAY 07	58.64
WATER YEAR 2003		HIGHEST	58.64	MAY 07, 2003	LOWEST
58.90		FEB 06, 2003			

GROUND-WATER LEVELS
HARRISON COUNTY—Continued

413523095483101. Local number, 78-43-05 ACDD.

LOCATION.--Lat 41°35'23", long 95°48'30", Hydrologic Unit 10230007, approximately 3.25 mi south of the Town of Logan and 1.5 mi east of U.S. Highway 30. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 179 ft, screened 168-175 ft, gravel-packed. Open to Pennsylvanian shale 175-179 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,080 ft above sea level, from topographic map. Measuring point: Top of casing, 2.35 ft above land-surface datum.

REMARKS.-- Well WC-33.

PERIOD OF RECORD.--May 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 66.20 ft below land-surface datum, March 21, 1990; lowest measured, 74.90 ft below land-surface datum, February 16, 1988.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 18	73.24	FEB 06	73.20	MAY 08	71.42	AUG 05	73.01
WATER YEAR 2003 HIGHEST		71.42	MAY 08, 2003 LOWEST		73.24	NOV 18, 2002	

413524095490601. Local number, 78-43-05 BCDD.

LOCATION.--Lat 41°35'24", long 95°49'06", Hydrologic Unit 10230007, approximately 2 mi north and 3.5 mi east of the Town of Missouri Valley and 1 mi east of U.S. Highway 30. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Alluvial: Boyer River sand and gravel of Holocene age.

WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 2 in., depth 51 ft, screened 48-51 ft, gravel-packed.

INSTRUMENTATION.--Monthly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,010 ft above sea level, from topographic map. Measuring point: Top of casing, 3.40 ft above land-surface datum.

REMARKS.-- Well WC-32.

PERIOD OF RECORD.--May 1982 to current year.

REVISION.--Measuring point revised September 4, 1990 to September 29, 1992.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 1.68 ft below land-surface datum, July 07, 1998; lowest measured, 7.00 ft below land-surface datum, September 9, 1988, October 18, 1990 and December 5, 1990.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 18	5.09	MAR 12	4.75	JUN 10	3.75	AUG 05	5.19
FEB 06	5.62	MAY 08	2.97	JUL 17	4.70	SEP 17	6.12
WATER YEAR 2003 HIGHEST		2.97	MAY 08, 2003 LOWEST		6.12	SEP 17, 2003	

413838095462001. Local number, 79-42-19 AADB.

LOCATION.--Lat 41°38'38", long 95°46'20", Hydrologic Unit 10230007, approximately 0.5 mi east of the Town of Logan, north of U.S. Highway 30. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Mississippian: dolomite of Mississippian age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 628 ft, screened 588-628 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,045 ft above sea level, from topographic map. Measuring point: Top of casing, 4.40 ft above land-surface datum.

REMARKS.-- Well WC-22.

PERIOD OF RECORD.--November 1981 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.33 ft above land-surface datum, June 19, 1987; lowest measured, 16.37 ft below land-surface datum, June 3, 1982.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 18	10.62	FEB 06	8.16	MAY 08	8.80	AUG 12	8.10
WATER YEAR 2003 HIGHEST		8.10	AUG 12, 2003 LOWEST		10.62	NOV 18, 2002	

HARRISON COUNTY—Continued

414700095373001. Local number, 81-41-33 CAAA.

LOCATION.--Lat 41°47'00", long 95°37'30", Hydrologic Unit 10230007, approximately 4.5 mi south of the Town of Dunlap, and 2 mi east of U.S. Highway 30. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 169 ft, screened 145-154 ft, gravel-packed.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,182 ft above sea level, from topographic map. Measuring point: Top of casing, 2.90 ft above land-surface datum.

REMARKS.-- Well WC-52.

PERIOD OF RECORD.--June 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 70.50 ft below land-surface datum, August 12, 1993; lowest measured, 85.03 ft below land-surface datum, June 4, 1982.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 18	78.11	FEB 06	78.70	MAY 07	77.45	AUG 05	76.04
WATER YEAR 2003 HIGHEST		76.04	AUG 05, 2003		LOWEST		78.70 FEB 06, 2003

HENRY COUNTY

405010091424901. Local number, 70-07-30 BCDD.

LOCATION.--Lat 40°50'10", long 91°42'49", Hydrologic Unit 07080107, in the Hillsboro City Park adjacent to water tower. Owner: City of Hillsboro.

AQUIFER.--Mississippian: limestone of Mississippian age.

WELL CHARACTERISTICS.--Drilled unused test hole, diameter 6 in., depth 365 ft, cased to 74.8 ft, open hole 74.8-365 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 733 ft above sea level, from topographic map. Measuring point: Hole in top of casing, 1.15 ft above land-surface datum.

REMARKS.-- Hillsboro Test 1.

PERIOD OF RECORD.--August 1989 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 70.12 ft below land-surface datum, February 23, 1996, May 6, 1994; lowest measured, 78.03 ft below land-surface datum, February 22, 2000.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 12	72.68	FEB 04	72.54	MAY 21	72.65	AUG 11	72.14
WATER YEAR 2003 HIGHEST		72.14	AUG 11, 2003		LOWEST		72.68 NOV 12, 2002

410852091394301. Local number, 73-07-09 AABD.

LOCATION.--Lat 41°08'51", long 91°39'43", Hydrologic Unit 07080107, north of Main Street near the water tower, Wayland. Owner: Town of Wayland.

AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Dug unused water-table well, diameter 4 ft, depth 52 ft. Casing information not available.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 735 ft above sea level, from topographic map. Measuring point: Hole in top of casing, 0.21 ft above land-surface datum.

REMARKS.-- Wayland Town Well.

PERIOD OF RECORD.--August 1960 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 2.30 ft below land-surface datum, September 1, 1965; lowest measured, 14.69 ft below land-surface datum, February 15, 1977.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 12	9.90	FEB 04	11.60	MAY 21	9.79	AUG 11	9.88
WATER YEAR 2003 HIGHEST		9.79	MAY 21, 2003		LOWEST		11.60 FEB 04, 2003

GROUND-WATER LEVELS

HOWARD COUNTY

432158092065801. Local number, 99-11-26 BCA.

LOCATION.--Lat 43°21'58", long 92°06'58", Hydrologic Unit 07060004, located approximately 1 mi west of the town of Cresco, 0.5 mi south from state highway 9 on county road V-58. Owner: Town of Cresco.

AQUIFER.--Cambrian/Ordovician.

WELL CHARACTERISTICS.--Drilled public use artesian well, diameter 16 in, depth 1120 ft., Casing information not available.

INSTRUMENTATION.--Quarterly measurement using an airline by USGS personnel.

DATUM.--Elevation of land-surface datum is 1288 ft above sea level, from topographic map.

REMARKS.-- Cresco Well No. 4. Previously published water levels may be incorrect due to inconsistencies in airline measurements.

PERIOD OF RECORD.--February 1997 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 318 ft below land surface datum, May 20, 1997 and May 6, 2003; lowest measured, 355 ft below land-surface datum, May 09, 2000.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	322	FEB 11	322	MAY 06	318	AUG 13	320
WATER YEAR 2003 HIGHEST		318	MAY 06, 2003 LOWEST		322	NOV 20, 2002 FEB 11, 2003	

HUMBOLDT COUNTY

424039094103601. Local number, 91-28-20 CAAA.

LOCATION.--Lat 42°40'29", long 94°10'47", Hydrologic Unit 07100004, approximately 3 mi south of the Town of Dakota City, on the west side of County Road P-56. Owner: Elmer Gravidlund.

AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Unused water-table well, diameter 3 ft, cribbed with field stone, depth 24.5 ft, casing information unavailable.

INSTRUMENTATION.--Monthly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,135 ft above sea level, from topographic map. Measuring point: Top of casing, 0.30 ft above land-surface datum. REMARKS: Gravidlund/G-1 well.

PERIOD OF RECORD.--July 1988 to current year. Well destroyed in June 2003.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 4.40 ft below land-surface datum, April 26, 1991; lowest measured, 19.29 ft below land-surface datum, March 12, 1990.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 08	7.64	DEC 23	9.09	FEB 11	9.88	APR 03	10.44	JUN 02	6.20
NOV 21	8.53	JAN 13	9.43	MAR 06	10.23	MAY 06	7.62		
WATER YEAR 2003 HIGHEST		6.20	JUN 02, 2003 LOWEST		10.44	APR 03, 2003			

424539094152401. Local number, 92-29-22CDDD1.

LOCATION.--Lat 42°45'39", long 94°15'24", Hydrologic Unit 07100002, 1.5 mi east of Rutland. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Quaternary.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 4 in., depth 20 ft, screened 10-20 ft.

INSTRUMENTATION.--Monthly measurement with chalked or electric tape by USGS personnel. Submersible pressure transducer with logger installed May, 2003.

DATUM.--Elevation of land-surface datum is 1,130 ft above sea level, from topographic map. Measuring point: Top of sleeve used to hang pressure transducer, 2.17 ft above land-surface datum.

REMARKS.-- Rutland Marsh 1. Part of well nest.

PERIOD OF RECORD.--May 2003 to September 30, 2003.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 2.54 ft below land-surface datum, July 14, 2003; lowest measured, 6.64 ft below land-surface datum, September 17, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAY 28	3.20	JUL 14	2.54	AUG 04	4.45	SEP 17	6.64
WATER YEAR 2003 HIGHEST		2.54	JUL 14, 2003 LOWEST		6.64	SEP 17, 2003	

HUMBOLDT COUNTY—Continued

424539094152402. Local number, 92-29-22CDDD2.

LOCATION.--Lat 42°45'39", long 94°15'24", Hydrologic Unit 07100002, 1.5 mi east of Rutland. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Mississippian: Limestone of Mississippian age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 4 in., depth 80 ft, screened 60-80 ft.

INSTRUMENTATION.--Monthly measurement with chalked or electric tape by USGS personnel. Submersible pressure transducer with logger installed May, 2003.

DATUM.--Elevation of land-surface datum is 1,130 ft above sea level, from topographic map. Measuring point: Top of sleeve used to hang pressure transducer, 1.99 ft above land-surface datum.

REMARKS.-- Rutland Marsh 2. Part of well nest.

PERIOD OF RECORD.--May 2003 to September 30, 2003.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 31.28 ft below land-surface datum, July 14, 2003; lowest measured, 40.57 ft below land-surface datum, September 17, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAY 28	38.04	JUL 14	31.28	AUG 04	36.61	SEP 17	40.57
WATER YEAR 2003 HIGHEST		31.28	JUL 14, 2003	LOWEST		40.57	SEP 17, 2003

424539094152403. Local number, 92-29-22CDDD3.

LOCATION.--Lat 42°45'39", long 94°15'24", Hydrologic Unit 07100002, 1.5 mi east of Rutland. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Mississippian: Limestone of Mississippian age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 4 in., depth 150 ft, screened 130-150 ft.

INSTRUMENTATION.--Monthly measurement with chalked or electric tape by USGS personnel. Submersible pressure transducer with logger installed May, 2003.

DATUM.--Elevation of land-surface datum is 1,130 ft above sea level, from topographic map. Measuring point: Top of sleeve used to hang pressure transducer, 2.16 ft above land-surface datum.

REMARKS.-- Rutland Marsh 3. Part of well nest.

PERIOD OF RECORD.--May 2003 to September 30, 2003.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 32.14 ft below land-surface datum, July 14, 2003; lowest measured, 41.38 ft below land-surface datum, September 17, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAY 28	38.81	JUL 14	32.14	AUG 04	37.75	SEP 17	41.38
WATER YEAR 2003 HIGHEST		32.14	JUL 14, 2003	LOWEST		41.38	SEP 17, 2003

424539094152404. Local number, 92-29-22CDDD4.

LOCATION.--Lat 42°45'39", long 94°15'24", Hydrologic Unit 07100002, 1.5 mi east of Rutland. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Mississippian: Limestone of Mississippian age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 4 in., depth 200 ft, screened 180-200 ft.

INSTRUMENTATION.--Monthly measurement with chalked or electric tape by USGS personnel. Submersible pressure transducer with logger installed May, 2003.

DATUM.--Elevation of land-surface datum is 1,130 ft above sea level, from topographic map. Measuring point: Top of sleeve used to hang pressure transducer, 2.44 ft above land-surface datum.

REMARKS.-- Rutland Marsh 4. Part of well nest.

PERIOD OF RECORD.--May 2003 to September 30, 2003.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 32.11 ft below land-surface datum, July 14, 2003; lowest measured, 41.23 ft below land-surface datum, September 17, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAY 28	38.67	JUL 14	32.11	AUG 04	37.65	SEP 17	41.23
WATER YEAR 2003 HIGHEST		32.11	JUL 14, 2003	LOWEST		41.23	SEP 17, 2003

GROUND-WATER LEVELS
HUMBOLDT COUNTY—Continued

424539094152405. Local number, 92-29-22CDDD5.

LOCATION.--Lat 42°45'39", long 94°15'24", Hydrologic Unit 07100002, 1.5 mi east of Rutland. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Mississippian: Limestone of Mississippian age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 4 in., depth 280 ft, screened 240-280 ft.

INSTRUMENTATION.--Monthly measurement with chalked or electric tape by USGS personnel. Submersible pressure transducer with logger installed May, 2003.

DATUM.--Elevation of land-surface datum is 1,130 ft above sea level, from topographic map. Measuring point: Top of sleeve used to hang pressure transducer, 2.34 ft above land-surface datum.

REMARKS.-- Rutland Marsh 5. Part of well nest.

PERIOD OF RECORD.--May 2003 to September 30, 2003.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 32.49 ft below land-surface datum, July 14, 2003; lowest measured, 41.22 ft below land-surface datum, September 17, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAY 28	38.85	JUL 14	32.49	AUG 04	37.76	SEP 17	41.22
WATER YEAR 2003		HIGHEST	32.49	JUL 14, 2003	LOWEST	41.22	SEP 17, 2003

IDA COUNTY

422215095390811. Local number, 87-41-05 CCCC11.

LOCATION.--Lat 42°22'15", long 95°39'08", Hydrologic Unit 10230005, approximately 0.75 mi east and 6.5 mi south of the Village of Cushing. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 490 ft, screened 301-305 ft. Original depth 510 ft, cemented back to 490 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,344 ft above sea level, from topographic map. Measuring point: Top of casing, 2.18 ft above land-surface datum.

REMARKS.-- Well D-10.

PERIOD OF RECORD.--June 1980 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 202.55 ft below land-surface datum, June 4, 1980; lowest measured, 208.52 ft below land-surface datum, November 18, 2002.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 18	208.52	FEB 11	208.52	MAY 08	208.46	AUG 04	208.27
WATER YEAR 2003		HIGHEST	208.27	AUG 04, 2003	LOWEST	208.52	NOV 18, 2002
						FEB 11, 2003	

423107095383201. Local number, 89-41-13 CCCC.

LOCATION.--Lat 42°31'07", long 95°38'28", Hydrologic Unit 10230003, at a roadside park on County Road D-15, approximately 1.5 mi east and 3.5 mi north of the Village of Cushing. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Mississippian: limestone of Mississippian age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 469 ft, sand point 465-468 ft, open hole 468-469 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,320 ft above sea level, from topographic map. Measuring point: Top of casing, 2.11 ft above land-surface datum.

REMARKS.-- Well D-9.

PERIOD OF RECORD.--December 1978 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 175.02 ft below land-surface datum, August 04, 2003; lowest measured, 324.01 ft below land-surface datum, May 5, 1980.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 18	175.58	FEB 13	176.29	MAY 08	175.46	AUG 04	175.02
WATER YEAR 2003		HIGHEST	175.02	AUG 04, 2003	LOWEST	176.29	FEB 13, 2003

JACKSON COUNTY

420842090165701. Local number, 85-6E-29 ACAD1.

LOCATION.--Lat 42°08'41", long 90°16'56", Hydrologic Unit 07060005, 1 mi east of U.S. Highway 52, 2 mi southeast of the Village of Green Island beside the Chicago, Milwaukee, St. Paul and Pacific Railroad tracks in the Upper Mississippi River Wildlife and Fish Refuge. Owner: U.S. Geological Survey.

AQUIFER.--Dresbach: Mt. Simon sandstone of Early Cambrian age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 1,804 ft, screened 1,705-1,725 ft, open hole 1,725-1,804 ft.

INSTRUMENTATION.--Quarterly measurement with engineers rule by USGS personnel.

DATUM.--Elevation of land-surface datum is 610 ft above sea level, from topographic map. Measuring point: Mark on angle iron attached to well house, 6.05 ft above land-surface datum.

REMARKS.--Flowing well. Green Island #1.

PERIOD OF RECORD.--May 1983 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 11.81 ft above land-surface datum, May 16, 1988; lowest measured, 10.50 ft above land-surface datum, August 14, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL
MAY 20	10.04	AUG 14	10.50
WATER YEAR 2003 HIGHEST		10.04 MAY	
20, 2003 LOWEST		10.50 AUG 14, 2003	

420842090165702. Local number, 85-06E-29 ACAD2.

LOCATION.--Lat 42°08'41", long 90°16'56", Hydrologic Unit 07060005, 1 mi east of U.S. Highway 52, 2 mi southeast of the Village of Green Island beside the Chicago, Milwaukee, St. Paul and Pacific Railroad tracks in the Upper Mississippi River Wildlife and Fish Refuge. Owner: U.S. Geological Survey.

AQUIFER.--Cambrian-Ordovician, Wonewoc sandstone of Late Cambrian age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 1,275 ft, screened 1,204.4-1,224.4 ft, open hole 1,224.4-1,275 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 610 ft above sea level, from topographic map. Measuring point: Top of casing, 2.0 ft above land-surface datum

REMARKS.-- Green Island No. 2 well. Well pumped during winter to supply water to goose pond. Water levels for water years 1986 to 1989 affected by oil in the well.

PERIOD OF RECORD.--July 1982 to November 1983, September 1986 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, +1.84 ft above land-surface datum, May 21, 1987; lowest measured, 3.88 below land-surface datum, November 4, 1982.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM (READINGS ABOVE LAND-SURFACE INDICATED BY "+"), WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 14	+90	FEB 05	+76	MAY 20	+1.42	AUG 14	+97
WATER YEAR 2003 HIGHEST		+1.42 MAY 20, 2003		LOWEST		+76 FEB 05, 2003	

420842090165703. Local number, 85-6E-29 ACAD3.

LOCATION.--Lat 42°08'41", long 90°16'56", Hydrologic Unit 07060005, 1 mi east of U.S. Highway 52, 2 mi southeast of the Village of Green Island beside the Chicago, Milwaukee, St. Paul and Pacific Railroad tracks in the Upper Mississippi River Wildlife and Fish Refuge. Owner: U.S. Geological Survey.

AQUIFER.--Cambrian-Ordovician: Prairie du Chien dolomite of Early Ordovician age and St. Peter sandstone of Middle Ordovician age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 910 ft, screened 604.2-624.2 ft, open hole 624.2-910 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 610 ft above sea level, from topographic map. Measuring point: Top of casing, 2.00 ft above land-surface datum.

REMARKS.-- Green Island No. 3.

PERIOD OF RECORD.--May 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 45.85 ft below land-surface datum, November 14, 2002; lowest measured 9.90 ft below land-surface datum, August 31, 1983.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 14	4.85	FEB 05	5.82	MAY 20	5.42	AUG 14	5.38
WATER YEAR 2003 HIGHEST		4.85 NOV 14, 2002		LOWEST		5.82 FEB 05, 2003	

GROUND-WATER LEVELS

JACKSON COUNTY—Continued

420433090502401. Local number, 84-01E 22.

LOCATION.--Lat 42°04'34", long 90°50'23", Hydrologic Unit 07060006, located just east of the water-tower in the Town of Baldwin. Owner: Town of Baldwin.

AQUIFER.--Devonian/Silurian.

WELL CHARACTERISTICS.--Drilled public-use well, diameter 14 in., depth 190 ft, open hole from 80-190 ft.

INSTRUMENTATION.--Quarterly measurement using airline by USGS personnel.

DATUM.--Elevation of land-surface is 760 feet above sea level, by topographic map.

REMARKS.-- Baldwin No. 2.

PERIOD OF RECORD.--August 1997 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 59.74 feet below land-surface datum, May 03, 1999; lowest measured, 64.22 feet below land-surface datum, February 09, 1999.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 14	61.97	FEB 05	63.07	MAY 20	62.26	AUG 13	63.28
WATER YEAR 2003 HIGHEST		61.97	NOV 14, 2002		LOWEST		63.28
AUG 13, 2003							

420842090165704. Local number, 85-6E-29 ACAD4.

LOCATION.--Lat 42°08'41", long 90°16'56", Hydrologic Unit 07060005, 1 mi east of U.S. Highway 52, 2 mi southeast of the Village of Green Island beside the Chicago, Milwaukee, St. Paul and Pacific Rail- road tracks in the Upper Mississippi River Wildlife and Fish Refuge. Owner: U.S. Geological Survey.

AQUIFER.--Cambrian-Ordovician: Galena dolomite of Middle Ordovician age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 400 ft, screened 300-320 ft, open hole 320-400 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 610 ft above sea level, from topographic map. Measuring point: Top of casing, 2.00 ft above land-surface datum.

REMARKS.-- Green Island No. 4.

PERIOD OF RECORD.--May 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 11.39 ft below land-surface datum April 27, 1993; lowest measured, 19.46 ft below land-surface datum, September 20, 1988.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 14	15.83	FEB 05	17.15	MAY 20	13.38	AUG 14	17.68
WATER YEAR 2003 HIGHEST		13.38	MAY 20, 2003		LOWEST		17.68
AUG 14, 2003							

JASPER COUNTY

414210092592001. Local number, 80-18-31 ABBB.

LOCATION.--Lat 41°42'10", long 92°59'20", Hydrologic Unit 07080105, approximately 3 mi east of the City of Newton just south of U.S. Highway 6. Owner: P.W. Beukema.

AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Dug stock water-table well, diameter 36 in., depth 37 ft, cribbed with brick.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 940 ft above sea level, from topographic map. Measuring point: Top of cement platform, 0.70 ft above land-surface datum.

REMARKS.-- Beukema well.

PERIOD OF RECORD.--February 1940 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 2.67 ft below land-surface datum, June 10, 1947; lowest measured, 27.15 ft below land-surface datum, December 18, 1948.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 12	8.86	FEB 04	12.55	MAY 21	4.45	AUG 12	5.76
WATER YEAR 2003 HIGHEST		4.45	MAY 21, 2003		LOWEST		12.55
FEB 04, 2003							

JASPER COUNTY—Continued

413908093071100. Local number, 79-19-01 CCCB.

LOCATION.--Lat 41°39'08", long 93°07'11", Hydrologic Unit 07080105, located approximately .5 miles east of Newton airport on county road. Owner: Newton Waterworks.

AQUIFER.--Cambrian/Ordovician.

WELL CHARACTERISTICS.--Drilled public-supply well, diameter 24 in. and 16 in., depth 2256.00 ft, open hole 1705-2256 ft.

INSTRUMENTATION.--Intermittent measurement by Newton Waterworks personnel by airline.

DATUM.--Elevation of land-surface datum is 775.00 ft above sea level, by levels.

REMARKS.-- Newton No. 24.

PERIOD OF RECORD.--October 2000 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 182 feet below land surface datum, Decemeber 18, 2000; lowest measured, 205 feet below land-surface datum March 24, 2001 and September 16, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 18	195	DEC 16	195	MAR 18	200	MAY 28	197	JUL 16	202	SEP 16	205
NOV 20	195	FEB 11	200	APR 17	200	JUN 16	197	AUG 19	200		
WATER YEAR 2003		HIGHEST	195	OCT 18, 2002	NOV 20, 2002	DEC 16, 2002	LOWEST	205	SEP 16, 2003		

JOHNSON COUNTY

413925091324001. Local number, 79-06-09 DDBC.

LOCATION.--Lat 41°39'34", long 91°32'42", Hydrologic Unit 07080209, at the Quadrangle Dormitory, University of Iowa, Iowa City. Owner: University of Iowa.

AQUIFER.--Silurian: dolomite of Silurian age.

WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 12 in., depth 430.5 ft, cased to 225 ft, open hole 225-430.5 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel, measured twice per month as part of project 461908100.

DATUM.--Elevation of land-surface datum is 714 ft above sea level, from topographic map. Measuring point: Nipple welded to plate on top of casing, 1.81 ft above land-surface datum.

REMARKS.-- University of Iowa Quadrangle Dormitory. Water levels affected by nearby wells pumping in late spring, summer, and early fall.

PERIOD OF RECORD.--April 1975 to current year.

REVISED RECORDS.--WDR IA-84-1, WDR IA-88-1.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 74.63 ft below land-surface datum, March 21, 1979; lowest measured, 174.62 ft below land-surface datum, September 5, 1995.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 15	127.45	DEC 23	137.46	MAR 12	118.80	JUN 19	162.99	SEP 17	147.19
	23 134.85	JAN 14	137.26	APR 15	133.59	JUL 15	134.22		
NOV 26	124.45	FEB 13	121.39	MAY 08	137.42	AUG 18	143.39		
WATER YEAR 2003		HIGHEST	118.80	MAR 12, 2003	LOWEST	162.99	JUN 19, 2003		

414132091345502. Local number, 80-06-31 ADBC1.

LOCATION.--Lat 41°41'45", long 91°35'00", Hydrologic Unit 07080209, located in the City of Coralville, north of U.S. Interstate 80. Owner: City of Coralville.

AQUIFER.--Silurian: dolomite of Silurian age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 5 in. to 130 ft, 2 in. to 300 ft, depth 500 ft, open hole 300-500 ft.

INSTRUMENTATION.--Monthly measurement with chalked tape by USGS personnel, measured twice per month March 1995 to September 1997.

DATUM.--Elevation of land-surface datum is 795 ft above sea level, from topographic map. Measuring point: top of casing, 1.03 ft above land-surface datum.

REMARKS.-- Coralville Observation No. 3, North.

PERIOD OF RECORD.--June 1988 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest level measured, 169.04 ft below land-surface datum, June 21, 1988; lowest water level measured, 266.96 ft. below land-surface datum, June 17, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 15	249.53	DEC 23	242.89	MAR 13	238.28	JUN 17	266.96	SEP 17	264.42
	23 255.17	JAN 14	244.17	APR 15	253.36	JUL 14	255.29		
NOV 26	242.03	FEB 14	231.75	MAY 08	263.48	AUG 18	264.95		
WATER YEAR 2003		HIGHEST	231.75	FEB 14, 2003	LOWEST	266.96	JUN 17, 2003		

GROUND-WATER LEVELS
JOHNSON COUNTY—Continued

414107091322901. Local number, 79-06-04 AAAA.

LOCATION.--Lat 41°41'07", long 91°32'29", Hydrologic Unit 07080209, at Forest View Trailer Court, northern edge of Iowa City. Owner: Forest View Trailer Court.

AQUIFER.--Silurian: limestone of Silurian age.

WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 6 in., depth 280 ft, cased to 96 ft, open hole 96-280 ft.

INSTRUMENTATION.--Monthly measurement with chalked tape by USGS personnel, measured twice per month March 1995 to October 1995. Graphic water-level recorder May 1971 to October 1986.

DATUM.--Elevation of land-surface datum is 735 ft above sea level, from topographic map. Measuring point: Nipple on plate welded to top of casing, 1.62 ft above land-surface datum.

REMARKS.--Forest View Trailer Court. Water levels affected by wells in the area pumping in late spring, summer, and early fall. The large number of water-level measurements in June 1996 are a result of the well being used as an observation well for a nearby pump test.

PERIOD OF RECORD.--May 1971 to current year.

REVISED RECORDS.--WDR IA-84-1.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 96.93 ft below land-surface datum, March 23, 1979; lowest measured, 166.59 ft below land-surface datum, June 17, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 16	141.87	DEC 23	139.87	MAR 13	137.36	JUN 17	166.59	SEP 17	150.53
23	148.50	JAN 14	149.09	APR 15	149.86	JUL 14	146.18		
NOV 26	142.01	FEB 14	136.74	MAY 08	153.40	AUG 18	148.96		

WATER YEAR 2003 HIGHEST 136.74 FEB 14, 2003 LOWEST 166.59 JUN 17, 2003

414132091345503. Local number, 80-06-31 ADBD1.

LOCATION.--Lat 41°41'44", long 91°34'35", Hydrologic Unit 07080209, located in the City of Coralville, north of U.S. Interstate 80. Owner: City of Coralville.

AQUIFER.--Silurian: dolomite of Silurian age.

WELL CHARACTERISTICS.--Drilled public-supply water well, 12 in. diameter, depth 500 ft, cased 0-200 ft, open hole 200-500 ft.

INSTRUMENTATION.--Monthly airline measurement by USGS personnel, measured twice per month March 1995 to October 1995.

DATUM.--Elevation of land-surface datum is 795 ft above sea level, from topographic map. Measuring point: airline gauge, 2.88 ft above land-surface datum.

REMARKS.--Coralville Production No. 9.

PERIOD OF RECORD.--June 1988 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 204 ft below land-surface datum, July 25, 1988; lowest water level measured, 328 ft below land-surface datum, September 17, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 15	311	NOV 26	300	JAN 14	250	MAR 13	292	JUN 17	322	AUG 18	321
23	321	DEC 23	300	FEB 14	240	APR 15	314	JUL 14	316	SEP 17	328

WATER YEAR 2003 HIGHEST 240 FEB 14, 2003 LOWEST 328 SEP 17, 2003

414145091350101. Local number, 80-06-31 ADC.

LOCATION.--Lat 41°41'45", long 91°35'01". Hydrologic unit 07080209, located in the city of Coralville., north of U.S. Interstate 80. Owner: City of Coralville.

AQUIFER.--Cambrian- Jordan sandstone.

WELL CHARACTERISTICS.--Drilled public-supply water well, diameter 16 in, depth 1710 ft., casing information not available.

INSTRUMENTATION.--Bi-monthly measurements using airline by USGS personnel.

DATUM.--Elevation of land-surface datum is 740 ft above sea level, from unknown method.

REMARKS.--Coralville No. 10.

PERIOD OF RECORD.--June 1996 to current year.

EXTREMES FOR PERIOD OF RECORD.--highest water level measured, 318 ft below land-surface datum, May 07, 1997; lowest water level measured, 419 ft. below land surface datum, August 13, 2001 and August 28, 2001.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 15	403	DEC 23	405	FEB 14	340	APR 15	320	AUG 18	354
NOV 26	407	JAN 14	345	MAR 13	395	JUL 14	347	SEP 17	347

WATER YEAR 2003 HIGHEST 320 APR 15, 2003 LOWEST 407 NOV 26, 2002

JOHNSON COUNTY—Continued

414315091252001. Local number, 80-05-22 CBCB1.

LOCATION.--Lat 41°43'15", long 91°25'18", Hydrologic Unit 07080209, along the Chicago, Rock Island and Pacific Railroad track, southeast of the overpass on Rapid Creek Road over the track, approximately 5.5 mi northeast of the junction of Interstate 80 and Iowa Highway 1. Owner: Chicago, Rock Island and Pacific Railroad Co.

AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Drilled unused water-table well, diameter 2.25 in., depth 18.43 ft, screened 16.43-18.43 ft. Depth originally 20 ft, depth of 18.43 ft measured June 23, 1989.

INSTRUMENTATION.--Monthly measurement with chalked tape by USGS personnel. Graphic water-level recorder February 1942 to October 1965, measured twice per month March 1995 to October 1995.

DATUM.--Elevation of land-surface datum is 753 ft above sea level, from topographic map. Measuring point: Nipple welded to casing, 4.47 ft above land-surface datum.

REMARKS.-- At the site of the former Elmira depot.

PERIOD OF RECORD.--May 1941 to September 1956, January 1958 to current year.

REVISED RECORDS.--WDR IA-88-1.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 4.84 ft below land-surface datum, April 29, 1947 (revised); lowest measured, dry, November 10, 15, 20, 25, and 30, 1964, December 5, 10, 15, 20, 25 and 31, 1964, December 1 and 10, 1975, October 21, November 23, and December 17, 1976, and January 20 and February 18, 1977.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 16	12.05	DEC 24	12.38	FEB 13	12.84	APR 14	13.39	JUN 19	12.76	AUG 19	13.28
NOV 27	12.20	JAN 15	12.58	MAR 13	13.13	MAY 09	13.28	JUL 16	12.90	SEP 18	13.77

WATER YEAR 2003 HIGHEST 12.05 OCT 16, 2002 LOWEST 13.77 SEP 18, 2003

414221091361101. Local number, 80-07-25 DBAC1.

LOCATION.--Lat 41°42'24", long 91°36'16", Hydrologic Unit 07080209, located at the Iowa Department of Natural Resources-- Geological Survey's Oakdale core repository. Owner: Iowa Department of Natural Resources--Geological Survey.

AQUIFER.--Silurian: dolomite of Silurian age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 6 in. to 164 ft, 5 in. to 319 ft, 4 in. 319- 361.5 ft, liner set 310-361.5 ft, depth 532 ft, open hole 361.5-532 ft.

INSTRUMENTATION.--Monthly measurement with chalked tape by USGS personnel, measured twice per month March 1995 to October 1995.

DATUM.--Elevation of land-surface datum is 790 ft above sea level, from topographic map. Measuring point: top of recorder platform, 2.65 ft above land-surface datum.

REMARKS.-- Oakdale No. 1 (ODW-1).

PERIOD OF RECORD.--April 1990 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 126.23 ft below land-surface datum, July, 31 1997; lowest water level measured, 248.96 ft below land-surface datum, September 7, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 15	236.28	DEC 23	220.06	MAR 13	224.99	JUN 17	248.00	SEP 17	248.96
23	239.30	JAN 14	224.23	APR 15	231.33	JUL 14	239.62		
NOV 26	224.79	FEB 14	224.28	MAY 08	240.57	AUG 18	242.18		

WATER YEAR 2003 HIGHEST 220.06 DEC 23, 2002 LOWEST 248.96 SEP 17, 2003

414221091361102. Local number, 80-07-25 DBAC2.

LOCATION.--Lat 41°42'24", long 91°36'16", Hydrologic Unit 07080209, located at the Iowa Department of Natural Resources-- Geological Survey's Oakdale core repository. Owner: Iowa Department of Natural Resources--Geological Survey.

AQUIFER.--Devonian: limestone and dolomite of Devonian age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 5 in., depth 301 ft, cased 0-175 ft, open hole 175-301 ft.

INSTRUMENTATION.--Monthly measurement with chalked tape by USGS personnel, measured twice per month March 1995 to October 1995.

DATUM.--Elevation of land-surface datum is 790 ft above sea level, from topographic map. Measuring point: top of recorder platform, 2.55 ft above land-surface datum.

REMARKS.-- Oakdale No. 2, (ODW-2).

PERIOD OF RECORD.--April 1990 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 198.65 ft below land-surface datum, June 2 and 7, 1996; lowest water level measured, 227.29 ft below land-surface datum, September 17, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 15	217.74	DEC 23	205.32	MAR 13	208.90	JUN 17	224.70	SEP 17	227.29
23	219.25	JAN 14	207.47	APR 15	212.43	JUL 14	221.18		
NOV 26	209.20	FEB 14	208.72	MAY 08	219.80	AUG 18	222.08		

WATER YEAR 2003 HIGHEST 205.32 DEC 23, 2002 LOWEST 227.29 SEP 17, 2003

GROUND-WATER LEVELS
JOHNSON COUNTY—Continued

413950091322402. Local number, 79-06-10 BCCD.

LOCATION.--Lat 41°39'57", long 91°32'14", Hydrologic Unit 07080209, located on the northeast corner of the terminal end of North Madison Street, just north of the Iowa City water treatment plant, approximately 0.5 miles north of Burlington St. Owner: The City of Iowa City.

AQUIFER.--Cambrian/Ordovician. Dolomite from the Prairie Du Chien Formation.

WELL CHARACTERISTICS.--Drilled public use well, diameter 26 in, depth 1570 ft, open interval from 1000-1570 ft.

INSTRUMENTATION.--Bi-weekly measurements using an airline by USGS personnel.

DATUM.--Elevation of land-surface datum is 650 ft above sea level, from topographic map.

REMARKS.-- Iowa City Well No. 1.

PERIOD OF RECORD.--April 1996 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 134 ft below land-surface datum, November 26, 2002; lowest water level measured, 360 ft below land-surface datum, May 12, 1999.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 15	184	DEC 23	185	FEB 14	200	MAY 09	183	JUL 15	280	SEP 18	180
NOV 26	134	JAN 14	180	APR 15	173	JUN 19	180	AUG 19	184		

WATER YEAR 2003 HIGHEST 134 NOV 26, 2002 LOWEST 200 FEB 14, 2003

413929091322401. Local number, 79-06-10 CCCB.

LOCATION.--Lat 41°39'30", long 91°32'25". Hydrologic Unit 07080209, located at University of Iowa water treatment plant. Owner: University of Iowa.

AQUIFER.--Cambrian-Jordan sandstone.

WELL CHARACTERISTICS.--Drilled artesian well used for withdrawal and testing, diameter 20 in, depth 1550 ft, casing open from 1063-1550 ft.

INSTRUMENTATION.--Bi-weekly measurements using airline by USGS personnel

DATUM.--Elevation of land-surface datum is 654.51 ft. above sea level, by levels run to accuracy of 0.01 ft. Measuring point is airline connection, 0.85 ft. above land surface datum.

REMARKS.-- SUI water treatment plant.

PERIOD OF RECORD.--May 17, 1995 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 157 ft below land-surface datum, April 15, 2003; lowest water level measured, 222 ft. below land-surface datum, June 21, 2001.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 15	175	DEC 23	164	FEB 14	180	APR 15	157	JUN 19	161	AUG 19	166
NOV 26	166	JAN 14	161	MAR 13	164	MAY 08	175	JUL 15	196	SEP 17	164

WATER YEAR 2003 HIGHEST 157 APR 15, 2003 LOWEST 180 FEB 14, 2003

414221091361103. Local number, 80-07-25 DBAD1.

LOCATION.--Lat 41°42'24", long 91°36'16", Hydrologic Unit 07080209, located at the Iowa Department of Natural Resources-- Geological Survey's Oakdale core repository. Owner: Iowa Department of Natural Resources--Geological Survey.

AQUIFER.--Buried channel: sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 4 in., depth 171 ft, screened 153-171 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel, measured twice per month March 1995 to October 1995.

DATUM.--Elevation of land-surface datum is 790 ft above sea level, from topographic map. Measuring point: top of recorder platform, 2.55 ft above land-surface datum.

REMARKS.-- Oakdale No. 3 (ODW-3).

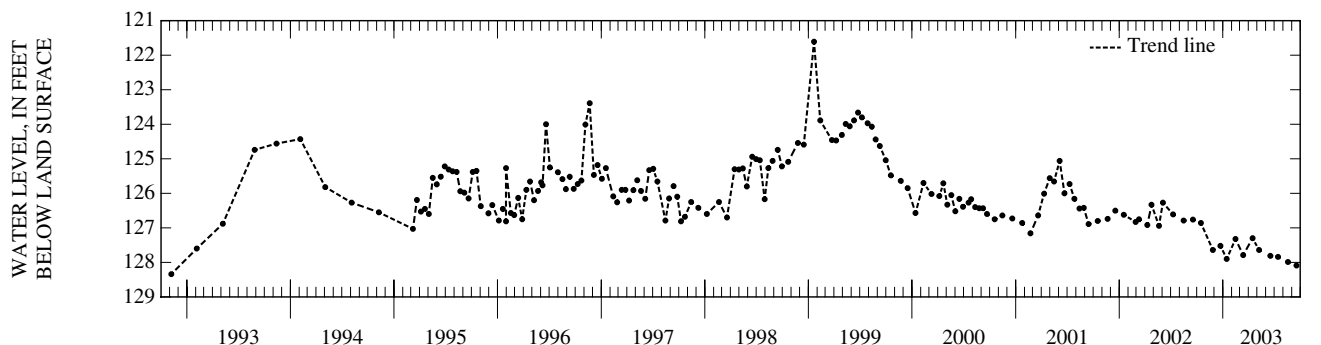
PERIOD OF RECORD.--April 1990 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 121.61 ft below land-surface datum, January 20, 1999; lowest water level measured, 128.74 ft below land-surface datum, April 12, 1992.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 15	126.86	DEC 23	127.52	FEB 14	127.32	APR 15	127.30	JUN 17	127.81	AUG 18	127.99
NOV 26	127.64	JAN 14	127.90	MAR 13	127.79	MAY 08	127.64	JUL 14	127.84	SEP 17	128.09

WATER YEAR 2003 HIGHEST 126.86 OCT 15, 2002 LOWEST 128.09 SEP 17, 2003



JOHNSON COUNTY—Continued

141315091252002. Local number, 80-05-22 CBCB2.

LOCATION.--Lat 41°43'15", long 91°25'18", Hydrologic Unit 07080209, along the Chicago, Rock Island and Pacific Railroad track, southeast of the overpass on Rapid Creek Road over the track, approximately 5.5 mi northeast of the junction of Interstate 80 and Iowa Highway 1. Owner: Chicago, Rock Island and Pacific Railroad Co.

AQUIFER.--Devonian: Cedar Valley limestone of Middle Devonian age.

WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 5 in., depth 82.5 ft. Casing information not available.

INSTRUMENTATION.--Intermittant measurement with chalked tape by USGS personnel. Shaft encoder and data collection platform (dcp) installed July, 1998.

DATUM.--Elevation of land-surface datum is 753 ft above sea level, from topographic map. Measuring point: Nipple welded to plate on top of casing, 4.01 ft above land-surface datum.

REMARKS.-- At the site of the former Elmira depot.

PERIOD OF RECORD.--December 1941 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.58 ft below land-surface datum, November 27, 1992; lowest measured, 21.65 ft below land-surface datum, August 21, 1989.

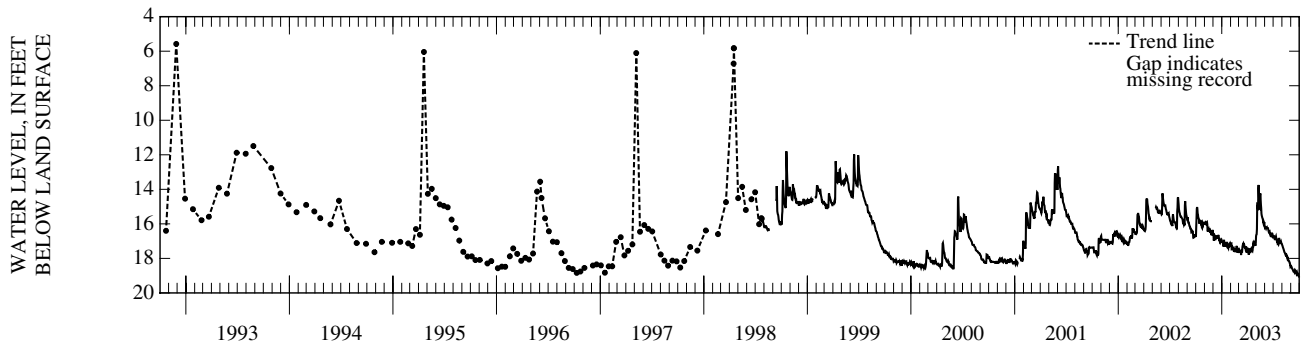
WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 04	14.84	DEC 24	16.86	MAR 13	17.54	JUN 19	16.61	SEP 18	18.79		
16	15.87	JAN 15	17.25	APR 14	17.48	JUL 16	17.15				
NOV 27	16.61	FEB 13	17.52	MAY 09	13.66	AUG 19	17.98				

WATER YEAR 2003 HIGHEST 13.66 MAY 09, 2003 LOWEST 18.79 SEP 18, 2003

DEPTH TO WATER LEVEL, FEET BELOW LAND SURFACE
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16.75	16.00	16.57	17.06	17.19	17.52	17.39	16.70	16.21	16.73	17.23	18.43
2	16.15	15.92	16.70	17.07	17.14	17.60	17.45	16.62	16.18	16.71	17.26	18.46
3	15.71	15.90	16.97	17.07	17.14	17.52	17.47	16.60	16.20	16.71	17.33	18.49
4	15.13	16.03	16.83	17.00	17.47	17.54	17.53	16.30	16.23	16.79	17.38	18.57
5	15.03	15.91	16.73	17.10	17.47	17.60	17.78	14.87	16.27	16.85	17.42	18.58
6	15.12	16.07	16.68	17.31	17.47	17.59	17.68	14.88	16.23	16.83	17.47	18.61
7	15.39	16.03	16.71	17.03	17.44	17.61	17.60	15.07	16.22	16.86	17.53	18.65
8	15.45	15.93	16.95	16.92	17.37	17.63	17.70	15.21	16.20	16.92	17.58	18.69
9	15.60	15.91	16.82	17.09	17.40	17.81	17.61	13.95	16.28	16.77	17.64	18.73
10	15.66	16.04	16.73	17.24	17.44	17.68	17.47	13.75	16.20	16.73	17.67	18.76
11	15.70	16.39	16.72	17.30	17.42	17.53	17.42	14.32	16.26	16.82	17.70	18.76
12	15.79	16.44	16.77	17.20	17.61	17.52	17.49	14.85	16.27	16.95	17.75	18.77
13	15.99	16.26	16.76	17.24	17.52	17.54	17.52	15.11	16.32	16.99	17.80	18.80
14	15.82	16.25	16.78	17.27	17.44	17.32	17.46	15.12	16.41	16.96	17.83	18.71
15	15.77	16.41	16.78	17.27	17.64	17.25	17.41	14.37	16.48	16.99	17.82	18.66
16	15.86	16.42	16.86	17.21	17.58	17.17	17.43	14.24	16.51	17.13	17.80	18.69
17	15.84	16.35	16.79	17.24	17.49	17.14	17.55	14.56	16.50	17.11	17.85	18.74
18	15.81	16.33	16.65	17.10	17.49	17.21	17.57	14.88	16.47	17.17	17.93	18.79
19	16.02	16.40	16.69	17.10	17.59	17.18	17.47	15.09	16.59	17.20	17.98	18.84
20	16.05	16.37	16.69	17.24	17.51	17.21	17.31	15.41	16.64	17.14	17.94	18.89
21	16.03	16.41	16.82	17.33	17.32	17.29	17.17	15.52	16.61	16.81	17.97	18.83
22	16.21	16.48	16.93	17.37	17.28	17.36	17.20	15.58	16.62	16.90	18.07	18.79
23	16.24	16.44	16.98	17.40	17.49	17.35	17.11	15.65	16.66	17.02	18.13	18.85
24	16.14	16.56	16.89	17.27	17.67	17.36	17.04	15.69	16.73	17.03	18.13	18.88
25	15.93	16.62	16.98	17.18	17.63	17.45	17.05	15.77	16.73	17.05	18.15	18.99
26	15.96	16.62	17.04	17.35	17.51	17.42	17.15	15.88	16.56	17.08	18.17	18.84
27	16.03	16.62	16.99	17.17	17.51	17.32	17.18	15.96	16.56	17.08	18.25	18.92
28	15.98	16.50	16.91	17.14	17.56	17.45	17.23	15.91	16.60	17.04	18.27	19.04
29	15.95	16.35	16.88	17.33	---	17.68	17.27	15.98	16.71	17.10	18.36	19.06
30	15.96	16.69	16.90	17.20	---	17.60	17.07	15.90	16.76	17.16	18.47	19.10
31	15.99	---	17.10	17.17	---	17.46	---	16.14	---	17.17	18.44	---
MEAN	15.84	16.29	16.83	17.19	17.46	17.45	17.39	15.35	16.44	16.96	17.85	18.76
MAX	16.75	16.69	17.10	17.40	17.67	17.81	17.78	16.70	16.76	17.20	18.47	19.10
MIN	15.03	15.90	16.57	16.92	17.14	17.14	17.04	13.75	16.18	16.71	17.23	18.43



GROUND-WATER LEVELS

JONES COUNTY

415808091160501. Local number, 83-04-25 CBBB.

LOCATION.--Lat 41°58'08", long 91°16'05", Hydrologic Unit 07080103, 4 mi north of the Town of Mechanicsville and 1 mi west of County Road X-40.

Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Silurian: dolomite of Silurian age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 6 in. to 41 ft, 5 in. 41-517 ft, depth 517 ft, open hole 41-517 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 811 ft above sea level, from topographic map. Measuring point: Nipple welded to plate on top of casing, 2.16 ft above land-surface datum.

REMARKS.-- White Oak Creek well.

PERIOD OF RECORD.--July 1976 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.78 ft below land-surface datum, May 3, 1993; lowest measured, 6.21 ft below land-surface datum, September 11, 1989.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 13	2.84	FEB 06	4.41	MAY 20	3.34	AUG 13	4.93
WATER YEAR 2003 HIGHEST		2.84	NOV 13, 2002 LOWEST		4.93	AUG 13, 2003	

KEOKUK COUNTY

412030092121601. Local number, 76-12-35 DBDC.

LOCATION.--Lat 41°20'27", long 92°12'22", Hydrologic Unit 07080106, approximately 0.25 mi north of the town of Sigourney, 0.25 mi north of Highway 92. Owner: City of Sigourney.

AQUIFER.--Mississippian: limestone and dolomite of Mississippian age.

WELL CHARACTERISTICS.--Drilled unused public-supply artesian well, diameter 14 in., depth 300 ft, cased to 128 ft, open hole 128-300 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel. Analog digital water-level recorder January 1989 to September 1992.

DATUM.--Elevation of land-surface datum is 769 ft above sea level, from topographic map. Measuring point: Top of recorder base, 1.56 ft above land-surface datum.

REMARKS.-- Sigourney South Rock Island No. 1 well. Water levels affected by nearby pumping.

PERIOD OF RECORD.--July 1988 to present.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 80.99 ft below land-surface datum, May 17, 1995; lowest measured, 118.29 ft below land-surface datum, August 31, 1991.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 13	92.63	FEB 05	85.58	MAY 21	90.05	AUG 12	86.58
WATER YEAR 2003 HIGHEST		85.58	FEB 05, 2003 LOWEST		92.63	NOV 13, 2002	

LINN COUNTY

415343091360101. Local number, 82-07-25 AAAB.

LOCATION.--Lat 41°53'43", long 91°36'01", Hydrologic Unit 07080208, 0.5 mi northwest of the Town of Ely at the southwest corner of the junction of County Roads E-70 and W-6E. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Silurian: limestone and dolomite of Silurian age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 6 in., depth 401 ft, cased to 121.5 ft, open hole 121.5-401 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel. Graphic water-level recorder April 1978 to October 1979.

Intermittent measurement with chalked tape by USGS personnel May 1976 to April 1978.

DATUM.--Elevation of land-surface datum is 772 ft above sea level, from topographic map. Measuring point: Top of casing, 1.76 ft above land-surface datum.

REMARKS.-- Ely (Northwest) Railroad well. Records for May 1976 to September 1988 are unpublished and available in the files of the Iowa District Office.

PERIOD OF RECORD.--May 1976 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.03 ft below land-surface datum, August 26, 1993; lowest measured, 19.96 ft below land-surface datum, June 14, 1977.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 13	11.34	FEB 06	13.08	MAY 19	13.27	AUG 13	15.37
WATER YEAR 2003 HIGHEST		11.34	NOV 13, 2002	LOWEST		15.37	AUG 13, 2003

415422091422601. Local number, 82-07-18 CDCD.

LOCATION.--Lat 41°54'22", long 91°42'29", Hydrologic Unit 07080205, on 76th Avenue SW, approximately 1.5 mi west of U.S. Highway 218, Cedar Rapids. Owner: Edwin J. Hynek.

AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Dug unused water-table well, diameter 4 ft, depth 13.5 ft, cribbed with brick.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel. Graphic water-level recorder July 1959 to September 1987.

DATUM.--Elevation of land-surface datum is 835 ft above sea level, from topographic map. Measuring point: Base of recorder shelter, 0.37 ft above land-surface datum.

REMARKS.-- Well previously owned by Lester Petrak.

PERIOD OF RECORD.--July 1959 to current year.

REVISED RECORDS.--WDR IA-84-1.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 1.09 ft below land-surface datum, August 4, 1968; lowest recorded, 11.75 ft below land-surface datum, February 8, 1977.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 13	5.44	FEB 06	8.67	MAY 19	4.79	AUG 13	8.21
WATER YEAR 2003 HIGHEST		4.79	MAY 19, 2003	LOWEST		8.67	FEB 06, 2003

415725091410101. Local number, 83-07-32 ACDC.

LOCATION.--Lat 41°57'25", long 91°41'01", Hydrologic Unit 07080205, northwest corner of 22nd Avenue SW and 11th Street SW, Cedar Rapids. Owner: Floyd Fetter.

AQUIFER.--Silurian: limestone of Silurian age.

WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 5 in., depth 282 ft. Casing information not available.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 805 ft above sea level, from topographic map. Measuring point: Plug in well cover at land-surface datum.

REMARKS.-- Water levels may be affected by pumping of near by wells.

PERIOD OF RECORD.--July 1940 to current year.

REVISED RECORDS.--WDR IA-88-1.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 75.88 ft below land-surface datum, January 26, 1942; lowest measured, 107.00 ft below land-surface datum, September 16, 1976.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 13	86.03	FEB 06	86.12	MAY 19	86.46	AUG 13	90.62
WATER YEAR 2003 HIGHEST		86.03	NOV 13, 2002	LOWEST		90.62	AUG 13, 2003

GROUND-WATER LEVELS

LINN COUNTY—Continued

415834091351601. Local number, 83-06-30 ABBA.

LOCATION.--Lat 41°58'34", long 91°35'14", Hydrologic Unit 07080206, approximately 200 ft west of 5201 Mount Vernon Road SE, Cedar Rapids. Owner: Vulcan Auto Yard. Formerly owned by B.L. Anderson.

AQUIFER.--Silurian-Devonian: dolomite of Silurian and limestone and dolomite of Devonian age.

WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 6 in., depth 76.5 ft. Casing information not available.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 755 ft above sea level, from topographic map. Measuring point: Hole in pump base, 0.50 ft above land-surface datum.

REMARKS.-- Katz well.

PERIOD OF RECORD.--May 1940 to current year.

EXTREMES OF PERIOD OF RECORD.--Highest water level measured, 37.68 ft below land-surface datum, August 24, 1993; lowest measured, 53.90 ft below land-surface datum, December 21, 1970.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 13	49.74	FEB 06	50.52	MAY 19	49.71	AUG 13	50.61
WATER YEAR 2003 HIGHEST		49.71	MAY 19, 2003 LOWEST		50.61	AUG 13, 2003	

420300091325801. Local number, 84-06-33 ABBA.

LOCATION.--Lat 42°03'00", long 91°32'58", Hydrologic Unit 07080206, near the City of Marion on the east side of Iowa Highway 13, approximately 1 mi north of U.S. Highway 151. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Silurian: dolomite of Silurian age.

WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 6 in. to 142 ft, 5 in. 142-161 ft, depth 481 ft, open hole 161-481 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 838 ft above sea level, from topographic map. Measuring point: Top of casing, 0.90 ft above land-surface datum.

REMARKS.-- Marion well.

PERIOD OF RECORD.--June 1976 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 42.15 ft below land-surface datum, June 18, 1986; lowest measured, 50.49 ft below land-surface datum, February 6, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 13	48.56	FEB 06	50.49	MAY 19	47.35	AUG 13	50.32
WATER YEAR 2003 HIGHEST		47.35	MAY 19, 2003 LOWEST		50.49	FEB 06, 2003	

420508091395811. Local number, 84-07-16 DBBB.

LOCATION.--Lat 42°05'15", long 91°40'04", Hydrologic Unit 07080205, approximately 0.5 mi south of County Road E-34, north of the Town of Robins. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Silurian: dolomite of Silurian age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 6 in. to 60.6 ft, 5 in. to 173 ft, depth 520 ft, open hole 173-520 ft. Open to Devonian rock 173-197, Silurian 196.5-510 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel. Graphic water-level recorder November 1975 to September 1979.

Intermittent measurement with chalked tape by USGS personnel April 1975 to November 1975.

DATUM.--Elevation of land-surface datum is 873 ft above sea level, from topographic map. Measuring point: Top of casing, 1.20 ft above land-surface datum.

REMARKS.-- Robins well. Records for April 1975 to September 1988 are unpublished and available in the files of the Iowa District Office.

PERIOD OF RECORD.--April 1975 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 36.33 ft below land-surface datum, August 24, 1993; lowest measured, 57.50 ft below land-surface datum, December 1, 1989.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 13	48.74	FEB 06	52.20	MAY 19	45.85	AUG 13	50.15
WATER YEAR 2003 HIGHEST		45.85	MAY 19, 2003 LOWEST		52.20	FEB 06, 2003	

LINN COUNTY—Continued

420526091370701. Local number, 84-07-13 BCBB.

LOCATION.--Lat 42°05'26", long 91°37'07", Hydrologic Unit 07080206, approximately 0.25 mi south of the junction of County Roads W-58 and E-34, on the east side of the road, or approximately 3.75 mi north of the City of Marion. Owner: U.S. Geological Survey.

AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 1.25 in., depth 17 ft, screened 15-17 ft.

INSTRUMENTATION.--Monthly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 882 ft above sea level, from topographic map. Measuring point: Nipple welded to casing, 1.24 ft above land-surface datum.

REMARKS.-- USGS13E2 well.

PERIOD OF RECORD.--September 1948 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.93 ft below land-surface datum, May 18, 1982; lowest measured, 15.19 ft below land-surface datum, January 20, 1977.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 23	5.49	DEC 19	5.90	FEB 06	6.82	APR 21	4.36	JUN 18	5.24	AUG 13	6.52
NOV 13	5.33	JAN 17	6.57	MAR 31	5.82	MAY 19	2.67	JUL 15	4.12	SEP 18	5.75

WATER YEAR 2003 HIGHEST 2.67 MAY 19, 2003 LOWEST 6.82 FEB 06, 2003

420730091490401. Local number, 85-08-31 DDCD1.

LOCATION.--Lat 42°07'29", long 91°49'01", Hydrologic Unit 07080205, at the fenced north end of Pleasant Creek Reservoir near the beach house in the beach area. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Silurian: dolomite of Silurian age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 6 in. to 53.5 ft, 5 in. to 214 ft, depth 481 ft, open hole 214-481 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel. Graphic water-level recorder May 1975 to December 1979.

DATUM.--Elevation of land-surface datum is 833 ft above sea level, from topographic map. Measuring point: Top of casing, 1.17 ft above land-surface datum.

REMARKS.-- Pleasant Creek Reservoir/Silurian well. Records for May 1975 to September 1988 are unpublished and available in the files of the Iowa District Office.

PERIOD OF RECORD.--May 1975 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 20.73 ft below land-surface datum, May 03, 1999; lowest measured, 108.49 ft below land-surface datum, August 4, 1997.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 13	31.96	FEB 06	30.93	MAY 19	29.90	AUG 14	33.37

WATER YEAR 2003 HIGHEST 29.90 MAY 19, 2003 LOWEST 33.37 AUG 14, 2003

420730091490402. Local number, 85-08-31 DDCD2.

LOCATION.--Lat 42°07'29", long 91°49'01", Hydrologic Unit 07080205, at the fenced north end of Pleasant Creek Reservoir near the beach house in the beach area. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Devonian: limestone and dolomite of Devonian age.

WELL CHARACTERISTICS.--Drilled observation artesian well, diameter 5 in., depth 205 ft, cased to 52 ft, open hole 52-205 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel. Graphic water-level recorder May 1975 to December 1979.

DATUM.--Elevation of land-surface datum is 841 ft above sea level, from topographic map. Measuring point: Top of casing, 2.38 ft above land-surface datum.

REMARKS.-- Pleasant Creek Reservoir/Devonian well. Records for May 1975 to September 1989 are unpublished and available in the Iowa District Office.

PERIOD OF RECORD.--May 1975 to May 1980, April 1984 to present.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 14.60 ft below land-surface datum, May 31, 1991; lowest measured, 48.55 ft below land-surface datum, November 12, 1976.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 13	19.79	FEB 06	19.75	MAY 19	18.62	AUG 14	19.61

WATER YEAR 2003 HIGHEST 18.62 MAY 19, 2003 LOWEST 19.79 NOV 13, 2002

GROUND-WATER LEVELS

LINN COUNTY—Continued

421149091403301. Local number, 85-07-04 CCCC.

LOCATION.--Lat 42°11'51", long 91°40'33", Hydrologic Unit 07080205, approximately 5 mi east of the Town of Center Point, north side of County Road E-16. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Silurian-Devonian: dolomite of Silurian age and limestone and dolomite of Devonian age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 6 in. to 41 ft, 5 in 129-147 ft, depth 435 ft, open hole 41-129 ft and 147-435 ft. Devonian rock 23-139 ft, Silurian rock 139-431 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel. Graphic water-level recorder March 1974 to December 1979.

Intermittent measurement with chalked tape by USGS personnel July 1973 to March 1974.

DATUM.--Elevation of land-surface datum is 912 ft above sea level, from topographic map. Measuring point: Nipple welded to plate on top of casing, 1.21 ft above land-surface datum.

REMARKS.-- Alice well.

PERIOD OF RECORD.--July 1973 to current year.

REVISED RECORDS.--WDR IA-84-1.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 17.06 ft below land-surface datum, June 10, 1974; lowest measured, 34.27 ft below land-surface datum, December 1, 1989.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 13	30.49	FEB 06	32.17	MAY 19	28.82	AUG 14	29.46
WATER YEAR 2003 HIGHEST		28.82	MAY 19, 2003 LOWEST		32.17	FEB 06, 2003	

421207091312201. Local number, 85-06-03 DABB.

LOCATION.--Lat 42°12'07", long 91°31'24", Hydrologic Unit 07080102, located east of State Highway 13 in the Town of Central City. Owner: Town of Central City.

AQUIFER.--Silurian.

WELL CHARACTERISTICS.--Drilled pumping well, diameter 6 in., depth 106 ft., casing information not available.

INSTRUMENTATION.--Quarterly measurements with airline by USGS personnel.

DATUM.--Elevation of land-surface datum is 825 ft, by topographic map.

REMARKS.--Central City Well.

PERIOD OF RECORD.--August 1997 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 8.0 feet below land-surface datum, May 09, 2001; lowest measured, 22 ft below land-surface datum, February 23, 1998.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 13	18	FEB 06	18.0	MAY 19	13.00	AUG 14	21.00
WATER YEAR 2003 HIGHEST		13.00	MAY 19, 2003 LOWEST		18	NOV 13, 2002 FEB 06, 2003	

LYON COUNTY

431812096302701. Local number, 98-48-16 DDAD.

LOCATION.--Lat 43°18'21", long 96°30'29", Hydrologic Unit 10170203, approximately 3.5 mi east of the City of Canton, S.D., south of U.S. Highway 18. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 358 ft, screened 335-355 ft. Open to Late Precambrian Sioux quartzite 353-358 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,268 ft above sea level, from topographic map. Measuring point: Top of casing, 2.00 ft above land-surface datum.

REMARKS.-- Well D-20.

PERIOD OF RECORD.--December 1978 to December 1980, May 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 91.89 ft below land-surface datum, July 8, 1986; lowest measured, 107.60 ft below land-surface datum, November 7, 1991.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	106.25	FEB 12	102.71	MAY 07	99.49	AUG 04	99.85
WATER YEAR 2003 HIGHEST		99.49	MAY 07, 2003 LOWEST		106.25	NOV 19, 2002	

LYON COUNTY—Continued

432140095595301. Local number, 99-44-26 DDDD.

LOCATION.--Lat 43°21'40", long 95°59'53", Hydrologic Unit 10170204, 1 mi north of the City of George, west of Iowa Highway 339. Owner: State of Iowa.
 AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Drilled unused water-table well, diameter 20 in., depth 38 ft, lined with tile.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

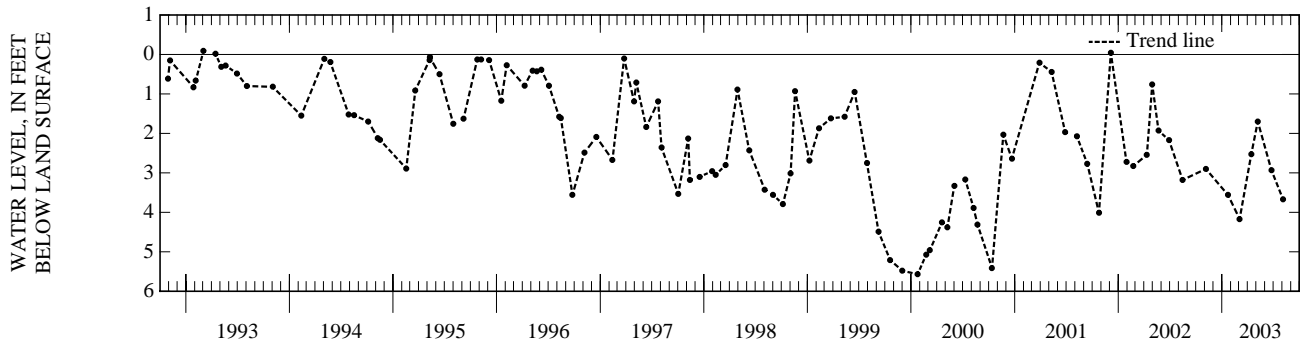
DATUM.--Elevation of land-surface datum is 1,400 ft above sea level, from topographic map. Measuring point: Plug in well cover, 2.01 ft above land-surface datum. REMARKS.- Well No. 26R1.

PERIOD OF RECORD.--October 1940 to June 1943, May 1947 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, -0.41 ft above land-surface datum, May 10, 1995; lowest measured, 9.74 ft below land-surface datum, October 24, 1940.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 05	2.90	MAR 04	4.17	MAY 07	1.70	AUG 04	3.67
JAN 22	3.56	APR 14	2.53	JUN 24	2.93		
WATER YEAR 2003 HIGHEST 1.70 MAY 07, 2003		LOWEST 4.17 MAR 04, 2003					



432553096105701. Local number, 99-45-05 ABAC.

LOCATION.--Lat 43°25'53", long 96°10'57", Hydrologic Unit 10170204, 0.05 mi south of Iowa Highway 9 on 2nd Street, Rock Rapids. Owner: City of Rock Rapids.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 10 in., depth 375 ft, cased to 296 ft, open hole 296- 375 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,368 ft above sea level, from topographic map. Measuring point: Plug in cover over casing, 1.00 ft above land-surface datum.

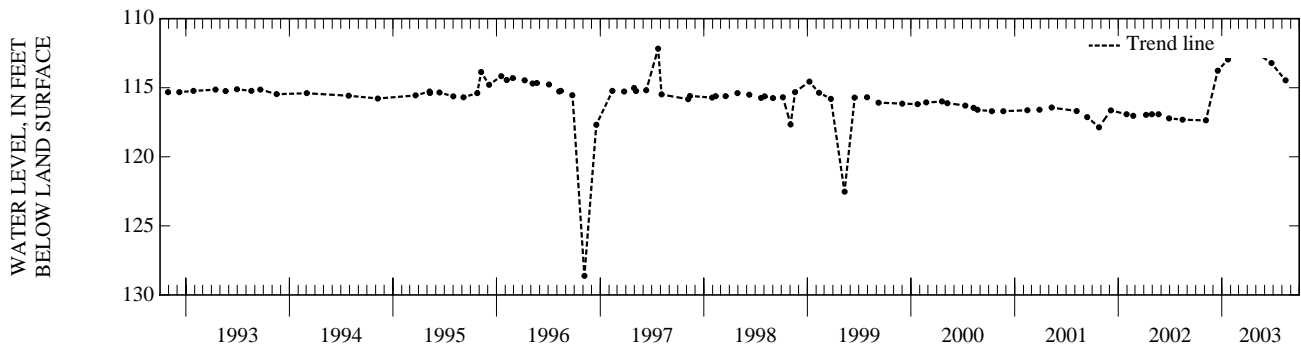
REMARKS.-- City test well No. 3.

PERIOD OF RECORD.--August 1960 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 100.08 ft below land-surface datum, July 27, 1964; lowest measured, 128.62 ft below land-surface datum, November 5, 1996.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 05	117.37	JAN 22	112.96	APR 14	112.16	JUN 24	113.22				
DEC 17	113.76	MAR 04	112.19	MAY 07	112.54	AUG 13	114.47				
WATER YEAR 2003 HIGHEST 112.16 APR 14, 2003		LOWEST 117.37 NOV 05, 2002									



GROUND-WATER LEVELS

LYON COUNTY—Continued

432601096335511. Local number, 100-48-31 CCCC11.

LOCATION.--Lat 43°26'01", long 96°33'55", Hydrologic Unit 10170203, 0.5 mi west and 2.5 mi south of the Village of Granite. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 657 ft, screened 450-455 ft and 630-650 ft. Dakota 437-653 ft, Sioux Quartzite 653-657 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,417 ft above sea level, from topographic map. Measuring point: Top of casing at land-surface datum.

REMARKS.-- Well D-19.

PERIOD OF RECORD.--December 1978 to December 1980, May 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 151.57 ft below land-surface datum, February 11, 1994; lowest measured, 158.25 ft below land-surface datum, April 11, 1990.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	155.75	FEB 12	155.76	MAY 07	155.65	AUG 04	156.00
WATER YEAR 2003		HIGHEST	155.65	MAY 07, 2003	LOWEST	156.00	AUG 04, 2003

MADISON COUNTY

411727093483001. Local number, 75-26-23 AAAC.

LOCATION.--Lat 41°17'26", long 93°48'36", Hydrologic Unit 07100008, near the shelter house in the city park, St. Charles. Owner: City of St. Charles.

AQUIFER.--Mississippian: limestone of Mississippian age.

WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 8 in., depth 867 ft, cased to 657 ft, open hole 657- 867 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,067 ft above sea level, from topographic map. Measuring point: Plug in well cover, 1.20 ft above land-surface datum.

REMARKS.-- City well No. 1.

PERIOD OF RECORD.--November 1962 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 261.76 ft below land-surface datum, November 20, 1962; lowest measured, 282.90 ft below land-surface datum, August 05, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	282.29	FEB 04	282.47	MAY 01	282.46	AUG 05	282.90
WATER YEAR 2003		HIGHEST	282.29	NOV 21, 2002	LOWEST	282.90	AUG 05, 2003

MAHASKA COUNTY

411912092273601. Local number, 75-14-10 BAAC.

LOCATION.--Lat 41°19'13", long 92°27'36", Hydrologic Unit 07080106, approximately 0.5 mi south of Iowa Highway 92 in the town of Rose Hill. Owner: City of Rose Hill.

AQUIFER.--Mississippian: limestone and dolomite of Mississippian age.

WELL CHARACTERISTICS.--Drilled unused public-supply artesian well, diameter 6 in., depth 370 ft, casing information not available.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel. Analog digital water-level recorder July 1990 to October 1992.

Intermittent measurement with chalked tape by USGS personnel May 1989 to June 1989.

DATUM.--Elevation of land-surface datum is 815 ft above sea level, from topographic map. Measuring point: Top of recorder platform, 1.63 ft above land-surface datum.

REMARKS.-- Rose Hill No. 2 well.

PERIOD OF RECORD.--May 1989 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 100.69 ft below land-surface datum, July 30, 1992; lowest measured, 107.51 ft below land-surface datum, February 08, 1999.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 13	100.75	FEB 05	101.55	MAY 21	101.69	AUG 12	101.77
WATER YEAR 2003		HIGHEST	100.75	NOV 13, 2002	LOWEST	101.77	AUG 12, 2003

MAHASKA COUNTY—Continued

411914092274701. Local number, 75-14-10 BABC.

LOCATION.--Lat 41°19'14", long 92°27'47", Hydrologic Unit 07080106, approximately 0.45 mi south of Iowa Highway 92, behind City Hall in the Town of Rose Hill. Owner: City of Rose Hill.

AQUIFER.--Mississippian: limestone and dolomite of Mississippian age.

WELL CHARACTERISTICS.--Drilled unused public-supply artesian well, diameter 5 in., depth 273 ft, cased to 106 ft, open hole 106-273 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 817 ft above sea level, from topographic map. Measuring point: Top of casing, 1.56 ft above land-surface datum.

REMARKS.-- Rose Hill No. 4 well.

PERIOD OF RECORD.--September 1988 to current year.

REVISION.--Site identification number. Previously published as 411914092273001.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 99.56 ft below land-surface datum, May 17, 1995; lowest measured, 106.03 ft below land-surface datum, May 05, 1999.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 13	101.31	FEB 05	101.17	MAY 21	101.33	AUG 12	101.37
WATER YEAR 2003 HIGHEST		101.17	FEB 05, 2003	LOWEST		101.37	AUG 12, 2003

412020092471002. Local number, 76-17-35 CADB.

LOCATION.--Lat 41°20'26", long 92°47'09", Hydrologic Unit 07100009, 150 ft east of the old treatment plant near a retirement village on the north end of the Town of Leighton. Owner: Town of Leighton.

AQUIFER.--Cambrian-Ordovician: sandstone of Late Cambrian and sandstone and sandy dolomite of Early Ordovician age.

WELL CHARACTERISTICS.--Drilled unused public-supply artesian well, diameter 8 in. to 383 ft, 5 in. 383-1778 ft, depth 2200 ft, open 1778-2200 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 820 ft above sea level, from topographic map. Measuring point: Top of casing, 5.43 ft above land-surface datum.

REMARKS.-- Leighton No. 4 well.

PERIOD OF RECORD.--May 1989 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 99.67 ft below land-surface datum, May 16, 2000; lowest measured, 282.96 ft below land-surface datum, August 20, 1996.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 12	157.26	FEB 04	156.59	MAY 21	147.96	AUG 12	145.09
WATER YEAR 2003 HIGHEST		145.09	AUG 12, 2003	LOWEST		157.26	NOV 12, 2002

MARION COUNTY

411323093142601. Local number, 74-21-11 DBCB1.

LOCATION.--Lat 41°13'25", long 93°14'27", Hydrologic Unit 07100008, north of the water tower in the town square. Owner: Town of Melcher.

AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Drilled unused water-table well, diameter 18 in., depth 9.7 ft, lined with tile. Depth originally 25 ft, depth measured in 1981 and 1991 at 12.2 ft.

INSTRUMENTATION.--Monthly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 948 ft above sea level, from topographic map. Measuring point: Top of tile casing at land-surface datum.

REMARKS.-- Town well No. 2.

PERIOD OF RECORD.--March 1950 to current year.

REVISION.--Highest water level measured, 0.20 ft below land-surface datum, October 10, 1973; lowest measured, 15.27 ft below land-surface datum, October 22, 1953.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.20 ft below land-surface datum, October 10, 1973; lowest measured, 15.27 ft below land-surface datum, October 22, 1953.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 16	5.98	DEC 30	6.75	FEB 11	6.99	MAY 05	2.36	AUG 11	7.17
NOV 12	5.90	FEB 04	6.82	MAR 20	5.22	21	3.49		
WATER YEAR 2003 HIGHEST		2.36	MAY 05, 2003	LOWEST		7.17	AUG 11, 2003		

GROUND-WATER LEVELS

MARION COUNTY—Continued

411328093143503. Local number, 74-21-11 CAAD3.

LOCATION.--Lat 41°13'30", long 93°14'33", Hydrologic Unit 07100008, northeast corner of the junction of West 1st Street and North A Street, Melcher.

Owner: Town of Melcher.

AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 1.25 in., depth 96.5 ft, screened 78-80 ft, open hole 80-96.5 ft.

INSTRUMENTATION.--Monthly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 944 ft above sea level, from topographic map. Measuring point: Nipple welded to casing, 0.51 ft above land-surface datum.

REMARKS.--Town well No. 5, well 11L1.

PERIOD OF RECORD.--August 1953 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 8.29 ft below land-surface datum, May 7, 1996; lowest measured (nearby well pumping), 55.16 ft, revised, below land-surface datum, March 4, 1954.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 12	12.70	FEB 04	13.34	MAY 21	11.87	AUG 11	13.06
WATER YEAR 2003 HIGHEST		11.87	MAY 21, 2003 LOWEST		13.34	FEB 04, 2003	

411329093142902. Local number, 74-21-11 DBBB2.

LOCATION.--Lat 41°13'33", long 93°14'29", Hydrologic Unit 07100008, southeast corner of the T junction of North B Street and Main Street, Melcher.

Owner: Town of Melcher.

AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 6 in., depth 119 ft, cased to 76 ft, open hole 76-119 ft.

INSTRUMENTATION.--Monthly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 943 ft above sea level, from topographic map. Measuring point: Nipple welded to plate on top of casing, 1.82 ft above land-surface datum.

REMARKS.--Town well No. 3, well 11K1.

PERIOD OF RECORD.--July 1945 to December 1955, October 1976 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 11.16 ft below land-surface datum, May 07, 1996; lowest measured (nearby well pumping), 108.85 ft below land-surface datum, December 4, 6-7, 1949.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 16	21.53	FEB 04	21.76	MAY 21	21.28	AUG 11	21.71
WATER YEAR 2003 HIGHEST		21.28	MAY 21, 2003 LOWEST		21.76	FEB 04, 2003	

MARSHALL COUNTY

420355092534701. Local number, 84-18-24 CDCA.

LOCATION.--Lat 42°03'55", long 92°53'47", Hydrologic Unit 07080208, east of Riverview Park and south of the sewage treatment plant, Marshalltown.

Owner: City of Marshalltown.

AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 8 in., depth 200 ft, screened 190-200 ft.

INSTRUMENTATION.--Quarterly measurement with electric line or chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 871 ft above sea level, from topographic map. Measuring point: Top of casing, 0.22 ft above land-surface datum.

REMARKS.--Marshalltown city well.

PERIOD OF RECORD.--May 1949 to August 1971, March 1973 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 4.92 ft below land-surface datum, July 13, 1951; lowest measured, 61.04 ft below land-surface datum, November 2, 1995.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	56.43	FEB 12	47.80	MAY 08	38.68	AUG 12	54.80
WATER YEAR 2003 HIGHEST		38.68	MAY 08, 2003 LOWEST		56.43	NOV 19, 2002	

MILLS COUNTY

405641095365101. Local number, 71-42-24 AAAA.

LOCATION.--Lat 40°56'41", long 95°36'51", Hydrologic Unit 10240002, at the intersection of County Roads M-16 and H-46, approximately 5 mi southeast of the City of Malvern. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Buried channel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 2 in., depth 255 ft, screened 240-250 ft, gravel packed.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,102 ft above sea level, from topographic map. Measuring point: Top of casing, 2.20 ft above land-surface datum.

REMARKS.-- Well SW-41.

PERIOD OF RECORD.--June 1990 and August 1992 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 135.50 feet below land-surface datum, August 5, 1993; lowest measured, 170.00 ft below land-surface datum, July 30, 2001.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	142.60	FEB 06	142.72	MAY 08	142.7	AUG 07	143.08
WATER YEAR 2003		HIGHEST	142.60	NOV 21, 2002	LOWEST	143.08	AUG 07, 2003

405813095433201. Local number, 71-42-07 BBCD.

LOCATION.--Lat 40°58'13", long 95°43'32", Hydrologic Unit 10240001, on the west side of the T-intersection of county roads, approximately 5.5 mi south of the City of Glenwood. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Buried channel: sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 2 in., depth 351 ft, screened 332-342 ft, gravel packed.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,122 ft above sea level, from topographic map. Measuring point: Top of casing, 1.80 ft above land-surface datum.

REMARKS.-- Well SW-40.

PERIOD OF RECORD.--August 1992 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 165.70 feet below land-surface datum, August 5, 1993; lowest measured, 174.59 ft below land-surface datum, August 07, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	173.55	FEB 06	173.88	MAY 08	173.47	AUG 07	174.59
WATER YEAR 2003		HIGHEST	173.47	MAY 08, 2003	LOWEST	174.59	AUG 07, 2003

MITCHELL COUNTY

432156092484101. Local number, 95-17-23 DAA1.

LOCATION.--Lat 43°22'42", long 92°48'41", Hydrologic Unit 07080201, approximately 4 mi southwest of Staceyville, at the intersection of Highway 218 and County Road T40. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 2 in., depth 27 ft, screened 10-27 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,210 ft above sea level, from topographic map. Measuring point: Top of casing, 2.41 ft above land-surface datum.

REMARKS.-- Well FM-2T.

PERIOD OF RECORD.--August 1992 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 1.46 ft above land-surface datum, May 6, 1993; lowest measured, 6.46 ft below land-surface datum, February 14, 2000.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	3.34	FEB 11	5.66	MAY 06	2.18	AUG 13	4.87
WATER YEAR 2003		HIGHEST	2.18	MAY 06, 2003	LOWEST	5.66	FEB 11, 2003

GROUND-WATER LEVELS

MITCHELL COUNTY—Continued

432156092484102. Local number, 95-17-23 DAA2.

LOCATION.--Lat 43°22'42", long 92°48'41", Hydrologic Unit 07080201, approximately 4 mi southwest of Staceyville, at the intersection of Highway 218 and County Road T40. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Devonian: dolomite of Devonian age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1 in., depth 70 ft, screened 55-70 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,210 ft above sea level, from topographic map. Measuring point: Top of casing, 2.58 ft above land-surface datum.

REMARKS.-- Well FM-2 (1).

PERIOD OF RECORD.--August 1992 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 6.89 ft above land-surface datum, August 23, 1993; lowest measured, 13.52 ft below land-surface datum, February 11, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	11.69	FEB 11	13.52	MAY 06	10.62	AUG 13	10.99
WATER YEAR 2003		HIGHEST	10.62	MAY 06, 2003	LOWEST	13.52	FEB 11, 2003

432156092484103. Local number, 95-17-23 DAA3.

LOCATION.--Lat 43°22'42", long 92°48'41", Hydrologic Unit 07080201, approximately 4 mi southwest of Staceyville, at the intersection of Highway 218 and County Road T40. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Devonian: dolomite of Devonian age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.5 in., depth 150 ft, screened 110-150 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,210 ft above sea level, from topographic map. Measuring point: Top of casing, 2.55 ft above land-surface datum.

REMARKS.-- Well FM-2 (2).

PERIOD OF RECORD.--August 1992 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 6.78 ft above land-surface datum, August 23, 1993; lowest measured, 14.69 ft below land-surface datum, February 11, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	12.84	FEB 11	14.69	MAY 06	12.25	AUG 13	11.47
WATER YEAR 2003		HIGHEST	11.47	AUG 13, 2003	LOWEST	14.69	FEB 11, 2003

432156092484104. Local number, 95-17-23 DAA4.

LOCATION.--Lat 43°22'42", long 92°48'41", Hydrologic Unit 07080201, approximately 4 mi southwest of Staceyville, at the intersection of Highway 218 and County Road T40. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Devonian: dolomite of Devonian age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.5 in., depth 250 ft, screened 188-250 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,210 ft above sea level, from topographic map. Measuring point: Top of casing, 2.44 ft above land-surface datum.

REMARKS.-- Well FM-2 (3).

PERIOD OF RECORD.--August 1992 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.54 ft above land-surface datum, May 6, 1993; lowest measured, 18.80 ft below land-surface datum, February 11, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	16.62	FEB 11	18.80	MAY 06	16.31	AUG 13	13.52
WATER YEAR 2003		HIGHEST	13.52	AUG 13, 2003	LOWEST	18.80	FEB 11, 2003

MITCHELL COUNTY—Continued

432156092484105. Local number, 95-17-23 DAA5.

LOCATION.--Lat 43°22'42", long 92°48'41", Hydrologic Unit 07080201, approximately 4 mi southwest of Staceyville, at the intersection of Highway 218 and County Road T40. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Devonian: dolomite of Devonian age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.5 in., depth 348 ft, screened 278-348 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,210 ft above sea level, from topographic map. Measuring point: Top of casing, 2.37 ft above land-surface datum.

REMARKS.-- Well FM-2 (4).

PERIOD OF RECORD.--August 1992 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 10.04 ft above land-surface datum, August 23, 1993; lowest measured, 24.46 ft below land-surface datum, February 11, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	22.35	FEB 11	24.46	MAY 06	23.85	AUG 13	18.11
WATER YEAR 2003 HIGHEST		18.11	AUG 13, 2003 LOWEST		24.46	FEB 11, 2003	

MONONA COUNTY

415456095414101. Local number, 82-42-14 ADCA.

LOCATION.--Lat 41°54'56", long 95°41'41", Hydrologic Unit 10230007, approximately 6 mi southeast of the Town of Soldier, on the north side of Iowa Highway 37. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 341 ft, slotted 311-336 ft, gravel- packed, open 336-341 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,340 ft above sea level, from topographic map. Measuring point: Top of casing, 2.02 ft above land-surface datum.

REMARKS.-- Well WC-4.

PERIOD OF RECORD.--May 1981 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 240.25 ft below land-surface datum, January 10, 1984; lowest measured, 246.69 ft below land-surface datum, July 28, 1981.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	245.61	FEB 07	245.73	MAY 07	245.33	AUG 12	245.41
WATER YEAR 2003 HIGHEST		245.33	MAY 07, 2003 LOWEST		245.73	FEB 07, 2003	

420004095451501. Local number, 83-42-17 ACDD.

LOCATION.--Lat 41°00'04", long 95°45'15", Hydrologic Unit 10230001, approximately 1.75 mi northeast of the Town of Soldier, 0.25 mi west of Iowa Highway 183. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 161 ft, screened 149-154 ft. Open to Pennsylvanian shale and limestone 153-161 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,160 ft above sea level, from topographic map. Measuring point: Top of casing, 2.20 ft above land-surface datum.

REMARKS.-- Well WC-176.

PERIOD OF RECORD.--May 1983 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 54.50 ft below land-surface datum, November 6, 1991; lowest measured, 64.09 ft below land-surface datum, September 7, 1983.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	62.13	FEB 07	61.72	MAY 08	61.38	AUG 05	61.54
WATER YEAR 2003 HIGHEST		61.38	MAY 08, 2003 LOWEST		62.13	NOV 19, 2002	

GROUND-WATER LEVELS
MONONA COUNTY—Continued

420139095155701. Local number, 83-43-04 CBCB.

LOCATION.--Lat 41°01'39", long 95°51'57", Hydrologic Unit 10230005, approximately 5.5 mi northwest of the Town of Soldier and 1.5 mi north of Iowa Highway 37. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 321 ft, screened 297-315 ft, gravel-packed, open hole 315-321 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,235 ft above sea level, from topographic map. Measuring point: Top of casing, 2.53 ft above land-surface datum.

REMARKS.-- Well WC-5.

PERIOD OF RECORD.--May 1981 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 183.60 ft below land-surface datum, November 3, 1993; lowest measured, 189.96 ft below land-surface datum, February 2, 1982.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	187.26	FEB 07	187.27	MAY 08	186.73	AUG 05	186.62
WATER YEAR 2003 HIGHEST		186.62 AUG 05, 2003		LOWEST		187.27 FEB 07, 2003	

421018095591301. Local number, 85-44-17 DCAA.

LOCATION.--Lat 41°10'18", long 95°59'13", Hydrologic Unit 10230003, approximately 2.5 mi southwest of the Town of Rodney on the north side of County Road L-12. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 135 ft, screened 115-125 ft, gravel-packed.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,110 ft above sea level, from topographic map. Measuring point: Top of casing, 2.70 ft above land-surface datum.

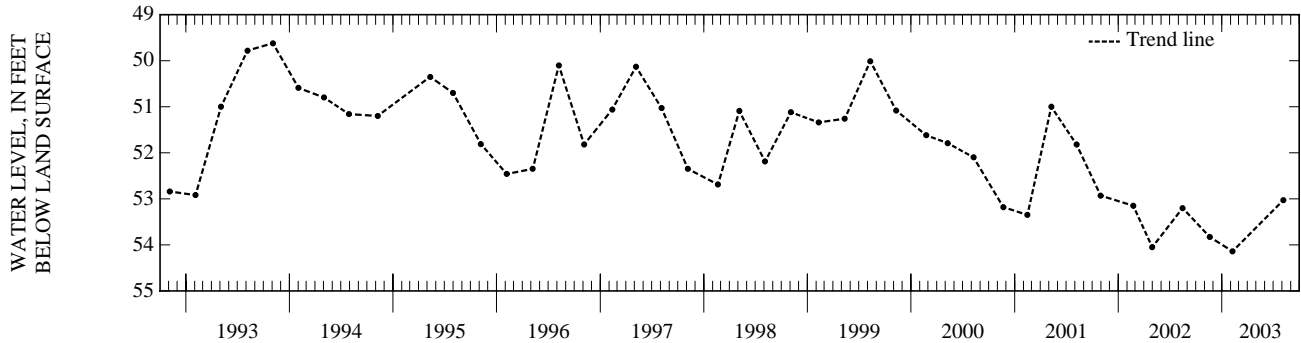
REMARKS.-- Well WC-158.

PERIOD OF RECORD.--October 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 49.62 ft below land-surface datum, November 3, 1993; lowest measured, 55.99 ft below land-surface datum, January 11, 1990.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	53.83	FEB 07	54.14	AUG 05	53.03
WATER YEAR 2003 HIGHEST		53.03 AUG 05, 2003		LOWEST	
54.14 FEB 07, 2003					



MONTGOMERY COUNTY

405841095012702. Local number, 71-36-06 DADA2.

LOCATION.--Lat 40°58'41", long 95°01'27", Hydrologic Unit 10240009, located east of dam at Viking Lake State Park, approximately 0.3 mi south of Iowa Highway 34 on the west side of road. Owner: Iowa Department of Natural Resources--Geological Survey, and U.S. Geological Survey.

AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 2 in., depth 36 ft, screened 33-36 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by observer and U.S.G.S. personnel.

DATUM.--Elevation of land-surface datum is 1,080 ft above sea level, from topographic map. Measuring point: Top of casing, 2.28 ft above land-surface datum.

REMARKS.-- Viking Lake No. 2 (6J2) well.

PERIOD OF RECORD.--June 1989 to present.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 11.51 ft below land-surface datum, September 9, 1989; lowest measured, 17.79 ft below land-surface datum, August 13, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	16.71	FEB 05	16.07	APR 30	15.96	AUG 13	17.79
WATER YEAR 2003 HIGHEST		15.96	APR 30, 2003		LOWEST		17.79
						AUG 13, 2003	

GROUND-WATER LEVELS

MONTGOMERY COUNTY—Continued

410057095075101. Local number, 72-37-29 BABA.

LOCATION.--Lat 41°00'57", long 95°07'50", Hydrologic Unit 10240005, approximately 4.35 mi east of the City of Red Oak, just south of County Road H-34. Owner: John Ogden.

AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Bored observation water-table well, diameter 3 in., depth 40 ft, screened interval unavailable.

INSTRUMENTATION.--Intermittent measurement with chalked tape by USGS personnel. Submersible pressure transducer and transmitting data collection platform (dcp) installed July, 1998.

DATUM.--Elevation of land-surface datum is 1,275 ft above sea level, from topographic map. Measuring point: Top of casing, 1.20 ft above land-surface datum.

PERIOD OF RECORD.--June 1937 to current year.

REVISION.--Measuring point revised May 10, 1990 to September 10, 1992.

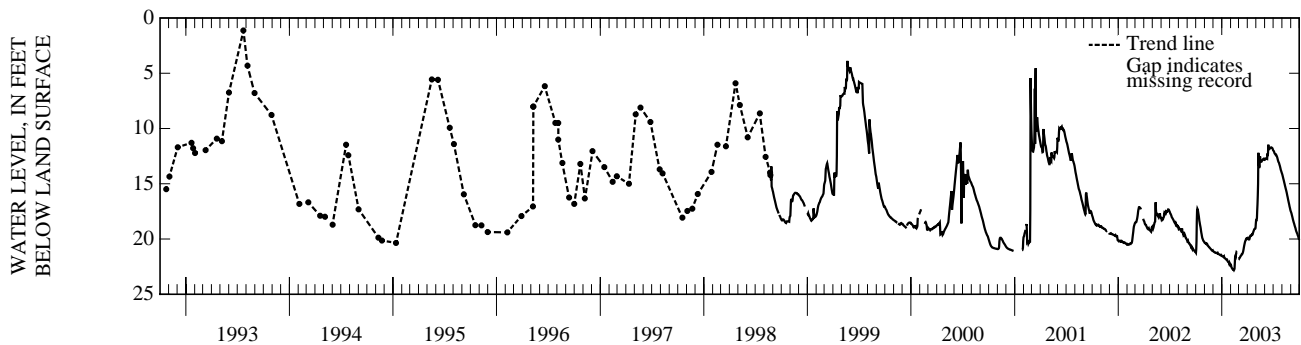
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 1.14 ft below land-surface datum, July 22, 1993; lowest measured, dry, July 8, 1963 and February 3, 1964.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 07	20.45	FEB 05	22.63	MAR 13	21.37	JUN 10	12.14	AUG 13	15.41
DEC 16	21.32	27	21.71	APR 30	18.47	JUL 17	12.87	20	16.22
WATER YEAR 2003 HIGHEST		12.14 JUN 10, 2003		LOWEST		22.63 FEB 05, 2003			

DEPTH TO WATER LEVEL, FEET BELOW LAND SURFACE
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21.24	20.35	21.10	21.55	22.35	21.77	19.90	18.33	12.82	12.00	14.12	17.55
2	20.93	20.37	21.12	21.56	22.40	21.80	19.88	18.27	12.81	12.03	14.21	17.62
3	20.22	20.36	21.16	21.57	22.54	21.74	19.89	18.28	12.75	12.07	14.32	17.71
4	18.36	20.39	21.18	21.58	22.60	21.71	19.93	18.11	12.73	12.15	14.43	17.81
5	17.40	20.38	21.19	21.61	22.63	21.68	20.01	17.38	12.73	12.24	14.54	17.92
6	17.26	20.43	21.20	21.63	22.69	21.62	20.04	16.87	12.72	12.28	14.64	18.02
7	17.32	20.46	21.21	21.61	22.72	21.56	20.04	16.09	12.74	12.29	14.74	18.13
8	17.43	20.45	21.24	21.58	22.75	21.52	19.97	15.01	12.73	12.35	14.85	18.24
9	17.59	20.44	21.24	21.68	22.74	21.50	19.84	12.20	12.75	12.38	14.96	18.35
10	17.76	20.47	21.24	21.71	22.76	21.46	19.74	12.84	12.27	12.36	15.07	18.43
11	17.93	20.55	21.24	21.74	22.78	21.39	19.70	13.27	12.50	12.39	15.18	18.52
12	18.12	20.61	21.27	21.75	22.82	21.36	19.71	13.49	12.25	12.45	15.29	18.60
13	18.36	20.63	21.28	21.78	22.77	21.36	19.72	13.49	11.46	12.51	15.39	18.69
14	18.48	20.65	21.29	21.81	22.69	21.32	19.70	13.05	11.80	12.57	15.49	18.79
15	18.65	20.70	21.29	21.83	22.21	21.25	19.66	12.53	11.88	12.66	15.59	18.87
16	18.80	20.74	21.30	21.86	21.68	21.17	19.60	12.89	11.88	12.77	15.70	18.95
17	18.91	20.75	21.27	21.89	21.58	21.06	19.63	13.00	11.86	12.87	15.81	19.03
18	19.08	20.77	21.32	21.90	21.62	20.92	19.62	13.02	11.83	12.96	15.94	19.15
19	19.28	20.81	21.35	21.89	21.42	20.76	19.57	13.01	11.78	13.03	16.07	19.25
20	19.44	20.84	21.36	21.97	21.28	20.61	19.46	13.01	11.77	13.07	16.19	19.33
21	19.57	20.87	21.38	22.02	21.18	20.49	19.37	12.96	11.74	13.13	16.32	19.39
22	19.72	20.90	21.40	22.06	21.20	20.37	19.29	12.92	11.72	13.23	16.45	19.46
23	19.87	20.93	21.41	22.09	---	20.26	19.23	12.88	11.71	13.32	16.57	19.50
24	19.96	20.96	21.41	22.10	---	20.18	19.15	12.83	11.72	13.40	16.68	19.58
25	20.01	21.00	21.44	22.12	---	20.12	19.11	12.79	11.74	13.50	16.80	19.68
26	20.09	21.02	21.46	22.20	---	20.06	19.09	12.77	11.74	13.62	16.92	19.71
27	20.15	21.04	21.46	22.14	---	19.97	19.07	12.79	11.77	13.74	17.05	19.82
28	20.19	21.04	21.47	22.22	21.77	19.96	19.06	12.78	11.81	13.81	17.16	19.91
29	20.21	21.02	21.45	22.32	---	20.00	19.00	12.77	11.90	13.89	17.27	20.00
30	20.27	21.09	21.47	22.30	---	20.00	18.61	12.65	11.97	13.97	17.39	20.07
31	20.31	---	21.53	22.37	---	19.95	---	12.79	---	14.05	17.48	---
MEAN	19.13	20.70	21.31	21.89	---	20.93	19.55	14.03	12.13	12.87	15.76	18.87
MAX	21.24	21.09	21.53	22.37	---	21.80	20.04	18.33	12.82	14.05	17.48	20.07
MIN	17.26	20.35	21.10	21.55	---	19.95	18.61	12.20	11.46	12.00	14.12	17.55



MUSCATINE COUNTY

412120091080401. Local number, 76-02-30 CBAA1.

LOCATION.--Lat 41°21'20", long 91°08'01", Hydrologic Unit 07080101, west of the Town of Fruitland on an Iowa State University Agricultural Experiment Farm. Owner: U.S. Geological Survey.

AQUIFER.--Alluvial: Mississippi River sand and gravel of Holocene age.

WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 6 in., depth 27 ft, screened 24-27 ft.

INSTRUMENTATION.--Intermittent measurement with chalked tape by USGS personnel. Graphic water-level recorder May 1966 to October 1987.

DATUM.--Elevation of land-surface datum is 546 ft above sea level, from topographic map. Measuring point: Top of casing, 3.40 ft above land-surface datum.

REMARKS.--Fruitland/30M4 well.

PERIOD OF RECORD.--May 1966 to current year.

REVISED RECORDS.-- WDR IA-84-1.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 7.15 ft below land-surface datum, September 7, 1993; lowest measured, 17.86 ft below land-surface datum, August 2, 1989.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 14	16.00	FEB 05	16.66	MAY 20	16.58	AUG 14	17.83
WATER YEAR 2003 HIGHEST		16.00	NOV 14, 2002	LOWEST		17.83	AUG 14, 2003

412120091080402. Local number, 76-02-30 CBAA.

LOCATION.--Lat 41°21'20", long 91°08'04", Hydrologic Unit 07080101, west of the Town of Fruitland on an Iowa State University Agricultural Experiment Farm. Owner: U.S. Geological Survey.

AQUIFER.--Silurian-Devonian: limestone of Silurian and Devonian age.

WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 2 in., depth 189 ft, screened 169-189 ft.

INSTRUMENTATION.--Intermittent measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 546 ft above sea level, from topographic map. Measuring point: Top of casing, 3.01 ft above land-surface datum.

REMARKS.-- Fruitland 13B well.

PERIOD OF RECORD.--October 1992 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 7.12 ft below land-surface datum, August 24, 1993; lowest measured, 17.72 ft below land-surface datum, August 14, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 14	15.98	FEB 05	16.62	MAY 20	16.59	AUG 14	17.72
WATER YEAR 2003 HIGHEST		15.98	NOV 14, 2002	LOWEST		17.72	AUG 14, 2003

412120091080403. Local number, 76-02-30 CBAA.

LOCATION.--Lat 41°21'20", long 91°08'04", Hydrologic Unit 07080101, west of the Town of Fruitland on an Iowa State University Agricultural Experiment Farm. Owner: U.S. Geological Survey.

AQUIFER.--Alluvial: Mississippi River sand and gravel of Quaternary age.

WELL CHARACTERISTICS.--Drilled observation water-table well, diameter 2 in., depth 100 ft, screened 90-100 ft.

INSTRUMENTATION.--Intermittent measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 546 ft above sea level, from topographic map. Measuring point: Top of casing, 3.13 ft above land-surface datum.

REMARKS.-- Fruitland 13C well.

PERIOD OF RECORD.--October 1992 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 7.20 ft below land-surface datum, September 10, 1993; lowest measured, 17.84 ft below land-surface datum, August 14, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 14	16.07	FEB 05	16.74	MAY 20	16.62	AUG 14	17.84
WATER YEAR 2003 HIGHEST		16.07	NOV 14, 2002	LOWEST		17.84	AUG 14, 2003

GROUND-WATER LEVELS

O'BRIEN COUNTY

425610095250611. Local number, 94-39-26 BADB11.

LOCATION.--Lat 41°56'10", long 95°25'06", Hydrologic Unit 10230003, near a dead-end road just south of the Little Sioux River, 0.9 mi north of Iowa Highway 10, approximately 5 mi southeast of the Town of Sutherland. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2.5 in., depth 352 ft, screened 291-295 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,212 ft above sea level, from topographic map. Measuring point: Top of casing, 2.30 ft above land-surface datum.

REMARKS.-- Well D-3.

PERIOD OF RECORD.--April 1980 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 34.94 ft below land-surface datum, May 09, 1995; lowest measured, 39.40 ft below land-surface datum, February 13, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	38.74	FEB 13	39.40	MAY 07	39.10	AUG 14	38.60
WATER YEAR 2003 HIGHEST		38.60	AUG 14, 2003 LOWEST		39.40	FEB 13, 2003	

430930095350401. Local number, 96-40-05 DDDA1.

LOCATION.--Lat 43°09'28", long 95°35'06", Hydrologic Unit 10230003, approximately 3 mi east of the Town of Sanborn and 2 mi south of U.S. Highway 18. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Ordovician and Dakota: sandy shale of Ordovician age and sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 701 ft, screened 661-701 ft. Dakota 487-688 ft, Ordovician 688-701 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,560 ft above sea level, from topographic map. Measuring point: Top of casing, 4.00 ft above land-surface datum.

REMARKS.-- Well D-41.

PERIOD OF RECORD.--June 1980 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 358.39 ft below land-surface datum, July 8, 1986; lowest measured, 364.74 ft below land-surface datum, November 7, 1991.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 18	362.62	FEB 12	362.72	MAY 07	362.64
WATER YEAR 2003 HIGHEST		362.62	NOV 18, 2002 LOWEST		362.72
					FEB 12, 2003

OSCEOLA COUNTY

431613095251801. Local number, 98-39-26 CDCC.

LOCATION.--Lat 43°16'13", long 95°25'18", Hydrologic Unit 10230003, 3.5 mi south and 2.5 mi east of the Village of May City. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 500 ft, screened 490-500 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,398 ft above sea level, from topographic map. Measuring point: Top of casing, 2.70 ft above land-surface datum.

REMARKS.-- Well D-39.

PERIOD OF RECORD.--June 1980 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 189.99 ft below land-surface datum, June 17, 1980; lowest measured, 198.38 ft (nearby well pumping) below land-surface datum, August 14, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	193.42	FEB 13	194.12	MAY 07	193.45	AUG 14	198.38
WATER YEAR 2003 HIGHEST		193.42	NOV 21, 2002 LOWEST		198.38	AUG 14, 2003	

OSCEOLA COUNTY—Continued

431620095250501. Local number, 98-39-26 CDAD1.

LOCATION.--Lat 43°16'18", long 95°25'01", Hydrologic Unit 10230003, 3.5 mi south and 2.5 mi east of the Village of May City. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Cambrian-Ordovician: St. Peter sandstone of Middle Ordovician age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 662 ft, screened 622-662 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,402 ft above sea level, from topographic map. Measuring point: Top of low pipe, 1.47 ft above land-surface datum.

REMARKS.-- Well D-38, Deep Hibbing; in same borehole as well D-38 Shallow Hibbing.

PERIOD OF RECORD.--June 1980 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 192.96 ft below land-surface datum, November 20, 1989; lowest measured, 202.43 ft below land-surface datum, February 07, 1996.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	199.64	FEB 13	199.91	MAY 07	199.83	AUG 14	197.10
WATER YEAR 2003 HIGHEST		197.10		AUG 14, 2003 LOWEST		199.91	
						FEB 13, 2003	

431620095250511. Local number, 98-39-26 CDAD11.

LOCATION.--Lat 43°16'18", long 95°25'01", Hydrologic Unit 10230003, 3.5 mi south and 2.5 mi east of the Village of May City. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 345 ft, screened 335-345 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,402 ft above sea level, from topographic map. Measuring point: Top of high pipe, 2.60 ft above land-surface datum.

REMARKS.-- Well D-38, Shallow Hibbing; in same borehole as well D-38 Deep Hibbing.

PERIOD OF RECORD.--June 1980 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 192.20 ft below land-surface datum, September 10, 1981; lowest measured, 200.42 ft below land-surface datum, August 14, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	195.54	FEB 13	195.83	MAY 07	195.67	AUG 14	200.42
WATER YEAR 2003 HIGHEST		195.54		NOV 21, 2002 LOWEST		200.42	
						AUG 14, 2003	

432828095283611. Local number, 100-39-17 DCCB11.

LOCATION.--Lat 43°28'33", long 95°28'35", Hydrologic Unit 10230003, approximately 2 mi west and 2 mi north of the Town of Harris, east of County Road M-12. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 5 in. to 461 ft, 4 in. 440-760 ft, depth 760 ft, screened 680-700 ft.

INSTRUMENTATION.--Quarterly measurement with electric line or chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,560 ft above sea level, from topographic map. Measuring point: Top of casing, 3.00 ft above land-surface datum.

REMARKS.-- Well D-13.

PERIOD OF RECORD.--July 1980 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 341.80 ft below land-surface datum, August 5, 1980; lowest measured, 350.68 ft below land-surface datum, November 05, 1997.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	345.67	FEB 13	345.77	MAY 07	345.57	AUG 14	346.61
WATER YEAR 2003 HIGHEST		345.57		MAY 07, 2003 LOWEST		346.61	
						AUG 14, 2003	

GROUND-WATER LEVELS

PAGE COUNTY

404257095150801. Local number, 68-38-07 CCAA.

LOCATION.--Lat 40°42'57", long 95°15'08", Hydrologic Unit 10240005, approximately 2 mi south of the Village of Norwich and 1.5 mi west of County Road M-48. Owner: William Brayman.

AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Drilled unused water-table well, diameter 12 in., depth 44 ft, lined with tile.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,087 ft above sea level, from topographic map. Measuring point: Top of well, 1.20 ft below original land-surface datum.

REMARKS.-- Braymen Farm Well. Terracing of the farm land surrounding well has lowered the land surface below the original measuring point.

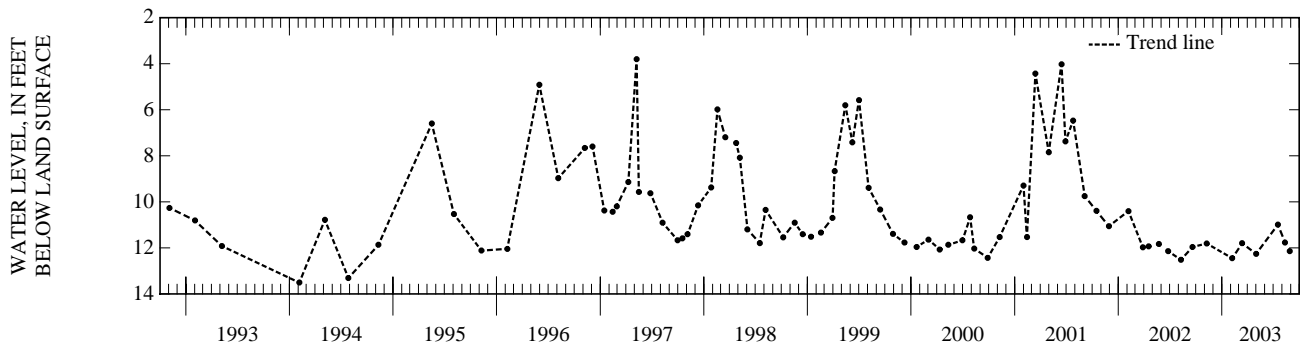
PERIOD OF RECORD.--January 1938 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 2.09 ft below land-surface datum, March 26, 1946; lowest measured, 22.76 ft below land-surface datum, June 23, 1947.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 08	11.81	MAR 13	11.80	JUL 17	10.99	AUG 28	12.14
FEB 06	12.45	MAY 01	12.26	AUG 11	11.76		

WATER YEAR 2003 HIGHEST 10.99 JUL 17, 2003 LOWEST 12.45 FEB 06, 2003



PLYMOUTH COUNTY

424833096324701. Local number, 92-48-06 DDDA.

LOCATION.--Lat 42°48'35", long 96°32'49", Hydrologic Unit 10170203, just south of the curve on Iowa Highway 3, 1 mi south of the Town of Akron. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: in sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 4 in. to 184 ft, 2 in. to 581 ft, depth 581 ft, screened 430-434 ft and 510-515 ft. Paleozoic rock 576-581 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,282 ft above sea level, from topographic map. Measuring point: Top of casing, 4.50 ft above land-surface datum.

REMARKS.-- Well D-35.

PERIOD OF RECORD.--December 1979 to December 1980, May 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 135.73 ft below land-surface datum, February 10, 1999; lowest measured, 159.82 ft below land-surface datum, August 06, 1980.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	137.38	FEB 12	137.48	MAY 07	137.17	AUG 05	137.33

WATER YEAR 2003 HIGHEST 137.17 MAY 07, 2003 LOWEST 137.48 FEB 12, 2003

PLYMOUTH COUNTY—Continued

424850096074801. Local number, 92-45-02 CBCB.

LOCATION.--Lat 42°48'50", long 96°08'02", Hydrologic Unit 10230002, approximately 3.8 mi west and 0.6 mi south of the Village of Oyens. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Cambrian-Ordovician: dolomite of Cambrian and Ordovician age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 5 in. to 161 ft, 4 in. to 598 ft, 2 in. to 1,340 ft, depth 1,340 ft, cased to 598 ft, open hole 598-1,340 ft. Well deepened from 1,089 ft to 1,340 ft in May, 1984. Ordovician rock 568-782 ft, Cambrian rock 782-1062 ft, Precambrian 1062-1340 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,245 ft above sea level, from topographic map. Measuring point: Top of casing, 2.80 ft above land-surface datum.

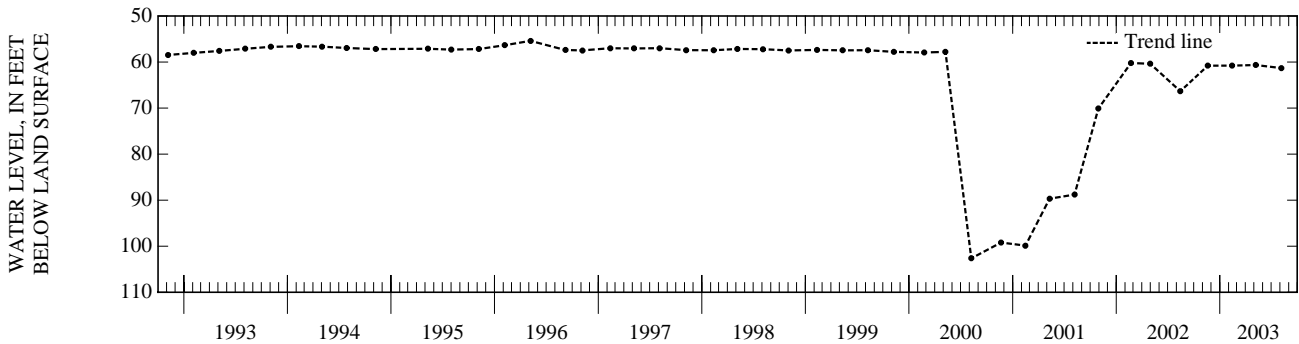
REMARKS.-- Well D-21.

PERIOD OF RECORD.--May 1979 to January 1981, May 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 55.40 ft below land-surface datum, May 06, 1996; Lowest measured, 102.64 ft below land-surface datum, August 07, 2000.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	60.79	FEB 12	60.78	MAY 07	60.65	AUG 05	61.31
WATER YEAR 2003 HIGHEST		60.65	MAY 07, 2003		LOWEST		61.31
						AUG 05, 2003	



425249096125001. Local number, 93-46-12 DDDD.

LOCATION.--Lat 42°52'49", long 96°12'50", Hydrologic Unit 10230002, 1 mi west and 1 mi south of the Village of Struble. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2.5 in., depth 570 ft, screened 356-360 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,280 ft above sea level, from topographic map. Measuring point: Top of coupling, 2.25 ft above land-surface datum.

REMARKS.-- Well D-2.

PERIOD OF RECORD.--March 1980 to December 1980, May 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 117.78 ft below land-surface datum, April 9, 1980; lowest measured, 128.05 ft below land-surface datum, November 19, 2002.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	128.05	FEB 12	126.44	MAY 07	127.50	AUG 04	126.92
WATER YEAR 2003 HIGHEST		126.44	FEB 12, 2003		LOWEST		128.05
						NOV 19, 2002	

GROUND-WATER LEVELS

POTTAWATTAMIE COUNTY

411359095171901. Local number, 74-39-01 CCCC.

LOCATION.--Lat 41°13'59", long 95°17'19", Hydrologic Unit 10240002, approximately 6.5 mi east of the Town of Carson, on the northeast corner of the junction of Iowa Highway 92 and County Road M-41. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Buried channel: sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 2 in., depth 216 ft, screened 189-206 ft, gravel-packed, open to Pennsylvanian shale 207-216 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,245 ft above sea level, from topographic map. Measuring point: Top of casing, 2.50 ft above land-surface datum.

REMARKS.-- Well SW-21.

PERIOD OF RECORD.--July 1986 to current year.

REVISION.--Lowest water level measured, 129.38 ft below land-surface datum, August 20, 1986.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 122.74 ft below land-surface datum, May 11, 2000; lowest measured, 129.38 ft below land-surface datum, August 20, 1986.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	126.12	FEB 03	126.30	MAY 02	126.93	AUG 07	127.32
WATER YEAR 2003 HIGHEST		126.12	NOV 20, 2002		LOWEST		127.32
						AUG 07, 2003	

412407095391201. Local number, 76-42-10 ADBC.

LOCATION.--Lat 41°24'01", long 95°39'17", Hydrologic Unit 10230006, approximately 1 mi east of the Town of Underwood, behind structure at reststop on eastbound Interstate 80. Owner: Iowa Highway Commission.

AQUIFER.--Cambrian: sandstone and dolomite. from the Jordan and Prairie du Chen formations.

WELL CHARACTERISTICS.--Drilled public use well, diameter 16 in., depth 2520 ft, screened 2420-2460 ft, gravel packed.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,093 ft above sea level, from topographic map. Measuring point: Top of casing, 1.72 ft above land-surface datum.

REMARKS.--Underwood Well.

PERIOD OF RECORD.--October 1996 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 71.30 ft below land surface datum, May 09, 2001 and May 08, 2003; lowest measured, 85.00 ft below land surface datum, November 19, 1969.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	72.61	FEB 06	72.63	MAY 08	71.30	AUG 21	71.47
WATER YEAR 2003 HIGHEST		71.30	MAY 08, 2003		LOWEST		72.63
						FEB 06, 2003	

SCOTT COUNTY

413544090212901. Local number, 78-5E-03 AADA.

LOCATION.--Lat 41°35'44", long 91°21'29", Hydrologic Unit 07080101, at the Bridgeview Elementary School corner of 12th and Davenport Streets, Le Claire. Owner: City of Le Claire.

AQUIFER.--Cambrian-Ordovician: sandstone of Late Cambrian and sandstone and sandy dolomite of Early Ordovician age.

WELL CHARACTERISTICS.--Drilled unused municipal artesian water well, diameter 16 to 10 in., depth 1,607 ft, cased to 1,300 ft, open hole 1,300-1,607 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel. Graphic water-level recorder July 1975 to December 1984.

DATUM.--Elevation of land-surface datum is 703 ft above sea level, from topographic map. Measuring point: Nipple on plate welded to casing, 2.11 ft above land-surface datum.

REMARKS.-- Le Claire Well No. 3.

PERIOD OF RECORD.--July 1975 to current year.

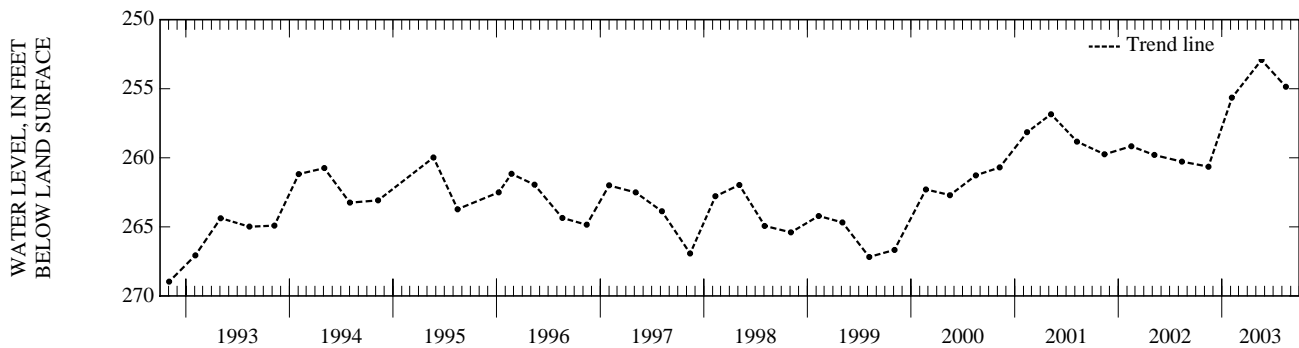
REVISED RECORDS.--WRD IA-84-1, WDR IA-88-1.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 247.46 ft below land-surface datum, July 8, 1975; lowest recorded, 276.86 ft below land-surface datum, September 1, 1978.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 14	260.64	FEB 05	255.65	MAY 20	252.92	AUG 14	254.86

WATER YEAR 2003 HIGHEST 252.92 MAY 20, 2003 LOWEST 260.64 NOV 14, 2002



SHELBY COUNTY

413255095070401. Local number, 78-37-17 DDDD.

LOCATION.--Lat 41°32'55", long 95°07'04", Hydrologic Unit 10240003, 3 mi south and 3 mi west of the Town of Elkhorn on the east side of County Road

M-56 near Elkhorn Creek. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota and Pennsylvanian: sandstone of Cretaceous age and shale and limestone of Pennsylvanian age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 181 ft, screened 121-179 ft, gravel-packed, open to Dakota 121-140 ft, Pennsylvanian 140-181 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,208 ft above sea level, from topographic map. Measuring point: Top of casing, 2.80 ft above land-surface datum.

REMARKS.-- Well WC-16.

PERIOD OF RECORD.--August 1981 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 36.60 ft below land-surface datum, August 11, 1993; lowest measured, 44.06 ft below land-surface datum, November 20, 2002.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	44.06	FEB 07	43.59	MAY 07	43.28	AUG 06	43.65

WATER YEAR 2003 HIGHEST 43.28 MAY 07, 2003 LOWEST 44.06 NOV 20, 2002

GROUND-WATER LEVELS
SHELBY COUNTY—Continued

413359095182701. Local number, 78-39-11 CCBC.

LOCATION.--Lat 41°33'59", long 95°18'27", Hydrologic Unit 10240002, approximately 5.5 mi south of the City of Harlan, 0.75 mi south of County Road F-58, and 1.5 mi east of U.S. Highway 59. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Fremont buried channel: sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 541 ft, screened 520-535 ft, gravel-packed. Pennsylvanian shale 537-541 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,310 ft above sea level, from topographic map. Measuring point: Top of casing, 1.65 ft above land-surface datum.

REMARKS.-- Well WC-227.

PERIOD OF RECORD.--July 1983 to current year.

REVISION.--Lowest water level measured, 153.32 below land-surface datum, April 12, 1990.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 146.61 ft below land-surface datum, September 6, 1983; lowest measured, 153.82 ft below land-surface datum, August 06, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	153.33	FEB 07	153.45	MAY 07	153.27	AUG 06	153.82
WATER YEAR 2003		HIGHEST	153.27	MAY 07, 2003	LOWEST	153.82	AUG 06, 2003

413953095302601. Local number, 79-40-09 DBCA.

LOCATION.--Lat 41°39'53", long 95°30'26", Hydrologic Unit 10230006, east of State Highway 191, approximately 1 mi northeast of the Town of Portsmouth. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 210 ft, screened 160-175 ft, gravel packed, open hole 200-210 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,205 ft above sea level, from topographic map. Measuring point: Top of casing, 4.10 ft above land-surface datum.

REMARKS.-- Well WC-15.

PERIOD OF RECORD.--August 1992 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 18.29 feet below land-surface datum, May 9, 1995; lowest measured, 20.02 ft below land-surface datum, February 06, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	19.95	FEB 06	20.02	MAY 07	19.58	AUG 05	19.99
WATER YEAR 2003		HIGHEST	19.58	MAY 07, 2003	LOWEST	20.02	FEB 06, 2003

414624095252301. Local number, 80-39-06 AADC.

LOCATION.--Lat 41°46'24", long 95°25'22", Hydrologic Unit 10230006, west of the Town of Earling on the north side of Iowa Highway 37 near the junction of Iowa Highways 37 and 191. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 370 ft, screened 332-347 ft, open to Pennsylvanian sandstone, shale, and limestone 347-370 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,305 ft above sea level, from topographic map. Measuring point: Top of casing, 2.60 ft above land-surface datum.

REMARKS.-- Well WC-10.

PERIOD OF RECORD.--June 1981 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 89.91 ft below land-surface datum, April 10, 1984; lowest measured, 131.70 ft below land-surface datum, April 12, 1990.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	111.18	FEB 07	110.28	MAY 07	109.56	AUG 05	109.24
WATER YEAR 2003		HIGHEST	109.24	AUG 05, 2003	LOWEST	111.18	NOV 20, 2002

SHELBY COUNTY—Continued

414856095160101. Local number, 81-38-21 ADAD.

LOCATION.--Lat 41°48'56", long 95°16'01", Hydrologic Unit 10240002, approximately 3.75 mi east of the Town of Defiance on the west side of County Road M-36. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Fremont buried channel: sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 535 ft, screened 525-535 ft, gravel-packed. Open to Pennsylvanian shale 530-535 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,370 ft above sea level, from topographic map. Measuring point: Top of casing, 2.90 ft above land-surface datum.

REMARKS.-- Well WC-222.

PERIOD OF RECORD.--August 1983 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 208.09 ft below land-surface datum, April 15, 1987; lowest measured, 213.13 ft below land-surface datum, August 05, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 20	212.68	FEB 07	212.92	MAY 07	212.57	AUG 05	213.13
WATER YEAR 2003		HIGHEST	212.57	MAY 07, 2003	LOWEST	213.13	AUG 05, 2003

SIOUX COUNTY

430140095573101. Local number, 95-43-07 AAAA.

LOCATION.--Lat 43°04'10", long 95°57'32", Hydrologic Unit 10230002, just south of County Road B-40, 1 mi east of the Village of Newkirk. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 681 ft, screened 641-681 ft. Open to Paleozoic rock from 674-681 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,390 ft above sea level, from topographic map. Measuring point: Top of casing, 3.70 ft above land-surface datum.

REMARKS.-- Well D-43.

PERIOD OF RECORD.--July 1980 to December 1980, May 1982 to current year.

REVISED RECORDS.--WDR IA-88-1.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 213.66 ft below land-surface datum, March 13, 1984; lowest measured, 220.61 ft below land-surface datum, August 04, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 18	220.57	FEB 12	220.52	MAY 08	220.28	AUG 04	220.61
WATER YEAR 2003		HIGHEST	220.28	MAY 08, 2003	LOWEST	220.61	AUG 04, 2003

430913096033201. Local number, 96-44-08 ADAA.

LOCATION.--Lat 43°09'13", long 96°03'32", Hydrologic Unit 10230002, west side of County Road K-64, approximately 2.5 mi west of the Town of Boyden and approximately 2.2 mi south of U.S. Highway 18. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 682 ft, screened 647-667 ft. Open to Paleozoic rock 681-682 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,373 ft above sea level, from topographic map. Measuring point: Top of casing, 3.70 ft above land-surface datum.

REMARKS.-- Well D-44.

PERIOD OF RECORD.--August 1980 to December 1980, May 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 187.85 ft below land-surface datum, October 16, 1984; lowest measured, 197.86 ft below land-surface datum, February 12, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	197.84	FEB 12	197.86	MAY 07	197.60	AUG 04	197.63
WATER YEAR 2003		HIGHEST	197.60	MAY 07, 2003	LOWEST	197.86	FEB 12, 2003

GROUND-WATER LEVELS

STORY COUNTY

420129093273701. Local number, 83-22-06 CDBD.

LOCATION.--Lat 42°01'30", long 93°27'33", Hydrologic Unit 07080105, approximately one mile north of Highway 30 near 1st and N ave. Owner: City of Nevada.

AQUIFER.--Cambrian-Ordovician aquifer.

WELL CHARACTERISTICS.--Drilled public supply well, diameter 16 in., depth 2630 ft, open hole 2015-2630 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 991 ft above sea level, from topographic map.

REMARKS.-- Nevada well no. 4.

PERIOD OF RECORD.--February 1997 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 295 ft below land-surface datum, February 08, 1999; lowest measured, 410 ft below land-surface datum, August 12, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	390	FEB 12	385	MAY 08	390	AUG 12	410
WATER YEAR 2003 HIGHEST		385 FEB 12, 2003	LOWEST		410	AUG 12, 2003	

420137093361501. Local number, 83-24-02 DABC.

LOCATION.--Lat 42°01'32", long 93°36'21", Hydrologic Unit 07080105, in Ames, north of the Chicago and Northwestern Railroad and County Road E-41, approximately 0.75 mi east of U.S. Highway 69. Owner: City of Ames.

AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Drilled municipal well, depth 124 ft, casing information unavailable.

INSTRUMENTATION.--Quarterly measurement with chalked tape or electric line by USGS personnel.

DATUM.--Elevation of land-surface datum is 926 ft above sea level, from topographic map. Measuring point: Top of casing, 0.82 ft above land-surface datum.

REMARKS.-- Ames city well No. 4.

PERIOD OF RECORD.--September 1987 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 49.98 ft below land-surface datum, March 14, 1991; lowest measured, 80.73 ft below land-surface datum, February 12, 2003.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	50.13	FEB 12	80.73	MAY 08	67.27	AUG 03	64.83
WATER YEAR 2003 HIGHEST		50.13 NOV 19, 2002	LOWEST		80.73	FEB 12, 2003	

VAN BUREN COUNTY

404150091483001. Local number, 68-08-08 CDD.

LOCATION.--Lat 40°41'53", long 91°48'20", Hydrologic Unit 07100009, located at the west end of the park in the City of Bonaparte, south of County Road J-40. Owner: City of Bonaparte.

AQUIFER.--Mississippian and dolomite of Mississippian age.

WELL CHARACTERISTICS.--Drilled unused semi-confined public-supply well, diameter 6 in., depth 205 ft, cased to 18 ft, open hole 18-205 ft.

INSTRUMENTATION.--Intermittent measurement with chalked tape by USGS personnel. Graphic water-level recorder December 1988 to July 1990.

Intermittent measurement with chalked tape by USGS personnel August 1988 to December 1988.

DATUM.--Elevation of land-surface datum is 552 ft above sea level, from topographic map. Measuring point: Top of recorder platform, 0.65 ft above land-surface datum.

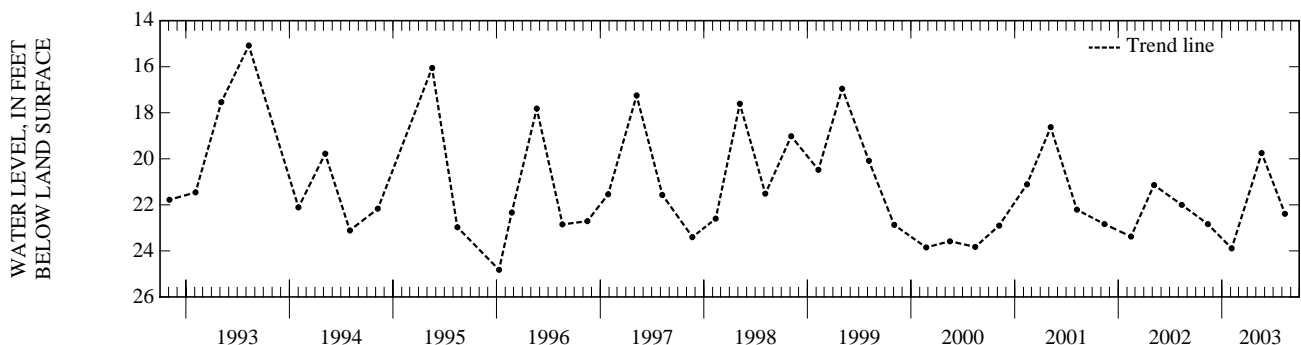
REMARKS.-- Bonaparte No. 1 well. Recorder removed July 17, 1990.

PERIOD OF RECORD.--August 1988 to present.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 15.08 ft below land-surface datum, August 10, 1993; lowest measured, 32.13 ft below land-surface datum, August 16, 1989.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 12	22.84	FEB 04	23.89	MAY 21	19.75	AUG 11	22.39
WATER YEAR 2003 HIGHEST		19.75	MAY 21, 2003		LOWEST		23.89 FEB 04, 2003



WASHINGTON COUNTY

411300091320701. Local number, 74-06-15 BDAC.

LOCATION.--Lat 41°12'59", long 91°32'07", Hydrologic Unit 07080107, in the water treatment plant, beneath the water tower in Crawfordsville. Owner: Town of Crawfordsville.

AQUIFER.--Mississippian: dolomite of Mississippian age.

WELL CHARACTERISTICS.--Drilled unused municipal artesian water well, diameter 6.5 in., depth 215 ft, cased to 132 ft, open hole 132-215 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 725 ft above sea level, from topographic map. Measuring point: Nipple on plate welded to casing, 1.10 ft above land-surface datum.

PERIOD OF RECORD.--September 1983, March 1987 to current year. REMARKS: Crawfordsville North.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 69.23 ft below land-surface datum, March 25, 1987; lowest measured, 78.09 ft below land-surface datum, August 05, 1999.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 12	72.38	FEB 04	71.66	MAY 21	72.02	AUG 11	73.51
WATER YEAR 2003 HIGHEST		71.66	FEB 04, 2003		LOWEST		73.51
AUG 11, 2003							

412750091495201. Local number, 77-09-24 AADA.

LOCATION.--Lat 41°27'53", long 91°49'47", Hydrologic Unit 07080209, north of the city sewage treatment plant and west of First Avenue SE, Wellman. Owner: City of Wellman.

AQUIFER.--Mississippian: dolomite of Mississippian age.

WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 10 in. to 27 ft, 8 in. to 47 ft, depth 110 ft, cased to 47 ft, open hole 47 to 110 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 695 ft above sea level, from topographic map. Measuring point: Nipple on plate welded to casing, 1.87 ft above land-surface datum.

REMARKS.-- City test well No. 1.

PERIOD OF RECORD.--May 1963 to October 1971, May 1973 to current year.

REVISED RECORDS.--WDR IA-84-1, WDR IA-88-1.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.31 ft above land-surface datum, May 08, 2001; lowest measured, 6.80 ft below land-surface datum, October 20, 1964.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 13	3.41	FEB 05	3.90	MAY 22	2.07	AUG 12	3.63
WATER YEAR 2003 HIGHEST		2.07	MAY 22, 2003		LOWEST		3.90
FEB 05, 2003							

421829091304701. Local number, 75-06-14 ABBB.

LOCATION.--Lat 41°18'28", long 91°30'47", Hydrologic Unit 07080209, 1 mi north and 1.5 mi east of the junction of U.S. Highway 218 and Iowa Highway 92. Owner: Mrs. David Armstrong.

AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Bored unused water-table well, diameter 12 in., depth 45 ft, lined with tile.

INSTRUMENTATION.--Monthly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 745 ft above sea level, from topographic map. Measuring point: Nipple welded to barrel, 4.08 ft above land-surface datum.

PERIOD OF RECORD.--November 1983 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 1.29 ft below land-surface datum, April 16, 1999; lowest measured, 12.65 ft below land-surface datum, November 1, 1988.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 23	10.30	DEC 19	8.37	FEB 04	8.88	APR 21	5.07	JUN 17	4.29	AUG 11	8.35
NOV 12	9.00	JAN 17	8.98	MAR 31	6.02	MAY 21	4.15	JUL 14	5.33	SEP 17	10.81
WATER YEAR 2003 HIGHEST		4.15	MAY 21, 2003		LOWEST		10.81	SEP 17, 2003			

GROUND-WATER LEVELS

WEBSTER COUNTY

421837094083601. Local number, 87-28-29 CCCD.

LOCATION.--Lat 41°18'38", long 94°08'36", Hydrologic Unit 07100006, 3 mi north and 2 mi east of the Town of Harcourt. Owner: Grace Helms.

AQUIFER.--Glacial drift of Pleistocene age.

WELL CHARACTERISTICS.--Drilled unused water-table well, diameter 12 in., depth 42 ft, lined with tile.

INSTRUMENTATION.--Monthly measurement with chalked tape by USGS personnel. Graphic water-level recorder October 1942 to December 1976.

DATUM.--Elevation of land-surface datum is 1,165 ft above sea level, from topographic map. Measuring point: Top of casing, 1.29 ft above land-surface datum.

PERIOD OF RECORD.--October 1942 to June 1956, March 1958 to current year.

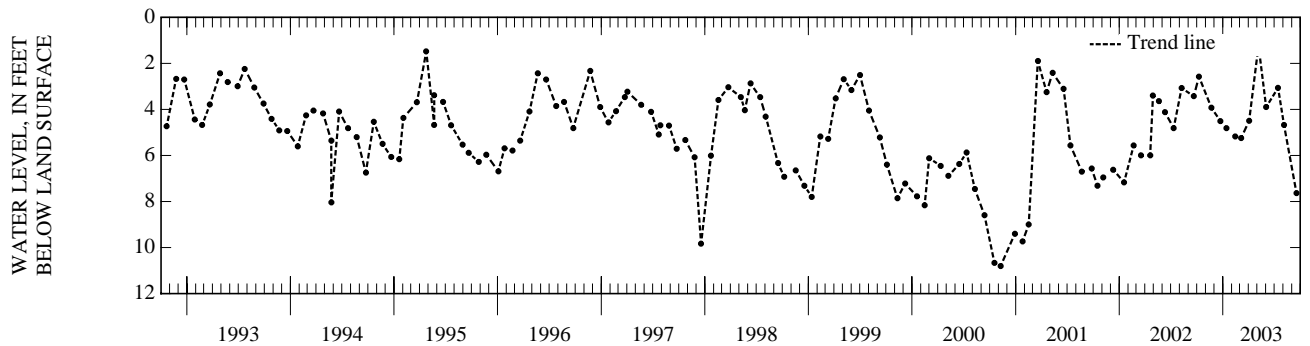
REMARKS.--Sometimes called Harcourt well.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.05 ft below land-surface datum, August 1, 1972; lowest measured, 13.62 ft below land-surface datum, March 12, 1956.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 08	2.57	DEC 23	4.51	FEB 13	5.17	APR 03	4.49	JUN 02	3.90	AUG 04	4.68
NOV 21	3.93	JAN 13	4.81	MAR 06	5.24	MAY 06	1.23	JUL 14	3.06	SEP 17	7.64

WATER YEAR 2003 HIGHEST 1.23 MAY 06, 2003 LOWEST 7.64 SEP 17, 2003



423018094214701. Local number, 89-30-23 CCBB.

LOCATION.--Lat 42°30'18", long 94°21'47", Hydrologic Unit 07100004, 75 ft west of the new school addition, Barnum. Owner: Johnson Township

Consolidated School.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled unused artesian water well, diameter 4 in., depth 208 ft, screened 203-208 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,174 ft above sea level, from topographic map. Measuring point: Top of casing, 0.15 ft above land-surface datum.

PERIOD OF RECORD.--October 1942 to September 1945, May 1947 to current year.

REVISED RECORDS.--WDR IA-88-1.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 2.68 ft below land-surface datum, May 7, 2003; lowest measured, 45.85 ft below land-surface datum, July 28, 1980.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	42.83	FEB 13	42.89	MAY 07	2.68	AUG 14	42.62

WATER YEAR 2003 HIGHEST 2.68 MAY 07, 2003 LOWEST 42.89 FEB 13, 2003

WOODBURY COUNTY

422058095573701. Local number, 87-44-15 CBBB.

LOCATION.--Lat 42°20'58", long 95°57'37", Hydrologic Unit 10230003, approximately 3.5 mi west and 5.5 mi north of the Village of Oto. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 2 in., depth 197 ft, screened 185-189 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,165 ft above sea level, from topographic map. Measuring point: Top of casing, 1.50 ft above land-surface datum.

REMARKS.-- Well D-34.

PERIOD OF RECORD.--April 1980 to December 1980, May 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 51.54 ft below land-surface datum, August 7, 1996; lowest measured, 63.56 ft below land-surface datum, November 02, 1982.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL
AUG 04	56.62

WOODBURY COUNTY—Continued

422830096000511. Local number, 88-44-16 BAAB11.

LOCATION.--Lat 42°28'30", long 96°00'31", Hydrologic Unit 10230004, approximately 3 mi east and 0.5 mi south of the Town of Moville. Owner: Iowa Department of Natural Resources--Geological Survey and U.S. Geological Survey.

AQUIFER.--Dakota: sandstone of Cretaceous age.

WELL CHARACTERISTICS.--Drilled observation artesian water well, diameter 4 in. to 235 ft, 2 in. to 337 ft, depth 337 ft, screened 332-337 ft.

INSTRUMENTATION.--Quarterly measurement with chalked tape by USGS personnel.

DATUM.--Elevation of land-surface datum is 1,340 ft above sea level, from topographic map. Measuring point: Top of casing, 3.50 ft above land-surface datum.

REMARKS.-- Well D-33. Damaged March 1998.

PERIOD OF RECORD.--October 1979 to December 1980, May 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 198.60 ft below land-surface datum, November 09, 1999; lowest measured, 202.90 ft below land-surface datum, October 17, 1979.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 19	199.83	FEB 11	199.90	MAY 08	199.98	AUG 04	199.84
WATER YEAR 2003 HIGHEST		199.83	NOV 19, 2002 LOWEST		199.98	MAY 08, 2003	

QUALITY OF GROUND WATER
GROUND WATER QUALITY MONITORING PROGRAM

[Geologic unit abbreviations used in this table: 110QRUC, Quarternary-Cretaceous Undifferentiated; 110QRNR, Quarternary System; 111ALVM, Holocene Alluvium; 111ENRV, East Nishnabotna River Alluvial; 111SDRV, Soldier River Alluvial; 112AFNN, Aftonian Interglacial Deposits; 112PLSC, Pleistocene Series]

MULTIPLE STATION ANALYSES

Station number	Station name	County	Date	Time	Geologic unit	Depth of well, feet below LSD (72008)	Flow rate of well, gal/min (00058)
411727094374001	075N33W15DDBB 1976Fontanelle 5	Adair	08-18-03	1350	111ALVM	39.00	80
405632094534401	071N35W20AACB 1990Nodaway 4	Adams	07-18-03	1045	111ALVM	35.00	40
431638091282902	098N05W30ACDC 1899Waukon 2	Allamakee	08-25-03	1520	371JRDN	577.00	250
413234094552401	078N35W19BCDB 1976Brayton 1	Audubon	07-16-03	1345	111ENRV	41.00	57
420535091524002	084N09W15ACC 1932Shellsburg 2	Benton	08-07-03	1345	340DVSL	335.00	--
422819092212701	089N13W34DDAA 12031 1960Waterloo 17	Black Hawk	08-07-03	0930	344DVNNM	215.00	2,350
420451093561301	084N27W13DCAA 1940Boone 20	Boone	07-28-03	1600	111ALVM	64.00	225
420959094001901	085N27W16CCDC 1967Pilot Mound 3	Boone	07-28-03	1415	112PLSC	30.00	32
422852092040101	089N10W31AAB 09382 1957Jesup 2	Buchanan	08-07-03	1130	358KNKK	380.00	260
424708094570901	092N35W14BCCC 2002 ALBERT CITY 3	Buena Vista	07-29-03	1030	112PLSC	183.00	190
425344095090401	093N37W01DDDD 1977Sioux Rapids 2	Buena Vista	07-29-03	0900	217DKOT	54.00	286
425330092483701	093N17W01DDDA 11918 1960Greene 2	Butler	08-06-03	1100	344CDVL	150.00	310
415233094403201	082N33W34ABBD 1938Coon Rapids 1, North	Carroll	07-30-03	1100	217DKOT	191.00	100
411622094520901	075N35W27BBAB 1921Cumberland 1	Cass	08-18-03	1115	112PLSC	155.00	30
411639094521101	075N35W22CBDC 1978Cumberland (5) 4	Cass	08-18-03	1215	217DKOT	213.00	45
414032091210001	079N04W06DACD 1979West Branch 4	Cedar	07-24-03	0750	358ALXD	450.00	360
423744095383301	090N41W11ADAD 1967Quimby 1	Cherokee	07-29-03	1430	217DKOT	225.00	100
424340095331301	091N40W03ACCC 1996Cherokee 10	Cherokee	07-29-03	1245	217DKOT	251.00	600
414652090153201	081N06E33ADA 1956Camanche 2	Clinton	08-26-03	1500	111ALVM	61.00	210
	081N06E33ADA 1956Camanche 2	Clinton	09-08-03	1245	111ALVM	61.2	--
414930090321601	081N04E18ACBB 00183 1923De Witt 3	Clinton	08-29-03	1105	371JRDN	1,646.00	300
420336095115601	084N37W30BDAD 1936Vail (1),2	Crawford	07-31-03	1320	111ALVM	32.00	100
413749093592601	079N27W21CDDA 1977Adel 3	Dallas	08-19-03	0830	111ALVM	54.00	350
413836094161701	079N29W19BAAC 19060 1966Linden 3	Dallas	08-18-03	1630	330MSSP	940.00	50
415057094065301	081N28W09ABBB 1987Perry 9R	Dallas	07-29-03	1445	111ALVM	45.00	335
	081N28W09ABBB 1987Perry 9R	Dallas	08-06-03	1630	111ALVM	45	--
423020091273701	089N05W20DBBB 1981Manchester 7	Delaware	09-03-03	1550	350SLRN	270.00	200
423135090383201	089N03E18AADD 1969Dubuque 9	Dubuque	08-26-03	0930	111ALVM	125.00	1,080
423602090595201	090N01W19AA 1987Holy Cross 1	Dubuque	08-26-03	1105	364GLEN	665.00	--
432349094285201	099N31W14BBCD 1995Armstrong 7	Emmet	07-23-03	0820	112PLSC	136.00	300
425717091382602	094N07W14CBAD 1954Elgin 2	Fayette	08-25-03	1330	364GLEN	220.00	--
425341093132501	093N20W05DDAB 1956Sheffield 2	Franklin	07-21-03	1555	110QRNR	27.00	140
404327095284801	068N40W07BCAA 1980Farragut 79-2 (North)	Fremont	07-17-03	1330	111ALVM	65.00	190
421322092522001	086N17W31ABDA 13238 1962Conrad 3	Grundy	08-06-03	1400	339HMPN	120.00	150
421856092355101	087N15W28BDD 1978Reinbeck 3	Grundy	08-06-03	1600	344CDVL	394.00	331
422611092552501	088N18W14BCCB 10984 1960Wellsburg 1	Grundy	08-28-03	1250	371JRDN	2,050.00	--
425533093364001	094N23W30CCD 1941Goodell 2	Hancock	07-21-03	1400	330MSSP	175.00	90
430015093360501	095N23W31ACA 11168 1959Klemme 2	Hancock	07-22-03	0845	341LMCK	185.00	120
430015093360502	095N23W31ABDD 00265 1934Klemme 1	Hancock	07-22-03	0810	371JRDN	1,512.00	130
414236096012501	080N45W25DABD 1951Mondamin 2, South	Harrison	08-18-03	0830	111ALVM	90.00	150
432650092170401	100N12W29DBD 1968Lime Springs 2	Howard	08-05-03	1245	364GLEN	380.00	--
422106095280201	087N40W14ACBB 1965Ida Grove 3	Ida	07-31-03	1000	112PLSC	65.00	100
422915095323504	089N39W33CDDD 1985Holstein 3	Ida	07-31-03	0815	111ALVM	54.00	100
414825091511201	081N09W23DADA 21060 1968East Amana 2	Iowa	07-25-03	1430	340DVSL	550.00	50
414520092112001	080N12W12ADDC 05509 1952Ladora 1	Iowa	09-08-03	1145	112PLSC	72.00	100
420414090113201	084N07E20BCDD 1895Sabula 1	Jackson	08-26-03	1330	360OVCB	973.00	130
413048093062101	078N20W36DBDA 1981Monroe 7	Jasper	07-29-03	1145	325DSMS	300.00	35
413913093070001	079N20W13ADDA 07999 1955Newton 13	Jasper	08-12-03	1345	111ALVM	45.00	150
410046091555701	Fairfield Municipal Well nr Walton Lake	Jefferson	08-22-03	0910	--	2,200.00	1,400
421442091120001	086N03W21CAAA 1977Monticello 4	Jones	08-25-03	1100	350SLRN	320.00	450
412138091571501	076N10W25ACCA 01794 1943Keota 2	Keokuk	08-22-03	1345	339WSVL	153.00	90
403745091174701	067N04W02CBBC 1991Fort Madison 4	Lee	08-11-03	1520	111ALVM	147.00	300
420005091431201	083N08W13ACDB 1970Cedar Rapids S6	Linn	09-04-03	0945	111ALVM	65.00	--
432608096201503	100N47W36DCBD 1988Lester (4) 2	Lyon	07-28-03	1645	111ALVM	32.00	45
420352092552401	084N18W22DDDD 1981Marshalltown 14	Marshall	08-27-03	1500	330MSSP	160.00	450
420405092545601	084N18W23ACA 1977Marshalltown 8	Marshall	08-27-03	1600	112PLSC	223.00	640
410656095380201	073N42W23AAAC 1978Silver City 3	Mills	07-17-03	0915	111ALVM	60.00	110
431654092484501	098N17W26ADBC 16641 1964Osage 5	Mitchell	08-06-03	0845	364GLEN	650.00	620
432150092332401	099N15W25DABA 1917Riceville 1	Mitchell	08-05-03	1500	344CDVL	515.00	210
432241092550802	099N18W24CABA 1960Saint Ansgar 2	Mitchell	08-06-03	0715	344CDVL	240.00	--

GROUND WATER QUALITY MONITORING PROGRAM—Continued

Station number	Date	Pump or flow period prior to sampling, minutes (72004)	Dis-solved oxygen, mg/L (00300)	pH, water, unfltrd field, std units (00400)	Specif. conduc-tance, wat unf uS/cm 25 degC (00095)	Temper-ature, water, deg C (00010)	Hard-ness, water, unfltrd mg/L as CaCO3 (00900)	ANC, wat unf fixed end pt, lab, mg/L as CaCO3 (90410)	Chlor-ide, water, fltrd, mg/L (00940)	Fluor-ide, water, fltrd, mg/L (00950)	Silica, water, fltrd, mg/L (00955)	Sulfate water, fltrd, mg/L (00945)
411727094374001	08-18-03	30	0.3	6.7	460	13.0	230	200	12.0	0.27	18.0	25.0
405632094534401	07-18-03	30	0.8	6.8	550	12.5	240	140	4.4	0.26	18.0	86.0
431638091282902	08-25-03	80	5.5	7.1	610	10.2	320	280	13.0	<0.10	15.0	19.0
413234094552401	07-16-03	30	0.7	6.8	1,100	12.5	420	310	52.0	0.34	17.0	57.0
420535091524002	08-07-03	105	11.4	6.9	650	12.0	350	270	18.0	0.24	13.0	38.0
422819092212701	08-07-03	--	1.0	7.1	660	13.4	350	230	22.0	0.62	15.0	92.0
420451093561301	07-28-03	20	0.8	8.3	900	15.2	390	260	29.0	0.38	20.0	61.0
420959094001901	07-28-03	30	0.5	8.0	830	13.1	390	290	10.0	0.31	32.0	71.0
422852092040101	08-07-03	30	1.7	7.2	520	13.4	300	250	5.5	0.67	11.0	20.0
424708094570901	07-29-03	20	0.2	7.2	1,600	10.5	690	390	<1.0	--	31.0	400
425344095090401	07-29-03	30	4.5	6.9	1,300	11.5	500	280	140	--	28.0	36.0
425330092483701	08-06-03	30	0.3	7.4	460	10.2	270	210	4.3	0.28	12.0	36.0
415233094403201	07-30-03	25	2.4	7.6	480	14.2	210	170	4.8	0.37	22.0	34.0
411622094520901	08-18-03	30	2.1	6.7	340	15.5	170	170	<1.0	0.28	20.0	10.0
411639094521101	08-18-03	30	0.4	6.7	370	13.0	200	190	<1.0	0.28	22.0	14.0
414032091210001	07-24-03	50	--	7.1	1,000	13.8	460	360	31.0	0.23	18.0	65.0
423744095383301	07-29-03	30	0.3	7.2	710	12.0	310	270	1.2	--	28.0	51.0
424340095331301	07-29-03	30	0.2	7.1	1,600	12.0	700	280	2.8	--	27.0	470
414652090153201	08-26-03	180	6.9	7.1	410	14.6	180	120	18.0	0.27	22.0	26.0
	09-08-03	--	--	--	--	--	--	--	--	--	--	--
414930090321601	08-29-03	60	0.2	7.3	620	14.6	240	260	21.0	0.69	8.40	32.0
420336095115601	07-31-03	30	1.0	7.1	1,000	13.5	440	280	48.0	0.23	25.0	74.0
413749093592601	08-19-03	30	1.2	6.7	710	12.0	380	300	25.0	0.33	20.0	57.0
413836094161701	08-18-03	30	0.2	7.4	2,300	16.0	730	190	40.0	0.30	8.60	1,000
415057094065301	07-29-03	30	0.3	8.2	830	12.3	390	280	12.0	0.33	24.0	77.0
	08-06-03	--	--	--	--	--	--	--	--	--	--	--
423020091273701	09-03-03	20	--	7.6	520	11.8	290	200	9.8	0.12	14.0	22.0
423135090383201	08-26-03	2,160	0.4	7.4	410	13.0	200	180	13.0	0.12	14.0	15.0
423602090595201	08-26-03	60	0.4	7.0	610	14.3	340	320	<1.0	0.20	9.10	21.0
432349094285201	07-23-03	20	0.5	7.6	1,300	10.0	570	440	<1.0	0.22	27.0	220
425717091382602	08-25-03	30	1.1	7.1	680	11.6	350	260	14.0	0.24	11.0	48.0
425341093132501	07-21-03	20	4.7	7.5	850	13.0	290	200	14.0	<0.10	30.0	15.0
404327095284801	07-17-03	30	0.8	6.8	730	14.0	290	240	16.0	0.35	23.0	60.0
421322092522001	08-06-03	30	2.4	--	720	11.9	390	300	22.0	0.30	16.0	40.0
421856092355101	08-06-03	90	0.4	7.0	990	10.7	600	220	<1.0	1.60	12.0	320
422611092552501	08-28-03	30	0.6	7.2	910	13.1	350	320	8.7	1.15	7.80	170
425533093364001	07-21-03	20	0.3	7.7	680	11.0	350	360	2.5	0.26	23.0	9.6
430015093360501	07-22-03	25	1.1	7.5	980	11.2	410	370	16.0	0.70	23.0	64.0
430015093360502	07-22-03	20	0.5	7.4	1,100	11.5	440	330	7.2	0.84	14.0	190
414236096012501	08-18-03	30	0.5	6.8	1,100	13.0	570	540	19.0	0.29	29.0	86.0
432650092170401	08-05-03	30	--	7.4	430	9.1	250	220	2.2	0.52	11.0	20.0
422106095280201	07-31-03	60	1.3	7.0	820	13.0	370	300	11.0	1.03	28.0	39.0
422915095323504	07-31-03	30	5.6	7.0	900	12.0	380	260	25.0	0.33	20.0	53.0
414825091511201	07-25-03	60	--	7.1	890	15.3	340	290	1.1	0.48	8.80	120
414520092112001	09-08-03	30	--	7.6	1,000	12.1	340	380	3.5	0.52	14.0	160
420414090113201	08-26-03	30	0.3	7.2	490	16.3	270	250	1.5	0.25	8.80	15.0
413048093062101	07-29-03	25	0.5	7.7	1,000	14.0	420	370	<1.0	0.31	19.0	100
413913093070001	08-12-03	505	6.5	7.1	670	17.6	350	280	15.0	0.25	24.0	41.0
410046091555701	08-22-03	--	0.7	7.2	1,700	24.2	320	240	140	1.81	11.0	420
421442091120001	08-25-03	240	3.2	7.2	600	16.6	330	270	7.4	0.17	15.0	24.0
412138091571501	08-22-03	30	0.3	6.8	900	14.2	450	420	19.0	0.39	10.0	64.0
403745091174701	08-11-03	40	0.7	6.9	460	14.1	220	220	16.0	0.16	26.0	3.2
420005091431201	09-04-03	>60	--	7.3	520	14.3	250	200	22.0	0.24	11.0	30.0
432608096201503	07-28-03	30	0.1	7.2	1,300	10.0	1,100	300	13.0	--	15.0	300
420352092552401	08-27-03	1,440	1.2	7.0	670	11.3	360	290	22.0	0.28	16.0	46.0
420405092545601	08-27-03	30	0.5	7.1	690	11.2	350	290	19.0	0.38	16.0	65.0
410656095380201	07-17-03	30	0.4	7.2	960	12.5	500	350	69.0	0.28	22.0	74.0
431654092484501	08-06-03	300	0.3	7.3	500	11.0	310	240	7.9	0.31	13.0	35.0
432150092332401	08-05-03	60	0.6	7.2	610	10.2	320	300	<1.0	0.79	11.0	44.0
432241092550802	08-06-03	30	3.4	7.2	680	10.1	340	250	28.0	0.14	12.0	55.0

QUALITY OF GROUND WATER

GROUND WATER QUALITY MONITORING PROGRAM—Continued

Station number	Date	Residue on evap. at 180degC wat flt mg/L (70300)	Ammonia + org-N, water, fltrd, mg/L as N (00623)	Ammonia water, fltrd, mg/L as N (00608)	Nitrite + nitrate water fltrd, mg/L as N (00631)	Organic nitrogen, water, fltrd, mg/L (00607)	Ortho-phosphate, water, fltrd, mg/L as P (00671)	Phosphate, water, unfltrd mg/L (00650)	Organic carbon, water, unfltrd mg/L (00680)	2,4,5-T water unfltrd ug/L (39740)	2,4-D water unfltrd ug/L (39730)	2,4-DB water unfltrd ug/L (30219)
411727094374001	08-18-03	280	0.42	0.270	<0.100	0.15	<0.020	0.480	2.4	<0.20	<0.20	<0.20
405632094534401	07-18-03	330	0.08	<0.050	1.80	0.08	<0.020	0.050	1.1	<0.20	<0.20	<0.20
431638091282902	08-25-03	360	<0.05	<0.050	1.90	<0.05	0.030	<0.020	0.6	<0.20	<0.20	<0.20
413234094552401	07-16-03	540	0.11	<0.050	<0.100	0.07	<0.020	0.190	1.3	<0.20	<0.20	<0.20
420535091524002	08-07-03	420	<0.05	<0.050	6.40	<0.05	<0.020	<0.020	1.0	<0.20	<0.20	<0.20
422819092212701	08-07-03	450	0.23	0.170	1.10	0.07	<0.020	<0.020	0.5	<0.20	<0.20	<0.20
420451093561301	07-28-03	490	0.23	<0.050	8.20	0.22	0.090	0.100	2.4	<0.20	<0.20	<0.20
420959094001901	07-28-03	450	0.20	0.180	<0.100	<0.05	<0.020	0.070	1.3	<0.20	<0.20	<0.20
422852092040101	08-07-03	340	<0.05	<0.050	3.10	<0.05	<0.020	<0.020	<0.5	<0.20	<0.20	<0.20
424708094570901	07-29-03	1,000	2.3	1.70	<0.100	0.60	<0.020	0.050	2.9	<0.20	<0.20	<0.20
425344095090401	07-29-03	660	<0.05	<0.050	5.80	<0.05	<0.020	0.020	0.9	<0.20	<0.20	<0.20
425330092483701	08-06-03	310	<0.05	<0.050	<0.100	<0.05	<0.020	0.020	<0.5	<0.20	<0.20	<0.20
415233094403201	07-30-03	270	<0.05	<0.050	1.80	<0.05	<0.020	<0.020	0.6	<0.20	<0.20	<0.20
411622094520901	08-18-03	190	<0.05	<0.050	0.100	<0.05	<0.020	0.050	<0.5	--	--	--
411639094521101	08-18-03	210	<0.05	<0.050	<0.100	<0.05	<0.020	0.090	<0.5	--	--	--
414032091210001	07-24-03	510	1.0	0.590	<0.100	0.44	<0.020	0.170	1.5	<0.20	<0.20	<0.20
423744095383301	07-29-03	360	0.68	0.480	<0.100	0.20	0.030	0.070	0.6	--	--	--
424340095331301	07-29-03	1,050	0.67	0.480	<0.100	0.19	<0.020	0.050	1.1	--	--	--
414652090153201	08-26-03	240	0.10	<0.050	6.20	0.10	0.050	0.020	0.6	<0.20	<0.20	<0.20
	09-08-03	--	--	--	--	--	--	--	--	--	--	--
414930090321601	08-29-03	360	0.87	0.670	<0.100	0.20	<0.020	<0.020	<0.5	<0.20	<0.20	<0.20
420336095115601	07-31-03	520	<0.05	<0.050	5.00	<0.05	0.120	0.020	0.8	<0.20	<0.20	<0.20
413749093592601	08-19-03	450	0.22	0.090	0.300	0.13	0.100	0.040	1.8	<0.20	<0.20	<0.20
413836094161701	08-18-03	1,650	1.4	1.10	<0.100	0.29	<0.020	<0.020	<0.5	--	--	--
415057094065301	07-29-03	470	0.05	<0.050	<0.100	<0.05	<0.020	0.050	1.6	<0.20	<0.20	<0.20
	08-06-03	--	--	--	--	--	--	--	--	--	--	--
423020091273701	09-03-03	280	0.05	<0.050	12.0	0.05	<0.020	<0.020	<0.5	<0.20	<0.20	<0.20
423135090383201	08-26-03	230	0.73	0.530	<0.100	0.21	0.060	0.460	4.5	<0.20	<0.20	<0.20
423602090595201	08-26-03	340	0.08	<0.050	<0.100	0.05	<0.020	<0.020	0.8	--	--	--
432349094285201	07-23-03	740	1.3	0.770	<0.100	0.53	<0.020	0.040	2.3	--	--	--
425717091382602	08-25-03	2,370	0.11	<0.050	5.90	0.11	<0.020	<0.020	0.9	<0.20	<0.20	<0.20
425341093132501	07-21-03	380	0.06	<0.050	17.0	0.06	1.90	6.00	1.1	<0.20	<0.20	<0.20
404327095284801	07-17-03	400	0.12	<0.050	1.50	0.09	0.070	0.180	0.8	<0.20	<0.20	<0.20
421322092522001	08-06-03	450	0.57	0.400	5.20	0.17	<0.020	<0.020	0.6	<0.20	<0.20	<0.20
421856092355101	08-06-03	770	0.93	0.860	<0.100	0.08	<0.020	<0.020	0.6	--	--	--
422611092552501	08-28-03	580	1.6	1.30	<0.100	0.26	<0.020	<0.020	<0.5	--	--	--
425533093364001	07-21-03	390	1.3	0.900	0.700	0.35	<0.020	0.090	1.6	--	--	--
430015093360501	07-22-03	500	0.73	0.420	<0.100	0.32	<0.020	0.020	2.2	--	--	--
430015093360502	07-22-03	650	1.2	0.860	0.900	0.34	<0.020	<0.020	1.1	<0.20	<0.20	<0.20
414236096012501	08-18-03	660	2.0	1.10	<0.100	0.93	<0.020	0.390	2.9	<0.20	<0.20	<0.20
432650092170401	08-05-03	270	0.29	0.270	<0.100	<0.05	<0.020	<0.020	0.6	<0.20	<0.20	<0.20
422106095280201	07-31-03	410	<0.05	<0.050	4.60	<0.05	0.050	<0.020	0.9	<0.20	<0.20	<0.20
422915095323504	07-31-03	470	<0.05	<0.050	15.0	<0.05	0.030	<0.020	0.9	<0.20	<0.20	<0.20
414825091511201	07-25-03	470	2.0	1.50	<0.100	0.51	<0.020	<0.020	0.7	--	--	--
414520092112001	09-08-03	630	5.4	4.90	<0.100	0.54	0.070	0.340	4.0	<0.20	<0.20	<0.20
420414090113201	08-26-03	250	<0.05	<0.050	<0.100	<0.05	<0.020	<0.020	<0.5	<0.20	<0.20	<0.20
413048093062101	07-29-03	530	2.1	1.40	<0.100	0.66	<0.020	0.020	1.4	--	--	--
413913093070001	08-12-03	430	<0.05	<0.050	7.60	<0.05	0.090	0.080	0.6	<0.20	<0.20	<0.20
410046091555701	08-22-03	1,140	1.6	1.30	<0.100	0.29	<0.020	<0.020	<0.5	--	--	--
421442091120001	08-25-03	340	0.06	<0.050	3.40	<0.05	<0.020	<0.020	0.5	<0.20	<0.20	<0.20
412138091571501	08-22-03	540	0.74	0.640	<0.100	0.11	<0.020	<0.020	0.9	<0.20	<0.20	<0.20
403745091174701	08-11-03	290	5.3	4.70	<0.100	0.54	<0.020	1.50	5.4	<0.20	<0.20	<0.20
420005091431201	09-04-03	260	0.13	<0.050	3.10	0.13	0.040	<0.020	1.6	<0.20	<0.20	<0.20
432608096201503	07-28-03	850	0.41	0.180	2.30	0.21	<0.020	0.080	1.4	<0.20	<0.20	<0.20
420352092552401	08-27-03	410	0.19	<0.050	2.80	0.19	0.040	0.030	1.6	<0.20	<0.20	<0.20
420405092545601	08-27-03	420	1.3	1.10	<0.100	0.17	<0.020	0.040	1.4	<0.20	<0.20	<0.20
410656095380201	07-17-03	590	0.27	0.160	<0.100	0.11	<0.020	0.220	1.3	<0.20	<0.20	<0.20
431654092484501	08-06-03	330	0.23	0.260	<0.100	0.53	<0.020	<0.020	<0.5	<0.20	<0.20	<0.20
432150092332401	08-05-03	380	3.1	2.60	<0.100	0.54	1.10	9.30	1.4	--	--	--
432241092550802	08-06-03	440	<0.05	<0.050	6.60	<0.05	<0.020	<0.020	<0.5	<0.20	<0.20	<0.20

GROUND WATER QUALITY MONITORING PROGRAM—Continued

Station number	Date	CIAT, water, unfltrd ug/L (75981)	CEAT, water, unfltrd ug/L (75980)	Aceto- chlor, water, unfltrd ug/L (49259)	Aci- fluor- fen, water, unfltrd ug/L (79193)	Ala- chlor, water, unfltrd ug/L (77825)	Aldrin, water, unfltrd ug/L (39330)	alpha- Endo- sulfan, water, unfltrd ug/L (34361)	Ametryn water unfltrd ug/L (82184)	Atra- zine, water, unfltrd ug/L (39630)	Ben- tazon, water, unfltrd ug/L (38710)	beta- Endo- sulfan, water, unfltrd ug/L (82624)
411727094374001	08-18-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	0.1	<0.20	<0.1
405632094534401	07-18-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
431638091282902	08-25-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
413234094552401	07-16-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
420535091524002	08-07-03	0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	0.1	<0.30	<0.1
422819092212701	08-07-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.50	<0.1
420451093561301	07-28-03	0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	0.1	<0.20	<0.1
420959094001901	07-28-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
422852092040101	08-07-03	0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
424708094570901	07-29-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
425344095090401	07-29-03	0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	0.1	<0.20	<0.1
425330092483701	08-06-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
415233094403201	07-30-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
411622094520901	08-18-03	--	--	--	--	--	--	--	--	--	--	--
411639094521101	08-18-03	--	--	--	--	--	--	--	--	--	--	--
414032091210001	07-24-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	0.1	<0.20	<0.1
423744095383301	07-29-03	--	--	--	--	--	--	--	--	--	--	--
424340095331301	07-29-03	--	--	--	--	--	--	--	--	--	--	--
414652090153201	08-26-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
	09-08-03	--	--	--	--	--	--	--	--	--	--	--
414930090321601	08-29-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
420336095115601	07-31-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
413749093592601	08-19-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
413836094161701	08-18-03	--	--	--	--	--	--	--	--	--	--	--
4150570940665301	07-29-03	<0.1	<0.1	<0.050	<0.20	<0.1	--	--	<0.1	<0.1	<0.20	--
	08-06-03	--	--	--	--	--	--	--	--	--	--	--
423020091273701	09-03-03	0.2	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	0.2	<0.20	<0.1
423135090383201	08-26-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
423602090595201	08-26-03	--	--	--	--	--	--	--	--	--	--	--
432349094285201	07-23-03	--	--	--	--	--	--	--	--	--	--	--
425717091382602	08-25-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
425341093132501	07-21-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
404327095284801	07-17-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
421322092522001	08-06-03	0.1	<0.1	<0.050	<0.20	0.2	<0.050	<0.1	<0.1	0.1	0.78	<0.1
421856092355101	08-06-03	--	--	--	--	--	--	--	--	--	--	--
422611092552501	08-28-03	--	--	--	--	--	--	--	--	--	--	--
425533093364001	07-21-03	--	--	--	--	--	--	--	--	--	--	--
430015093360501	07-22-03	--	--	--	--	--	--	--	--	--	--	--
430015093360502	07-22-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
414236096012501	08-18-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
432650092170401	08-05-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
422106095280201	07-31-03	0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	0.1	<0.20	<0.1
422915095323504	07-31-03	0.1	<0.1	1.2	<0.20	<0.1	<0.050	<0.1	<0.1	0.2	<0.20	<0.1
414825091511201	07-25-03	--	--	--	--	--	--	--	--	--	--	--
414520092112001	09-08-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
420414090113201	08-26-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
413048093062101	07-29-03	--	--	--	--	--	--	--	--	--	--	--
413913093070001	08-12-03	0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
410046091555701	08-22-03	--	--	--	--	--	--	--	--	--	--	--
421442091120001	08-25-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
412138091571501	08-22-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
403745091174701	08-11-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
420005091431201	09-04-03	0.2	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	0.6	<0.20	<0.1
432608096201503	07-28-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
420352092552401	08-27-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	0.1	<0.20	<0.1
420405092545601	08-27-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
410656095380201	07-17-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
431654092484501	08-06-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
432150092332401	08-05-03	--	--	--	--	--	--	--	--	--	--	--
432241092550802	08-06-03	0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	0.1	<0.20	<0.1

QUALITY OF GROUND WATER

GROUND WATER QUALITY MONITORING PROGRAM—Continued

Station number	Date	Bromacil, water, unfltrd ug/L (30234)	Bromomethane water unfltrd ug/L (30202)	Butachlor, water, unfltrd ug/L (30235)	Butylate, water, unfltrd ug/L (30236)	Carbaryl, water, unfltrd ug/L (39750)	Carbofuran, water, unfltrd ug/L (82615)	Chloramben, water, unfltrd ug/L (82051)	Chloromethane water unfltrd ug/L (30201)	Chlorpyrifos water unfltrd ug/L (38932)	Clomazone, water, fltrd, ug/L (50344)	Cyanazine, water, unfltrd ug/L (81757)
411727094374001	08-18-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
405632094534401	07-18-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
431638091282902	08-25-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
413234094552401	07-16-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
420535091524002	08-07-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
422819092212701	08-07-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
420451093561301	07-28-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
420959094001901	07-28-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
422852092040101	08-07-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
424708094570901	07-29-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
425344095090401	07-29-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
425330092483701	08-06-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
415233094403201	07-30-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
411622094520901	08-18-03	--	--	--	--	--	--	--	--	--	--	--
411639094521101	08-18-03	--	--	--	--	--	--	--	--	--	--	--
414032091210001	07-24-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
423744095383301	07-29-03	--	--	--	--	--	--	--	--	--	--	--
424340095331301	07-29-03	--	--	--	--	--	--	--	--	--	--	--
414652090153201	08-26-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
	09-08-03	--	--	--	--	--	--	--	--	--	--	--
414930090321601	08-29-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
420336095115601	07-31-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
413749093592601	08-19-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
413836094161701	08-18-03	--	--	--	--	--	--	--	--	--	--	--
415057094065301	07-29-03	<0.1	<0.50	<0.1	<0.1	<0.05	--	<0.20	<0.50	--	<0.050	<0.1
	08-06-03	--	--	--	--	--	--	--	--	--	--	--
423020091273701	09-03-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
423135090383201	08-26-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
423602090595201	08-26-03	--	--	--	--	--	--	--	--	--	--	--
432349094285201	07-23-03	--	--	--	--	--	--	--	--	--	--	--
425717091382602	08-25-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
425341093132501	07-21-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
404327095284801	07-17-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
421322092522001	08-06-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
421856092355101	08-06-03	--	--	--	--	--	--	--	--	--	--	--
422611092552501	08-28-03	--	--	--	--	--	--	--	--	--	--	--
425533093364001	07-21-03	--	--	--	--	--	--	--	--	--	--	--
430015093360501	07-22-03	--	--	--	--	--	--	--	--	--	--	--
430015093360502	07-22-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
414236096012501	08-18-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
432650092170401	08-05-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
422106095280201	07-31-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
422915095323504	07-31-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	0.1
414825091511201	07-25-03	--	--	--	--	--	--	--	--	--	--	--
414520092112001	09-08-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
420414090113201	08-26-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
413048093062101	07-29-03	--	--	--	--	--	--	--	--	--	--	--
413913093070001	08-12-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
410046091555701	08-22-03	--	--	--	--	--	--	--	--	--	--	--
421442091120001	08-25-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
412138091571501	08-22-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
403745091174701	08-11-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
420005091431201	09-04-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
432608096201503	07-28-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
420352092552401	08-27-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
420405092545601	08-27-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
410656095380201	07-17-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
431654092484501	08-06-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
432150092332401	08-05-03	--	--	--	--	--	--	--	--	--	--	--
432241092550802	08-06-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1

GROUND WATER QUALITY MONITORING PROGRAM—Continued

Station number	Date	Diazinon, water, unfltrd ug/L (39570)	Dicamba water unfltrd ug/L (82052)	Di-chlor-prop, water, unfltrd ug/L (30190)	Di-chlor-ros, water, unfltrd ug/L (30218)	Diel-drin, water, unfltrd ug/L (39380)	Dimeth-enamid water, fltrd, ug/L (61588)	Dimeth-oate, water, unfltrd ug/L (39009)	Dinoseb water unfltrd ug/L (30191)	Disul-foton, water, unfltrd ug/L (82617)	Endo-sulfan sulfate water unfltrd ug/L (82623)	Endrin alde-hyde, water, unfltrd ug/L (82622)
411727094374001	08-18-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
405632094534401	07-18-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
431638091282902	08-25-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
413234094552401	07-16-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
420535091524002	08-07-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
422819092212701	08-07-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
420451093561301	07-28-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
420959094001901	07-28-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
422852092040101	08-07-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
424708094570901	07-29-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
425344095090401	07-29-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
425330092483701	08-06-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
415233094403201	07-30-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
411622094520901	08-18-03	--	--	--	--	--	--	--	--	--	--	--
411639094521101	08-18-03	--	--	--	--	--	--	--	--	--	--	--
414032091210001	07-24-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
423744095383301	07-29-03	--	--	--	--	--	--	--	--	--	--	--
424340095331301	07-29-03	--	--	--	--	--	--	--	--	--	--	--
414652090153201	08-26-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
	09-08-03	--	--	--	--	--	--	--	--	--	--	--
414930090321601	08-29-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
420336095115601	07-31-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
413749093592601	08-19-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
413836094161701	08-18-03	--	--	--	--	--	--	--	--	--	--	--
4150570940665301	07-29-03	--	<0.20	<0.20	--	--	<0.05	--	<0.20	--	--	--
	08-06-03	--	--	--	--	--	--	--	--	--	--	--
423020091273701	09-03-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
423135090383201	08-26-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
423602090595201	08-26-03	--	--	--	--	--	--	--	--	--	--	--
432349094285201	07-23-03	--	--	--	--	--	--	--	--	--	--	--
425717091382602	08-25-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
425341093132501	07-21-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
404327095284801	07-17-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
421322092522001	08-06-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
421856092355101	08-06-03	--	--	--	--	--	--	--	--	--	--	--
422611092552501	08-28-03	--	--	--	--	--	--	--	--	--	--	--
425533093364001	07-21-03	--	--	--	--	--	--	--	--	--	--	--
430015093360501	07-22-03	--	--	--	--	--	--	--	--	--	--	--
430015093360502	07-22-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
414236096012501	08-18-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
432650092170401	08-05-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
422106095280201	07-31-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
422915095323504	07-31-03	<0.05	<0.20	<0.20	<0.05	<0.050	0.06	<0.05	<0.20	<0.1	<0.1	<0.1
414825091511201	07-25-03	--	--	--	--	--	--	--	--	--	--	--
414520092112001	09-08-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
420414090113201	08-26-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
413048093062101	07-29-03	--	--	--	--	--	--	--	--	--	--	--
413913093070001	08-12-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
410046091555701	08-22-03	--	--	--	--	--	--	--	--	--	--	--
421442091120001	08-25-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
412138091571501	08-22-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
403745091174701	08-11-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
420005091431201	09-04-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
432608096201503	07-28-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
420352092552401	08-27-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
420405092545601	08-27-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
410656095380201	07-17-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
431654092484501	08-06-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
432150092332401	08-05-03	--	--	--	--	--	--	--	--	--	--	--
432241092550802	08-06-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1

QUALITY OF GROUND WATER

GROUND WATER QUALITY MONITORING PROGRAM—Continued

Station number	Date	Endrin ketone, water, unfltrd ug/L (78008)	Endrin, water, unfltrd ug/L (39390)	EPTC, water, unfltrd ug/L (81894)	Etho-prop, water, unfltrd ug/L (81758)	Fonofos water, fltrd, ug/L (04095)	Hepta-chlor, water, unfltrd ug/L (39410)	Iso-fenphos surrog, water, unfltrd percent recovry (99577)	Lindane water, unfltrd ug/L (39340)	Malathion, water, unfltrd ug/L (39530)	Methyl parathion, water, unfltrd ug/L (39600)	Metola-chlor, water, unfltrd ug/L (39356)
411727094374001	08-18-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
405632094534401	07-18-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
431638091282902	08-25-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
413234094552401	07-16-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
420535091524002	08-07-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
422819092212701	08-07-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
420451093561301	07-28-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
420959094001901	07-28-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
422852092040101	08-07-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
424708094570901	07-29-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
425344095090401	07-29-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	3.10
425330092483701	08-06-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
415233094403201	07-30-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
411622094520901	08-18-03	--	--	--	--	--	--	--	--	--	--	--
411639094521101	08-18-03	--	--	--	--	--	--	--	--	--	--	--
414032091210001	07-24-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	2.80
423744095383301	07-29-03	--	--	--	--	--	--	--	--	--	--	--
424340095331301	07-29-03	--	--	--	--	--	--	--	--	--	--	--
414652090153201	08-26-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
	09-08-03	--	--	--	--	--	--	--	--	--	--	--
414930090321601	08-29-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
420336095115601	07-31-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
413749093592601	08-19-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
413836094161701	08-18-03	--	--	--	--	--	--	--	--	--	--	--
415057094065301	07-29-03	--	--	<0.05	--	--	--	--	--	--	--	<0.05
	08-06-03	--	--	--	--	--	--	--	--	--	--	--
423020091273701	09-03-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
423135090383201	08-26-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
423602090595201	08-26-03	--	--	--	--	--	--	--	--	--	--	--
432349094285201	07-23-03	--	--	--	--	--	--	--	--	--	--	--
425717091382602	08-25-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
425341093132501	07-21-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
404327095284801	07-17-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
421322092522001	08-06-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	0.14
421856092355101	08-06-03	--	--	--	--	--	--	--	--	--	--	--
422611092552501	08-28-03	--	--	--	--	--	--	--	--	--	--	--
425533093364001	07-21-03	--	--	--	--	--	--	--	--	--	--	--
430015093360501	07-22-03	--	--	--	--	--	--	--	--	--	--	--
430015093360502	07-22-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
414236096012501	08-18-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
432650092170401	08-05-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
422106095280201	07-31-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
422915095323504	07-31-03	<0.05	<0.050	0.28	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	2.40
414825091511201	07-25-03	--	--	--	--	--	--	--	--	--	--	--
414520092112001	09-08-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
420414090113201	08-26-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
413048093062101	07-29-03	--	--	--	--	--	--	--	--	--	--	--
413913093070001	08-12-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
410046091555701	08-22-03	--	--	--	--	--	--	--	--	--	--	--
421442091120001	08-25-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
412138091571501	08-22-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
403745091174701	08-11-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
420005091431201	09-04-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
432608096201503	07-28-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
420352092552401	08-27-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
420405092545601	08-27-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
410656095380201	07-17-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
431654092484501	08-06-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
432150092332401	08-05-03	--	--	--	--	--	--	--	--	--	--	--
432241092550802	08-06-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05

GROUND WATER QUALITY MONITORING PROGRAM—Continued

Station number	Date	Metri- buzin, water unfltrd ug/L (81408)	p,p'- Meth- oxy- chlor, water, unfltrd ug/L (39480)	Para- thion, water, unfltrd ug/L (39540)	Pendi- meth- alin, water unfltrd ug/L (79190)	Penta- chloro- phenol, water, unfltrd ug/L (39032)	Phorate water unfltrd ug/L (39023)	Pic- loram water unfltrd ug/L (39720)	Prome- ton, water, unfltrd ug/L (39056)	Propa- chlor, water, unfltrd ug/L (77729)	Propa- zine, water, unfltrd ug/L (39024)	Silvex, water, unfltrd ug/L (39760)
411727094374001	08-18-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
405632094534401	07-18-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
431638091282902	08-25-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
413234094552401	07-16-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
420535091524002	08-07-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
422819092212701	08-07-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
420451093561301	07-28-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
420959094001901	07-28-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
422852092040101	08-07-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
424708094570901	07-29-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
425344095090401	07-29-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	0.1	<0.05	<0.1	<0.20
425330092483701	08-06-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
415233094403201	07-30-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
411622094520901	08-18-03	--	--	--	--	--	--	--	--	--	--	--
411639094521101	08-18-03	--	--	--	--	--	--	--	--	--	--	--
414032091210001	07-24-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
423744095383301	07-29-03	--	--	--	--	--	--	--	--	--	--	--
424340095331301	07-29-03	--	--	--	--	--	--	--	--	--	--	--
414652090153201	08-26-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
	09-08-03	--	--	--	--	--	--	--	--	--	--	--
414930090321601	08-29-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
420336095115601	07-31-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
413749093592601	08-19-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
413836094161701	08-18-03	--	--	--	--	--	--	--	--	--	--	--
415057094065301	07-29-03	<0.05	--	--	<0.05	<0.2	--	<0.20	<0.1	<0.05	<0.1	<0.20
	08-06-03	--	--	--	--	--	--	--	--	--	--	--
423020091273701	09-03-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
423135090383201	08-26-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
423602090595201	08-26-03	--	--	--	--	--	--	--	--	--	--	--
432349094285201	07-23-03	--	--	--	--	--	--	--	--	--	--	--
425717091382602	08-25-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
425341093132501	07-21-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
404327095284801	07-17-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
421322092522001	08-06-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
421856092355101	08-06-03	--	--	--	--	--	--	--	--	--	--	--
422611092552501	08-28-03	--	--	--	--	--	--	--	--	--	--	--
425533093364001	07-21-03	--	--	--	--	--	--	--	--	--	--	--
430015093360501	07-22-03	--	--	--	--	--	--	--	--	--	--	--
430015093360502	07-22-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
414236096012501	08-18-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
432650092170401	08-05-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
422106095280201	07-31-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
422915095323504	07-31-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
414825091511201	07-25-03	--	--	--	--	--	--	--	--	--	--	--
414520092112001	09-08-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
420414090113201	08-26-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
413048093062101	07-29-03	--	--	--	--	--	--	--	--	--	--	--
413913093070001	08-12-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
410046091555701	08-22-03	--	--	--	--	--	--	--	--	--	--	--
421442091120001	08-25-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
412138091571501	08-22-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
403745091174701	08-11-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
420005091431201	09-04-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
432608096201503	07-28-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
420352092552401	08-27-03	<0.05	<0.100	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
420405092545601	08-27-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
410656095380201	07-17-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
431654092484501	08-06-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
432150092332401	08-05-03	--	--	--	--	--	--	--	--	--	--	--
432241092550802	08-06-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20

QUALITY OF GROUND WATER

GROUND WATER QUALITY MONITORING PROGRAM—Continued

Station number	Date	Simazine, water, unfltrd ug/L (39055)	Terbu- fos, water, unfltrd ug/L (82088)	Toxa- phene, water, unfltrd ug/L (39400)	Tri- allate, water, fltrd 0.7u GF ug/L (82678)	Tri- clopyr, water, unfltrd ug/L (04092)	Tri- flur- alin, water, unfltrd ug/L (39030)	Xylenes water unfltrd ug/L (81551)	1,1,1,2- Tetra- chloro- ethane, water, unfltrd ug/L (77562)	1,1,1- Tri- chloro- ethane, water, unfltrd ug/L (34506)	1,1,2,2- Tetra- chloro- ethane, water, unfltrd ug/L (34516)	1,1,2- Tri- chloro- ethane, water, unfltrd ug/L (34511)
411727094374001	08-18-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
405632094534401	07-18-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
431638091282902	08-25-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
413234094552401	07-16-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
420535091524002	08-07-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
422819092212701	08-07-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
420451093561301	07-28-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
420959094001901	07-28-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
422852092040101	08-07-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
424708094570901	07-29-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
425344095090401	07-29-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
425330092483701	08-06-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
415233094403201	07-30-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
411622094520901	08-18-03	--	--	--	--	--	--	--	--	--	--	--
411639094521101	08-18-03	--	--	--	--	--	--	--	--	--	--	--
414032091210001	07-24-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
423744095383301	07-29-03	--	--	--	--	--	--	--	--	--	--	--
424340095331301	07-29-03	--	--	--	--	--	--	--	--	--	--	--
414652090153201	08-26-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
	09-08-03	--	--	--	--	--	--	--	--	--	--	--
414930090321601	08-29-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
420336095115601	07-31-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
413749093592601	08-19-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
413836094161701	08-18-03	--	--	--	--	--	--	--	--	--	--	--
415057094065301	07-29-03	<0.1	--	--	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
	08-06-03	--	--	--	--	--	--	--	--	--	--	--
423020091273701	09-03-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
423135090383201	08-26-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
423602090595201	08-26-03	--	--	--	--	--	--	--	--	--	--	--
432349094285201	07-23-03	--	--	--	--	--	--	--	--	--	--	--
425717091382602	08-25-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
425341093132501	07-21-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
404327095284801	07-17-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
421322092522001	08-06-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
421856092355101	08-06-03	--	--	--	--	--	--	--	--	--	--	--
422611092552501	08-28-03	--	--	--	--	--	--	--	--	--	--	--
425533093364001	07-21-03	--	--	--	--	--	--	--	--	--	--	--
430015093360501	07-22-03	--	--	--	--	--	--	--	--	--	--	--
430015093360502	07-22-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
414236096012501	08-18-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
432650092170401	08-05-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
422106095280201	07-31-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
422915095323504	07-31-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
414825091511201	07-25-03	--	--	--	--	--	--	--	--	--	--	--
414520092112001	09-08-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
420414090113201	08-26-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
413048093062101	07-29-03	--	--	--	--	--	--	--	--	--	--	--
413913093070001	08-12-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
410046091555701	08-22-03	--	--	--	--	--	--	--	--	--	--	--
421442091120001	08-25-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
412138091571501	08-22-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
403745091174701	08-11-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
420005091431201	09-04-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
432608096201503	07-28-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
420352092552401	08-27-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
420405092545601	08-27-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
410656095380201	07-17-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
431654092484501	08-06-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
432150092332401	08-05-03	--	--	--	--	--	--	--	--	--	--	--
432241092550802	08-06-03	<0.1	<0.05	<0.5	<0.050	<0.20	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5

QUALITY OF GROUND WATER

GROUND WATER QUALITY MONITORING PROGRAM—Continued

Station number	Date	Tri-chloro-ethene, water, unfltrd ug/L (39180)	Tri-chloro-methane water, unfltrd ug/L (32106)	Vinyl chloride, water, unfltrd ug/L (39175)	p,p'-DDD, suspnd sedimnt ug/L (39362)	p,p'-DDE, suspnd sedimnt ug/L (39367)	p,p'-DDT, suspnd sedimnt ug/L (39372)	Gross alpha radioac water, fltrd, U-nat, pCi/L (01515)	Gross beta radioac water, fltrd, Cs-137, pCi/L (03515)	Ra-226, water, fltrd, pCi/L (09503)	Tritium water unfltrd pCi/L (07000)
411727094374001	08-18-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
405632094534401	07-18-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
431638091282902	08-25-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
413234094552401	07-16-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
420535091524002	08-07-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	22.2
422819092212701	08-07-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
420451093561301	07-28-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
420959094001901	07-28-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
422852092040101	08-07-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
424708094570901	07-29-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<3.0	9.4	<0.7	-0.3
425344095090401	07-29-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
425330092483701	08-06-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	<1.8	1.8	2	17.8
415233094403201	07-30-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
411622094520901	08-18-03	--	--	--	--	--	--	2.1	4.7	<0.7	--
411639094521101	08-18-03	--	--	--	--	--	--	1.8	4.0	<0.7	--
414032091210001	07-24-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
423744095383301	07-29-03	--	--	--	--	--	--	2.2	9.0	<0.9	--
424340095331301	07-29-03	--	--	--	--	--	--	2.6	11.5	5	--
414652090153201	08-26-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
	09-08-03	--	--	--	--	--	--	--	--	--	--
414930090321601	08-29-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
420336095115601	07-31-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
413749093592601	08-19-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
413836094161701	08-18-03	--	--	--	--	--	--	5.5	12.5	2	--
415057094065301	07-29-03	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
	08-06-03	--	--	--	--	--	--	--	--	--	--
423020091273701	09-03-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
423135090383201	08-26-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
423602090595201	08-26-03	--	--	--	--	--	--	3.6	<1.9	2	--
432349094285201	07-23-03	--	--	--	--	--	--	3.9	6.8	<0.9	--
425717091382602	08-25-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
425341093132501	07-21-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
404327095284801	07-17-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
421322092522001	08-06-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
421856092355101	08-06-03	--	--	--	--	--	--	0.7	4.3	<0.7	--
422611092552501	08-28-03	--	--	--	--	--	--	15	24.5	5	--
425533093364001	07-21-03	--	--	--	--	--	--	<2.5	3.3	M	--
430015093360501	07-22-03	--	--	--	--	--	--	2.6	7.4	2	--
430015093360502	07-22-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
414236096012501	08-18-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
432650092170401	08-05-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
422106095280201	07-31-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
422915095323504	07-31-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
414825091511201	07-25-03	--	--	--	--	--	--	4.3	9.3	3	-0.2
414520092112001	09-08-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
420414090113201	08-26-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
413048093062101	07-29-03	--	--	--	--	--	--	<2.6	<2.2	2	--
413913093070001	08-12-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
410046091555701	08-22-03	--	--	--	--	--	--	31	20.7	12	--
421442091120001	08-25-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
412138091571501	08-22-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
403745091174701	08-11-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
420005091431201	09-04-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
432608096201503	07-28-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
420352092552401	08-27-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
420405092545601	08-27-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
410656095380201	07-17-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
431654092484501	08-06-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
432150092332401	08-05-03	--	--	--	--	--	--	2.2	4.0	2	--
432241092550802	08-06-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--

GROUND WATER QUALITY MONITORING PROGRAM—Continued

Station number	Station name	County	Date	Time	Geologic unit	Depth of well, feet below LSD (72008)	Flow rate of well, gal/min (00058)
420955095475601	085N43W24BDBA 1973Mapleton 5	Monona	07-30-03	1030	111ALVM	64.00	400
405850095061701	071N37W04ACD 06207 1953Stanton 1	Montgomery	07-18-03	0915	217DKOT	158.00	160
413521090511001	078N01E04CAA 03238 1948Stockton 1	Muscatine	08-26-03	1715	355HPKN	247.00	--
403906095015001	067N37W01AAAA 1985Shambaugh 3	Page	07-18-03	0730	111ALVM	30.00	14
425731094270801	094N31W13ACCC 1949West Bend 2	Palo Alto	07-23-03	1340	217DKOT	115.00	20
423537095583901	090N43W19CCBB 1956Kingsley 1	Plymouth	07-29-03	1645	110QRNR	37.00	220
411501095251301	075N40W35CBCA 1975Carson (5) 3	Pottawattamie	07-17-03	1115	111ALVM	25.00	45
414430092433001	080N16W16BCCB 06931 1955Grinnell 7	Poweshiek	08-12-03	1520	371JRDN	2,550.00	1,100
421617095051001	086N36W07CDBB 1971Wall Lake (3),2	Sac	07-31-03	1145	112PLSC	43.00	400
413040090455001	078N02E32CC 22757 1971Blue Grass (2),1	Scott	08-29-03	0850	364PLVL	500.00	--
413923090350901	079N03E11CCBD 1929Eldridge 2	Scott	08-21-03	1350	350SLRN	515.00	210
413049095254501	078N39W34ACCD 1968Shelby 5	Shelby	07-16-03	1145	111ALVM	48.00	8.0
430017096285301	095N48W35BDDC 1931Hawarden 2	Sioux	07-28-03	1210	110QRUC	36.00	150
415252093411401	082N24W30DCBB 1945Slater 1	Story	07-29-03	0910	112PLSC	180.00	75
415417092180101	082N13W24AAAD 12850 1961Belle Plaine 4	Tama	08-20-03	1500	111ALVM	42.00	179
415753092350201	083N15W27CDD 18841 1966Tama 5	Tama	08-27-03	1300	111ALVM	43.00	525
421135092275002	085N14W10ABCD 1894Traer 2	Tama	08-27-03	1830	344CDVL	350.00	--
403659094285301	067N32W12CAAD 1960Blockton 1	Taylor	07-17-03	1545	112PLSC	271.00	80
410907092375301	073N15W06CADA 1995Eddyville 3	Wapello	08-22-03	1130	111ALVM	35.00	190
413040093290501	078N23W34DDBD 1979Carlisle 5	Warren	08-19-03	1130	111ALVM	30.00	300
412013091485701	076N08W31DDCC 08701 1957West Chester 1	Washington	07-24-03	1310	339WSVL	243.00	110
412850091342901	077N06W17BBA 14835 1961Riverside 5	Washington	07-24-03	1155	112PLSC	250	--
423028094115101	089N28W19CAA 1931Fort Dodge 12	Webster	08-01-03	0855	339KDRK	541.00	800
423043094120401	089N28W19BDBB 13068 1962Fort Dodge 16	Webster	08-01-03	0815	360OVCB	1,850.00	1,400
431556093375401	098N24W26DDCC 00304 1934Forest City 2	Winnebago	07-22-03	1050	344CDVL	142.00	1,000
431828091473201	098N08W16ACBC 1972Decorah 6	Winneshiek	08-05-03	1100	111ALVM	82.00	--
422831095465102	089N42W34DDDD 1927Correctionville 1 W	Woodbury	07-30-03	1510	111ALVM	26.00	83
422927096252201	089N47W29CDDC 1971SIOUX CITY RIVER 2	Woodbury	07-28-03	1015	217DKOT	310.00	1,030
423954093535801	091N26W27CAAD 1952Eagle Grove 3	Wright	07-21-03	1130	112PLSC	70.00	285

Station number	Date	Pump or flow period prior to sampling, minutes (72004)	Dis-solved oxygen, mg/L (00300)	pH, water, unfltrd field, std units (00400)	Specif. conduc-tance, wat unf uS/cm (00095)	Temper-ature, water, deg C (00010)	Hard-ness, water, unfltrd mg/L as CaCO3 (00900)	ANC, wat unf fixed end pt, lab, mg/L as CaCO3 (90410)	Chlor-ide, water, fltrd, mg/L (00940)	Fluor-ide, water, fltrd, mg/L (00950)	Silica, water, fltrd, mg/L (00955)	Sulfate water, fltrd, mg/L (00945)
420955095475601	07-30-03	20	4.4	7.0	970	12.5	410	310	22.0	0.32	28.0	58.0
405850095061701	07-18-03	30	0.3	7.0	700	12.5	280	250	41.0	0.31	23.0	16.0
413521090511001	08-26-03	--	0.9	7.0	600	12.4	330	320	2.1	0.21	14.0	11.0
403906095015001	07-18-03	30	0.4	6.3	620	12.0	230	160	34.0	0.24	25.0	52.0
425731094270801	07-23-03	25	0.5	7.2	870	11.0	400	390	2.5	0.37	31.0	34.0
423537095583901	07-29-03	30	2.4	7.1	1,000	13.0	440	330	22.0	--	28.0	59.0
411501095251301	07-17-03	30	0.7	7.0	800	11.5	390	300	13.0	0.39	9.20	56.0
414430092433001	08-12-03	60	0.4	7.2	1,000	24.8	370	300	14.0	1.40	11.0	240
421617095051001	07-31-03	30	0.5	7.0	990	11.0	430	280	31.0	0.40	23.0	100
413040090455001	08-29-03	30	0.7	6.9	640	13.2	370	350	<1.0	0.27	15.0	12.0
413923090350901	08-21-03	30	0.4	--	430	12.8	220	240	<1.0	0.49	15.0	<1.0
413049095254501	07-16-03	30	--	6.9	520	14.0	210	130	16.0	0.35	17.0	19.0
430017096285301	07-28-03	30	6.0	7.2	1,100	11.5	470	310	17.0	--	27.0	100
415252093411401	07-29-03	20	0.2	8.3	860	14.4	270	430	1.2	0.32	9.50	<1.0
415417092180101	08-20-03	--	0.3	11.1	730	16.0	260	120	36.0	0.61	31.0	89.0
415753092350201	08-27-03	60	2.6	7.0	640	11.9	330	240	25.0	0.22	26.0	57.0
421135092275002	08-27-03	30	6.0	7.5	1,500	12.1	800	210	2.1	0.71	14.0	1,300
403659094285301	07-17-03	30	0.2	7.8	2,000	14.0	170	420	94.0	0.82	12.0	300
410907092375301	08-22-03	150	1.3	7.0	790	13.0	440	260	17.0	0.12	16.0	140
413040093290501	08-19-03	30	0.4	6.8	550	13.0	280	210	22.0	0.16	23.0	45.0
412013091485701	07-24-03	30	0.7	7.3	940	13.0	360	390	1.7	0.27	12.0	64.0
412850091342901	07-24-03	30	0.5	7.7	730	14.2	320	360	1.8	0.14	14.0	13.0
423028094115101	08-01-03	20	0.4	7.6	1,000	13.2	260	380	2.4	0.67	15.0	110
423043094120401	08-01-03	25	0.3	7.7	1,600	17.4	400	320	120	1.05	8.80	190
431556093375401	07-22-03	20	0.6	7.5	850	9.6	420	380	<1.0	0.32	15.0	38.0
431828091473201	08-05-03	90	2.2	7.1	650	11.3	350	280	26.0	0.14	13.0	25.0
422831095465102	07-30-03	30	4.3	7.1	930	13.0	400	290	16.0	0.20	21.0	45.0
422927096252201	07-28-03	30	0.3	7.2	1,300	13.0	510	260	24.0	--	17.0	280
423954093535801	07-21-03	15	0.5	7.4	860	12.0	400	390	5.3	0.82	7.00	25.0

QUALITY OF GROUND WATER

GROUND WATER QUALITY MONITORING PROGRAM—Continued

Station number	Date	Residue	Ammonia		Nitrite	Organic	Ortho-	Phos-	Organic	2,4,5-T	2,4-D	2,4-DB
		on evap. at 180degC wat flt mg/L (70300)	+ org-N, water, fltrd, mg/L as N (00623)	Ammonia water, fltrd, mg/L as N (00608)	+ nitrate water fltrd, mg/L as N (00631)	nitro- gen, water, fltrd, mg/L (00607)	phos- phate, water, fltrd, mg/L as P (00671)	phate, water, unfltrd mg/L (00650)	carbon, water, unfltrd mg/L (00680)	water unfltrd ug/L (39740)	water unfltrd ug/L (39730)	water unfltrd ug/L (30219)
420955095475601	07-30-03	500	<0.05	<0.050	10.0	<0.05	0.080	<0.020	0.8	<0.20	<0.20	<0.20
405850095061701	07-18-03	360	0.51	0.490	<0.100	<0.05	<0.020	0.030	0.6	<0.20	<0.20	<0.20
413521090511001	08-26-03	330	0.12	0.060	<0.100	0.06	<0.020	0.060	<0.5	--	--	--
403906095015001	07-18-03	320	0.16	<0.050	<0.100	0.14	<0.020	0.810	1.6	<0.20	<0.20	<0.20
425731094270801	07-23-03	450	1.0	0.630	<0.100	0.39	<0.020	0.330	1.6	--	--	--
423537095583901	07-29-03	530	0.06	<0.050	8.10	0.06	0.120	0.130	1.2	<0.20	<0.20	<0.20
411501095251301	07-17-03	440	<0.05	<0.050	0.300	<0.05	<0.020	0.050	0.7	<0.20	<0.20	<0.20
414430092433001	08-12-03	710	1.5	1.00	<0.100	0.46	<0.020	<0.020	<0.5	--	--	--
421617095051001	07-31-03	540	0.10	<0.050	2.40	0.06	<0.020	0.020	1.3	<0.20	<0.20	<0.20
413040090455001	08-29-03	390	0.10	<0.050	<0.100	0.10	<0.020	<0.020	<0.5	--	--	--
413923090350901	08-21-03	240	2.4	1.90	<0.100	0.53	<0.020	0.330	2.8	--	--	--
413049095254501	07-16-03	280	<0.05	<0.050	13.0	<0.05	0.160	0.150	0.7	<0.20	<0.20	<0.20
430017096285301	07-28-03	590	<0.05	<0.050	11.0	<0.05	0.040	0.080	1.1	<0.20	<0.20	<0.20
415252093411401	07-29-03	460	9.4	8.60	<0.100	0.82	<0.020	0.060	18.0	--	--	--
415417092180101	08-20-03	430	0.27	0.210	5.40	0.06	<0.020	0.040	0.6	<0.20	<0.20	<0.20
415753092350201	08-27-03	400	<0.05	<0.050	4.60	<0.05	0.080	0.090	<0.5	<0.20	<0.20	<0.20
421135092275002	08-27-03	1,300	5.5	5.30	<0.100	0.20	<0.020	0.070	2.4	--	--	--
403659094285301	07-17-03	1,100	3.3	3.30	<0.100	<0.05	0.390	0.400	13.0	--	--	--
410907092375301	08-22-03	550	<0.05	<0.050	1.50	<0.05	0.070	0.050	0.9	<0.20	<0.20	<0.20
413040093290501	08-19-03	340	<0.05	<0.050	0.700	<0.05	<0.020	0.020	0.6	<0.20	<0.20	<0.20
412013091485701	07-24-03	450	2.4	1.75	<0.100	0.81	<0.020	0.050	1.1	--	--	--
412850091342901	07-24-03	410	4.0	2.50	<0.100	1.5	0.100	0.250	2.0	--	--	--
423028094115101	08-01-03	550	0.82	0.590	<0.100	0.22	<0.020	<0.020	1.3	--	--	--
423043094120401	08-01-03	820	0.46	0.380	<0.100	0.08	<0.020	<0.020	0.5	--	--	--
431556093375401	07-22-03	440	0.96	0.600	<0.100	0.37	<0.020	0.030	2.0	--	--	--
431828091473201	08-05-03	410	<0.05	<0.050	3.10	<0.05	<0.020	0.030	0.8	--	--	--
422831095465102	07-30-03	460	<0.05	<0.050	15.0	<0.05	0.020	<0.020	1.1	<0.20	<0.20	<0.20
422927096252201	07-28-03	760	0.39	0.240	<0.100	0.15	<0.020	0.100	1.7	<0.20	<0.20	<0.20
423954093535801	07-21-03	440	0.99	0.650	<0.100	0.34	<0.020	0.080	2.1	<0.20	<0.20	<0.20
Station number	Date	CIAT, water, unfltrd ug/L (75981)	CEAT, water, unfltrd ug/L (75980)	Aceto- chlor, water, unfltrd ug/L (49259)	Ac- fluor- fen, water, unfltrd ug/L (79193)	Ala- chlor, water, unfltrd ug/L (77825)	Aldrin, water, unfltrd ug/L (39330)	alpha- Endo- sulfan, water, unfltrd ug/L (34361)	Ametryn water unfltrd ug/L (82184)	Atra- zine, water, unfltrd ug/L (39630)	Ben- tazon, water, unfltrd ug/L (38710)	beta- Endo- sulfan, water, unfltrd ug/L (82624)
420955095475601	07-30-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
405850095061701	07-18-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
413521090511001	08-26-03	--	--	--	--	--	--	--	--	--	--	--
403906095015001	07-18-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
425731094270801	07-23-03	--	--	--	--	--	--	--	--	--	--	--
423537095583901	07-29-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
411501095251301	07-17-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
414430092433001	08-12-03	--	--	--	--	--	--	--	--	--	--	--
421617095051001	07-31-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
413040090455001	08-29-03	--	--	--	--	--	--	--	--	--	--	--
413923090350901	08-21-03	--	--	--	--	--	--	--	--	--	--	--
413049095254501	07-16-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
430017096285301	07-28-03	0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
415252093411401	07-29-03	--	--	--	--	--	--	--	--	--	--	--
415417092180101	08-20-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
415753092350201	08-27-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
421135092275002	08-27-03	--	--	--	--	--	--	--	--	--	--	--
403659094285301	07-17-03	--	--	--	--	--	--	--	--	--	--	--
410907092375301	08-22-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
413040093290501	08-19-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	0.1	<0.20	<0.1
412013091485701	07-24-03	--	--	--	--	--	--	--	--	--	--	--
412850091342901	07-24-03	--	--	--	--	--	--	--	--	--	--	--
423028094115101	08-01-03	--	--	--	--	--	--	--	--	--	--	--
423043094120401	08-01-03	--	--	--	--	--	--	--	--	--	--	--
431556093375401	07-22-03	--	--	--	--	--	--	--	--	--	--	--
431828091473201	08-05-03	--	--	--	--	--	--	--	--	--	--	--
422831095465102	07-30-03	0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
422927096252201	07-28-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1
423954093535801	07-21-03	<0.1	<0.1	<0.050	<0.20	<0.1	<0.050	<0.1	<0.1	<0.1	<0.20	<0.1

GROUND WATER QUALITY MONITORING PROGRAM—Continued

Station number	Date	Bromacil, water, unfltrd ug/L (30234)	Bromomethane water unfltrd ug/L (30202)	Butachlor, water, unfltrd ug/L (30235)	Butylate, water, unfltrd ug/L (30236)	Carbaryl, water, unfltrd ug/L (39750)	Carbofuran, water, unfltrd ug/L (82615)	Chloramben, water, unfltrd ug/L (82051)	Chloromethane water unfltrd ug/L (30201)	Chlorpyrifos water unfltrd ug/L (38932)	Clomazone, water, fltrd, ug/L (50344)	Cyanazine, water, unfltrd ug/L (81757)
420955095475601	07-30-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
405850095061701	07-18-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
413521090511001	08-26-03	--	--	--	--	--	--	--	--	--	--	--
403906095015001	07-18-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
425731094270801	07-23-03	--	--	--	--	--	--	--	--	--	--	--
423537095583901	07-29-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
411501095251301	07-17-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
414430092433001	08-12-03	--	--	--	--	--	--	--	--	--	--	--
421617095051001	07-31-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
413040090455001	08-29-03	--	--	--	--	--	--	--	--	--	--	--
413923090350901	08-21-03	--	--	--	--	--	--	--	--	--	--	--
413049095254501	07-16-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
430017096285301	07-28-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
415252093411401	07-29-03	--	--	--	--	--	--	--	--	--	--	--
415417092180101	08-20-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
415753092350201	08-27-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
421135092275002	08-27-03	--	--	--	--	--	--	--	--	--	--	--
403659094285301	07-17-03	--	--	--	--	--	--	--	--	--	--	--
410907092375301	08-22-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
413040093290501	08-19-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
412013091485701	07-24-03	--	--	--	--	--	--	--	--	--	--	--
412850091342901	07-24-03	--	--	--	--	--	--	--	--	--	--	--
423028094115101	08-01-03	--	--	--	--	--	--	--	--	--	--	--
423043094120401	08-01-03	--	--	--	--	--	--	--	--	--	--	--
431556093375401	07-22-03	--	--	--	--	--	--	--	--	--	--	--
431828091473201	08-05-03	--	--	--	--	--	--	--	--	--	--	--
422831095465102	07-30-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
422927096252201	07-28-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
423954093535801	07-21-03	<0.1	<0.50	<0.1	<0.1	<0.05	<0.05	<0.20	<0.50	<0.05	<0.050	<0.1
Station number	Date	Diazinon, water, unfltrd ug/L (39570)	Dicamba water unfltrd ug/L (82052)	Dichloroprop, water, unfltrd ug/L (30190)	Dichlorvos, water, unfltrd ug/L (30218)	Dieldrin, water, unfltrd ug/L (39380)	Dimethamid water, fltrd, ug/L (61588)	Dimethoate, water, unfltrd ug/L (39009)	Dinoseb water unfltrd ug/L (30191)	Disulfoton, water, unfltrd ug/L (82617)	Endosulfan sulfate water unfltrd ug/L (82623)	Endrin aldehyde, water, unfltrd ug/L (82622)
420955095475601	07-30-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
405850095061701	07-18-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
413521090511001	08-26-03	--	--	--	--	--	--	--	--	--	--	--
403906095015001	07-18-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
425731094270801	07-23-03	--	--	--	--	--	--	--	--	--	--	--
423537095583901	07-29-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
411501095251301	07-17-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
414430092433001	08-12-03	--	--	--	--	--	--	--	--	--	--	--
421617095051001	07-31-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
413040090455001	08-29-03	--	--	--	--	--	--	--	--	--	--	--
413923090350901	08-21-03	--	--	--	--	--	--	--	--	--	--	--
413049095254501	07-16-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
430017096285301	07-28-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
415252093411401	07-29-03	--	--	--	--	--	--	--	--	--	--	--
415417092180101	08-20-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
415753092350201	08-27-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
421135092275002	08-27-03	--	--	--	--	--	--	--	--	--	--	--
403659094285301	07-17-03	--	--	--	--	--	--	--	--	--	--	--
410907092375301	08-22-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
413040093290501	08-19-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
412013091485701	07-24-03	--	--	--	--	--	--	--	--	--	--	--
412850091342901	07-24-03	--	--	--	--	--	--	--	--	--	--	--
423028094115101	08-01-03	--	--	--	--	--	--	--	--	--	--	--
423043094120401	08-01-03	--	--	--	--	--	--	--	--	--	--	--
431556093375401	07-22-03	--	--	--	--	--	--	--	--	--	--	--
431828091473201	08-05-03	--	--	--	--	--	--	--	--	--	--	--
422831095465102	07-30-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
422927096252201	07-28-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1
423954093535801	07-21-03	<0.05	<0.20	<0.20	<0.05	<0.050	<0.05	<0.05	<0.20	<0.1	<0.1	<0.1

QUALITY OF GROUND WATER

GROUND WATER QUALITY MONITORING PROGRAM—Continued

Station number	Date	Endrin	Endrin	EPTC,	Etho-	Fonofos	Hepta-	Iso-	Lindane	Malathion,	Methyl	Metola-
		ketone, water, unfltrd ug/L (78008)	water, unfltrd ug/L (39390)	water, unfltrd ug/L (81894)	prop, water, unfltrd ug/L (81758)	water, fltrd, ug/L (04095)	chlor, water, unfltrd ug/L (39410)	fenphos surrog, water, unfltrd percent recovry (99577)	water, unfltrd ug/L (39340)	water, unfltrd ug/L (39530)	parathion, water, unfltrd ug/L (39600)	chlor, water, unfltrd ug/L (39356)
420955095475601	07-30-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
405850095061701	07-18-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
413521090511001	08-26-03	--	--	--	--	--	--	--	--	--	--	--
403906095015001	07-18-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
425731094270801	07-23-03	--	--	--	--	--	--	--	--	--	--	--
423537095583901	07-29-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
411501095251301	07-17-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
414430092433001	08-12-03	--	--	--	--	--	--	--	--	--	--	--
421617095051001	07-31-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.37
413040090455001	08-29-03	--	--	--	--	--	--	--	--	--	--	--
413923090350901	08-21-03	--	--	--	--	--	--	--	--	--	--	--
413049095254501	07-16-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
430017096285301	07-28-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
415252093411401	07-29-03	--	--	--	--	--	--	--	--	--	--	--
415417092180101	08-20-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
415753092350201	08-27-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
421135092275002	08-27-03	--	--	--	--	--	--	--	--	--	--	--
403659094285301	07-17-03	--	--	--	--	--	--	--	--	--	--	--
410907092375301	08-22-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
413040093290501	08-19-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
412013091485701	07-24-03	--	--	--	--	--	--	--	--	--	--	--
412850091342901	07-24-03	--	--	--	--	--	--	--	--	--	--	--
423028094115101	08-01-03	--	--	--	--	--	--	--	--	--	--	--
423043094120401	08-01-03	--	--	--	--	--	--	--	--	--	--	--
431556093375401	07-22-03	--	--	--	--	--	--	--	--	--	--	--
431828091473201	08-05-03	--	--	--	--	--	--	--	--	--	--	--
422831095465102	07-30-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
422927096252201	07-28-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
423954093535801	07-21-03	<0.05	<0.050	<0.05	<0.05	<0.050	<0.050	<0.1	<0.0500	<0.05	<0.05	<0.05
Station number	Date	Metri-	p,p'-	Para-	Pendi-	Penta-	Phorate	Pic-	Prome-	Propa-	Propa-	Silvex,
		buzin, water unfltrd ug/L (81408)	Meth- oxy- chlor, water, unfltrd ug/L (39480)	thion, water, unfltrd ug/L (39540)	meth- alin, water unfltrd ug/L (79190)	chloro- phenol, water, unfltrd ug/L (39032)	water unfltrd ug/L (39023)	loram water unfltrd ug/L (39720)	ton, water, unfltrd ug/L (39056)	chlor, water, unfltrd ug/L (77729)	azine, water, unfltrd ug/L (39024)	water, unfltrd ug/L (39760)
420955095475601	07-30-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
405850095061701	07-18-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
413521090511001	08-26-03	--	--	--	--	--	--	--	--	--	--	--
403906095015001	07-18-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
425731094270801	07-23-03	--	--	--	--	--	--	--	--	--	--	--
423537095583901	07-29-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
411501095251301	07-17-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
414430092433001	08-12-03	--	--	--	--	--	--	--	--	--	--	--
421617095051001	07-31-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
413040090455001	08-29-03	--	--	--	--	--	--	--	--	--	--	--
413923090350901	08-21-03	--	--	--	--	--	--	--	--	--	--	--
413049095254501	07-16-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
430017096285301	07-28-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
415252093411401	07-29-03	--	--	--	--	--	--	--	--	--	--	--
415417092180101	08-20-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
415753092350201	08-27-03	<0.05	<0.100	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
421135092275002	08-27-03	--	--	--	--	--	--	--	--	--	--	--
403659094285301	07-17-03	--	--	--	--	--	--	--	--	--	--	--
410907092375301	08-22-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
413040093290501	08-19-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
412013091485701	07-24-03	--	--	--	--	--	--	--	--	--	--	--
412850091342901	07-24-03	--	--	--	--	--	--	--	--	--	--	--
423028094115101	08-01-03	--	--	--	--	--	--	--	--	--	--	--
423043094120401	08-01-03	--	--	--	--	--	--	--	--	--	--	--
431556093375401	07-22-03	--	--	--	--	--	--	--	--	--	--	--
431828091473201	08-05-03	--	--	--	--	--	--	--	--	--	--	--
422831095465102	07-30-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
422927096252201	07-28-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20
423954093535801	07-21-03	<0.05	<0.050	<0.05	<0.05	<0.2	<0.05	<0.20	<0.1	<0.05	<0.1	<0.20

QUALITY OF GROUND WATER

GROUND WATER QUALITY MONITORING PROGRAM—Continued

Station number	Date	Tri-chloro-ethene, water, unfltrd ug/L (39180)	Tri-chloro-methane water unfltrd ug/L (32106)	Vinyl chloride, water, unfltrd ug/L (39175)	p,p'-DDD, suspnd sedimnt ug/L (39362)	p,p'-DDE, suspnd sedimnt ug/L (39367)	p,p'-DDT, suspnd sedimnt ug/L (39372)	Gross alpha radioac water, fltrd, U-nat, pCi/L (01515)	Gross beta radioac water, fltrd, Cs-137, pCi/L (03515)	Ra-226, water, fltrd, pCi/L (09503)	Tritium water unfltrd pCi/L (07000)
420955095475601	07-30-03	<0.5	4	<0.5	<0.05	<0.05	<0.05	--	--	--	--
405850095061701	07-18-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
413521090511001	08-26-03	--	--	--	--	--	--	3.0	<2.1	M	--
403906095015001	07-18-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
425731094270801	07-23-03	--	--	--	--	--	--	17	16.4	12	--
423537095583901	07-29-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
411501095251301	07-17-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
414430092433001	08-12-03	--	--	--	--	--	--	15	24.8	5	--
421617095051001	07-31-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
413040090455001	08-29-03	--	--	--	--	--	--	2.0	2.4	M	--
413923090350901	08-21-03	--	--	--	--	--	--	<1.0	6.5	<0.7	--
413049095254501	07-16-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
430017096285301	07-28-03	<0.5	M	<0.5	<0.05	<0.05	<0.05	--	--	--	--
415252093411401	07-29-03	--	--	--	--	--	--	6.5	5.3	3	--
415417092180101	08-20-03	<0.5	4	<0.5	<0.05	<0.05	<0.05	--	--	--	--
415753092350201	08-27-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
421135092275002	08-27-03	--	--	--	--	--	--	<0.7	6.5	<0.7	--
403659094285301	07-17-03	--	--	--	--	--	--	<0.7	<2.9	<1	--
410907092375301	08-22-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
413040093290501	08-19-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--
412013091485701	07-24-03	--	--	--	--	--	--	<1.0	2.9	M	--
412850091342901	07-24-03	--	--	--	--	--	--	<2.5	4.1	1	--
423028094115101	08-01-03	--	--	--	--	--	--	--	--	--	--
423043094120401	08-01-03	--	--	--	--	--	--	--	--	--	--
431556093375401	07-22-03	--	--	--	--	--	--	4.6	4.5	6	--
431828091473201	08-05-03	--	--	--	--	--	--	<2.2	4.8	<0.7	20.2
422831095465102	07-30-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	23.4
422927096252201	07-28-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	15	23.0	4	--
423954093535801	07-21-03	<0.5	<0.5	<0.5	<0.05	<0.05	<0.05	--	--	--	--

405747093233201 MCNAY RESEARCH STATION NEAR CHARITON, IOWA—Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	pH, wet atm dep unfltrd field, std units (83106)	Specif. conduc- tance, wet dep unfltrd field, uS/cm (83154)	Calcium wet atm dep fltrd, mg/L (82932)	Magnes- ium, wet atm dep fltrd, mg/L (83002)	Potas- sium, wet atm dep fltrd, mg/L (83120)	Sodium, wet atm dep fltrd, mg/L (83138)	Chlor- ide, wet atm dep fltrd, mg/L (82944)	Sulfate wet atm dep fltrd, mg/L (83160)	Ammonia wet atm dep fltrd, mg/L as N (83044)	Nitrate wet atm dep fltrd, mg/L as N (83068)	Ortho- phos- phate, wet dep fltrd, mg/L as P (83108)
APR 15-22	6.14	16.9	1.15	0.14	0.23	0.10	0.14	1.45	0.670	0.252	0.127
APR 22-29	5.88	13.7	0.91	0.16	0.11	0.04	0.11	1.70	0.930	0.276	0.030
APR 29- MAY 06	5.61	9.8	0.40	0.04	0.05	0.07	0.09	1.75	0.550	0.246	<0.003
MAY 06-13	6.00	16.3	1.14	0.11	0.11	0.19	0.27	2.12	0.700	0.179	<0.003
MAY 13-20	5.59	12.5	0.66	0.04	0.04	0.02	0.09	1.19	<0.860	0.455	<0.003
MAY 20-27	6.39	15.8	1.69	0.14	0.06	0.05	0.10	0.56	0.670	0.300	<0.003
MAY 27- JUN 03	4.62	18.4	0.29	0.03	0.04	0.01	0.05	1.94	0.540	0.309	<0.003
JUN 03-10	5.27	7.7	0.32	0.02	0.02	0.01	0.03	1.09	0.320	0.260	<0.003
JUN 10-17	--	--	--	--	--	--	--	--	--	--	--
JUN 17-24	--	--	--	--	--	--	--	--	--	--	--
JUN 24- JUL 01	5.60	8.2	0.30	0.02	0.02	0.09	0.14	1.04	0.270	0.191	<0.003
JUL 01-08	5.70	10.4	0.62	0.04	0.04	0.06	0.08	1.02	0.540	0.262	<0.003
JUL 08-15	5.50	9.5	0.65	0.05	0.04	0.09	0.12	1.02	0.360	0.298	<0.003
JUL 15-22	6.44	31.5	1.62	0.16	0.67	0.10	0.24	1.83	2.06	0.512	0.178
JUL 22-29	5.51	16.9	0.74	0.06	0.06	0.12	0.16	1.95	0.900	0.611	<0.003
JUL 29- AUG 05	--	--	--	--	--	--	--	--	--	--	--
AUG 05-12	5.73	12.3	1.23	0.07	0.01	0.01	0.04	0.99	0.470	0.240	<0.003
AUG 12-19	--	--	--	--	--	--	--	--	--	--	--
AUG 19-26	5.44	23.7	1.36	0.09	0.05	0.10	0.18	1.71	0.580	0.685	<0.003
AUG 26- SEP 02	5.40	7.2	0.28	0.03	0.02	0.01	0.05	0.69	0.320	0.250	<0.003
SEP 02-09	--	--	--	--	--	--	--	--	--	--	--
SEP 09-16	4.72	3.5	0.06	0.01	M	<0.003	0.02	0.39	0.130	0.083	<0.003
SEP 16-23	5.84	6.8	0.16	0.01	0.01	0.01	0.03	0.83	0.200	0.151	<0.003
SEP 23-30	--	--	3.51	0.19	0.20	0.16	0.32	4.05	2.26	1.78	<0.009

425435091281101 BIG SPRING FISH HATCHERY NEAR ELKADER, IOWA—Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	pH, wet atm dep unfltrd field, std units (83106)	Specif. conduc- tance, wet dep unfltrd field, uS/cm (83154)	Calcium wet atm dep fltrd, mg/L (82932)	Magnes- ium, wet atm dep fltrd, mg/L (83002)	Potas- sium, wet atm dep fltrd, mg/L (83120)	Sodium, wet atm dep fltrd, mg/L (83138)	Chlor- ide, wet atm dep fltrd, mg/L (82944)	Sulfate wet atm dep fltrd, mg/L (83160)	Ammonia wet atm dep fltrd, mg/L as N (83044)	Nitrate wet atm dep fltrd, mg/L as N (83068)	Ortho- phos- phate, wet dep fltrd, mg/L as P (83108)
APR 15-22	--	15.6	0.63	0.09	0.20	0.05	0.09	1.88	0.960	0.400	<0.003
APR 22-29	--	--	--	--	--	--	--	--	--	--	--
APR 29- MAY 06	--	10.1	0.23	0.04	0.03	0.04	0.09	1.36	0.440	0.273	<0.003
MAY 06-13	5.65	10.5	0.31	0.05	0.06	0.10	0.13	1.45	0.600	0.285	<0.003
MAY 13-20	5.78	9.0	0.38	0.05	0.05	0.01	0.04	1.01	0.560	0.326	<0.003
MAY 20-27	--	--	5.30	0.34	0.06	0.04	0.13	3.12	0.880	1.33	<0.003
MAY 27- JUN 03	6.68	19.0	0.95	0.17	0.08	0.02	0.09	2.17	1.27	0.641	<0.003
JUN 03-10	6.33	7.4	0.11	0.02	0.03	<0.003	0.02	0.71	0.400	0.180	<0.003
JUN 10-17	--	--	6.17	0.33	0.09	0.04	0.29	1.62	1.45	1.19	<0.011
JUN 17-24	--	9.0	0.36	0.08	0.11	0.03	0.07	0.74	0.160	0.147	<0.003
JUN 24- JUL 01	5.99	8.8	0.51	0.07	0.06	0.05	0.10	0.54	0.320	0.179	<0.003
JUL 01-08	6.48	12.0	0.60	0.09	0.15	0.04	0.09	1.10	0.510	0.286	<0.003
JUL 08-15	6.14	6.6	0.33	0.06	0.05	0.04	0.09	0.77	0.300	0.231	<0.003
JUL 15-22	--	--	--	--	--	--	--	--	--	--	--
JUL 22-29	--	--	4.81	0.23	0.38	0.05	0.28	3.02	0.580	0.717	<0.003
JUL 29- AUG 05	--	--	--	--	--	--	--	--	--	--	--
AUG 05-12	--	--	--	--	--	--	--	--	--	--	--
AUG 12-19	--	--	--	--	--	--	--	--	--	--	--
AUG 19-26	--	36.9	2.78	0.65	1.66	0.03	0.14	2.76	0.620	0.669	0.004
AUG 26- SEP 02	--	35.9	3.48	0.30	0.12	0.05	0.11	2.67	1.77	0.971	<0.003
SEP 02-09	--	--	--	--	--	--	--	--	--	--	--
SEP 09-16	--	7.1	0.12	0.02	0.02	M	0.02	0.76	0.490	0.169	<0.003
SEP 16-23	--	9.5	0.60	0.12	0.05	0.01	0.05	1.59	0.400	0.253	<0.003
SEP 23-30	6.19	16.4	1.52	0.20	0.09	0.03	0.07	1.03	0.760	0.258	<0.003

Index

- Acid neutralizing capacity, definition of 12
- Acre-foot, definition of 12
- Adenosine triphosphate, definition of 12
- Adjusted discharge, definition of 12
- Algae,
 Blue-green, definition of 13
 Fire, definition of 16
 Green, definition of 17
- Algal growth potential, definition of 12
- Alkalinity, definition of 12
- Annual runoff, definition of 12
- Annual 7-day minimum, definition of 12
- Aquifer
 Confined, definition of 14
 Unconfined, definition of 25
 Water-table, definition of 25
- Aroclor, definition of 12
- Artificial substrate, definition of 12
- Ash mass, definition of 12
- Aspect, definition of 12
- Bacteria, definition of 12
 Enterococcus, definition of 15
 Escherichia coli, definition of 16
 Fecal coliform, definition of 16
 Fecal streptococcal, definition of 16
 Total coliform, definition of 24
- Bankfull stage, definition of 13
- Base discharge, definition of 13
- Base flow, definition of 13
- Bed material, definition of 13
- Bedload, definition of 13
- Bedload discharge, definition of 13
- Benthic organisms, definition of 13
- Biochemical oxygen demand, definition of 13
- Biomass, definition of 13
- Biomass pigment ratio, definition of 13
- Blue-green algae, definition of 13
- Bottom material, definition of 13
- Bulk electrical conductivity, definition of 13
- Canadian Geodetic Vertical Datum 1928, definition of 13
- Cell volume, definition of 13
- Cells/volume, definition of 13
- Cfs-day, definition of 14
- Channel bars, definition of 14
- Chemical oxygen demand, definition of 14
- Clostridium perfringens, definition of 14
- Coliphages, definition of 14
- Color unit, definition of 14
- Conductivity, definition of 22
- Confined aquifer, definition of 14
- Contents, definition of 14
- Continuous-record station, definition of 14
- Control, definition of 14
- Control structure, definition of 14
- Cubic foot per second, definition of 14
- Cubic foot per second-day, definition of 14
- Cubic foot per second per square mile, definition of 14
- Daily mean suspended-sediment concentration, definition of 14
- Daily record station, definition of 14
- Data collection platform, definition of 14
- Data logger, definition of 14
- Datum, definition of 14
- Diatoms, definition of 15
- Diel, definition of 15
- Discharge, definition of 15
- Dissolved, definition of 15
- Dissolved oxygen, definition of 15
- Dissolved solids concentration, definition of 15
- Diversity index, definition of 15
- Drainage area, definition of 15
- Drainage basin, definition of 15
- Dry mass, definition of 15
- Dry weight, definition of 15
- Embeddedness, definition of 15
- Enterococcus bacteria, definition of 15
- EPT Index, definition of 16
- Escherichia coli (E. coli), definition of 16
- Estimated (E) value, definition of 16
- Euglenoids, definition of 16
- Extractable organic halides, definition of 16
- Fecal coliform bacteria, definition of 16
- Fecal streptococcal bacteria, definition of 16
- Fire algae, definition of 16
- Flow, definition of 15
- Flow-duration percentiles, definition of 16
- Gage datum, definition of 16
- Gage height, definition of 16
- Gage values, definition of 16
- Gaging station, definition of 16
- Gas chromatography/flame ionization detector, definition of 16
- Geomorphic channel units, definition of 17
- Green algae, definition of 17
- Habitat, definition of 17
- Habitat quality index, definition of 17
- Hardness, definition of 17
- High tide, definition of 17
- Hilsenhoff's Biotic Index, definition of 17
- Horizontal datum, definition of 17

- Hydrologic conditions, summary of
 Ground water 2
 Ground-water quality 5
 hydrologic conditions, summary of
 precipitation 1
 surface water 2
 Hydrologic index stations, definition of 17
 Hydrologic unit, definition of 17
- Inch, definition of 17
 Instantaneous discharge, definition of 17
 International Boundary Commission Survey Datum, definition
 of 17
 Island, definition of 17
- Laboratory reporting level, definition of 17
 Land-surface datum, definition of 17
 Latent heat flux, definition of 17
 Light-attenuation coefficient, definition of 18
 Lipid, definition of 18
 Long-term method detection level, definition of 18
 Low flow, 7-day, 10-year, definition of 22
 Low tide, definition of 18
- Macrophytes, definition of 18
 Mean concentration of suspended sediment, definition of 18
 Mean discharge, definition of 18
 Mean high tide, definition of 18
 Mean low tide, definition of 18
 Mean sea level, definition of 18
 Measuring point, definition of 18
 Megahertz, definition of 18
 Membrane filter, definition of 18
 Metamorphic stage, definition of 18
 Method detection limit, definition of 18
 Method of Cubatures, definition of 18
 Methylene blue active substances, definition of 18
 Micrograms per gram, definition of 18
 Micrograms per kilogram, definition of 18
 Micrograms per liter, definition of 19
 Microsiemens per centimeter, definition of 19
 Milligrams per liter, definition of 19
 Minimum reporting level, definition of 19
 Miscellaneous site, definition of 19
 Most probable number, definition of 19
 Multiple-plate samplers, definition of 19
- Nanograms per liter, definition of 19
 National Geodetic Vertical Datum of 1929, definition of 19
 Natural substrate, definition of 19
 Nekton, definition of 19
 Nephelometric turbidity unit, definition of 19
 North American Datum of 1927, definition of 19
 North American Datum of 1983, definition of 19
 North American Vertical Datum of 1988, definition of 19
- Open interval, definition of 19
 Organic carbon, definition of 19
 Organic mass, definition of 19
 Organism count,
 Area, definition of 19
 Total, definition of 25
 Volume, definition of 20
 Organochlorine compounds, definition of 20
- Parameter code, definition of 20
 Partial-record station, definition of 20
 Particle size, definition of 20
 Particle-size classification, definition of 20
 Peak flow, definition of 20
 Peak stage, definition of 20
 Percent composition, definition of 20
 Percent of total, definition of 20
 Percent shading, definition of 20
 Periodic-record station, definition of 20
 Periphyton, definition of 20
 Pesticides, definition of 20
 pH, definition of 20
 Phytoplankton, definition of 20
 Picocurie, definition of 21
 Plankton, definition of 21
 Polychlorinated biphenyls, definition of 21
 Polychlorinated naphthalenes, definition of 21
 Pool, definition of 21
 Primary productivity, definition of 21
 Carbon method, definition of 21
 Oxygen method, definition of 21
- Radioisotopes, definition of 21
 Reach, definition of 21
 Recoverable from bed (bottom) material, definition of 21
 Recurrence interval, definition of 21
 Replicate samples, definition of 22
 Return period, definition of 22
 Riffle, definition of 22
 River mileage, definition of 22
 Run, definition of 22
 Runoff, definition of 22
- Screened interval, definition of 19
 Sea level, definition of 22
 Sediment, definition of 22
 Sensible heat flux, definition of 22
 Seven-day, 10-year low flow, definition of 22
 Shelves, definition of 22
 Sodium adsorption ratio, definition of 22
 Soil heat flux, definition of 22
 Soil-water content, definition of 22
 Specific electrical conductance (conductivity), definition of 22

Stable isotope ratio, definition of	22	Total discharge, definition of	24
Stage, definition of	23	Total in bottom material, definition of	24
Stage-discharge relation, definition of	23	Total length, definition of	24
Streamflow, definition of	23	Total load, definition of	25
Substrate, definition of	23	Total organism count, definition of	25
Artificial, definition of	12	Total recoverable, definition of	25
Natural, definition of	19	Total sediment discharge, definition of	25
Substrate embeddedness class, definition of	23	Total sediment load, definition of	25
Surface area of a lake, definition of	23	Transect, definition of	25
Surficial bed material, definition of	23	Turbidity, definition of	25
Surrogate, definition of	23	Ultraviolet (UV) absorbance (absorption), definition of	25
Suspended, definition of	23	Unconfined aquifer, definition of	25
Recoverable, definition of	23	Vertical datum, definition of	25
Total, definition of	23	Volatile mass, definition of	19
Suspended sediment, definition of	23	Volatile organic compounds, definition of	25
Suspended-sediment concentration, definition of	23	Water table, definition of	25
Suspended-sediment discharge, definition of	23	Water-table aquifer, definition of	25
Suspended-sediment load, definition of	23	Water year, definition of	25
Suspended solids, total residue at 105 °C concentration, definition of	23	Watershed, definition of	25
Synoptic studies, definition of	24	WDR, definition of	25
Taxa (Species) richness, definition of	24	Weighted average, definition of	26
Taxonomy, definition of	24	Wet mass, definition of	26
Thalweg, definition of	24	Wet weight, definition of	26
Thermograph, definition of	24	WSP, definition of	26
Time-weighted average, definition of	24	Zooplankton, definition of	26
Tons per acre-foot, definition of	24		
Tons per day, definition of	24		
Total, definition of	24		
Total coliform bacteria, definition of	24		

Conversion Factors

Multiply	By	To obtain
Length		
inch (in.)	2.54×10^1	millimeter (mm)
	2.54×10^{-2}	meter
foot (ft)	3.048×10^{-1}	meter (m)
mile (mi)	1.609×10^0	kilometer (km)
Area		
acre	4.047×10^3	square meter (m ²)
	4.047×10^{-1}	square hectometer (hm ²)
	4.047×10^{-3}	square kilometer (km ²)
square mile (mi ²)	2.590×10^0	square kilometer (km ²)
Volume		
gallon (gal)	3.785×10^0	liter (L)
	3.785×10^{-3}	cubic meter (m ³)
	3.785×10^0	cubic decimeter (dm ³)
million gallons (Mgal)	3.785×10^3	cubic meter (m ³)
	3.785×10^{-3}	cubic hectometer (hm ³)
cubic foot (ft ³)	2.832×10^{-2}	cubic meter (m ³)
	2.832×10^1	cubic decimeter (dm ³)
cubic-foot-per-second-per-day [(ft ³ /s/d)]	2.447×10^3	cubic meter (m ³)
	2.447×10^{-3}	cubic hectometer (hm ³)
acre-foot (acre-ft)	1.223×10^3	cubic meter (m ³)
	1.223×10^{-3}	cubic hectometer (hm ³)
	1.223×10^{-6}	cubic kilometer (km ³)
Flow rate		
cubic foot per second (ft ³ /s)	2.832×10^1	liter (L/s)
	2.832×10^{-2}	cubic meter per second (m ³ /s)
	2.832×10^1	cubic decimeter per second (dm ³ /s)
gallon per minute (gal/min)	6.309×10^{-2}	liter per second (L/s)
	6.309×10^{-5}	cubic meter per second (m ³ /s)
	6.309×10^{-2}	cubic decimeter per second (dm ³ /s)
million gallons per day (Mgal/d)	4.381×10^{-2}	cubic meter per second
	4.381×10^1	cubic decimeter per second (dm ³ /s)
Mass		
ton, short (2,000 lb)	9.072×10^{-1}	megagram (Mg) or metric ton

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as follows:

$$^{\circ}\text{F} = (1.8 \times ^{\circ}\text{C}) + 32$$


125 *years of*
science
for America

1879–2004