GROUND-WATER DATA THROUGH 1980 FOR THE HANNA AND CARBON BASINS, SOUTH-CENTRAL WYOMING

By Pamela B. Daddow

U.S. GEOLOGICAL SURVEY

Open-File Report 85-628

The stratigraphic nomenclature used in this report does not conform to the usage of the U.S. Geological Survey.

Cheyenne, Wyoming
1986

UNITED STATES DEPARTMENT OF THE INTERIOR

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GEOLOGICAL SURVEY

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CONTENTS

ILLUSTRATIONS

TABLES

CONVERSION FACTORS

The following factors may be used to convert the inch-pound units used in this report to metric units:

Multiply	By	To obtain
inch	25.40	millimeter
foot (ft)	0.3048	meter
acre	4,047	square meter
square mile	2.590	square kilometer
gallon per minute (gal/min)	0.06308	liter per second

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ABSTRACT

Ground-water resources in the Hanna and Carbon basins were assessed in a study from 1974 through 1980 because of the development of coal mining in the area. Data collected from 105 wells during that study are presented in this report. The data include well-completion records, lithologic logs, and water levels. The data are from stock wells, coal-test holes completed as observation wells by the U.S. Geological Survey, and mining company observation wells monitored by the U.S. Geological Survey. The data are mostly from mined coal-bearing formations: The Tertiary Hanna Formation and the Tertiary and Cretaceous Ferris Formation. Well-completion data and lithologic logs were collected during drilling of the wells or from U.S. Geological Survey files, company records, Wyoming State Engineer well-permit files, and published reports.

INTRODUCTION

Ground-water resources in the Hanna and Carbon basins were assessed in a study from 1974 through 1980 by the U.S. Geological Survey. The study was a part of the U.S. Geological Survey's coal-hydrology program. Coal has been mined in the Hanna and Carbon basins since the late 1800's, but coal production significantly increased during the 1970's because of increased production from surface mining. The purposes of the hydrologic study were to describe the existing characteristics of the hydrologic system, including both surface water and ground water, and to monitor changes as mining continued.

This report presents the data collected from 105 wells during the study, including well-completion records, lithologic logs, and water levels. Water-level data collected from these wells prior to the study (Lowry and others, 1973) also are included. The data are from stock wells, coal-test holes completed as observation wells by the U.S. Geological Survey, and mining company observation wells monitored by the U.S. Geological Survey. Water-quality data collected from wells and streams during the study were published previously by Freudenthal (1979).

PREVIOUS INVESTIGATIONS

A comprehensive coal-hydrology study including the Hanna and Carbon basins (Kuhn and others, 1983) provides coal information and surface- and ground-water quantity and quality information. Water-quality data are available in Freudenthal (1979). The water resources of the area are described by Lowry and others (1973). The geology is described in reports by the U.S. Geological Survey (Dobbin and others, 1929; Gill and others, 1970) and by the Geological Survey of Wyoming (Glass, 1972, 1978). A coal resource and reclamation potential evaluation by the Bureau of Land Management, Bureau of Reclamation, and U.S. Geological Survey (U.S. Bureau of Land Management, 1975) also is available. Lithologic and geophysical data are included in Blanchard and Pike (1977), Glass (1978), Hansen and Schug (1979), Hansen and others (1980), Hettinger (1978), Hettinger and Brown (1978), and Schroeder and Dronyk (1978).

The Wyoming Department of Environmental Quality has mine permit information for all coal mines operating in the basins. The permits contain coal, geology, surface-water, and ground-water data. Recent water-level data and completion records on wells not monitored during this study may be available from the Department of Environmental Quality or from the Wyoming State Engineer.

WELL-NUMBERING SYSTEMS

The wells in this report are assigned a local number and site number. The local number is based on the Federal township-range system of land subdivision. The first segment denotes the township north of the 40th Parallel Base Line; the second segment denotes the range west of the Sixth Principal Meridian; and the third segment refers to the section. Subdivisions within a section are lettered A, B, C, and D in a counterclockwise direction, beginning in the northeast quarter (A - NE1/4, B - NW1/4, C - SW1/4, D - SE1/4). The first letter following the section number denotes the quarter section (160 acres); the second letter denotes the quarter-quarter section (40 acres); and the third letter denotes the quarter-quarter-quarter section (10 acres). A sequential number after the letters distinguishes that well from others assigned a number in the same quarter-quarter-quarter section. For example, in figure 1, the well with local number 23N 083W 32DBC01 is the first well in the SW1/4 of the NW1/4 of the SE1/4 of sec. 32, T. 23 N., R. 83 W.

The 15-digit site number is based on the universal system of latitude and longitude. The first six digits denote degrees, minutes, and seconds of north latitude; the second six digits denote degrees, minutes, and seconds of west longitude; and the last two digits (assigned sequentially) are based on the number of sites within a one-second grid. Access to information in the U.S. Geological Survey's Ground-Water Site Inventory (GWSI) data base is by use of the site number.

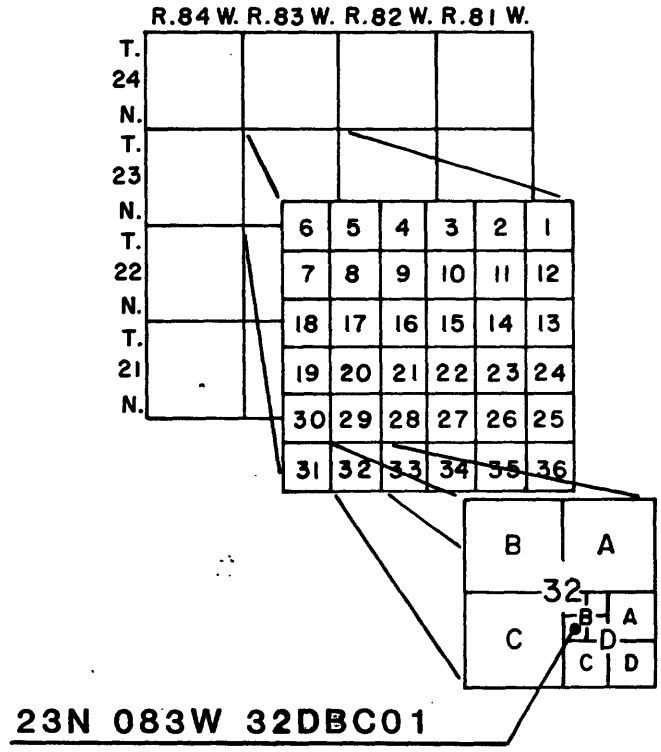


Figure 1.--Well-numbering system based on township and range.

DESCRIPTION OF THE AREA

The Hanna and Carbon basins, in Carbon County, south-central Wyoming, have a combined area of 1,500 square miles. Resistant rocks of the Late Cretaceous Mesaverde Group, which forms the Saddleback Hills, separate the Hanna basin on the west from the Carbon basin on the east (fig. 2). The basins are bounded on the north by the Seminoe, Shirley, and Freezeout Mountains; on the west by the Haystack Mountains; and on the south by the Medicine Bow Mountains.

The average altitude is about 7,000 feet; the topography principally consists of undulating plains broken by high ridges. Typically, the topography closely reflects the structure of the underlying rocks.

Stratigraphic and structural features of the area are shown in figure 3. Outcropping formations range in age from Late Cretaceous to Holocene. The Late Cretaceous Medicine Bow Formation, late Cretaceous and early Tertiary Ferris Formation, and early Tertiary Hanna Formation contain coal layers. Coal in the Hanna and Ferris Formations is mined by surface and underground methods; coal in the Medicine Bow Formation is not mined presently (1980).

DESCRIPTION OF THE DATA

Ground-water data from 105 wells in the area (fig. 4) are presented in tables 1, 2, and 3, at the end of this report. This information includes well-completion records, lithologic logs, and water levels. Well-completion records and lithologic logs were collected on-site during drilling of the wells or from U.S. Geological Survey files, company records, Wyoming State Engineer well-permit files, and published reports. Well-completion data, water levels, and additional information are available in the U.S. Geological Survey's computer data base, the Ground-Water Site-Inventory (GWSI) file of the National Water Data Storage and Retrieval System (WATSTORE). The lithologic logs are not in the computer data base.

The lithologic logs quoted from published sources have not been edited to conform to U.S. Geological Survey style. Coal bed names are those used by the source and are not necessarily approved by the U.S. Geological Survey.

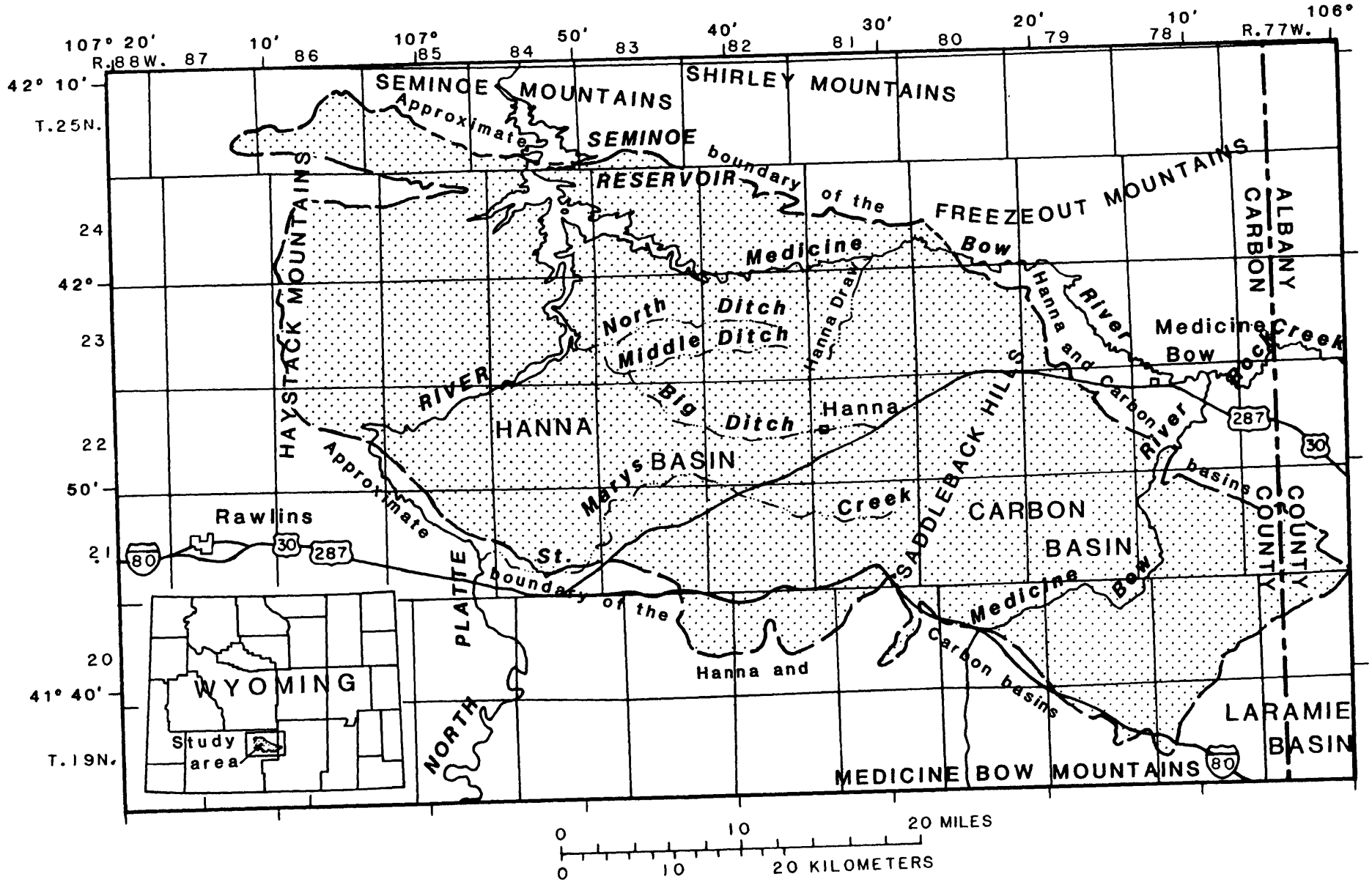


Figure 2.--Location of Hanna and Carbon basins.

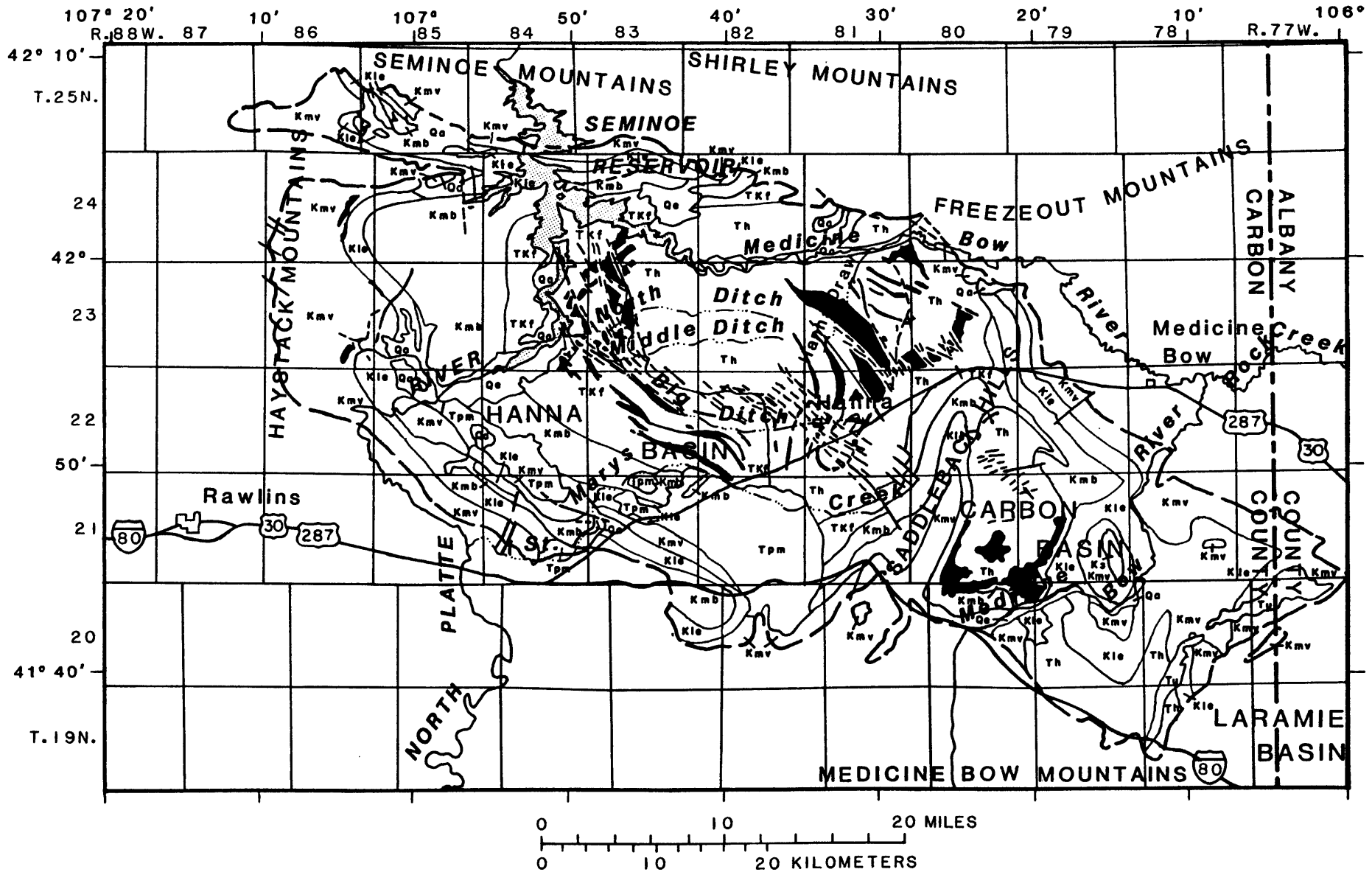
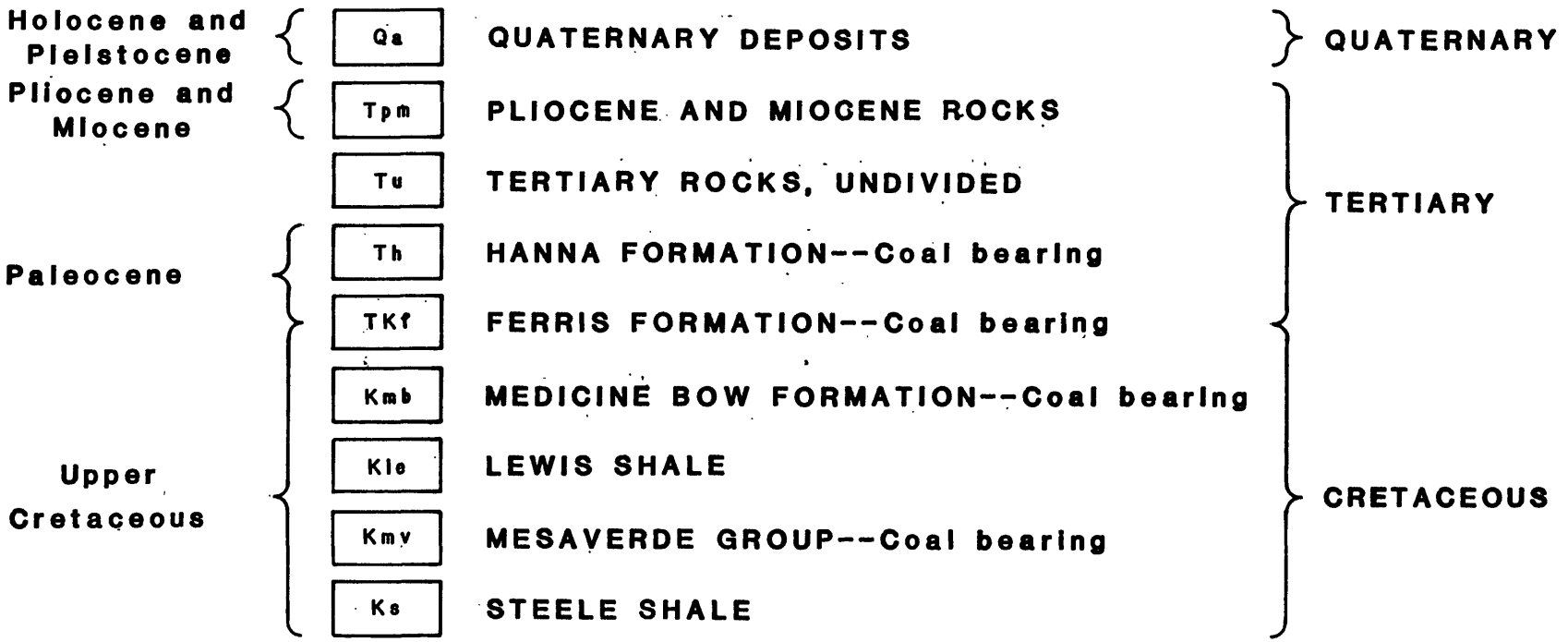


Figure 3.--Geology of the Hanna and Carbon basins (modified from Glass and Roberts, 1979, p. 63, published with permission).

EXPLANATION



APPROXIMATE LOCATION OF STRIPPABLE COAL RESOURCES

CONTACT

FAULT--Dashed where approximately located

APPROXIMATE BOUNDARY OF THE HANNA AND CARBON BASINS

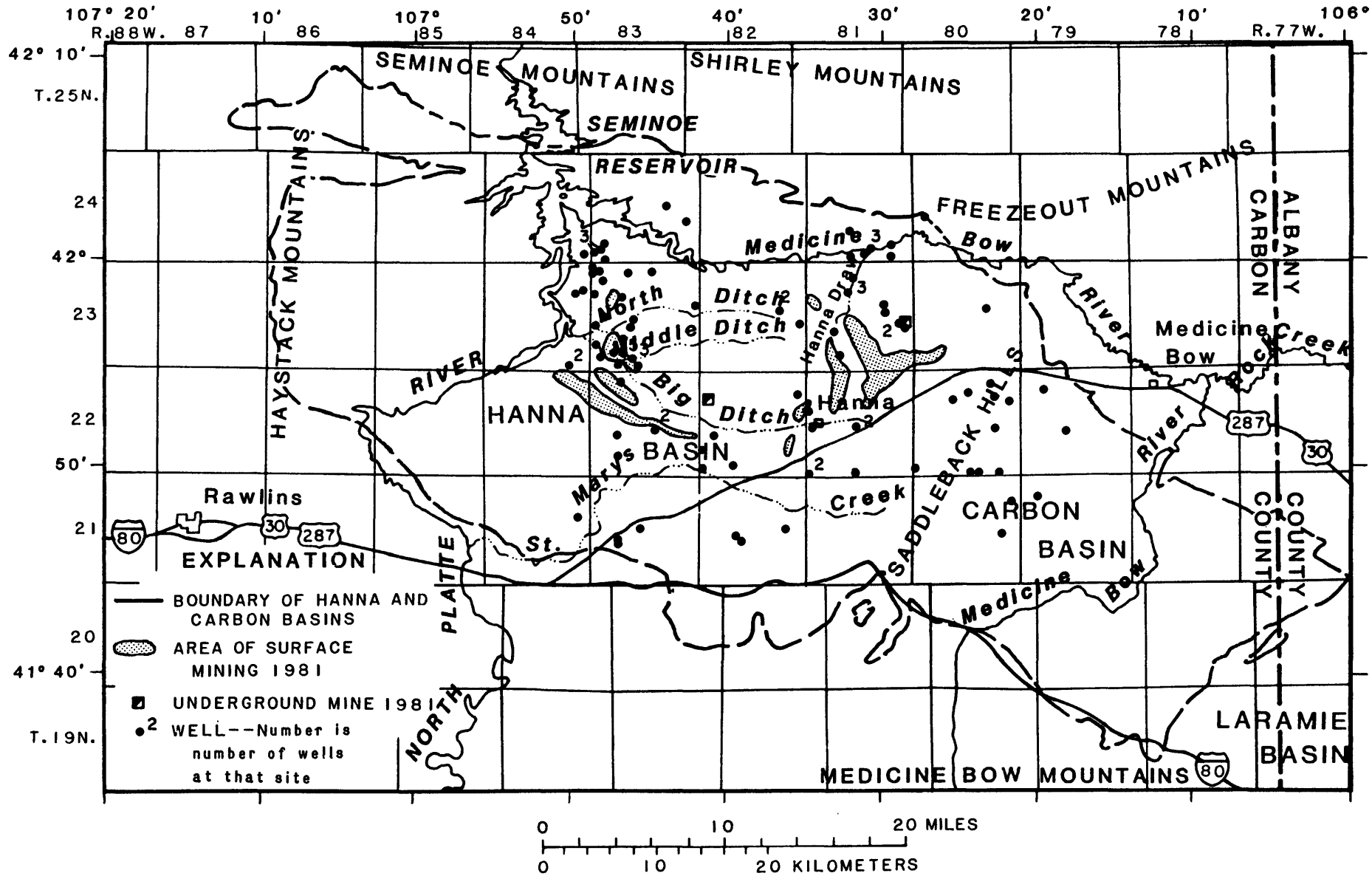


Figure 4.--Location of wells and mines.

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Schroeder, M. L., and Dronyk, Michael, 1978, Lithologic and geophysical logs of 30 coal test holes drilled in the Hanna Basin coal field, Carbon County, Wyoming: U.S. Geological Survey Open-File Report 78-657, 53 p.

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GROUND-WATER DATA

Table 1.--Selected well-

[Local number, township-range-section location. Site number, latitude-longitude location. Principal aquifer: 111ALVM, Alluvium; 121NRPK, North Park Formation; 124HANN, Hanna Formation; Mesaverde Formation; 221SNDC, Sundance Formation. Owner: BLM, Bureau of Land Management; MED BOW Type of lift: C, centrifugal; J, jet; P, piston; S, submergible; T, turbine. Altitude of land method of measurement, if known: B, bailer; E, estimate; F, flowing estimate; V, volumetric.

Local number	Site number	Principal aquifer	Depth of cased well (feet)	Casing diameter (inches)	Date well completed	Owner
21N 079W 07AAD01	414837106193001	124HANN	395	5.25	6-27-71	Anschutz Land
21N 080W 12ACA01	414828106205601	124HANN	310	4	7-08-77	USGS, BLM, WGS
21N 080W 24BBA01	414657106213601	124HANN	200	4	12-09-76	USGS, BLM, WGS
21N 082W 14DDA01	414711106355001	121NRPK	480	2	12-04-79	Town-Hanna, BLM
21N 082W 21BBC01	414650106390201	121NRPK	180	--	8- -60	Elmer Peterson
21N 082W 21BDA01	414643106384701	121NRPK	200	--	1965	Elmer Peterson
21N 083W 16DDA01	414709106450701	211MVRD	314	4	9-09-65	Elmer Peterson
21N 083W 20ACC01	414634106464601	211LWIS	210	6	8- -41	Anderson
21N 083W 20DBD01	414624106463601	211MDCB	--	--	--------	----------
21N 084W 13BA 01	414747106491401	211LWIS	155	6	8- -62	Leo Sheep Company
22N 079W 08B 01	415340106193001	211MDCB	97	--	1954	Chace Brothers
22N 079W 21 01	415145106244501	211MDCB	70	6	1954	Chace Brothers
22N 080W 02CDB01	415401106223601	125FRRS	120	8	8-10-59	Chace Brothers
22N 080W 09CCB01	415315106251801	211MDCB	90	6	1954	Chace Brothers
22N 080W 10BCC01	415302106241501	211MDCB	50	6	1954	Chace Brothers
22N 080W 11DBB01	415332106222501	125FRRS	208	8	6-02-69	Chace Brothers
22N 080W 12CDD01	415312106211601	211MDCB	177	--	1958	Chace Brothers
22N 080W 23ACA01	415155106222001	124HANN	132	6	1954	Chace Brothers
22N 080W 31CB 01	414950106272501	211MDCB	131	6	1958	Chace Brothers
22N 080W 34CC 01	414945106214001	211LWIS	240	--	--------	----------
22N 080W 34DCD01	414932106232201	124HANN	310	4	11-01-76	USGS, BLM, WGS
22N 080W 35DDC01	414928106215601	124HANN	175	4	11-21-76	USGS, BLM, WGS
22N 081W 18BBA01	415257106342501	124HANN	125	5	9-15-79	Jim Linder
22N 081W 19BAA01	415209106340301	124HANN	250	6	1936	Palm Livestock Co.
22N 081W 21AAB01	415209106312801	124HANN	150	2	11-08-76	Arch Mineral
22N 081W 21AAB02	415210106312602	124HANN	150	4	11-08-76	Arch Mineral
22N 081W 31CDD01	414942106340401	124HANN	140	2	11-04-76	Arch Mineral
22N 081W 31CDD02	414942106340602	124HANN	260	2	11-05-76	Arch Mineral
22N 081W 33DDC01	414938106312201	124HANN	120	2	11-08-76	Arch Mineral
22N 082W 12ACD01	415336106345501	124HANN	240	2	11-04-76	Arch Mineral

completion records

Principal aquifer: 111ALVM, Alluvium; 121NRPK, North Park Formation; 124HANN, Hanna Formation; 125FRRS, Ferris Formation; 211LWIS, Lewis Shale; 211MDCB, Medicine Bow Formation; 211MVRD, COAL, Medicine Bow Coal Company; USGS, U.S. Geological Survey; WGS, Geological Survey of Wyoming. surface, in feet above sea level. Water level: t, feet above land surface. Discharge, letter is Other data available: QW, chemical analysis of water; WL, water levels; LG, lithologic log]

Local number	Type of lift	Altitude of land surface (feet)	Water level (feet below land surface)	Date water level measured	Discharge (gallons per minute)		Date discharge estimated or measured	Other data available QW	WL	LG
21N 079W 07AAD01	C	7075	185.00	--------	15		--------	--	--	X
21N 080W 12ACA01	--	7040	70.00	10-06-77	--		--------	X	X	X
21N 080W 24BBA01	--	7165	113.89	1-11-77	--		--------	X	X	X
21N 082W 14DDA01	--	6895	12.70	--------	5.5		--------	X	--	X
21N 082W 21BBC01	P	6990	51.60	7-10-67	40	B	7-10-67	--	--	X
21N 082W 21BDA01	--	6935	--	--------	16	F	7-10-67	X	--	--
21N 083W 16DDA01	--	7040	--	--------	57	F	6- -67	X	--	X
21N 083W 20ACC01	S	6760	16.00	--------	--		--------	--	--	--
21N 083W 20DBD01	--	6770	--	--------	1	F	7-19-67	--	--	--
21N 084W 13BA 01	P	6850	2.65	7-26-67	10		7-26-67	--	--	X
22N 079W 08B 01	--	6700	--	--------	--		--------	--	--	X
22N 079W 21 01	--	--	--	--------	4		--------	--	--	X
22N 080W 02CDB01	T	6750	55.00	8-10-59	300		11-10-59	X	--	X
22N 080W 09CCB01	--	6825	28.54	7-19-67	10		--	--	--	X
22N 080W 10BCC01	P	6810	13.37	6-15-77	2		7-19-67	X	--	X
22N 080W 11DBB01	S	6790	24.00	6-02-69	40		6-02-69	--	--	--
22N 080W 12CDD01	P	6795	56.00	7-19-67	7	E	7-19-67	X	--	X
22N 080W 23ACA01	P	6855	--	--------	--		--------	X	--	X
22N 080W 31CB 01	P	--	89.00	7-19-67	25		7-19-67	X	--	X
22N 080W 34CC 01	--	--	--	--------	--		--------	--	--	--
22N 080W 34DCD01	--	7040	60.44	11-18-76	3.1	B	10-05-77	X	X	X
22N 080W 35DDC01	--	6950	84.10	1-11-77	--		--------	X	X	X
22N 081W 18BBA01	S	6855	82.00	--------	--		--------	--	--	--
22N 081W 19BAA01	T	6770	200.00	--------	25		1936	X	--	--
22N 081W 21AAB01	--	6845	28.84	12-15-76	--		--------	--	X	X
22N 081W 21AAB02	--	6850	25.91	11-08-76	--		--------	--	X	X
22N 081W 31CCD01	--	7040	43.40	11-16-76	1.4	B	11-07-76	--	X	X
22N 081W 31CDD02	--	7040	7.78	11-16-76	--		--------	--	X	X
22N 081W 33DDC01	--	7075	--	--------	2	F	12-02-76	--	--	X
22N 082W 12ACD01	--	7150	121.89	12-15-76	--		--------	--	X	X

Table 1.--Selected well-completion

Local number	Site number	Principal aquifer	Depth of cased well (feet)	Casing diameter (inches)	Date well completed	Owner
22N 082W 19DAB01	415144106403801	125FRRS	210	2	11-09-76	Arch Mineral
22N 082W 30BCB01	415102106413301	125FRRS	220	2	11-09-76	Arch Mineral
22N 082W 31BCD01	415005106411701	125FRRS	140	2	11-09-76	Arch Mineral
22N 082W 32AAA01	415026106391201	125FRRS	250	2	11-09-76	Arch Mineral
22N 083W 05DDB01	415408106463001	125FRRS	--	8	--------	Palm Ranch
22N 083W 20DBB01	415143106464301	125FRRS	310	6	11-15-71	Arch Mineral
22N 083W 22ACB01	415152106441901	125FRRS	118	6	8-23-71	Arch Mineral
22N 083W 22ACB02	415152106441902	125FRRS	280	6	6- -78	Arch Mineral, BLM
22N 083W 29DCC01	415031106465701	125FRRS	95	6	1955	Palm Livestock Co.
23N 080W 14CBA01	415750106225001	211MDCB	110	6	1954	Chace Brothers
23N 081W 04DCC01	415913106314101	124HANN	520	3	8-28-78	USGS, BLM
23N 081W 09CAC01	415831106320101	124HANN	300	2	11-01-76	Arch Mineral
23N 081W 09CAC02	415830106320302	124HANN	200	2	11-02-76	Arch Mineral
23N 081W 09CAC03	415830106320503	124HANN	175	4	11-05-76	Arch Mineral
23N 081W 14BDD01	415752106293101	124HANN	480	3	11-07-78	USGS, BLM
23N 081W 14CDB01	415730106294501	124HANN	390	3	11-18-78	USGS
23N 081W 20DCB01	415642106324801	124HANN	230	3	6-15-79	USGS, BLM
23N 081W 24BCA01	415709106284301	124HANN	80	3	6-06-79	USGS, BLM
23N 081W 24BCC01	415658106285101	124HANN	320	3	9-28-78	USGS, BLM
23N 081W 24DBB01	415656106282001	124HANN	281	3	9-29-78	USGS, BLM
23N 081W 32AAA01	415529106332501	124HANN	200	2	10-22-76	Arch Mineral
23N 082W 14DBC01	415740106361901	124HANN	160	3	8-13-78	USGS, BLM
23N 082W 14DBC02	415740106361902	124HANN	70	3	8-13-78	USGS, BLM
23N 082W 24ACD01	415702106350201	124HANN	350	3	6-10-79	USGS, BLM
23N 083W 03BDC01	415939106443901	124HANN	126	--	--------	Palm Ranch
23N 083W 04BCC01	415937106461301	125FRRS	387	4	6-25-76	USGS, BLM
23N 083W 06ACA01	415945106474401	125FRRS	303	4	6-15-76	USGS, BLM
23N 083W 06BBB01	415958106482901	125FRRS	146	1.5	9-28-74	USGS, BLM
23N 083W 06BCD01	415938106482101	125FRRS	264	4	6-17-76	USGS, BLM
23N 083W 06DDD01	415908106472701	125FRRS	200	1.5	9- -74	USGS, BLM
23N 083W 07CAA01	415838106480701	125FRRS	124	6	1955	Palm Ranch
23N 083W 08DDD01	415816106461501	125FRRS	412	4	6-28-76	USGS, BLM
23N 083W 13AAD01	415808106413701	124HANN	--	6	--------	Palm Ranch
23N 083W 18DDD01	415727106473101	125FRRS	275	4	7-01-76	USGS, BLM
23N 083W 19BDB01	415716106482601	125FRRS	195	6	7- -74	MED BOW COAL
23N 083W 21BAB01	415722106455301	125FRRS	140	2	11-11-76	Arch Mineral
23N 083W 21BDA01	415710106454601	124HANN	--	6	--------	Palm Ranch
23N 083W 29AAB01	415631106462601	125FRRS	150	2	11-12-76	Arch Mineral
23N 083W 29CDA01	415548106465201	125FRRS	170	2	7-31-74	MED BOW COAL
23N 083W 30BDD01	415607106480101	111ALVM	24	2	8-12-75	USGS, BLM

records--Continued

Local number	Type of lift	Altitude of land surface (feet)	Water level (feet below land surface)	Date water level measured	Discharge (gallons per minute)	Date discharge estimated or measured	Other data available QW	WL	LG
22N 082W 19DAB01	--	6790	149.32	11-16-76	--	--------	--	--	X
22N 082W 30BCB01	--	6985	90.20	12-14-76	--	--------	--	X	X
22N 082W 31BCD01	--	6795	9.14	11-16-76	1.2 B	9-01-77	--	X	X
22N 082W 32AAA01	--	6945	91.09	11-16-76	--	--------	--	X	X
22N 083W 05DDB01	P	6539	79.80	7-13-74	--	--------	X	X	--
22N 083W 20DBB01	--	6890	250.00	--------	10	11-15-71	--	--	X
22N 083W 22ACB01	--	6690	25.01	6-15-77	24	8-23-71	--	--	X
22N 083W 22ACB02	S	6709	23.80	6-15-78	35	8-28-78	--	--	X
22N 083W 29DCC01	P	6833	63.40	7-12-67	8	7-12-67	--	--	X
23N 080W 14CBA01	--	6750	41.36	7- -67	--	--------	--	X	X
23N 081W 04DCC01	--	6600	--	--------	--	--------	--	--	X
23N 081W 09CAC01	--	6660	64.92	12-15-76	45 B	11-01-76	--	X	X
23N 081W 09CAC02	--	6660	9.76	12-15-76	--	--------	--	X	X
23N 081W 09CAC03	--	6660	18.62	12-15-76	--	--------	--	X	X
23N 081W 14BDD01	--	6950	16.38	11-18-78	--	--------	--	X	X
23N 081W 14CDB01	--	7070	32.94	11-18-78	--	--------	--	X	X
23N 081W 20DCB01	--	7020	133.62	6-20-79	--	--------	--	X	X
23N 081W 24BCA01	--	7070	37.49	6-20-79	--	--------	--	X	X
23N 081W 24BCC01	--	7020	94.86	11-19-78	--	--------	--	X	X
23N 081W 24DBB01	--	6980	67.23	6-20-79	--	--------	--	X	X
23N 081W 32AAA01	--	7105	105.87	1-13-77	--	--------	--	X	X
23N 082W 14DBC01	--	7005	25.73	8-29-78	--	--------	--	X	X
23N 082W 14DBC02	--	7005	32.11	8-29-78	--	--------	--	X	--
23N 082W 24ACD01	--	7170	169.95	9-24-80	--	--------	--	--	X
23N 083W 03BDC01	P	6596	79.44	4-01-76	--	--------	--	X	--
23N 083W 04BCC01	--	6560	128.92	6-29-76	--	--------	--	X	X
23N 083W 06ACA01	--	6530	71.56	6-29-76	4.1 B	9-12-77	--	X	X
23N 083W 06BBB01	--	6440	77.22	10-10-74	--	--------	--	X	X
23N 083W 06BCD01	--	6465	78.04	6-29-76	4.1 B	9-13-77	--	X	X
23N 083W 06DDD01	--	6480	51.86	9- -74	--	--------	X	X	X
23N 083W 07CAA01	--	6420	41.28	6-13-67	5	6-13-67	--	X	X
23N 083W 08DDD01	--	6595	92.52	6-29-76	1.6 B	9-09-77	--	X	X
23N 083W 13AAD01	P	6680	126.10	7-13-67	--	--------	X	X	--
23N 083W 18DDD01	--	6540	116.59	8-10-76	--	--------	--	X	X
23N 083W 19BDB01	J	6440	86.30	7-31-74	10	--------	--	X	X
23N 083W 21BAB01	--	6480	24.98	11-19-76	2.5 B	9-10-77	--	X	X
23N 083W 21BDA01	--	6496	45.01	6-13-67	--	--------	--	X	--
23N 083W 29AAB01	--	6510	95.85	11-19-76	1.4 B	9-23-77	--	X	X
23N 083W 29CDA01	--	6544	100.80	8-06-74	--	--------	--	X	--
23N 083W 30BDD01	--	6370	9.55	8-12-75	--	--------	--	--	X

Table 1.--Selected well-completion

Local number	Site number	Principal aquifer	Depth of cased well (feet)	Casing diameter (inches)	Date well completed	Owner
23N 083W 31ABA01	415538106474201	125FRRS	--	--	--------	Palm Ranch
23N 083W 32AAD01	415530106461601	125FRRS	140	4	1974	MED BOW COAL
23N 083W 32ABA01	415539106463301	125FRRS	130	6	3-28-74	MED BOW COAL
23N 083W 32ACD01	415513106463501	125FRRS	130	2	8-13-74	MED BOW COAL
23N 083W 32ADA01	415521106461801	125FRRS	115	4	9-03-74	MED BOW COAL
23N 083W 32ADB01	415526106462801	125FRRS	93	2	8-21-74	MED BOW COAL
23N 083W 32DBC01	415506106464201	125FRRS	300	--	1974	MED BOW COAL
23N 083W 33BBB01	415537106461101	125FRRS	320	4	4-07-77	Arch Mineral
23N 083W 33BBC01	415533106460901	125FRRS	198	5	4-28-77	Arch Mineral
23N 083W 33BDB01	415532106455901	125FRRS	--	8	--------	Palm Ranch
23N 083W 33DBC01	415509106453801	125FRRS	148	5	4-06-77	Arch Mineral
23N 084W 12ACB01	415852106490301	125FRRS	120	2	9-05-74	USGS, BLM
23N 084W 12CBD01	415834106493001	125FRRS	147	2	9-05-74	USGS, BLM
23N 084W 35DAA01	415508106494401	125FRRS	220	4	11-18-76	MED BOW COAL
23N 084W 35DAA02	415508106494602	125FRRS	236	2	11-16-76	MED BOW COAL
24N 080W 19ADD01	420214106263301	221SNDC	--	--	--------	----------
24N 081W 26DDD01	420054106290101	--	800	2.88	12-10-72	Robert J. Korkow
24N 081W 28ABA01	420139106313901	124HANN	120	6	--------	Palm Ranch
24N 081W 33DBA01	420022106313301	124HANN	193	2	11-02-76	Arch Mineral
24N 081W 34ABB01	420044106303801	--	800	2.88	5-20-70	Robert J. Korkow
24N 081W 34ABC01	420039106303801	--	403	2.88	3-10-70	BLM
24N 081W 34ACD01	420026106303001	124HANN	35	2	8-11-75	USGS, BLM
24N 081W 34BDA01	420035106304501	111ALVM	15	2	8-12-75	USGS, BLM
24N 081W 35DAD01	420009106285701	124HANN	231	2	11-03-76	Arch Mineral
24N 083W 14CC 01	420240106434801	125FRRS	395	--	1966	BLM
24N 083W 24CAA01	420203106421901	124HANN	274	7	1966	BLM
24N 083W 30DDD01	420052106472801	125FRRS	202	1.50	10-03-74	USGS, BLM
24N 083W 31ABB01	420051106475301	125FRRS	210	2	11-19-76	Arch Mineral
24N 083W 31ABB02	420051106475402	125FRRS	200	4	11-16-76	Arch Mineral
24N 083W 31ABB03	420052106475403	125FRRS	150	2	11-17-76	MED BOW COAL
24N 083W 31BAD01	420035106480301	125FRRS	220	2	11-17-76	Arch Mineral
24N 083W 31BAD02	420035106480401	125FRRS	220	4	11-15-76	Arch Mineral
24N 083W 32BAA01	420044106465201	125FRRS	250	2	11-12-76	Arch Mineral
24N 083W 32DDD01	420001106461501	125FRRS	96	2	8-14-74	USGS, BLM
24N 084W 36ADC01	420027106484301	125FRRS	300	3	6-22-76	USGS, BLM

records--Continued

Local number	Type of lift	Altitude of land surface (feet)	Water level (feet below land surface)	Date water level measured	Discharge (gallons per minute)	Date discharge estimated or measured	Other data available QW	WL	LG
23N 083W 31ABA01	P	6433	52.10	12-17-74	--	--------	X	--	--
23N 083W 32AAD01	--	6492	56.50	7-03-75	--	--------	--	X	--
23N 083W 32ABA01	--	6508	76.10	7-03-75	10 B	9-21-77	--	X	X
23N 083W 32ACD01	--	6449	30.00	8-20-74	--	--------	--	X	X
23N 083W 32ADA01	--	6461	21.00	12-17-74	--	--------	--	--	X
23N 083W 32ADB01	--	6477	29.20	8-28-74	--	--------	--	--	X
23N 083W 32DBC01	--	6476	65.55	7-03-75	13 B	9-21-77	--	X	X
23N 083W 33BBB01	--	6504	78.22	6-30-77	11 B	9-22-77	--	X	X
23N 083W 33BBC01	--	6502	76.90	6-30-77	--	--------	--	X	X
23N 083W 33BDB01	--	6460	12.10	7-31-74	--	--------	--	X	--
23N 083W 33DBC01	--	6501	86.44	11-02-77	--	--------	--	X	X
23N 084W 12ACB01	--	6424	50.80	9-09-74	--	--------	--	X	X
23N 084W 12CBD01	--	6450	64.30	10-09-74	--	--------	--	--	X
23N 084W 35DAA01	--	6555	121.05	12-15-76	.14	11-18-76	--	X	X
23N 084W 35DAA02	--	6555	97.85	11-18-76	--	--------	--	X	X
24N 080W 19ADD01	--	6610	--	--------	5 F	7-14-67	--	--	--
24N 081W 26DDD01	--	6450	--	--------	10 V	--------	--	--	--
24N 081W 28ABA01	--	6520	+1.12	7-12-67	--	--------	X	X	--
24N 081W 33DBA01	--	6510	73.20	11-16-76	1.3 B	9-28-77	--	X	--
24N 081W 34ABB01	--	6510	--	--------	8 F	5-20-70	--	--	--
24N 081W 34ABC01	--	6530	--	--------	--	--------	--	--	--
24N 081W 34ACD01	--	6440	31.87	10-21-75	--	--------	--	--	X
24N 081W 34BDA01	--	6426	10.34	8-12-75	--	--------	--	X	X
24N 081W 35DAD01	--	6825	189.32	12-13-76	--	--------	--	X	X
24N 083W 14CC 01	--	--	160.00	--------	1	--------	--	--	X
24N 083W 24CAA01	--	6560	50.90	6-27-67	--	--------	--	X	X
24N 083W 30DDD01	--	6615	118.20	10-10-74	1.3 B	9-20-77	--	X	X
24N 083W 31ABB01	--	6580	97.49	12-14-76	--	--------	--	--	X
24N 083W 31ABB02	--	6575	89.38	12-14-76	--	--------	--	X	X
24N 083W 31ABB03	--	6565	88.10	12-14-76	--	--------	--	X	X
24N 083W 31BAD01	--	6585	100.49	11-18-76	--	--------	--	--	X
24N 083W 31BAD02	--	6585	98.17	11-18-76	--	--------	--	X	X
24N 083W 32BAA01	--	6565	114.40	11-16-76	1.8 B	9-20-77	--	X	X
24N 083W 32DDD01	--	6502	68.20	12-06-74	--	--------	--	X	X
24N 084W 36ADC01	--	6482	110.73	6-29-76	1.4 B	9-14-77	--	X	X

Table 2.--Lithologic logs of selected wells and test holes

[The owner's well designation is listed after the local number. See Table 1 for principal aquifer of the well. Logs quoted from other sources have not been edited to conform to U.S. Geological Survey style. Alpha-numeric code in parenthesis refers to color from rock-color chart from Geological Society of America, 1963. ft, feet; %, percent]

	Thickness (ft)	Depth (ft)
21N 079W 07AAD01		
Anschutz #7		
Logged by: Driller (Serve A Drill)		
Sandstone, gray	30	30
Shale	5	35
Sandstone, gray	115	150
Sandstone, light-gray	45	195
Sandstone, fractured; water	2	197
Sandstone, hard	18	215
Sandstone, fractured, increase in water	61	276
Sandstone, hard, gray	8	284
Shale, light-gray, and sandstone stringers	8	292
Same, with increase in water	36	328
Same, water-bearing	46	374
Coal, some water	1	375
Sandstone and coal stringers	3	378
Sandstone, gray	7	385
Shale, gray, buff, sandy, water-bearing	1	386
Sandstone, gray, fractured water-bearing	9	395
21N 080W 12ACA01		
WGS-C4		
Logged by: Geologist (Glass)		
Log from corehole WGS-C4, located 10 ft west of the cased well WGS-C4A; from Glass, 1978.		
Air-drilled; no core; probably sandstone-	12	12
21N 080W 12ACA01--Continued		
Sandstone, yellowish-gray (5Y7/2); silty to to coarse-grained sand with medium-dark-gray (N4) shale-pebble zones; six fining-upward units 3-17 ft thick; ripplemarked and crossbedded in places; calcareous in places; plant debris; unconformable basal contact	37.6	49.6
Interbedded clay shale and claystone, medium-gray (N5); silty downward with very fine grained sandy zones to 0.5 ft thick; leaves near base; sharp basal contact	12.5	62.1
Clay shale, medium-dark-gray (N4) becoming dark-gray (N3) downward; coal laminae; rootlets; sharp basal contact	1.9	64.0
Coal, Carbon No. 6 Rider coal bed; sharp basal contact	1.95	65.95
Clay shale, grayish-black (N2) to medium-dark-gray (N4); coal laminae abundant; rootlets and plant debris; sharp basal contact	2.35	68.3
Shaly coal, Carbon No. 6 Rider coal bed; sharp basal contact	0.9	69.2

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
21N 080W 12ACA01--Continued		
Interbedded claystone, clay shale, and interlaminated coal and clay shale, brownish-gray (5YR4/1) claystone and grayish-black (N2) to dark-gray (N3) clay shale; 0.3-1.1 ft thick interbeds; rootlets; sharp basal contact---	4.5	73.7
Shaly coal, Carbon No. 6 Rider coal bed; sharp basal contact---------	1.1	74.8
Interbedded clay shale and claystone, medium-dark-gray (N4) to medium-gray (N5); rootlets, grass, leaves; sharp basal contact----------	11.7	86.5
Coal, Upper Carbon No. 6 coal bed; sharp basal contact----------	1.4	87.9
Silt-clay-sand laminite, medium-light-gray (N6) silt and sand and medium-dark-gray (N4) clay; silty to very fine grained sand; roots, rootlets, and leaves; gradational basal contact---------	3.1	91.0
Sandstone, light-gray (N7) to very light gray (N8); silty to fine-grained; ripple-marked; calcareous in places; plant debris; gradational basal contact----------	6.4	97.4
21N 080W 12ACA01--Continued		
Siltstone, medium-light-gray (N6) becomes medium-gray (N5) and clayey downward; leaves, grass, and rootlets; sharp basal contact----------	0.6	98.0
Sandstone, light-gray (N7) to very light gray (N8); silty to fine-grained; cross-bedded; calcareous in places; unconformable basal contact---------	6.7	104.7
Silt-clay laminite, medium-gray (N5) silt and medium-dark-gray (N4) to dark-gray (N3) clay; leaves and plant debris; sharp basal contact----------	1.7	106.4
Shaly coal, Lower Carbon No. 6 coal bed; sharp basal contact---------	0.9	107.3
Interbedded clay shale and shaly coal, grayish-black (N2) to dark-gray (N3) shale; 0.1-1.3 ft thick shale interbeds, coals 0.6-0.8 ft thick; rootlets; gradational basal contact----------	6.5	113.8
Sand-silt laminite, medium-light-gray (N6) sand and medium-gray (N5) silt; silty to very fine grained sand; ripplemarked; plant debris and rootlets; sharp basal contact---	1.8	115.6

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
21N 080W 12ACA01--Continued		
Claystone, olive-gray (5Y4/1); rootlets; sharp basal contact---	1.5	117.1
Clay shale, grayish-black (N2) at top grading down into olive-gray (5Y4/1); freshwater gastropod operculae; leaves, grass, and reeds; gradational basal contact----------	3.1	120.2
Sandstone, light-gray (N7) to very light gray (N8); very fine to fine-grained; ripplemarked; calcareous near base; burrowed; leaves, bark, and twigs; sharp basal contact---	12.1	132.3
Interbedded claystone and interlaminated coal and clay shale, medium-gray (N5) claystone and grayish-black (N2) clay shale; 0.1-1.6 ft thick interbeds; plant debris and rootlets; sharp basal contact---	3.4	135.7
Claystone, medium-gray (N5) becoming dark-gray (N3) and shaly at base; plant debris; coal laminae at base; gradational basal contact----------	2.5	138.2
Claystone, olive-gray (5Y4/1); roots and rootlets; sharp basal contact----------	4.1	142.3
21N 080W 12ACA01--Continued		
Shaly coal, Carbon No. 7 Rider coal bed; sharp basal contact---------	1.5	143.8
Interbedded claystone, clay shale, and interlaminated coal and clay shale, medium-dark-gray (N4) claystone, olive-gray (5Y4/1) to grayish-black (N2) clay shale; plant debris and rootlets; sharp basal contact----------	3.5	147.3
Coal, Upper Carbon No. 7 (upper bench) coal bed; sharp basal contact---	1.5	148.8
Claystone, dark-gray (N3) to olive-black (5Y2/1); coal interbed at middle, 0.3 ft thick; sharp basal contact----------	1.2	150.0
Shaly coal, Upper Carbon No. 7 (lower bench) coal bed; sharp basal contact----------	1.4	151.4
Interbedded clay shale and interlaminated coal and clay shale, medium-dark-gray (N4) to grayish-black (N2) clay shale; leaves, reeds, grass, rootlets, and plant debris; sharp basal contact----------	3.5	154.9
Coal, Lower Carbon No. 7 coal bed; sharp basal contact----------	2.1	157.0

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
21N 080W 12ACA01--Continued		
Interbedded clay shale, coal, and interlaminated coal and clay shale, grayish-black (N2) to dark-gray (N3) clay shale; coal interbeds to 0.8 ft thick; rootlets, leaves, reeds, and plant debris; gradational basal contact--	8.8	165.8
Claystone, medium-gray (N5); silty at base; rootlets; mottled-brownish-gray (5YR4/1) and brownish-black (5YR2/1) at top-------	3.5	169.3
Core loss----------	3.0	172.3
Interbedded siltstone and claystone, medium-light-gray (N6) to light-olive-gray (5Y6/1); sharp basal contact----------	13.2	185.5
Interbedded sandstone and clay shale, medium-light-gray (N6) to light-gray (N7) sand and dark-gray (N3) to medium-gray (N5) clay shale; 0.5-2.6 ft thick interbeds; silty to fine-grained sand; ripplemarked; sandstones burrowed; plant debris; gradational basal contact--	12.1	197.6
Clay shale, medium-dark-gray (N4) to dark-gray (N3) with medium-light-gray (N6) sand lenses at top; varve-like, color laminae; freshwater pelecypods and gastropod operculae; leaves; gradational basal contact----------	7.9	205.5
21N 080W 12ACA01--Continued		
Claystone, dark-greenish-gray (5G4/1) to medium-gray (N5); rootlets; gradational basal contact---------	2.0	207.5
Claystone, mottled-light-olive-gray (5Y6/1) and olive-gray (5Y4/1); brecciated appearance; rootlets; unconformable basal contact----------	1.0	208.5
Sandstone, very light gray (N8) to light-gray (N7); fine-grained to pebbly sand with medium-gray (N5) shale-pebble zones; nine fining-upward units, 3-40 ft thick; crossbedded in places; calcareous in places; coalified bark; sharp basal contact---------	105.9	314.4
Shaly coal, Bed No. 111 coal; sharp basal contact----------	3.2	317.6
Interbedded siltstone and sandstone, olive-gray (5Y4/1) siltstone and light-gray (N7) sandstone; silty to very fine grained sand; sandstone interbeds increase downward; burrowed in basal 2 ft; roots and rootlets at top; sharp basal contact---------	4.4	322.0
Clay shale, medium-gray (N5) to medium-dark-gray (N4) color laminae; freshwater ostracodes, gastropod operculae, and fish vertebrae; leaves, reeds, and roots; gradational basal contact---------	6.3	328.3

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
21N 080W 12ACA01--Continued		
Interlaminated coal and clay shale, grayish-black (N2) clay shale; coal laminae make up less than 10% of unit; reeds, grass, and plant debris; gradational basal contact---	0.4	328.7
Interbedded clay shale and sandstone, medium-dark-gray (N4) to medium-light-gray (N6) shale and very light gray (N8) sandstone; fine- to medium-grained sand; 0.2-1.1 ft thick interbeds; rootlets; gradational basal contact---------	2.5	331.2
Interbedded sandstone and siltstone, medium-gray (N5) silt and light-gray (N7) sand; silty to fine-grained sand; gradational to sharp interbed contacts; 0.5-12 inch thick interbeds; burrowed; leaves and plant debris; sharp basal contact---------	8.8	340.0
Sandstone, light-gray (N7) to very light gray (N8), silty to very coarse grained sand with medium-gray (N5) shale and siltstone pebbles and cobbles in units up to 8.4 ft thick; six fining-upward units, 2.5-18 ft thick; crossbedded in places; calcareous in places; leaves, coalified bark, and plant debris; sharp basal contact---	68.4	408.4
21N 080W 12ACA01--Continued		
Shaly coal, unnamed coal above the Bed No. 109 coal; sharp basal contact----------	0.8	409.2
Siltstone, light-olive-gray (5Y6/1); sandy downward; roots and rootlets; gradational basal contact---------	1.5	410.7
Sandstone, medium-light-gray (N6) to light-gray (N7); silty to very fine grained; roots and rootlets; sharp basal contact---	1.6	412.3
Claystone, olive-black (5Y2/1) to grayish-black (N2); rootlets--	0.2	412.5
Core loss----------	1.0	413.5
Interbedded claystone and clay shale, olive-gray (5Y4/1) to brownish-gray (5Y4/1) claystone and olive-black (5Y2/1) clay shale; coal laminae in places; roots and rootlets; sharp basal contact----------	4.5	418.0
Coal, Upper Bed No. 109 coal bed; up to 0.7 ft lost in coring; sharp basal contact---------	1.8	419.8
Interbedded clay shale and claystone, grayish-black (N2) shale and olive-black (5Y2/1) to brownish-gray (5Y4/1) claystone; grades into a 0.2 ft thick coal at base; rootlets; sharp basal contact---------	2.2	422.0

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
21N 080W 12ACA01--Continued		
Claystone, light-olive-gray (5Y6/1) to brownish-gray (5YR4/1), mottled near base with brecciated appearance; roots and rootlets----	3.0	425.0
Core loss----------	0.5	425.5
Claystone, greenish-gray (5GY6/1) to olive-gray (5Y4/1); gradational basal contact---------	3.0	428.5
Clay shale, grayish-black (N2); coal laminae make up less than 10% of unit; sharp basal contact---	0.4	428.9
Coal, Lower Bed No. 109 coal bed; sharp basal contact----------	0.6	429.5
Clay shale, olive-gray (5Y4/1); vague color laminae; rootlets, twigs, leaves; coalified bark; sharp basal contact----------	3.2	432.7
Claystone, mottled-light-olive-gray (5Y6/1) and olive-black (5Y2/1); brecciated appearance; rootlets; gradational basal contact---------	1.5	434.2
Siltstone, light-olive-gray (5Y6/1); roots; sharp basal contact---	6.8	441.0
Interbedded clay shale and claystone, olive-gray (5Y6/1) to olive-black (5Y2/1) shale and light-olive-gray (5Y6/1) to greenish-gray (5GY6/1) claystone; 0.5-3.3 ft thick interbeds; rootlets, leaves, and plant debris----------	9.9	450.9
21N 080W 12ACA01--Continued		
Core loss----------	1.3	452.2
Clay shale, olive-gray (5Y4/1), silty; roots and plant debris; sharp basal contact---	0.3	452.5
Sandstone, light-brownish-gray (5YR6/1) to medium-light-gray (N6); silty to very fine grained roots; gradational basal contact----------	1.6	454.1
Claystone, light-olive-gray (5Y6/1); roots and rootlets; gradational lower contact--	2.7	456.8
Interbedded siltstone and sandstone, medium-gray (N5) silt and light-gray (N7) sand; silty to very fine grained sand; ripple-marked; burrows; roots, reeds, and grass; gradational basal contact---------	4.0	460.8
Claystone, medium-gray (N5); roots and rootlets; gradational basal contact---------	2.3	463.1
Interbedded sandstone and siltstone, light-gray (N7) sand and medium-gray (N5) silt; silty to fine-grained sand; sharp contacts between interbeds; ripplemarked at top, crossbedded near base; burrows; leaves, reeds, roots, and rootlets; basal contact not seen-	8.3	471.4
Claystone, medium-dark-gray (N4) to greenish-gray (5GY6/1); sharp basal contact---------	5.8	477.2

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
21N 080W 12ACA01--Continued		
Siltstone, medium-light-gray (N6) to light-bluish-gray (5B7/1); sandy at top; gradational basal contact----------	2.5	479.7
Intraformational breccia, medium-bluish-gray (5B5/1) claystone fragments in a light-bluish-gray (5B7/1) matrix of silt or very fine grained sand; matrix material fines upward; basal contact not seen------	1.9	481.6
Clay shale, medium-dark-gray (N4); reeds; gradational lower contact----------	2.4	484.0
Sandstone, light-gray (N7) to very light gray (N8); silty to granular sand; top 4.5 ft ripplemarked; six fining-upward units, 3-7 ft thick; crossbedded; calcareous in places; coalified bark; sharp basal contact---------	39.9	523.9
Interbedded clay shale and silt shale, dark-gray (N3) to medium-dark-gray (N4) clay shale and medium-gray (N5) silt shale; freshwater gastropod operculae at top of unit; leaves and grass at top of unit; sharp basal contact---------	8.2	532.1
21N 080W 12ACA01--Continued		
Sandstone, light-gray (N7) to very light gray (N8); very fine grained to granular sand with medium-gray (N5) shale and siltstone pebbles; 18 fining-upward units, 2-24 ft thick; crossbedded; calcareous in places; coalified bark; unconformable basal contact---------	111.2	643.3
Pebbly sandstone, light-gray (N7); medium- to very coarse grained sand with numerous, randomly-oriented, medium-gray (N5) shale and siltsone pebbles and cobbles; matrix material fines upward; gradational basal contact----------	11.9	655.2
Sandstone, light-gray (N7); medium- to very coarse grained with occasional medium-gray (N5) shale-pebbles; fining-upward unit; calcareous in places; gradational basal contact----------	13.4	668.6
Shale-pebble conglomerate, medium-gray (N5) shale and siltstone pebbles in a light-gray (N7), coarse- to very coarse-grained matrix of sand; fining-upward unit; pebbles randomly oriented; calcareous in places; sharp basal contact----------	9.8	678.4

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
21N 080W 12ACA01--Continued		
Sandstone, light-gray (N7) to very light gray (N8); fine-grained to granular sand with medium-gray (N5) shale-pebble zones; five fining-upward units; 2-10 ft thick; crossbedded; calcareous in places--	24.5	702.9

	Thickness (ft)	Depth (ft)
21N 080W 24BBA01		
WGS-C2A		
Logged by: Geologist (Glass)		
Log modified from core-hole WGS-C2A and core-hole WGS-C2, located about 200 ft northeast of WGS-C2A; from Glass, 1978.		
Sandstone, grayish-orange (10YR7/4); fine- to coarse-grained; friable; air-drilled cuttings--	25	25
Sandstone, yellowish-gray (5Y7/2); fine- to very coarse-grained with shale chips; air-drilled cuttings----------	9	34
Clay shale, medium-dark-gray (N4); air-drilled cuttings----------	9	43
Coal, Bed No. 111 coal; air-drilled cuttings--	1	44
Clay shale, medium-gray (N5); air-drilled cuttings----------	5	49

	Thickness (ft)	Depth (ft)
21N 080W 24BBA01--Continued		
Claystone, medium-gray (N5); air-drilled cuttings----------	2.0	51.0
Clay shale, medium-dark-gray (N4) to medium-light-gray (N6); plant debris; gradational basal contact---------	5.7	56.7
Siltstone, medium-light-gray (N6); calcareous; rootlets; gradational basal contact---------	1.3	58.0
Clay shale, medium-gray (N5) to medium-light-gray (N6); twigs and grass; gradational basal contact---------	3.3	61.3
Claystone, medium-gray (N5); loose and jumbled in core barrel----------	3.4	64.7
Core loss----------	5.9	70.6
Shaly coal, Bed No. 110 coal; sharp basal contact----------	0.3	70.9
Claystone interbedded with interlaminated clay shale and coal, medium-gray (N5) claystone and grayish-black (N2) clay shale; 0.2-1.6 ft thick interbeds; coal makes up less than 20% of the interlaminated units----------	3.7	74.6
Core loss----------	2.4	77.0
Clay shale, dark-gray (N3); shaly coal to interlaminated clay shale and coal at about middle of unit; gradational basal contact----------	1.6	78.6

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
21N 080W 24BBA01--Continued		
Claystone, dark-gray (N3); loose and jumbled in core barrel; rootlets near base; gradational basal contact---------	2.4	81.0
Sand-silt-clay laminite, light-gray (N7) sand, medium-gray (N5) silt, and medium-dark-gray (N4) clay; sandy laminae at top only; burrowed; rootlets and leaves; gradational basal contact--	2.0	83.0
Clay shale, medium-gray (N5) to grayish-black (N2) downward; coal laminae near base; rootlets, grass, reeds, and plant debris; gradational basal contact---------	2.9	85.9
Claystone, medium-gray (N5); rootlets; gradational basal contact--	2.8	88.7
Clay shale, medium-gray (N5) to medium-dark-gray (N4) downward; leaves, grass, reeds, and rootlets; sharp basal contact---------	12.2	100.9
Coal, Upper Bed No. 109 coal; upper 1.4 ft shaly coal and clay shale; sharp basal contact----------	7.2	108.1
Claystone, grayish-black (N2) to dark-gray (N3); coal laminae; sharp basal contact---	0.9	109.0
Coal, Lower Bed No. 109 coal; sharp basal contact----------	1.95	110.95
Clay shale, dark-gray (N3); coal laminae; plant debris; sharp basal contact---------	0.25	111.2
Interbedded sandstone, siltstone, and claystone, light-gray (N7) to very light gray (N8) sand, medium-gray (N5) to medium-light-gray (N6) silt, and medium-gray (N5) clay; ½ inch to 2 ft thick interbeds with a few laminite zones; leaves, rootlets, grass, reeds, and plant debris; gradational basal contact--	19.8	131.0
Sandstone, light-gray (N7) to very light gray (N8); very fine to coarse-grained; two fining-upward units, 12 and 15 ft thick; medium-gray (N5) siltstone interbeds and fragments noted; crossbedded; bark; sharp basal contact---	27.4	158.4
Claystone, mottled medium-dark-gray (N4) to medium-light-gray (N6); brecciated appearance; rootlets; sharp basal contact---	2.0	160.4
Shale-pebble conglomerate, greenish-gray (5G6/1) shale in a very light gray (N8) sand matrix; very fine to fine-grained sand with shale-pebbles; slightly calcareous; sharp basal contact---	0.6	161.0

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
21N 080W 24BBA01--Continued		
Siltstone, medium-gray (N5); light-gray (N7) to very light gray (N8) sand laminae common at top; root-worked; leaves and plant debris; sharp basal contact	3.8	164.8
Interbedded sandstone and siltstone, light-gray (N7) to very light-gray (N8) sand and medium-gray (N5) silt; silty to fine-grained sand; 2 inches to 2 ft thick interbeds; part of a fining-upward unit; few shale-pebble zones; ripplemarked; calcareous in places; sharp basal contact	9.3	174.1
Sandstone, very light gray (N8); fine- to coarse-grained sand with medium-gray (N5) siltstone fragments in 0.5-0.8 ft thick units in lower 4 ft; calcareous in places; part of a fining-upward unit; gradational basal contact	26.9	191.0
Sandstone, light-gray (N7); medium-grained to granular; fining-upward unit; cross-bedded; calcareous in places	20.0	211.0
Core loss	2.5	213.5
21N 080W 24BBA01--Continued		
Sandstone, light-gray (N7); fine-grained to granular sand with medium-light-gray (N6) silt and clay shale-pebble zones; six fining-upward units, 2.5-18 ft thick; crossbedded in places; calcareous in places; coalified bark; sharp basal contact	56.2	269.7
Clay shale, medium-light-gray (N6) to dark-gray (N3) downward; basal 0.1 ft is coal; plant debris, reeds and grass; sharp basal contact	1.4	271.1
Clay shale, dark-gray (N3) to medium-dark-gray (N4); freshwater gastropods; plant debris and reeds; gradational basal contact	1.8	272.9
Claystone, dark-gray (N3) to brownish-gray (5YR4/1); grass, reeds, leaves, and rootlets; shaly in places with coal laminae; gradational basal contact	3.1	276.0
Shaly coal, Bed No. 108 coal; sharp basal contact	1.2	277.2
Interbedded claystone and clay shale, olive-gray (5Y4/1) claystone and dark-gray (N3) to medium-gray (N5) clay shale, 0.2-2.8 ft thick interbeds; some coal laminae; reeds, grass, and rootlets; gradational basal contact	7.4	284.6

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
21N 080W 24BBA01--Continued		
Sandstone, very light gray (N8), silty to very fine grained; ripplemarked; calcareous in upper half; unconformable basal contact	4.6	289.2
Interbedded sandstone and silt-clay laminite, light-gray (N7) to very light-gray (N8) sand, medium-gray (N5) to medium-light-gray (N6) silt, and medium-dark-gray (N4) to medium-gray (N5) clay; very fine-grained sand; 0.2-0.9 ft thick interbeds; ripplemarked; calcareous in places; plant debris; sharp basal contact	3.9	293.1
Clay shale, medium-light-gray (N6) to dark-gray (N3) downward; coal laminae at base; freshwater ostracodes; grass, reeds, and plant debris	1.8	294.9
Core loss	0.8	295.7
Clay shale, medium-light-gray (N6) to grayish black (N2); coal laminae at top; leaves, grass, reeds, and plant debris; gradational basal contact	0.7	296.4
Interbedded claystone and clay shale, brownish gray (5YR4/1) to medium-light-gray (N6); gradational interbeds; rootlets; gradational basal contact	3.9	300.3
21N 080W 24BBA01--Continued		
Clay shale, medium-dark-gray (N4) to medium-gray (N5); mud cracks; freshwater ostracodes, pelecypods, and gastropod operculae; leaves, grass, and reeds; sharp basal contact	19.5	319.8
Sandstone, light-gray (N7) to very light gray (N8); silty to granular; fining upward unit; ripplemarked at top, crossbedded below; plant debris; sharp basal contact	9.6	329.4
Interbedded siltstone and claystone, medium-gray (N5) to greenish-gray (5G6/1); gradational interbeds; unconformable basal contact	1.2	330.6
Clay shale, medium-gray (N5) and dark-gray (N3) laminae (varved appearance); fish scales and bones; leaves; basal contact sharp	7.6	338.2
Sandstone, light-gray (N7); very fine to very coarse grained; poorly sorted; coalified bark	1.0	339.2
Core loss	2.3	341.5
Sandstone, light-gray (N7) to very light gray (N8); fine-grained to pebbly with 0.5-2.4 ft thick shale-pebble zones common; six fining upward units, 2.5-10 ft thick; crossbedded; calcareous in places	51.4	392.9

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
21N 080W 24BBA01--Continued		
Core loss----------	1.0	393.9
Sandstone, light-gray (N7) to very light gray (N8); very fine to very coarse grained; three fining upward units, 5-9 ft thick; cross-bedded---	20.5	414.4
21N 082W 14DDA01		
Hanna #3		
Logged by: Driller (Teton Drilling)		
Sand, tan, medium-coarse; granite and quartzite gravel (to 2 inches)--	5.0	5.0
Sand, yellow, medium-grained, quartz, well-rounded, very clean; moist at approximately 5 ft----	5.0	10.0
Sand, rust-brown, medium-grained, quartz, well-rounded; 10% clay----------	11.0	21.0
Sand, green, brown, and tan; medium-grained, well-rounded, interbedded; approximately 2% dark minerals. Tan sand is more fine grained----------	3.0	24.0
Sandstone, blue-gray, medium-grained, quartz, poorly cemented, with interbedded thin (less than 6 inch) limestone stringers becoming more abundant with depth. 1% dark minerals, 5% clay; saturated at 32 ft----	84.0	108.0
Clay, white, silty, creamy texture--------	2.0	110.0
21N 082W 14DDA01--Continued		
Clay, gray, sandy (fine- to medium-grained), with thin (less than 6 inch) limestone stringers, and thin (less than 6 inch) calcareous clay stringers; overall clay 50%----------	19.0	129.0
Sand, blue-gray, fine-grained, clean; less than 1% dark minerals, less than 10% clay----	41.0	170.0
Sand, medium-gray, fine- to medium-grained, quartz with interbedded thin (less than 6 inch) layers of white clay; thin (less than 6 inch) limestone stringers, and green claystone stringers. Green claystone becomes more abundant with depth----------	104.0	274.0
Sandstone, light-gray, quartz, hard----------	1.5	275.5
Sandstone, gray, coarse-grained, arkosic; 5% dark minerals----------	7.5	283.0
Sandstone, gray, medium- to coarse-grained, with interbedded clay layers----------	9.0	292.0
Sand, coarse, to fine gravel, pyritic, conglomerate----------	5.0	297.0
Clay, gray, sandy (medium to very coarse); 2% dark minerals------	16.0	313.0
Conglomerate, gray-green, very hard, quartz, with interbedded limestone (0.5 to 2 ft) layers; 15% dark minerals----------	21.0	334.0

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
21N 082W 14DDA01--Continued		
Sandstone, gray, very coarse grained, quartz, with interbedded thin (less than 6 inch) limestone stringers---	16.0	350.0
Claystone, gray, sandy (fine-grained)--------	10.0	360.0
Same, but much more limey. Probably a carbonate-cemented quartz sandstone with thin (less than 1 ft) limestone stringers---	72.0	432.0
Claystone, green-gray---	7.0	439.0
Sandstone, medium- to coarse-grained, quartz----------	7.0	446.0
Claystone, gray, brown, and black (carbonaceous), alternating; minor amounts of low grade coal----------	34.0	480.0
21N 082W 21BBC01 Logged by: Driller (Galusha)		
Surface rock----------	6	6
Silt, light-brown, shells----------	10	16
Sand, brown, silty------	49	65
Sand, gray, fine; and shale----------	50	115
Sand, coarse, water-----	10	125
Shale, blue----------	35	160
Sand, gray, water-------	15	175
Sand, gray, shale streaks----------	20	195
21N 083W 16DDA01 Logged by: Driller (Ferguson)		
No samples----------100		100
Sandstone, medium-grained, sub-angular, white- and light-tan-weathered, clay cement, salt-and-pepper, scattered pink chert grains-----	30	130
Same as above with carbonaceous shale streaks and interbeds-	20	150
Sandstone, as above, irregular weathering as above----------	70	220
Sandstone, medium-grained, poorly sorted, very light gray, sub-angular to sub-rounded, salt-and-pepper, loose grains, no shows, no fluorescence----------	70	290
Sandstone, as above with interbedded gray shale----------	28	318
Sandstone, light-gray, salt-and-pepper, sub-angular, no shows no fluorescence, hole making 500 gal/min fresh water estimated on connection at 336 ft, sandstone friable, loose grains----------129		447
Shale, gray to dark-gray----------	53	500

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
21N 083W 16DDA01--Continued		
Shale, as above with interbedded fine- to medium-grained, light-gray, salt-and-pepper sandstone, poor porosity, no shows, no fluorescence, abundant sandstone at 510, streaks gray bentonite 520-540 ft----------	40	540
Sandstone, medium- to fine-grained, light-gray, salt-and-pepper, no shows, no fluorescence----------	10	550
Shale, dark-gray with interbedded sandstone as above----------	10	560
Sandstone, gray, medium- to fine-grained, scattered medium-grained, salt-and-pepper, sub-rounded, no shows, no fluorescence, poor porosity, clay cement, occasional streaks gray sandy shale------	80	640
Sandstone, loose grains, gray, salt-and-pepper, fine- to medium-grained, sub-rounded, trace black carbonaceous shale, trace gilsonite-like material, grades to better cemented sandstone 660-680 ft------	80	720
Sandstone, light-gray, salt-and-pepper, sub-rounded, fine- to medium-grained, well cemented with clay cement, poor porosity, trace carbonaceous shale----------	30	750
21N 083W 16DDA01--Continued		
Sandstone, loose grains, sub-rounded to sub-angular, salt-and-pepper, trace carbonaceous shale---------	20	770
Sandstone, as above, hard, tight, clay cement, abundant weathered surface sandstone----------110		880
Sandstone as above with streaks interbedded gray shale, still abundant weathered surface sandstone-----130		1010
Sandstone, loose grains, salt-and-pepper, medium- to fine-grained, sub-rounded, gray carbonaceous shale flakes throughout, fine-grained 1040-1170 ft----------160		1170
Shale, dark-gray, carbonaceous, and sandstone, medium- to fine-grained as above interbedded----------	30	1200
Sandstone, medium- to fine-grained, light-gray, salt-and-pepper, sub-rounded, with streaks gray shale; sandstone is hard and tight, increase in shale to interbedded 1230-1300 ft----------100		1300
Sandstone, fine- to medium-grained, loose grains, friable with interbedded gray shale----------	10	1310
Sandstone, as above, hard and tight--------	10	1320

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
21N 083W 16DDA01--Continued		
Sandstone, fine- to medium-grained, friable, loose grains, with interbedded gray shale, abundant weathered surface sandstone	180	1500

Note: The hole flowed an estimated 500-700 gal/min of tasteless, clear, odorless, excellent domestic water after making a connection at 336 ft. It is believed other zones all the way to total depth contributed to the water flow as various increases were noted.

21N 084W 13BA 01
Logged by: Driller
(Galusha)

Surface	6	6
Sandstone, gray	6	12
Shale, blue	20	32
Sandstone, gray, trace water	8	40
Shale, blue and shells	40	80
Shale, blue, sticky, with water	50	130
Shale, black, hard, with water	25	155

22N 079W 08B 01
Logged by: Driller
(Roscoe Drilling)

Clay	40	40
Rock	10	50
Shale and sand	10	60
Shale	31	91
Sandrock	6	97

22N 079W 21 01
Logged by: Driller
(Roscoe Drilling)

Surface sand	10	10
Shale	40	50
Sandrock	10	60
Shale	10	70

22N 080W 02CDB01
Como 1
Logged by: Driller
(Roscoe Drilling)

Clay, sandy	24	24
Sandrock	4	28
Shale, sandy	26	54
Sandrock, white	49	103
Sandrock, blue	5	108
Shale	12	120

22N 080W 09CCB01
Stinking Spring
Logged by: Driller
(C&C Drilling)

Surface sand	10	10
Sandrock	80	90

22N 080W 10BCC01
Horse Pasture
Logged by: Driller
(C&C Drilling)

Bentonite	10	10
Shale	40	50

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
22N 080W 12CDD01		
Write Homestead		
Logged by: Driller (C&C Drilling)		
Clay	40	40
Shale	40	80
Sandstone	3	83
Shale, sandy	11	94
Sandrock, gray	12	106
Shale, slightly sandy	44	150
Shale, light-gray	27	177
22N 080W 23ACA01		
Logged by: Driller (Benefiel)		
Surface sand	50	50
Sandstone, hard	10	60
Sandstone	10	70
Clay and sand	10	80
Sandrock	52	132
22N 080W 31CB 01		
Logged by: Driller (Burnley)		
No log	47.5	47.5
Sandrock, gray, hard	3	50.5
Sandrock, gray; gas pocket--blow cleaned hole	46.5	97
Sandrock, gray, some gas, 4" crack, water	24	121
Sandrock, gray	10	131
22N 080W 34DCD01		
WGS-C1		
Logged by: Geologist (Glass)		
Log from corehole; from Glass, 1978.		
Sand, dusky-yellow (5Y6/4); fine- to medium-grained; air-drilled cuttings	25.0	25.0

	Thickness (ft)	Depth (ft)
22N 080W 34DCD01--Continued		
Sandstone and clay shale, dusky-yellow (5Y6/4) sand and light-olive-gray (5Y5/2) shale; sand very fine to fine-grained; air-drilled cuttings	5.0	30.0
Sandstone, very light gray (N8); fine-grained; calcareous; sharp basal contact	1.0	31.0
Sandstone, yellowish-gray (5Y7/2); fine-grained to pebbly, shale chips and fragments common; two fining-upward units, 5 and 12 ft thick; crossbedded; twigs	25.8	56.8
Core loss	0.7	57.5
Silt shale, light-gray (N7); sandy zones; plant debris; sharp basal contact	1.4	58.9
Sandstone, yellowish-gray (5Y5/2) near top to very light gray (N8) downward; fine- to very coarse-grained; six fining-upward units, 5-25 ft thick; crossbedded; twigs, bark, and plant debris; unconformable basal contact	68.8	127.7
Siltstone, medium-light-gray (N6); sandy laminae; plant debris; sharp basal contact	6.1	133.8

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
22N 080W 34DCD01--Continued		
Sandstone, light-gray (N7) to very light gray (N8); fine- to coarse-grained; 6 fining-upward units, 3-6 ft thick; upper 5 ft calcareous; crossbedded; twigs and coalified debris; unconformable basal contact----------	25.2	159.0
Coal, Carbon No. 6 Rider coal bed; sharp basal contact----------	1.2	160.2
Clay shale, medium-light-gray (N6); upper 0.7 ft grayish-black (N2) with coal laminae; leaves, twigs, reeds, grass; sharp basal contact---	4.1	164.3
Coal, Carbon No. 6 Rider coal bed; sharp basal contact----------	1.8	166.1
Clay shale, medium-gray (N5) to medium-light-gray (N6); reeds and grass----------	2.9	169.0
Core loss----------	5.5	174.5
Claystone, medium-gray (N5); rootlets; sharp basal contact---------	7.1	181.6
Sandstone, light-gray (N7) to very light gray (N8); silty to fine-grained; ripple-marked; rootlets at top; sharp basal contact----------	4.7	186.3

	Thickness (ft)	Depth (ft)
22N 080W 34DCD01--Continued		
Interbedded clay shale and sandstone, medium-light-gray (N6) shale and light-gray (N7) sand; silty to fine-grained sand units 0.3-0.7 ft thick; shale units 1-2 ft thick; rootlets, twigs, and reeds; sharp basal contact---	4.2	190.5
Claystone, medium-dark-gray (N4) to medium-gray (N5); rootlets, twigs, and reeds; gradational basal contact----------	7.2	1[illegible]
Sand-clay laminite, medium-gray (N5) clay and light-gray (N7) sand; silt to very fine sand, 2 ft bedded at top to thin interbeds and laminae near base; burrowed; twigs, leaves, and plant debris; sharp basal contact----------	17.0	214.7
Coal, Upper Carbon No. 6 coal bed; sharp basal contact----------	2.3	217.0
Clay shale, grayish-black (N2) to dark-gray (N3); coal laminae----------	2.0	219.0
Core loss----------	0.5	219.5
Claystone, olive-black (5Y2/1); rootlets; sharp basal contact---	0.8	220.3

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
22N 080W 34DCD01--Continued		
Coal, Lower Carbon No. 6 coal bed; sharp basal contact----------	1.6	221.9
Sand-clay laminite, light-gray (N7) sand and medium-gray (N5) clay; very fine grained sand laminae increase downward; brecciated appearance at top; burrowed in lower half; gradational basal contact--	4.1	226.0
Interbedded claystone and siltstone, medium-dark-gray (N4) clay and medium-gray (N5) silt; 0.4-2.3 ft interbeds; 0.2 ft coal interbed at 231.4-232.2 ft; rootlets----	8.6	234.6
Core loss----------	1.4	236.0
Claystone, medium-dark-gray (N4); sharp basal contact----------	3.5	239.5
Siltstone, medium-gray (N5) silt with light-gray (N7) sand laminae; sand silty to very fine grained; ripplemarked; rootworked; leaves, reeds, and plant debris; sharp basal contact---	12.0	251.5
Sand-silt laminite, light-gray (N7) sand and medium-gray (N5) silt; sand units thicken to 2 ft in places; ripplemarks; leaves and plant debris; gradational basal contact---------	7.7	259.2
22N 080W 34DCD01--Continued		
Sandstone, light-gray (N7) with medium-gray (N5) silt laminae; silty to very fine grained; calcareous in places; rootworked?; leaves; sharp basal contact----------	7.6	266.8
Interbedded siltstone and claystone, medium-light-gray (N6) to greenish-gray (5G6/1); grass and leaves; sharp basal contact---	3.1	269.9
Clay shale, dark-gray (N3); coal laminae; plant debris; sharp basal contact---------	3.9	273.9
Coal, Upper Carbon No. 7 (upper bench) coal bed; shaly in places; sharp basal contact---------	1.65	275.55
Clay shale, grayish-black (N2); coal laminae; plant debris; sharp basal contact---------	0.35	275.9
Coal, Upper Carbon No. 7 (lower bench) coal bed; shaly in places; sharp basal contact---	1.9	277.8
Claystone, medium-gray (N5); upper 1.2 ft mottled-medium-dark-gray (N4) and light-olive-gray (5Y6/1); rootlets----------	3.3	281.1
Core loss----------	4.7	285.8
Clay shale, medium-dark-gray (N4) grading down into grayish-black (N2); burrowed; reeds, leaves, and plant debris; sharp basal contact----------	8.5	294.3

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
22N 080W 34DCD01--Continued		
Coal, Lower Carbon No. 7 coal bed; sharp basal contact	1.3	295.6
Claystone, medium-light-gray (N6) to light-olive-gray (5Y6/1); rootlets; plastic; gradational basal contact	7.6	303.2
Clay shale, medium-gray (N5) to olive-gray (5Y4/1); rootlets at top; leaves, twigs, and plant debris; sandstone laminae and interbeds at base	6.7	309.9
Sandstone, light-gray (N7); silty to medium-grained; ripplemarked and crossbedded; calcareous near base	14.4	324.3
Core loss	2.7	327.0
Sandstone, light-gray (N7); to very light gray (N8); fine- to medium-grained; crossbedded; calcareous; plant debris	11.3	338.3
Core loss	8.9	347.2
Sandstone, light-gray (N7) to very light gray (N8); medium- to coarse-grained; crossbedded; shale chips common; calcareous	8.7	355.9
Core loss	1.3	357.2
Sandstone, light-gray (N7) to very light gray (N8); fine- to coarse-grained; calcareous	0.2	357.4
Core loss	1.7	359.1
22N 080W 34DCD01--Continued		
Shale-pebble conglomerate, medium-gray (N5) shale in a light-gray (N7) sand matrix; fine- to medium-grained sand with shale pebbles to 2 inches in diameter; fining-upward unit; calcareous; sharp basal contact	1.3	360.4
Sandstone, light-gray (N7); fine- to very coarse grained; at least four fining-upward units noted, 5-15 ft thick; medium-gray (N5) shale chips common at the base of some units; calcareous in places; coalified bark	74.8	435.2
Core loss	2.4	437.6
Sandstone, light-gray (N7); fine- to very coarse grained; three fining-upward units, 5-15 ft thick; medium-gray (N5) shale pebbles and chips at the base of some units; calcareous in places; crossbedded in places; bark and plant debris	49.1	467.2
Core loss	0.5	467.7
Sandstone, light-gray (N7); fine-grained to granular; includes parts of two fining-upward units, 7-19 ft thick; medium-gray (N5) shale pebbles in upper 1.8 ft; calcareous in places; crossbedded in places; plant debris	9.3	476.5

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
22N 080W 34DCD01--Continued		
Core loss----------	0.8	477.7
Sandstone, light-gray (N7); very fine to very coarse grained; portion of fining-upward unit; cross-bedded and ripple-marked; plant debris--	9.0	486.7
Core loss----------	1.0	487.7
Sandstone, light-gray (N7); coarse- to very coarse grained with shale and coal pebbles common; sharp basal contact----------	1.0	488.7
Coal, Bed No. 111 coal; estimate up to 1.5 ft lost in coring; sharp basal contact---------	4.3	493.0
Clay shale, medium-light-gray (N6); rootlets; sharp basal contact---------	1.6	494.6
Coal, unnamed; sharp basal contact---------	0.1	494.7
Siltstone, medium-light-gray (N6); rootlets; gradational basal contact---------	1.9	496.6
Sand-silt laminite, light-gray (N7) sand with medium-light-gray (N6) silt laminae and interbeds; silty to very fine grained sand; ripplemarked; rootlets, reeds, and twigs----------	3.4	500.0
Core loss----------	7.7	507.7

	Thickness (ft)	Depth (ft)
22N 080W 35DDC01		
WGS-C3A		
Logged by: Geologist (Glass)		
Log modified from core-hole WGS-C3A and core-hole WGS-C3, located 25 ft north of WGS-C3A; from Glass, 1978.		
Clay and soil, moderate-yellowish-brown (10YR5/4); minor amount of sand; air-drilled cuttings------	5.0	5.0
Sandstone, yellowish-gray (5Y7/2); medium to very coarse grained; friable; air-drilled cuttings----------	10.0	15.0
Silt shale, yellowish-gray (5Y7/2); air-drilled cuttings------	5.0	20.0
Claystone, yellowish-gray (5Y7/2); air-drilled cuttings------	3.0	23.0
Siltstone, yellowish-gray (5Y7/2); few ½ to 1 inch thick very fine grained sandstone interbeds; gradational basal contact---------	0.7	23.7
Claystone, yellowish-gray (5Y7/2); shaly in places; coalified roots; plastic--------	5.8	29.5
Core loss----------	1.0	30.5
Claystone, yellowish-gray (5Y7/2) to pale olive (10Y6/2); shaly in places; plastic----	6.8	37.3
Core loss----------	1.5	38.8

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
22N 080W 35DDC01--Continued		
Claystone, yellowish-gray (5Y7/2) grading down into greenish-gray (5GY6/1) and medium light gray (N6); silty at base; upper part jumbled and broken in core barrel; gradational basal contact---------	6.8	45.6
Interbedded siltstone and claystone, light-bluish-gray (5B7/1) to medium-light-gray (N6); gradational interbeds with sandy zones near base; roots near base; gradational basal contact---------	13.7	59.3
Clay shale, medium-light-gray (N6); silty in places-------	0.6	59.9
Core loss----------	1.6	61.5
Interbedded claystone and clay shale, medium-light-gray (N6) with occasional very fine grained, light-gray (N7) sandstone interbeds 0.2-0.5 ft thick; some claystones exhibit brecciated appearance; burrowed; roots in lower 4 ft; gradational basal contact----------	16.7	77.2
Sandstone, light-gray (N7) to very light gray (N8); silty to pebbly sand with medium-gray (N5) shale-pebble zones; three fining-upward units, 2.5-10 ft thick; crossbedded in places; calcareous in places; coalified bark----------	14.7	91.9
Core loss----------	3.0	94.9
Sandstone, light-gray (N7) to very light gray (N8); very fine grained to pebbly sand with medium-gray (N5) shale-pebble zones; three fining-upward units, 4-13 ft thick; crossbedded; coalified bark and logs---------	23.4	118.3
Core loss----------	1.7	120.0
Sandstone, medium-light-gray (N6) to light-gray (N7); fine grained to granular sand; two fining-upward units, 3-6.4 ft thick; crossbedded; calcareous in places; coalified bark--------	9.4	129.4
Core loss----------	0.6	130.0
Sandstone, medium-light-gray (N6) to light-gray (N7); medium to very coarse grained; fining-upward unit; crossbedded; unconformable basal contact----------	4.3	134.3
Shaly coal, Carbon No. 6 Rider coal bed; portions broken and jumbled in core barrel----------	1.0	135.3
Claystone, dark-gray (N3) to brownish-gray (5YR4/1); broken and jumbled in core barrel----------	0.3	135.6
Core loss----------	1.4	137.0
Clay shale, medium-dark-gray (N4); leaves, reeds, and grass------	2.9	139.9
Core loss----------	4.0	143.9

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
22N 080W 35DDC01--Continued		
Claystone, medium-dark-gray (N4) becomes dark gray (N3) and shaly at top and bottom of unit; leaves, reeds, grass, and plant debris	5.2	149.1
Core loss	1.9	151.0
Clay shale, grayish-black (N2) to dark-gray (N3); coal laminae common; plant debris; sharp basal contact	1.9	152.9
Coal, Carbon No. 6 Rider coal bed; sharp basal contact	0.4	153.3
Clay shale, medium-dark-gray (N4); leaves, grass, and reeds; gradational basal contact	6.3	159.6
Claystone, medium-gray (N5); roots, rootlets, and leaves; sharp basal contact	10.4	170.0
Siltstone, medium-gray (N5); few fine grained sandstone interbeds to 0.5 ft thick; base marked by broken, jumbled core	9.2	179.2
Sandstone, very light gray (N8); fine grained; crossbedded	4.5	183.7
Core loss	1.0	184.7
Sandstone, light-gray (N7) to very light gray (N8); fine to medium grained; crossbedded	10.7	195.4
Core loss	3.6	199.0
22N 080W 35DDC01--Continued		
Sandstone, light-gray (N7) to very light gray (N8); medium- to coarse-grained; fining upward unit; crossbedded calcareous in places	10.2	209.2
Claystone, mottled-olive-gray (5Y4/1) and brownish-black (5YR2/1); brecciated appearance; rootlets	4.0	213.5
Core loss	1.0	214.5
Sandstone, very light gray (N8); fine grained; unconformable basal contact	0.5	215.0
Claystone, medium-gray (N5); plant debris; sharp basal contact	1.5	216.5
Sandstone, very light gray (N8); fine grained to pebbly; two fining-upward units, 3-4 ft thick; calcareous in places; coalified bark; unconformable basal contact	8.2	224.7
Interbedded siltstone and claystone, medium-gray (N5) to medium-light-gray (N6); shaly in places; ripple-marked; leaves, grass, and rootlets; sharp basal contact	7.8	232.5
Coal, Upper Carbon No. 6 coal bed; sharp basal contact	6.2	238.7
Clay shale, grayish-black (N2) to brownish-black (5YR2/1); coal laminae	1.0	239.7

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
22N 080W 35DDC01--Continued		
Coal, Lower Carbon No. 6 coal bed; sharp basal contact	1.3	241.0
Clay shale, grayish-black (N2) grading down into medium dark gray (N4); coal laminae at top; rootlets, grass, reeds, and leaves; sharp basal contact	5.2	246.2
Shaly coal, unnamed coal bed; sharp basal contact	0.4	246.6
Claystone, medium-dark-gray (N4) to medium-gray (N5); shaly in places; silty in places; rootlets; gradational basal contact	6.5	253.1
Interlaminated and interbedded coal and clay shale, grayish-black (N2) to medium-dark-gray (N4) clay shale; coal interbeds to 0.3 ft thick; plant debris; gradational basal contact	2.7	255.8
Interbedded claystone and clay shale, mottled-medium-gray (N5) and olive-gray (5Y4/1); brecciated appearance in places; rootlets; sharp basal contact	6.2	262.0
Coal, unnamed coal bed; sharp basal contact	0.6	262.6
Interbedded claystone and clay shale, medium-gray (N5) to medium-light-gray (N6); upper 0.4 ft plastic; brecciated appearance in places; rootlets; gradational basal contact	3.9	266.5
22N 080W 35DDC01--Continued		
Interlaminated coal and clay shale, grayish-black (N2) to dark-gray (N3) shale; coal laminae less than 25% of unit; plant debris; sharp basal contact	1.0	267.5
Claystone, dark-gray (N3) to medium-dark-gray (N4); sharp basal contact	0.6	268.1
Coal, Upper Carbon No. 7 (upper-bench) coal bed; sharp basal contact	1.7	269.8
Interlaminated coal and clay shale, grayish-black (N2) shale; coal laminae less than 25% of unit; sharp basal contact	0.5	270.3
Coal, Upper Carbon No. 7 (lower bench) coal bed; sharp basal contact	2.1	272.4
Claystone, medium-gray (N5) to medium-light-gray (N6); rootlets; sharp basal contact	2.0	274.4
Silt-sand laminite, medium-light-gray (N6) silt and light-gray (N7) sand; silty to very fine grained sand; calcareous in places; roots and rootlets; gradational basal contact	1.9	276.3
Interbedded claystone and clay shale, medium-gray (N5) to medium-light-gray (N6); rootlets; basal 0.5 ft jumbled and loose in core barrel	4.5	280.8

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
22N 080W 35DDC01--Continued		
Clay shale, medium-gray (N5); freshwater gastropod operculae; leaves, reeds, and grass; sharp basal contact----------	2.4	283.2
Coal, Lower Carbon No. 7; sharp basal contact----------	2.0	285.2
Claystone, brownish-gray (5YR4/1); upper 0.2 ft has brecciated appearance; rootlets and plant debris; sharp basal contact---------	8.5	293.7
Interbedded coal, claystone, and interlaminated coal and clay shale, brownish-gray (5YR4/1) claystone and medium-dark-gray (N4) to grayish-black (N2) clay shale; coal interbeds to 0.5 ft thick; most units 0.3-0.5 ft thick; claystones contain rootlets; clay shales contain plant debris; sharp basal contact---	6.0	299.7
Claystone, medium-gray (N5) to brownish-gray (5YR4/1); rootlets and roots; gradational basal contact---------	24.3	324.0
Interbedded siltstone and claystone, medium-gray (N5); rootlets; gradational basal contact----------	7.9	331.9
22N 080W 35DDC01--Continued		
Claystone, medium-dark-gray (N4) to light-olive-gray (5Y6/1); brecciated appearance in places; rootlets; thin calcareous sandstone interbed just below middle (0.1 ft thick); gradational basal contact---------	27.6	359.5
Clay shale, medium-dark-gray (N4), becomes dark gray (N3) at base with coal laminae; leaves, reeds, grass, and plant debris; sharp basal contact---	2.0	361.5
Interbedded claystone and siltstone, medium-light-gray (N6) to greenish-gray (5GY6/1); gradational interbeds; rootlets at top; gradational basal contact---------	4.6	366.1
Siltstone, light-gray (N7) to medium-dark-gray (N4); interlaminated with silty to very fine grained sand near base; rootlets, grass, leaves, and plant debris; sharp basal contact---------	3.6	369.7
Sandstone, light-gray (N7) to very light gray (N8); silty to fine grained; calcareous; bark and plant debris; gradational basal contact---------	2.2	371.9

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
22N 080W 35DDC01--Continued		
Claystone, medium-light-gray (N6); silty; plant debris; gradational basal contact--	1.7	372.2
Interbedded silt shale and sandstone, medium-light-gray (N6) shale and very light gray (N8) sand; 0.3-0.6 ft thick units with sharp contacts; sandstones are calcareous, roots, leaves, grass, and reeds; sharp basal contact----------	3.2	375.4
Interbedded claystone, clay shale, and interlaminated coal and clay shale, brownish-gray (5Y4/1) claystone and medium-light-gray (N6) to dark-gray (N3) clay shale; 0.2-1.3 ft thick interbeds; freshwater ostracodes; rootlets, grass, reeds, and leaves; basal 0.4 ft jumbled and loose in core barrel----------	4.6	380.0
Silt shale, medium-dark-gray (N4) and medium-light-gray (N6) color laminations (varve-like); freshwater gastropods, gastropod operculae, ostracodes, and fish bones, leaves, grass, and plant debris; gradational basal contact--	7.3	387.3
Clay shale, medium-dark-gray (N4) and medium-gray (N5) color laminations (varve-like); fish bones at top of unit; leaves at top of unit; sharp basal contact----------	3.3	390.6
22N 080W 35DDC01--Continued		
Sandstone, light-gray (N7) to very light gray (N8); very fine grained to granular sand with medium gray (N5) shale-pebble zones common; nine fining-upward units, 3-15 ft thick; crossbedded; plant debris and coalified bark; sharp basal contact---	58.0	448.6
Coal, Bed No. 111 coal, sharp basal contact---	3.4	452.0
Siltstone, medium-light-gray (N6) with light-gray (N7), very fine to fine-grained sandy interbeds at base; calcareous in places; roots and rootlets; sharp basal contact---	5.5	457.5
Sandstone, light-gray (N7) to very light gray (N8); very fine grained to granular with medium-gray (N5) shale-pebble zones; three fining-upward units, 2-5 ft thick; crossbedded; calcareous in places; coalified bark and plant debris; unconformable basal contact----------	11.9	469.4
Interbedded siltstone and claystone, light-gray (N7) silt and medium-gray (N5) clay; shaly at top and bottom; rootlets, grass, reeds, and plant debris; sharp basal contact----------	5.3	474.7

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
22N 080W 35DDC01--Continued		
Claystone, dark-greenish-gray (5GY4/1) to medium-gray (N5); rootlets; sharp basal contact----------	4.9	479.6
Interbedded silt shale, clay shale, and sandstone, medium-light-gray (N6) silt, medium-gray (N5) clay, and light-gray (N7) sand; silty to very fine grained sandstone units to one foot thick, calcareous; ripplemarked; clay-silt-sand laminite in places; leaves, reeds, grass, and plant debris; sharp basal contact----------	8.7	488.3
Sandstone, light-gray (N7) to very light gray (N8); silty to fine grained; ripplemarked; calcareous in places; leaves and plant debris----------	11.3	499.6
Core loss----------	2.0	501.6
Sandstone, light-gray (N7) to very light gray (N8); very fine grained to pebbly; six fining-upward units, 3-30 ft thick; medium-gray (N5) shale-pebble conglomerates 1.7-5.4 ft thick; crossbedded; calcareous in places; plant debris, leaves, and coalified bark; unconformable basal contact----------	65.2	566.8
22N 080W 35DDC01--Continued		
Coal, Upper Bed No. 109 coal; 1.25 ft thick, grayish-black (N2), clay shale parting 1.7 ft below top of coal; sharp basal contact----------	3.8	570.6
Claystone, medium-dark-gray (N4) becoming brownish-gray (5YR4/1) downward; shaly at base; leaves, reeds, roots, and rootlets; gradational basal contact----------	3.8	574.4
Siltstone, medium-gray (N5); leaves, grass, reeds, roots; gradational basal contact--	3.1	577.5
Claystone, medium-gray (N5) becoming dark-gray (N3) downward; roots, rootlets, and leaves; sharp basal contact----------	2.1	579.6
Coal, Lower bed No. 109; sharp basal contact---	1.0	580.6
Clay shale, medium-dark-gray (N4) becoming medium-light-gray (N6) downward; silty downward; leaves and plant debris; sharp basal contact----------	0.7	581.3
Sand-silt laminite, light-olive-gray (5Y6/1) sand and dark-gray (N3) to medium-gray (N5) silt; ripple marked; leaves, reeds, and grass; gradational basal contact----------	5.1	586.4

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
22N 080W 35DDC01--Continued		
Interbedded silt and clay shale, medium-dark-gray (N4) to medium-gray (N5); leaves, reeds and grass; gradational basal contact	6.8	593.2
Sandstone, light-gray (N7) to very light gray (N8); silty to very coarse sand with medium-gray (N5) shale-pebble zones; four fining-upward units, 3-7 ft thick; crossbedded; calcareous in places; plant debris	27.5	620.7
22N 081W 21AAB01		
HSW-4		
Logged by: Driller (Meidinger)		
Clay, sandy	2.4	2.4
Sand	3.1	5.5
Sandstone	15.8	21.3
Shale, sandy	2.9	24.2
Sandstone	7.7	31.9
Shale, sandy	3.8	35.7
Sandstone	58.3	94.0
Sandstone, water	56.0	150.0
22N 081W 21ABB02		
HSW-5		
Logged by: Driller (Meidinger)		
Clay, sandy	2.6	2.6
Sand	3.2	5.8
Sandstone	15.7	21.5
Shale, sandy	3.5	25.0
Sandstone	8.2	33.2
Shale, sandy	2.7	35.9
Sandstone	59.2	95.1
Sandstone, water	54.9	150.0
22N 081W 31CDD01		
HSW-1		
Logged by: Driller (Havercroft)		
Clay, brown, sandy	22	22
Sand, brown	16	38
Shale, black	32	70
Coal	5	75
Shale, gray	40	115
Sandstone, gray, fractured, water at 115 ft	15	130
Shale, black	10	140
22N 081W 31CDD02		
HSW-2		
Logged by: Driller (Havercroft)		
Clay, brown, sandy	22	22
Sand, brown with clay	16	38
Shale, black	37	75
Shale, gray; some black	55	130
Shale, black; some gray clay	40	170
Clay, gray	45	215
Clay, gray; with stringers of gray sand; slight water in sand stringers	45	260
22N 081W 33DDC01		
HSW-3		
Logged by: Driller (Havercroft)		
Clay, yellow; some sand	5	5
Sand, brown, with brown clay	5	10
Shale, black (water at 26 ft)	60	70
Shale, black, with gray sandy stringers (water increase to about 5 gal/min)	10	80

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
22N 081W 33DDC01--Continued		
Sandstone, gray, fractured (water increase to 25-30 gal/min)	40	120
22N 082W 12ACD01 S2W-7 Logged by: Driller		
Rock, broken	1.9	1.9
Sandstone, soft	6.1	8.0
Shale	7.7	15.7
Shale, carbonaceous	8.2	23.9
Shale	1.9	25.8
Shale, sandy, and sandstone	19.8	45.6
Sandstone	18.6	64.2
Shale	5.9	70.1
Shale, carbonaceous	1.5	71.6
Sandstone	10.9	82.5
Shale, dark	3.2	85.7
Shale, carbonaceous, with coal streaks	1.4	87.1
Shale	7.7	94.8
Shale, carbonaceous	3.1	97.9
Shale	0.9	98.8
Shale, carbonaceous	2.9	101.7
Sandstone	24.2	125.9
Shale	5.2	131.1
Shale, carbonaceous	9.2	140.3
Sandstone	12.6	152.9
Sandstone, hard	1.7	154.6
Shale, sandy	1.2	155.8
Shale, with carbonaceous shale streaks	10.2	166.0
Sandstone	5.8	171.8
Shale, sandy	2.6	174.4
Sandstone	8.5	182.9
Shale, sandy	8.7	191.6
Sandstone, hit water at 215.2 ft	48.4	240.0
22N 082W 19DAB01 S1W-3 Logged by: Driller (Meidinger)		
Clay, sandy	1.1	1.1
Sandstone, hard streaks	77.5	78.6
Shale, carbonaceous, and coal	1.7	80.3
Shale, sandy	6.2	86.5
Sandstone	5.3	91.8
Shale, carbonaceous, with coal streaks	1.7	93.5
Shale, sandy	6.2	99.7
Sandstone	11.7	111.4
Shale, carbonaceous, with coal streaks	1.5	112.9
Sandstone	27.5	140.4
Sandstone, hard	2.7	143.1
Sandstone	9.3	152.4
Sandstone, hard	1.8	154.2
Sandstone	12.4	166.6
Shale, sandy, and sandstone	2.8	169.4
Shale, carbonaceous	4.6	174.0
Sandstone	29.3	203.3
Shale, carbonaceous, and shale	12.3	215.6
Shale, sandy and sandstone	11.3	226.9
Sandstone, water at 251.6 ft	33.1	260.0

Table 2.--Lithologic logs of selected wells and test holes--Continued

22N 082W 30BCB01
S1W-4
Logged by: Driller (Havercroft)

	Thickness (ft)	Depth (ft)
Clay, yellow, with sand and gravel	30	30
Shale, dark-brown, with soft sandstone stringers; water at 40 ft (8-12 gal/min)	70	100
Coal	10	110
Shale, dark-brown, with sandstone stringer	90	200
Sandstone, gray, fractured; water 2-3 gal/min	10	210
Sand, gray, and dark brown shale (more water)	15	225
Shale, brown	35	260

22N 082W 31BCD01
S1W-1
Logged by: Driller (Meidinger)

	Thickness (ft)	Depth (ft)
Clay, sandy	2.9	2.9
Clay, sticky	15.9	18.8
Sand and gravel, water	6.9	25.7
Shale	1.9	27.6
Shale, carbonaceous	3.1	30.7
Sandstone	25.7	56.4
Shale	1.1	57.5
Coal	0.4	57.9
Shale	4.3	62.2
Sandstone	3.5	65.7
Shale	20.9	86.6
Sandstone	40.1	126.7
Shale	5.1	131.8
Shale, sandy, and sandstone	8.2	140.0

22N 082W 32AAA01
S1W-2
Logged by: Driller (Meidinger)

	Thickness (ft)	Depth (ft)
Clay, sandy	3.2	3.2
Sand	8.7	11.9
Sandstone	10.2	22.1
Shale	1.9	24.0
Sandstone	106.5	130.5
Coal and carbonaceous shale	2.3	132.8
Shale, carbonaceous, damp	2.4	135.2
Coal	2.9	138.1
Shale, carbonaceous	2.6	140.7
Shale, carbonaceous, with coal streaks	3.1	143.8
Shale, sandy, and sandstone	31.8	175.6
Sandstone	64.2	239.8
Shale, sandy	10.2	250.0

22N 083W 20DBB01
AMC-2
Logged by: Driller (Evitt)

	Thickness (ft)	Depth (ft)
Sand	8.5	8.5
Shale, sandy	7.7	16.2
Shale	7.6	23.8
Sandstone	31.1	54.9
Shale	10.3	65.2
Shale, carbonaceous	4.5	69.7
Shale	13.7	83.4
Sandstone	19.4	102.8
Shale	31.4	134.2
Sandstone, water; small amount porous sandstone	41.1	175.3
Shale	35.2	210.5
Shale, carbonaceous	7.8	218.3
Shale	31.7	250.0
Sandstone, porous; water, principal source	60.0	310.0

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
22N 083W 22ACB01		
AMC-1		
Logged by: Driller		
Shale, sandy, gray------	15.1	15.1
Sandstone, brown, water at 40 ft----------	24.9	40.0
Sandstone, water at 80 ft-----------------	120.0	160.0
Shale, gray----------	9.0	169.0
22N 083W 22ACB02		
AMC-9		
Logged by: Driller		
Shale, sandy----------	5.4	5.4
Shale----------	7.9	13.3
Shale, sandy----------	4.2	17.5
Shale----------	21.1	38.6
Sandstone, water--------	109.1	147.7
Shale----------	39.9	187.6
Sandstone, water at 215 ft----------	83.4	271.0
Shale----------	69.0	340.0
22N 083W 29DCC01		
Palm #3		
Logged by: Driller (Galusha)		
Topsoil----------	4	4
Sandrock----------	8	12
Shale, brown----------	6	18
Sandrock----------	4	22
Shale, brown----------	38	60
Hardshell----------	4	64
Sand, fine, gray--------	28	92
Shale, black----------	3	95
23N 080W 14CBA01		
Pine Draw		
Logged by: Driller (C&C Drilling)		
Sand, surface----------	20	20
Sandrock, water---------	90	110

	Thickness (ft)	Depth (ft)
23N 081W 04DCC01		
25E-B		
Logged by: Geologist (Schug)		
Log from Hansen and Schug, 1979.		
Alluvium and weathered material----------	35.0	35.0
Shale, light-gray with coal traces----------	3.0	38.0
Coal and interbedded carbonaceous shale----	13.0	51.0
Sandstone, light-gray, very fine grained-----	22.0	73.0
Siltstone grading into shale----------	7.0	80.0
Coal with minor carbonaceous shale partings--	9.0	89.0
Shale parting carbonaceous----------	2.5	91.5
Coal----------	1.0	92.5
Siltstone, light-gray---	5.0	97.5
Shale, carbonaceous-----	3.0	100.5
Siltstone, light-gray, grading into dark-gray mudstone----------	11.0	111.5
Shale, carbonaceous-----	3.0	114.5
Shale and dark-gray mudstone, grading into light-gray siltstone, interbedded----	22.5	137.0
Sandstone, light- to dark-gray, fine-grained, laminated----	11.0	148.0
Coal and dull-black carbonaceous shale, interbedded----------	35.0	183.0
Mudstone, dark-gray, shale, and carbonaceous shale, interbedded----------	16.0	199.0
Coal, with minor carbonaceous shale partings----------	8.0	207.0
Shale, carbonaceous shale, and coal interbedded----------	14.5	221.5

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 081W 04DCC01--Continued		
Coal, with small carbonaceous shale partings	15.5	237.0
Shale, siltstone, and minor coal, interbedded	12.5	249.5
Mudstone, dark-gray, grading into siltstone	6.0	255.5
Sandstone and siltstone, very fine grained, alternating	61.0	316.5
Coal, carbonaceous shale, interbedded coal, and carbonaceous shale, alternating	53.5	370.0
Sandstone, light-gray, fine-grained	5.0	375.0
Coal	2.0	377.0
Mudstone, dark-gray	5.0	382.0
Coal with thin carbonaceous shale partings	7.5	389.5
Sandstone, light-gray, very fine grained	11.0	400.5
Coal and carbonaceous shale, alternating	44.5	445.0
Sandstone, light-gray to medium-gray, very fine to fine-grained	16.0	461.0
Coal and carbonaceous shale, alternating	18.0	479.0
Mudstone and siltstone	8.0	487.0
Coal and carbonaceous shale, minor siltstone interbeds	15.0	502.0
Sandstone, light-gray, very fine grained; interbedded siltstone	19.0	521.0
Coal with minor carbonaceous shale partings	9.0	530.0
Sandstone and siltstone, very fine to fine-grained, interbedded	180.0	710.0

	Thickness (ft)	Depth (ft)
23N 081W 09CAC01 S2W-3 Logged by: Driller (Havercroft)		
Clay, yellow	33	33
Shale, black, sandy; some gravel	10	43
Shale, black	17	60
Shale, gray, sandy; some gravel	35	95
Shale, black	25	120
Sandstone, gray	9	129
Shale, black	21	150
Clay, gray; some sand and black shale	135	285
Shale, black	15	300
23N 081W 09CAC02 S2W-4 Logged by Driller (Havercroft)		
Sandstone, yellow, and gravel	25	25
Shale, black	35	60
Shale, black, and gray sand	5	65
Sandstone, gray, medium hard with black shale; water	30	95
Shale, black	17	112
Sandstone, gray, hard	14	126
Shale, black, with 6 to 18 inch coal seams	50	176
Sandstone, gray	20	196
Shale, black	4	200
23N 081W 09CAC03 S2W-5 Logged by: Driller (Meidinger)		
Clay, sticky	35.6	35.6
Shale, dark	10.4	46.0

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 081W 09CAC03--Continued		
Sandstone, water	4.6	50.6
Shale, sandy	1.5	52.1
Hard rock	3.2	55.3
Sandstone	0.9	56.2
Shale, carbonaceous, with coal streaks	4.6	60.8
Coal	4.1	64.9
Shale, carbonaceous	0.9	65.8
Coal	2.8	68.6
Shale, carbonaceous	1.2	69.8
Coal with carbonaceous shale	2.0	71.8
Coal	2.1	73.9
Coal with carbonaceous shale streaks	1.7	75.6
Shale	2.4	78.0
Sandstone	5.2	83.2
Shale, sandy	3.9	87.1
Sandstone, hard	1.5	88.6
Shale, sandy	1.3	89.9
Coal	2.8	92.7
Shale	3.2	95.9
Sandstone	9.2	105.1
Shale, sandy	3.5	108.6
Shale, carbonaceous	5.8	114.4
Shale	1.5	115.9
Shale, sandy	1.7	117.6
Sandstone	3.7	121.3
Sandstone, hard	1.0	122.3
Sandstone	2.1	124.4
Shale, carbonaceous	3.6	128.0
Sandstone, firm	31.2	159.2
Sandstone, hard	0.8	160.0
Sandstone	9.2	169.2
Shale, sandy	4.4	173.6
Coal	1.2	174.8
Shale, carbonaceous with coal streaks	1.6	176.4
Sandstone	4.2	180.6
Sandstone, hard	3.7	184.3
Shale, sandy with sandstone	14.5	198.8
Sandstone, hard	1.2	200.0

	Thickness (ft)	Depth (ft)
23N 081W 14BDD01 5CW		
Logged by: Geologist (Hansen)		
Log from Hansen and Schug, 1979.		
Sandstone, light-brown-yellow, fine- to very coarse grained to granular	5.0	5.0
Sandstone, light-yellowish-gray, medium- to coarse-grained	4.0	9.0
Sandstone, light-yellowish-gray, fine- to medium-grained	19.5	28.5
Siltstone, medium-gray and light-olive-gray, very sandy	9.5	38.0
Siltstone, medium-gray, shaly	15.0	53.0
Shale, medium-gray, silty	59.3	112.3
Sandstone, light-gray, fine-grained, silty	5.7	118.0
Shale, medium-gray and dark-gray, carbonaceous	4.0	122.0
Coal	9.0	131.0
Shale, medium-gray	1.3	132.3
Coal	5.7	138.0
Shale, black, coaly	2.0	140.0
Coal, shaly	2.0	142.0
Shale, dark-gray to black, carbonaceous	1.0	143.0
Coal, shaly	12.5	155.5
Shale, dark-gray to black, coaly	10.5	166.0
Coal	2.3	168.3
Shale, dark-gray, carbonaceous	3.7	172.0
Coal, shaly	1.0	173.0
Shale, dark-gray to black, carbonaceous	9.3	182.3

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 081W 14BDD01--Continued		
Shale, medium-gray, silty	4.7	187.0
Sandstone, light-gray, fine- to medium-grained, friable	113.0	300.0
Sandstone, light-gray, coarse-grained, granular	15.3	315.3
Shale, light-gray, very silty	21.0	336.3
Siltstone, light-gray	14.1	350.4
Shale, light-gray, silty	11.1	361.5
Sandstone, light-gray, very fine grained, very silty	13.5	375.0
Siltstone, light-gray	40.0	415.0
Sandstone, light-gray, very fine grained	6.2	421.2
Siltstone, medium-gray, shaly	8.8	430.0
Siltstone, medium-gray, sandy	26.0	456.0
Sandstone, light- to medium-gray, very fine grained, silty	28.5	484.5
Shale, medium-gray, silty	3.8	488.3
Coal	5.7	494.0
Shale, black, coaly	3.0	497.0
Coal	3.0	500.0
Shale, dark-gray to black, carbonaceous	2.0	502.0
Coal	4.4	506.4
Shale, black, very coaly	1.6	508.0
Coal	7.0	515.0
Shale, black, coaly	1.0	516.0
Coal	4.4	520.4
Coal, shaly and black, coaly shale	4.9	525.3
Shale, medium-dark-gray	3.0	528.3
Coal, shaly	9.2	537.5
Shale, medium-dark-gray	5.0	542.5

	Thickness (ft)	Depth (ft)
23N 081W 14BDD01--Continued		
Sandstone, light-gray, fine-grained	18.0	560.5
Shale, dark-gray, carbonaceous	1.5	562.0
Coal, shaly	11.0	573.0
Shale, dark-gray to black, carbonaceous, coal stringers	4.3	577.3
Shale, dark-gray to black, coaly	5.0	582.3
Shale, dark-gray, carbonaceous	4.7	587.0
Shale, medium-gray, silty	4.0	591.0
Shale, medium-dark-gray, carbonaceous	10.0	601.0
Shale, medium-dark-gray, silty	16.0	617.0
Sandstone, light-gray, fine-grained	9.0	626.0
Siltstone, medium-gray, sandy	5.0	631.0
Sandstone, light-gray, fine-grained	12.0	643.0
Shale, medium-dark-gray	9.0	652.0
Coal, shaly	10.6	662.6
Shale, medium-dark-gray, silty	8.4	671.0
Sandstone, light-gray, fine- to medium-grained; upper part is shaly and silty	19.0	690.0
Shale, dark-gray to black, carbonaceous	11.0	701.0
Coal, shaly	3.3	704.3
Shale, dark-gray, carbonaceous	3.7	708.0
Siltstone, medium-gray, shaly	4.0	712.0
Sandstone, light-gray, fine-grained	3.0	715.0

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 081W 14CDB01		
6CW		
Logged by: Geologist (Hansen)		
Log from Hansen and Schug, 1979.		
Sandstone, yellow- to red-brown, fine-grained	12.5	12.5
Siltstone, medium-gray	5.3	17.8
Sandstone, light-yellow, fine-grained	6.5	24.3
Siltstone, medium-gray, shaly	2.6	26.9
Sandstone, light-gray, fine-grained	2.6	29.5
Siltstone, medium-gray	1.5	31.0
Sandstone, light-gray, fine-grained	16.0	47.0
Shale, medium-gray, silty	6.0	53.0
Coal	5.5	58.5
Coal and shale, interbedded, dark-gray	3.0	61.5
Coal	1.1	62.6
Shale, black, carbonaceous	1.4	64.0
Coal	3.8	67.8
Shale, black carbonaceous	1.0	68.8
Coal	5.8	74.6
Coal with interbedded carbonaceous shale	2.1	76.7
Coal	3.6	80.3
Coal and shale, carbonaceous	5.7	86.0
Shale, black, carbonaceous	2.0	88.0
Coal	1.7	89.7
Coal and shale, carbonaceous	6.3	96.0
Claystone, dark-gray	1.2	97.2
23N 081W 14CDB01--Continued		
Sandstone, light- to medium-gray, fine-grained, friable, argillaceous	57.8	155.0
Siltstone, medium-gray	4.0	159.0
Shale, black	3.0	162.0
Coal	4.0	168.0
Shale, black, carbonaceous	1.8	170.2
Coal	0.8	171.0
Shale, black carbonaceous	1.5	172.5
Coal	1.5	174.0
Shale, black, carbonaceous	2.0	176.0
Coal	0.8	176.8
Shale, black carbonaceous	1.4	178.2
Coal	1.8	180.0
Shale, black very coaly	2.5	182.5
Shale, black, carbonaceous	12.0	194.5
Shale, medium-dark-gray	2.5	197.0
Siltstone, medium-gray	6.2	203.2
Shale, dark-gray, silty	15.5	218.7
Siltstone, medium-gray, sandy	9.5	228.2
Sandstone, light-gray, fine-grained	20.6	248.8
Shale, black, carbonaceous	1.7	250.5
Coal	10.5	261.0
Shale, black, carbonaceous	7.4	268.4
Sandstone, medium-gray, fine-grained, argillaceous	10.6	279.0
Shale, black, carbonaceous	7.0	286.0
Coal	3.0	289.0
Shale, black	2.3	291.3
Sandstone, fine-grained, interbedded	16.2	307.5
Shale, dark-gray	8.0	315.5

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 081W 14CDB01--Continued		
Coal	5.2	320.7
Shale, dark-gray, silty	4.3	325.0
Sandstone, light-gray, fine-grained	2.2	327.2
Siltstone	1.7	328.9
Shale, black	8.6	337.5
Siltstone, medium-gray, silty	1.5	339.0
Shale and siltstone, interbedded	11.5	350.5
Siltstone, medium-gray, sandy	13.5	364.0
Sandstone, light-gray, fine-grained, friable, partly coarse-grained to granular	278.0	642.0
Sandstone, light-gray, fine- to medium-grained, argillaceous	33.0	675.0
23N 081W 20DCB01		
26E		
Logged by: Geologist (Hansen)		
Log from Hansen and Schug, 1979.		
Surface material	4.0	4.0
Shale, light-brown	5.0	9.0
Sandstone, light-yellow, fine-grained	5.5	14.5
Siltstone, medium-gray	4.7	19.2
Sandstone, light-yellow-gray, fine-grained	13.8	33.0
Shale, medium- to dark-gray, partly carbonaceous with coal traces	42.0	75.0
Sandstone, light-yellow, fine-grained	10.0	85.0
Siltstone, olive-gray, with interbedded medium-gray shale	14.0	99.0
23N 081W 20DCB01--Continued		
Sandstone, light-gray to tan, fine-grained with coarse-grained lenses, partly silty	155.0	254.0
Siltstone and claystone, interbedded	56.0	310.0
Claystone, dark-brown to black	20.0	330.0
Sandstone, dark-gray, very fine-grained	20.0	350.0
Claystone, dark-brown	22.0	372.0
Sandstone, dark-gray, very fine grained	15.0	387.0
Claystone, dark-brown to black	8.0	395.0
Sandstone, medium-gray, fine-grained	13.0	408.0
Claystone, dark-brown to black, slightly silty	45.0	453.0
Sandstone, light-gray, fine-grained	6.9	459.9
Claystone, black	5.1	465.0
Shale, black, carbonaceous	2.3	467.3
Coal	0.7	468.0
Shale, black, carbonaceous	1.5	469.5
Coal	3.5	473.0
Shale, black, carbonaceous	2.0	475.0
Coal	3.0	478.0
Shale, black, very coaly	7.6	485.6
Claystone, black to dark-brown	4.3	489.9
Sandstone, light-gray, fine-grained	12.1	511.0
Siltstone, dark-gray, sandy	12.0	523.0
Sandstone, light-gray, very fine-grained	53.0	576.0
Claystone, dark-gray	6.0	582.0
Coal	6.0	588.0
Shale, black, carbonaceous	1.0	589.0

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 081W 20DCB01--Continued		
Coal	6.4	595.4
Shale, black, carbonaceous	0.6	596.0
Coal	5.0	601.0
Shale, black carbonaceous	2.0	603.0
Coal	5.0	608.0
Shale, black, carbonaceous	1.0	609.0
Coal	1.0	610.0
Claystone, dark-gray to black, partly carbonaceous	18.0	628.0
Sandstone, dark-gray, very fine grained, partly silty	31.0	659.0
Claystone, dark-gray	2.0	661.0
Coal	1.0	662.0
Claystone and shale, interbedded	7.5	670.5
Coal	1.2	671.7
Claystone, dark-brown to black	4.3	676.0
Coal	2.0	678.0
Shale, black, carbonaceous	2.0	680.0
Claystone, dark-brown	4.0	684.0
Shale, black, carbonaceous	4.0	688.0
Coal	1.0	689.0

23N 081W 24BCA01
23CW
Logged by: Geologist (Hansen)
Log from Hansen and Schug, 1979.

Sandstone and siltstone, interbedded, light-brownish-gray; sandstone is fine-grained	3.0	3.0
23N 081W 24BCA01--Continued		
Siltstone, grayish-brown	5.0	8.0
Shale, grayish-brown	5.0	13.0
Siltstone, grayish-brown	2.0	15.0
Shale, medium-gray, silty	5.0	20.0
Siltstone, light- to medium-gray	3.5	23.5
Sandstone, light-gray	2.0	25.5
Siltstone, light- to medium-gray, sandy	6.5	32.0
Shale, black carbonaceous	4.0	36.0
Coal	6.0	42.0
Shale, black, carbonaceous, thin coal lenses	4.0	46.0
Coal	5.0	51.0
Shale, black, carbonaceous	2.0	53.0
Coal	5.0	58.0
Shale, thin coal lenses or laminations	3.0	61.0
Coal	3.5	64.5
Shale, black, carbonaceous	1.5	66.0
Coal, laminations and lenses of black shale and claystone	3.0	69.0
Shale, black, carbonaceous	3.0	72.0
Coal	2.0	74.0
Coal and shale, interbedded; shale is black, coal lenses and laminations	4.0	78.0
Shale, black, carbonaceous	4.0	82.0
Shale, black, coal lenses and laminations	6.0	88.0
Shale, medium-dark-gray and black, carbonaceous	8.0	96.0

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 081W 24BCA01--Continued		
Shale, medium-gray, silty	5.0	101.0
Siltstone and shale, interbedded, medium-gray	17.0	118.0
Siltstone, medium-gray, sandy	18.5	136.5
Sandstone, light- to medium-gray, fine-grained, silty	24.5	161.0
Sandstone, light-gray, fine- to very coarse grained; few granules and pebbles	52.0	213.0
Sandstone, light-gray, fine-grained, friable	53.0	266.0
Coal, thin carbonaceous shale lenses or laminations	12.0	278.0
Shale, dark-brown to black, carbonaceous	9.0	287.0
Sandstone and siltstone, light-gray; sandstone is very fine grained	6.0	293.0
Shale, medium-gray	2.0	295.0
Coal and carbonaceous shale, interbedded; shale is black, coal lenses and laminations	7.5	302.5
Siltstone and shale, interbedded, medium-gray, sandy	15.5	318.0
Sandstone, light-gray, fine-grained	4.0	322.0
Shale, dark-gray to black, carbonaceous	8.0	330.0
Coal, shaly	6.0	336.0
Shale, medium-gray, silty	3.0	339.0
Sandstone, light-gray, fine-grained	7.0	346.0
Shale, dark-gray to black, carbonaceous	6.0	352.0
Shale, medium-gray, silty	14.0	366.0
Siltstone, medium-gray	3.0	369.0
Siltstone, medium-gray, sandy	10.0	379.0
Sandstone, light-gray, fine to very coarse grained, granules	26.0	405.0
Shale, medium-gray	2.0	407.0
Sandstone, light-gray, fine- to very coarse grained, granules, shaly and silty	17.0	424.0
Shale, medium-gray	1.0	425.0
Sandstone, light-gray, fine- to very coarse grained, and granules	100.0	525.0
Sandstone, light- to medium-gray, fine-grained, silty and shaly	25.0	550.0
Sandstone, light-gray, fine- to medium-grained; some very coarse grained	165.0	715.0

23N 081W 24BCC01
18CW
Logged by: Geologist (Hansen)
Log from Hansen and Schug, 1979.

Sandstone, light-yellowish-gray, fine- to coarse-grained	17.0	17.0
Shale, dark-gray	7.0	24.0
Coal; black carbonaceous shale partings	7.0	31.0
Siltstone, medium-gray	4.0	35.0
Mudstone, medium- to dark-gray, silty	22.0	57.0
Siltstone, medium-gray	6.5	63.5

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 081W 24BCC01--Continued		
Sandstone, light-gray, fine- to coarse-grained	32.0	95.5
Mudstone, dark-gray, silty	5.2	100.7
Sandstone, light-gray, fine- to coarse-grained with carbonaceous clasts	15.2	115.9
Mudstone, dark-gray, silty	6.6	122.5
Sandstone, light- to medium-gray, fine- to medium-grained, with some chert pebbles	62.5	185.0
Mudstone	4.0	189.0
Sandstone, light- to medium-gray, medium- to coarse-grained, with some chert pebbles	192.0	381.0
Shale, brown, coaly	7.8	388.8
Coal, shaly	2.2	391.0
Sandstone, light-gray, very fine grained	10.0	401.0
Shale, dark-gray to dark-brown, silty	57.0	458.0
Shale and siltstone, gray, interbedded	21.0	479.0
Siltstone, light- to medium-gray, shaly	25.0	504.0
Sandstone, light-gray, fine- to medium-grained	7.0	511.0
Shale, dark-gray	5.0	516.0
Sandstone, light-gray, fine to medium-grained, with some interbedded siltstone, and minor pyrite	103.0	619.0
Siltstone, light-gray	26.0	645.0
Shale, medium-gray	9.0	654.0
23N 081W 24BCC01--Continued		
Shale and siltstone, interbedded; shale is medium brown and partly carbonaceous; siltstone is light greenish gray and partly sandy	63.0	717.0
23N 081W 24DBB01		
19CW		
Logged by: Geologist (Hansen)		
Log from Hansen and Schug, 1979.		
Surface material	3.7	3.7
Claystone, light-yellow-gray	3.6	7.3
Sandstone, light-yellow, very fine grained	6.7	14.0
Claystone, yellow-brown-	4.0	18.0
Shale, black, carbonaceous	3.0	21.0
Coal, dull-black	5.7	26.7
Coal, laminations and thin lenses of carbonaceous shale	2.8	29.5
Shale, thin lenses or laminations of coal	6.4	35.9
Claystone, medium-gray	5.1	41.0
Shale, medium- to dark gray	12.0	53.0
Claystone, light- to medium-gray, silty	2.5	55.5
Sandstone, light- to dark-gray, very fine to coarse-grained, micaceous, subrounded, partly interbedded with siltstone	235.5	309.0

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 081W 32AAA01		
S2W-6		
Logged by: Driller (Havercroft)		
Clay, yellow, sandy-----	5	5
Shale, dark brown and sandy clay----------	20	25
Shale, black----------	5	30
Coal----------	6	36
Shale, dark brown and soft sandstone--------	24	60
Coal, decomposed; and black shale----------	15	75
Shale, black; and light gray sand; hole making 15 to 20 gal/min water at 87 ft----------	15	90
Coal with stringers-----	15	105
Shale, black, with sandstone stringers---	20	125
Sandstone----------	6	131
Shale, black, soft, with sandstone--------	14	145
Sandstone, hard---------	5	150
Shale, black, with sandstone stringers---	22	172
Sand, light-gray, and sandstone; some coal at 170-178 ft---------	28	200
23N 082W 14DBC01		
34E		
Logged by: Geologist (Schug)		
Log from Hansen and Schug, 1979.		
Shale, dark-brown, carbonaceous, weathered--	20.0	20.0
Coal, dull-black, slightly bony---------	5.0	25.0
Shale, black, carbonaceous, with vitrinite banding----------	15.0	40.0
Coal and shale, black, carbonaceous----------	5.0	45.0
Mudstone, dark-gray, grading into silt stone----------	15.0	60.0
Siltstone, light-gray---	7.5	67.5
Shale, dark-gray, carbonaceous----------	5.5	73.0
Mudstone, grading into siltstone----------	13.5	86.5
Sandstone, coarse to very coarse grained---	11.0	97.5
Siltstone, light-gray---	5.5	103.0
Sandstone, coarse grained to granular, sub-angular----------	31.5	134.5
Shale, dull-dark-brown, carbonaceous----------	3.5	138.0
Sandstone, light-gray, fine-grained----------	5.0	143.0
Shale, black, carbonaceous, with traces of coal----------	7.0	150.0
Sandstone, light-gray, fine- to coarse-grained----------	24.0	174.0
Shale and siltstone, interbedded; with thin beds of carbonaceous shale----------	26.5	200.5
Sandstone, fine-grained, and siltstone, alternating; with thin interbeds of dark-gray mudstone----------	51.5	252.0
Shale, black, carbonaceous, with thin coal beds (<0.5 ft thick) grading into dark-gray shale-------	21.0	273.0
Sandstone, siltstone and mudstone, alternating; sandstone is fine- to coarse-grained----------	55.0	328.0
Shale, black, carbonaceous, with thin coal stringers--------	20.5	348.5
Sandstone, very coarse-grained--------	4.5	353.0

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 082W 14DBC01--Continued		
Mudstone and siltstone, gray	10.0	363.0
Sandstone and siltstone, alternating; with thin interbedded carbonaceous shales and very minor coal stringers; sandstone is fine- to coarse-grained	82.0	445.0
23N 082W 24ACD01		
32E		
Logged by: Geologist (Hansen)		
Log from Hansen and Schug, 1979.		
Surface material	5.0	5.0
Shale, black, carbonaceous, with very thin, weathered, coal interbeds	7.5	12.5
Sandstone, tan, fine-grained	19.5	32.0
Shale, medium- to dark-gray with interbedded carbonaceous shale and very thin coals	48.0	80.0
Sandstone, light-gray, fine-grained	8.0	88.0
Siltstone, medium-gray	5.0	93.0
Sandstone, light-gray, very fine to coarse-grained	96.0	189.0
Shale, dark-gray	16.0	205.0
Sandstone, light-gray, fine- to medium-grained with coarse-grained to granular lenses	62.0	267.0
Shale, medium- to dark-gray with thin interbeds of coal	11.5	278.5
23N 082W 24ACD01--Continued		
Coal	1.3	279.8
Shale, black, carbonaceous	4.7	284.5
Coal	1.2	285.7
Shale, dark-gray	1.3	287.0
Sandstone, light-gray, fine-grained, partly silty	28.0	315.0
Shale, medium- to dark-gray	6.0	321.0
Sandstone, light-gray, fine-grained	38.0	359.0
Shale, dark-gray	5.0	364.0
Sandstone, light-gray, fine-grained, silty	6.0	370.0
Shale, dark-gray to black, partly carbonaceous	2.0	372.0
Granules, partly conglomoratic	33.0	405.0
23N 083W 04BCC01		
CD-8, PB-1-4		
Logged by: Geologist (Blanchard)		
Log from Blanchard and Pike, 1977.		
Sandstone, brown, fine	5	5
Sandstone, brown, fine-grained	5	10
Mudstone, tan, silty; sandstone, gray	5	15
Mudstone, dark-brown, silty; sandstone, gray, fine-grained	5	20
Shale, carbonaceous; mudstone, gray	5	25
Shale, carbonaceous; sandstone, gray, fine; mudstone, dark-gray	5	30
Mudstone, dark-gray; sandstone, gray	5	35

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 083W 04BCC01--Continued		
Shale, carbonaceous; mudstone, dark-gray---	5	40
Mudstone, gray, silty---	5	45
Sandstone, gray, fine; coal; trace shale, carbonaceous----------	5	50
Sandstone, light-gray, medium-grained--------	10	60
Sandstone, gray, fine-grained; shale, dark-gray----------	5	65
Sandstone, gray, fine-grained; shale, gray----------	5	70
Sandstone, gray, fine-grained; siltstone, gray----------	5	75
Shale, gray, silty; trace coal----------	5	80
Sandstone, gray, fine-grained----------	5	85
Sandstone, gray, fine- to medium-grained-----	5	90
Shale, gray, slightly silty, bentonitic-----	5	95
Shale, brown, carbonaceous; shale, gray----	5	100
Shale, brown, carbonaceous; shale, gray----	5	105
Sandstone, gray, fine-grained----------	5	110
Shale, gray, silty; trace coal----------	5	115
Siltstone, dark-gray; sandstone, gray, fine-grained----------	5	120
Sandstone, gray, fine-grained; siltstone, gray----------	5	125
Siltstone, gray; sandstone, gray-------	5	130
Mudstone, dark-gray; shale, gray, slightly silty----------	5	135
Shale, gray, silty------	5	140
23N 083W 04BCC01--Continued		
Siltstone, gray---------	5	145
Sandstone, gray, fine-grained----------	5	150
Shale, gray, silty; sandstone, gray; trace shale, carbonaceous----------	5	155
Siltstone, gray; shale, carbonaceous----------	5	160
Sandstone, gray, fine-grained; trace shale, gray, silty----------	5	165
Sandstone, gray, medium-grained--------	10	175
Shale, carbonaceous, silty; trace coal; trace mudstone, carbonaceous----------	5	180
Shale, carbonaceous; trace coal----------	5	185
Shale, carbonaceous; trace coal; trace siltstone, gray-------	5	190
Shale, carbonaceous; shale, gray, silty; sandstone, gray, fine-grained; trace coal----------	5	195
Sandstone, gray, fine-grained----------	20	215
Sandstone, gray, fine-grained; shale, carbonaceous----------	5	220
Shale, carbonaceous; trace coal----------	5	225
Shale, gray, silty; siltstone, gray-------	5	230
Siltstone, gray---------	5	235
Shale, gray, silty------	5	240
Shale, carbonaceous-----	10	250
Sandstone, gray, fine-grained----------	5	255
Sandstone, gray, fine-grained; shale, carbonaceous----------	5	260

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 083W 04BCC01--Continued		
Shale, gray, fine-grained; sandstone, gray, fine-grained----	5	265
Shale, gray; siltstone, gray; trace shale, carbonaceous----------	5	270
Shale, carbonaceous; trace coal----------	5	275
Siltstone, gray---------	5	280
Shale, gray, silty------	5	285
Sandstone, gray, fine-grained----------	5	290
Sandstone, gray, fine-grained; siltstone, gray----------	5	295
Sandstone, gray, fine-grained; shale, gray, silty----------	5	300
Siltstone; shale, gray, silty----------	5	305
Siltstone, gray---------	5	310
Siltstone, dark-gray; sandstone, gray, very fine grained-----	5	315
Shale, dark-gray, carbonaceous; siltstone, gray-------	5	320
Shale, carbonaceous; shaly coal----------	5	325
Shale, carbonaceous; mudstone, carbonaceous; shaly coal-----	5	330
Shale, carbonaceous-----	5	335
Shale, carbonacous, silty----------	5	340
Shale, carbonaceous; trace coal----------	20	360
Siltstone, gray---------	5	365
Shale, gray, silty; shale, carbonaceous; trace coal----------	5	370
Coal; shale, carbonacous; siltstone, carbonacous----------	5	375
23N 083W 04BCC01--Continued		
Shale, carbonacous; trace coal; trace siltstone, gray-------	5	380
Shale, gray, silty; trace coal----------	5	385
Shale, dark-gray, silty-	5	390
Shale, carbonacous; coal----------	10	400
Mudstone, gray; shale, carbonaceous; coal----	5	405
Mudstone, carbonacous; trace coal----------	5	410
Mudstone, gray; shale, carbonaceous; trace coal----------	5	415
Shale, gray, silty------	5	420
Siltstone, gray---------	10	430
23N 083W 06ACA01		
CD-6, PB-2-6		
Logged by: Geologist (Blanchard)		
Log from Blanchard and Pike, 1977.		
Sandstone, brown, fine-grained----------	5	5
Shale, carbonaceous-----	5	10
Shale, gray, silty------	5	15
Sandstone, buff, silty--	5	20
Sandstone, brown, fine-grained----------	10	30
Coal; sandstone, light-brown, fine-grained----------	5	35
Shale, gray, silty, bentonitic----------	5	40
Shale, gray, silty; siltstone, gray-------	5	45
Sandstone, gray, fine-grained----------	10	55
Sandstone, gray and brown, fine-grained---	5	60

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 083W 06ACA01--Continued		
Sandstone, gray, medium-grained	5	65
Shale, gray, silty; sandstone, fine-grained	5	70
Shale, brown, carbonaceous; shale, gray	5	75
Shale, gray, silty	15	90
Shale, dark-gray, bentonitic	10	100
Siltstone, gray	5	105
Sandstone, gray, fine-grained; shale, carbonaceous; trace coal	5	110
Shale, gray, silty; sandstone, gray, fine-grained; trace coal	5	115
Shale, gray, silty	10	125
Shale, dark-gray; sandstone, gray, fine-grained	5	130
Sandstone, gray, fine-grained	15	145
Sandstone, gray, medium-grained	5	150
Sandstone, gray, fine-grained; trace shaly coal; trace coal	5	155
Sandstone, gray, fine-grained; shale, carbonaceous; shaly coal; coal	5	160
Shale, carbonaceous; coal; sandstone, gray, fine-grained	5	165
Shale, carbonaceous	10	175
Shale, carbonaceous; coal	5	180
Shale, gray, slightly silty	5	185
Sandstone, gray, medium-grained; siltstone, gray	10	195
Sandstone, gray, coarse-grained	5	200
Coal; mudstone, gray	5	205
Coal; shale, carbonaceous; siltstone, gray	5	210
Shale, silty, gray; mudstone, brown	5	215
Siltstone, gray	5	220
Shale, gray	5	225
Siltstone, gray; shale, gray, silty	5	230
Sandstone, gray, fine-grained	5	235
Sandstone, gray, medium-grained	5	240
Sandstone, gray, medium- to fine-grained	5	245
Shale, carbonaceous	5	250
Sandstone, gray, medium-grained	5	255
Sandstone, gray, coarse-grained	5	260
Siltstone, gray, sandstone, gray, coarse-grained	5	265
Sandstone, gray, medium- to coarse-grained	5	270
Sandstone, gray, coarse-grained	5	275
No recovery of samples	55	330

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 083W 06BBB01		
Logged by: Geologist (Bennett)		
Log edited from U.S. Bureau of Land Management, 1975		
Surface soil; silt and residual sandstone at bottom of interval; coarse-grained sandstone; little to highly calcareous-----	3.9	3.9
Sandstone, whitish, fine- to medium-grained, slightly friable; quartzose, highly calcareous; hardness 6----------	0.7	4.6
Shale, gray, silty, grades in and out of siltstone; black clayey shale 22.6-22.8 ft; moderately to highly calcareous 4.6-22.6 ft slightly calcareous below 22.8 ft; hardness 4-5----------	30.2	34.8
Sandstone, rusty color to 37.6 ft, tan 37.6-42.4 ft; fine- to medium-grained, slightly friable to none; increasing carbonacous content below 37.6 ft; hardness 6---	7.6	42.4
Shale, black to gray, silty; partially desiccated; hardness 3-4----------	6.8	49.2
Sandstone, rusty to whitish, fine- to coarse-grained; slightly calcareous to ferruginous, some carbonaceous silty layers; hardness 6----	13.4	62.6
23N 083W 06BBB01--Continued		
Shale, gray to black, clayey to silty; fissile; partially desiccated in places; hardness 3-4----------	9.8	72.4
Sandstone, dark- to light-gray, fine-grained; silty to shaly zones, carbonaceous; hardness 5-6---	16.5	88.9
Shale and siltstone, gray to dark-gray, fissile shale to massive siltstone; shale partially desiccated; some sandy zones; carbonaceous pods in siltstone; hardness 5-6 in siltstone, 4-5 in shale---	9.3	98.2
Sandstone, gray to whitish, fine to 101.6 ft, coarse 101.8-102.6 ft, shale separates these two zones; siltstone 99.3-99.7 ft; highly calcareous 101.1-101.6; poorly cemented at bottom; hardness 6-7----------	4.4	102.6
Siltstone and shale, alternating with thin (1.3 ft maximum) medium- to coarse-grained sandstone layers. Shale is black to dark gray, thinly bedded to fissile; partially desiccated; slightly coaly 142.7-143.7 ft, other zones silty to clayey, hardness 3. Siltstone is light to dark gray, carbonaceous, hardness 6; maximum thickness 1.1 ft----------	47.8	150.4

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 083W 06BCD01		
CD-7, PB-1-6		
Logged by: Geologist (Blanchard)		
Log from Blanchard and Pike, 1977.		
Sandstone, gray, fine-grained; shale, gray, silty	5	5
Mudstone, brown; sandstone, buff, fine- to medium-grained	5	10
Shale, carbonaceous; mudstone, brown	5	15
Shale, carbonaceous, slightly boney; shale, brown, silty	5	20
Sandstone, buff, very fine grained; shale, gray	5	25
Shale, gray, silty; siltstone, gray	5	30
Sandstone, tan, fine-grained; shale, gray, silty	5	35
Shale, carbonaceous; trace coal; shale carbonaceous, silty	5	40
Coal; shale, carbonaceous; shale, silty	5	45
Shale, dark-gray, silty, slightly carbonaceous-	5	50
Sandstone, gray, fine-grained; shale, carbonaceous; coal	5	55
Coal; shale, carbonaceous; mudstone, dark-gray; shale, gray, silty	5	60
Shale, gray, silty; sandstone, gray, fine-grained	5	65
Sandstone, light-gray, fine-grained; siltstone, gray	5	70
Mudstone, dark-gray, slightly carbonaceous, silty	5	75
23N 083W 06BCD01--Continued		
Shale, carbonaceous, silty	10	85
Shale, carbonaceous, silty; shale, carbonaceous; sandstone, fine-grained; coal	5	90
Shale, carbonaceous, very silty	5	95
Coal; shale, carbonaceous; shale, gray, silty	5	100
Shale, carbonaceous; trace coal	5	105
Coal; shaly coal	5	110
Siltstone, gray	10	120
Shale, gray, silty; shale, carbonaceous	5	125
Siltstone, gray, fine-grained	5	130
Siltstone, gray	20	150
Sandstone, gray, fine-grained	10	160
Shale, dark-gray, silty; shale, carbonaceous	5	165
Coal; shale, carbonaceous	10	175
Siltstone, gray; coal	5	180
Siltstone, gray; sandstone, gray, fine- to medium-grained	5	185
Shale, dark-gray, silty; shale, carbonaceous	5	190
Shale, dark-gray, silty-	5	195
Siltstone, gray; mudstone, gray, silty	5	200
Sandstone, gray, fine-grained	5	205
Sandstone, gray, medium- to coarse-grained	5	210
Sandstone, gray, medium-grained; sandstone, fine-grained	5	215

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 083W 06BCD01--Continued		
Shale, carbonaceous; sandstone, gray, medium-grained	5	220
Shale, carbonaceous	5	225
Sandstone, gray, coarse-grained	10	235
Shale, dark-gray	5	240
Coal; shale, gray, silty	5	245
Coal; shale, carbonaceous; shaly coal	5	250
Siltstone, gray	5	255
Siltstone, gray; sandstone, gray, fine-grained	5	260
Sandstone, gray, fine-grained	5	265
Sandstone, gray, medium-grained	5	270
23N 083W 06DDD01		
9004		
Logged by: Geologist (Bennett)		
Log edited from U.S. Bureau of Land Management, 1975.		
Silt and clay, brown and black, sandy; some organic matter	7.0	7.0
Siltstone, light-gray to tannish-gray, fine, sandy; moderately calcareous 16.7-19.2 ft; hardness 5-6	12.2	19.2
Shale, gray, silty; thin-bedded; crushed to 20.2 ft	2.4	21.6
Siltstone, tan to gray; hardness 5	2.7	24.3
Sandstone, tan, fine-grained; highly calcareous	2.2	26.5
23N 083W 06DDD01--Continued		
Siltstone, tan and gray; slightly calcareous, slightly carbonaceous near bottom	4.0	30.5
Sandstone, tan to slightly rusty, fine to very fine grained at bottom, non-friable; calcareous, increasing carbonaceous banding	7.2	37.7
Siltstone, tan and gray	4.3	42.0
Shale, gray, thin-bedded to fissile; desiccated	0.8	42.8
Coal and highly carbonaceous shale	6.1	48.9
Shale, gray and black, fine sandy zones, increasing sandstone and siltstone with depth; hardness 3-4	39.4	88.3
Sandstone, light gray; fine, coarse at bottom; few 3 inch carbonaceous layers; calcareous to 94.7; very friable and silty below 94.7	15.9	104.2
Siltstone, light gray, shaly layers; becomes carbonaceous and black toward bottom	6.9	111.1
Coal, black, thin-bedded; highly carbonaceous shale	1.2	112.3
Siltstone, gray, carbonaceous; thin coal seam; sandstone 113.0-113.5 ft, calcareous--	1.8	114.1
Coal, black, laminated; carbonaceous shale 119.8-120.3 ft	8.7	122.8

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 083W 06DDD01--Continued		
Siltstone, gray, fine, sandy; scattered carbonaceous banding; hardness 6----------	6.9	129.7
Sandstone, light gray, gray, black; fine to coarse grained; interbedded siltstone and shale; low grade coal 162.4-162.7; carbonaceous banding and pods. Siltstone not over 1.5 ft thick, shale is desiccated with 0.4 ft maximum thickness-----	43.1	172.8
Shale, gray, black, silty; highly carbonaceous to coaly 180.0-181.6 ft; hardness 5-6----------	13.9	186.7
Siltstone, gray, carbonaceous banding, sandy layers to sandstone, gradational between the two; hardness 6-7----------	8.1	194.8
Shale and coal, black to dark gray, thin-bedded; most of core missing--	6.6	201.4
23N 083W 07CAA01		
Palm #4		
Logged by: Driller (Galusha)		
Surface----------	6	6
Rock, brown----------	6	12
Sand, brown----------	4	16
Sand, gray----------	4	20
Shale, brown----------	30	50
Shale, blue----------	15	65
Shale, black----------	8	73
Coal, water----------	3	76
Shale, blue----------	29	105
Rock, sand----------	6	111
Coal----------	4	115
Shale, blue----------	9	124
23N 083W 08DDD01		
CD-9, PB-1-8		
Logged by: Geologist (Blanchard)		
Log from Blanchard and Pike, 1977.		
Sandstone, brown, fine-grained; shale, gray--	5	5
Sandstone, brown, coarse-grained--------	5	10
Siltstone, light-brown to gray----------	5	15
Mudstone, carbonaceous; shale, light-brown----	5	20
Sandstone, light-brown, fine-grained----------	10	30
Sandstone, light-gray, fine-grained----------	5	35
Shale, carbonaceous; coal----------	10	45
Shale, gray, slightly silty----------	5	50
Shale, dark-gray--------	5	55
Sandstone, light-gray, very fine grained-----	5	60
Shale, gray, silty------	5	65
Siltstone, gray---------	5	70
Shale, carbonaceous; shaly coal; trace coal----------	5	75
Shale, carbonaceous; trace coal----------	5	80
Shale, carbonaceous; shaly coal; trace coal----------	5	85
Shale, carbonaceous; mudstone, carbonaceous----------	5	90
Shale, carbonaceous-----	10	100
Sandstone, gray, very fine grained----------	5	105
Shale, carbonaceous-----	10	115
Shale, gray; shale, carbonaceous----------	5	120
Shale, carbonaceous-----	5	125
Sandstone, gray, fine-grained; shale, gray--	5	130
Siltstone, carbonaceous; shale, carbonaceous---	5	135

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 083W 08DDD01--Continued		
Siltstone, gray	10	145
Sandstone, gray, very fine grained	5	150
Shale carbonaceous; trace coal	5	155
Shale, gray, silty	5	160
Sandstone, gray, medium-grained	5	165
Sandstone, gray, medium-grained; siltstone, gray	5	170
Shale, gray, silty	10	180
Sandstone, gray, fine-grained	5	185
Siltstone, gray	5	190
Sandstone, gray, medium-grained	5	195
Sandstone, gray, fine-grained	5	200
Sandstone, gray, medium-grained	5	205
Sandstone, gray, coarse-grained	5	210
Siltstone, gray	5	215
Sandstone, gray, coarse-grained	5	220
Sandstone, gray, coarse-grained; trace shale, carbonaceous	5	225
Sandstone, gray, medium-grained; shale, gray, bentonitic	5	230
Sandstone, gray, coarse-grained; siltstone, gray	5	235
Sandstone, gray, medium-grained	5	240
Sandstone, gray, coarse-grained	10	250
Shale, carbonaceous; trace coal	5	255
Siltstone, carbonaceous	5	260
Siltstone, gray; shale, carbonaceous; coal; shale, bentonitic	5	265
Siltstone, gray; mudstone, gray	5	270
23N 083W 08DDD01--Continued		
Shale, gray, silty; shale, carbonaceous	5	275
Shale, gray, silty	5	280
Sandstone, gray, very fine-grained	5	285
Sandstone, gray, fine-grained	40	325
Sandstone, gray, medium-grained	5	330
Sandstone, gray, coarse-grained	10	340
Sandstone, gray, medium-grained	5	345
Sandstone, gray, coarse-grained	5	350
Sandstone, gray, very coarse-grained	5	355
Sandstone, gray, coarse-grained	5	360
Sandstone, gray, fine-grained	5	365
No recovery of samples	65	430

23N 083W 18DDD01
CD-10, PB-1-18
Logged by: Geologist (Blanchard)
Log from Blanchard and Pike, 1977.

Sandstone, brown, fine-grained; shale, brown	5	5
Siltstone, brown	5	10
Sandstone, brown, fine-grained	5	15
Shale, light-brown, silty	5	20
Shale, gray, silty	5	25
Sandstone, gray, fine-grained	5	30
Shale, carbonaceous; sandstone, brown, fine-grained	5	35
Shale, carbonaceous	5	40
Coal; shale, carbonaceous	5	45

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 083W 18DDD01--Continued		
Shale, carbonaceous; coal	5	50
Sandstone, gray, fine-grained	5	55
Shale, carbonaceous	10	65
Shale, carbonaceous; siltstone, gray	5	70
Shale, gray, silty	5	75
Siltstone, gray	5	80
Shale, carbonaceous; trace coal	5	85
Siltstone, gray	5	90
Coal; trace shale, carbonaceous	5	95
Shale, carbonaceous	5	100
Shale, carbonaceous, silty; shale, gray, silty	5	105
Mudstone, carbonaceous; coal; shale, gray, silty	5	110
Mudstone, dark-gray, bentonitic	5	115
Mudstone, gray-brown, bentonitic	5	120
Shale, dark-gray, silty	5	125
Shale, gray, silty	5	130
Sandstone, gray, fine-grained	10	140
Shale, gray, silty; trace coal	5	145
Sandstone, gray, fine-grained	5	150
Shale, gray, silty; shale, carbonaceous	5	155
Sandstone, gray, fine-grained	5	160
Shale, carbonaceous	5	165
Siltstone, gray	5	170
Sandstone, gray, fine-grained	5	175
Shale, gray, silty; shale, carbonaceous	5	180
Shale, carbonaceous; siltstone, gray	5	185
Shale, carbonaceous	5	190
Sandstone, gray, fine-grained; shale, gray, silty	10	200
Shale, carbonaceous	5	205
Siltstone, gray	10	210
Coal; trace shale, carbonaceous	5	215
Sandstone, gray, medium-grained	25	240
Sandstone, gray, fine-grained	10	250
Sandstone, gray, medium-grained	10	260
Sandstone, gray, fine-grained	10	270
Shale, carbonaceous; siltstone, gray	5	275
Sandstone, gray, fine-grained; shale, carbonaceous	5	280
Shale, gray, silty; shale, carbonaceous	5	285
Sandstone, gray, fine-grained; shale, gray, silty	5	290
Sandstone, gray, fine-grained; siltstone, gray	5	295
Siltstone, gray; sandstone, gray, fine-grained	5	300
Sandstone, gray, fine-grained; shale, gray, silty	5	305
Sandstone, gray, fine-grained	15	320
Sandstone, gray, medium-grained	5	325
Sandstone, gray, fine-grained	5	330
Shale, gray, silty; trace shaly coal	5	335
Siltstone, gray	5	340

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 083W 18DDD01--Continued		
Sandstone, gray, fine- to medium-grained	5	345
Siltstone, gray; shale, gray, silty	5	350
Siltstone, gray; trace shale, carbonaceous; trace shaly coal	5	355
Shale, gray; shale, dark-gray; sandstone, gray, fine-grained	5	360
Siltstone, gray	5	365
Shale, gray, silty; sandstone, gray, fine-grained	5	370
Sandstone, gray, fine-grained; shale, carbonaceous	5	375
Shale, silty, dark-gray; shale, carbonaceous; sandstone, gray, medium-grained	5	380
Siltstone, gray; shale, gray, silty	5	385
Sandstone, gray, fine-grained	5	390
Sandstone, gray, fine-grained; siltstone, gray	5	395
Sandstone, gray, fine-grained	15	410

	Thickness (ft)	Depth (ft)
23N 083W 19BDB01 MBCC-1 Logged by: Driller (Sipe)		
Sandstone	15	15
Shale, carbonaceous	2	17
Coal	2	19
Shale	7	26
Coal	2	28
Shale, sandy	69	97
Sandstone	6	103
Shale, sandy	70	173
Sandstone	22	195

	Thickness (ft)	Depth (ft)
23N 083W 21BAB01 MBW-4 Logged by: Driller (Meidinger)		
Clay, sandy	10.4	10.4
Shale, carbonaceous	7.6	18.0
Sandstone	1.6	19.6
Shale, carbonaceous	6.3	25.9
Shale, sandy	4.9	30.8
Shale, carbonaceous	3.0	33.8
Shale, sandy, water	3.4	37.2
Shale, carbonaceous, with shale streaks	20.9	58.1
Sandstone	15.2	73.3
Shale, carbonaceous, with coal streaks	2.6	75.9
Coal	0.8	76.7
Shale	2.8	79.5
Sandstone, hard, water	2.2	81.7
Sandstone	6.4	88.1
Shale	2.1	90.2
Coal, B	3.0	93.2
Shale, carbonaceous	1.2	94.4
Sandstone	9.4	103.8
Shale, sandy	4.8	108.6
Sandstone	7.2	115.8
Shale and carbonaceous shale	12.5	128.3
Sandstone	4.3	132.6
Shale, carbonaceous, and shale	7.4	140.0

	Thickness (ft)	Depth (ft)
23N 083W 29AAB01 MBW-5 Logged by: Driller (Meidinger)		
Clay, sandy	2.3	23.
Sand	8.2	10.5
Shale, sandy	4.9	15.4
Sandstone	2.6	18.0
Shale, sandy, and sandstone	21.8	39.8
Shale	9.5	49.3
Shale, carbonaceous	0.8	50.1
Shale, sandy	1.2	51.3
Sandstone	2.8	54.1

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 083W 29AAB01--Continued		
Sandstone, hard	1.2	55.3
Shale, sandy, and sandstone	6.6	61.9
Shale, carbonaceous	2.3	64.2
Shale, sandy	1.4	65.6
Sandstone	9.7	75.3
Shale	3.6	78.9
Sandstone	1.6	80.5
Sandstone, hard	1.8	82.3
Sandstone	7.8	90.1
Shale	1.9	92.0
Coal	1.1	93.1
Shale, carbonaceous	0.6	93.7
Shale, sandy	3.3	96.4
Shale, damp	2.4	98.8
Sandstone	4.3	103.1
Shale, carbonaceous	1.8	104.9
Shale, sandy	2.9	107.8
Shale, carbonaceous	0.3	108.1
Shale, carbonaceous, with coal streaks	2.1	110.2
Sandstone	23.0	133.2
Sandstone, hard, water	2.0	135.2
Sandstone	5.2	140.4
Shale, carbonaceous	7.2	147.6
Shale	0.4	150.0
23N 083W 30BDD01 Big Ditch Auger Logged by: Hydrologist (Peter)		
Silt, no sand	2.5	2.5
Clay chips and silt	3.5	6.0
Clay, brown, plastic; and moist silt	1.5	7.5
Sand and silt, brown, fine to medium, dirty	1.5	9.0
Water, no return of cuttings	6.0	15.0
Clay, gray, and coal	1.0	16.0
Sand, clayey	2.0	18.0
23N 083W 30BDD01--Continued		
Sand and clay, coarse sand about 10%; brown, wet less plastic, coal particles, some clumped together; bedrock	4.0	22.0
Clay, stiff	7.0	29.0
23N 083W 32ABA01 North well Logged by: Driller (Sishe)		
Sand	11.1	11.1
Sandstone	30.5	41.6
Shale, sandy	8.1	49.7
Coal	1.5	51.2
Shale, carbonaceous	0.9	52.1
Shale, sandy	7.4	59.5
Shale, carbonaceous	0.2	59.7
Coal	5.7	65.4
Shale, carbonaceous	0.3	65.7
Coal	0.7	66.4
Shale, carbonaceous	19.9	68.3
Shale, sandy	13.7	82.0
Sandstone, wet	12.8	94.8
Shale, carbonaceous	4.3	99.1
Coal	0.4	99.5
Shale, carbonaceous, with coal streaks	1.4	100.9
Coal	5.2	106.1
Shale, carbonaceous	0.9	107.0
Shale, sandy	14.4	121.4
Sandstone, hard	1.6	123.0
Shale, sandy	6.1	129.1
Coal	6.4	135.5
Shale, carbonaceous	0.5	136.0
Shale, sandy	7.9	143.9
Sandstone, hard	1.8	145.7
Sandstone	11.8	157.5
Shale, sandy	4.4	161.9
Bone	0.5	162.4
Coal	4.0	166.4

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 083W 32ABA01--Continued		
Shale, carbonaceous-----	0.3	166.7
Shale, sandy----------	17.7	184.4
Coal----------	5.5	189.9
Shale, carbonaceous-----	?	?
Coal----------	?	193.7
Shale, carbonaceous-----	0.7	194.4
Shale, sandy----------	5.6	200.0
23N 083W 32ACD01		
12880		
Logged by: Driller (Blackman)		
Sand----------	1.2	1.2
Sandstone----------	9.2	10.4
Shale, sandy----------	19.4	29.8
Coal----------	0.8	30.6
Shale----------	2.2	32.8
Coal----------	3.7	36.5
Bone----------	0.6	37.1
Shale, carbonaceous, with coal----------	3.3	40.4
Sandstone, water--------	6.1	46.5
Shale----------	1.3	47.8
Sandstone----------	12.4	60.2
Shale, sandy----------	16.4	76.6
Sandstone----------	6.4	83.0
Shale, sandy----------	5.1	88.1
Sandstone----------	63.2	151.3
Coal----------	4.3	155.6
Shale, carbonaceous-----	1.0	156.6
Sandstone----------	3.7	160.3
Shale, sandy----------	39.7	200.0
23N 083W 32ADA01		
12950C		
Logged by: Driller (Crawford)		
Sandy clay----------	12.0	12.0
Shale, carbonaceous-----	7.1	19.1

	Thickness (ft)	Depth (ft)
23N 083W 32ADA01--Continued		
Coal----------	4.8	23.9
Shale, sandy----------	22.6	46.5
Coal----------	5.9	52.4
Shale, sandy----------	27.3	79.7
Coal----------	3.9	83.6
Shale, sandy----------	21.7	105.3
Coal----------	5.4	110.7
Shale, carbonaceous-----	0.9	111.6
Coal----------	2.3	113.9
Shale, sandy----------	1.4	115.3
23N 083W 32ADB01		
12944C		
Logged by: Driller (Crawford)		
Shale, carbonaceous-----	18.2	18.2
Coal----------	6.8	25.0
Shale, sandy----------	20.5	45.5
Coal----------	6.6	52.1
Shale, sandy----------	39.9	92.0
Coal----------	4.6	96.6
Shale, sandy----------	6.4	103.0
Coal----------	5.0	108.0
Shale, carbonaceous-----	0.3	108.3
Coal----------	2.9	111.2
Shale, sandy----------	0.8	112.0
23N 083W 32DBC01		
Haystack		
Logged by: Driller (Blackman)		
Sand----------	7.5	7.5
Sandstone----------	14.3	21.8
Coal, soft----------	3.9	25.7
Sandstone-----------	139.6	165.3
Shale, sandy----------	13.2	178.5
Sandstone, great water at 212 ft-------	121.5	300.0

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 083W 33BBB01		
MBW 33-4-1		
Logged by: Geologist (Engineering Enterprises)		
Sand, light-brownish-yellow, fine- to medium-grained	22.3	22.3
Sandstone, light-brownish-yellow, medium-grained	18.0	40.3
Sandstone, coarser-grained	2.0	42.3
Sandstone, brownish-yellow, medium-grained, with black carboniferous stringers 43.5-45.5 ft	10.6	52.9
Sandstone, light-gray, fine-grained	6.1	59.0
Sandstone, light-gray, shaly, fine- to medium-grained	2.1	61.1
Sandstone, light-gray, fine-grained	3.1	64.2
Shale, dark gray	3.9	68.1
Lost interval	2.5	70.6
Shale, with some coal stringers; coal shows a trace of marcasite	3.7	74.3
Sandstone, light-gray, fine-grained, some carboniferous stringers	5.9	80.2
Sandstone	0.2	80.4
Shale, dark-gray	0.7	81.1
Sandstone, light-gray, fine- to medium-grained	4.9	86.0
Sandstone, light- to dark-gray, shaly, fine- to medium-grained	2.0	88.0
Sandstone, light-gray, fine- to medium-grained	12.8	100.8
Sandstone, light- to dark-gray, shaly, fine-grained	4.0	104.8
23N 083W 33BBB01--Continued		
Sandstone, light-gray, fine- to medium-grained	5.5	110.3
Sandstone, light-gray, fine- to medium-grained, crumbles very easily	10.0	120.3
Sandstone, light-gray, fine- to medium-grained, hard, doesn't crumble	4.7	125.0
Sandstone, light-gray, medium-grained	5.3	130.3
Sandstone, light-gray, fine- to medium-grained; trace mica at 14.04 ft; few coal stringers at 144.0 ft	19.5	149.8
Sandstone, light-gray, medium- to coarse-grained, with scattered thin coal stringers	9.4	159.2
Lost interval	0.6	159.8
Sandstone, light-gray, medium- to coarse-grained, crumbles easily	8.0	167.8
Sandstone, light-gray, medium-grained, harder	17.8	185.6
Coal, trace marcasite	1.1	186.7
Coal, shaly	1.6	188.3
Coal (bed 66)	7.5	195.8
Shale, dark-gray	2.0	197.8
Shale, dark-gray, sandy-	5.7	203.5
Shale, dark-gray	3.3	206.8
Shale, dark-gray, sandy-	2.6	209.4
Sandstone, light-gray, fine-grained	2.4	211.8
Sandstone, medium-gray, shaly, fine-grained	3.2	215.0
Sandstone, light- to dark-gray, shaly, fine-grained	5.2	220.2

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 083W 33BBB01--Continued		
Sandstone, light-gray, medium-grained, marcasite in filled fractures to 222.1 ft-----	5.6	225.8
Sandstone, light- to dark-gray, shaly, fine-grained----------	2.1	227.9
Coal, shaly; (part of coal bed 65?)---------	7.8	235.7
Coal, few scattered traces of marcasite; bed 65----------	3.6	239.3
Shale, gray----------	3.3	242.6
Sandstone, light-gray, fine-grained----------	0.6	243.2
Coal----------	0.2	243.4
Shale, gray----------	2.3	245.7
Shale, gray, sandy------	1.2	246.9
Sandstone, light-gray, fine- to medium-grained, with black carboniferous stringers----------	2.7	249.6
Shale, gray, sandy------	5.5	255.1
Sandstone, light-gray, fine-grained, with black carboniferous stringers----------	2.2	257.3
Sandstone, light-gray, fine- to medium-grained----------	4.9	262.2
Shale, medium gray------	5.3	267.5
Coal, bed 64; more marcasite apparent than in other seams---	6.6	274.1
Shale, gray----------	0.7	274.8
Sandstone, light-gray, fine- to medium-grained, with black carboniferous stringers----------	1.3	276.1
Shale, gray----------	4.9	281.0
Sandstone, light-gray, fine- to medium-grained, with black carboniferous stringers----------	9.2	290.2
Shale, gray----------	4.5	294.7
Coal, bed 63; small trace of marcasite----	3.9	298.6
Shale, gray----------	7.1	305.7
Sandstone, light- to medium-gray, fine-grained, silty, with black carboniferous stringers----------	4.8	310.5
Coal, bed 62; very small trace of marcasite----	5.2	315.7
Sandstone, light-gray, fine-grained----------	0.3	316.0
Coal----------	0.4	316.4
Shale----------	1.3	317.7
Coal, shaly----------	0.6	318.3
Coal, trace of marcasite----------	1.6	319.9
Sandstone, light-gray, fine- to medium-grained----------	5.7	325.6
Sandstone, silty, fine-grained, with black carboniferous stringers----------	5.4	331.0
Sandstone, coarser-grained, some calcite, pyrite infillings, (fault) fracture at 338.2 ft----------	8.7	339.7
Shale, carbonaceous-----	1.0	340.7
Coal, (bed 61?)---------	2.3	343.0
Shale, carbonaceous-----	4.9	347.9

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 083W 33BBC01		
MBW 33-4-2		
Logged by: Geologist (Engineering Enterprises)		
Sand, brownish-yellow, fine-grained	15.0	15.0
Sand, light-brownish-yellow, fine-grained; some sandstone fragments, with more sandstone and siltstone fragments 25-30 ft	15.0	30.0
Sand, light-brown, fine-grained, no sandstone or siltstone	25.0	55.0
Sand, light brown, fine-grained, some light-gray silt	4.0	59.0
Coal	6.0	65.0
Shale, light-gray, carbonaceous	25.0	90.0
Coal, shaly, and shale, some sandstone	5.0	95.0
Coal and light-brown to light-gray, fine-grained sandstone	5.0	100.0
Shale, light-gray, some light gray siltstone	17.0	117.0
Sandstone, light-gray, fine-grained	8.0	125.0
Shale, gray, silty	10.0	135.0
Shale, gray, silty, with a trace of coal	1.0	136.0
Coal	4.0	140.0
Shale stringers, black, carbonaceous, grading to gray, medium-grained sandstone	3.0	143.0
23N 083W 33BBC01--Continued		
Sandstone, light-gray, medium-grained; convoluted black stringers; vert. fracture, clean except for pyrite blobs, open fracture. Becomes finer grained, more massive at 147.0 ft; and sandstone changes to carbonaceous shale	6.2	149.2
Shale, light-gray, dessicates on drying	5.0	154.2
Shale, very carbonaceous, and coal	0.9	155.3
Coal, high in pyrite on fracture and cleats; badly broken	4.3	159.6
Shale, gray-dark gray, carbonaceous, interbedded with convoluted gray-brown, fine-grained sandstone	7.4	167.0
Shale	3.0	170.0
Sandstone, silty, fine- to medium-grained, black convoluted stringers	7.3	177.3
Sandstone, gray, medium-grained, massive, occasional black stringers and wood fragments. Lost interval 187.1-189.1 ft.	17.0	194.3
Coal, trace of pyrite	5.1	197.4
Lost interval	0.6	198.0

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 083W 33DBC01		
MBW 33-11-1		
Logged by: Geologist (Engineering Enterprises)		
Sand, light-brownish-yellow, fine- to medium-grained; some coarser sandstone fragments at 16.0 ft--	23.0	23.0
Sandstone, yellow-brown, medium-grained, micaceous; finer grained, dark laminations at 30.2 ft; coarser grained with waxy coal laminations at 31.2 ft------	10.0	33.0
Footage adjustment------	4.0	37.0
Sandstone, yellow-brown, medium grained, fine grained band 37.1-37.7 ft, very wet with trace of waxy coal at 39.1 ft, 41.0 ft, and 41.9 ft; coarser grained and lighter gray 43.5-43.6 ft; 47.1-47.2 ft waxy coal fracture and infilled with gray sandstone----------	10.5	47.5
Sandstone, gray, fine- to medium-grained with dark gray interbedding; waxy coal 50.8-50.9 ft----------	12.8	60.3
Sandstone, gray, silty, fine- to medium-grained----------	2.4	62.7
Shale, light gray-------	7.8	70.5
Coal, bed 66, with scattered trace of marcasite----------	5.9	76.4
Shale, light gray-------	0.2	76.6
Sandstone, fine-grained, with black carboniferous stringers------	3.6	80.2
Sandstone, light-gray, fine-grained, with black carboniferous stringers----------	13.3	93.5
Shale, dark gray--------	3.8	97.3
Sandstone, medium-gray, shaly, fine-grained, with black carboniferous stringers------	7.9	105.2
Shale, dark-gray, with coal stringers--------	5.8	111.0
Coal, bed 65----------	4.5	115.5
Coal, shaly----------	2.6	118.1
Sandstone, fine-grained, with thin interbedded shale, black carboniferous stringers convoluted to 122.5 ft; thin coal stringers at 119.0 ft; coal log apparently only partially metamorphosed 124.0-126.0 ft--------	10.0	128.1
Shale, silty, and slate, sandy, interbedded and grading from one to another imperceptively----------	14.4	132.5
Sandstone, medium-grained, with thin layers of more shaly material becoming coarser at 137.3 ft---	7.7	140.2
Shale, dark gray--------	0.3	140.5
Coal, bed 64----------	6.0	146.5
Sandstone, light-gray, fine-grained----------	1.5	148.0
23N 084W 12ACB01		
9005		
Logged by: Geologist (Bennett)		
Log edited from U.S. Bureau of Land Management, 1975.		
Silt, tan, sandy; vegetative matter top 1 ft----------	3.5	3.5

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 084W 12ACB01--Continued		
Shale, brownish-gray, fissile to ¼-inch fragments; carbonaceous below 8.0 ft; weathered----------	5.5	9.0
Siltstone, tan, blocky, ½- to 2-inch pieces; weathered; hardness 5-6----------	10.0	19.0
Shale, brown to black, fissile to blocky; scattered carbonaceous and coal pods; minute gypsum seam at about 23 ft; grades into underlying coal. Sandstone at 41-43.5 ft; 1-inch siltstone pieces at 24-26 ft----	30.7	49.7
Coal, lignite; breaks into ¼-inch fragments; hardness 5----------	0.8	50.5
Shale, gray to black; ½- to 2-inch flat pieces; scattered carbonaceous material, grades from above coal. Gray sandstone 51.5-52.2 ft----------	7.7	58.2
Sandstone, gray, very fine grained, silty, slightly calcareous; fine horizontal dark carbonaceous banding; 2-inch to 1.4-ft pieces; hardness 6----	7.1	65.3
Siltstone, gray to black; starts grading into shale and coal at 70.5 ft; hardness 5----------	6.2	71.5
Coal, gray to black; with minor carbonaceous and coaly shale and siltstone; 1- to 4-inch pieces; grades into underlying unit; hardness 4----------	4.9	76.4
23N 084W 12ACB01--Continued		
Sandstone, gray, silty, very fine grained; scattered thin carbonaceous bands; highly calcareous 88.2-88.8 ft; grades into siltstone at various places; hardness 7----	16.0	92.4
Coal; breaks into 1-inch chunks or along ¼-inch-thick bedding----	5.8	98.2
Sandstone, gray, very fine grained, silty; becomes carbonaceous toward bottom; 1-inch- to 3-ft-long pieces; good rock----------	15.0	113.2
Shale, coaly and carbonaceous, silty, thin-bedded----------	0.8	114.0
Coal----------	1.5	115.5
Siltstone, gray; 1-inch-thick bedding; hardness 6----------	1.5	117.0
Sandstone, very light gray to white with black flecks, fine-grained, slightly friable, mostly silty but few calcareous zones; black carbonaceous banding scattered throughout but increasing toward bottom; hardness 6-7--	20.2	137.2
Coal, mudstone, and siltstone; mostly coal; gradational; low grade coal is 2.5 ft thick; siltstone at bottom has thin carbonaceous seams----------	9.3	146.5
Sandstone, fine-grained; same as 117.0-137.2 ft----------	23.2	169.7

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 084W 12ACB01--Continued		
Coal; grades into black shale at bottom; ½-inch-thick bedding in shale to blocky in coal	0.8	170.5
Sandstone, light-gray to white, very fine to fine-grained, silty except 187.5-190.5 ft where it is highly calcareous; fragments to 4-ft pieces; some siltstone, scattered carbonaceous banding; hardness 6-7	26.0	196.5
Coal, with metallic-yellow flakes; grades into carbonaceous siltstone and shale at 198.5 ft; ¼-inch- to 6-inch-thick beds in siltstone	3.5	200.0
23N 084W 12CBD01		
9008		
Logged by: Geologist (Bennett)		
Log edited from U.S. Bureau of Land Management, 1975.		
Silt, tan to rusty, sandy, calcareous; sandstone fragments increasing with depth	3.0	3.0
Sandstone, tan to rusty, fine- to medium-grained; weathered; 1- to 2-inch fragments	4.4	7.4
Siltstone, tan to rusty, fine sandy, shaly near bottom; weathered; few 6-inch sandstone layers; 1- to 3-inch pieces; hardness 5-6	14.0	21.4
23N 084W 12CBD01--Continued		
Shale and mudstone, gray; thin-bedded to blocky; scattered gypsum crystals; minute carbonaceous banding	2.1	23.5
Sandstone, medium-grained	0.5	24.0
Siltstone and shale, rusty-tan; 2- to 7-inch pieces; black shale at 27.6-29.8 ft	5.8	29.8
Sandstone, tan, medium- to coarse-grained, slightly friable	2.9	32.7
Shale, thin-bedded to fragmented; most of core is missing	0.8	33.5
Siltstone, light- to dark-gray; carbonaceous banding; shaly 42.1-42.5 ft; hardness 6	14.8	48.3
Shale, black to dark-gray; carbonaceous; thin-bedded to fissile; coaly 49.6-52.0 ft; hardness 5; grades into next unit	4.6	52.9
Sandstone, gray, with siltstone and shaly layers, fine- to medium-grained; carbonaceous banding and pods	14.7	67.6
Siltstone, gray; fragments to 80-inch pieces; shaly 67.9-68.4 ft	2.8	70.4
Sandstone, light-gray; fine-grained quartz with fine mica; silty carbonaceous banding	3.2	73.6
Siltstone, gray; black carbonaceous banding increasing with depth	2.9	76.5

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 084W 12CBD01--Continued		
Coal	6.2	82.7
Shale and mudstone, black to gray; coaly near top; thin-bedded to fragments	1.7	84.4
Siltstone, light-gray; thin carbonaceous zones and banding; hardness 6; grades into next interval	4.7	89.1
Sandstone, light-gray, fine-grained, massive; slightly friable and porous; composed of quartz with fine mica; black carbonaceous banding near top; mostly silty but some calcareous zones; hardness 6	14.1	103.2
Shale, black	1.4	104.6
Coal; highly carbonaceous shale at top	6.9	111.5
Sandstone, light-gray, fine-grained; quartz with mica; carbonaceous banding increasing with depth; carbonaceous shaly siltstone 116.9-118.5 ft; 4-inch to 1.5-ft pieces; grades into next interval	12.6	124.1
Shale and mudstone, dark-gray to black, thin-bedded to fissile to fragmented; coal fragments 132.5-134.2 ft; hardness 5-6	10.8	134.9
Siltstone, gray to dark-gray, fine sandy; increasing carbonaceous matter toward bottom	31.9	166.8
23N 084W 12CBD01--Continued		
Sandstone, light-gray, fine-grained, slightly friable; carbonaceous and micaceous banding; ½-inch coal seams 192.8-193.5 and 201.5 ft	36.7	203.5
23N 084W 35DAA01		
MBW-6		
Logged by: Driller (Havercroft)		
Shale, dark-brown, and decomposed coal	10	10
Shale, brown	5	15
Clay, yellow, sandy	5	20
Coal, decomposed, and dark-brown shale	5	25
Shale, brown	65	90
Shale, dark brown, sandy	25	115
Coal, decomposed, and dark brown shale	?	?
Shale, dark brown with stringers of chert and decomposed granite	?	155
Shale, dark brown	10	165
Shale, dark brown, with sand stringers; water-	55	220
23N 084W 35DAA02		
MBW-7		
Logged by: Driller (Havercroft)		
Coal, decomposed, and black shale	15	15
Clay, yellow, sandy	5	20
Coal, decomposed, and black shale	5	25
Shale, dark brown	65	90
Sand, gray and brown shale; water	25	115

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
23N 084W 35DAA02--Continued		
Coal, decomposed, and dark brown shale------	15	130
Shale, black, very hard-	35	165
Shale, dark brown, sandy, with stringers of sand and decomposed coal; water----------	95	260
24N 081W 34ACD01		
Hanna Draw Auger		
Logged by: Hydrologist (Peter)		
Silt, brown, fine, with less than 5% sand; low clay; low moisture----	2.5	2.5
Clatter, small boulders, shale; 3/4- to 1-inch well-rounded gravel---	3.5	6
Silt----------	2	8
More clatter----------	3	11
Top of Hanna Fm., slower drilling-------	3	14
Shale, dark-brown, powdered; sand grains----	2	16
Shale, darker----------	2	18
Coal, no clatter--------	3	21
Coal----------	14	35
24N 081W 34BDA01		
Medicine Bow Auger		
Logged by: Hydrologist (Peter)		
Silt, brown, with less than 5% medium-grained sand----------	3.5	3.5
Silt, brown, clayey; slightly moist--------	2.0	6.5
Gravel, limestone or calcareous sand, coarse 3/4- to 1-inch and ¼-inch gravel mixed with silty sand ----------	6.0	12.5
24N 081W 34BDA01--Continued		
Sand, silty, wet, with particles of coal and clay layers; clatter, sandstone(?) bedrock at 15 ft----------	2.5	15.0
24N 081W 35DAD01		
S2W-2		
Logged by: Driller (Havercroft)		
Clay, yellow, sandy, and medium-hard sandstone----------	21	21
Shale, black, and decomposed coal-------	9	30
Sandstone, yellow-------	14	44
Shale, black----------	35	79
Shale, gray, and sandstone----------	21	100
Shale, black-----------	125	225
Coal with black shale---	35	260
Shale, black----------	40	300
24N 083W 14CC 01		
BLM		
Logged by: Driller (Mills)		
Topsoil and sand--------	20	20
Sandstone----------	10	30
Sandstone and shale-----	45	75
Shale, blue----------	35	110
Sand----------	20	130
Shale, brown----------	10	140
Shale, blue----------	10	150
Sand, coal, and shale---	10	160
Shale----------	10	170
Sand----------	8	178
Shale----------	12	190
Sand, shale, coal-------	3	193
Shale----------	39	232
Sand----------	2	234
Shale-----------	116	350

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
24N 083W 24CAA01		
E. Seminoe 2		
Logged by: Driller (Mills)		
Silt and sand----------	20	20
Sand, imbedded in clay--	20	40
Shale, brown----------	15	55
Shale, light-gray-------	25	80
Shale, light-gray; with sand streaks----------110		190
Sand, with streaks of shale----------	10	200
Shale, light-gray-------	10	210
Sand----------	35	245
Shale, sandy----------	5	250
Shale----------	12	262
Sand and shale----------	8	270
Shale----------	4	274
24N 083W 30DDD01		
Logged by: Geologist (Bennett)		
Log edited from U.S. Bureau of Land Management, 1975.		
Silt and mudstone, gray, tan, and black; highly weathered formation rock starting at 1.2 ft, mixed with silt and clay; sandstone cobble (?) 3.4-3.8 ft----------	7.7	7.7
Sandstone, rusty, fine-grained; highly weathered; organic top 0.8 ft----------	2.1	9.8
Shale, light-gray to black, silty, fissile to fragmented by desiccation; hardness 3-4----------	11.7	21.5
Sandstone, tan to rusty, fine-grained, slightly carbonaceous; 2- to 7-inch pieces; hardness 6-7----------	3.2	24.7
24N 083W 30DDD01--Continued		
Siltstone and shale, black, dark-gray, and tan; both gradational and sharp contacts. Siltstone with few pods, hardness 6. Shale is fissile and/or desiccated, moist, carbonaceous, hardness 3. Coal or lignitic zones at 24.7, 36.6, 38.8-39.5, 43.8-44.1, 53.6-54.1 ft----------	31.9	56.6
Siltstone, carbonaceous layering, hardness 6-7; 1/8-inch coal layer at 59.1 ft------	4.0	60.6
Sandstone, gray, faint carbonaceous banding; highly calcareous 62.6-63.1 ft; hardness 7----------	3.9	64.5
Coal, very hard, impure----------	0.5	65.0
Siltstone, same as 60.6-64.5 ft; jointed and broken----------	1.9	66.9
Sandstone, gray, fine to coarse at bottom, carbonaceous banding; hardness 7----------	7.7	74.6
Siltstone, grades into shale in places; coal 75.7-76.3 ft. Shale is fissile to fragmented and partially desiccated. Siltstone has slight carbonaceous banding; fragments to 1 ft pieces; hardness 6----------	18.4	93.0
Coal----------	0.5	93.5

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
24N 083W 30DDD01--Continued		
Shale and siltstone, mainly gradational; few sandstone layers not exceeding 2.5 ft thickness; coaly or lignitic zones 93.5-95.5, 109.1-109.4, 112.4-126.4 (poor) ft. Shale is gray to black, fissile to fragmented and desiccated, moist in places, with hardness 3. Siltstone is gray with white and dark-gray banding, carbonaceous banding, few thin (¼ inch) coal seams, and has a maximum thickness of 2.5 ft----------	108.3	201.8
24N 083W 31ABB01		
MBW-1		
Logged by: Driller (Meidinger)		
Shale, sandy----------	0.4	0.4
Sandstone----------	3.4	3.8
Shale, sandy, and sandstone----------	13.3	17.1
Sandstone----------	5.2	22.3
Shale, sandy----------	3.1	25.4
Shale, carbonaceous-----	2.1	27.5
Shale, carbonaceous and s-coal----------	0.6	28.1
Coal, B----------	0.7	28.8
Shale, carbonaceous-----	1.5	30.3
Coal----------	2.8	33.1
Shale, carbonaceous, and coal----------	1.5	34.6
Shale----------	0.4	35.0
Shale, carbonaceous-----	2.7	37.7
Shale, sandy----------	3.9	41.6
Shale, carbonaceous-----	5.5	47.1
24N 083W 31ABB01--Continued		
Shale----------	8.3	55.4
Shale, sandy, and sandstone----------	4.4	59.8
Sandstone and sandy shale streaks---------	22.6	82.4
Sandstone, hard---------	1.7	84.1
Shale, sandy, and sandstone streaks-----	7.2	91.3
Sandstone----------	7.7	99.0
Sandstone, burnt, and water----------	54.2	153.2
Shale, sandy and sandstone----------	10.5	163.7
Shale----------	5.4	169.1
Coal----------	14.3	183.4
Coal and carbonaceous shale----------	1.5	184.9
Coal----------	14.5	199.4
Shale, carbonaceous, and coal----------	3.7	203.1
Coal----------	2.4	205.5
Shale, sandy, and sandstone----------	4.5	210.0
24N 083W 31ABB02		
MBW-2		
Logged by: Driller (Meidinger)		
Clay, sandy----------	1.2	1.2
Shale----------	0.9	2.1
Sandstone----------	1.3	3.4
Shale, sandy----------	4.1	7.5
Sandstone----------	2.6	10.1
Sandstone, hard---------	0.8	10.9
Sandstone----------	1.2	12.1
Shale, sandy----------	6.1	18.2
Sandstone----------	5.0	23.2
Shale----------	1.1	24.3
Shale, carbonaceous-----	0.6	24.9
Shale----------	2.2	27.1
Shale, carbonaceous-----	1.9	29.0
Coal, oxidized----------	1.4	30.4
Shale, carbonaceous-----	0.8	31.2
Shale----------	1.1	32.3

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
24N 083W 31ABB02--Continued		
Coal	2.6	34.9
Shale, carbonaceous, with coal streaks	5.1	40.0
Shale	4.9	44.9
Shale, carbonaceous	4.9	49.8
Shale	7.5	57.3
Shale, sandy, and sandstone	3.7	61.0
Sandstone	15.0	76.0
Shale, sandy, and sandstone	15.7	91.7
Sandstone, with sandy shale streaks	38.5	130.2
Water	0.7	130.9
Shale and sandstone	20.2	151.1
Shale, carbonaceous	4.9	156.0
Coal	31.1	187.1
Shale, carbonaceous, and coal	3.9	191.0
Coal	2.1	193.1
Shale, sandy, and sandstone	6.9	200.0

	Thickness (ft)	Depth (ft)
24N 083W 31ABB03		
MBW-10		
Logged by: Driller (Meidinger)		
Shale	1.1	1.1
Sandstone	11.6	12.7
Shale, sandy	2.7	15.4
Sandstone	5.5	20.9
Shale, sandy	2.7	23.6
Shale, carbonaceous	2.2	25.8
Coal, oxidized	0.6	26.4
Shale, carbonaceous	1.9	28.3
Coal	2.5	30.8
Shale, carbonaceous, and coal	1.6	32.4
Shale	0.8	33.2
Shale, carbonaceous, and coal	2.8	36.0
Sandstone	3.6	39.6
Shale, sandy	2.3	41.9
Shale, carbonaceous, and shale	4.9	46.8

	Thickness (ft)	Depth (ft)
24N 083W 31ABB03--Continued		
Shale, carbonaceous, with coal streaks	0.6	47.4
Shale	8.4	55.8
Shale, sandy, and sandstone	3.2	59.0
Sandstone	11.3	70.3
Shale, sandy, and burnt sandstone	26.5	96.8
Sandstone with sandy shale streaks; water	31.0	127.8
Shale with sandstone streaks, burnt	27.0	154.8
Shale, burnt	12.7	167.5
Shale, carbonaceous	0.5	168.0
Coal and carbonaceous shale	1.8	169.8
Coal	15.8	185.6
Coal and carbonaceous shale	3.3	188.9
Coal	1.8	190.7
Sandstone and sandy shale	9.3	200.0

	Thickness (ft)	Depth (ft)
24N 083W 31BAD01		
MBW-8		
Logged by: Driller (Meidinger)		
Clay, sandy	1.7	1.7
Sandstone	8.4	10.1
Coal	1.9	12.0
Sandstone	14.6	26.6
Sandstone, hard	1.5	28.1
Sandstone	16.5	44.6
Shale, sandy	1.2	45.8
Coal and carbonaceous shale	1.2	47.0
Sandstone	1.1	48.1
Shale, sandy	2.9	51.0
Coal	2.1	53.1
Shale	0.7	53.8
Sandstone	1.9	55.7
Shale, carbonaceous	2.2	57.9
Sandstone	2.2	60.1
Shale, carbonaceous, and coal	3.3	63.4
Shale, carbonaceous, and shale	3.2	66.6

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
24N 083W 31BAD01--Continued		
Sandstone with hard streaks	87.8	154.5
Sandstone, hard	2.1	156.5
Sandstone	5.6	172.1
Shale, sandy and sandstone	6.6	178.7
Shale	6.7	185.4
Coal, water	34.6	220.0
24N 083W 31BAD02 MBW-9 Logged by: Driller (Meidinger)		
Clay, sandy	2.2	2.2
Shale, sandy	20.9	23.1
Shale, carbonaceous	0.6	23.7
Shale	4.2	27.9
Sandstone	1.6	29.5
Shale, carbonaceous and coal	1.5	31.0
Shale, sandy, and sandstone	5.7	36.7
Sandstone	3.9	40.6
Shale, carbonaceous, and coal	1.2	41.8
Shale, sandy, and sandstone	5.5	47.3
Coal	2.4	49.7
Shale	0.5	50.2
Sandstone	1.9	52.1
Shale, carbonaceous	2.7	54.8
Sandstone	1.3	56.1
Shale, carbonaceous, with coal streaks	3.8	59.9
Shale, with carbonaceous shale streaks	3.6	63.5
Sandstone, with hard streaks	102.6	166.1
Shale, sandy, and sandstone; damp	9.0	175.1
Shale	5.1	180.2
Coal, water	39.8	220.0
24N 083W 32BAA01 MBW-3 Logged by: Driller (Meidinger)		
Clay, sandy	2.4	2.4
Shale, sandy	2.2	4.6
Shale, carbonaceous	7.3	11.9
Shale	1.1	13.0
Sandstone	15.4	28.4
Shale	9.8	38.2
Sandstone	1.7	39.9
Shale	11.3	51.2
Shale, carbonaceous	0.9	52.1
Shale, carbonaceous, and coal	1.5	53.6
Shale	4.2	57.8
Shale, sandy and sandstone	33.1	90.9
Sandstone	20.8	111.7
Shale, sandy, and shale	30.6	142.3
Sandstone	7.5	149.8
Sandstone, hard; water	1.0	150.8
Shale, sandy, sandstone	18.3	169.1
Shale, with sandstone streaks	28.0	197.1
Sandstone	8.3	205.4
Sandstone, hard; water	1.0	206.4
Shale, sandy, and sandstone	9.1	215.5
Sandstone, with hard streaks	33.2	248.7
Shale, carbonaceous, and coal	1.3	250.0
24N 083W 32DDD01 Logged by: Geologist (Bennett) Log edited from U.S. Bureau of Land Management, 1975.		
Silt, tan, slightly sandy	6.6	6.6

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
24N 083W 32DDD01--Continued		
Sandstone and siltstone, light-gray to light-brownish-gray, slightly to moderately clayey, non-calcareous with much woody organic material on irregular bedding surfaces. Siltstone is very clayey and fractured----------	4.4	11.0
Shale, dark-gray to dark-brownish-gray, silty, fissile to very shaly; becomes highly organic (lignitic) 27-28 ft with some sulfur surface coating. Locally medium-grained sandstone at about 15 ft, with slight ferruginous cement; non-calcareous; moderately to poorly cemented----	18.0	29.0
Sandstone, light-brownish-gray to gray, medium-grained, sub-angular; silty in upper 2 ft; bedding averages 6 inches thick, 1.4 ft maximum; many irregular, finely-bedded (1/4-inch) organic iron partings with fine selenite throughout; some siltstone partings with fragmented organic-woody material. Grades into next unit----------	15.4	44.4
24N 083W 32DDD01--Continued		
Shale and coal, black to brownish-black, very organic fissile shale with coal; lignite partings; lignite 45-45.8 ft; scattered selenite flakes. Grades to coal below lignite, up to 1.5 ft thick with good conchoidal fracture----------	2.2	46.6
Sandstone and siltstone, gray, fine-grained, interbedded; angular to sub-angular quartz grains; more massive; silty and calcareous. Silty units are very fractured, shaly, and clayey; some thin irregular coaly seams near base----------	3.4	50.0
Shale, black, very fissile; very thin coaly partings; soft; grades into units above and below-------	1.0	51.0
Sandstone, light- to dark-gray, fine-grained, non-calcareous; irregular partings and carbonaceous woody fragments; thin- to moderately-bedded (25 inches) grading into shale in lower 0.4 ft----------	1.2	52.2
Shale, gray, fissile to blocky; scattered carbonaceous material and small coal chunks; hardness 4----------	1.3	53.5

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
24N 083W 32DDD01--Continued		
Coal, grading into lignite, shale, and coal again; thin-bedded to blocky; metallic-yellow flecks at 58 ft-------	4.8	58.3
Siltstone and sandstone, gray, blocky; scattered coaly and carbonaceous pods; hardness 5. Sandstone at 60.5-61.1 ft and 84.9-88.6 ft; both light gray and very fine grained. Lower sandstone has 2-inch thick bedding, hardness 6---	40.3	98.6
Shale, gray, with some mudstone; ¼ to ½ inch thick bedding to blocky; some carbonaceous material; portions appear to have air desiccated--------	1.4	100.0
24N 084W 36ADC01		
CD-1, SD-1-36		
Logged by: Geologist (Blanchard)		
Log from Blanchard and Pike, 1977.		
Sandstone, tan, very fine grained; shale, gray, silty----------	5	5
Shale, dark-gray; siltstone, tan; sandstone, tan, fairly coarse----	5	10
Siltstone, gray, slightly shaly--------	5	15
Shale, brown, carbonaceous; sandstone, very fine grained; mudstone, gray, silty----------	5	20
Sandstone, buff, fine-grained; coal---------	5	25

	Thickness (ft)	Depth (ft)
24N 084W 36ADC01--Continued		
Coal; shale, carbonaceous----------	5	30
Siltstone, gray---------	5	35
Siltstone, gray; sandstone, brown, fine-grained----------	5	40
Siltstone, shaly, gray----------	10	50
Shale, gray, slightly silty, carbonaceous---	5	55
Coal; shaly coal; shale, carbonaceous----------	5	60
Shale, carbonaceous-----	10	70
Shale, carbonaceous, siltstone, gray-------	5	75
Shale, gray, silty------	5	80
Shale, carbonaceous-----	5	85
Shale, carbonaceous; shaly coal----------	5	90
Siltstone, gray---------	5	95
Shale, gray, slightly silty----------	5	100
Sandstone, gray, fine-grained----------	10	110
Shale, gray, very silty-	5	115
Siltstone, gray---------	5	120
Shale, gray, silty------	5	125
Shale, carbonaceous-----	5	130
Shale, gray----------	25	155
Siltstone, gray---------	20	175
Sandstone, gray, very fine grained----------	10	185
Shale, gray, silty; mudstone, brown-------	5	190
Mudstone, gray; shale, carbonaceous----------	5	195
Shale, gray, silty; mudstone, brown-------	5	200
Shale, dark-gray; mudstone, gray--------	5	205
Siltstone, gray; shale, carbonaceous; trace coal----------	5	210
Siltstone, gray---------	5	215
Shale, carbonaceous; trace coal----------	5	220
Shale, carbonaceous-----	5	225

Table 2.--Lithologic logs of selected wells and test holes--Continued

	Thickness (ft)	Depth (ft)
24N 084W 36ADC01--Continued		
Shale, gray, silty------	5	230
Shale, gray, slightly carbonaceous----------	5	235
Siltstone, gray---------	5	240
Shale, gray, slightly silty----------	5	245
Shale, carbonaceous-----	5	250
Coal----------	20	270
Coal; trace shale, carbonaceous----------	10	280
Coal----------	10	290
Coal; shale, carbonaceous; shaly coal-----	5	295
Sandstone, fine-grained; shaly coal; shale, carbonaceous----------	5	300
Sandstone, gray, fine-grained----------	5	305
Shale, carbonaceous; shaly coal; siltstone----------	5	310
Shale, gray, silty------	5	315
Sandstone, gray, fine-grained; mudstone, gray----------	5	320
Sandstone, gray, fine-grained----------	5	325
Siltstone, gray---------	10	335
Shale, gray, slightly silty and carbonaceous; siltstone, gray----------	5	340
Shale, carbonaceous-----	5	345
Shale, gray, silty------	5	350
Shale, carbonaceous-----	10	360
Shale, carbonaceous; shale, gray, silty----	5	365
Shale, gray, silty------	5	370
Shale, carbonaceous; shaly coal----------	5	375
Shale, gray, slightly silty; shale, carbonaceous----------	5	380
Shale, gray, silty; siltstone, gray-------	5	385
Siltstone, gray; mudstone, slightly carbonaceous----------	5	390
Sandstone, gray, fine-grained; mudstone, brown-------	5	395
Sandstone, gray, fine-grained----------	5	400
Siltstone, gray; siltstone, tan; mudstone, gray----------	5	405
Sandstone, gray and tan-	5	410

Table 3.--Selected water-level data

[Well number, township-range-section location. Water level, in feet below land surface; +, water level, in feet above land surface; letter is method of measurement: S, steel tape; T, electric tape]

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Well 21N 080W 12ACA01							
10-06-77	70.00 T	06-22-78	73.38 S	09-22-80	72.69 S		
Well 21N 080W 24BBA01							
01-11-77	113.89 S	10-06-77	97.80 T	06-22-78	75.20 S	09-22-80	72.04 S
06-13	104.12 S						
Well 22N 080W 34DCD01							
11-18-76	60.44 S	04-05-77	59.30 S	10-05-77	59.50 T	09-22-80	53.65 S
01-11-77	57.66 S	06-13-77	58.09 S	06-22-78	54.18 S		
Well 22N 080W 35DDC01							
01-11-77	84.10 S	06-13-77	82.56 S	02-06-78	76.63 S	09-22-80	75.22 S
04-05-77	83.03 S	10-08-77	82.20 T	06-22-78	75.54 S		
Well 22N 081W 21AAB01							
12-15-76	28.84 S	08-25-77	29.30 S	02-06-78	29.07 S	09-24-80	28.43 S
04-07-77	28.19 S	09-23-77	29.90 T	06-23-78	27.74 S		
06-13-77	27.94 S	09-24-77	30.30 T	06-02-79	27.37 S		
Well 22N 081W 21AAB02							
11-08-76	25.91	06-13-77	26.08 S	11-01-77	27.63 S	06-02-79	25.54 S
12-15-76	26.95 S	08-25-77	27.44 S	02-06-78	27.23 S	09-24-80	26.53 S
04-07-77	26.38 S	09-23-77	27.90 T	06-23-78	25.89 S		
Well 22N 081W 31CCD01							
11-16-76	43.40 S	04-07-77	42.98 S	09-01-77	42.75 S	09-27-78	42.92 S
12-15-76	43.92 S	06-13-77	42.87 S	11-01-77	43.25 S	06-02-79	42.84 S
01-13-77	43.30 S	08-25-77	42.71 S	06-12-78	42.85 S	09-24-80	42.30 S
Well 22N 081W 31CDD02							
11-16-76	7.78 S	04-07-77	3.57 S	09-01-77	3.06 S	09-27-78	1.48 S
12-15-76	10.02 S	06-13-77	3.25 S	11-01-77	1.95 S	06-02-79	0.61 S
01-13-77	8.09 S	08-25-77	3.06 S	06-12-78	1.51 S	09-24-80	+1.40 S
Well 22N 082W 12ACD01							
12-15-76	121.89 S	06-15-77	122.46 S	02-08-78	122.09 S	09-26-78	122.15 S
01-13-77	122.62 S	09-25-77	122.70 T	06-23-78	122.20 S	06-02-79	122.29 S
04-07-77	122.72 S						

Table 3.--Selected water-level data--Continued

Date	Water level		Date	Water level		Date	Water level		Date	Water level	
Well 22N 082W 30BCB01											
12-14-76	90.20	S	04-06-77	89.59	S	02-06-78	80.93	S	10-04-78	78.39	S
01-12-77	89.88	S	06-14-77	88.15	S	06-14-78	79.11	S	09-25-80	80.66	S
Well 22N 082W 31BCD01											
11-16-76	9.14	S	04-06-77	6.20	S	11-01-77	7.38	S	09-24-80	6.48	S
12-15-76	6.95	S	06-13-77	6.35	S	02-06-78	7.01	S			
01-13-77	6.56	S	09-01-77	7.62	S	06-12-78	5.07	S			
Well 22N 082W 32AAA01											
11-16-76	91.09	S	04-06-77	89.36	S	06-15-78	90.00	T	09-25-80	89.04	S
01-13-77	90.47	T	07-13-77	89.57	S						
Well 22N 083W 05DDB01											
07-13-67	79.80	S	09-22-76	79.80	S	01-13-77	79.58	S	09-26-80	79.91	S
07-31-74	79.80	S	10-21-76	79.95	S	04-05-77	80.28	S			
06-04-76	79.79	S	11-19-76	79.96	S	06-14-77	80.05	S			
08-12-76	79.88	S	12-15-76	80.10	S	10-04-78	79.74	S			
Well 23N 080W 14CBA01											
07- -67	41.36	S	11-13-77	40.20	T	02-09-78	39.89	S	06-23-78	38.96	S
06-15-76	39.42	S									
Well 23N 081W 09CAC01											
12-15-76	64.92	S	06-15-77	42.42	S	02-08-78	64.38	S	06-03-79	24.54	S
01-13-77	46.05	S	09-26-77	25.70	T	06-23-78	45.25	S	09-24-80	27.35	S
04-07-77	25.30	S	11-01-77	89.54	S	09-27-78	36.58	S			
Well 23N 081W 09CAC02											
12-15-76	9.76	S	06-15-77	9.89	S	02-08-78	10.65	S	06-03-79	7.19	S
01-13-77	9.60	S	09-26-77	10.90	S	06-23-78	7.40	S	09-24-80	6.90	S
04-07-77	9.08	S	11-01-77	10.71	S	09-27-78	9.11	S			
Well 23N 081W 09CAC03											
12-15-76	18.62	S	06-15-77	13.10	T	02-08-78	11.56	S	06-03-79	10.91	S
01-13-77	18.06	S	09-25-77	13.10	S	06-23-78	11.15	S	09-24-80	1.27	S
04-07-77	13.39	S	11-01-77	11.77	S	09-27-78	11.28	S			
Well 23N 081W 14BDD01											
11-18-78	16.38	S	06-02-79	20.36	S	07- -79	21.04	S	09-23-80	23.80	S
Well 23N 081W 14CDB01											
11-18-78	32.94	S	06-02-79	40.34	S	09-23-80	44.45	S			
Well 23N 081W 20DCB01											
06-20-79	133.62	S	09-24-80	133.09	S						

Table 3.--Selected water-level data--Continued

Date	Water level		Date	Water level		Date	Water level		Date	Water level	
Well 23N 081W 24BCA01											
06-20-79	37.49	S	09-23-80	38.37	S						
Well 23N 081W 24BCC01											
11-19-78	94.86	S	06-02-79	96.04	S	07- -79	95.45	S	09-23-80	94.05	S
Well 23N 081W 24DBB01											
06-20-79	67.23	S	07- -79	67.11	S	09-23-80	66.75	S			
Well 23N 081W 32AAA01											
01-13-77	105.87	S	09-24-77	100.20	T	06-23-78	101.20	T	06-03-79	99.59	S
06-15-77	102.02	S	11-01-77	103.16	S	09-27-78	100.80	T	09-24-80	100.83	S
Well 23N 082W 14DBC01											
08-29-78	25.73	S	06-05-79	25.68	S	09-24-80	25.77	S			
Well 23N 082W 14DBC02											
08-29-78	32.11	S	06-05-79	30.97	S	09-24-80	29.86	S			
Well 23N 083W 03BDC01											
04-01-76	79.44	S	09-21-76	74.89	S	04-06-77	75.30	S	09-25-80	77.66	S
05-06-76	75.19	S	10-20-76	75.05	S	06-14-77	75.18	S			
06-03-76	75.11	S	11-19-76	74.95	S	06-14-78	75.13	S			
08-11-76	75.10	S	12-14-76	75.09	S	07-26-79	74.56	S			
Well 23N 083W 04BCC01											
06-29-76	128.92	S	11-19-76	128.91	S	06-14-77	128.05	S	07-26-79	130.58	S
08-11-76	129.17	S	12-14-76	128.89	S	09-10-77	127.90	T	09-25-80	129.78	S
09-21-76	128.99	S	01-12-77	128.27	S	06-14-78	129.99	S			
10-20-76	128.97	S	04-06-77	128.24	S	05-14-79	130.10	S			
Well 23N 083W 06ACA01											
06-26-76	71.59	S	10-20-76	71.36	S	04-06-77	71.55	S	09-25-80	68.34	S
06-29-76	71.56	S	11-19-76	71.41	S	06-14-77	71.65	S			
08-11-76	71.30	S	12-14-76	71.48	S	09-12-77	71.60	T			
09-22-76	71.31	S	01-12-77	71.45	S	06-13-78	71.74	S			
Well 23N 083W 06BBB01											
10-10-74	77.22	T	05-27-76	77.30	S	11-18-76	77.49	S	06-13-78	76.57	S
12-04-74	77.22	T	06-30-76	77.18	S	12-14-76	77.20	S	10-03-78	77.22	S
03-31-76	77.34	S	08-11-76	77.22	S	06-14-77	76.69	S	05-14-79	75.37	S
04-06-76	76.83	S	09-22-76	77.20	S	09-13-77	76.70	T	09-26-80	73.10	S
05-03-76	77.45	S	10-20-76	77.85	S	04-25-78	79.38	S			

Table 3.--Selected water-level data--Continued

Date	Water level		Date	Water level		Date	Water level		Date	Water level	
Well 23N 083W 06BCD01											
06-26-76	77.76	S	10-20-76	78.64	S	04-06-77	79.45	S	06-13-78	78.55	S
06-29-76	78.04	S	11-18-76	78.74	S	06-14-77	79.88	S	10-03-78	78.20	S
08-11-76	78.22	S	12-14-76	78.92	S	09-12-77	80.50	T	09-26-80	77.78	S
09-22-76	78.43	S	01-12-77	78.99	S	05-14-78	77.63	S			
Well 23N 083W 06DDD01											
09- -74	51.86	S	06-30-76	51.95	S	11-19-76	50.05	S	06-14-77	50.46	S
12-06-74	51.90	S	08-11-76	52.10	S	12-14-76	47.95	S	09-11-77	48.10	T
04-01-76	48.27	S	09-21-76	52.24	S	01-12-77	52.96	T	06-14-78	52.80	T
05-05-76	51.62	S	10-20-76	52.39	S	04-06-77	52.70	S	09-25-80	44.16	S
Well 23N 083W 07CAA01											
06-13-67	41.28	S	06-03-76	37.55	S	11-19-76	36.98	S	06-14-78	35.73	S
12-10-74	43.70	T	08-11-76	37.83	S	12-14-76	36.89	S			
04-01-76	37.24	S	09-21-76	37.21	S	04-06-77	36.54	S			
05-05-76	37.50	S	10-20-76	37.08	S	06-14-77	37.14	S			
Well 23N 083W 08DDD01											
06-29-76	92.52	S	12-14-76	106.54	S	11-02-77	127.36	S	10-03-78	128.98	S
08-10-76	95.71	S	01-12-77	111.87	S	02-09-78	130.90	S	01-15-79	129.43	S
09-21-76	100.65	S	04-06-77	118.27	S	04-25-78	128.30	S	05-14-79	129.79	S
10-20-76	102.77	S	06-14-77	119.12	S	06-14-78	130.80	S	09-25-80	128.69	S
11-19-76	105.29	S	09-08-77	126.00	T	08-30-78	128.57	S			
Well 23N 083W 13AAD01											
07-13-67	126.10	S	08-12-76	124.14	S	04-06-77	127.87	S	09-25-80	119.33	T
03-31-76	95.03	S	09-21-76	123.95	S	06-14-77	123.39	S			
05-06-76	95.58	S	10-20-76	123.69	S	06-14-78	122.06	S			
Well 23N 083W 18DDD01											
08-10-76	116.59	S	12-14-76	115.20	S	09-07-77	115.70	T	10-04-78	114.90	S
09-21-76	115.43	S	01-12-77	114.67	S	11-02-77	114.26	S	09-25-80	116.80	S
10-21-76	115.09	S	04-06-77	115.27	S	04-24-78	113.89	S			
11-19-76	115.16	S	06-14-77	114.97	S	06-14-78	114.30	S			
Well 23N 083W 19BDB01											
07-31-74	86.30	T	09-21-76	82.56	S	01-12-77	82.64	S	06-14-78	83.08	S
12-10-74	86.30	T	10-21-76	82.68	S	04-06-77	82.58	S	10-03-78	83.58	S
06-04-76	82.95	S	11-19-76	82.77	S	06-14-77	83.06	S	09-26-80	81.34	S
08-12-76	82.73	S	12-14-76	81.75	S	02-09-78	83.27	S			
Well 23N 083W 21BAB01											
11-19-76	24.98	S	04-06-77	24.70	S	09-11-77	26.90	S	09-25-80	28.45	S
12-14-76	25.72	S	06-14-77	25.63	S	06-14-78	25.15	S			
01-13-77	26.20	T	09-09-77	27.10	T	05-14-79	28.28	S			

Table 3.--Selected water-level data--Continued

Date	Water level		Date	Water level		Date	Water level		Date	Water level	
Well 23N 083W 21BDA01											
06-13-67	45.01	S	09-21-76	43.18	S	04-05-77	43.10	S	09-25-80	42.22	S
08-24-74	44.70	T	10-20-76	43.34	S	06-14-77	43.09	S			
12-10-74	44.70	T	11-19-76	43.40	S	09-10-77	43.49	S			
05-06-76	43.20	S	12-14-76	44.33	S	06-14-78	42.03	S			
Well 23N 083W 29AAB01											
11-19-76	95.85	S	09-10-77	94.80	S	11-02-77	94.15	S	10-14-78	94.75	S
04-05-77	95.75	S	09-22-77	93.00	T	06-14-78	95.40	T	05-14-79	95.15	S
06-14-77	94.19	S									
Well 23N 083W 29CDA01											
08-06-74	100.80	T	12-10-74	101.90	T	09-22-76	140.08	S	11-19-76	143.48	S
08-28-74	101.20	T	08-12-76	135.88	S	10-21-76	142.98	S	12-15-76	143.89	S
Well 23N 083W 32AAD01											
07-03-75	56.50	S	06-30-76	73.32	S	11-19-76	78.33	S	11-02-77	94.97	S
09-09-75	59.21	S	08-12-76	73.84	S	12-15-76	80.45	S	11-07-77	99.30	T
09-10-75	65.24	S	09-22-76	64.89	S	06-14-77	89.80	S	02-09-78	101.10	S
05-06-76	63.40	S	10-21-76	72.08	S	06-30-77	89.84	S			
Well 23N 083W 32ABA01											
07-03-75	76.10	S	12-15-76	107.43	S	09-11-77	113.80	T	06-14-78	135.69	S
09-10-75	83.94	S	01-12-77	110.44	S	09-21-77	113.70	T	08-30-78	137.62	S
09-22-76	97.76	S	04-05-77	108.95	S	11-02-77	117.95	S	10-04-78	138.22	S
10-21-76	99.12	S	06-14-77	111.14	S	02-09-78	120.26	S			
11-19-76	103.50	S	06-30-77	110.77	S	04-24-78	128.41	S			
Well 23N 083W 32ACD01											
08-20-74	30.00	T	06-04-76	23.86	S	11-19-76	25.70	S	04-25-78	22.64	S
08-28-74	30.40	T	06-30-76	25.64	S	12-15-76	25.88	S	06-14-78	25.35	S
12-17-74	30.00	T	08-12-76	24.53	S	01-13-77	27.37	S	10-04-78	25.50	S
07-03-75	32.88	S	09-22-76	25.53	S	04-05-77	22.77	S			
05-06-76	24.32	S	10-21-76	23.48	S	06-14-77	24.73	S			
Well 23N 083W 32DBC01											
07-03-75	65.55	S	08-12-76	65.19	S	01-13-77	66.13	T	04-25-78	65.89	S
09-08-75	66.30	S	09-22-76	65.82	S	04-05-77	65.92	S	06-14-78	65.61	S
05-06-76	64.30	S	10-21-76	65.74	S	06-14-77	65.77	S	10-04-78	66.94	S
06-04-76	64.37	S	11-19-76	65.66	S	09-21-77	67.15	T	09-26-80	63.31	S
06-30-76	64.67	S	12-15-76	65.83	S	11-10-77	67.65	T			
Well 23N 083W 33BBB01											
06-30-77	78.22	S	02-09-78	82.30	S	08-30-78	83.03	S	05-14-79	87.88	S
09-22-77	79.40	T	04-24-78	81.27	S	10-04-78	83.65	S			
11-02-77	79.65	S	06-14-78	80.50	S	01-15-79	84.92	S			

Table 3.--Selected water-level data--Continued

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Well 23N 083W 33BBC01							
06-30-77	76.90 S	04-24-78	83.75 S	08-30-78	83.80 S	01-15-79	92.30 T
11-02-77	80.80 S	06-14-78	84.97 S	10-04-78	85.07 S	05-14-79	90.07 S
02-09-78	84.71 S						
Well 23N 083W 33BDB01							
07-31-74	12.10 S	09-22-76	15.82 S	01-12-77	20.04 S	02-09-78	34.76 S
05-06-76	16.75 S	10-21-76	16.83 S	04-05-77	23.17 S	04-24-78	28.44 S
06-30-76	18.46 S	11-19-76	18.01 S	06-14-77	25.69 S	06-16-78	30.63 S
08-12-76	16.13 S	12-15-76	19.18 S	11-02-77	29.35 S		
Well 23N 083W 33DBC01							
11-02-77	86.44 S	04-24-78	88.86 S	08-30-78	92.87 S	01-15-79	92.82 S
11-10-77	87.60 T	06-14-78	87.92 S	10-04-78	93.08 S	05-14-79	93.44 S
02-09-78	89.95 S						
Well 23N 084W 12ACB01							
09-09-74	50.80 S	06-30-76	51.54 S	11-18-76	51.86 S	06-14-77	52.17 S
12-02-74	51.14 T	08-11-76	51.65 S	12-14-76	51.93 S	06-13-78	52.45 S
03-31-76	51.29 S	09-22-76	51.76 S	01-12-77	51.86 S	05-14-79	50.25 S
05-05-76	51.35 S	10-20-76	51.88 S	04-06-77	52.03 S	07-26-79	52.48 S
Well 23N 084W 35DAA01							
12-15-76	121.05 S	09-21-77	117.20 T	02-09-78	121.26 S	10-04-78	117.25 S
04-06-77	119.24 S	11-02-77	120.18 S	06-14-78	118.80 S	05-14-79	115.68 S
06-14-77	117.86 S						
Well 23N 084W 35DAA02							
11-18-76	97.85 S	06-14-77	118.56 S	11-02-77	119.29 S	06-14-78	117.60 S
12-15-76	118.00 S	09-21-77	119.70 T	02-09-78	120.54 S	10-04-78	116.72 S
04-06-77	123.00 S						
Well 24N 081W 28ABA01							
07-12-67	+1.12 T	07-14-77	+0.45 S	06-22-78	+0.72 S		
Well 24N 081W 33DBA01							
11-16-76	73.20 S	06-15-77	76.54 S	02-08-78	76.60 T	06-20-79	78.00 S
12-13-76	76.82 S	09-27-77	77.20 T	06-22-78	76.30 T	09-23-80	75.90 S
04-07-77	76.63 S	11-01-77	76.88 S				
Well 24N 081W 34BDA01							
08-12-75	10.34 S	03-24-76	9.97 S	05-11-76	7.63 S	07-20-76	8.47 S
11-17-75	8.30 S	04-12-76	7.83 S	06-07-76	7.57 S	08-18-76	8.42 S
Well 24N 081W 35DAD01							
12-13-76	189.32 S	09-27-77	193.90 T	11-01-77	193.52 S	06-03-79	198.59 S
06-15-77	191.42 S						
Well 24N 083W 24CAA01							
06-27-67	50.90 S	10-04-77	51.70 T	06-22-78	51.59 S		

Table 3.--Selected water-level data--Continued

Date	Water level	Date	Water level	Date	Water level	Date	Water level
Well 24N 083W 30DDD01							
10-10-74	118.20 T	08-11-76	130.09 S	04-06-77	131.93 S	10-03-78	129.77 S
12-05-74	118.20 T	09-22-76	128.83 S	06-14-77	132.02 S	05-14-79	123.92 S
05-06-76	123.98 S	10-20-76	128.40 S	09-20-77	132.10 T	09-26-80	120.12 S
05-27-76	123.58 S	11-18-76	126.49 S	04-25-78	134.00 T		
06-29-76	129.13 S	12-14-76	126.75 S	06-13-78	131.05 T		
Well 24N 083W 31ABB02							
12-14-76	89.38 S	06-14-77	89.59 S	04-25-78	91.02 S	10-03-78	91.09 S
04-06-77	89.48 S	09-20-77	89.64 S	06-13-78	91.01 S		
Well 24N 083W 31ABB03							
12-14-76	88.10 S	06-14-77	88.31 S	04-25-78	89.75 S	10-03-78	89.84 S
04-06-77	88.21 S	09-20-77	88.40 S	06-13-78	89.70 S		
Well 24N 083W 31BAD02							
11-18-76	98.17 S	06-14-77	98.18 S	04-25-78	99.84 S	10-03-78	99.83 S
12-14-76	97.97 S	09-14-77	99.10 T	06-13-78	99.69 S	05-14-79	99.67 S
04-06-77	98.19 S						
Well 24N 083W 32BAA01							
11-16-76	114.40 S	04-06-77	114.57 S	04-25-78	112.30 T	10-03-78	112.89 S
11-18-76	111.98 S	06-14-77	114.72 S	06-13-78	112.53 S	05-14-79	110.90 S
12-14-76	111.50 S	09-20-77	115.30 T				
Well 24N 083W 32DDD01							
12-06-74	68.20 T	06-30-76	68.52 S	11-19-76	69.70 S	06-14-77	70.16 S
04-01-76	69.09 S	08-11-76	69.58 S	12-14-76	69.83 S	09-11-77	68.30 T
05-05-76	69.21 S	09-21-76	69.65 S	01-11-77	69.72 S	06-14-78	70.59 S
05-28-76	69.23 S	10-20-76	69.74 S	04-06-77	73.21 S	09-25-80	71.14 S
Well 24N 084W 36ADC01							
06-29-76	110.73 S	12-14-76	117.12 S	11-09-77	130.80 T	05-14-79	125.54 S
09-22-76	112.72 S	04-06-77	120.84 S	04-25-78	136.89 S	09-26-80	104.96 S
10-20-76	113.04 S	06-14-77	118.37 S	06-13-78	135.62 S		
11-18-76	114.96 S	09-13-77	116.60 T	10-03-78	118.52 S		