HYDROLOGY OF AN ABANDONED COAL-MINING AREA NEAR MCCURTAIN, HASKELL COUNTY, OKLAHOMA

By Larry J. Slack

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FACTORS FOR CONVERTING INCH-POUND UNITS TO INTERNATIONAL SYSTEM OF UNITS (SI)

For the convenience of readers who may want to use International System of Units (SI), the data may be converted by using the following factors:

Multiply inch-pound units	By	To obtain SI units
acres	0.4047	square hectometers
acre-feet	1233.	cubic meters
cubic feet	0.02832	cubic meters
cubic feet per second (ft^3/s)	0.02832	cubic meters per second
feet	0.3048	meters
inches	25.4	millimeters
miles	1.609	kilometers
square feet	0.09294	square meters
square miles	2.590	square kilometers
Temperature		
degrees Fahrenheit (°F)	°C = 5/9 (°F-32)	degrees Celsius (°C)
Specific conductance		
micromhos per centimeter at 25° Celsius	1.000	microsiemens per centimeter at 25° Celsius

HYDROLOGY OF AN ABANDONED COAL-MINING AREA NEAR MCCURTAIN, HASKELL COUNTY, OKLAHOMA

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ABSTRACT

Water quality was investigated from October 1980 to May 1983 in an area of abandoned coal mines in Haskell County, Oklahoma. Bedrock in the area is shale, siltstone, sandstone, and the McAlester (Stigler) and Hartshorne coals of the McAlester Formation and Hartshorne Sandstone of Pennsylvanian age. The two coal beds, upper and lower Hartshorne, associated with the Hartshorne Sandstone converge or are separated by a few feet or less of bony coal or shale in the McCurtain area. Many small faults cut the Hartshorne coal in all the McCurtain-area mines. The main avenues of water entry to and movement through the bedrock are the exposed bedding-plane openings between layers of sandstone, partings between laminae of shale, fractures and joints developed during folding and faulting of the brittle rocks, and openings caused by surface mining--the overburden being shattered and broken to form spoil. Water-table conditions exist in bedrock and spoil in the area. Mine pond water is in direct hydraulic connection with water in the spoil piles and the underlying Hartshorne Sandstone.

Sulfate is the best indicator of the presence of coal-mine drainage in both surface and ground water in the Oklahoma coal field. Median sulfate concentrations for four sites on Mule Creek ranged from 26 to 260 milligrams per liter. Median sulfate concentrations increased with increased drainage from unreclaimed mined areas. The median sulfate concentration in Mule Creek where it drains the reclaimed area is less than one-third of that at the next site downstream where the stream begins to drain abandoned (unreclaimed) mine lands.

Water from Mule Creek predominantly is a sodium sulfate type. Maximum and median values for specific conductance and concentrations of calcium, magnesium, sodium, sulfate, chloride, dissolved solids, and alkalinity increase as Mule Creek flows downstream and drains increasing areas of abandoned (unreclaimed) mining lands. Constituent concentrations in Mule Creek, except those for dissolved solids, iron, manganese, and sulfate, generally do not exceed drinking-water limits. Reclamation likely would result in decreased concentrations of dissolved solids, calcium, magnesium, sodium, sulfate, and alkalinity in Mule Creek in the vicinity of the reclaimed area.

Ground water in the area is moderately hard to very hard alkaline water with a median pH of 7.2 to 7.6. It predominantly is a sodium sulfate type and, except for dissolved solids, iron, manganese, and sulfate, constituent concentrations generally do not exceed drinking-water limits. Ground-water quality would likely be unchanged by reclamation.

The quality of water in the two mine ponds is quite similar to that of the shallow ground water in the area. Constituents in water from both ponds generally do not exceed drinking-water limits and the water quality is unlikely to be changed by reclamation in the area.

INTRODUCTION

Coal is the most abundant fossil fuel in the United States, and the quantity mined probably will increase to meet our energy needs. The United States Congress in passing the Surface Mining Control and Reclamation Act of 1977 (Public Law 95-87) recognized the need for "...the protection of public health, safety, and the general welfare from adverse effects of coal mining practices..." and "...the restoration of land and water resources and the environment previously degraded by adverse effects of coal mining practices including measures for the conservation and development of soil, water (including channelization), woodland, fish, and wildlife, recreation resources, and agricultural productivity." The law established an Abandoned Mine Reclamation Fund to be paid by all operators of coal-mining operations to the Secretary of the Interior.

As of January 1982, 28,622 acres of land disturbed by surface mining for coal in eastern Oklahoma (5,793 acres in Haskell County) are unreclaimed and referred to as "orphan (abandoned) coal mine lands" (Oklahoma Conservation Commission, 1983). Practically all the unreclaimed areas were mined prior to the Oklahoma Mining Lands Act of 1971, which required mined areas be graded to a rolling topography, the topsoil replaced, and the area seeded or planted. In Oklahoma, the Oklahoma Conservation Commission has the responsibility of administering the State program of reclamation of abandoned mine lands.

In January 1982, Secretary of the Interior James G. Watt approved Oklahoma's Abandoned Mine Land Reclamation Plan (Oklahoma Conservation Commission, 1983), allowing Oklahoma to begin applying for about $3.3 million in reclamation funds (or 50 percent of all fees collected from active coal mine operations in Oklahoma since enactment of the Surface Mining Act). Since then, the State has been submitting detailed plans for high-priority projects, with an emphasis on hazardous highwalls, impoundments, subsidence and improperly sealed shafts from old underground mines.

Purpose and Scope

The purpose of this report is to evaluate the water resources of an abandoned coal-mining area near McCurtain in Haskell County in the Oklahoma coal field (figs. 1 and 2) and to appraise the probable effects of reclamation on water-quality, based primarily on data collected from October 1980 to May 1983. These data include: (1) Photographic and topographic data for the area; (2) records of five test holes and one pre-existing well, (3) laboratory analyses of dissolved major constituents and trace metals in water from these wells, (4) water-level stage and contents records for two coal-mine ponds, (5) laboratory analyses of dissolved major constituents and dissolved and total trace metals in water from each pond: (6) temperature, pH, specific conductance, and dissolved oxygen profiles for both ponds; (7) continuous stream-stage data at three sites on Mule Creek: (8) periodic stream-discharge data at four sites on Mule Creek and at the outlet of east pond, which discharges to Mule Creek: and (9) laboratory determinations of dissolved major constituents and dissolved and total trace metals in water from four sites on Mule Creek.

Information on the geology of the area, as related to hydrology, was obtained from reports by Oakes and Knechtel (1948) and Marcher and others (1983). Information on soils is summarized from a report by Brinlee (1975) and climatic data are summarized from a report by Holbrook (1975).

Acknowledgments

Appreciation is extended to area residents who provided information about their wells and permitted passage across their land by surveying parties. Special appreciation is extended to C. C. Willard who assisted in collecting hydrologic data for this study. Appreciation is also extended to R. L. Houghton (U.S. Geological Survey, Bismarck, North Dakota) and the University of North Dakota for X-ray diffraction analysis of spoil-pile cuttings.

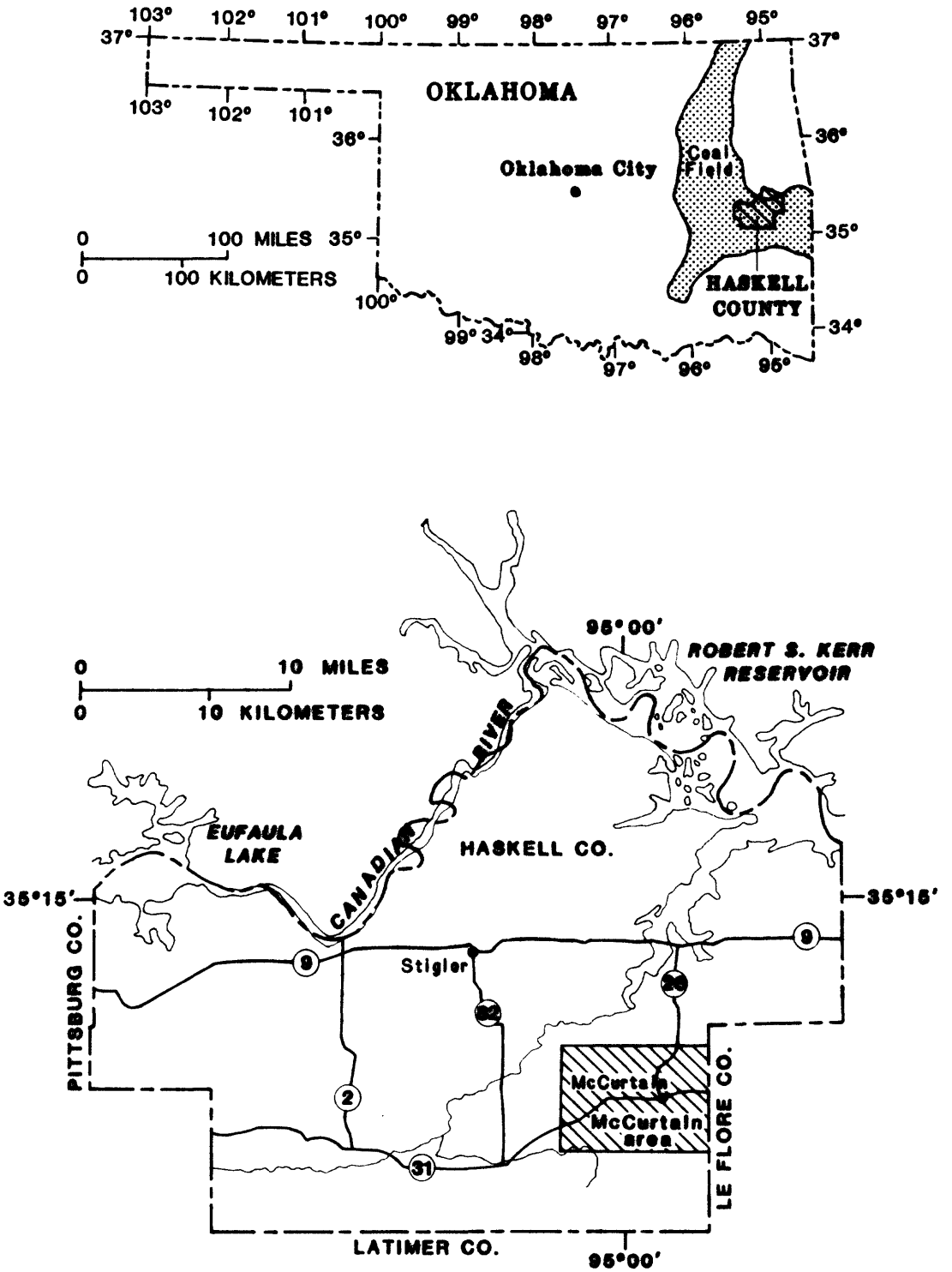


Figure 1.--Location of Haskell County and the McCurtain area.

Next page is 7.

Site-Numbering Systems

Wells, ponds, and other miscellaneous sites at which hydrologic data were collected for this study (fig. 2) were assigned site or station numbers based on the grid system of latitude and longitude. The system provides the geographic location of the well or miscellaneous site and a unique number for each site. The number consists of 15 digits. The first six digits denote degrees, minutes, and seconds of latitude: the next seven digits denote degrees, minutes, and seconds of longitude: and the last two digits (assigned sequentially) identify the wells or other sites within a 1-second grid.

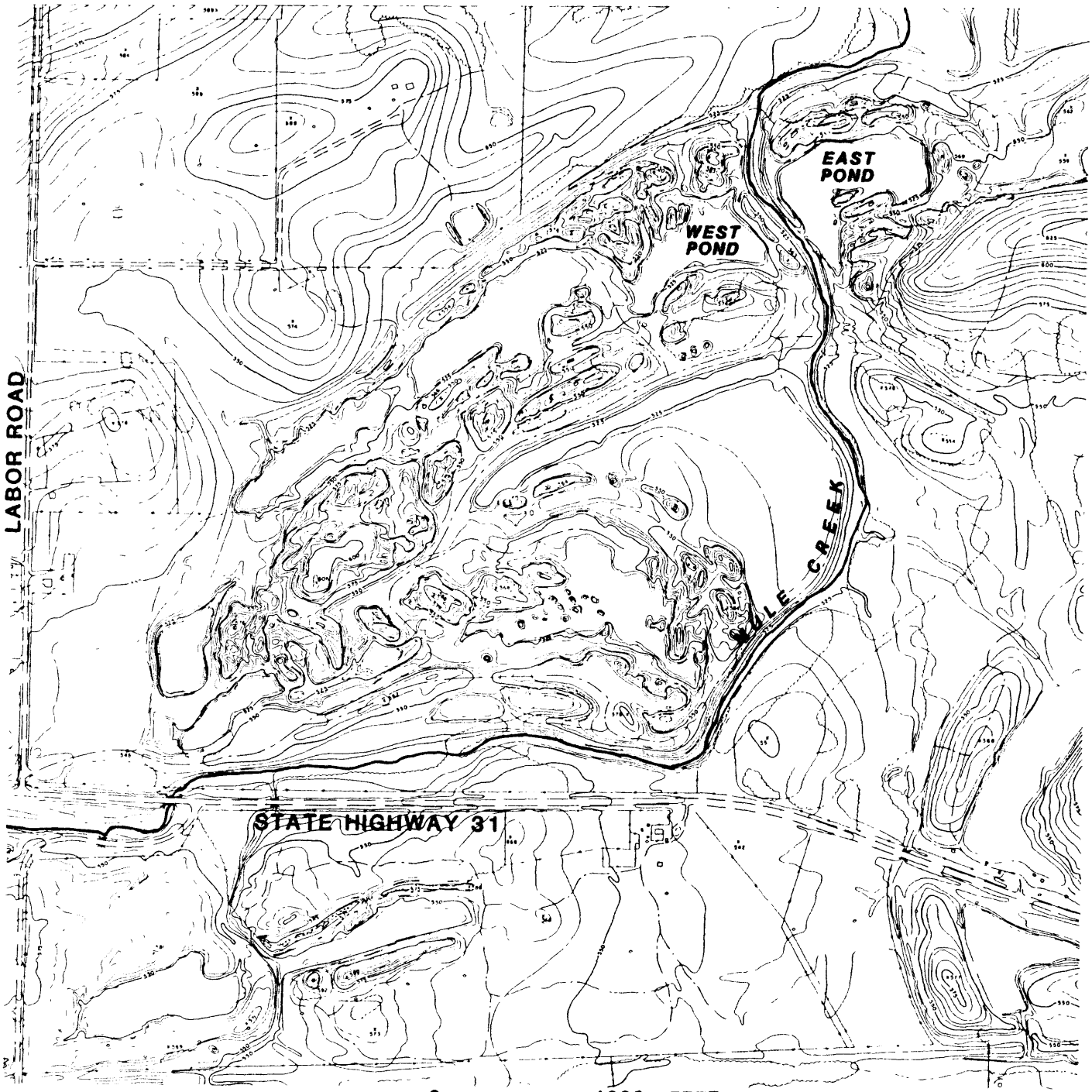
Stream sites were assigned eight-digit downstream order station numbers. However, for purposes of this report, the terms "site" and "station" are synonymous and the terms "site number" and "station number" are used interchangeably.

Geographic Setting

The McCurtain area is in the McAlester marginal hills geomorphic province (Johnson and others, 1972) and is in the Arkoma geologic basin. In this province, the rocks have been folded to form east-trending anticlines and synclines. The landscape is characterized by irregular hills and ridges generally capped by erosion-resistant sandstone and covered with scrubby trees and brush. The intervening broad valleys have been formed by weathering and erosion of thick, easily eroded shale and are vegetated with native grasses, shrubs, wild flowers, and weeds.

The principal economic activities in the McCurtain area have been associated with coal mining and cattle grazing since about 1900. The last surface mining in the Mule Creek-east pond-west pond area was completed in July 1968. Currently (May 1983) coal is being mined northeast and northwest (downstream) of the project area. The extent of past surface mining in the immediate study area is perhaps best illustrated by close spacing of topographic contours shown in figure 3. A map showing potentially strippable coal beds in southeastern Haskell County (Friedman and Woods, 1982) is shown in figure 4.

Reclaimed, partly reclaimed, and unreclaimed "disturbed" coal lands in the McCurtain area as of June 1973 are shown in figure 5. The "disturbed" lands are primarily surface-mined coal lands but also include some small adjacent "disturbed" areas. The estimated contributing drainage to Mule Creek from reclaimed and unreclaimed areas (table 1) is less than the total reclaimed and unreclaimed area because of impoundments. Upstream from site A at State Highway 31 (station 07245580) are 42 acres of unreclaimed land--most of which does not contribute to Mule Creek except during periods of intense rainfall--and 68 acres of reclaimed land (fig. 5). Most of the flow of Mule Creek at State Highway 31 is from reclaimed surface-mined lands and undisturbed (unmined) lands. Land use immediately surrounding abandoned mine lands has been determined for the entire county by the Oklahoma Conservation Commission (1983) as follows: pasture, 69; forest, 21: urban, 8; and cropland, 2.

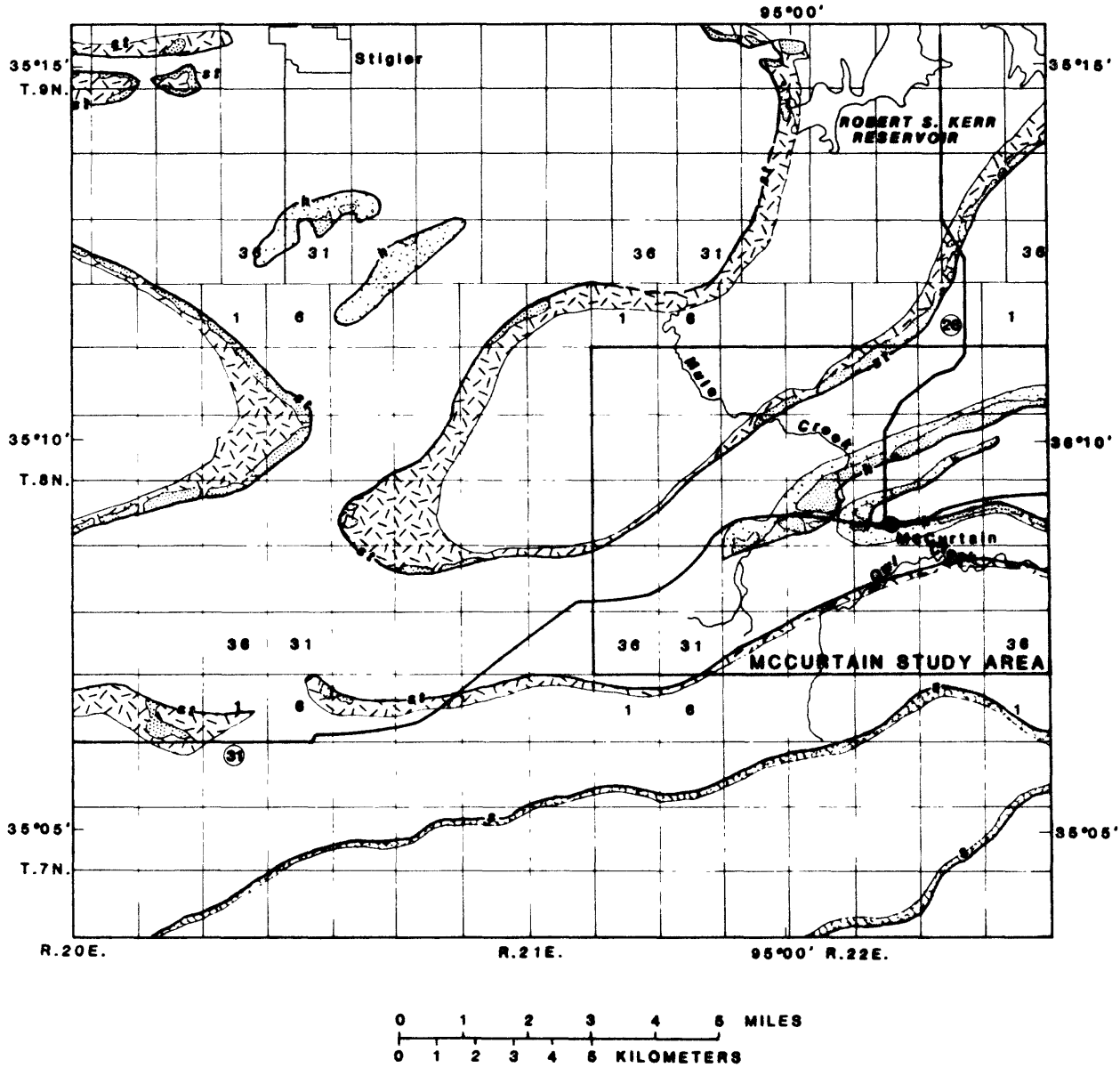


Base by Ace Aerial Photography
under contract with the
U.S. Geological Survey
(October 1980)

0 1000 FEET
0 300 METERS

CONTOUR INTERVAL IS 5 FEET
DATUM IS SEA LEVEL

Figure 3.--Topography of central part of study area.



EXPLANATION

COAL-BED OUTCROP.--Dashed where approximately located

LINE SHOWING MAXIMUM STRIPPABLE DEPTH FOR EACH COAL.--Dashed where approximately located

AREA WHERE COAL HAS BEEN MINED BY SURFACE METHODS

HARTSHORNE COAL (*h*); AREA POTENTIALLY STRIPPABLE TO A MAXIMUM DEPTH OF 150 FEET

STIGLER COAL (*st*); AREA POTENTIALLY STRIPPABLE TO A MAXIMUM DEPTH OF 150 FEET

SECOR COAL (*s*); AREA POTENTIALLY STRIPPABLE TO A MAXIMUM DEPTH OF 100 FEET

Figure 4.--Potentially strippable coal beds in southeastern Haskell County (modified from Friedman and Woods, 1982).

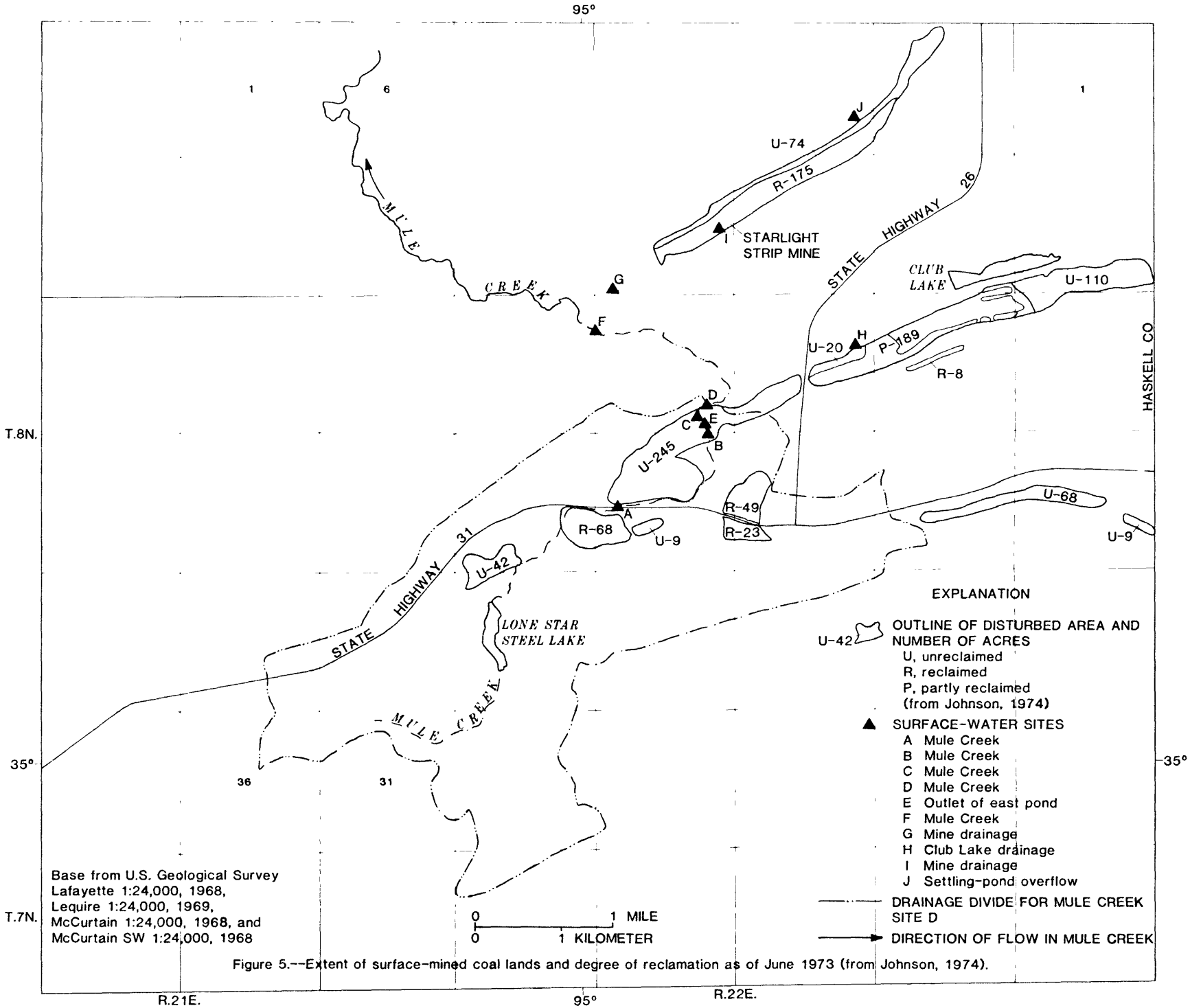


Figure 5.--Extent of surface-mined coal lands and degree of reclamation as of June 1973 (from Johnson, 1974).

Table 1.--Drainage area and estimated contributing area from coal-mined lands upstream from selected surface-water sites, and median sulfate concentrations at the sites

Station name	Station number	Drainage area (square miles)	Estimated contributing drainage (acres)		Median sulfate concentration (milligrams per liter)
			Reclaimed area	Unreclaimed area	
Mule Creek, site A	07245580	3.64	68	0	26
Mule Creek, site B	07245590	6.45	80	159	83
Mule Creek, site C	07245592	6.49	80	201	170
Mule Creek, site D	07245594	6.74	80	209	260
East-pond outlet, site E	07245591	--	80	10	660

Climate

Precipitation records have been collected at McCurtain for 35 years and temperature records for 22 years. Both, precipitation and temperature records have been collected for 70 years at Eufaula (about 34 miles west of McCurtain); these data are considered representative of the Haskell County climate (Holbrook, 1975).

The area has a warm, temperate climate. Spring and autumn usually are mild and summers are hot. Temperatures reach 100° F about 12 days each year. Winters are comparatively mild, although the temperature is less than 32° F an average of 7 days each year. Average annual precipitation is about 43 inches. On the average, 35 percent of the year's total moisture falls during the spring, 27 percent during summer, 23 percent during autumn, and 15 percent during winter (Holbrook, 1975). Much of the precipitation results from short-duration, sometimes severe, thunderstorms of varying intensity which commonly occur during April to June, but can occur during any month. The last freeze in the spring occurs around March 30: the first freeze in autumn, about November 4. Average annual lake evaporation is about 53 inches.

GROUND WATER

The occurrence, movement, and storage of ground water in the McCurtain area largely is controlled by the lateral and vertical distribution of rock units and their physical characteristics, especially permeability, and by the geologic structure.

Bedrock in the area is shale, siltstone, sandstone, and coal of the McAlester Formation and Hartshorne Sandstone of Pennsylvanian age. The Hartshorne Sandstone, about 100 to 200 feet thick, overlies the Atoka Formation and underlies the McAlester Formation. Two coal beds are associated with the Hartshorne Sandstone: the upper and lower Hartshorne coal. However, the two coals converge or are separated by only inches to a few feet of bony coal or coaly shale in the McCurtain area (Oakes and Knechtel, 1948). In Haskell County the Hartshorne Sandstone crops out on the crests and flanks of anticlines.

The McAlester Formation in Haskell County consists mostly of silty shale, but at widely spaced intervals it contains several erosion-resistant sandstones. The upper McAlester (Stigler rider) coal, the McAlester (Stigler) coal, and the Warner Sandstone Member of the McAlester Formation overlie the Hartshorne Sandstone.

Structurally, the McCurtain area is dominated by the Milton anticline which extends into Haskell County from northwestern Le Flore County. The axis enters Haskell County at sec. 13, T. 8 N., R. 22 E., plunging southwestward to section 29 about 2 miles southwest of McCurtain. Many small faults cut the Hartshorne coal in all the McCurtain mines: both normal and reverse faults occur.

The main avenues of water entry to and movement through the bedrock are the exposed bedding-plane openings between layers of sandstone, partings between laminae of shale, overburden shattered and broken during surface mining, and fractures and joints developed during folding and faulting of the brittle rocks. Although faults may be water conduits, they also may be barriers if the openings are sealed.

Water-table conditions exist in bedrock and spoil and the water in the bedrock and spoil is in direct hydraulic connection with the water in the east and west ponds. (See Pond Characteristics section.) Water levels are shallow in private wells in the McCurtain area. Only 2 of 34 private wells in southeastern Haskell County east of Stigler and south of the Arkansas River had water levels greater than 32 feet below land surface when measured in 1966-67 (Marcher, 1969). In fact, none of the five wells in T. 8 N., R. 22 E (for which McCurtain is approximately the center) had water levels greater than 32 feet below land surface (Marcher, 1969).

Four wells were drilled in spoil piles on the north side of east pond (fig. 2). The wells were drilled by the reverse air rotary method and cased with 4-inch diameter polystyrene: 10-foot sections of slotted casing were placed at the water-producing zone or at the bottom of each well. In addition, well 5 was drilled on the peninsula of land between Mule Creek and east pond (fig. 2). A preexisting well, well 6, was discovered just north of the spoil piles on the north side of the west pond. Well records are summarized in table 2. X-ray diffraction analyses of spoil-pile cuttings are summarized in table 3. Water-level measurements in the six wells were made approximately quarterly. A continuous water-level recorder was placed on well 6.

Table 2.--Records of wells

[C, caliper log: G, gamma log: N, neutron log]

Well	Diameter (inches)	Date (drilled)	Well depth (feet)	Length of casing (feet)	Screened interval (feet)	Depth to water (feet below land surface)	Geophysical logs
1	4	11-10-80	45	43	33 - 43	39.74	G,N
2	4	11-11-80	160	100	40 - 50 90 - 100	31.05	G,N
3	4	11-13-80	138	138	128 - 138	50.65	G,N
4	4	11-12-80	80	62.5	42 - 62	55.28	G,N
5	4	11-13-80	41	37.5	17 - 37	11.50	G,N
6	14	--	113	9	0	12.00	C,G,N

Table 3.--Quantitative X-ray diffraction analyses of spoil-pile cuttings
[Analyses by the University of North Dakota]

Material (weight percent)	Depth in well (feet)									
	Well 1				Well 3			Well 4		
	5	20	35	45	35	85	130	20	30	40
Smectites	2	2	3	0	2	2	1	2	2	1
Illite	5	6	7	4	9	5	4	4	11	5
Kaolinite	22	18	13	4	15	12	15	19	18	21*
Chlorite	7	7	10	3	11	7	6	9	9	--
Mixed-layer clays	--	<1	--	--	--	<1	<1	<1	<1	<1
Quartz	53	46	51	89	49	61	54	49	57	60
K-feldspar	1	<1	<1	--	<1	<1	<1	--	--	--
Plagioclase	1	3	1	<1	1	1	1	<1	1	1
Calcite	1	2	<1	<1	<1	<1	<1	<1	<1	<1
Gypsum	1	2	<1	--	1	1	<1	1	--	1
Siderite	1	3	4	<1	3	2	3	3	<1	3
Mica	6	7	6	2	6	5	6	7	3	4
Pyrite	1	2	1	--	2	1	2	2	--	1
Marcasite	--	<1	--	--	--	--	1	--	--	--
Ferrous sulfate	--	2	2	--	--	--	2	--	--	--
Magnetite	--	<1	--	--	--	--	--	--	--	--
Total	101	101	99	103	100	98	96	98	102	98

*kaolinite + chlorite undifferentiated.

SURFACE WATER

Stream-Discharge Characteristics

Continuous stage (water level) records were collected at three sites on Mule Creek (sites B, C, and D, fig. 2). Miscellaneous discharge measurements were made at these three sites: at the outlet of east pond that discharges to Mule Creek at site E; and at site A at State Highway 31. Because the predominantly shale bedrock lacks the capacity to store water, streams in the area are ephemeral and most of their discharge is the result of storm runoff lasting a few hours or days after precipitation. During all of the period of record, however, flow at the downstream sites (sites C and D on Mule Creek) was maintained by flow from east pond via the outlet from the pond. (See Pond Characteristics section.) Base flow from east pond to Mule Creek was about 0.5 ft^3/s. The maximum measured discharge at site C on Mule Creek was 336 ft^3/s (December 3, 1982), at which time flow in the outlet from east pond was 23 ft^3/s.

Pond Characteristics

Continuous stage records were collected at east pond and west pond (fig. 2). East pond is connected to Mule Creek through a break in the wall between east pond and Mule Creek, which is referred to as the outlet from east pond (site E, fig. 2). During storms when there is runoff to Mule Creek upstream of east pond, Mule Creek discharges to east pond as well as downstream. During a recession following the storm and during base flow east pond discharges to Mule Creek. West pond, however, is self-contained; that is, there are no streams or tributaries draining to or from west pond. Both ponds receive precipitation falling within their basins and are in direct hydraulic connection with water in the spoil piles and the underlying Hartshorne Formation, as indicated by the similarity of stage (water level) at east pond, west pond, and well 6 and their response to precipitation (figs. 6 and 7).

Computer-generated sketches of east pond and west pond, based on sonar-depth determinations, are given in figures 8 and 9. These drawings show what the mine ponds would look like if the water from each were completely removed. The east pond is viewed from an "altitude" of 45 feet and an azimuth of 315° (or from the southeast). The west pond is viewed from an "altitude" of 45 feet above the present water surface and an azimuth of 45°(or from the southwest). East pond has a mean volume of 5,782,000 cubic feet, a mean depth of 21.6 feet, and a surface area of 267,000 square feet. The west pond has a mean volume of 2,067,000 cubic feet, a mean depth of 12.9 feet, and a surface area of 160,000 square feet (table 4).

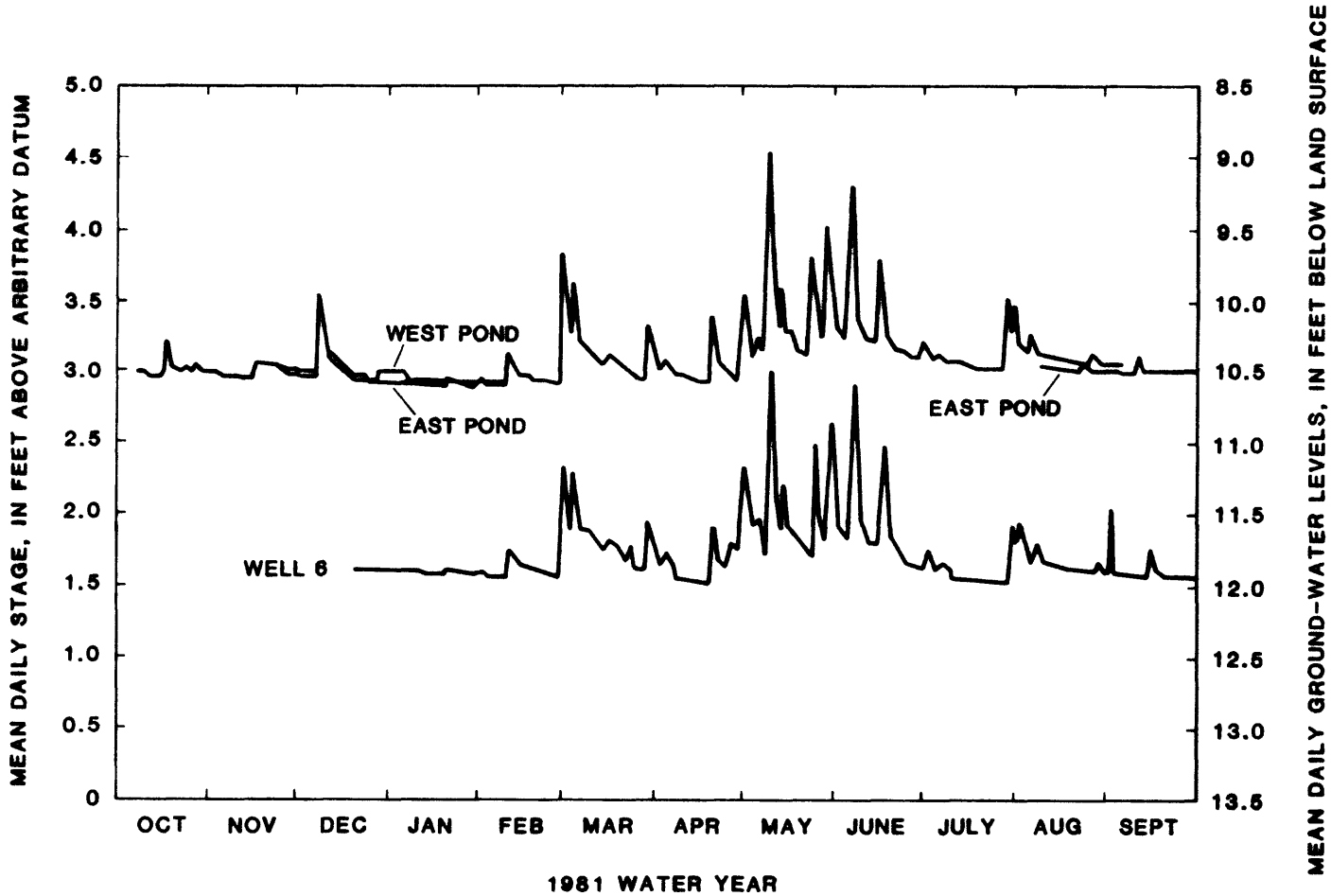


Figure 6.--Hydrographs of west pond, east pond, and well 6.

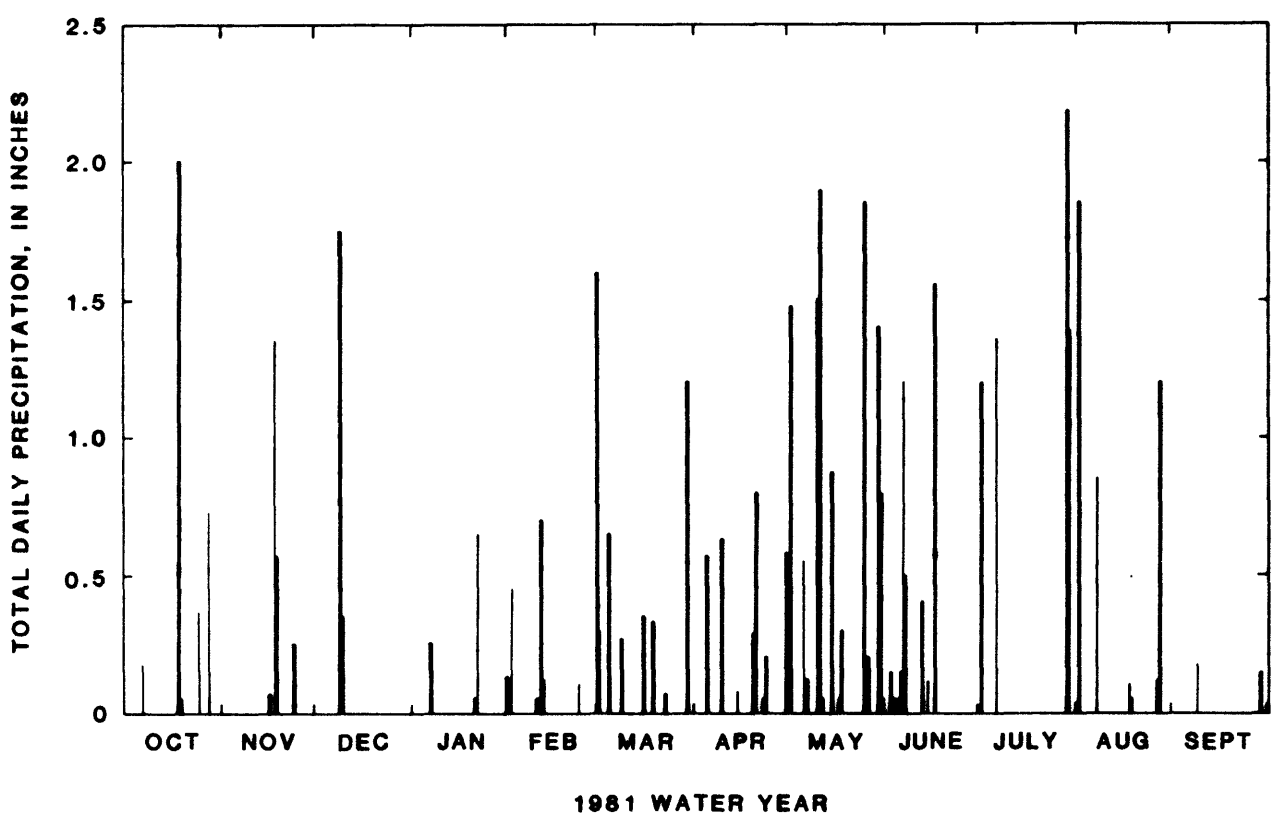


Figure 7.--Precipitation at McCurtain.

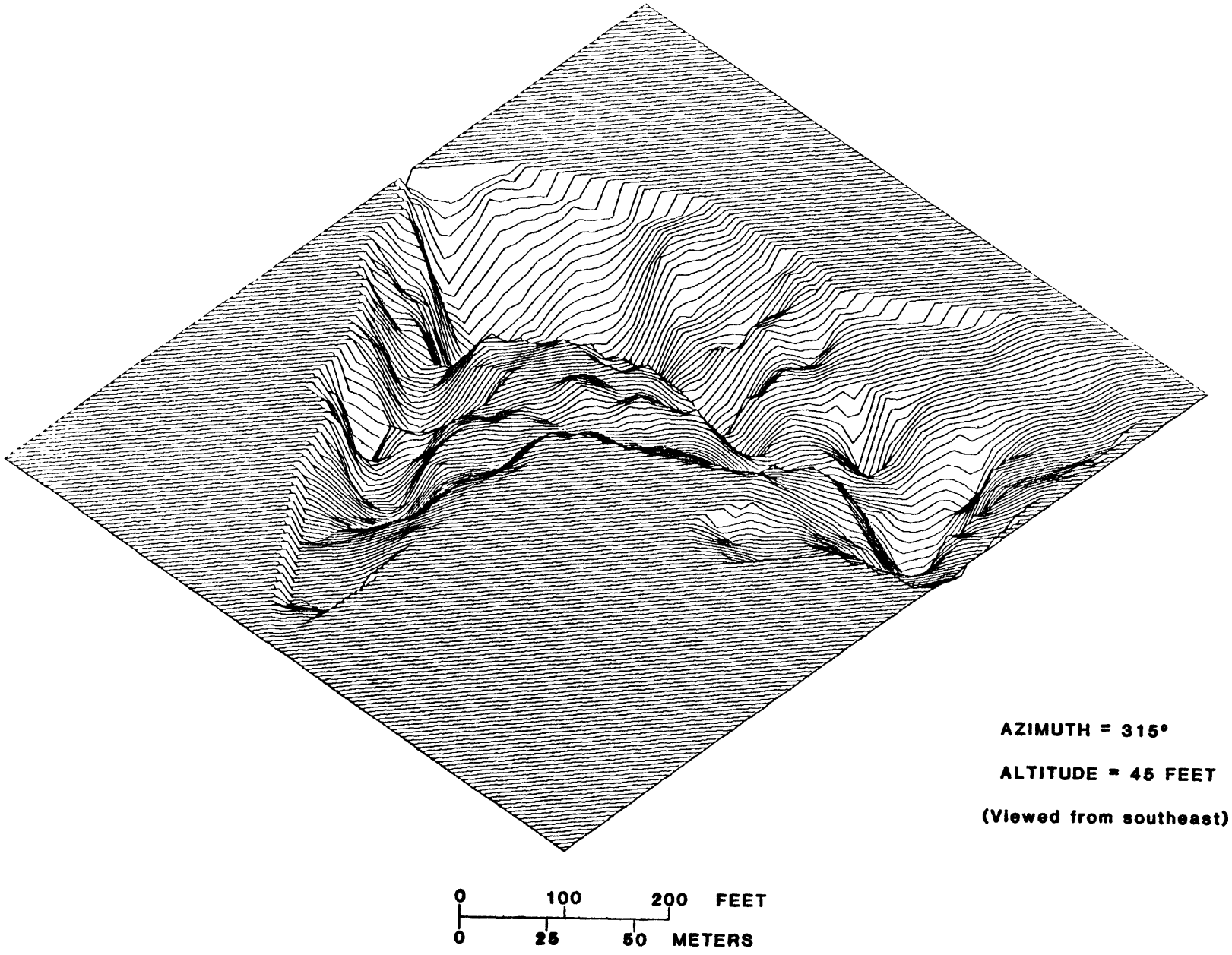


Figure 8.--Computer-generated sketch of east pond.

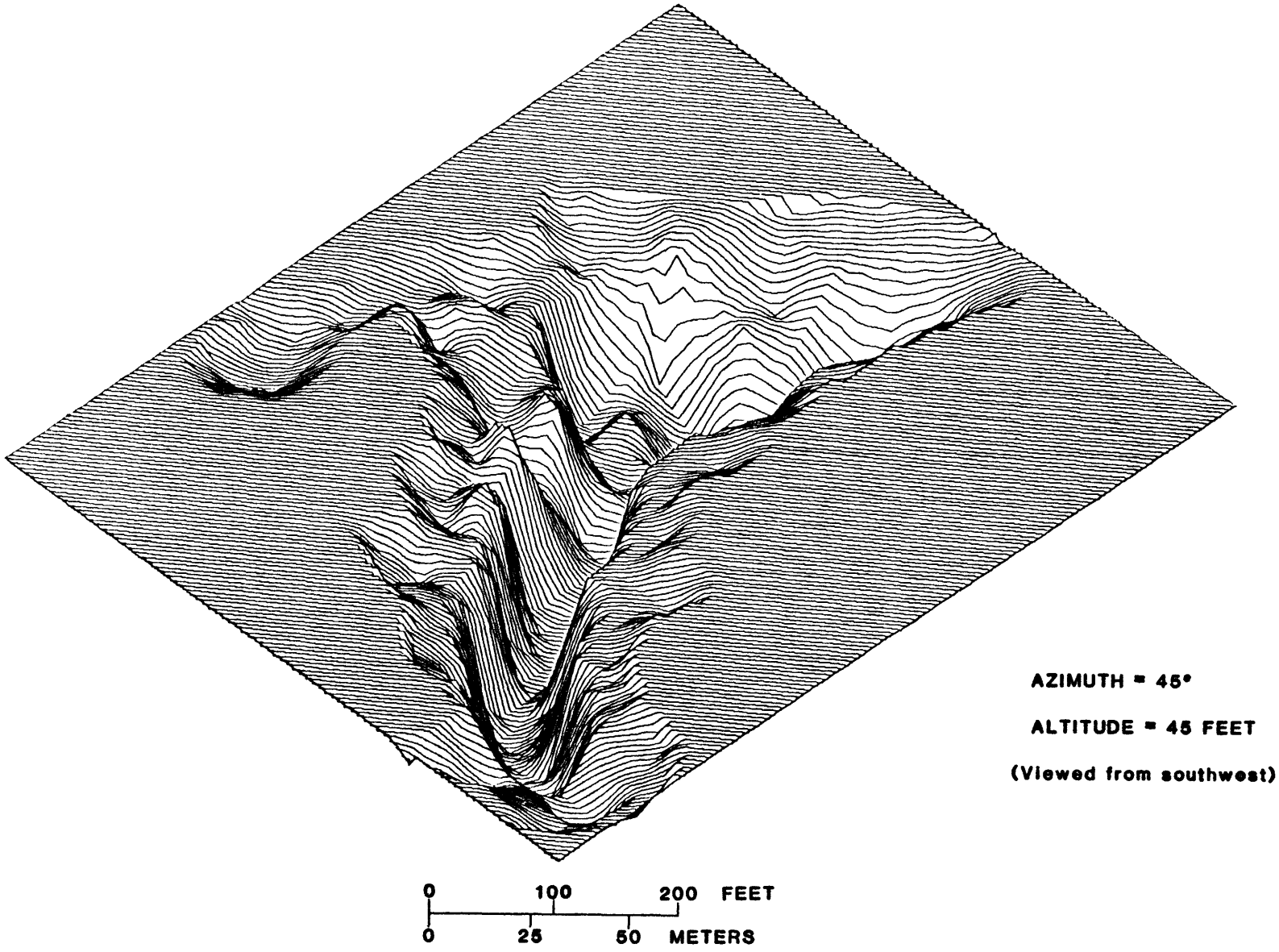


Figure 9.--Computer-generated sketch of west pond.

Table 4.--Mean volume, depth, and surface area of ponds

Pond	Mean volume		Mean depth	Surface area	
	Cubic feet	Acre-feet	(feet)	Square feet	Acres
East	5,782,000	132.7	21.6	267,000	6.7
West	2,067,000	47.4	12.9	159,000	3.7

WATER QUALITY

All natural waters contain mineral constituents dissolved from the rock and soil with which the water has been in contact. The concentration of dissolved constituents primarily depends on the type of rock or soil, the length of contact time, pressure, temperature, and mixing conditions. In addition to these natural conditions, man's activities, such as disposal of wastes, agricutural practices, and activities associated with coal mining and oil-and-gas-field development can have a significant effect on the chemical quality of water.

In natural waters, the major cations--calcium, magnesium, sodium, and potassium--and the major anions--carbonate/bicarbonate (alkalinity), chloride, and sulfate--generally constitute more than 95 percent of the total ions in solution. Water can be categorized, or typed, according to the percentage of each of the major ions. For example, in a calcium sulfate type water, calcium constitutes more than 50 percent of the cations and sulfate more than 50 percent of the anions. If none of the cations or anions constitutes more than 50 percent of its respective ion group (or 25 percent of the total ions), the water is described as a mixed type.

Minimum, maximum, and mean of water-quality analyses are given for the wells in tables 5-10; for each station on Mule Creek including the outlet from east pond in tables 11-15; and for the ponds, in tables 16-19. The number of determinations, median, minimum, and maximum values of selected constituents and properties in water for the grouped stations are compared in tables 20 to 23. The complete water-quality data (table 25) used in obtaining the statistical tables follow the list of references at the end of this report.

Water quality was evaluated in relation to the National Primary and Secondary Drinking Water Regulations (U.S. Environmental Protection Agency, 1976a and 1979, respectively). The Primary Drinking Water Regulations are enforceable in public water systems by either the U.S. Environmental Protection Agency or the States. Secondary Drinking Water Regulations are not Federally enforceable. They pertain to the esthetic qualities of drinking water and are intended as guidelines for the States.

Concentrations for most chemical constituents in this report are given in milligrams per liter (mg/L) and micrograms per liter (µg/L). Specific conductance is given in micromhos per centimeter at 25° C; pH is given in standard pH units.

TABLE 5. SUMMARY OF WATER-QUALITY ANALYSES, WELL 1 (350943094585701)

[MG/L=MILLIGRAMS PER LITER, DEG C=DEGREES CELSIUS, PCI/L=PICOCURIES PER LITER, UMHO=MICROMHOS PER CENTIMETER AT 25 DEGREES CELSIUS, UG/L=MICROGRAMS PER LITER]

CONSTITUENT OR PROPERTY	MINIMUM VALUE	MAXIMUM VALUE	MEAN
ALKALINITY, LAB (MG/L AS CACO3)	200.0	650.0	400.7
CALCIUM, DISSOLVED (MG/L AS CA)	92.0	270.0	191.2
CHLORIDE, DISSOLVED (MG/L AS CL)	4.7	30.0	17.4
FLUORIDE, DISSOLVED (MG/L AS F)	0.2	0.6	0.3
HARDNESS (MG/L AS CACO3)	568.1	1952.7	1290.8
HARDNESS, NONCARBONATE (MG/L AS CACO3)	150.0	1700.0	967.8
MAGNESIUM, DISSOLVED (MG/L AS MG)	82.0	310.0	197.2
POTASSIUM, DISSOLVED (MG/L AS K)	2.1	6.8	5.4
SILICA, DISSOLVED (MG/L AS SIO2)	4.1	46.0	11.9
SODIUM, DISSOLVED (MG/L AS NA)	240.0	690.0	541.0
SOLIDS, RESIDUE AT 180 DEG C, DISSOLVED (MG/L)	1300.0	4810.0	3362.0
SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	1374.4	4540.5	3144.0
SULFATE, DISSOLVED (MG/L AS SO4)	660.0	3100.0	1936.0
PERCENT SODIUM	36.2	61.6	47.9
pH (STANDARD UNITS)	6.8	8.0	7.3
POTASSIUM 40, DISSOLVED (PCI/L AS K-40)	3.9	5.1	4.7
SODIUM ADSORPTION RATIO	4.5	9.3	6.8
SPECIFIC CONDUCTANCE (UMHO)	3000.0	4700.0	3726.3
ALUMINUM, DISSOLVED (UG/L AS AL)	0.0	230.0	42.0
ARSENIC, DISSOLVED (UG/L AS AS)	0.0	4.0	2.0
BERYLLIUM, DISSOLVED (UG/L AS BE)	0.0	10.0	6.3
CADMIUM, DISSOLVED (UG/L AS CD)	0.0	4.0	1.2
CHROMIUM, DISSOLVED (UG/L AS CR)	0.0	20.0	8.9
COPPER, DISSOLVED (UG/L AS CU)	0.0	6.0	2.1
IRON, DISSOLVED (UG/L AS FE)	30.0	1200.0	302.2
LEAD, DISSOLVED (UG/L AS PB)	1.0	6.0	2.6
LITHIUM, DISSOLVED (UG/L AS LI)	20.0	90.0	57.8
MANGANESE, DISSOLVED (UG/L AS MN)	290.0	3400.0	1866.7
MERCURY, DISSOLVED (UG/L AS HG)	0.0	0.3	0.1
MOLYBDENUM, DISSOLVED (UG/L AS MO)	0.0	3.0	1.0
NICKEL, DISSOLVED (UG/L AS NI)	1.0	8.0	4.2
SELENIUM, DISSOLVED (UG/L AS SE)	0.0	17.0	3.6
STRONTIUM, DISSOLVED (UG/L AS SR)	640.0	1800.0	1233.0
VANADIUM, DISSOLVED (UG/L AS V)	1.0	4.0	2.2
ZINC, DISSOLVED (UG/L AS ZN)	10.0	300.0	54.4

TABLE 6. SUMMARY OF WATER-QUALITY ANALYSES, WELL 2 (350943094585901)

[MG/L=MILLIGRAMS PER LITER, DEG C=DEGREES CELSIUS, PCI/L=PICOCURIES PER LITER, UMHO=MICROMHOS PER CENTIMETER AT 25 DEGREES CELSIUS, UG/L=MICROGRAMS PER LITER]

CONSTITUENT OR PROPERTY	MINIMUM VALUE	MAXIMUM VALUE	MEAN
ALKALINITY, LAB (MG/L AS CACO3)	460.0	610.0	552.7
CALCIUM, DISSOLVED (MG/L AS CA)	15.0	70.0	29.5
CHLORIDE, DISSOLVED (MG/L AS CL)	71.0	170.0	99.6
FLUORIDE, DISSOLVED (MG/L AS F)	0.4	0.7	0.6
HARDNESS (MG/L AS CACO3)	59.5	360.6	142.6
HARDNESS, NONCARBONATE (MG/L AS CACO3)	0.0	0.0	0.0
MAGNESIUM, DISSOLVED (MG/L AS MG)	4.7	45.0	16.7
POTASSIUM, DISSOLVED (MG/L AS K)	1.5	5.7	2.3
SILICA, DISSOLVED (MG/L AS SIO2)	8.8	47.0	14.2
SODIUM, DISSOLVED (MG/L AS NA)	380.0	680.0	566.4
SOLIDS, RESIDUE AT 180 DEG C, DISSOLVED (MG/L)	1280.0	2040.0	1752.7
SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	1298.7	2026.2	1738.2
SULFATE, DISSOLVED (MG/L AS SO4)	450.0	840.0	676.4
PERCENT SODIUM	75.5	95.7	89.2
pH (STANDARD UNITS)	7.1	8.0	7.6
POTASSIUM 40, DISSOLVED (PCI/L AS K-40)	1.1	1.8	1.5
SODIUM ADSORPTION RATIO	11.5	37.1	25.6
SPECIFIC CONDUCTANCE (UMHO)	2000.0	7600.0	3176.0
ALUMINUM, DISSOLVED (UG/L AS AL)	10.0	370.0	130.0
ARSENIC, DISSOLVED (UG/L AS AS)	0.0	4.0	2.2
BERYLLIUM, DISSOLVED (UG/L AS BE)	0.0	10.0	5.7
CADMIUM, DISSOLVED (UG/L AS CD)	0.0	3.0	1.2
CHROMIUM, DISSOLVED (UG/L AS CR)	0.0	20.0	8.9
COPPER, DISSOLVED (UG/L AS CU)	0.0	6.0	2.8
IRON, DISSOLVED (UG/L AS FE)	20.0	1300.0	446.7
LEAD, DISSOLVED (UG/L AS PB)	1.0	23.0	3.9
LITHIUM, DISSOLVED (UG/L AS LI)	40.0	60.0	53.6
MANGANESE, DISSOLVED (UG/L AS MN)	180.0	1700.0	510.0
MERCURY, DISSOLVED (UG/L AS HG)	0.0	0.4	0.1
MOLYBDENUM, DISSOLVED (UG/L AS MO)	0.0	11.0	3.9
NICKEL, DISSOLVED (UG/L AS NI)	0.0	13.0	3.2
SELENIUM, DISSOLVED (UG/L AS SE)	0.0	1.0	0.6
STRONTIUM, DISSOLVED (UG/L AS SR)	190.0	480.0	271.8
VANADIUM, DISSOLVED (UG/L AS V)	1.0	14.0	3.1
ZINC, DISSOLVED (UG/L AS ZN)	4.0	80.0	24.9

TABLE 7. SUMMARY OF WATER-QUALITY ANALYSES, WELL 3 (350941094590301)

[MG/L=MILLIGRAMS PER LITER, DEG C=DEGREES CELSIUS, PCI/L=PICOCURIES PER LITER, UMHO=MICROMHOS PER CENTIMETER AT 25 DEGREES CELSIUS, UG/L=MICROGRAMS PER LITER]

CONSTITUENT OR PROPERTY	MINIMUM VALUE	MAXIMUM VALUE	MEAN
ALKALINITY, LAB (MG/L AS CACO3)	320.0	460.0	413.2
CALCIUM, DISSOLVED (MG/L AS CA)	62.0	92.0	73.2
CHLORIDE, DISSOLVED (MG/L AS CL)	30.0	160.0	96.9
FLUORIDE, DISSOLVED (MG/L AS F)	0.4	0.5	0.4
HARDNESS (MG/L AS CACO3)	177.8	568.1	383.2
HARDNESS, NONCARBONATE (MG/L AS CACO3)	0.0	150.0	32.0
MAGNESIUM, DISSOLVED (MG/L AS MG)	4.2	82.0	48.5
POTASSIUM, DISSOLVED (MG/L AS K)	2.1	2.6	2.3
SILICA, DISSOLVED (MG/L AS SIO2)	5.5	12.0	7.3
SODIUM, DISSOLVED (MG/L AS NA)	240.0	600.0	475.0
SOLIDS, RESIDUE AT 180 DEG C, DISSOLVED (MG/L)	1300.0	2050.0	1784.0
SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	1374.4	1974.8	1796.2
SULFATE, DISSOLVED (MG/L AS SO4)	660.0	1000.0	843.0
PERCENT SODIUM	47.8	87.9	72.1
pH (STANDARD UNITS)	7.0	8.0	7.4
POTASSIUM 40, DISSOLVED (PCI/L AS K-40)	1.6	1.8	1.7
SODIUM ADSORPTION RATIO	4.5	20.6	11.4
SPECIFIC CONDUCTANCE (UMHO)	2400.0	3000.0	2706.7
ALUMINUM, DISSOLVED (UG/L AS AL)	0.0	40.0	15.6
ARSENIC, DISSOLVED (UG/L AS AS)	1.0	2.0	1.7
BERYLLIUM, DISSOLVED (UG/L AS BE)	0.0	10.0	5.6
CADMIUM, DISSOLVED (UG/L AS CD)	0.0	1.0	0.8
CHROMIUM, DISSOLVED (UG/L AS CR)	0.0	10.0	7.8
COPPER, DISSOLVED (UG/L AS CU)	0.0	3.0	1.0
IRON, DISSOLVED (UG/L AS FE)	20.0	1200.0	387.8
LEAD, DISSOLVED (UG/L AS PB)	1.0	4.0	1.8
LITHIUM, DISSOLVED (UG/L AS LI)	40.0	90.0	74.4
MANGANESE, DISSOLVED (UG/L AS MN)	300.0	3400.0	858.9
MERCURY, DISSOLVED (UG/L AS HG)	0.0	0.3	0.1
MOLYBDENUM, DISSOLVED (UG/L AS MO)	0.0	10.0	2.0
NICKEL, DISSOLVED (UG/L AS NI)	1.0	5.0	2.2
SELENIUM, DISSOLVED (UG/L AS SE)	0.0	1.0	0.6
STRONTIUM, DISSOLVED (UG/L AS SR)	520.0	640.0	573.0
VANADIUM, DISSOLVED (UG/L AS V)	0.0	3.2	1.2
ZINC, DISSOLVED (UG/L AS ZN)	10.0	50.0	20.0

TABLE 8. SUMMARY OF WATER-QUALITY ANALYSES, WELL 4 (350941194590601)

[MG/L=MILLIGRAMS PER LITER, DEG C=DEGREES CELSIUS, PCI/L=PICOCURIES PER LITER, UMHO=MICROMHOS PER CENTIMETER AT 25 DEGREES CELSIUS, UG/L=MICROGRAMS PER LITER]

CONSTITUENT OR PROPERTY	MINIMUM VALUE	MAXIMUM VALUE	MEAN
ALKALINITY, LAB (MG/L AS CACO3)	352.0	710.0	546.5
CALCIUM, DISSOLVED (MG/L AS CA)	69.0	120.0	87.8
CHLORIDE, DISSOLVED (MG/L AS CL)	28.0	60.0	39.4
FLUORIDE, DISSOLVED (MG/L AS F)	0.5	1.0	0.8
HARDNESS (MG/L AS CACO3)	419.8	753.4	571.3
HARDNESS, NONCARBONATE (MG/L AS CACO3)	0.0	260.0	59.4
MAGNESIUM, DISSOLVED (MG/L AS MG)	60.0	110.0	85.4
POTASSIUM, DISSOLVED (MG/L AS K)	1.5	2.7	2.0
SILICA, DISSOLVED (MG/L AS SIO2)	10.0	19.0	12.9
SODIUM, DISSOLVED (MG/L AS NA)	330.0	610.0	478.8
SOLIDS, RESIDUE AT 180 DEG C, DISSOLVED (MG/L)	1400.0	2570.0	2003.8
SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	1418.5	2569.8	1997.0
SULFATE, DISSOLVED (MG/L AS SO4)	560.0	1300.0	961.3
PERCENT SODIUM	59.4	68.4	64.3
pH (STANDARD UNITS)	7.0	7.4	7.2
POTASSIUM 40, DISSOLVED (PCI/L AS K-40)	1.4	2.0	1.6
SODIUM ADSORPTION RATIO	6.6	10.3	8.9
SPECIFIC CONDUCTANCE (UMHO)	2010.0	3200.0	2712.1
ALUMINUM, DISSOLVED (UG/L AS AL)	0.0	70.0	28.6
ARSENIC, DISSOLVED (UG/L AS AS)	1.0	1.0	1.0
BERYLLIUM, DISSOLVED (UG/L AS BE)	0.0	10.0	5.7
CADMIUM, DISSOLVED (UG/L AS CD)	0.0	2.0	1.3
CHROMIUM, DISSOLVED (UG/L AS CR)	0.0	20.0	10.0
COPPER, DISSOLVED (UG/L AS CU)	1.0	6.0	3.0
IRON, DISSOLVED (UG/L AS FE)	20.0	100.0	42.9
LEAD, DISSOLVED (UG/L AS PB)	0.0	4.0	2.0
LITHIUM, DISSOLVED (UG/L AS LI)	20.0	40.0	28.6
MANGANESE, DISSOLVED (UG/L AS MN)	470.0	910.0	632.9
MERCURY, DISSOLVED (UG/L AS HG)	0.1	0.6	0.3
MOLYBDENUM, DISSOLVED (UG/L AS MO)	1.0	6.0	2.4
NICKEL, DISSOLVED (UG/L AS NI)	2.0	6.0	3.4
SELENIUM, DISSOLVED (UG/L AS SE)	0.0	4.0	1.0
STRONTIUM, DISSOLVED (UG/L AS SR)	410.0	720.0	527.5
VANADIUM, DISSOLVED (UG/L AS V)	0.0	3.0	1.8
ZINC, DISSOLVED (UG/L AS ZN)	10.0	40.0	21.4

TABLE 9. SUMMARY OF WATER-QUALITY ANALYSES, WELL 5 (350939094590501)

[MG/L=MILLIGRAMS PER LITER, DEG C=DEGREES CELSIUS, PCI/L=PICOCURIES PER LITER, UMHO=MICROMHOS PER CENTIMETER AT 25 DEGREES CELSIUS, UG/L=MICROGRAMS PER LITER]

CONSTITUENT OR PROPERTY	MINIMUM VALUE	MAXIMUM VALUE	MEAN
ALKALINITY, LAB (MG/L AS CACO3)	410.0	568.0	464.1
CALCIUM, DISSOLVED (MG/L AS CA)	56.0	81.0	70.4
CHLORIDE, DISSOLVED (MG/L AS CL)	42.0	93.0	57.2
FLUORIDE, DISSOLVED (MG/L AS F)	0.4	0.7	0.6
HARDNESS (MG/L AS CACO3)	325.6	482.9	397.5
HARDNESS, NONCARBONATE (MG/L AS CACO3)	0.0	27.0	3.0
MAGNESIUM, DISSOLVED (MG/L AS MG)	45.0	68.0	53.7
POTASSIUM, DISSOLVED (MG/L AS K)	1.4	2.6	1.7
SILICA, DISSOLVED (MG/L AS SIO2)	8.8	39.0	12.9
SODIUM, DISSOLVED (MG/L AS NA)	400.0	460.0	433.6
SOLIDS, RESIDUE AT 180 DEG C, DISSOLVED (MG/L)	1390.0	1910.0	1684.5
SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	1534.9	1829.8	1686.9
SULFATE, DISSOLVED (MG/L AS SO4)	680.0	880.0	777.3
PERCENT SODIUM	66.9	74.5	70.4
pH (STANDARD UNITS)	7.0	7.6	7.4
POTASSIUM 40, DISSOLVED (PCI/L AS K-40)	1.0	1.3	1.1
SODIUM ADSORPTION RATIO	9.1	10.9	9.7
SPECIFIC CONDUCTANCE (UMHO)	2250.0	2900.0	2465.0
ALUMINUM, DISSOLVED (UG/L AS AL)	0.0	80.0	35.0
ARSENIC, DISSOLVED (UG/L AS AS)	0.0	3.0	1.3
BERYLLIUM, DISSOLVED (UG/L AS BE)	0.0	10.0	5.0
CADMIUM, DISSOLVED (UG/L AS CD)	0.0	2.0	0.9
CHROMIUM, DISSOLVED (UG/L AS CR)	0.0	10.0	6.0
COPPER, DISSOLVED (UG/L AS CU)	0.0	5.0	1.3
IRON, DISSOLVED (UG/L AS FE)	10.0	1100.0	195.0
LEAD, DISSOLVED (UG/L AS PB)	1.0	5.0	1.9
LITHIUM, DISSOLVED (UG/L AS LI)	40.0	60.0	49.0
MANGANESE, DISSOLVED (UG/L AS MN)	170.0	1700.0	553.0
MERCURY, DISSOLVED (UG/L AS HG)	0.0	0.1	0.1
MOLYBDENUM, DISSOLVED (UG/L AS MO)	0.0	20.0	3.6
NICKEL, DISSOLVED (UG/L AS NI)	0.0	4.0	2.1
SELENIUM, DISSOLVED (UG/L AS SE)	0.0	1.0	0.5
STRONTIUM, DISSOLVED (UG/L AS SR)	400.0	600.0	489.1
VANADIUM, DISSOLVED (UG/L AS V)	0.0	31.0	4.7
ZINC, DISSOLVED (UG/L AS ZN)	10.0	50.0	25.0

TABLE 10. SUMMARY OF WATER-QUALITY ANALYSES, WELL 6 (350938094591201)

[MG/L=MILLIGRAMS PER LITER, DEG C=DEGREES CELSIUS, PCI/L=PICOCURIES PER LITER, UMHO=MICROMHOS PER CENTIMETER AT 25 DEGREES CELSIUS, UG/L=MICROGRAMS PER LITER]

CONSTITUENT OR PROPERTY	MINIMUM VALUE	MAXIMUM VALUE	MEAN
ALKALINITY, LAB (MG/L AS CACO3)	280.0	460.0	374.7
CALCIUM, DISSOLVED (MG/L AS CA)	26.0	100.0	72.1
CHLORIDE, DISSOLVED (MG/L AS CL)	6.5	190.0	105.6
FLUORIDE, DISSOLVED (MG/L AS F)	0.4	0.4	0.4
HARDNESS (MG/L AS CACO3)	126.9	530.6	388.4
HARDNESS, NONCARBONATE (MG/L AS CACO3)	0.0	170.0	57.7
MAGNESIUM, DISSOLVED (MG/L AS MG)	15.0	68.0	50.4
POTASSIUM, DISSOLVED (MG/L AS K)	1.2	2.5	2.1
SILICA, DISSOLVED (MG/L AS SIO2)	5.7	14.0	8.3
SODIUM, DISSOLVED (MG/L AS NA)	200.0	470.0	380.0
SOLIDS, RESIDUE AT 180 DEG C, DISSOLVED (MG/L)	679.0	1970.0	1504.9
SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	701.8	1906.4	1516.9
SULFATE, DISSOLVED (MG/L AS SO4)	270.0	850.0	671.4
PERCENT SODIUM	64.1	77.3	69.1
pH (STANDARD UNITS)	6.8	7.5	7.2
POTASSIUM 40, DISSOLVED (PCI/L AS K-40)	1.7	1.9	1.8
SODIUM ADSORPTION RATIO	7.2	9.8	8.7
SPECIFIC CONDUCTANCE (UMHO)	1300.0	3300.0	2350.0
ALUMINUM, DISSOLVED (UG/L AS AL)	0.0	40.0	15.7
ARSENIC, DISSOLVED (UG/L AS AS)	0.0	1.0	0.6
BERYLLIUM, DISSOLVED (UG/L AS BE)	0.0	10.0	3.2
CADMIUM, DISSOLVED (UG/L AS CD)	1.0	5.0	1.9
CHROMIUM, DISSOLVED (UG/L AS CR)	0.0	10.0	8.6
COPPER, DISSOLVED (UG/L AS CU)	1.0	5.0	2.0
IRON, DISSOLVED (UG/L AS FE)	10.0	3600.0	744.1
LEAD, DISSOLVED (UG/L AS PB)	0.0	10.0	2.9
LITHIUM, DISSOLVED (UG/L AS LI)	30.0	90.0	66.9
MANGANESE, DISSOLVED (UG/L AS MN)	190.0	760.0	427.1
MERCURY, DISSOLVED (UG/L AS HG)	0.0	0.1	0.1
MOLYBDENUM, DISSOLVED (UG/L AS MO)	0.0	7.0	1.7
NICKEL, DISSOLVED (UG/L AS NI)	1.0	14.0	4.1
SELENIUM, DISSOLVED (UG/L AS SE)	0.0	1.0	0.6
STRONTIUM, DISSOLVED (UG/L AS SR)	180.0	740.0	525.7
VANADIUM, DISSOLVED (UG/L AS V)	1.0	2.0	1.3
ZINC, DISSOLVED (UG/L AS ZN)	4.0	80.0	24.0

TABLE 11. SUMMARY OF WATER-QUALITY ANALYSES, MULE CREEK SITE A (07245580)

[MG/L=MILLIGRAMS PER LITER, DEG C=DEGREES CELSIUS, PCI=PICOCURIES PER LITER, UMHO=MICROMHOS PER CENTIMETER AT 25 DEGREES CELSIUS, UG/L=MICROGRAMS PER LITER]

CONSTITUENT OR PROPERTY	MINIMUM VALUE	MAXIMUM VALUE	MEAN
ALKALINITY, LAB (MG/L AS CACO3)	10.0	21.0	15.0
CALCIUM, DISSOLVED (MG/L AS CA)	4.2	14.0	9.4
CHLORIDE, DISSOLVED (MG/L AS CL)	1.5	3.6	2.7
FLUORIDE, DISSOLVED (MG/L AS F)	0.0	0.2	0.1
HARDNESS (MG/L AS CACO3)	17.5	61.8	39.2
HARDNESS, NONCARBONATE (MG/L AS CACO3)	4.0	41.0	23.5
MAGNESIUM, DISSOLVED (MG/L AS MG)	1.7	6.5	3.8
POTASSIUM, DISSOLVED (MG/L AS K)	1.7	2.3	2.0
SILICA, DISSOLVED (MG/L AS SIO2)	4.9	8.7	7.2
SODIUM, DISSOLVED (MG/L AS NA)	2.3	8.7	5.1
SOLIDS, RESIDUE AT 180 DEG C, DISSOLVED (MG/L)	53.0	134.0	84.0
SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	32.5	106.8	70.1
SULFATE, DISSOLVED (MG/L AS SO4)	7.0	52.0	30.4
PERCENT SODIUM	20.0	22.7	20.8
pH (STANDARD UNITS)	6.5	7.6	6.9
POTASSIUM 40, DISSOLVED (PCI/L AS K-40)	1.3	1.7	1.4
SODIUM ADSORPTION RATIO	0.2	0.5	0.4
SPECIFIC CONDUCTANCE (UMHO)	80.0	400.0	194.4
ALUMINUM, DISSOLVED (UG/L AS AL)	10.0	120.0	58.0
ARSENIC, DISSOLVED (UG/L AS AS)	0.0	1.0	0.6
BERYLLIUM, DISSOLVED (UG/L AS BE)	1.0	3.0	1.4
CADMIUM, DISSOLVED (UG/L AS CD)	1.0	3.0	1.6
CHROMIUM, DISSOLVED (UG/L AS CR)	0.0	10.0	6.0
COPPER, DISSOLVED (UG/L AS CU)	1.0	4.0	2.0
IRON, DISSOLVED (UG/L AS FE)	90.0	450.0	232.0
LEAD, DISSOLVED (UG/L AS PB)	0.0	3.0	1.6
LITHIUM DISSOLVED (UG/L AS LI)	4.0	12.0	6.4
MANGANESE, DISSOLVED (UG/L AS MN)	37.0	100.0	56.6
MERCURY, DISSOLVED (UG/L AS HG)	0.1	0.2	0.1
MOLYBDENUM, DISSOLVED (UG/L AS MO)	1.0	10.0	8.2
NICKEL, DISSOLVED (UG/L AS NI)	1.0	6.0	3.0
SELENIUM, DISSOLVED (UG/L AS SE)	0.0	1.0	0.4
STRONTIUM, DISSOLVED (UG/L AS SR)	20.0	50.0	34.0
VANADIUM, DISSOLVED (UG/L AS V)	0.0	2.0	1.0
ZINC, DISSOLVED (UG/L AS ZN)	8.0	50.0	26.0
ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	490.0	1500.0	876.0
ARSENIC, TOTAL RECOVERABLE (UG/L AS AS)	1.0	1.0	1.0
BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	0.0	10.0	4.0
CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	0.0	1.0	0.6
CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	0.0	10.0	8.0
COPPER, TOTAL RECOVERABLE (UG/L AS CU)	1.0	9.0	5.6
IRON, TOTAL RECOVERABLE (UG/L AS FE)	1100.0	1900.0	1580.0
LEAD, TOTAL RECOVERABLE (UG/L AS PB)	1.0	11.0	6.0
LITHIUM, TOTAL RECOVERABLE (UG/L AS LI)	0.0	10.0	6.0
MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	50.0	120.0	86.0
MERCURY, TOTAL RECOVERABLE (UG/L AS HG)	0.1	0.2	0.1
MOLYBDENUM, TOTAL RECOVERABLE (UG/L AS MO)	1.0	74.0	16.2
NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	0.0	9.0	4.6
SELENIUM, TOTAL RECOVERABLE (UG/L AS SE)	0.0	1.0	0.6
ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	20.0	210.0	62.0

TABLE 12. SUMMARY OF WATER-QUALITY ANALYSES, MULE CREEK SITE B (07245590)

[MG/L=MILLIGRAMS PER LITER, DEG C=DEGREES CELSIUS, PCI/L=PICOCURIES PER LITER, UMHO=MICROMHOS PER CENTIMETER AT 25 DEGREES CELSIUS, UG/L=MICROGRAMS PER LITER]

CONSTITUENT OR PROPERTY	MINIMUM VALUE	MAXIMUM VALUE	MEAN
ALKALINITY, LAB (MG/L AS CACO3)	21.0	140.0	64.7
CALCIUM, DISSOLVED (MG/L AS CA)	7.9	37.0	20.1
CHLORIDE, DISSOLVED (MG/L AS CL)	2.5	10.0	5.5
FLUORIDE, DISSOLVED (MG/L AS F)	0.1	0.5	0.2
HARDNESS (MG/L AS CACO3)	31.7	191.4	96.5
HARDNESS, NONCARBONATE (MG/L AS CACO3)	4.0	41.0	24.6
MAGNESIUM, DISSOLVED (MG/L AS MG)	2.9	24.0	11.2
POTASSIUM, DISSOLVED (MG/L AS K)	2.1	4.0	2.6
SILICA, DISSOLVED (MG/L AS SIO2)	2.9	7.7	6.1
SODIUM, DISSOLVED (MG/L AS NA)	6.1	67.0	30.5
SOLIDS, RESIDUE AT 180 DEG C, DISSOLVED (MG/L)	61.0	409.0	206.5
SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	64.3	431.6	209.3
SULFATE, DISSOLVED (MG/L AS SO4)	23.0	240.0	93.8
PERCENT SODIUM	26.5	44.8	37.1
pH (STANDARD UNITS)	7.2	8.8	7.6
POTASSIUM 40, DISSOLVED (PCI/L AS K-40)	1.6	1.9	1.7
SODIUM ADSORPTION RATIO	0.5	2.3	1.3
SPECIFIC CONDUCTANCE (UMHO)	120.0	3900.0	630.4
ALUMINUM, DISSOLVED (UG/L AS AL)	8.0	260.0	91.5
ARSENIC, DISSOLVED (UG/L AS AS)	0.0	1.0	0.8
BERYLLIUM, DISSOLVED (UG/L AS BE)	0.5	3.0	1.1
CADMIUM, DISSOLVED (UG/L AS CD)	1.0	3.0	1.3
CHROMIUM, DISSOLVED (UG/L AS CR)	0.0	10.0	5.0
COPPER, DISSOLVED (UG/L AS CU)	0.0	3.0	1.6
IRON, DISSOLVED (UG/L AS FE)	10.0	390.0	124.5
LEAD, DISSOLVED (UG/L AS PB)	0.0	3.0	1.2
LITHIUM, DISSOLVED (UG/L AS LI)	4.0	23.0	12.7
MANGANESE, DISSOLVED (UG/L AS MN)	2.0	81.0	40.1
MERCURY, DISSOLVED (UG/L AS HG)	0.0	0.5	0.1
MOLYBDENUM, DISSOLVED (UG/L AS MO)	1.0	10.0	7.0
NICKEL, DISSOLVED (UG/L AS NI)	0.0	4.0	1.8
SELENIUM, DISSOLVED (UG/L AS SE)	0.0	1.0	0.4
STRONTIUM, DISSOLVED (UG/L AS SR)	32.0	210.0	109.8
VANADIUM, DISSOLVED (UG/L AS V)	0.0	1.7	0.7
ZINC, DISSOLVED (UG/L AS ZN)	3.0	28.0	12.0
ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	130.0	2400.0	820.8
ARSENIC, TOTAL RECOVERABLE (UG/L AS AS)	0.0	2.0	0.9
BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	0.0	10.0	5.0
CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	0.0	1.0	0.5
CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	0.0	30.0	8.3
COPPER, TOTAL RECOVERABLE (UG/L AS CU)	2.0	9.0	4.7
IRON, TOTAL RECOVERABLE (UG/L AS FE)	310.0	3500.0	1320.8
LEAD, TOTAL RECOVERABLE (UG/L AS PB)	0.0	6.0	1.9
LITHIUM, TOTAL RECOVERABLE (UG/L AS LI)	10.0	20.0	12.5
MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	50.0	180.0	95.8
MERCURY, TOTAL RECOVERABLE (UG/L AS HG)	0.0	0.6	0.2
MOLYBDENUM, TOTAL RECOVERABLE (UG/L AS MO)	0.0	67.0	6.6
NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	1.0	11.0	4.2
SELENIUM, TOTAL RECOVERABLE (UG/L AS SE)	0.0	7.0	1.0
ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	10.0	250.0	50.8

TABLE 13. SUMMARY OF WATER-QUALITY ANALYSES, MULE CREEK SITE C (07245592)

[MG/L=MILLIGRAMS PER LITER, DEG C=DEGREES CELSIUS, PCI/L=PICOCURIES PER LITER]
UMHO=MICROMHOS PER CENTIMETER AT 25 DEGREES CELSIUS, UG/L=MICROGRAMS PER LITER]

CONSTITUENT OR PROPERTY	MINIMUM VALUE	MAXIMUM VALUE	MEAN
ALKALINITY, LAB (MG/L AS CACO3)	29.0	420.0	155.3
CALCIUM, DISSOLVED (MG/L AS CA)	7.6	79.0	33.6
CHLORIDE, DISSOLVED (MG/L AS CL)	4.2	90.0	27.8
FLUORIDE, DISSOLVED (MG/L AS F)	0.1	0.5	0.2
HARDNESS (MG/L AS CACO3)	35.5	453.3	181.8
HARDNESS, NONCARBONATE (MG/L AS CACO3)	6.0	83.0	26.8
MAGNESIUM, DISSOLVED (MG/L AS MG)	4.0	62.0	23.7
POTASSIUM, DISSOLVED (MG/L AS K)	2.0	3.5	2.6
SILICA, DISSOLVED (MG/L AS SIO2)	4.7	7.9	6.0
SODIUM, DISSOLVED (MG/L AS NA)	16.0	520.0	164.2
SOLIDS, RESIDUE AT 180 DEG C, DISSOLVED (MG/L)	105.0	1950.0	688.1
SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	95.9	1942.4	689.7
SULFATE, DISSOLVED (MG/L AS SO4)	38.0	940.0	337.9
PERCENT SODIUM	43.2	71.3	58.1
pH (STANDARD UNITS)	7.2	8.2	7.7
POTASSIUM 40, DISSOLVED (PCI/L AS K-40)	1.5	1.9	1.8
SODIUM ADSORPTION RATIO	1.2	10.9	4.5
SPECIFIC CONDUCTANCE (UMHO)	230.0	2650.0	1017.3
ALUMINUM, DISSOLVED (UG/L AS AL)	8.0	270.0	92.3
ARSENIC, DISSOLVED (UG/L AS AS)	0.0	1.0	0.8
BERYLLIUM, DISSOLVED (UG/L AS BE)	0.0	3.0	0.9
CADMIUM, DISSOLVED (UG/L AS CD)	0.0	3.0	1.2
CHROMIUM, DISSOLVED (UG/L AS CR)	0.0	10.0	5.8
COPPER, DISSOLVED (UG/L AS CU)	1.0	3.0	1.8
IRON, DISSOLVED (UG/L AS FE)	10.0	330.0	139.1
LEAD, DISSOLVED (UG/L AS PB)	0.0	4.0	1.7
LITHIUM, DISSOLVED (UG/L AS LI)	4.0	90.0	34.0
MANGANESE, DISSOLVED (UG/L AS MN)	10.0	91.0	32.2
MERCURY, DISSOLVED (UG/L AS HG)	0.0	1.2	0.2
MOLYBDENUM, DISSOLVED (UG/L AS MO)	0.0	10.0	5.4
NICKEL, DISSOLVED (UG/L AS NI)	0.0	6.0	2.5
SELENIUM, DISSOLVED (UG/L AS SE)	0.0	7.0	1.1
STRONTIUM, DISSOLVED (UG/L AS SR)	42.0	640.0	248.3
VANADIUM, DISSOLVED (UG/L AS V)	0.0	6.0	1.2
ZINC, DISSOLVED (UG/L AS ZN)	3.0	31.0	13.9
ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	90.0	2900.0	875.0
ARSENIC, TOTAL RECOVERABLE (UG/L AS AS)	0.0	1.0	0.9
BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	0.0	10.0	5.8
CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	0.0	1.0	0.7
CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	0.0	10.0	7.5
COPPER, TOTAL RECOVERABLE (UG/L AS CU)	2.0	11.0	5.1
IRON, TOTAL RECOVERABLE (UG/L AS FE)	100.0	3600.0	1293.3
LEAD, TOTAL RECOVERABLE (UG/L AS PB)	0.0	11.0	3.7
LITHIUM, TOTAL RECOVERABLE (UG/L AS LI)	10.0	80.0	30.8
MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	50.0	160.0	81.7
MERCURY, TOTAL RECOVERABLE (UG/L AS HG)	0.0	0.9	0.2
MOLYBDENUM, TOTAL RECOVERABLE (UG/L AS MO)	0.0	71.0	7.1
NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	1.0	14.0	5.4
SELENIUM, TOTAL RECOVERABLE (UG/L AS SE)	0.0	7.0	1.1
ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	10.0	140.0	44.2

TABLE 14. SUMMARY OF WATER-QUALITY ANALYSES, MULE CREEK SITE D (07245594)

[MG/L=MILLIGRAMS PER LITER, DEG C=DEGREES CELSIUS, PCI/L=PICOCURIES PER LITER, UMHO=MICROMHOS PER CENTIMETER AT 25 DEGREES CELSIUS, UG/L=MICROGRAMS PER LITER]

CONSTITUENT OR PROPERTY	MINIMUM VALUE	MAXIMUM VALUE	MEAN
ALKALINITY, LAB (MG/L AS CACO3)	23.0	420.0	154.5
CALCIUM, DISSOLVED (MG/L AS CA)	7.8	79.0	34.2
CHLORIDE, DISSOLVED (MG/L AS CL)	3.5	110.0	31.5
FLUORIDE, DISSOLVED (MG/L AS F)	0.1	0.5	0.3
HARDNESS (MG/L AS CACO3)	32.7	453.3	182.5
HARDNESS, NONCARBONATE (MG/L AS CACO3)	0.0	71.0	23.7
MAGNESIUM, DISSOLVED (MG/L AS MG)	3.2	62.0	23.5
POTASSIUM, DISSOLVED (MG/L AS K)	2.0	3.0	2.5
SILICA, DISSOLVED (MG/L AS SIO2)	4.5	7.4	5.9
SODIUM, DISSOLVED (MG/L AS NA)	8.6	520.0	168.0
SOLIDS, RESIDUE AT 180 DEG C, DISSOLVED (MG/L)	76.0	1960.0	684.0
SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	71.4	2012.5	690.3
SULFATE, DISSOLVED (MG/L AS SO4)	26.0	980.0	331.4
PERCENT SODIUM	34.5	71.3	59.3
pH (STANDARD UNITS)	7.2	8.1	7.7
POTASSIUM 40, DISSOLVED (PCI/L AS K-40)	1.6	1.9	1.7
SODIUM ADSORPTION RATIO	0.7	10.9	4.8
SPECIFIC CONDUCTANCE (UMHO)	140.0	2680.0	1071.9
ALUMINUM, DISSOLVED (UG/L AS AL)	0.0	250.0	91.8
ARSENIC, DISSOLVED (UG/L AS AS)	0.0	1.0	0.7
BERYLLIUM, DISSOLVED (UG/L AS BE)	0.0	10.0	1.8
CADMIUM, DISSOLVED (UG/L AS CD)	1.0	3.0	1.2
CHROMIUM, DISSOLVED (UG/L AS CR)	0.0	10.0	6.4
COPPER, DISSOLVED (UG/L AS CU)	1.0	7.0	2.8
IRON, DISSOLVED (UG/L AS FE)	0.0	320.0	108.3
LEAD, DISSOLVED (UG/L AS PB)	0.0	2.0	1.1
LITHIUM, DISSOLVED (UG/L AS LI)	6.0	90.0	33.6
MANGANESE, DISSOLVED (UG/L AS MN)	4.0	60.0	30.3
MERCURY, DISSOLVED (UG/L AS HG)	0.0	0.3	0.1
MOLYBDENUM, DISSOLVED (UG/L AS MO)	1.0	10.0	5.1
NICKEL, DISSOLVED (UG/L AS NI)	1.0	5.0	2.0
SELENIUM, DISSOLVED (UG/L AS SE)	0.0	1.0	0.6
STRONTIUM, DISSOLVED (UG/L AS SR)	35.0	630.0	246.5
VANADIUM, DISSOLVED (UG/L AS V)	0.0	2.0	0.8
ZINC, DISSOLVED (UG/L AS ZN)	3.0	40.0	16.8
ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	20.0	2400.0	341.8
ARSENIC, TOTAL RECOVERABLE (UG/L AS AS)	0.0	1.0	0.9
BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	0.0	10.0	6.0
CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	0.0	1.0	0.6
CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	0.0	30.0	9.0
COPPER, TOTAL RECOVERABLE (UG/L AS CU)	0.0	10.0	4.3
IRON, TOTAL RECOVERABLE (UG/L AS FE)	30.0	5900.0	929.4
LEAD, TOTAL RECOVERABLE (UG/L AS PB)	1.0	13.0	3.8
LITHIUM, TOTAL RECOVERABLE (UG/L AS LI)	10.0	90.0	33.0
MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	10.0	320.0	73.2
MERCURY, TOTAL RECOVERABLE (UG/L AS HG)	0.1	0.8	0.2
MOLYBDENUM, TOTAL RECOVERABLE (UG/L AS MO)	0.0	82.0	3.4
NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	1.0	16.0	5.0
SELENIUM, TOTAL RECOVERABLE (UG/L AS SE)	0.0	1.0	0.5
ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	10.0	140.0	44.0

TABLE 15. SUMMARY OF WATER-QUALITY ANALYSES, OUTLET OF EAST POND, SITE E (07245591)

[MG/L=MILLIGRAMS PER LITER, DEG C=DEGREES CELSIUS, PCI/L=PICOCURIES PER LITER, UMHO=MICROMHOS PER CENTIMETER AT 25 DEGREES CELSIUS, UG/L=MICROGRAMS PER LITER]

CONSTITUENT OR PROPERTY	MINIMUM VALUE	MAXIMUM VALUE	MEAN
ALKALINITY, LAB (MG/L AS CACO3)	75.0	420.0	285.0
CALCIUM, DISSOLVED (MG/L AS CA)	17.0	81.0	55.3
CHLORIDE, DISSOLVED (MG/L AS CL)	17.0	110.0	55.5
FLUORIDE, DISSOLVED (MG/L AS F)	0.0	0.5	0.3
HARDNESS (MG/L AS CACO3)	87.9	466.5	313.8
HARDNESS, NONCARBONATE (MG/L AS CACO3)	0.0	87.0	33.5
MAGNESIUM, DISSOLVED (MG/L AS MG)	11.0	64.0	42.5
POTASSIUM, DISSOLVED (MG/L AS K)	2.3	3.3	2.7
SILICA, DISSOLVED (MG/L AS SIO2)	0.3	5.9	4.6
SODIUM, DISSOLVED (MG/L AS NA)	71.0	510.0	351.6
SOLIDS, RESIDUE AT 180 DEG C, DISSOLVED (MG/L)	302.0	1890.0	1348.5
SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	318.4	1919.4	1369.8
SULFATE, DISSOLVED (MG/L AS SO4)	150.0	970.0	682.3
PERCENT SODIUM	63.0	77.7	69.9
pH (STANDARD UNITS)	7.0	8.8	7.8
POTASSIUM 40, DISSOLVED (PCI/L AS K-40)	1.8	2.0	1.9
SODIUM ADSORPTION RATIO	3.4	12.4	8.6
SPECIFIC CONDUCTANCE (UMHO)	570.0	3000.0	1961.2
ALUMINUM, DISSOLVED (UG/L AS AL)	8.0	90.0	33.7
ARSENIC, DISSOLVED (UG/L AS AS)	0.0	2.0	0.8
BERYLLIUM, DISSOLVED (UG/L AS BE)	0.0	10.0	2.2
CADMIUM, DISSOLVED (UG/L AS CD)	0.0	3.0	1.0
CHROMIUM, DISSOLVED (UG/L AS CR)	0.0	10.0	5.4
COPPER, DISSOLVED (UG/L AS CU)	0.0	3.0	1.2
IRON, DISSOLVED (UG/L AS FE)	0.0	140.0	55.3
LEAD, DISSOLVED (UG/L AS PB)	0.0	4.0	1.5
LITHIUM, DISSOLVED (UG/L AS LI)	18.0	90.0	57.5
MANGANESE, DISSOLVED (UG/L AS MN)	0.0	90.0	33.9
MERCURY, DISSOLVED (UG/L AS HG)	0.0	0.5	0.1
MOLYBDENUM, DISSOLVED (UG/L AS MO)	0.0	10.0	4.3
NICKEL, DISSOLVED (UG/L AS NI)	0.0	3.0	1.6
SELENIUM, DISSOLVED (UG/L AS SE)	0.0	1.0	0.5
STRONTIUM, DISSOLVED (UG/L AS SR)	110.0	670.0	464.6
VANADIUM, DISSOLVED (UG/L AS V)	0.0	2.8	0.6
ZINC, DISSOLVED (UG/L AS ZN)	3.0	40.0	15.9
ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	100.0	2000.0	630.8
ARSENIC, TOTAL RECOVERABLE (UG/L AS AS)	0.0	2.0	0.9
BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	0.0	10.0	5.4
CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	0.0	2.0	0.5
CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	0.0	30.0	10.8
COPPER, TOTAL RECOVERABLE (UG/L AS CU)	1.0	11.0	4.3
IRON, TOTAL RECOVERABLE (UG/L AS FE)	110.0	2700.0	1013.8
LEAD, TOTAL RECOVERABLE (UG/L AS PB)	0.0	15.0	3.2
LITHIUM, TOTAL RECOVERABLE (UG/L AS LI)	10.0	80.0	54.6
MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	30.0	130.0	92.3
MERCURY, TOTAL RECOVERABLE (UG/L AS HG)	0.0	0.7	0.2
MOLYBDENUM, TOTAL RECOVERABLE (UG/L AS MO)	1.0	77.0	7.1
NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	0.0	9.0	3.8
SELENIUM, TOTAL RECOVERABLE (UG/L AS SE)	0.0	1.0	0.5
ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	10.0	560.0	67.7

TABLE 16. SUMMARY OF WATER-QUALITY ANALYSES, SURFACE OF EAST POND (350936094590301)

[MG/L=MILLIGRAMS PER LITER, DEG C=DEGREES CELSIUS, PCI/L=PICOCURIES PER LITER, UMHO=MICROMHOS PER CENTIMETER AT 25 DEGREES CELSIUS, UGL=MICROGRAMS PER LITER]

CONSTITUENT OR PROPERTY	MINIMUM VALUE	MAXIMUM VALUE	MEAN
ALKALINITY, LAB (MG/L AS CACO3)	88.0	420.0	294.7
CALCIUM, DISSOLVED (MG/L AS CA)	28.0	97.0	68.0
CHLORIDE, DISSOLVED (MG/L AS CL)	7.4	170.0	75.5
FLUORIDE, DISSOLVED (MG/L AS F)	0.2	0.4	0.4
HARDNESS (MG/L AS CACO3)	140.1	547.7	417.0
HARDNESS, NONCARBONATE (MG/L AS CACO3)	39.0	260.0	136.8
MAGNESIUM, DISSOLVED (MG/L AS MG)	17.0	80.0	59.9
POTASSIUM, DISSOLVED (MG/L AS K)	2.3	3.5	2.7
SILICA, DISSOLVED (MG/L AS SIO2)	0.8	6.4	4.4
SODIUM, DISSOLVED (MG/L AS NA)	41.0	540.0	382.3
SOLIDS, RESIDUE AT 180 DEG C, DISSOLVED (MG/L)	285.0	1970.0	1608.3
SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	283.0	1993.4	1565.3
SULFATE, DISSOLVED (MG/L AS SO4)	130.0	1000.0	794.4
PERCENT SODIUM	38.5	73.3	63.3
pH (STANDARD UNITS)	7.3	9.1	7.7
POTASSIUM 40, DISSOLVED (PCI/L AS K-40)	1.9	1.9	1.9
SODIUM ADSORPTION RATIO	1.5	11.6	8.1
SPECIFIC CONDUCTANCE (UMHO)	590.0	3200.0	2607.8
ALUMINUM, DISSOLVED (UG/L AS AL)	10.0	90.0	24.4
ARSENIC, DISSOLVED (UG/L AS AS)	0.0	2.0	0.9
BERYLLIUM, DISSOLVED (UG/L AS BE)	0.0	10.0	4.6
CADMIUM, DISSOLVED (UG/L AS CD)	0.0	2.0	0.9
CHROMIUM, DISSOLVED (UG/L AS CR)	0.0	10.0	6.7
COPPER, DISSOLVED (UG/L AS CU)	1.0	4.0	1.8
IRON, DISSOLVED (UG/L AS FE)	3.0	40.0	25.6
LEAD, DISSOLVED (UG/L AS PB)	1.0	5.0	2.3
LITHIUM, DISSOLVED (UG/L AS LI)	17.0	90.0	73.9
MANGANESE, DISSOLVED (UG/L AS MN)	5.0	2700.0	328.7
MERCURY, DISSOLVED (UG/L AS HG)	0.0	0.4	0.1
MOLYBDENUM, DISSOLVED (UG/L AS MO)	0.0	10.0	1.7
NICKEL, DISSOLVED (UG/L AS NI)	0.0	5.0	1.8
SELENIUM, DISSOLVED (UG/L AS SE)	0.0	1.0	0.7
STRONTIUM, DISSOLVED (UG/L AS SR)	150.0	720.0	541.1
VANADIUM, DISSOLVED (UG/L AS V)	0.0	1.8	0.6
ZINC, DISSOLVED (UG/L AS ZN)	3.0	40.0	14.2
ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	30.0	650.0	176.3
ARSENIC, TOTAL RECOVERABLE (UG/L AS AS)	1.0	2.0	1.1
BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	0.0	10.0	7.5
CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	0.0	2.0	0.9
CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	10.0	10.0	10.0
COPPER, TOTAL RECOVERABLE (UG/L AS CU)	2.0	22.0	8.1
IRON, TOTAL RECOVERABLE (UG/L AS FE)	50.0	1400.0	373.8
LEAD, TOTAL RECOVERABLE (UG/L AS PB)	0.0	4.0	1.6
LITHIUM, TOTAL RECOVERABLE (UG/L AS LI)	10.0	90.0	70.0
MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	20.0	280.0	102.5
MERCURY, TOTAL RECOVERABLE (UG/L AS HG)	0.0	0.5	0.2
MOLYBDENUM, TOTAL RECOVERABLE (UG/L AS MO)	1.0	4.0	2.1
NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	1.0	7.0	4.1
SELENIUM, TOTAL RECOVERABLE (UG/L AS SE)	0.0	1.0	0.8
ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	10.0	50.0	27.5

TABLE 17. SUMMARY OF WATER-QUALITY ANALYSES, BOTTOM OF EAST POND (350936094590302)

[MG/L=MILLIGRAMS PER LITER, DEG C=DEGREES CELSIUS, PCI/L=PICOCURIES PER LITER, UMHO=MICROMHOS PER CENTIMETER AT 25 DEGREES CELSIUS, UG/L=MICROGRAMS PER LITER]

CONSTITUENT OR PROPERTY	MINIMUM VALUE	MAXIMUM VALUE	MEAN
ALKALINITY, LAB (MG/L AS CACO3)	210.0	432.0	357.6
CALCIUM, DISSOLVED (MG/L AS CA)	45.0	100.0	76.1
CHLORIDE, DISSOLVED (MG/L AS CL)	37.0	160.0	82.5
FLUORIDE, DISSOLVED (MG/L AS F)	0.3	0.4	0.4
HARDNESS (MG/L AS CACO3)	339.5	559.4	469.8
HARDNESS, NONCARBONATE (MG/L AS CACO3)	0.0	310.0	129.6
MAGNESIUM, DISSOLVED (MG/L AS MG)	55.0	84.0	67.8
POTASSIUM, DISSOLVED (MG/L AS K)	2.4	3.6	2.9
SILICA, DISSOLVED (MG/L AS SIO2)	2.5	6.6	4.6
SODIUM, DISSOLVED (MG/L AS NA)	280.0	520.0	440.0
SOLIDS, RESIDUE AT 180 DEG C, DISSOLVED (MG/L)	1440.0	2000.0	1782.5
SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	1340.9	1990.3	1782.1
SULFATE, DISSOLVED (MG/L AS SO4)	740.0	1000.0	892.5
PERCENT SODIUM	52.0	76.5	66.2
pH (STANDARD UNITS)	7.3	8.0	7.7
POTASSIUM 40, DISSOLVED (PCI/L AS K-40)	1.9	1.9	1.9
SODIUM ADSORPTION RATIO	5.3	12.3	9.2
SPECIFIC CONDUCTANCE (UMHO)	2090.0	3200.0	2595.7
ALUMINUM, DISSOLVED (UG/L AS AL)	0.0	40.0	13.5
ARSENIC, DISSOLVED (UG/L AS AS)	0.0	1.0	0.9
BERYLLIUM, DISSOLVED (UG/L AS BE)	0.0	10.0	6.3
CADMIUM, DISSOLVED (UG/L AS CD)	0.0	1.0	0.8
CHROMIUM, DISSOLVED (UG/L AS CR)	0.0	10.0	6.3
COPPER, DISSOLVED (UG/L AS CU)	0.0	5.0	1.6
IRON, DISSOLVED (UG/L AS FE)	10.0	60.0	37.5
LEAD, DISSOLVED (UG/L AS PB)	1.0	4.0	2.0
LITHIUM, DISSOLVED (UG/L AS LI)	70.0	90.0	82.5
MANGANESE, DISSOLVED (UG/L AS MN)	10.0	1500.0	266.3
MERCURY, DISSOLVED (UG/L AS HG)	0.0	0.4	0.1
MOLYBDENUM, DISSOLVED (UG/L AS MO)	0.0	4.0	1.3
NICKEL, DISSOLVED (UG/L AS NI)	0.0	5.0	2.6
SELENIUM, DISSOLVED (UG/L AS SE)	0.0	1.0	0.6
STRONTIUM, DISSOLVED (UG/L AS SR)	410.0	750.0	620.0
VANADIUM, DISSOLVED (UG/L AS V)	0.0	1.6	1.0
ZINC, DISSOLVED (UG/L AS ZN)	10.0	30.0	17.5
ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	40.0	200.0	102.9
ARSENIC, TOTAL RECOVERABLE (UG/L AS AS)	1.0	1.0	1.0
BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	0.0	10.0	7.1
CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	0.0	2.0	0.9
CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	10.0	10.0	10.0
COPPER, TOTAL RECOVERABLE (UG/L AS CU)	1.0	11.0	5.1
IRON, TOTAL RECOVERABLE (UG/L AS FE)	60.0	420.0	192.9
LEAD, TOTAL RECOVERABLE (UG/L AS PB)	1.0	7.0	2.7
LITHIUM, TOTAL RECOVERABLE (UG/L AS LI)	70.0	90.0	80.0
MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	30.0	1500.0	352.9
MERCURY, TOTAL RECOVERABLE (UG/L AS HG)	0.0	0.5	0.2
MOLYBDENUM, TOTAL RECOVERABLE (UG/L AS MO)	1.0	6.0	2.6
NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	1.0	9.0	4.7
SELENIUM, TOTAL RECOVERABLE (UG/L AS SE)	0.0	1.0	0.7
ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	10.0	30.0	24.3

TABLE 18. SUMMARY OF WATER-QUALITY ANALYSES, SURFACE OF WEST POND (350934094590801)

[MG/L=MILLIGRAMS PER LITER, DEG C=DEGREES CELSIUS, PCI/L=PICOCURIES PER LITER, UMHO=MICROMHOS PER CENTIMETER AT 25 DEGREES CELSIUS, UG/L=MICROGRAMS PER LITER]

CONSTITUENT OR PROPERTY	MINIMUM VALUE	MAXIMUM VALUE	MEAN
ALKALINITY, LAB (MG/L AS CACO3)	186.0	440.0	278.3
CALCIUM, DISSOLVED (MG/L AS CA)	62.0	89.0	76.7
CHLORIDE, DISSOLVED (MG/L AS CL)	33.0	71.0	48.0
FLUORIDE, DISSOLVED (MG/L AS F)	0.3	0.8	0.4
HARDNESS (MG/L AS CACO3)	453.3	610.0	521.0
HARDNESS, NONCARBONATE (MG/L AS CACO3)	13.0	320.0	242.2
MAGNESIUM, DISSOLVED (MG/L AS MG)	62.0	94.0	79.9
POTASSIUM, DISSOLVED (MG/L AS K)	2.0	3.3	2.9
SILICA, DISSOLVED (MG/L AS SIO2)	1.3	11.0	3.9
SODIUM, DISSOLVED (MG/L AS NA)	270.0	490.0	335.7
SOLIDS, RESIDUE AT 180 DEG C, DISSOLVED (MG/L)	1350.0	2000.0	1611.4
SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	1375.5	1992.1	1573.6
SULFATE, DISSOLVED (MG/L AS SO4)	740.0	1100.0	858.6
PERCENT SODIUM	52.2	70.1	57.5
pH (STANDARD UNITS)	7.2	9.0	8.3
POTASSIUM 40, DISSOLVED (PCI/L AS K-40)	2.2	2.2	2.2
SODIUM ADSORPTION RATIO	5.2	10.3	6.6
SPECIFIC CONDUCTANCE (UMHO)	1530.0	3150.0	2295.0
ALUMINUM, DISSOLVED (UG/L AS AL)	10.0	50.0	22.9
ARSENIC, DISSOLVED (UG/L AS AS)	1.0	2.0	1.1
BERYLLIUM, DISSOLVED (UG/L AS BE)	0.0	10.0	4.9
CADMIUM, DISSOLVED (UG/L AS CD)	0.0	3.0	1.1
CHROMIUM, DISSOLVED (UG/L AS CR)	0.0	10.0	5.7
COPPER, DISSOLVED (UG/L AS CU)	0.0	7.0	2.4
IRON, DISSOLVED (UG/L AS FE)	9.0	30.0	21.3
LEAD, DISSOLVED (UG/L AS PB)	0.0	5.0	1.7
LITHIUM, DISSOLVED (UG/L AS LI)	40.0	90.0	74.7
MANGANESE, DISSOLVED (UG/L AS MN)	0.0	480.0	76.1
MERCURY, DISSOLVED (UG/L AS HG)	0.0	0.4	0.1
MOLYBDENUM, DISSOLVED (UG/L AS MO)	0.0	10.0	2.1
NICKEL, DISSOLVED (UG/L AS NI)	0.0	4.0	1.9
SELENIUM, DISSOLVED (UG/L AS SE)	0.0	4.0	1.0
STRONTIUM, DISSOLVED (UG/L AS SR)	440.0	630.0	534.3
VANADIUM, DISSOLVED (UG/L AS V)	0.0	2.0	1.0
ZINC, DISSOLVED (UG/L AS ZN)	8.0	20.0	14.3
ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	20.0	720.0	226.0
ARSENIC, TOTAL RECOVERABLE (UG/L AS AS)	1.0	1.0	1.0
BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	0.0	10.0	6.0
CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	0.0	1.0	0.6
CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	0.0	10.0	8.0
COPPER, TOTAL RECOVERABLE (UG/L AS CU)	1.0	11.0	5.6
IRON, TOTAL RECOVERABLE (UG/L AS FE)	10.0	2000.0	474.0
LEAD, TOTAL RECOVERABLE (UG/L AS PB)	1.0	6.0	3.0
LITHIUM, TOTAL RECOVERABLE (UG/L AS LI)	70.0	80.0	76.0
MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	10.0	990.0	224.0
MERCURY, TOTAL RECOVERABLE (UG/L AS HG)	0.1	1.6	0.4
MOLYBDENUM, TOTAL RECOVERABLE (UG/L AS MO)	1.0	2.0	1.6
NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	1.0	8.0	4.0
SELENIUM, TOTAL RECOVERABLE (UG/L AS SE)	0.0	1.0	0.6
ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	10.0	30.0	20.0

TABLE 19. SUMMARY OF WATER-QUALITY ANALYSES, BOTTOM OF WEST POND (350934094590802)

[MG/L=MILLIGRAMS PER LITER, DEG C=DEGREES CELSIUS, PCI/L=PICOCURIES PER LITER, UMHO=MICROMHOS PER CENTIMETER AT 25 DEGREES CELSIUS, UG/L=MICROGRAMS PER LITER]

CONSTITUENT OR PROPERTY	MINIMUM VALUE	MAXIMUM VALUE	MEAN
ALKALINITY, LAB (MG/L AS CACO3)	230.0	440.0	292.4
CALCIUM, DISSOLVED (MG/L AS CA)	73.0	110.0	81.6
CHLORIDE, DISSOLVED (MG/L AS CL)	35.0	170.0	70.4
FLUORIDE, DISSOLVED (MG/L AS F)	0.3	0.5	0.4
HARDNESS (MG/L AS CACO3)	446.7	658.4	524.6
HARDNESS, NONCARBONATE (MG/L AS CACO3)	7.0	400.0	237.4
MAGNESIUM, DISSOLVED (MG/L AS MG)	61.0	93.0	77.8
POTASSIUM, DISSOLVED (MG/L AS K)	2.6	3.4	3.1
SILICA, DISSOLVED (MG/L AS SIO2)	1.3	5.8	3.7
SODIUM, DISSOLVED (MG/L AS NA)	270.0	500.0	330.0
SOLIDS, RESIDUE AT 180 DEG C, DISSOLVED (MG/L)	1460.0	2000.0	1611.3
SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	1364.4	1916.6	1554.5
SULFATE, DISSOLVED (MG/L AS SO4)	730.0	930.0	813.8
PERCENT SODIUM	48.0	70.8	56.9
pH (STANDARD UNITS)	7.3	8.4	7.9
POTASSIUM 40, DISSOLVED (PCI/L AS K-40)	2.3	2.4	2.4
SODIUM ADSORPTION RATIO	4.9	10.5	6.5
SPECIFIC CONDUCTANCE (UMHO)	1725.0	3100.0	2330.7
ALUMINUM, DISSOLVED (UG/L AS AL)	8.0	20.0	12.3
ARSENIC, DISSOLVED (UG/L AS AS)	1.0	1.0	1.0
BERYLLIUM, DISSOLVED (UG/L AS BE)	0.0	10.0	5.5
CADMIUM, DISSOLVED (UG/L AS CD)	0.0	3.0	1.3
CHROMIUM, DISSOLVED (UG/L AS CR)	0.0	10.0	6.3
COPPER, DISSOLVED (UG/L AS CU)	0.0	4.0	1.6
IRON, DISSOLVED (UG/L AS FE)	10.0	90.0	28.9
LEAD, DISSOLVED (UG/L AS PB)	1.0	10.0	2.8
LITHIUM, DISSOLVED (UG/L AS LI)	70.0	90.0	80.6
MANGANESE, DISSOLVED (UG/L AS MN)	4.0	3700.0	704.3
MERCURY, DISSOLVED (UG/L AS HG)	0.0	0.5	0.1
MOLYBDENUM, DISSOLVED (UG/L AS MO)	0.0	10.0	2.0
NICKEL, DISSOLVED (UG/L AS NI)	0.0	6.0	2.3
SELENIUM, DISSOLVED (UG/L AS SE)	0.0	1.0	0.6
STRONTIUM, DISSOLVED (UG/L AS SR)	480.0	720.0	566.3
VANADIUM, DISSOLVED (UG/L AS V)	0.0	2.0	1.1
ZINC, DISSOLVED (UG/L AS ZN)	5.0	40.0	20.9
ALUMINUM, TOTAL RECOVERABLE (UG/L AS AL)	30.0	840.0	188.6
ARSENIC, TOTAL RECOVERABLE (UG/L AS AS)	1.0	1.0	1.0
BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE)	0.0	10.0	7.1
CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	0.0	1.0	0.7
CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	0.0	10.0	8.6
COPPER, TOTAL RECOVERABLE (UG/L AS CU)	1.0	11.0	5.0
IRON, TOTAL RECOVERABLE (UG/L AS FE)	30.0	3100.0	550.0
LEAD, TOTAL RECOVERABLE (UG/L AS PB)	0.0	5.0	2.0
LITHIUM, TOTAL RECOVERABLE (UG/L AS LI)	70.0	80.0	77.1
MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	10.0	3600.0	924.3
MERCURY, TOTAL RECOVERABLE (UG/L AS HG)	0.1	1.0	0.3
MOLYBDENUM, TOTAL RECOVERABLE (UG/L AS MO)	1.0	4.0	2.3
NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	1.0	7.0	3.6
SELENIUM, TOTAL RECOVERABLE (UG/L AS SE)	0.0	1.0	0.7
ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	10.0	50.0	24.3

Table 20.--Number of water samples analyzed for selected constituents and properties, wells 1-6, surface water sites A-E, and east and west ponds

Source	Alkalinity	Calcium	Chloride	Magnesium	Sodium	Solids	Sulfate	Specific conductance	pH
Well 1	10	10	10	10	10	10	10	8	9
Well 2	11	11	11	11	11	11	11	10	10
Well 3	10	10	10	10	10	10	10	9	9
Well 4	8	8	8	8	8	8	8	7	6
Well 5	11	11	11	11	11	11	11	10	9
Well 6	7	7	7	7	7	7	7	7	7
Mule C, site A	5	5	5	5	5	5	5	5	4
Mule C, site B	12	12	12	12	12	12	12	12	12
Mule C, site C	12	12	12	12	12	12	12	13	12
Mule C, site D	11	11	11	11	11	11	11	11	10
East pond, outlet, site E	12	13	13	13	13	13	13	13	13
East pond, surface	9	9	9	9	9	9	9	90	216
East pond, bottom	8	8	8	8	8	8	8	7	7
West pond, surface	7	7	7	7	7	7	7	6	153
West pond, bottom	7	8	8	8	8	8	8	7	7

	Dissolved																
Source	Al	As	Be	Cd	Cr	Cu	Fe	Pb	Li	Mn	Hg	Mo	Ni	Se	Sr	V	Zn
Well 1	9	9	8	9	9	9	9	9	9	9	9	9	9	9	10	9	9
Well 2	9	9	9	9	9	9	9	9	9	9	9	9	9	9	11	9	9
Well 3	9	9	9	9	9	9	9	9	9	9	9	9	9	9	10	9	9
Well 4	7	7	7	7	7	7	7	7	7	7	7	7	7	7	8	7	7
Well 5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	11	10	10
Well 6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Mule C, site A	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mule C, site B	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Mule C, site C	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Mule C, site D	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
East pond, outlet, site E	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
East pond, surface	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
East pond, bottom	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
West pond, surface	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
West pond, bottom	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7

	Total Recoverable														
Source	Al	As	Be	Cd	Cr	Cu	Fe	Pb	Li	Mn	Hg	Mo	Ni	Se	Zn
Mule C, site A	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mule C, site B	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Mule C, site C	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Mule C, site D	88	88	10	10	10	10	10	98	10	10	88	10	98	10	10
East pond, outlet, site E	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
East pond, surface	8	8	8	7	8	7	7	7	8	8	8	8	7	8	8
East pond, bottom	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
West pond, surface	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
West pond, bottom	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7

Aluminum, Al
Arsenic, As
Beryllium, Be
Cadmium, Cd
Chromium, Cr
Copper, Cu
Iron, Fe
Lead, Pb
Lithium, Li
Manganese, Mn
Mercury, Hg
Molybdenum, Mo
Nickel, Ni
Selenium, Se
Strontium, Sr
Vanadium, V
Zinc, Zn

Table 21.--Median values of selected constituents and properties in water from wells 1-6, at surface water sites A-E, and in east and west ponds
[micromhos, micromhos per centimeter at 25° Celsius]

Source	Dissolved (milligrams per liter)							Specific conductance (micromhos)	pH (units)
	Alkalinity	Calcium	Chloride	Magnesium	Sodium	Solids	Sulfate		
Well 1	419	210	21	205	590	3560	2000	3745	7.2
Well 2	570	19	86	9	580	1770	680	2800	7.6
Well 3	435	74	92	49	480	1810	850	2700	7.5
Well 4	570	88	35	89	490	2030	1040	2800	7.2
Well 5	460	71	54	56	440	1730	780	2450	7.4
Well 6	380	79	120	58	440	1780	770	2500	7.2
Mule C, site A	14	10	3	4	5	70	26	130	6.7
Mule C, site B	53	20	5	11	25	189	83	300	7.6
Mule C, site C	87	23	11	14	75	356	170	765	7.6
Mule C, site D	130	33	17	19	130	558	260	1050	7.8
East pond, outlet, site E	270	53	53	41	350	1320	660	1948	7.9
East pond, surface	310	73	61	81	450	1860	850	2700	7.4
East pond, bottom	395	78	74	65	490	1835	885	2600	7.8
West pond, surface	250	77	46	80	290	1490	820	2195	8.2
West pond, bottom	250	77	63	80	285	1505	805	2300	8.0

Source	Dissolved (micrograms per liter)																
	Al	As	Be	Cd	Cr	Cu	Fe	Pb	Li	Mn	Hg	Mo	Ni	Se	Sr	V	Zn
Well 1	10	2	10	1	10	1	190	2	50	1400	0.1	1	4	1	1200	2.0	30
Well 2	90	2	10	1	10	1	320	1	60	310	0.1	1	2	1	250	2.0	20
Well 3	10	2	10	1	10	1	410	2	80	550	0.1	1	2	1	560	1.0	20
Well 4	20	1	10	1	10	3	30	2	30	620	0.3	1	3	1	510	2.0	20
Well 5	30	1	5.0	1	10	1	75	1	50	300	0.1	2	2	1	490	1.0	20
Well 6	10	1	0.5	1	10	1	60	1	70	250	0.1	1	3	1	570	1.0	10
Mule C, site A	60	1	1.0	1	10	1	220	2	4	50	0.1	10	2	0	30	1.0	30
Mule C, site B	50	1	1.0	1	10	2	60	1	30	30	0.1	1	2	1	210	1.0	14
Mule C, site C	35	1	1.0	1	10	2	140	1	18	31	0.2	6	3	1	136	1.0	11
Mule C, site D	65	1	1.0	1	5	2	80	1	10	40	0.1	10	2	0	98	1.0	10
East pond, outlet, site E	30	1	1.0	1	10	1	50	1	60	40	0.1	1	2	0	450	0.0	10
East pond, surface	10	1	10	1	10	1	40	2	80	60	0.1	1	3	1	625	1.0	15
East pond, bottom	20	1	1.0	1	10	2	30	2	80	30	0.1	1	1	1	610	1.0	10
West pond, surface	10	1	6.5	1	10	1	20	2	80	15	0.1	1	2	1	540	1.0	20
West pond, bottom	10	1	3.0	1	10	1	20	1	80	10	0.1	1	2	1	510	1.0	12

Source	Total recoverable (micrograms per liter)														
	Al	As	Be	Cd	Cr	Cu	Fe	Pb	Li	Mn	Hg	Mo	Ni	Se	Zn
Mule C, site A	870	1	0	1	10	7	1800	7	10	90	0.1	1	4	1	30
Mule C, site B	645	1	5	1	10	4	1150	1	10	85	0.1	1	4	1	35
Mule C, site C	615	1	10	1	10	5	1350	2	20	80	0.1	1	5	1	25
Mule C, site D	210	1	10	1	10	4	595	2	25	60	0.2	1	4	1	25
East pond, outlet, site E	500	1	10	0	10	3	1000	1	50	100	0.1	1	3	0	20
East pond, surface	95	1	10	1	10	7	210	1	80	80	0.2	2	4	1	25
East pond, bottom	80	1	10	1	10	5	130	2	80	100	0.2	2	4	1	30
West pond, surface	100	1	10	1	10	5	100	3	80	40	0.1	2	4	1	20
West pond, bottom	60	1	10	1	10	5	120	2	80	50	0.1	2	3	1	20

Aluminum, Al
Arsenic, As
Beryllium, Be
Cadmium, Cd
Chromium, Cr
Copper, Cu
Iron, Fe
Lead, Pb
Lithium, Li
Manganese, Mn
Mercury, Hg
Molybdenum, Mo
Nickel, Ni
Selenium, Se
Strontium, Sr
Vanadium, V
Zinc, Zn

Table 22.--Minimum values of selected constituents and properties in water from wells 1-6, at surface water sites A-E, and in east and west ponds
[micromhos, micromhos per centimeter at 25° Celsius]

Source	Dissolved (milligrams per liter) Alkalinity	Calcium	Chloride	Magnesium	Sodium	Solids	Sulfate	Specific conductance (micromhos)	pH (units)
Well 1	200	92	5	82	240	1300	660	3000	6.8
Well 2	460	15	71	5	380	1280	450	2000	7.1
Well 3	320	62	30	4	240	1300	660	2400	7.0
Well 4	352	69	28	60	330	1400	560	2010	7.0
Well 5	410	56	42	45	400	1390	680	2250	7.0
Well 6	280	26	7	15	200	679	270	1300	6.8
Mule C, site A	10	4	2	2	2	53	7	80	6.5
Mule C, site B	21	8	3	3	6	61	23	120	7.2
Mule C, site C	29	8	4	4	16	105	38	230	7.2
Mule C, site D	23	8	4	3	9	76	26	140	7.2
East pond, outlet, site E	75	17	17	11	71	302	150	570	7.0
East pond, surface	88	28	7	17	41	285	130	590	7.3
East pond, bottom	210	45	37	55	280	1440	740	2090	7.3
West pond, surface	186	62	33	62	270	1350	740	1530	7.2
West pond, bottom	230	73	35	61	270	1460	730	1725	7.3

Source	Dissolved (micrograms per liter) Al	As	Be	Cd	Cr	Cu	Fe	Pb	Li	Mn	Hg	Mo	Ni	Se	Sr	V	Zn
Well 1	0	0	0.0	0	0	0	30	1	20	290	0.0	0	1	0	640	1.0	10
Well 2	10	0	0.0	0	0	0	20	1	40	180	0.0	0	0	0	190	1.0	4
Well 3	0	1	0.0	0	0	0	20	1	40	300	0.0	0	1	0	520	0.0	10
Well 4	0	1	0.0	0	0	1	20	0	20	470	0.1	1	2	0	410	0.0	10
Well 5	0	0	0.0	0	0	0	10	1	40	170	0.0	0	0	0	400	0.0	10
Well 6	0	0	0.0	1	0	1	10	0	30	190	0.0	0	1	0	180	1.0	4
Mule C, site A	10	0	1.0	1	0	1	90	0	4	37	0.1	1	1	0	20	0.0	8
Mule C, site B	0	0	0.0	1	0	1	0	0	6	4	0.0	1	1	0	35	0.0	3
Mule C, site C	8	0	0.0	0	0	1	10	0	4	10	0.0	0	0	0	42	0.0	3
Mule C, site D	8	0	0.5	1	0	0	10	0	4	2	0.0	1	0	0	32	0.0	3
East pond, outlet, site E	8	0	0.0	0	0	0	0	0	18	0	0.0	0	0	0	110	0.0	3
East pond, surface	0	0	0.0	0	0	0	10	1	70	10	0.0	0	0	0	410	0.0	10
East pond, bottom	10	0	0.0	0	0	1	3	1	17	5	0.0	0	0	0	150	0.0	3
West pond, surface	8	1	0.0	0	0	0	10	1	70	4	0.0	0	0	0	480	0.0	5
West pond, bottom	10	1	0.0	0	0	0	9	0	40	0	0.0	0	0	0	440	0.0	8

Source	Total recoverable (micrograms per liter) Al	As	Be	Cd	Cr	Cu	Fe	Pb	Li	Mn	Hg	Mo	Ni	Se	Zn
Mule C, site A	490	1	0	0	0	1	1100	1	0	50	0.1	1	0	0	20
Mule C, site B	130	0	0	0	0	2	310	0	10	50	0.0	0	1	0	10
Mule C, site C	90	0	0	0	0	2	100	0	10	50	0.0	0	1	0	10
Mule C, site D	20	0	0	0	0	0	30	1	10	10	0.1	0	1	0	10
East pond, outlet, site E	100	0	0	0	0	1	110	0	10	30	0.0	1	0	0	10
East pond, surface	30	1	0	0	10	2	50	0	10	20	0.0	1	1	0	10
East pond, bottom	40	1	0	0	10	1	60	1	70	30	0.0	1	1	0	10
West pond, surface	20	1	0	0	0	1	10	1	70	10	0.1	1	1	0	10
West pond, bottom	30	1	0	0	0	1	30	0	70	10	0.1	1	1	0	10

Aluminum, Al
Arsenic, As
Beryllium, Be
Cadmium, Cd
Chromium, Cr
Copper, Cu
Iron, Fe
Lead, Pb
Lithium, Li
Manganese, Mn
Mercury, Hg
Molybdenum, Mo
Nickel, Ni
Selenium, Se
Strontium, Sr
Vanadium, V
Zinc, Zn

Table 23.--Maximum values of selected constituents and properties in water from wells 1-6, at surface water sites A-E, and in east and west ponds
[micromhos, micromhos per centimeter at 25° Celsius]

Source	Dissolved (milligrams per liter)							Specific conductance (micromhos)	pH (units)
	Alkalinity	Calcium	Chloride	Magnesium	Sodium	Solids	Sulfate		
Well 1	650	270	30	310	690	4810	3100	4700	8.0
Well 2	610	70	170	45	680	2040	840	7600	8.0
Well 3	460	92	160	82	600	2050	1000	3000	8.0
Well 4	710	120	60	110	610	2570	1300	3200	7.4
Well 5	568	81	93	68	460	1910	880	2900	7.6
Well 6	460	100	190	68	470	1970	850	3300	7.5
Mule C, site A	21	14	4	7	9	134	52	400	7.6
Mule C, site B	140	37	10	24	67	409	240	3900	8.8
Mule C, site C	420	79	90	62	520	1950	940	2650	8.2
Mule C, site D	420	79	110	62	520	1960	980	2680	8.1
East pond, outlet, site E	420	81	110	64	510	1890	970	3000	8.8
East pond, surface	420	97	170	80	540	1970	1000	3200	9.1
East pond, bottom	432	100	160	84	520	2000	1000	3200	8.0
West pond, surface	440	89	71	94	490	2000	1100	3150	9.0
West pond, bottom	440	110	170	93	500	2000	930	3100	8.4

Source	Dissolved (micrograms per liter)																
	Al	As	Be	Cd	Cr	Cu	Fe	Pb	Li	Mn	Hg	Mo	Ni	Se	Sr	V	Zn
Well 1	230	4	10	4	20	6	1200	6	90	3400	0.3	3	8	17	1800	4.0	300
Well 2	370	4	10	3	20	6	1300	23	60	1700	0.4	11	13	1	480	14	80
Well 3	40	2	10	1	10	3	1200	4	90	3400	0.3	10	5	1	640	3.2	50
Well 4	70	1	10	2	20	6	100	4	40	910	0.6	6	6	4	720	3.0	40
Well 5	80	3	10	2	10	5	1100	5	60	1700	0.1	20	4	1	600	31	50
Well 6	40	1	10	5	10	5	3600	10	90	760	0.1	7	14	1	740	2.0	80
Mule C, site A	120	1	3.0	3	10	4	450	3	12	100	0.2	10	6	1	50	2.0	50
Mule C, site B	250	1	10	3	10	7	320	2	90	60	0.5	10	5	1	630	2.0	40
Mule C, site C	270	1	3.0	3	10	3	330	4	90	91	1.2	10	6	7	640	6.0	31
Mule C, site D	260	1	3.0	3	10	3	390	3	23	81	0.3	10	4	1	210	1.7	28
East pond, outlet, site E	90	2	10	3	10	3	140	4	90	90	0.5	10	3	1	670	2.8	40
East pond, surface	40	1	10	1	10	5	60	4	90	1500	0.4	4	5	1	750	1.6	30
East pond, bottom	90	2	10	2	10	4	40	5	90	2700	0.4	10	5	1	720	1.8	40
West pond, surface	20	1	10	3	10	4	90	10	90	3700	0.4	10	6	1	720	2.0	40
West pond, bottom	50	2	10	3	10	7	30	5	90	480	0.5	10	4	4	630	2.0	20

Source	Total recoverable (micrograms per liter)														
	Al	As	Be	Cd	Cr	Cu	Fe	Pb	Li	Mn	Hg	Mo	Ni	Se	Zn
Mule C, site A	1500	1	10	1	10	9	1900	11	10	120	0.2	74	9	1	210
Mule C, site B	2400	2	10	1	30	9	3500	6	20	180	0.6	67	11	7	250
Mule C, site C	2900	1	10	1	10	11	3600	11	80	160	0.9	71	14	7	140
Mule C, site D	2400	1	10	1	30	10	5900	13	90	320	0.8	82	16	1	140
East pond, outlet, site E	2000	2	10	2	30	11	2700	15	80	130	0.7	77	9	1	560
East pond, surface	650	2	10	2	10	22	1400	4	90	280	0.5	4	7	1	50
East pond, bottom	200	1	10	2	10	11	420	7	90	1500	0.5	6	9	1	30
West pond, surface	720	1	10	1	10	11	2000	6	80	990	1.6	2	8	1	30
West pond, bottom	840	1	10	1	10	11	3100	5	80	3600	1.0	4	7	1	50

Aluminum, Al
Arsenic, As
Beryllium, Be
Cadmium, Cd
Chromium, Cr
Copper, Cu
Iron, Fe
Lead, Pb
Lithium, Li
Manganese, Mn
Mercury, Hg
Molybdenum, Mo
Nickel, Ni
Selenium, Se
Strontium, Sr
Vanadium, V
Zinc, Zn

Table 24. -- Comparison of sulfate concentrations at selected sites

Site	Sulfate concentration (milligrams per liter)
Mule Creek, site A	7 -52
Mule Creek, site B	23 - 240
Mule Creek, site C	38 - 940
Mule Creek, site D	26 - 980
Mule Creek, site F	600[a]
Mule Creek, site G	1,040[a]
Club drainage, site H	106[a]
Mine drainaage, site I	1,370[a]
Settling-pond overflow, site J	1,450[a]

[a] J. P. Savage, Lone Star Steel Co., written communication, 1978 (samples collected June 16, 1978).

Ground Water

The ground water from six wells was predominantly a sodium sulfate type. The water was a moderately hard to very hard alkaline water with a median pH of 7.2 to 7.6 (table 21). Median specific conductance and concentrations of sodium, calcium, magnesium, sulfate, alkalinity, and dissolved solids (residue) were approximately the same (within 10 percent) in water from wells 3, 5, and 6 as median concentrations in water in east pond. Median specific conductance and concentrations of calcium, magnesium, sulfate, and dissolved solids (residue) were approximately twice as great in water from well 1 as in water from any of the other five wells or from the two ponds, probably due to well 1 being finished at the top of a clay layer and having a small yield. At times well 1 is dry: at other times well 1 can be bailed dry.

In water from all six wells, the maximum concentrations of the following dissolved metals were less than limits in the the Primary Drinking Water Regulations (U. S. Environmental Protection Agency, 1976a): arsenic, chromium, and lead less than 50 µg/L; cadmium less than 10 µg/L: and mercury less than 2 µg/L (table 23). The maximum concentrations of dissolved selenium in water from wells 2 to 6 were less than the 10-µg/L limit. The median concentration of dissolved selenium in water from well 1 (table 21) was less than the limit: however, the maximum concentration (17 µg/L) exceeded the limit (table 23).

Median concentrations of dissolved iron in water from wells 2 and 3 (table 21) and all concentrations of dissolved manganese in water from all six wells (table 22) exceeded the recommended limits in the Secondary Drinking Water Regulations (U.S. Environmental Protection Agency, 1979) of 300 µg/L for iron and 50 µg/L for manganese.

All concentrations of dissolved solids were greater than 500 mg/L and all concentrations of dissolved sulfate were greater than 250 mg/L--secondary limits for public water supplies--(table 22). Other values were within the secondary limits: pH within the 6.5 to 8.5 range; dissolved chloride less than 250 mg/L, dissolved copper less than 1,000 ug/L: and dissolved zinc less than 5,000 ug/L.

Mule Creek and Outlet of East Pond

The quality of the water at Mule Creek at site A at State Highway 31 is representative of water quality for an area draining a previously mined (both surface and underground) area which is no longer being mined, has been partly reclaimed, and is being used for grazing--essentially a description of the lower Mule Creek and east and west pond areas after reclamation. (See Geographic Setting section.) Water in Mule Creek at site A generally had much less dissolved solids than at the downstream sites.

All concentrations of dissolved arsenic, cadmium, chloride, chromium, copper, lead, mercury, selenium, and zinc for the four sites on Mule Creek and the outlet of east pond to Mule Creek were within primary and secondary limits (table 23). Maximum concentrations of dissolved sulfate were within secondary limits at only two of the five sites: Mule Creek sites A and B. Maximum concentrations of dissolved iron and manganese exceeded secondary limits at all four Mule Creek sites (A-D). (See table 23.) Median values for specific conductance, and dissolved solids, calcium, magnesium, sodium, sulfate, chloride, copper, lithium, and strontium were about 2 to 3 times larger for the next downstream station (Mule Creek, site B) than for Mule Creek site A (table 21). However, median dissolved aluminum, iron, lead,

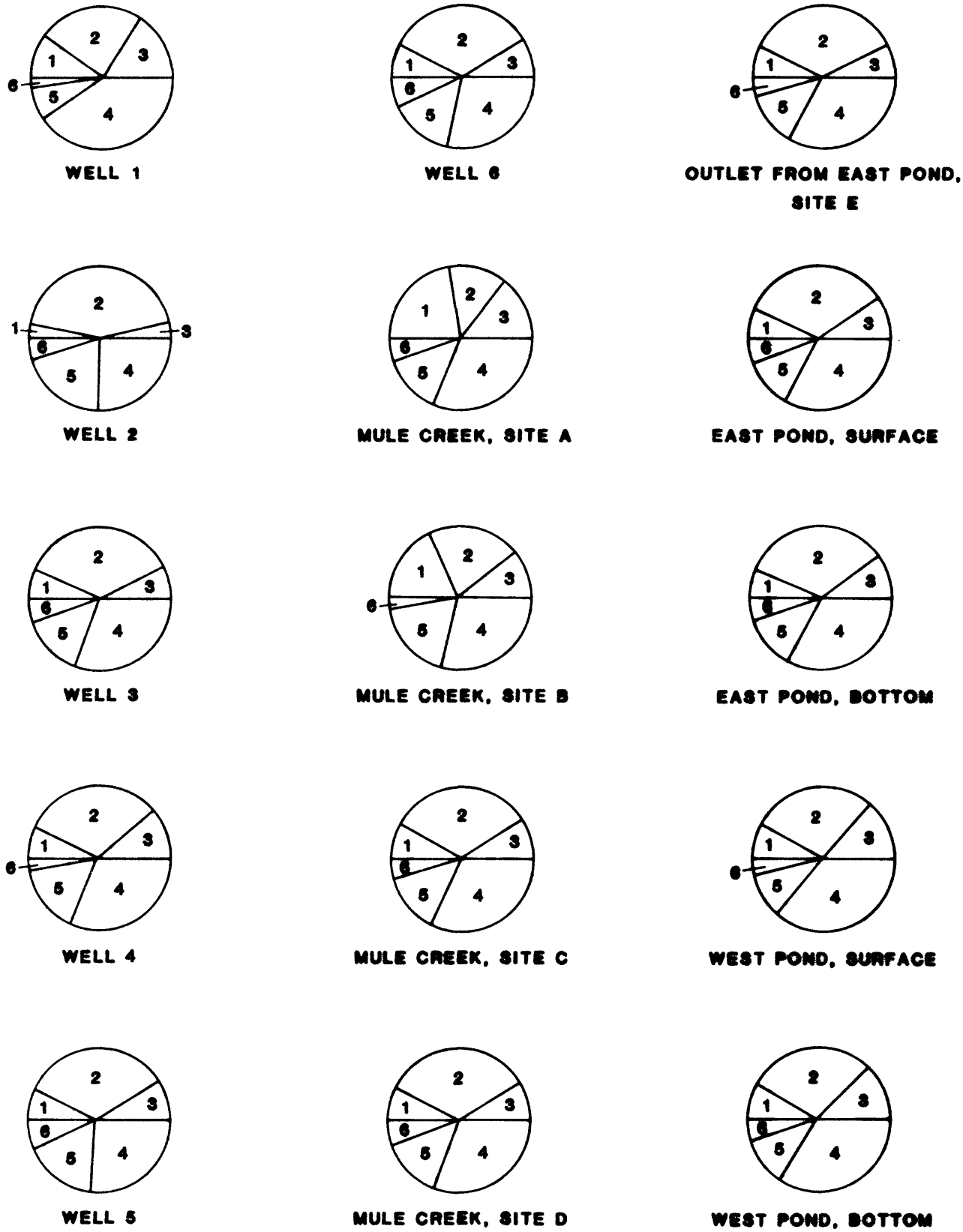
As shown in tables 1 and 21, median values for calcium, magnesium, sodium, sulfate, chloride, dissolved solids (residue), alkalinity, and specific conductance increase as Mule Creek flows downstream and drains increasing areas of the abandoned mining lands (from site A to site B to site C to site D).

The large increase in median dissolved solids (residue) between sites B and C on Mule Creek was entirely due to drainage from east pond. During base flow there was no flow at site B on Mule Creek past a shale dam; all flow at site C on Mule Creek was from east pond. During base flow, the upper 0.5 foot of east pond empties into Mule Creek. The median dissolved-solids concentration at the outlet from east pond was about 70 percent of the median dissolved-solids concentration in east pond, due to the dilution effect of Mule Creek emptying into east pond during the first run-off.

East and West Ponds

The water quality in east and west ponds was virtually the same, based on milliequivalent-percent (mean concentrations) of major ions (see fig. 10). Both ponds were sodium sulfate type and very hard alkaline waters. Both ponds had median concentrations of calcium, magnesium, sodium, sulfate, dissolved solids (residue), and alkalinity similar to those for wells 2 to 6, although the median concentrations of sodium, sulfate, dissolved solids, and alkalinity were somewhat less in west pond (table 21).

Maximum concentrations of dissolved arsenic, cadmium, chromium, lead, mercury, and selenium (table 23) in both ponds were less than limits in the Primary Drinking Water Regulations (U.S. Environmental Protection Agency, 1976). Maximum concentrations of chloride, dissolved iron, copper, and zinc were less than the limits in the Secondary Drinking Water Regulations (U.S. Environmental Protection Agency, 1979); however, median concentrations (table 21) of sulfate and dissolved solids (residue) exceeded secondary limits. Median dissolved-manganese concentrations in both ponds were less than secondary limits; median dissolved-manganese concentrations in west pond were about one-third those in east pond.



EXPLANATION

1-CALCIUM	4-SULFATE
2-SODIUM	5-BICARBONATE
3-MAGNESIUM	6-CHLORIDE

Figure 10.--Milliequivalent-percent of major ions for selected sites.

HYDROLOGIC EFFECTS OF SURFACE MINING AND RECLAMATION

Physical Changes

Surface mining for coal and subsequent reclamation in the Oklahoma coal field may cause short- and long-term changes in the hydrologic system. The following description of the coal-mining process as practiced in Oklahoma is summarized from Johnson (1974) to show how some of these changes may occur (see fig. 11).

In a surface-mining operation, first a trench or box cut is made through the overburden to expose the coal which is then removed. As each succeeding cut is made, the overburden or spoil is placed into the cut previously excavated. Successive cuts are mined until the overburden thickness becomes so great that the coal can no longer be mined profitably. The final cut leaves an open trench bounded by the last spoil pile on one side and the undisturbed highwall on the other. The ridges of spoil are graded to a rolling topography and revegetated with pasture grasses. The final cut and other depressions partly fill with water from precipitation, ground-water seepage and, if in direct contact with surface water, for example east pond, surface-water inflow. The revegetated area usually is not grazed until the grass has become well established.

The mining in any given area may not always follow the pattern outlined in the previous paragraph. For example, both underground and surface mining for coal have occurred in the McCurtain area. Also, upgradient of Mule Creek at site A the area contributing to flow (table 1) has been reclaimed and is presently used for grazing; downgradient, including sites B, C, and D along Mule Creek, and east and west pond, the area largely is unreclaimed. Furthermore, the Mule Creek and east and west pond areas were mined on successive runs from 1964 to 1968.

A readily apparent change in the hydrologic system resulting from surface mining is the creation of additional water storage in the last mine cut shown in figure 11. East pond and west pond have volumes of about 133 and 47 acre-feet, respectively. Such ponds provide habitat for aquatic and semiaquatic wildlife and could be stocked with fish as has been done in other areas of the coal field. Some fish have been observed in both ponds. Other physical changes in the hydrologic system may include (1) changes in permeability and ground water storage, and (2) changes in runoff, streamflow characteristics, and drainage patterns.

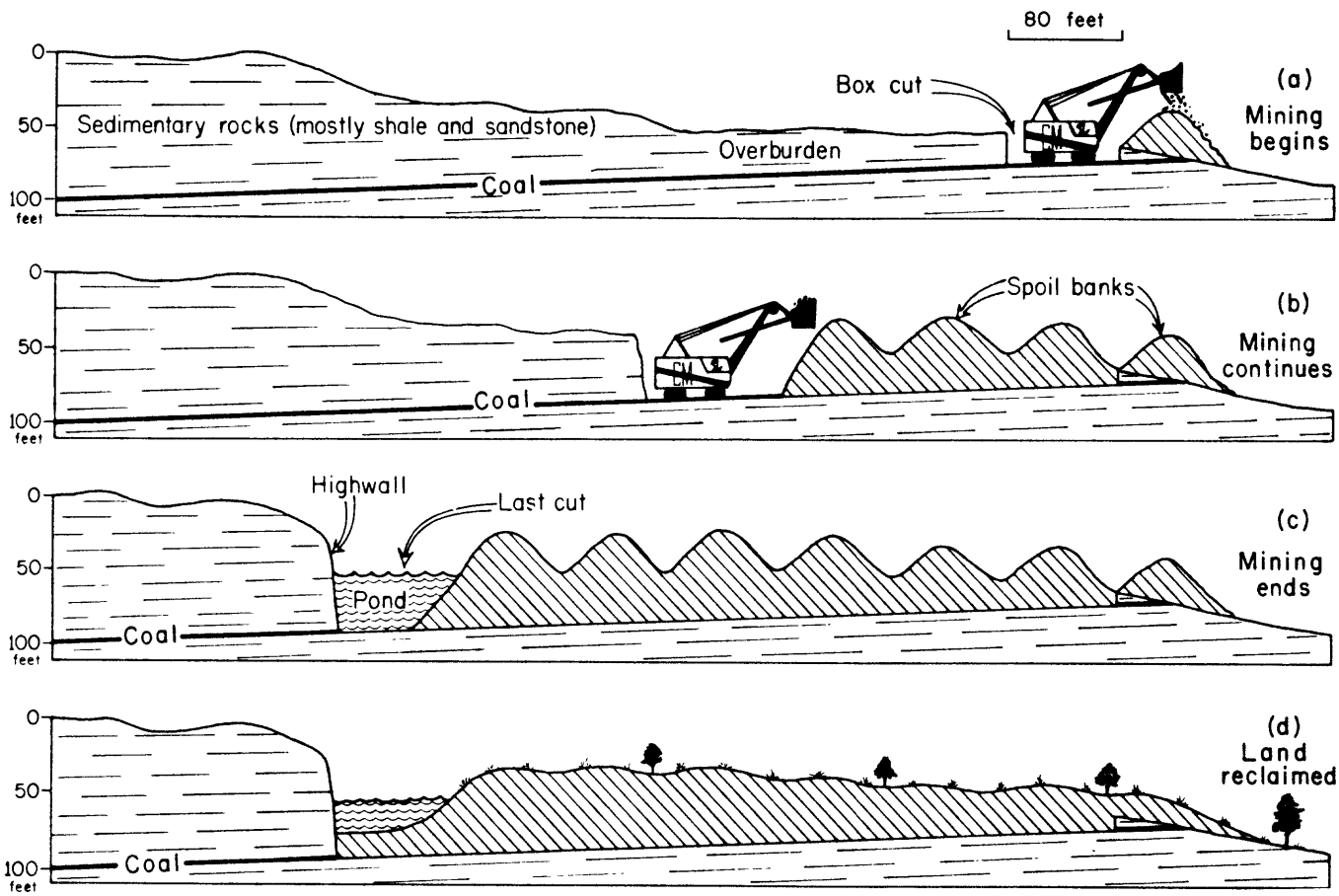


Figure 11.--Stages of surface mining of coal (from Johnson, 1974).

1. Changes in permeability and ground-water storage

Overburden in the southern part of the Oklahoma coal field consists mainly of shale with some siltstone and sandstone; these rocks have minimal porosity and permeability (Marcher and others, 1983). During mining, however, the overburden is broken and shattered to form spoil with many openings that may facilitate the entry, movement, and storage of water. Water stored in the spoil may (a) move into adjacent bedrock, (b) be slowly discharged to streams, and (c) be used by plants. During reclamation the spoil material may be compacted and thus decrease infiltration of water.

2. Changes in runoff, streamflow characteristics, and drainage patterns

Observations in various parts of the Oklahoma coal field show that if appropriate reclamation procedures are used and climatic conditions are favorable, grasses on reclaimed spoil may be more lush and have denser growth than the original native vegetation (Marcher and others, 1983). This denser plant growth tends to retard overland storm runoff so that it has more time to soak into the soil and, as a consequence, less water reaches streams during times of normally high runoff. Conversely, water stored in the spoil, under some circumstances, may be released slowly to streams thereby sustaining streamflow during dry periods. The overall resulting change in streamflow would be to decrease peak discharges and to extend periods of low flow.

Streamflow characteristics also may be affected by interception of runoff in mine ponds and depressions left in the reclaimed areas. In the McCurtain area, drainageways in parts of secs. 16, 20, 21, 22, and 29, T. 8 N., R. 22 E. have been disrupted by mining and reclamation so that some of the overland flow is intercepted before it can reach Mule Creek and, in some instances after it has reached Mule Creek. (See Geographic Setting section.) Additional interception on Mule Creek occurs because of dams created by beavers. Reclamation in the vicinity of east pond and west pond alone, because of the small area involved, likely would have little effect on runoff and streamflow characteristics. The principal drainage pattern for the area generally would be unchanged.

Chemical Changes

Minerals in the overburden and coal are in equilibrium with their environment as long as that environment is not changed. Mining and subsequent reclamation disturb that equilibrium and the minerals react with various chemical components of their new environment such as water, oxygen, and plant acids.

Sulfate is the best indicator of coal-mine drainage in the eastern Oklahoma coal field. The principal sources of sulfate include the weathering of gypsum ($CaSO_4$) and the oxidation of various iron sulfides such as pyrite (FeS_2) and marcasite (FeS_2). Iron pyrite (FeS_2) occurs naturally with coal, and along with other mining wastes is deposited in spoil piles near mining activities. Once exposed to oxygen (O_2) and water (H_2O) pyrite can be oxidized to release sulfuric acid (H_2SO_4) and ferrous sulfate ($FeSO_4$), with a corresponding decrease in pH of the solution (or increase in H^+ ions):

$$FeS_2 + \frac{7}{2} O_2 + H_2O \rightarrow Fe^{+2} + 2\ H^+ + 2\ SO_4^{-2}$$

The same reaction occurs in the interior of active and abandoned coal mines, and where coal seams crop out.

The variability of sulfate concentrations in streams draining mined areas primarily is due to the quantities of iron sulfide and calcium sulfate minerals in spoil material, the length of time of exposure of these materials to weathering, the length of time water is in contact with the spoils, and the quantity of water leaving the mined areas. As shown in figure 12, concentrations are greatest during low flow, when contact time with spoil has been fairly long and water draining from spoil material may constitute a significant part of the flow. Sulfate concentrations are less during high flow when contact time is short and dilution occurs.

Median sulfate concentrations at sites A, B, C, and D on Mule Creek ranged from 26 to 260 mg/L and increased with increased area of unreclaimed surface-mined areas drained (fig. 5, table 1). The median sulfate concentration in Mule Creek at site A where it drains the reclaimed area is less than one-third of that in Mule Creek at site B, the next site downstream where the stream drains about 159 acres of unreclaimed surface-mined lands (table 1). The range of sulfate concentrations in Mule Creek at sites C and D is similar to the concentration in Mule Creek at site F about 1 mile northwest (downgradient)--where streamflow consists of mine drainage and runoff from areas affected by surface mining of coal (fig. 5, table 24). Mine drainage in the McCurtain area contains sulfate concentrations (1,040 mg/L, site G: and 1,370 mg/L, site I) exceeding the maximum determined in Mule Creek (940 mg/L, site C: and 980 mg/L, site D): the sulfate concentration of 1,450 mg/L in settling-pond overflow, site J, exceeded the maximum for Mule Creek by about 50 percent. The sulfate concentration in settling-pond overflow, site J, was about 28 times larger than the maximum sulfate concentration in Mule Creek at site A draining the reclaimed area.

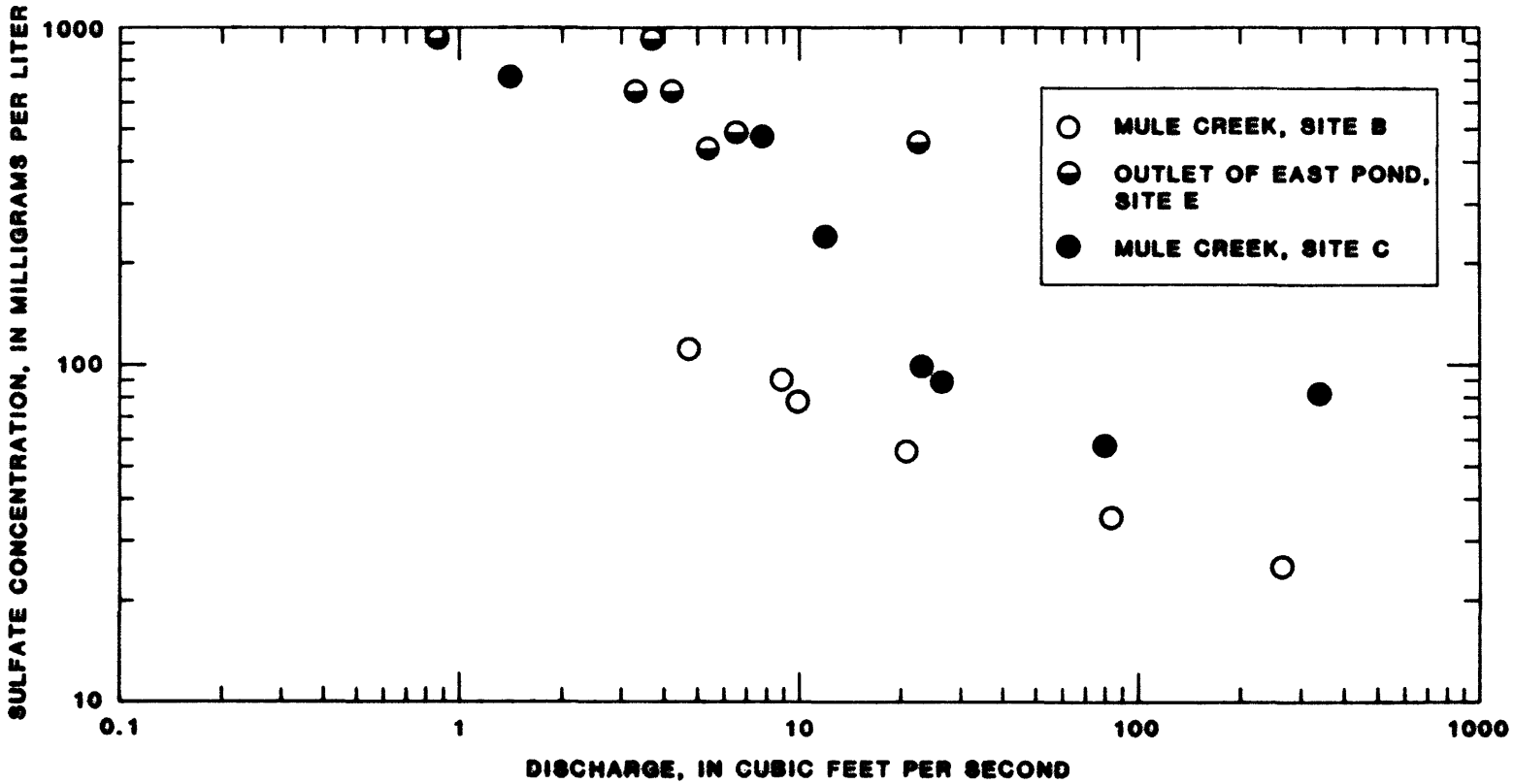


Figure 12.--Relationship between sulfate concentration and discharge.

If the study area were reclaimed, the quality of water in Mule Creek would improve to a limited extent. Based on the water quality in Mule Creek at site A, maximum and median concentrations of sulfate and dissolved solids (which are directly proportional to sulfate concentrations) would be decreased, perhaps to within secondary limits for drinking water. Maximum and median specific conductance and concentrations of calcium, magnesium, sodium, chloride and alkalinity, which increase with drainage from increasing areas of abandoned coal-mine lands, would be decreased.

The small (about 100 mg/L) sulfate concentration in Club Lake (site H, fig. 5) likely represents the optimum concentration after reclamation for area mine ponds and lakes not in direct contact with coal beds or spoil piles. After reclamation, however, sulfate concentrations and concentrations of most other water-quality constituents likely would be virtually unchanged in east and west ponds, which are in direct hydraulic contact with coal beds as well as the spoil piles.

Similarly, the ground water also is in direct contact with coal beds and after reclamation likely would have sulfate concentrations and water quality characteristics that were about the same as prior to reclamation.

On the basis of taste and laxative effects, the recommended maximum limit for sulfate is 250 mg/L in waters intended for human consumption in areas where sources with less sulfate concentrations are or can be made available (U.S. Environmental Protection Agency, 1979). Acclimation to sulfate is rapid and many people can drink water with as much as 600 mg/L of sulfate and not experience any laxative effects (Peterson, 1951).

The pH of a solution is an indicator of how acidic or alkaline a solution is. A pH of 7.0 indicates neutral water. The greater the pH (more than 7.0), the more alkaline a solution is: the lesser the pH (less than 7.0), the more acidic. Common vinegar has a pH of 2.4 to 3.4: sea water, about 8; saturated lime, 12.4. In natural water, the pH usually is within the range of 6.0 to 8.5, depending on the equilibrium between chemical species dissolved in the water (Hem, 1970).

The net result of the pyrite-oxidation equation is that two molecules of sulfuric acid are released for each molecule of the original pyrite dissolved. However, most ground and surface water in the Oklahoma coal field has a pH greater than 7.0 (alkaline) because of the buffering (neutralizing) effect of the carbonate-bearing minerals such as siderite, calcite, and ankerite which commonly occur in large quantities in spoil in parts of the area. Where the minerals are part of the spoil, acidic mine drainage is neutralized rapidly. In the McCurtain area, spoils contain large quantities of hydroxide-bearing minerals such as kaolinite and chlorite (table 3). Although a calcareous layer is exposed in the McCurtain area (T. 8 N., R. 22 E., Oakes and Knechtel, 1948, p.32), little calcareous material was detected in the spoil pile analyses (table 3). Therefore, the neutralization of acidic mine drainage in the McCurtain area is more likely to be caused by interaction with hydroxides than carbonates.

Consequently, in both the immediate project area and generally in the entire Oklahoma coal field, pH is not a good indicator, on an areal basis, of the effect on water quality by discharge from abandoned or reclaimed coal mine lands. In fact, unlike many areas of the country that have reported an acid-mine-drainage problem associated with surface mining, water in Mule Creek at site A draining the reclaimed area has a smaller minimum pH--6.5 versus 7.2--and median pH--6.7 versus 7.6 to 7.8--than water from the unreclaimed areas (tables 21 and 22). Not only is this true for the project area, but it generally is true for the entire Oklahoma coal field. However, a pH of 3.0 to 4.0 has been reported (Doerr, 1961) in drainage from a few isolated strip pits in the State.

Iron and manganese are common components of rocks and soils and, in water may originate from leaching of rocks and minerals. Other sources of these elements in water include industrial wastes, municipal wastes, corroded metal, and acid mine drainage.

Total-iron and total-manganese concentrations less than 1,000 µg/L (micrograms per liter) are nontoxic to freshwater aquatic life (U.S. Environmental Protection Agency, 1976b, p. 80, and McKee and Wolf, 1963, p. 215) and are essential to certain physiological functions of aquatic life. The maximum dissolved-iron and dissolved-manganese concentration limits, 300 and 50 µg/L, respectively, recommended for drinking water by the U.S. Environmental Protection Agency (1976b and 1979) are intended to prevent objectionable tastes and to minimize staining of clothing and plumbing. Iron can impart a bittersweet astringent taste detectable by some persons at concentrations greater than 1,000 or 2,000 µg/L (American Public Health Association and others, 1976, p. 207).

Maximum concentrations of total iron and manganese for Mule Creek generally increased with increased drainage from unreclaimed areas. The large maximum total-iron (1,900 µg/L) and manganese (120 µg/L) concentrations in Mule Creek at site A indicate that even if the east pond-west pond area were reclaimed, large iron and manganese concentrations exceeding secondary drinking water limits would occur occasionally downstream. In fact, the maximum total-iron concentration for the reclaimed area was greater than three times the 600 µg/L concentration (J.P. Savage, Lone Star Steel Co., written commun., 1978) in Mule Creek at site F (fig. 5) downstream of the Starlight Mine.

SUMMARY

Bedrock in the McCurtain area is shale, siltstone, sandstone, and coal. Water-table conditions exist in bedrock and spoil in the area. Mine pond water is in direct hydraulic connection with water in the spoil piles and the underlying Hartshorne Sandstone. Surface and ground waters in the abandoned coal-mining area predominantly are a sodium sulfate type and moderately hard to very hard alkaline waters. Properties and constituent concentrations in surface and ground waters, except for dissolved solids, iron, manganese, and sulfate, generally do not exceed drinking-water limits.

Sulfate is the best indicator of the presence of coal-mine drainage in both surface and ground water in the Oklahoma coal field. Median sulfate concentrations for four sites on Mule Creek ranged from 26 to 260 milligrams per liter. Median sulfate concentrations increased with increased drainage from unreclaimed mined areas. The median sulfate concentration in Mule Creek where it drains the reclaimed area is less than one-third of that at the next site downstream where the stream begins to drain abandoned (unreclaimed) mine lands.

Reclamation likely would result in decreased concentrations of dissolved solids, calcium, magnesium, sodium, sulfate, and alkalinity in Mule Creek in the vicinity of the reclaimed area. However, the quality of the ground water and the quality of water in the mine ponds that are in direct hydraulic connection with the ground water are unlikely to be changed by reclamation.

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DATE	ALKA-LINITY LAB (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SODIUM, DIS-SOLVED (MG/L AS NA)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)
JAN , 1981												
27...	650	120	21	.6	795	--	120	6.2	12	590	2230	2364
APR												
06...	540	210	27	.3	1267	730	180	6.7	46	590	3670	3289
MAY												
06...	560	220	20	.2	1457	900	220	6.8	10	660	3970	3774
JUN												
23...	200	210	7.5	.2	1432	1200	220	5.2	4.9	600	4200	3571
SEP												
10...	500	190	21	.4	1299	800	200	6.6	12	630	3460	3263
DEC												
02...	420	210	11	.3	1390	970	210	5.8	8.5	560	3510	3361
MAR , 1982												
24...	250	270	6.1	.3	1953	1700	310	5.5	5.2	690	4810	4540
JUN												
23...	242	160	26	.3	1101	860	170	4.1	4.5	420	2860	2632
DEC												
01...	227	230	4.7	.3	1646	1400	260	4.7	4.1	430	3610	3272

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DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	PERCENT SODIUM	PH (STAND-ARD UNITS)	POTAS-SIUM 40 DIS-SOLVED (PCI/L AS K40)	SODIUM AD-SORP-TION RATIO	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COPPER, DIS-SOLVED (UG/L AS CU)
JAN , 1981												
27...	1100	62	6.8	4.6	9.3	3420	8	3	10	0	0	6
APR												
06...	1900	50	7.2	5.0	7.4	3590	10	4	0	2	20	1
MAY												
06...	2300	50	--	5.1	7.7	--	--	--	--	--	--	--
JUN												
23...	2400	48	7.2	3.9	7.0	--	230	0	0	4	10	4
SEP												
10...	1900	51	7.4	--	7.8	4000	0	4	0	0	0	0
DEC												
02...	2100	47	6.9	--	6.7	4200	10	2	<10	<1	<10	<1
MAR , 1982												
24...	3100	43	6.8	--	6.9	4700	60	1	--	1	10	1
JUN												
23...	1700	45	7.4	--	5.6	3000	30	1	<10	<1	<10	1
DEC												
01...	2200	36	7.6	--	4.7	3900	20	1	<10	1	<10	4

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DATE	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)
JAN , 1981											
27...	450	2	20	3100	.3	0	4	0	800	3.0	30
APR											
06...	190	6	30	3300	.0	0	6	0	1400	2.0	40
JUN											
23...	400	6	90	1100	.0	3	8	2	1500	1.0	300
SEP											
10...	190	2	40	1200	.0	1	4	1	1300	4.0	10
DEC											
02...	50	2	50	2400	.1	<1	7	1	1100	3.0	20
MAR , 1982											
24...	170	2	90	1400	<.1	1	5	5	1800	1.0	10
JUN											
23...	30	<1	70	610	<.1	1	2	5	990	1.2	10
DEC											
01...	40	1	90	290	.2	<1	<1	17	1400	1.3	40

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DATE	ALKA-LINITY LAB (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SODIUM, DIS-SOLVED (MG/L AS NA)
DEC , 1980										
23...	460	70	170	.4	361	--	45	5.7	13	520
FEB , 1981										
20...	610	22	95	.7	91	--	8.6	2.4	11	680
APR										
08...	580	19	72	.6	74	.00	6.5	1.7	47	600
MAY										
06...	590	19	86	.6	86	.00	9.2	2.2	9.7	610
JUN										
23...	570	16	78	.5	66	.00	6.3	1.5	11	580
SEP										
09...	520	42	71	.6	216	.00	27	2.2	13	380
DEC										
02...	590	16	96	.7	60	.00	4.7	1.5	11	620
MAR , 1982										
23...	560	18	84	.6	77	.00	7.6	1.6	10	550
JUN										
23...	493	54	150	.5	312	.00	43	2.2	12	460
SEP										
02...	514	33	84	.5	161	.00	19	2.5	8.8	560
DEC										
01...	593	15	110	.6	66	.00	6.8	1.8	9.5	670

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DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SULFATE DIS-SOLVED (MG/L AS SO4)	PERCENT SODIUM	PH (STAND-ARD UNITS)	POTAS-SIUM 40 DIS-SOLVED (PCI/L AS K40)	SODIUM AD-SORP-TION RATIO	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)
DEC , 1980										
23...	1880	1790	690	75	7.8	--	12	2060	--	--
FEB , 1981										
20...	1880	2026	840	94	8.0	1.8	32	2800	20	4
APR										
08...	1770	1746	650	94	7.7	1.3	31	2300	120	4
MAY										
06...	1920	1821	730	94	--	1.6	30	--	--	--
JUN										
23...	1690	1656	620	95	7.9	1.1	32	2500	190	0
SEP										
09...	1280	1299	450	79	7.5	--	12	2000	10	3
DEC										
02...	1720	1784	680	96	7.4	--	36	2800	10	2
MAR , 1982										
23...	1640	1599	590	94	7.4	--	28	7600	20	2
JUN										
23...	1680	1660	640	76	7.1	--	12	3300	370	1
SEP										
02...	1780	1748	730	88	7.2	--	20	3300	340	2
DEC										
01...	2040	1990	820	96	8.0	--	37	3100	90	2

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DATE	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)
FEB , 1981										
20...	0	0	0	0	130	3	60	310	.0	4
APR										
08...	0	3	20	6	320	23	60	310	.1	0
JUN										
23...	0	1	10	6	710	1	60	230	.0	6
SEP										
09...	<1	<1	0	1	20	3	42	810	.1	<10
DEC										
02...	<10	<1	<10	<1	40	1	50	180	.3	1
MAR , 1982										
23...	<10	2	<10	3	1300	1	50	180	.4	1
JUN										
23...	<10	1	<10	6	30	<1	40	1700	.1	<1
SEP										
02...	<10	<1	10	1	1000	<1	60	610	<.1	11
DEC										
01...	<10	<1	<10	1	470	<1	60	260	.1	<1

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DATE	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)
DEC , 1980					
23...	--	--	480	--	--
FEB , 1981					
20...	0	0	260	1.0	20
APR					
08...	13	0	220	2.0	10
MAY					
06...	--	--	250	--	--
JUN					
23...	2	0	220	3.0	20
SEP					
09...	0	0	300	2.0	4
DEC					
02...	<1	<1	190	2.0	10
MAR , 1982					
23...	2	<1	240	2.0	20
JUN					
23...	8	<1	350	<1.0	80
SEP					
02...	2	<1	280	<1.0	20
DEC					
01...	<1	<1	200	14	40

350941094590301 - WELL 3

DATE	ALKA-LINITY LAB (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SODIUM, DIS-SOLVED (MG/L AS NA)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)
FEB , 1981												
18...	460	62	89	.4	328	--	42	2.2	6.9	530	1910	1959
APR												
08...	350	67	90	.4	337	.00	41	2.3	6.3	540	1940	1898
MAY												
06...	440	64	76	.4	178	.00	4.2	2.3	5.5	600	1870	1877
JUL												
09...	440	76	94	.4	392	.00	49	2.4	7.4	460	1810	1795
SEP												
09...	430	75	60	.5	443	13	62	2.6	5.5	510	2050	1975
DEC												
03...	380	76	120	.4	405	25	52	2.5	7.0	460	1720	1757
MAR , 1982												
23...	320	77	130	.5	424	100	56	2.4	6.9	460	1740	1806
JUN												
23...	451	70	120	.4	377	.00	49	2.2	8.6	450	1690	1682
SEP												
02...	443	73	160	.4	381	.00	48	2.3	7.1	500	1810	1838
DEC												
01...	418	92	30	.4	568	150	82	2.1	12	240	1300	1374

350941094590301 - WELL 3

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	PERCENT SODIUM	PH (STAND-ARD UNITS)	POTAS-SIUM 40 DIS-SOLVED (PCI/L AS K40)	SODIUM AD-SORP-TION RATIO	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COPPER, DIS-SOLVED (UG/L AS CU)
FEB , 1981												
18...	950	78	7.4	1.6	13	2760	0	2	0	0	0	0
APR												
08...	940	78	7.5	1.7	13	2500	40	2	0	1	10	0
MAY												
06...	860	88	--	1.7	21	--	--	--	--	--	--	--
JUL												
09...	840	72	7.5	1.8	10	2500	20	2	0	1	10	3
SEP												
09...	1000	71	7.6	--	11	2800	0	1	0	0	0	1
DEC												
03...	810	71	7.5	--	10	2700	10	2	<10	<1	<10	<1
MAR , 1982												
23...	880	70	7.2	--	10.0	2700	30	1	<10	1	<10	1
JUN												
23...	710	72	7.0	--	10	2400	20	2	<10	<1	<10	<1
SEP												
02...	780	74	7.0	--	11	3000	<10	1	<10	<1	10	1
DEC												
01...	660	48	8.0	--	4.5	3000	<10	2	<10	<1	<10	<1

350941094590301 - WELL 3

DATE	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)
FEB , 1981											
18...	290	2	80	300	.0	2	2	0	530	1.0	20
APR											
08...	450	4	80	340	.1	0	5	0	560	1.0	20
JUL											
09...	410	2	90	550	.0	10	1	0	630	1.0	50
SEP											
09...	480	2	90	340	.0	1	1	0	550	.0	10
DEC											
03...	530	1	80	540	<.1	1	4	<1	550	1.0	10
MAR , 1982											
23...	30	1	70	770	<.1	1	2	<1	590	2.0	10
JUN											
23...	20	<1	70	930	<.1	<1	1	<1	520	<1.0	20
SEP											
02...	80	2	70	560	<.1	<1	3	<1	600	<1.0	10
DEC											
01...	1200	<1	40	3400	.3	<1	1	<1	640	3.2	30

350941094590601 - WELL 4

DATE	ALKALINITY LAB (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	MAGNESIUM, DISSOLVED (MG/L AS MG)	POTASSIUM, DISSOLVED (MG/L AS K)	SILICA, DISSOLVED (MG/L AS SIO2)	SODIUM, DISSOLVED (MG/L AS NA)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)
APR , 1981												
07...	530	80	46	.7	489	.00	70	2.0	18	330	1450	1426
MAY												
06...	640	120	30	.6	753	110	110	2.7	12	610	2570	2570
JUL												
09...	390	69	53	.5	420	30	60	1.9	19	330	1400	1419
SEP												
10...	550	86	36	1.0	565	15	85	1.6	11	500	2090	2032
MAR , 1982												
24...	590	95	29	.9	650	60	100	1.8	10	560	2380	2352
JUN												
23...	610	89	28	.9	602	.00	92	2.1	11	570	2350	2360
SEP												
01...	710	74	60	.9	482	.00	72	1.5	11	480	1820	1826
DEC												
01...	352	89	33	.8	610	260	94	2.0	11	450	1970	1992

350941094590601 - WELL 4

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	PERCENT SODIUM	PH (STAND-ARD UNITS)	POTAS-SIUM 40 DIS-SOLVED (PCI/L AS K40)	SODIUM AD-SORP-TION RATIO	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COPPER, DIS-SOLVED (UG/L AS CU)
APR , 1981												
07...	560	59	7.0	1.5	6.6	2010	0	1	0	1	20	1
MAY												
06...	1300	64	--	2.0	9.9	--	--	--	--	--	--	--
JUL												
09...	650	63	7.2	1.4	7.2	2125	20	1	0	2	10	6
SEP												
10...	980	66	7.4	--	9.3	3150	70	1	0	0	0	2
MAR , 1982												
24...	1200	65	7.0	--	9.7	3200	30	1	<10	2	<10	3
JUN												
23...	1200	67	7.3	--	10	2700	20	<1	<10	2	<10	4
SEP												
01...	700	68	--	--	9.7	3000	<10	<1	<10	1	10	3
DEC												
01...	1100	62	7.3	--	8.1	2800	50	1	<10	<1	<10	2

350941094590601 - WELL 4

DATE	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)
APR , 1981											
07...	30	4	30	910	.5	5	6	0	450	.0	30
JUL											
09...	20	3	40	760	.2	6	2	0	430	3.0	40
SEP											
10...	100	0	20	620	.3	1	4	0	500	2.0	20
MAR , 1982											
24...	70	2	30	510	.4	2	4	<1	560	2.0	10
JUN											
23...	30	3	20	470	<.1	1	3	<1	520	2.9	20
SEP											
01...	20	<1	20	680	.6	<1	3	<1	410	<1.0	10
DEC											
01...	30	<1	40	480	.1	<1	2	4	630	2.0	20

350939094590501 - WELL 5

DATE	ALKA-LINITY LAB (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SODIUM, DIS-SOLVED (MG/L AS NA)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)
JAN , 1981												
28...	420	60	42	.4	344	--	47	1.6	11	400	1390	1535
FEB												
19...	470	71	49	.5	408	--	56	1.5	9.1	440	1740	1790
APR												
08...	460	71	44	.6	367	.00	46	1.8	39	440	1620	1639
MAY												
06...	460	71	44	.5	408	.00	56	1.4	10	420	1910	1699
JUL												
09...	420	74	66	.5	395	.00	51	1.5	10	440	1750	1696
SEP												
09...	470	71	50	.7	408	.00	56	1.4	10	430	1730	1682
DEC												
02...	480	77	64	.6	428	.00	57	1.7	11	460	1740	1830
MAR , 1982												
23...	410	65	55	.6	365	.00	49	1.6	8.8	400	1520	1537
JUN												
24...	455	81	54	.6	483	27	68	2.2	11	450	1790	1791
SEP												
01...	568	77	68	.7	440	.00	60	2.6	11	450	1720	1732
DEC												
01...	492	56	93	.7	326	.00	45	1.8	11	440	1620	1625

350939094590501 - WELL 5

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	PERCENT SODIUM	PH (STAND-ARD UNITS)	POTAS-SIUM 40 DIS-SOLVED (PCI/L AS K40)	SODIUM AD-SORP-TION RATIO	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COPPER, DIS-SOLVED (UG/L AS CU)
JAN , 1981												
28...	720	72	7.5	1.2	9.6	2500	80	1	0	0	0	2
FEB												
19...	880	70	7.4	1.1	9.7	2530	0	1	0	1	0	0
APR												
08...	720	72	7.6	1.3	10	2250	50	1	0	1	10	0
MAY												
06...	820	69	--	1.0	9.3	--	--	--	--	--	--	--
JUL												
09...	800	71	7.1	1.1	9.9	2450	20	0	0	2	0	5
SEP												
09...	780	70	7.6	--	9.5	2450	10	1	0	0	0	1
DEC												
02...	870	70	7.0	--	9.9	2500	<10	1	<10	<1	<10	<1
MAR , 1982												
23...	710	70	7.4	--	9.3	2370	30	1	<10	1	<10	1
JUN												
24...	850	67	7.3	--	9.1	2300	30	2	<10	<1	<10	<1
SEP												
01...	720	69	--	--	9.6	2900	70	3	<10	1	10	1
DEC												
01...	680	75	7.3	--	11	2400	50	2	<10	<1	<10	<1

350939094590501 - WELL 5

DATE	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)
JAN , 1981											
28...	100	3	50	460	.1	0	1	0	400	8.0	20
FEB											
19...	20	1	50	290	.0	2	2	0	510	1.0	20
APR											
08...	200	3	50	220	.0	0	4	0	530	.0	30
JUL											
09...	40	1	60	170	.0	20	0	0	600	2.0	20
SEP											
09...	70	5	50	270	.0	1	2	0	420	1.0	20
DEC											
02...	10	<1	60	230	.1	<1	2	<1	470	1.0	20
MAR , 1982											
23...	30	<1	40	310	<.1	2	2	<1	460	1.0	30
JUN											
24...	80	1	40	950	<.1	2	3	<1	540	<1.0	30
SEP											
01...	300	2	40	1700	<.1	7	4	<1	490	<1.0	10
DEC											
01...	1100	1	50	930	<.1	<1	<1	<1	450	31	50

350938094591201 - WELL 6

DATE	ALKA-LINITY LAB (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SODIUM, DIS-SOLVED (MG/L AS NA)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)
MAR , 1981												
02...	420	78	120	.4	434	--	58	2.3	5.7	460	1780	1821
APR												
07...	430	79	110	.4	424	.00	55	2.3	6.0	450	1800	1731
JUL												
09...	460	92	120	.4	506	46	67	2.5	6.4	440	1810	1845
DEC												
03...	380	93	170	.4	509	130	67	2.5	6.0	420	1680	1758
MAR , 1982												
24...	290	37	23	.4	187	.00	23	1.5	14	220	815	855
JUN												
24...	280	26	6.5	.4	127	.00	15	1.2	14	200	679	702
SEP												
01...	363	100	190	.4	531	170	68	2.5	6.3	470	1970	1906

350938094591201 - WELL 6

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	PERCENT SODIUM	PH (STAND-ARD UNITS)	POTAS-SIUM 40 DIS-SOLVED (PCI/L AS K40)	SODIUM AD-SORP-TION RATIO	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COPPER, DIS-SOLVED (UG/L AS CU)
MAR , 1981												
02...	840	70	7.4	1.7	9.8	2600	30	0	0	3	0	2
APR												
07...	770	70	7.4	1.7	9.7	2500	0	0	0	1	10	1
JUL												
09...	840	65	7.5	1.9	8.7	2500	10	0	0	1	10	3
DEC												
03...	770	64	7.1	--	8.3	2550	10	1	<10	<1	<10	<1
MAR , 1982												
24...	360	72	6.8	--	7.2	1700	40	1	2	<1	<10	<1
JUN												
24...	270	77	7.2	--	7.9	1300	10	<1	1	<1	<10	<1
SEP												
01...	850	66	7.2	--	9.1	3300	<10	<1	<10	<5	<10	5

350938094591201 - WELL 6

DATE	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)
MAR , 1981											
02...	3600	0	90	190	.0	1	3	0	570	1.0	80
APR											
07...	60	4	70	220	.1	0	14	0	630	1.0	10
JUL											
09...	160	3	90	250	.0	7	1	0	740	2.0	20
DEC											
03...	<10	1	70	240	<.1	<1	4	<1	570	2.0	10
MAR , 1982											
24...	1300	<1	38	730	<.1	<1	<1	<1	250	<1.0	4
JUN											
24...	19	<1	30	600	<.1	<1	1	<1	180	<1.0	34
SEP											
01...	60	10	80	760	<.1	<1	5	<1	740	<1.0	10

07245580 - MULE CREEK, SITE A

DATE	ALKALINITY LAB (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	HARDNESS (MG/L AS CACO3)	HARDNESS NONCARBONATE (MG/L AS CACO3)	MAGNESIUM, DISSOLVED (MG/L AS MG)	POTASSIUM, DISSOLVED (MG/L AS K)	SILICA, DISSOLVED (MG/L AS SIO2)	SODIUM, DISSOLVED (MG/L AS NA)
MAR , 1981										
04...	10	10	2.6	.1	37	--	3.0	1.7	8.1	4.7
APR										
23...	21	14	3.1	.1	62	41	6.5	2.3	6.8	8.7
MAY										
12...	17	11	2.8	.0	45	28	4.2	1.7	8.7	5.4
FEB , 1982										
02...	13	8.0	3.6	.2	34	21	3.5	2.2	7.3	4.5
MAY										
13...	14	4.2	1.5	.1	18	4.0	1.7	2.0	4.9	2.3

DATE	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SULFATE DISSOLVED (MG/L AS SO4)	PERCENT SODIUM	PH (STANDARD UNITS)	POTASSIUM 40 DISSOLVED (PCI/L AS K40)	SODIUM ADSORPTION RATIO	SPECIFIC CONDUCTANCE (UMHOS)	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)
MAR , 1981										
04...	68	62	25	21	6.5	1.3	.3	87	90	0
APR										
23...	134	107	52	23	--	1.7	.5	275	10	0
MAY										
12...	95	86	42	20	6.6	1.3	.4	400	10	1
FEB , 1982										
02...	70	63	26	21	6.8	--	.3	130	60	<1
MAY										
13...	53	32	7.0	20	7.6	--	.2	80	120	1

07245580 - MULE CREEK, SITE A

DATE	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)
MAR , 1981										
04...	<1	<1	0	4	270	0	<4	50	.1	<10
APR										
23...	<1	2	10	3	450	3	8	100	.2	<10
MAY										
12...	<1	<1	0	1	90	2	<4	40	.1	<10
FEB , 1982										
02...	<1	<1	<10	1	130	1	<4	56	<.1	<10
MAY										
13...	<3	<3	<10	1	220	2	<12	37	<.1	<1

DATE	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)	ALUM-INUM, TOTAL RECOV-ERABLE (UG/L AS AL)	ARSENIC TOTAL (UG/L AS AS)	BERYL-LIUM, TOTAL RECOV-ERABLE (UG/L AS BE)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)
MAR , 1981										
04...	4	0	30	2.0	30	870	1	0	0	0
APR										
23...	6	0	50	1.0	30	520	1	0	0	10
MAY										
12...	2	0	40	1.0	50	490	1	0	1	10
FEB , 1982										
02...	<1	<1	30	.0	8	1000	1	<10	<1	10
MAY										
13...	2	<1	20	1.0	<12	1500	1	<10	<1	10

07245580 - MULE CREEK, SITE A

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LITHIUM TOTAL RECOV-ERABLE (UG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MOLYB-DENUM, TOTAL RECOV-ERABLE (UG/L AS MO)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)
MAR , 1981										
04...	7	1900	7	10	90	.2	1	3	1	210
APR										
23...	7	1800	11	0	120	.2	74	9	0	30
MAY										
12...	4	1100	2	0	50	.1	4	0	0	20
FEB , 1982										
02...	1	1300	<1	<10	80	.1	<1	4	<1	20
MAY										
13...	9	1800	9	<10	90	.1	<1	7	<1	30

07245590 - MULE CREEK, SITE B

DATE	ALKA-LINITY LAB (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SODIUM, DIS-SOLVED (MG/L AS NA)
DEC , 1980										
11...	110	27	10	.2	134	--	16	2.5	6.7	49
JAN , 1981										
22...	85	37	10	.3	191	--	24	2.2	2.9	64
MAR										
02...	53	18	5.1	.2	86	--	10	2.2	7.3	28
APR										
23...	66	22	4.5	.2	104	39	12	2.5	5.1	32
MAY										
11...	46	21	4.3	.1	84	38	7.6	2.2	7.7	22
SEP										
01...	140	36	8.7	.5	177	37	21	2.8	4.8	67
OCT										
14...	53	18	3.8	.2	94	41	12	4.0	5.5	21
FEB , 1982										
02...	41	12	4.6	.1	58	17	6.9	2.7	6.9	16
MAY										
01...	21	7.9	2.7	.2	32	11	2.9	2.5	5.6	6.1
NOV										
30...	103	25	6.2	.2	124	22	15	2.8	6.8	45
DEC										
03...	30	8.2	2.5	.1	34	4.0	3.2	3.0	7.0	6.2
FEB , 1983										
01...	28	8.9	3.9	<.1	40	12	4.2	2.1	7.0	10

07245590 - MULE CREEK, SITE B

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SULFATE DIS-SOLVED (MG/L AS SO4)	PERCENT SODIUM	PH (STAND-ARD UNITS)	POTAS-SIUM 40 DIS-SOLVED (PCI/L AS K40)	SODIUM AD-SORP-TION RATIO	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)
DEC , 1980										
11...	299	308	130	44	8.8	1.9	1.9	--	50	1
JAN , 1981										
22...	409	432	240	42	7.9	1.6	2.1	554	8	1
MAR										
02...	194	191	88	41	7.4	1.6	1.3	313	100	0
APR										
23...	232	211	93	39	--	1.9	1.4	3900	20	0
MAY										
11...	149	162	69	36	7.5	1.6	1.1	500	40	1
SEP										
01...	408	405	180	45	7.8	--	2.3	636	20	1
OCT										
14...	183	174	78	31	7.2	--	1.0	287	20	1
FEB , 1982										
02...	131	129	55	36	7.3	--	.9	230	90	<1
MAY										
01...	61	64	23	28	7.3	--	.5	120	260	1
NOV										
30...	259	273	110	43	7.6	--	1.8	510	80	1
DEC										
03...	72	74	25	26	7.6	--	.5	150	200	1
FEB , 1983										
01...	81	88	35	34	7.7	--	.7	165	210	<1

07245590 - MULE CREEK, SITE B

DATE	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)
DEC , 1980										
11...	<1	2	0	1	30	2	20	40	.0	<10
JAN , 1981										
22...	<1	<1	0	0	10	1	20	30	.0	<10
MAR										
02...	<1	<1	0	2	90	0	10	50	.1	<10
APR										
23...	<1	<1	0	2	180	0	10	40	.3	<10
MAY										
11...	<1	<1	10	2	70	3	4	30	.3	<10
SEP										
01...	<1	<1	0	3	<10	1	20	2	.0	<10
OCT										
14...	1	<1	0	1	40	1	10	38	.0	<10
FEB , 1982										
02...	<1	<1	<10	1	100	1	10	70	<.1	<10
MAY										
01...	<3	<3	<10	2	390	2	<12	51	<.1	<1
NOV										
30...	<1	<1	<10	<1	64	<1	23	81	<.1	<1
DEC										
03...	1	<1	<10	2	250	<1	<4	7	<.1	<1
FEB , 1983										
01...	<1	<1	<10	2	260	<1	9	42	.5	<1

07245590 - MULE CREEK, SITE B

DATE	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)	ALUM-INUM, TOTAL RECOV-ERABLE (UG/L AS AL)	ARSENIC TOTAL (UG/L AS AS)	BERYL-LIUM, TOTAL RECOV-ERABLE (UG/L AS BE)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)
DEC , 1980										
11...	0	0	180	1.0	10	630	1	0	0	0
JAN , 1981										
22...	0	0	200	.0	7	130	1	0	0	10
MAR										
02...	4	0	110	1.0	20	610	0	0	0	0
APR										
23...	3	0	130	1.0	10	620	0	0	0	30
MAY										
11...	2	0	80	.0	10	390	1	0	1	0
SEP										
01...	3	0	210	.0	4	140	1	0	0	10
OCT										
14...	2	0	85	1.0	3	660	2	<10	0	0
FEB , 1982										
02...	<1	<1	64	.0	8	1000	<1	<10	<1	10
MAY										
01...	3	<1	32	1.0	27	2400	1	<10	1	<10
NOV										
30...	<1	<1	150	<1.0	5	670	1	<10	<1	<10
DEC										
03...	<1	<1	36	1.7	28	--	--	--	--	--
FEB , 1983										
01...	1	<1	41	<1.0	12	1600	1	<10	<1	<10

07245590 - MULE CREEK, SITE B

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LITHIUM TOTAL RECOV-ERABLE (UG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MOLYB-DENUM, TOTAL RECOV-ERABLE (UG/L AS MO)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)
DEC , 1980										
11...	4	1000	1	20	60	.0	0	2	0	10
JAN , 1981										
22...	3	310	4	10	50	.1	3	3	0	10
MAR										
02...	6	1300	2	10	80	.1	0	4	7	250
APR										
23...	6	1100	0	10	60	.5	67	4	0	20
MAY										
11...	5	930	2	10	50	.4	2	2	0	40
SEP										
01...	4	1100	1	20	180	.0	1	1	0	10
OCT										
14...	9	1200	6	10	90	.2	1	3	0	40
FEB , 1982										
02...	3	1200	<1	<10	110	.1	<1	3	<1	30
MAY										
01...	7	3500	1	10	130	.1	<1	11	<1	50
NOV										
30...	2	810	1	20	180	.1	<1	5	<1	40
FEB , 1983										
01...	3	2000	<1	<10	90	.2	<1	5	<1	30

07245592 - MULE CREEK, SITE C

DATE	ALKA-LINITY LAB (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SODIUM, DIS-SOLVED (MG/L AS NA)
JAN , 1981										
22...	390	70	56	.4	410	--	57	2.5	4.7	440
MAR										
04...	48	18	6.4	.1	79	--	8.3	2.0	7.0	40
APR										
23...	150	32	14	.2	167	17	21	2.6	4.8	140
MAY										
11...	49	16	4.2	.1	74	25	8.3	2.4	7.9	27
SEP										
01...	420	79	80	.5	453	33	62	2.5	5.9	520
OCT										
14...	120	27	13	.2	146	26	19	3.5	5.2	110
JAN , 1982										
21...	280	66	90	.4	363	83	48	2.9	4.8	340
FEB										
02...	54	16	9.3	.2	78	24	9.1	2.8	7.8	36
MAY										
13...	29	7.6	4.8	.2	35	7.0	4.0	2.3	5.0	16
NOV										
30...	239	50	40	.3	269	31	35	2.8	6.1	240
DEC										
03...	49	11	7.7	.1	55	6.0	6.6	3.0	6.0	38
FEB , 1983										
01...	36	11	8.1	<.1	52	16	6.0	2.1	6.4	23

07245592 - MULE CREEK, SITE C

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SULFATE DIS-SOLVED (MG/L AS SO4)	PERCENT SODIUM	PH (STAND-ARD UNITS)	POTAS-SIUM 40 DIS-SOLVED (PCI/L AS K40)	SODIUM AD-SORP-TION RATIO	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)
JAN , 1981										
22...	1820	1805	940	70	8.0	1.9	9.7	2340	8	1
MAR										
04...	218	211	100	52	7.6	1.5	2.0	345	70	0
APR										
23...	611	595	290	64	--	1.9	4.8	1025	20	0
MAY										
11...	182	177	81	43	7.6	1.8	1.4	600	10	1
SEP										
01...	1950	1942	940	71	8.0	--	11	2650	10	1
OCT										
14...	494	490	240	61	8.0	--	4.1	765	20	1
JAN , 1982										
21...	1380	1441	720	67	8.2	--	8.0	1800	40	<1
FEB										
02...	201	202	88	49	7.2	--	1.8	400	160	<1
MAY										
13...	105	96	38	48	7.3	--	1.2	230	270	1
NOV										
30...	964	998	480	66	7.8	--	6.5	1600	30	1
DEC										
03...	191	183	81	59	7.3	--	2.3	350	230	<1
FEB , 1983										
01...	141	136	57	48	7.5	--	1.4	340	240	<1

07245592 - MULE CREEK, SITE C

DATE	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)
JAN , 1981										
22...	0	0	0	1	40	2	80	10	.1	0
MAR										
04...	<1	<1	0	1	220	0	9	40	.1	<10
APR										
23...	<1	<1	10	2	100	1	30	30	.4	<10
MAY										
11...	<1	2	0	2	260	4	4	40	.3	<10
SEP										
01...	0	1	0	2	10	2	90	10	.0	1
OCT										
14...	<1	<1	0	3	40	1	24	29	.0	<10
JAN , 1982										
21...	<1	1	<10	1	20	1	72	31	<.1	<10
FEB										
02...	<1	1	10	3	330	2	10	91	<.1	<10
MAY										
13...	<3	<3	<10	2	240	4	<12	32	<.1	<1
NOV										
30...	1	<1	<10	<1	29	1	55	24	<.1	<1
DEC										
03...	<1	<1	<10	3	180	1	11	10	<.1	<1
FEB , 1983										
01...	<1	<1	<10	1	200	<1	11	39	1.2	<1

07245592 - MULE CREEK, SITE C

DATE	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)	ALUM-INUM, TOTAL RECOV-ERABLE (UG/L AS AL)	ARSENIC TOTAL (UG/L AS AS)	BERYL-LIUM, TOTAL RECOV-ERABLE (UG/L AS BE)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)
JAN , 1981										
22...	0	0	620	1.0	10	90	1	0	0	10
MAR										
04...	4	7	90	<6.0	20	740	1	0	1	0
APR										
23...	3	0	230	1.0	10	680	0	0	0	10
MAY										
11...	3	0	90	.0	30	460	1	0	1	0
SEP										
01...	6	0	640	.0	10	170	1	0	0	10
OCT										
14...	2	0	180	.0	3	550	1	<10	0	0
JAN , 1982										
21...	<1	<1	510	1.0	12	130	<1	<10	<1	<10
FEB										
02...	5	<1	92	.0	31	1100	1	<10	<1	10
MAY										
13...	3	<1	42	<1.0	<12	2900	1	<10	<1	<10
NOV										
30...	<1	<1	360	<1.0	6	480	1	<10	<1	<10
DEC										
03...	1	<1	68	2.2	13	--	--	--	--	--
FEB , 1983										
01...	<1	<1	58	<1.0	10	2200	1	<10	<1	<10

07245592 - MULE CREEK, SITE C

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LITHIUM TOTAL RECOV-ERABLE (UG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MOLYB-DENUM, TOTAL RECOV-ERABLE (UG/L AS MO)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)
JAN , 1981										
22...	3	170	7	70	50	.1	4	3	0	10
MAR										
04...	6	1800	2	10	90	.1	1	3	7	140
APR										
23...	6	900	11	20	60	.3	71	6	0	10
MAY										
11...	6	1200	0	10	50	.4	0	2	0	90
SEP										
01...	2	220	7	80	70	.0	1	1	0	20
OCT										
14...	9	1500	7	20	80	.1	2	2	0	30
JAN , 1982										
21...	2	100	<1	60	60	.1	1	5	<1	20
FEB										
02...	11	2000	3	10	90	.1	<1	4	<1	30
MAY										
13...	5	3600	2	10	110	.1	<1	14	<1	20
NOV										
30...	2	630	<1	50	160	.2	<1	6	<1	20
FEB , 1983										
01...	4	1800	1	10	80	.2	<1	10	<1	30

07245594 - MULE CREEK, SITE D

DATE	ALKA-LINITY LAB (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SODIUM, DIS-SOLVED (MG/L AS NA)
MAR , 1981										
04...	61	23	8.0	.2	103	--	11	2.1	7.4	60
APR										
23...	160	33	17	.3	177	17	23	2.5	4.5	160
MAY										
12...	130	33	29	.2	161	.00	19	2.3	5.9	130
SEP										
02...	420	79	110	.5	453	33	62	2.5	6.0	520
OCT										
15...	220	43	45	.3	235	15	31	3.0	5.1	240
JAN , 1982										
21...	300	66	67	.4	371	71	50	3.0	4.5	380
FEB										
02...	70	20	14	.2	104	34	13	2.7	6.4	68
MAY										
13...	23	7.8	3.5	.2	33	10	3.2	2.3	5.3	8.6
NOV										
30...	236	50	38	.3	269	34	35	2.8	6.2	230
DEC										
03...	39	9.0	5.1	.1	44	5.0	5.1	2.8	5.8	23
FEB , 1983										
01...	40	12	9.4	.1	58	18	6.7	2.0	7.3	28

07245594 - MULE CREEK, SITE D

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SULFATE DIS-SOLVED (MG/L AS SO4)	PERCENT SODIUM	PH (STAND-ARD UNITS)	POTAS-SIUM 40 DIS-SOLVED (PCI/L AS K40)	SODIUM AD-SORP-TION RATIO	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)
MAR , 1981										
04...	280	299	150	55	8.0	1.6	2.7	447	50	0
APR										
23...	686	677	340	66	--	1.9	5.4	1100	10	0
MAY										
12...	558	558	260	63	7.7	1.7	4.6	1050	20	0
SEP										
02...	1960	2012	980	71	7.8	--	11	2680	0	1
OCT										
15...	969	930	430	69	8.1	--	7.0	1434	30	1
JAN , 1982										
21...	1420	1472	720	69	8.1	--	8.8	2200	60	<1
FEB										
02...	361	327	160	58	7.3	--	3.0	550	110	1
MAY										
13...	76	71	26	34	7.2	--	.7	140	250	1
NOV										
30...	928	964	460	65	7.9	--	6.3	1600	40	1
DEC										
03...	135	129	54	52	7.6	--	1.6	290	250	1
FEB , 1983										
01...	151	155	65	50	7.7	--	1.6	300	190	<1

07245594 - MULE CREEK, SITE D

DATE	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)
MAR , 1981										
04...	<1	<1	0	2	230	0	20	40	.1	<10
APR										
23...	<1	<1	10	1	50	1	30	20	.2	<10
MAY										
12...	<1	<1	0	1	70	2	30	30	.1	<10
SEP										
02...	0	1	0	6	0	1	90	10	.0	1
OCT										
15...	<1	<1	0	2	29	1	46	17	.0	<10
JAN , 1982										
21...	<10	<1	<10	2	70	<1	60	50	<.1	<1
FEB										
02...	<1	1	<10	7	54	1	20	60	<.1	<10
MAY										
13...	<3	<3	<10	2	320	2	<12	32	<.1	<1
NOV										
30...	<1	<1	<10	<1	28	<1	48	29	<.1	<1
DEC										
03...	1	<1	<10	3	60	<1	6	4	<.1	<1
FEB , 1983										
01...	<1	<1	<10	4	280	<1	8	41	.3	<1

07245594 - MULE CREEK, SITE D

DATE	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)	ALUM-INUM, TOTAL RECOV-ERABLE (UG/L AS AL)	ARSENIC TOTAL (UG/L AS AS)	BERYL-LIUM, TOTAL RECOV-ERABLE (UG/L AS BE)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)
MAR , 1981										
04...	4	0	120	2.0	40	930	1	0	0	0
APR										
23...	2	1	240	.0	3	580	0	0	0	30
MAY										
12...	2	0	210	2.0	40	450	1	0	1	0
SEP										
02...	2	0	630	1.0	10	60	1	0	0	0
OCT										
15...	1	0	310	.0	14	640	1	<10	0	10
JAN , 1982										
21...	<1	<1	560	.0	20	170	<1	<10	<1	10
FEB										
02...	<1	<1	130	.0	<3	1000	1	<10	<1	<10
MAY										
13...	2	<1	35	<1.0	16	2400	1	<10	<1	10
NOV										
30...	<1	<1	360	<1.0	4	430	1	<10	<1	<10
DEC										
03...	1	<1	52	1.0	24	--	--	--	--	--
FEB , 1983										
01...	5	<1	65	<1.0	11	1500	1	<10	<1	<10

07245594 - MULE CREEK, SITE D

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LITHIUM TOTAL RECOV-ERABLE (UG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MOLYB-DENUM, TOTAL RECOV-ERABLE (UG/L AS MO)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)
MAR , 1981										
04...	5	1700	2	10	80	.1	1	3	0	140
APR										
23...	6	750	2	30	50	.8	77	6	0	20
MAY										
12...	4	1100	10	20	70	.3	1	4	0	120
SEP										
02...	0	30	1	90	60	.1	0	1	0	10
OCT										
15...	10	660	6	50	80	.2	1	2	0	50
JAN , 1982										
21...	3	70	<1	60	50	.1	1	3	<1	20
FEB										
02...	1	1600	1	10	90	<.1	<1	4	<1	10
MAY										
13...	10	3100	13	10	110	.1	<1	16	<1	30
NOV										
30...	1	450	<1	40	120	.2	<1	5	<1	10
FEB , 1983										
01...	3	1700	1	10	70	.2	<1	6	<1	30

07245591 - EAST POND OUTLET TO MULE CREEK, SITE E

DATE	ALKA-LINITY LAB (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SODIUM, DIS-SOLVED (MG/L AS NA)
DEC , 1980										
11...	--	51	28	.4	297	63	41	2.7	.3	480
JAN , 1981										
22...	400	73	58	.4	430	--	60	2.6	4.8	510
MAR										
04...	260	53	35	.3	293	--	39	2.4	4.9	350
APR										
23...	360	63	53	.4	356	.00	48	2.7	4.1	410
MAY										
11...	230	42	36	.2	233	3.0	31	2.4	5.1	280
SEP										
01...	370	79	83	.0	457	87	63	2.5	5.9	500
OCT										
14...	190	40	24	.3	220	30	29	3.3	5.2	210
JAN , 1982										
21...	400	74	110	.5	424	24	58	2.9	4.8	480
FEB										
02...	280	55	64	.4	311	31	42	3.0	4.5	320
MAY										
13...	75	17	17	.2	88	13	11	2.3	4.6	71
NOV										
30...	420	81	82	.3	467	47	64	2.7	4.9	480
DEC										
03...	207	41	41	.3	226	20	30	2.8	4.7	220
FEB , 1983										
01...	228	50	91	.3	278	50	37	2.3	5.5	260

07245591 - EAST POND OUTLET TO MULE CREEK, SITE E

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SULFATE DIS-SOLVED (MG/L AS SO4)	PERCENT SODIUM	PH (STAND-ARD UNITS)	POTAS-SIUM 40 DIS-SOLVED (PCI/L AS K40)	SODIUM AD-SORP-TION RATIO	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)
DEC , 1980										
11...	1800	1700	880	78	8.8	2.0	12	--	30	1
JAN , 1981										
22...	1890	1919	970	72	7.9	1.9	11	2340	8	1
MAR										
04...	1320	1301	660	72	8.2	1.8	9.1	1948	30	0
APR										
23...	1670	1648	850	71	--	2.0	9.7	2400	10	0
MAY										
11...	1020	1045	510	72	7.7	1.8	8.2	1800	10	0
SEP										
01...	1810	1856	900	70	8.0	--	10	2700	10	1
OCT										
14...	834	866	440	67	8.0	--	6.3	1238	10	2
JAN , 1982										
21...	1800	1911	940	71	8.5	--	10	2700	60	<1
FEB										
02...	1290	1317	660	69	7.0	--	8.1	1900	40	1
MAY										
13...	302	318	150	63	7.2	--	3.4	570	80	1
NOV										
30...	1800	1917	950	69	7.7	--	9.9	3000	10	1
DEC										
03...	935	924	460	68	7.9	--	6.5	1500	50	1
FEB , 1983										
01...	1060	1083	500	67	7.8	--	7.0	1400	90	<1

07245591 - EAST POND OUTLET TO MULE CREEK, SITE E

DATE	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)
DEC , 1980										
11...	0	1	0	1	70	0	80	90	.0	0
JAN , 1981										
22...	0	0	0	0	10	2	80	10	.0	1
MAR										
04...	<1	<1	0	0	40	0	60	40	.0	<10
APR										
23...	0	0	10	2	90	1	70	0	.2	10
MAY										
11...	<1	<1	0	1	60	3	40	40	.2	<10
SEP										
01...	0	1	0	3	0	2	90	10	.0	0
OCT										
14...	<1	<1	0	1	24	4	40	41	.0	<10
JAN , 1982										
21...	<10	<1	<10	1	50	<1	30	30	<.1	1
FEB										
02...	<1	<1	<10	1	17	1	60	43	<.1	<10
MAY										
13...	<3	<3	<10	2	140	2	18	40	.1	<1
NOV										
30...	<10	<1	<10	<1	10	<1	80	20	<.1	<1
DEC										
03...	<1	<1	<10	1	110	<1	51	11	<.1	<1
FEB , 1983										
01...	1	<1	<10	2	98	<1	49	66	.5	<1

07245591 - EAST POND OUTLET TO MULE CREEK, SITE E

DATE	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)	ALUM-INUM, TOTAL RECOV-ERABLE (UG/L AS AL)	ARSENIC TOTAL (UG/L AS AS)	BERYL-LIUM, TOTAL RECOV-ERABLE (UG/L AS BE)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)
DEC , 1980										
11...	0	0	550	1.0	20	480	1	0	0	10
JAN , 1981										
22...	0	0	670	1.0	10	100	1	0	0	10
MAR										
04...	3	0	440	.0	30	500	0	0	0	10
APR										
23...	2	0	520	.0	10	230	0	0	0	30
MAY										
11...	2	0	340	.0	40	570	1	0	0	10
SEP										
01...	3	0	650	.0	10	140	1	0	0	10
OCT										
14...	2	0	290	.0	<3	780	2	<10	0	0
JAN , 1982										
21...	<1	<1	670	.0	10	200	<1	<10	<1	10
FEB										
02...	<1	<1	450	.0	9	640	1	<10	<1	10
MAY										
13...	2	<1	110	<1.0	<12	2000	1	<10	1	<10
NOV										
30...	<1	<1	660	<1.0	20	260	1	<10	<1	<10
DEC										
03...	3	<1	310	2.8	24	--	--	--	--	--
FEB , 1983										
01...	1	1	380	1.5	9	1100	1	<10	<1	<10

07245591 - EAST POND OUTLET TO MULE CREEK, SITE E

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LITHIUM TOTAL RECOV-ERABLE (UG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MOLYB-DENUM, TOTAL RECOV-ERABLE (UG/L AS MO)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)
DEC , 1980										
11...	5	490	0	70	130	.0	1	3	0	20
JAN , 1981										
22...	3	210	3	80	50	.1	4	3	0	10
MAR										
04...	4	1000	0	50	100	.1	1	1	0	560
APR										
23...	5	350	4	60	30	.4	77	4	0	20
MAY										
11...	3	1400	1	40	110	.4	1	1	0	50
SEP										
01...	2	340	2	80	70	.0	1	0	0	10
OCT										
14...	11	1600	8	40	90	.1	1	2	0	20
JAN , 1982										
21...	1	110	<1	80	80	<.1	1	2	<1	20
FEB										
02...	1	1200	<1	40	90	.1	<1	4	<1	20
MAY										
13...	11	2700	15	10	110	.1	1	9	<1	50
NOV										
30...	1	180	<1	80	110	.2	<1	5	<1	20
FEB , 1983										
01...	1	1600	<1	40	130	.2	<1	7	<1	30

350936094590301 - EAST POND, SURFACE

DATE	ALKA-LINITY LAB (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SODIUM, DIS-SOLVED (MG/L AS NA)
JAN , 1981										
22...	420	73	61	.4	426	--	59	2.5	4.9	540
APR										
08...	310	72	50	.4	399	89	53	2.6	4.2	470
SEP										
23...	260	64	45	.4	490	230	80	3.5	4.4	310
DEC										
23...	410	79	88	.4	449	39	61	2.9	5.3	410
JAN , 1982										
21...	88	28	7.4	.2	140	52	17	2.3	4.0	41
APR										
13...	370	78	120	.4	434	64	58	2.4	3.9	450
JUN										
23...	147	43	53	.3	408	260	73	2.9	.8	260
AUG										
26...	346	97	170	.4	548	200	74	2.6	6.4	470
NOV										
16...	301	78	85	.4	459	160	64	2.8	5.8	490

350936094590301 - EAST POND, SURFACE

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SULFATE DIS-SOLVED (MG/L AS SO4)	PERCENT SODIUM	PH (STAND-ARD UNITS)	POTAS-SIUM 40 DIS-SOLVED (PCI/L AS K40)	SODIUM AD-SORP-TION RATIO	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)
JAN , 1981										
22...	1970	1993	1000	73	8.0	1.9	12	2180	20	0
APR										
08...	1870	1779	940	72	8.4	1.9	10	2450	20	0
SEP										
23...	1560	1426	760	58	--	--	6.2	--	10	2
DEC										
23...	1860	1723	830	66	8.0	--	8.6	2730	20	<1
JAN , 1982										
21...	285	283	130	38	8.9	--	1.5	590	90	<1
APR										
13...	1820	1785	850	69	7.8	--	9.6	2900	<10	<1
JUN										
23...	1330	1251	730	58	8.4	--	5.7	2000	10	<1
AUG										
26...	1910	1939	910	65	7.6	--	8.9	2900	20	1
NOV										
16...	1870	1907	1000	70	7.8	--	10	3200	20	<1

350936094590301 - EAST POND, SURFACE

DATE	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)
JAN , 1981										
22...	0	0	0	1	10	2	80	10	.1	0
APR										
08...	0	1	0	4	30	4	70	10	.1	0
SEP										
23...	0	0	0	1	20	4	80	2700	.0	0
DEC										
23...	<10	<1	<10	2	40	1	80	80	<.1	<1
JAN , 1982										
21...	<1	<1	<10	1	37	1	17	43	<.1	<10
APR										
13...	<10	<2	10	2	20	2	80	70	.4	<1
JUN										
23...	1	<1	<10	2	3	<1	78	5	<.1	<1
AUG										
26...	<10	<1	<10	2	40	<5	90	10	<.1	<1
NOV										
16...	<10	1	<10	1	30	1	90	30	<.1	<1

350936094590301 - EAST POND, SURFACE

DATE	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)	ALUM-INUM, TOTAL RECOV-ERABLE (UG/L AS AL)	ARSENIC TOTAL (UG/L AS AS)	BERYL-LIUM, TOTAL RECOV-ERABLE (UG/L AS BE)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)
JAN , 1981										
22...	0	0	670	.0	10	100	1	0	0	10
APR										
08...	4	0	610	.0	20	--	--	--	--	--
SEP										
23...	0	0	530	.0	20	50	2	0	0	10
DEC										
23...	2	<1	610	1.0	10	650	1	<10	<1	10
JAN , 1982										
21...	<1	<1	150	.0	3	300	<1	<10	--	<10
APR										
13...	<2	<1	620	1.0	10	160	1	10	2	10
JUN										
23...	<1	<1	260	<1.0	5	30	<1	<10	<1	<10
AUG										
26...	5	<1	720	<1.0	10	50	1	<10	<1	<10
NOV										
16...	1	<1	700	1.8	40	70	1	<10	<1	<10

350936094590301 - EAST POND, SURFACE

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LITHIUM TOTAL RECOV-ERABLE (UG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MOLYB-DENUM, TOTAL RECOV-ERABLE (UG/L AS MO)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)
JAN , 1981										
22...	4	240	0	80	50	.1	4	4	0	20
SEP										
23...	12	1400	3	70	280	.0	3	4	0	20
DEC										
23...	7	580	1	80	160	.2	2	1	<1	30
JAN , 1982										
21...	--	350	--	10	50	<.1	<1	--	<1	40
APR										
13...	22	180	4	80	90	.2	1	5	<1	50
JUN										
23...	2	50	<1	70	20	.2	2	5	<1	20
AUG										
26...	8	60	<1	80	70	.1	3	7	<1	10
NOV										
16...	2	130	1	90	100	.5	<1	3	<1	30

350936094590302 - EAST POND, BOTTOM

DATE	ALKA-LINITY LAB (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SODIUM, DIS-SOLVED (MG/L AS NA)
JAN , 1981										
22...	390	75	60	.4	439	--	61	2.5	4.9	520
APR										
08...	400	45	37	.4	340	.00	55	2.5	4.8	510
SEP										
23...	210	63	44	.4	491	280	81	3.6	2.5	280
DEC										
23...	400	77	92	.4	440	40	60	2.8	5.3	500
APR , 1982										
13...	400	78	120	.4	434	34	58	2.4	3.8	490
JUN										
23...	248	85	60	.3	559	310	84	3.1	3.1	280
AUG										
26...	381	100	160	.4	559	180	75	2.7	6.6	450
NOV										
16...	432	86	87	.4	496	63	68	3.2	5.9	490

350936094590302 - EAST POND, BOTTOM

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SULFATE DIS-SOLVED (MG/L AS SO4)	PERCENT SODIUM	PH (STAND-ARD UNITS)	POTAS-SIUM 40 DIS-SOLVED (PCI/L AS K40)	SODIUM AD-SORP-TION RATIO	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)
JAN , 1981										
22...	1940	1948	990	72	7.9	1.9	11	2090	8	1
APR										
08...	2000	1895	1000	76	7.9	1.9	12	2550	10	0
SEP										
23...	1440	1341	740	55	--	--	5.6	--	0	1
DEC										
23...	1820	1848	870	71	8.0	--	11	2730	20	<1
APR , 1982										
13...	1850	1833	840	71	7.3	--	10	2900	10	<1
JUN										
23...	1520	1475	810	52	7.8	--	5.3	2100	40	<1
AUG										
26...	1810	1925	900	64	7.4	--	8.5	2600	10	1
NOV										
16...	1880	1990	990	68	7.8	--	9.8	3200	<10	1

350936094590302 - EAST POND, BOTTOM

DATE	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)
JAN , 1981										
22...	0	0	0	0	40	2	90	10	.0	1
APR										
08...	0	1	0	2	40	4	80	60	.1	0
SEP										
23...	0	0	0	5	10	4	80	10	.0	0
DEC										
23...	<10	<1	<10	1	60	1	80	80	.1	1
APR , 1982										
13...	<10	<1	<10	1	10	2	80	60	.4	<1
JUN										
23...	<10	<1	<10	2	50	<1	70	380	<.1	<1
AUG										
26...	<10	<1	<10	1	40	<1	90	1500	.1	4
NOV										
16...	<10	<1	<10	<1	50	1	90	30	.2	2

350936094590302 - EAST POND, BOTTOM

DATE	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)	ALUM-INUM, TOTAL RECOV-ERABLE (UG/L AS AL)	ARSENIC TOTAL (UG/L AS AS)	BERYL-LIUM, TOTAL RECOV-ERABLE (UG/L AS BE)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)
JAN , 1981										
22...	0	0	680	1.0	10	150	1	0	0	10
APR										
08...	5	0	620	1.0	30	--	--	--	--	--
SEP										
23...	0	0	410	.0	20	80	1	0	0	10
DEC										
23...	5	<1	610	1.0	10	200	<1	<10	<1	<10
APR , 1982										
13...	2	<1	630	<1.0	10	80	<1	<10	2	10
JUN										
23...	4	<1	560	<1.0	20	110	1	<10	<1	10
AUG										
26...	4	<1	750	<1.0	10	40	1	<10	<1	<10
NOV										
16...	1	<1	700	1.6	30	60	1	<10	1	<10

350936094590302 - EAST POND, BOTTOM

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LITHIUM TOTAL RECOV-ERABLE (UG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MOLYB-DENUM, TOTAL RECOV-ERABLE (UG/L AS MO)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)
JAN , 1981										
22...	5	400	7	80	70	.1	3	4	0	20
SEP										
23...	11	100	1	70	30	.0	2	3	0	30
DEC										
23...	7	160	2	80	110	.3	2	1	<1	30
APR , 1982										
13...	8	60	3	80	80	.3	6	4	<1	30
JUN										
23...	1	420	1	80	580	.2	2	9	<1	20
AUG										
26...	<1	80	<1	80	1500	.1	2	7	<1	10
NOV										
16...	3	130	4	90	100	.5	<1	5	<1	30

350934094590801 - WEST POND, SURFACE

DATE	ALKA-LINITY LAB (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SODIUM, DIS-SOLVED (MG/L AS NA)
JAN , 1981										
21...	250	73	38	.4	500	--	77	2.9	3.1	280
APR										
07...	230	73	36	.3	512	280	80	3.0	1.3	290
SEP										
23...	440	79	71	.5	453	13	62	2.7	5.7	490
DEC										
29...	240	77	46	.4	530	290	82	3.3	2.3	280
APR , 1982										
12...	250	84	51	.4	536	290	79	3.1	2.1	270
AUG										
26...	186	62	61	.3	505	320	85	3.0	2.1	290
DEC										
01...	352	89	33	.8	610	260	94	2.0	11	450

350934094590801 - WEST POND, SURFACE

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SULFATE DIS-SOLVED (MG/L AS SO4)	PERCENT SODIUM	PH (STAND-ARD UNITS)	POTAS-SIUM 40 DIS-SOLVED (PCI/L AS K40)	SODIUM AD-SORP-TION RATIO	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)
JAN , 1981										
21...	1350	1445	820	55	8.4	2.2	5.6	1530	30	2
APR										
07...	1490	1452	830	55	8.4	2.2	5.7	1900	10	1
SEP										
23...	2000	1895	920	70	--	--	10	--	40	1
DEC										
29...	1470	1375	740	53	8.2	--	5.4	2090	10	1
APR , 1982										
12...	1480	1430	790	52	7.3	--	5.2	2300	10	<1
AUG										
26...	1520	1425	810	55	7.4	--	5.7	3150	<10	1
DEC										
01...	1970	1992	1100	62	7.3	--	8.1	2800	50	1

350934094590801 - WEST POND, SURFACE

DATE	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)	ALUM-INUM, TOTAL RECOV-ERABLE (UG/L AS AL)	ARSENIC TOTAL (UG/L AS AS)	BERYL-LIUM, TOTAL RECOV-ERABLE (UG/L AS BE)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)
JAN , 1981										
21...	0	0	510	2.0	8	100	1	0	0	0
APR										
07...	3	0	500	.0	20	--	--	--	--	--
SEP										
23...	4	0	610	1.0	20	90	1	0	0	10
DEC										
29...	2	<1	510	.0	10	200	1	<10	<1	10
APR , 1982										
12...	<1	<1	540	<1.0	<12	720	1	<10	<1	10
AUG										
26...	1	<1	440	<1.0	10	20	1	<10	<1	<10
DEC										
01...	2	4	630	2.0	20	--	--	--	--	--

350934094590801 - WEST POND, SURFACE

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LITHIUM TOTAL RECOV-ERABLE (UG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MOLYB-DENUM, TOTAL RECOV-ERABLE (UG/L AS MO)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)
JAN , 1981										
21...	4	180	6	70	50	.1	2	5	0	20
SEP										
23...	11	100	1	80	40	.1	2	4	0	20
DEC										
29...	7	80	3	80	30	.2	2	2	<1	20
APR , 1982										
12...	5	2000	4	80	990	1.6	<1	8	<1	30
AUG										
26...	<1	10	<1	70	10	.1	<1	<1	<1	10

350934094590802 - WEST POND, BOTTOM

DATE	ALKA-LINITY LAB (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	HARD-NESS (MG/L AS CACO3)	HARD-NESS NONCAR-BONATE (MG/L AS CACO3)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SODIUM, DIS-SOLVED (MG/L AS NA)
JAN , 1981										
21...	--	73	39	.4	504	254	78	3.2	3.0	290
APR										
07...	250	85	35	.4	551	300	82	3.1	1.9	290
SEP										
23...	440	78	73	.5	447	7.0	61	2.7	5.7	500
DEC										
29...	240	75	48	.4	521	280	81	3.3	2.3	280
APR , 1982										
12...	230	73	55	.3	508	280	79	3.0	1.3	280
JUN										
22...	394	86	170	.4	483	88	65	2.6	5.7	450
AUG										
26...	257	110	73	.3	658	400	93	3.1	5.8	280
NOV										
16...	236	73	70	.4	525	290	83	3.4	4.1	270

350934094590802 - WEST POND, BOTTOM

DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SULFATE DIS-SOLVED (MG/L AS SO4)	PERCENT SODIUM	PH (STAND-ARD UNITS)	POTAS-SIUM 40 DIS-SOLVED (PCI/L AS K40)	SODIUM AD-SORP-TION RATIO	SPE-CIFIC CON-DUCT-ANCE (UMHOS)	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)
JAN , 1981										
21...	1480	1460	820	55	8.4	2.4	5.7	1725	8	1
APR										
07...	1530	1458	810	53	8.2	2.3	5.5	1900	10	1
SEP										
23...	2000	1917	930	71	--	--	11	--	20	1
DEC										
29...	1470	1364	730	54	8.3	--	5.4	2090	10	1
APR , 1982										
12...	1480	1420	790	54	7.4	--	5.5	2300	10	<1
JUN										
22...	1830	1817	800	67	7.3	--	9.1	2700	20	<1
AUG										
26...	1640	1574	850	48	7.6	--	4.9	3100	<10	<1
NOV										
16...	1460	1426	780	53	8.0	--	5.2	2500	<10	1

350934094590802 - WEST POND, BOTTOM

DATE	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)
JAN , 1981										
21...	<1	<1	0	0	10	1	80	10	.0	<10
APR										
07...	0	2	0	4	40	2	70	20	.1	0
SEP										
23...	0	0	0	1	20	3	90	1200	.0	0
DEC										
29...	<10	<1	<10	<1	10	1	80	10	.1	2
APR , 1982										
12...	<3	<3	10	1	11	<1	85	4	.5	<1
JUN										
22...	<10	<1	<10	1	90	<1	80	680	<.1	<1
AUG										
26...	<10	1	<10	4	30	3	80	3700	<.1	<1
NOV										
16...	<10	<1	<10	<1	20	10	80	10	.2	<1

350934094590802 - WEST POND, BOTTOM

DATE	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, DIS-SOLVED (UG/L AS ZN)	ALUM-INUM, TOTAL RECOV-ERABLE (UG/L AS AL)	ARSENIC TOTAL (UG/L AS AS)	BERYL-LIUM, TOTAL RECOV-ERABLE (UG/L AS BE)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)
JAN , 1981										
21...	0	0	510	2.0	5	60	1	0	0	0
APR										
07...	6	0	560	1.0	20	--	--	--	--	--
SEP										
23...	0	0	620	1.0	30	80	1	0	0	10
DEC										
29...	2	<1	500	.0	10	200	1	<10	<1	10
APR , 1982										
12...	<1	<1	480	<1.0	<12	30	1	<10	1	10
JUN										
22...	2	<1	620	<1.0	40	60	<1	<10	<1	<10
AUG										
26...	3	<1	720	<1.0	20	50	1	<10	<1	<10
NOV										
16...	4	<1	520	1.7	30	840	1	<10	1	<10

350934094590802 - WEST POND, BOTTOM

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LITHIUM TOTAL RECOV-ERABLE (UG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MOLYB-DENUM, TOTAL RECOV-ERABLE (UG/L AS MO)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)
JAN , 1981										
21...	5	160	5	70	50	.1	3	4	0	20
SEP										
23...	11	120	0	80	40	.1	2	3	0	20
DEC										
29...	6	80	2	80	30	.1	2	1	<1	30
APR , 1982										
12...	3	30	2	80	10	1.0	4	2	<1	20
JUN										
22...	1	110	2	80	740	.1	2	7	<1	20
AUG										
26...	5	250	<1	70	3600	.2	2	1	<1	10
NOV										
16...	4	3100	2	80	2000	.4	<1	7	<1	50