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COAL RESOURCE OCCURRENCE MAPS AND AND COAL DEVELOPMENT POTENTIAL OF THE PIEDMONT RESERVOIR QUADRANGLE UINTA COUNTY, WYOMING

[Report includes 3 plates]

Prepared for

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

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INTRODUCTION

Purpose

This text is to be used in conjunction with Coal Resource Occurrence (CRO) Maps of the Piedmont Reservoir quadrangle, Uinta County, Wyoming. This report was compiled to support the land planning work of the Bureau of Land Management (BLM) to provide a systematic coal resource inventory of Federal coal lands in Known Recoverable Coal Resource Areas (KRCRA's) in the western United States. This investigation was undertaken by Dames & Moore, Denver, Colorado, at the request of the U.S. Geological Survey under contract number 14-08-0001-17104. The resource information gathered for this report is in response to the Federal Coal Leasing Amendments Act of 1976 (P.L. 94-377). Published and unpublished public information available through April, 1978, was used as the data base for this study. No new drilling or field mapping was performed, nor was any confidential data used.

Location

The Piedmont Reservoir quadrangle is located in southwestern Uinta County, Wyoming, approximately 12 airline miles (19 km) southeast of the town of Evanston and 14 airline miles (23 km) southwest of the town of Fort Bridger, Wyoming. The townsite of Piedmont is located near the east-central edge of the quadrangle along Piedmont Creek (U.S. Bureau of Land Management, 1971; Wyoming State Highway Commission, 1978).

Accessibility

Several improved light-duty roads cross the quadrangle. One passes through Piedmont and follows the Piedmont Creek and Aspen Creek valleys southwesterly across the north-central part of the quadrangle. It connects Interstate Highway 80 north of the quadrangle boundary and the town of Robertson east of the quadrangle with Wyoming Highway 150 west of the quadrangle. A second light-duty road turns south from Piedmont and follows the Muddy Creek valley to Byrne Reservoir, then turns west across the southern part of the quadrangle until it joins the road along Aspen Creek. A third light-duty road crosses the northwestern corner of the quadrangle connecting Wyoming Highway 150 to the west with Interstate Highway 80 to the north of the quadrangle. Numerous unimproved dirt roads and trails provide access through the remainder of the quadrangle (U.S. Bureau of Land Management, 1971; Wyoming State Highway Commission, 1978).

The main east-west line of the Union Pacific Railroad crosses southwesterly through the northwestern corner of the quadrangle, following the Aspen Creek valley. This railway provides service across southern Wyoming connecting Ogden, Utah, to the west with Omaha, Nebraska, to the east (U.S. Bureau of Land Management, 1978).

Physiography

The Piedmont Reservoir quadrangle lies on the southeastern edge of the Wyoming Overthrust Belt. The landscape within the quadrangle is characterized by northeasterly-trending ridges and narrow valleys. Altitudes range from over 7,960 feet (2,426 m) on Moslander Ridge along the south-central edge of the quadrangle to less than 6,920 feet (2,109 m) on Soda Hollow in the northeastern corner of the quadrangle.

Muddy Creek and its tributaries, Guild Hollow, Piedmont Creek, Soda Hollow, and Antelope Creek, drain all except the southwestern corner of the quadrangle. They flow northeasterly into Blacks Fork and the Green River drainage system east of the quadrangle boundary. Aspen Creek, draining the southwestern corner of the quadrangle, flows westerly into the Bear River and the Great Basin drainage system west of the quadrangle boundary. Five reservoirs located in the quadrangle include Thirtythree Pond, Byrne Reservoir, Guild Reservoir, and Piedmont Reservoir in the southern half of the quadrangle and Little Piedmont Reservoir along the northeastern edge of the quadrangle. Numerous springs also occur throughout the quadrangle. All streams in the quadrangle, with the exception of Muddy Creek, are intermittent and flow mainly in response to snowmelt in the spring (U.S. Bureau of Land Mangement, 1971, 1978).

Climate and Vegetation

The climate of southwestern Wyoming is semiarid, characterized by low precipitation, rapid evaporation, and large daily temperature variations. Summers are usually dry and mild, and winters are cold. The annual precipitation averages approximately 10 inches (25 cm) and is fairly evenly distributed throughout the year (Wyoming Natural Resources Board, 1966).

The average annual temperature of the area is 39° F (4° C). The temperature during January averages 17° F (-8° C) and typically ranges from 4° F (-16° C) to 30° F (-1° C). During July, the average temperature is 62° F (17° C), and the temperature typically ranges from 43° F (6° C) to 82° F (28° C) (Wyoming Natural Resources Board, 1966; U.S. Bureau of Land Management, 1978).

Winds are usually from the west and west-southwest with an average annual velocity of approximately 15 miles per hour (24 km per hr) (U.S. Bureau of Land Management, 1978).

Principal types of vegetation in the quadrangle include grasses, sedges, sagebrush, and rabbitbrush. Land along Muddy Creek, Piedmont Creek, and Aspen Creek is utilized as cropland (U.S. Bureau of Land Management, 1978).

Land Status

The Piedmont Reservoir quadrangle lies on the southeastern tip of the Kemmerer Known Recoverable Coal Resource Area (KRCRA). The northwestern corner of the quadrangle, approximately 15 percent of the quadrangle's total area, lies within the KRCRA boundary and the Federal government owns the coal rights for approximately one quarter of this land as shown on plate 2. No Federal coal leases, prospecting permits or licenses occur within the KRCRA boundary.

GENERAL GEOLOGY

Previous Work

Veatch (1907) mapped the geology and economic resources of a large part of Lincoln and Uinta counties in southwestern Wyoming. Hale (1960) described the stratigraphy of the Frontier Formation in southwestern Wyoming and Utah. Oriel and Tracey (1970) described the stratigraphy of the Evanston and Wasatch Formations present in the Kemmerer area. The geology of the Kemmerer and Sage 15-minute quadrangles to the north was mapped by Rubey and others (1975). Glass reported chemical analyses and measured sections of coal beds in the Adaville Formation in the Kemmerer coal field in 1975, and updated information on the coal field in 1977. Cook (1977) described the structural geology of the Aspen Tunnel area that included this quadrangle. Roehler and others (1977) described the geology and coal resources of the Hams Fork coal region, including the Kemmerer coal field. Myers (1977) reported on the stratigraphy of the Frontier Formation in the Kemmerer area. Schroeder mapped the surface geology and coal resources of the Ragan (1976a), the Meadow Draw 1976b), the eastern half of the Guild Hollow (1977a), and the Sulphur Creek Reservoir (1977b) quadrangles. Unpublished data from Rocky Mountain Energy Company (RMEC) also provided coal thickness information.

Stratigraphy

Formations in the Piedmont Reservoir quadrangle range in age from Cretaceous to Eocene. All of the Cretaceous formations, with the exception of small parts of the coal-bearing Frontier Formation, are present only in the subsurface of the quadrangle and are covered by the Eocene Wasatch Formation.

The Bear River Formation of Early Cretaceous age occurs in the subsurface in the Piedmont Reservoir quadrangle. It consists of approximately 500 to 600 feet (152 to 183 m) of interbedded dark-gray to black shale and claystone, olive to tan-weathering fine-grained sandstone and thin beds of fossiliferous limestone in the Meadow Draw quadrangle to the north (Rubey and others, 1975; Schroeder, 1976b; Cook, 1977).

The Aspen Shale of latest Early Cretaceous age conformably overlies the Bear River Formation and is present in the subsurface of the quadrangle. It is composed of approximately 900 to 1,000 feet (274 to 305 m) of light- to dark-gray siltstone and shale, gray quartzitic sandstone and porcelanite in the Meadow Draw quadrangle to the north (Rubey and others, 1975; Schroeder, 1976b; Cook, 1977).

The Frontier Formation of early Late Cretaceous age conformably overlies the Aspen Shale and crops out in a small area in the northwestern corner of the quadrangle. In the Meadow Draw quadrangle, Schroeder (1976b) has subdivided the formation into lower and upper units (not shown on plate 3). The lower unit consists of approximately a 1,000 feet (305 m) of dark-gray shale, tan siltstone and brown sandstone which is less resistant than the remainder of the formation. The Spring Valley coal zone is in the lower part of this unit. The upper unit consists of approximately 1,200 feet (366 m) of shale and gray sandstone. The middle part of the upper unit, the Oyster Ridge Sandstone Member, consists of a ridge-forming white to light-gray-weathering, oyster-bearing sandstone approximately 85 to 100 feet (26 to 30 m) thick (Schroeder, oral communication, 1979). It is underlain by a thick shale interval and overlain by shale and thin beds of gray sandstone containing the Kemmerer coal zone near the top (Schroeder, 1976b; Cook, 1977).

The Frontier Formation is conformably overlain by the Hilliard Shale of early Late Cretaceous age. It occurs in the subsurface in the quadrangle and consists of a very thick sequence of dark-gray to dark-brown marine shale, siltstone and sandy shale. A few conspicuous light-gray to light-tan fine-grained resistant sandstone beds occur in the upper part of the formation. This formation is approximately 6,000 feet (1,829 m) thick in the Meadow Draw quadrangle to the north (Rubey and others, 1975; Schroeder, 1976b; Cook, 1977).

The Wasatch Formation of Eocene age unconformably overlies older formations and is exposed over most of the quadrangle. It consists of as much as 2,000 feet (610 m) of red, maroon, yellow, and gray mudstone;

yellow, brown, and gray fine- to coarse-grained sandstone; and some stream-channel conglomerates (Schroeder, 1976b; Cook, 1977).

Holocene deposits of alluvium cover the stream valleys of Muddy and Aspen Creeks and their tributaries.

The Cretaceous formations in the Piedmont Reservoir quadrangle indicate the transgressions and regressions of a broad, shallow north-south seaway that extended across central North America. These formations accumulated near the western edge of the Cretaceous sea and reflect the location of the shoreline (Weimer, 1960 and 1961).

The interbedded claystones, sandstones, and limestones of the Bear River Formation were deposited in a predominantly marine environment (Eyer, 1969). According to Roehler and others (1977), the formation thickens to the north, where it was deposited in mixed fluvial, paludal, and marine environments.

Deposition of the Aspen Shale marked a westward or landward movement of the sea. According to Hale (1960), the marine shales and sandstones of the Aspen Shale were deposited in water depths up to 120 feet (37 m).

Sediments of the Frontier Formation were deposited during two major transgressions and regressions of the sea. The coal beds in the upper and lower parts of the formation were deposited in coastal swamps during periods when the sea retreated eastward. The Oyster Ridge Sandstone Member is a littoral or beach deposit marking the retreat of the Cretaceous sea from the area (Hale, 1960; Myers, 1977; Roehler and others, 1977).

The marine sequence of shales and sandstones of the Hilliard Shale were deposited during a transgression of the Cretaceous sea and indicate the fluctuations of the shoreline (Roehler and others, 1977).

The Wasatch Formation is composed of continental sediments. The bright-colored mudstones were probably deposited on a flood plain and then cut by stream channels now filled with well-sorted conglomerate (Oriel and Tracey, 1970).

Structure

The Piedmont Reservoir quadrangle is located on the southeastern edge of the structurally complex Wyoming Overthrust Belt. Folded Paleozoic and Mesozoic rocks are thrust eastward over folded older-Cretaceous rocks with younger Cretaceous and Tertiary rocks resting unconformably on top of the older rocks. Coal-bearing strata crop out in eroded limbs of folds as long north-south trending belts bounded on the west by major thrust faults (Roehler and others, 1977).

The trace of the Round Mountain thrust fault crosses the northwestern corner of the quadrangle but is covered by Tertiary formations. Stratigraphic displacement on the Round Mountain thrust fault may be as much as 7,000 feet (2,134 m) in the quadrangle (Cook, 1977). Cretaceous formations east of the Round Mountain thrust fault dip to the west at approximately 26°. West of the fault, Cretaceous beds dip to the east, but their attitudes have not been measured (Schroeder, oral communication, 1979).

COAL GEOLOGY

The Spring Valley and Kemmerer coal zones of the Frontier Formation are known to contain coal beds of Reserve Base thickness (5 feet or 1.5 meters) in this quadrangle. The Spring Valley coal zone is located near the base of the formation and is separated from the overlying Kemmerer coal zone by approximately 1,400 feet (427 m) of sandstone, shale, and siltstone. The Willow Creek coal zone is found between the two coal zones in the northern part of the Kemmerer coal field, but has not been mapped in quadrangles to the south. Coals in the Frontier Formation have been traced for more than 60 miles (97 km) in the Kemmerer area (Glass, 1977).

Chemical analyses of coal.--Chemical analyses of coals in the Frontier Formation were not available in this quadrangle, but representative analyses from the Kemmerer 15-minute quadrangle and the Elkol quadrangle are listed in table 1. In general, coals in the Spring Valley and Kemmerer coal zones rank as high-volatile B bituminous. The coals have been ranked on a moist, mineral-matter-free basis according to ASTM Standard Specification D 388-77 (American Society for Testing and Materials, 1977).

Coal beds identified with bracketed numbers are not formally named, but have been given bracketed numbers for identification purposes in this quadrangle only.

Spring Valley Coal Zone

The Spring Valley coal zone crops out in a small area in secs. 27 and 34, T. 15 N., R. 118 W., in the northwestern corner of the quadrangle. North and south of this area, the coal zone is covered by Tertiary rocks which unconformably overlie the Frontier Formation. The Spring Valley coal beds are named for Spring Valley in T. 15 N., R. 118 W., where they were mined near the turn of the century (Hunter, 1950). They dip approximately 26° to the west. Two coal beds in the Spring Valley coal zone have been isopached in the Piedmont Reservoir quadrangle.

Spring Valley [1] Coal Bed

The Spring Valley [1] coal bed is, stratigraphically, the lowest coal bed isopached in this quadrangle and is shown in figure 4. (All figures are included at the end of this report.) It attains a maximum recorded thickness of 6.5 feet (2.0 m) with no partings in sec. 34, T. 15 N., R. 118 W. The Spring Valley [1] coal bed is not known to correlate with coal beds in the Ragan quadrangle to the north.

Spring Valley [2] Coal Bed

The Spring Valley [2] coal bed lies stratigraphically above the Spring Valley [1] bed. It was mined in the Spring Valley Mine No. 1

located in secs. 27 and 34, T. 15 N., R. 118 W. during the early 1900's (RMEC, no date). The coal bed has a maximum recorded thickness of 6.5 feet (2.0 m), with no partings, where measured at the outcrop in sec. 34, T. 15 N., R. 118 W. (figure 7). The Spring Valley [2] coal bed may correlate with the lowest Spring Valley coal bed mapped in the Ragan quadrangle, where the coal bed is designated the Spring Valley [1], but this association is not certain because the coal beds in the southern part of the Ragan quadrangle are covered by Tertiary rocks. The Spring Valley [1] coal bed in the Ragan quadrangle has a maximum recorded thickness of 6.5 feet (2.0 m), but averages about 4 feet (1.2 m) thick.

Areal distribution and identified resources maps were not prepared for the Spring Valley [1] and Spring Valley [2] coal beds because the areas in which they contain coal of Reserve Base thickness lie on non-Federal lands.

The Carter seam (Veatch, 1907) is a local coal bed that lies approximately 180 feet (55 m) stratigraphically above the Spring Valley coals (Glass, 1977). Only one measurement is available for the Carter seam in this quadrangle. Veatch (1907) reported the bed had a cumulative coal thickness of 8.5 feet (2.6 m) with 1.7 feet (0.5 m) of rock partings in the Carter mine located in sec. 34, T. 15 N., R. 118 W. The mine was operated in the early 1900's (Glass, 1977).

Kemmerer Coal Zone

The Kemmerer coal zone occurs only in the subsurface in this quadrangle and is overlain by Tertiary formations. Kemmerer coal beds have been encountered in drill holes on both sides of the Round Mountain thrust fault. The coal beds east of the fault dip to the west at approximately 26° as derived from structure maps. West of the fault, where the coal beds have been displaced, the coals dip toward the east but their attitudes are not known (Schroeder, oral communication, 1979).

Kemmerer [1] Coal Bed

Only the Kemmerer [1] coal bed has been isopached in this quadrangle, and the map is in figure 4. It is bounded at depth by the

Round Mountain thrust fault on the west and by the unconformable contact with the Wasatch Formation on the east. The coal bed is 7 feet (2.1 m) thick and did not contain rock partings where measured in a drill hole in sec. 32, T. 15 N., R. 118 W. However, it thins to the east to 3.6 (1.1 m) in sec. 33, T. 15 N., R. 118 W.

COAL RESOURCES

Coal test hole data and and surface mapping by RMEC (no date) and Veatch (1907), as well as information from oil and gas wells, were used to construct outcrop, isopach, and structure contour maps of the coal beds in the quadrangle. The source of each indexed data point shown on plate 1 is listed in table 2.

Coal resources were calculated using data obtained from the coal isopach map of the Kemmerer [1] coal bed (figure 4). The coal bed acreage (measured by planimeter) multiplied by the average isopached thickness of the coal and by a conversion factor of 1,800 short tons of coal per acre-foot (13,238 metric tons per hectare-meter) for bituminous coal, yields the coal resources in short tons for the coal bed. Coal beds of Reserve Base thickness (5.0 feet or 1.5 meters) or greater that lie less than 3,000 feet (914 m) below the ground surface are included. These criteria differs somewhat from those used in calculating Reserve Base tonnages as stated in U.S. Geological Survey Bulletin 1450-B which calls for a minimum thickness of 28 inches (70 cm) and a maximum depth of 1,000 feet (305 m) for bituminous coal.

Reserve Base tonnages for the Kemmerer coal zone are shown in figure 6, and are rounded to the nearest 10,000 short tons (9,072 metric tons). Coal Reserve Base tonnages per Federal section are shown on plate 2 and total approximately 320,000 short tons (290,000 metric tons) for the entire quadrangle.

Dames & Moore has not made any determination of economic recoverability for any of the coal zones described in this report.

COAL DEVELOPMENT POTENTIAL

Coal development potential areas are drawn so as to coincide with the boundaries of the smallest legal land subdivisions shown on plate 2. In sections or parts of sections where no land subdivisions have been surveyed by the BLM, approximate 40-acre (16-ha) parcels have been used to show the limits of the high, moderate, or low development potentials. A constraint imposed by the BLM specifies that the highest development potential affecting any part of a 40-acre (16-ha) lot, tract, or parcel be applied to that entire lot, tract, or parcel. For example, if 5 acres (2 ha) within a parcel meet criteria for a high development potential, 25 acres (10 ha) a moderate development potential, and 10 acres (4 ha) a low development potential, then the entire 40 acres (16 ha) are assigned a high development potential.

Development Potential for Surface and Subsurface Mining Methods

Areas where coal beds of Reserve Base thickness (5 feet or 1.5 meters) are overlain by 200 feet (61 m) or less of overburden are ordinarily considered to have potential for surface mining. Areas considered to have development potential for conventional subsurface mining methods include those areas where the coal beds of Reserve Base thickness are between 200 feet (61 m) and 3,000 feet (914 m) below the ground surface and have dips less than 15°. In the Piedmont Reservoir quadrangle, coal beds of Reserve Base thickness are not known to occur between the 200-foot (61-m) overburden line and the ground surface on Federal land, and no coal beds of Reserve Base thickness that occur between 200 and 3,000 feet (61 and 914 m) below the ground surface have dips less than 15°. For these reasons, all Federal lands within the KRCRA boundary have been classified as having an unknown development potential for both surface and conventional subsurface mining methods.

Development Potential for In-Situ Mining Methods

Coal beds lying between 200 feet and 3,000 feet (61 and 914 m) below the ground surface, dipping greater than 15°, are considered to have a development potential for in-situ mining methods. Because only 320,000 short tons (290,000 metric tons) of coal from the Kemmerer [1] coal bed are available for in-situ mining and because of the presence of the Round Mountain thrust fault, all of the Federal land areas in this quadrangle have been classified as having an unknown development potential for in-situ mining methods. These areas include the SE 1/4 SE 1/4, NE 1/4 SE 1/4, and SE 1/4 NE 1/4 sec. 32, T. 15 N., R. 118 W.

Table 1. Chemical analyses of coals in the Piedmont Reservoir quadrangle, Uinta County, Wyoming.

Location	COAL BED NAME	Form of Analysis	Proximate				Ultimate					Heating Value	
			Moisture	Volatile Matter	Fixed Carbon	Ash	Sulfur	Hydrogen	Carbon	Nitrogen	Oxygen	Calories	Btu/Lb
SW¼, NE¼, sec. 12, T. 22 N., R. 116 W., No. 6 Mine (U.S. Bureau of Mines, 1931)	Kemmerer	A	3.9	40.1	49.0	7.0	0.6	-	-	-	-	-	12,890
		C	0.0	41.7	51.0	7.3	0.6	-	-	-	-	-	13,420
Sec. 4, T. 20 N., R. 116 W., Fitzpatrick Mine (U.S. Bureau of Mines, 1931)	Spring Valley	A	7.1	35.2	50.8	6.9	0.4	-	-	-	-	-	12,470
		C	0.0	37.9	54.7	7.4	0.5	-	-	-	-	-	13,420

Form of Analysis: A, as received
B, air dried
C, moisture free

Note: To convert Btu/pound to kilojoules/kilogram, multiply by 2.326

Table 2. -- Sources of data used on plate 1

Plate 1 Index Number	Source	Data Base
1	Rocky Mountain Energy Co., (no date), unpublished data	Drill hole No. 2, line A
2		Drill hole No. 1, line A
3		Drill hole No. 1, line A
4		Drill hole No. X
5		Drill hole No. 1
6		Drill hole No. 3, line A
7		Drill hole No. 2, line A
8		Drill hole No. 1, line A
9	Brinkerhoff Drilling	Oil/gas well No. 1-31 Unit
10	Veatch, 1907, U.S. Geological Survey Professional Paper 56, p. 143	Drill hole No. 14 (Union Pacific Coal Co.)
11	Rocky Mountain Energy Co., (no date), unpublished data	Drill hole No. 5
12	Veatch, 1907, U.S. Geological Survey Professional Paper 56, p. 85	Drill hole No. 6 (Union Pacific Coal Co.)
13	Veatch, 1907, U.S. Geological Survey Professional Paper 56, p. 84 and p. 150, No. 11	Baker oil well (Western Wyoming Oil Co.)
14	Rocky Mountain Energy Co., (no date), unpublished data	Drill hole No. 7

Table 2. -- Continued

Plate 1 Index Number	Source	Data Base
15	Veatch, 1907, U.S. Geological Survey Professional Paper 56, p. 116	Drill hole No. 8
16	Veatch, 1907, U.S. Geological Survey Professional Paper 56, p. 84	Drill hole No. 1 (Union Pacific Coal Co.)
17		Drill hole No. 2 (Union Pacific Coal Co.)
18	Veatch, 1907, U.S. Geological Survey Professional Paper 56, p. 85	Drill hole No. 3 (Union Pacific Coal Co.)
19	Veatch, 1907, U.S. Geological Survey Professional Paper 56, p. 84 and p. 129, No. 138	Drill hole No. 4 (Union Pacific Coal Co.)
20	Veatch, 1907, U.S. Geological Survey Professional Paper 56, p. 84 and p. 129, No. 137	Drill hole No. 5 (Union Pacific Coal Co.)
21	Rocky Mountain Energy Co., (no date), unpublished data	Drill hole No. 2, line A
22	Veatch, 1907, U.S. Geological Survey Professional Paper 56, p. 129, No. 139	Drill hole No. 9 (Union Pacific Coal Co.)
23	Veatch, 1907, U.S. Geological Survey Professional Paper 56, p. 129, No. 141	Mine Section (Union Pacific Coal Co.-Spring Valley Mine)
24	Veatch, 1907, U.S. Geological Survey Professional Paper 56, p. 129, No. 140	Mine Section (Carter Coal Mine)
25	Veatch, 1907, U.S. Geological Survey Professional Paper 56, p. 130, No. 142	Measured Section
26	Veatch, 1907, U.S. Geological Survey Professional Paper 56, p. 130, No. 143	Measured Section
27	Amoco Production Co.	Oil/gas well No. 1 Champlin-381-Amoco-A

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EXPLANATION

5
6

ISOPACHS - Showing thickness of coal, in feet. Long dashed where inferred. Isopach interval 1 foot.

7000
6800

STRUCTURE CONTOURS - Drawn on top of coal bed. Solid where vertical accuracy within 40 feet; long dashed where vertical accuracy possibly not within 40 feet. Contour interval 200 feet (61 m). Datum is mean sea level.

○ 6559
4.9

DRILL HOLE - Showing altitude of top of coal bed, and thickness of coal, in feet.

▲ 7120
6.3

POINT OF MEASUREMENT - Showing altitude of top of coal bed, and thickness of coal, in feet. Includes all points of measurement other than drill holes.

K[1] - Kemmerer [1]
SV[2] - Spring Valley [2]
SV[1] - Spring Valley [1]

COAL BED SYMBOLS AND NAMES - Coal beds identified by bracketed numbers are not formally named, but are numbered for identification purposes in this quadrangle only.

SV[1]

TRACE OF COAL BED OUTCROP - Showing symbol of name of coal bed as listed above. Arrow points toward coal-bearing area. Short dashed where inferred by present authors.

Spring Valley
Mine No. 1

SUBSURFACE COAL MINE - Showing name of mine. Dashed where approximately located.

To convert feet to meters, multiply feet by 0.3048.

FIGURE 1. — Explanation for isopach and structure contour maps.

EXPLANATION

——— 200 ——— ———

OVERBURDEN ISOPACHS - Showing thickness of overburden, in feet, from surface to top of coal bed. Dashed where vertical accuracy possibly not within 40 feet. Isopach interval 200 feet (61 m) over strippable coal and 400 feet (122 m) beyond the stripping-limit line.

○581

DRILL HOLE - Showing thickness of overburden, in feet, from surface to top of coal bed.

——— · ———10——— · ———

MINING-RATIO CONTOUR - Number indicates cubic yards of overburden per ton of recoverable coal by surface mining methods. Contours shown only in areas underlain by coal of Reserve Base thickness within the stripping-limit (in this quadrangle, the 200-foot-overburden isopach). To convert mining ratio to cubic meters of overburden per metric ton of recoverable coal, multiply mining ratio by 0.8428.

K[1] - Kemmerer [1]
SV[2] - Spring Valley [2]
SV[1] - Spring Valley [1]

COAL BED SYMBOLS AND NAMES - Coal beds identified by bracketed numbers are not formally named, but are numbered for identification purposes in this quadrangle only.

– – – – SV[1] – – – – –

TRACE OF COAL BED OUTCROP - Showing symbol of name of coal bed as listed above. Short dashed where inferred by present authors.

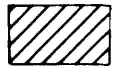
Spring Valley
Mine No. 1

SUBSURFACE COAL MINE - Showing name of mine. Dashed where approximately located.

To convert feet to meters, multiply feet by 0.3048.

FIGURE 2. — Explanation for overburden isopach and mining ratio maps.

EXPLANATION



NON-FEDERAL COAL LAND - Land for which the Federal Government does not own the coal rights.

K[1] - Kemmerer [1]

COAL BED SYMBOL AND NAME - Coal bed identified by bracketed numbers is not formally named, but is numbered for identification purposes in this quadrangle only.

RB	R(50%)	
0.29	—	(Measured)
0.03	—	(Indicated)
—	—	(Inferred)

IDENTIFIED COAL RESOURCES - Showing totals for Reserve Base (RB) and Reserves (R), in millions of short tons, for each section or part of section of non-leased Federal coal land, both within and beyond the stripping-limit line. Reserve (R) tonnage is calculated by multiplying the Reserve Base (RB) tonnage by the appropriate recovery factor. Dash indicates no resource in that category. Underground Reserves have been calculated for only that part of the Reserve Base that is suitable for underground mining, and do not include Reserves for areas where the dip of the coal bed exceeds 15°. Measured resources (M) extend 0.25 miles beyond the point of measurement. Indicated resources (I) are defined between 0.25 and 0.75 miles from the point of measurement. Inferred resources (Inf) extend from 0.75 to 3 miles from the point of measurement.

To convert short tons to metric tons, multiply short tons by 0.9072.

To convert feet to meters, multiply feet by 0.3048.

To convert miles to kilometers, multiply miles by 1.6093.

FIGURE 3. — Explanation for areal distribution and identified resources map.

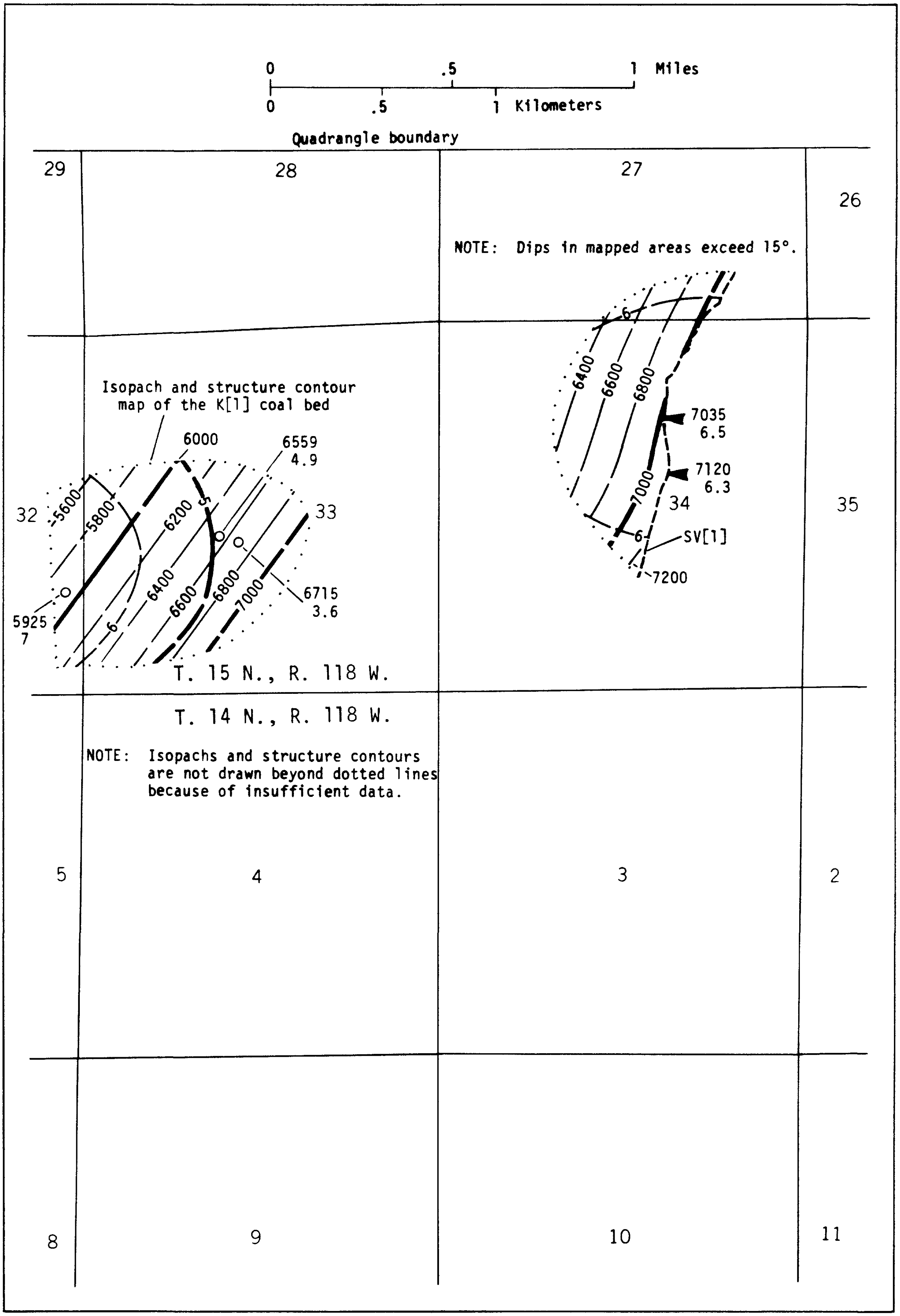


FIGURE 4. — Isopach and structure contour maps of the Spring Valley [1] and the Kemmerer [1] coal beds.

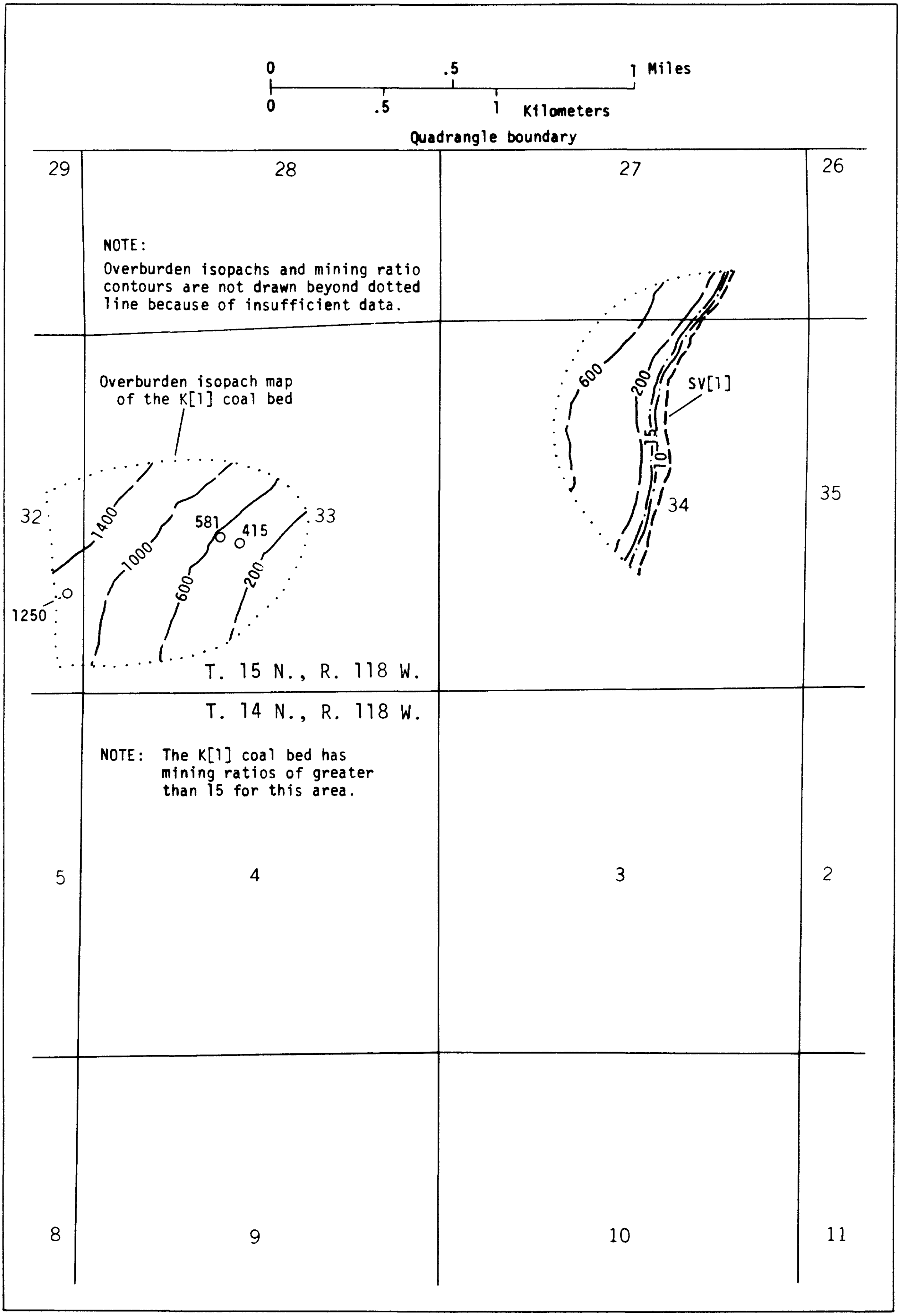


FIGURE 5. — Overburden isopach and mining ratio maps of the Spring Valley [1] and the Kemmerer [1] coal beds.

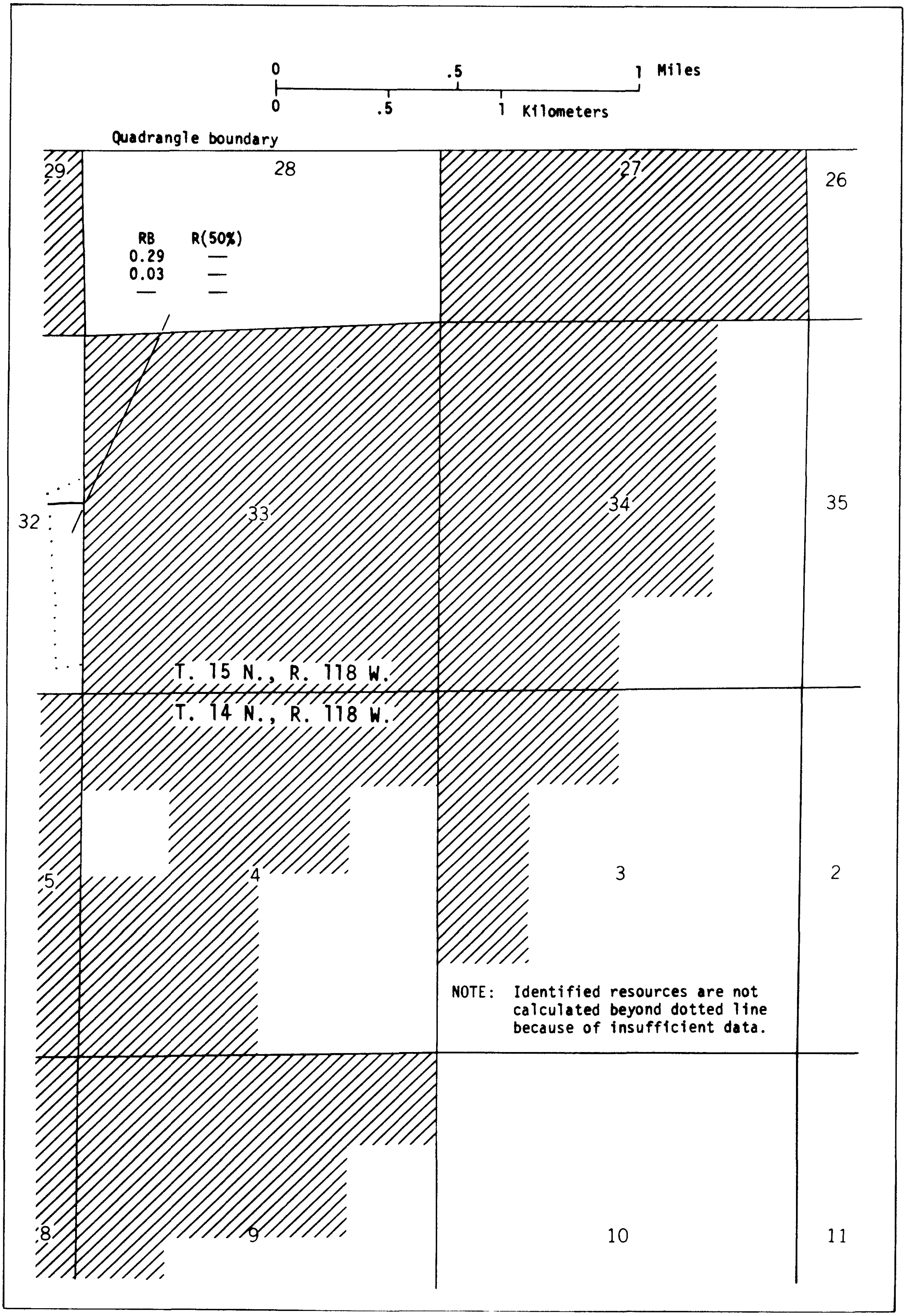


FIGURE 6. — Areal distribution and identified resources map of the Kemmerer [1] coal bed.

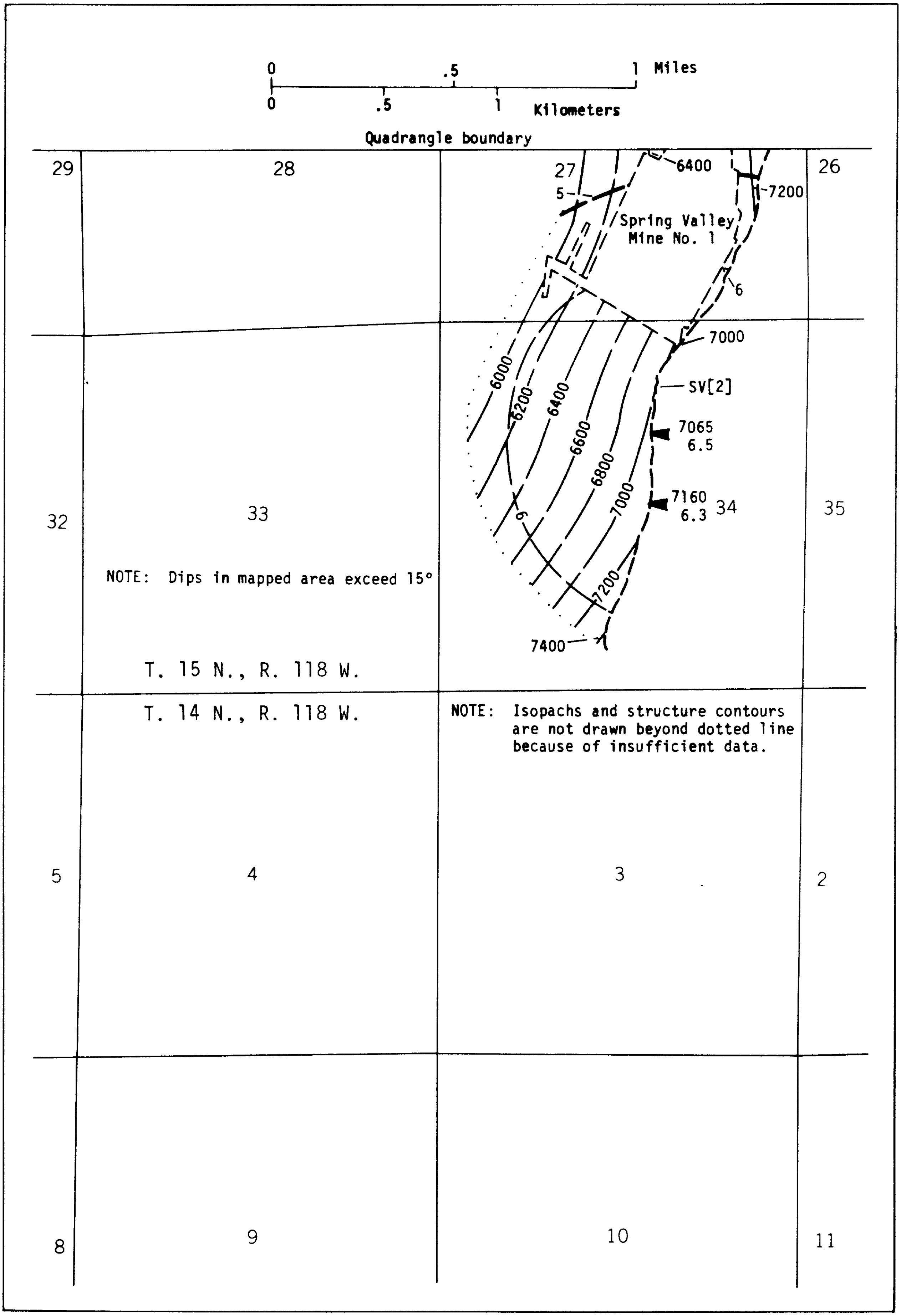


FIGURE 7. — Isopach and structure contour map of the Spring Valley [2] coal bed.

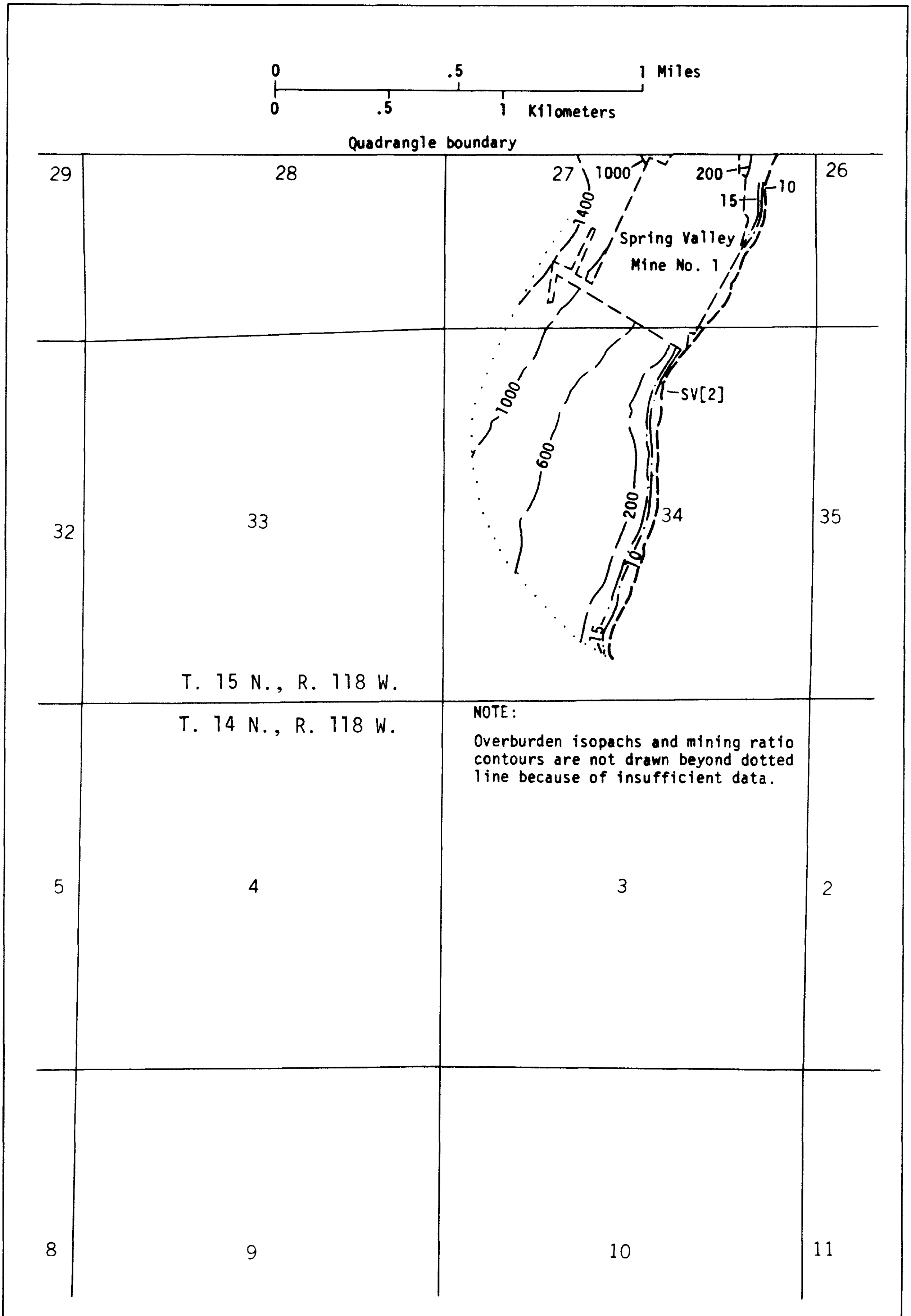


FIGURE 8. — Overburden isopach and mining ratio map of the Spring Valley [2] coal bed.

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