Text to Accompany:

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COAL RESOURCE OCCURRENCE AND COAL DEVELOPMENT POTENTIAL MAPS OF THE GUILD HOLLOW QUADRANGLE, UINTA COUNTY, WYOMING

[Report includes 3 plates]

Prepared for

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

By

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This report has not been edited for conformity with U.S. Geological Survey editorial standards or stratigraphic nomenclature.

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INTRODUCTION

Purpose

This text is to be used in conjunction with Coal Resource Occurrence (CRO) and Coal Development Potential (CDP) Maps of the Guild Hollow 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 Published and unpublished public information available thorugh May, 1978, was used as the data base for this study.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 Guild Hollow quadrangle is located in west-central Uinta County, Wyoming, approximately 5 airline miles ([illegible] km) east of the town of Evanston and 18 airline miles (29 km) southwest of the town of Carter, Wyoming. In general, the quadrangle is unpopulated.

Accessibility

Interstate Highway 80 crosses southwesterly through the southern half of the quadrangle, connecting Evanston to the west with the town of Fort Bridger approximately 20 miles (32 km) to the east. Numerous unimproved dirt roads and trails provide access through the remainder of the quadrangle (U.S. Bureau of Land Management, 1971).

The main east-west line of the Union Pacific Railroad passes through the adjacent Sulphur Creek Reservoir quadrangle to the south and through Evanston to the west. This line provides railway service across southern Wyoming between Ogden, Utah, to the west and Omaha, Nebraska, to the east (U.S. Bureau of Land Management, 1978).

Physiography

The Guild Hollow quadrangle lies on the southeastern edge of the Wyoming Overthrust Belt. The landscape within the quadrangle is characterized by northeast-trending ridges, flat-topped hills, canyons and ravines. Altitudes in the quadrangle range from less than 6,900 feet (2,103 m) in Duncomb Hollow on the southwestern edge of the quadrangle, to over 7,920 feet (2,414 m) on a ridge along the north-central edge of the quadrangle.

The eastern half of the quadrangle is drained by tributaries of Albert Creek that empties into Little Muddy Creek east of the quadrangle boundary. Tributaries of the Bear River drain the western half of the quadrangle. All streams in the quadrangle are intermittent and flow mainly in response to snowmelt in the spring. Numerous springs and small ponds occur throughout the quadrangle. There is a small reservoir on Guild Hollow in the south-central part of the quadrangle and a larger reservoir on Little Byrne Creek on the northeastern edge of the quadrangle (U.S. Bureau of Land Management, 1971).

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, greasewood, saltbush, mountain mahogany, rabbitbrush, serviceberry, and juniper (U.S. Bureau of Land Management, 1978).

Land Status

The Guild Hollow quadrangle lies in the southwestern part of the Kemmerer Known Recoverable Coal Resource Area (KRCRA). Only the eastern edge of the quadrangle, approximately 20 percent of its total area, lies within the KRCRA boundary. The Federal government owns the coal rights for less than half of this land as shown on plate 2. No outstanding Federal coal leases, prospecting permits, or licenses occur within the quadrangle.

GENERAL GEOLOGY

Previous Work

Veatch (1906 and 1907) mapped the geology and economic resources of a large part of Uinta and Lincoln Counties in southwestern Wyoming including the Guild Hollow quadrangle. Cobban and Reeside described the stratigraphy of the coal-bearing Frontier Formation in the Kemmerer area in 1952. Glass reported chemical analyses and measured sections of Adaville Formation coal in the Kemmerer coal field in 1975, and updated information on the Kemmerer coal field in 1977. Schroeder (1976a) mapped the surface geology of the Ragan quadrangle to the east, the Meadow Draw quadrangle to the northeast (1976b), the eastern half of the Guild Hollow quadrangle (1977a), and the Sulphur Creek Reservoir quadrangle to the south (1977b). Roehler and others (1977) described the geology and coal resources of the Hams Fork coal region including the Kemmerer coal field.

Stratigraphy

The formations cropping out in the Guild Hollow quadrangle range in age from Late Jurassic to Eocene. The Late Cretaceous Frontier and Adaville Formations are known to be coal-bearing.

The Stump Sandstone and Preuss Red Beds of Late Jurassic age, cropping out in the southeast quarter of the quadrangle, have been mapped by Schroeder (1977a) as undifferentiated beds. The Preuss Red Beds are characterized by purplish-red to red silty mudstone and thin beds of red, tan, and gray sandstone. The Stump Sandstone, located stratigraphically above the Preuss Red Beds, consists of greenish- to brownish-gray, cross-bedded, fine-grained sandstone and some limestone beds (Rubey and others, 1975; Schroeder, 1976b and 1977a).

The Early Cretaceous-age rocks of the Gannett Group conformably overlie the Stump Sandstone and crop out in the southeastern quarter of the quadrangle. The Gannett Group consists of brick-red shale and mudstone, tan to red sandstone, and conglomerate in the lower part; and interbedded red sandy mudstone with thin beds of gray to reddish- to purplish-gray limestone in the upper part. The combined thickness of the Stump Sandstone, Preuss Red Beds, and Gannett Group is approximately 1,200 feet (366 m) in the Meadow Draw quadrangle (Rubey and others, 1975; Schroeder, 1976b and 1977a).

The Bear River Formation of Early Cretaceous age crops out in the southeast quarter of the quadrangle (Cook, 1977). This formation conformably (Eyer, 1969) overlies the Gannett Group and consist of approximately 500 feet (152 m) of interbedded dark gray to black claystone, olive to tan-weathering fine-grained sandstone, and thin fossiliferous limestone (Rubey and others, 1975; Schroeder, 1976b and 1977a).

The Aspen Shale of latest Early Cretaceous age conformably overlies the Bear River Formation. The Aspen Shale is present in the subsurface between the Absaroka and Round Mountain faults and in the western part of the quadrangle (Cook, 1977). It is composed primarily of light to dark-gray shale and siltstone containing a few beds of gray quartzitic sandstone and white to light-gray porcelanite. The formation is approximately 900 to 1,000 feet (274 to 305 m) thick where measured in the Meadow Draw quadrangle to the northeast (Rubey and others, 1975; Schroeder, 1976b and 1977a).

The sandstones and shales of the Frontier Formation, early Late Cretaceous in age, crop out in the southeastern corner of the quadrangle (Schroeder, 1977a). The formation has been divided into two mappable units. The lower unit consists mainly of brown sandstone, tan siltstone, mudstone, dark-gray carbonaceous shale, minor limestone, and coal (Spring Valley coal zone) approximately 1,000 feet (305 m) thick. The upper unit contains approximately 1,200 feet (366 m) of gray sandstone, siltstone, shale, and near the top, the Kemmerer coal zone. This unit also contains the Oyster Ridge Sandstone Member, a ridge-forming sandstone that is characterized by the presence of Ostrea soleniscus, a long, slender oyster (Bozzuto, 1977). The Oyster Ridge Sandstone Member is approximately 85 to 100 feet (26 to 30 m) thick (Schroeder, oral communication, 1979).

The Hilliard Shale is early Late Cretaceous in age and conformably overies the Frontier Formation. It consists of a very thick sequence of dark-gray to dark-brown marine shale, siltstone, and sandy shale containing glauconitic sandstone beds. The formation is present in the subsurface and is approximately 6,000 feet (1,829 m) thick (Rubey and others, 1975; Schroeder, 1976b and 1977a; Cook, 1977).

The Adaville Formation of Late Cretaceous age conformably overlies the Hilliard Shale and crops out in secs. 8 and 17, T. 15 N., R. 118 W. It consists of approximately 2,700 feet (823 m) of gray-brown-weathering carbonaceous shale and mudstone containing yellowish-brown to reddish-brown sandstone and siltstone and numerous coal beds. The Lazeart Sandstone Member comprises the lower 200 to 400 feet (61 to 122 m) of the formation. This prominent ledge- and cliff-forming unit is composed of light-gray to white, fine- to coarse-grained sandstone (Rubey and others, 1975; Schroeder, 1976b and 1977a).

The Evanston Formation unconformably overlies the Adaville Formation, cropping out in parts of the northeastern quarter of the quadrangle. The basal member of this formation, the Hams Fork Conglomerate Member of latest Cretaceous age, consists of up to 1,000 feet (305 m) of boulder-conglomerate beds interbedded with white to brown calcareous sandstone. The main body of the Evanston Formation, which is Paleocene in age, consists of over 200 feet (61 m) of gray siltstone, carbonaceous claystone, shaly mudstone, quartzitic siltstone and gray carbonaceous sandstone (Schroeder, 1976b and 1977a).

The Wasatch Formation of Eocene age unconformably overlies Paleocene-age and older formations, cropping out in large areas throughout the quadrangle. The Wasatch Formation 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 and 1977a).

Holocene deposits of alluvium cover the stream valleys of the creeks in the quadrangle.

The Preuss Red Beds and Stump Sandstone are shallow-marine in origin. The Gannett Group sediments accumulated in fluvial and lacustrine environments (Eyer, 1969; Furer, 1970).

The Upper Cretaceous formations in the Guild Hollow 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 Lazeart Sandstone Member at the base of the Adaville Formation is a beach deposit marking a transition from the marine deposition of the Hilliard Shale to the continental coastal plain deposition of the Adaville Formation. The sediments of the Adaville Formation were deposited in flood plains and swamps along the coastal plain (Roehler and others, 1977).

After the final withdrawal of the Cretaceous sea, thick sections of detrital material, eroded from older deposits to the west, were deposited by large streams as the conglomerates of the Hams Fork Conglomerate Member of the Evanston Formation. Environments of deposition for the main body of the Evanston Formation included streams, marshes, and, probably, ponds (Oriel and Tracey, 1970).

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 Guild Hollow 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.

Three major faults and two synclines have been mapped (Schroeder, 1977a) in the eastern half of the Guild Hollow quadrangle and are shown on plate 1. The Oil Spring syncline is located between the Absaroka and Round Mountain thrust faults, and the Lazeart syncline is bounded on the west by the Round Mountain fault. Both synclines contain coal-bearing strata. The folded strata of the Frontier Formation within the Oil Springs syncline is offset by a reverse fault, the Oil Springs fault. Cook (1977) illustrates the general structural features in the Aspen tunnel area (including the Guild Hollow quadrangle) through a series of cross sections.

COAL GEOLOGY

Both the Frontier and Adaville Formations contain coal in this quadrangle. In the Frontier Formation, coal beds within the Kemmerer coal zone, near the top of the formation, have been mapped by Schroeder (1977a). Measurements along the outcrops indicate that the coal beds in this zone are thin, and do not exceed Reserve Base thickness (5 feet or 1.5 meters). The Spring Valley coal zone, in the lower part of the Frontier Formation, is not exposed in the quadrangle but is believed to be present in the subsurface between the Absaroka and Round Mountain faults.

The Adaville Formation, partially exposed east of the Round Mountain fault, probably contains several coal beds. Two coal test holes drilled in sec. 7, T. 15 N., R. 118 W., encountered only thin coals. However, data projected from the adjacent Ragan quadrangle to the east indicates the presence of at least one thick Adaville coal bed in this quadrangle.

Chemical analyses of coal.--Representative analyses of coal from the Kemmerer coal zone and the Adaville Formation are listed in table 1. These coals were sampled in the southeast quarter of the Kemmerer 15-minute quadrangle.

In general, coals in the Kemmerer coal zone rank as high-volatile B bituminous and coal from the Adaville No. 1 coal bed ranks as subbituminous A. Coal from other Adaville coal beds is either subbituminous B or C (Glass, 1975). The coals are 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 of the Adaville Formation

The Adaville No. 1, a thick persistant coal bed lying directly above the Lazeart Sandstone Member, has been traced west from the Lazeart Mine located in sec. 8, T. 15 N., R. 118 W., into this quadrangle. Mine-measured sections and drill-hole data from in the Ragan quadrangle have been projected into this quadrangle. These data have been used to construct derivative maps of the Adaville No. 1 coal bed in this quadrangle.

In the Guild Hollow quadrangle, the Adaville No. 1 coal bed has been inferred to range from 5 to more than 25 feet (1.5 to 7.6 m) in thickness, thinning to the north as indicated in figure 1 (All figures are located at the end of this report). Where mined previously at the Lazeart Mine in the Ragan quadrangle, the Adaville No. 1 coal bed is 30 feet (9.1 m) thick with no partings. The coal bed splits irregularly in the Ragan quadrangle, but remains quite thick as it is traced northward. In the Meadow Draw quadrangle, the coal bed thickens to 62 feet (18.9 m).

Several thick coal beds are usually present stratigraphically above the Adaville No. 1, but lack of subsurface data in the Guild Hollow quadrangle prevents confirmation.

COAL RESOURCES

Information from coal test holes drilled by Rocky Mountain Energy Company (RMEC), as well as surface geologic data from Schroeder (1977a), were used to construct maps of the coal beds in the Guild Hollow quadrangle. The source of each indexed data point shown on plate 1 is listed in table 4.

Coal resources were calculated using data obtained from the coal isopach map (figure 1). The coal bed acreage (measured by planimeter) multiplied by the average isopached thickness of the coal bed, and by a conversion factor of 1,770 short tons of coal per acre-foot (13,018 metric tons per hectare-meter) for subbituminous coal, yields the coal resources in short tons. Reserve Base and Reserve tonnages for the isopached bed are shown on figure 4, and are rounded to the nearest 10,000 short tons (9,072 metric tons). Coal beds of Reserve Base thickness (5 feet or 1.5 meters) or greater that lie less than 3,000 feet (914 m) below the ground surface are included. These criteria differ somewhat from those used in calculating Reserve Base and Reserve tonnages as stated in U.S. Geological Survey Bulletin 1450-B which calls for a maximum depth of 1,000 feet (305 m) for subbituminous coal.

Coal Reserve Base tonnages per Federal section are shown on plate 2 and total approximately 4.86 million short tons (4.41 million metric tons) for the entire quadrangle. Reserve Base tonnages in the various development potential categories for surface and subsurface mining methods are shown in tables 2 and 3.

Dames & Moore has not made any determination of economic recoverability for any of the coal beds 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 Mining Methods

Areas where the coal beds of Reserve Base thickness are overlain by 200 feet (61 m) or less of overburden are considered to have potential for surface mining and were assigned a high, moderate, or low development potential based on the mining ratio (cubic yards of overburden per ton of recoverable coal). The formula used to calculate mining ratios for surface mining of coal is shown below:

$$MR = \frac{t_o\ (cf)}{t_c\ (rf)}$$

where MR = mining ratio

t_o = thickness of overburden in feet

t_c = thickness of coal in feet

rf = recovery factor (85 percent for this quadrangle)

cf = conversion factor to yield MR value in terms of cubic yards of overburden per short tons of recoverable coal:

0.911 for subbituminous coal

0.896 for bituminous coal

Note: To convert mining ratio to cubic meters of overburden per metric ton of recoverable coal, multiply MR by 0.8428.

Areas of high, moderate, and low development potential for surface mining methods are defined as areas underlain by coal beds having respective mining ratio values of 0 to 10, 10 to 15, and greater than 15. These mining ratio values for each development potential category are based on economic and technological criteria and were provided by the U.S. Geological Survey.

Areas where the coal data is absent or extremely limited between the 200-foot (61-m) overburden line and the outcrop are assigned unknown development potentials for surface mining methods. This applies to areas where coal beds 5 feet (1.5 m) or more thick are not known, but may occur.

The coal development potential for surface mining methods is shown in figure 5. Of that part of sec. 8, T. 15 N., R. 118 W., that is present within the quadrangle, 40 percent is rated high for surface development potential. The remaining Federal lands within the KRCRA boundary are classified as having unknown development potential for surface mining methods.

Development Potential for Subsurface and In-Situ Mining Methods

Areas considered to have a development potential for conventional subsurface mining methods include those areas where the coal beds of Reserve Base thickness are between 200 and 3,000 feet (61 and 914 m) below the ground surface and have dips of 15° or less. Coal beds lying between 200 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.

Areas of high, moderate, and low development potential for subsurface mining methods are defined as areas underlain by coal beds at depths ranging from 200 to 1,000 feet (61 to 305 m), 1,000 to 2,000 feet (305 to 610 m), and 2,000 to 3,000 feet (610 to 914 m), respectively.

The coal development potential for subsurface mining methods is shown in figure 6. Of that part of sec. 8, T. 15 N., R. 118 W. that is present within the quadrangle, 10 percent is rated high and 5 percent is rated moderate for conventional subsurface mining methods. The remaining Federal land area in the section has unknown development potential for conventional subsurface mining methods because the coal bed in that area dips in excess of 15°. This area could have been rated for in-situ development potential, but both surface and conventional subsurface mining methods take precedence over the in-situ method in this case. A total of approximately 3.43 million short tons (3.11 million metric tons) of coal, dipping in excess of 15°, is available for the in-situ process.

Table 1.--Chemical analyses of coals in the Guild Hollow 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, SW¼, sec. 11, T. 21 N., R. 116 N., Elkol Mine (Glass, 1975)	Adaville No. 1	A	16.7	36.5	42.8	4.0	1.3	-	-	-	-	-	10,530
		C	0.0	43.8	51.4	4.8	1.5	-	-	-	-	-	12,640
SW¼, NE¼, sec. 12, T. 21 N., R. 116 W., Kemmerer No. 1 Mine (Glass, 1975)	Kemmerer No. 1	A	5.9	37.6	49.0	7.5	1.4	-	-	-	-	-	12,370
		C	0.0	39.9	52.1	8.0	1.5	-	-	-	-	-	13,140

Form of Analysis: A, as received
C, moisture free

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

Table 2.--Coal Reserve Base data for surface mining methods for Federal coal lands (in short tons) in the Guild Hollow quadrangle, Uinta County, Wyoming.

Coal Bed or Zone	High Development Potential	Moderate Development Potential	Low Development Potential	Unknown Development Potential	Total
Adaville No. 1	750,000	70,000	10,000	-0-	830,000
Totals	750,000	70,000	10,000	-0-	830,000

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

Table 3.--Coal Reserve Base data for subsurface mining methods for Federal coal lands (in short tons) in the Guild Hollow quadrangle, Uinta County, Wyoming.

Coal Bed or Zone	High Development Potential	Moderate Development Potential	Low Development Potential	Unknown Development Potential	Total
Adaville No. 1	260,000	340,000	-0-	3,430,000	4,030,000
Totals	260,000	340,000	-0-	3,430,000	4,030,000

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

Table 4. -- 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. 1
2	↓	Drill hole No. 1A
3	Schroeder, 1977a, U.S. Geological Survey Open-File Report 77-427	Measured Section No. 19
4	Veatch, 1907, U.S. Geological Survey Professional Paper 56, p. 130	Measured Section No. 144

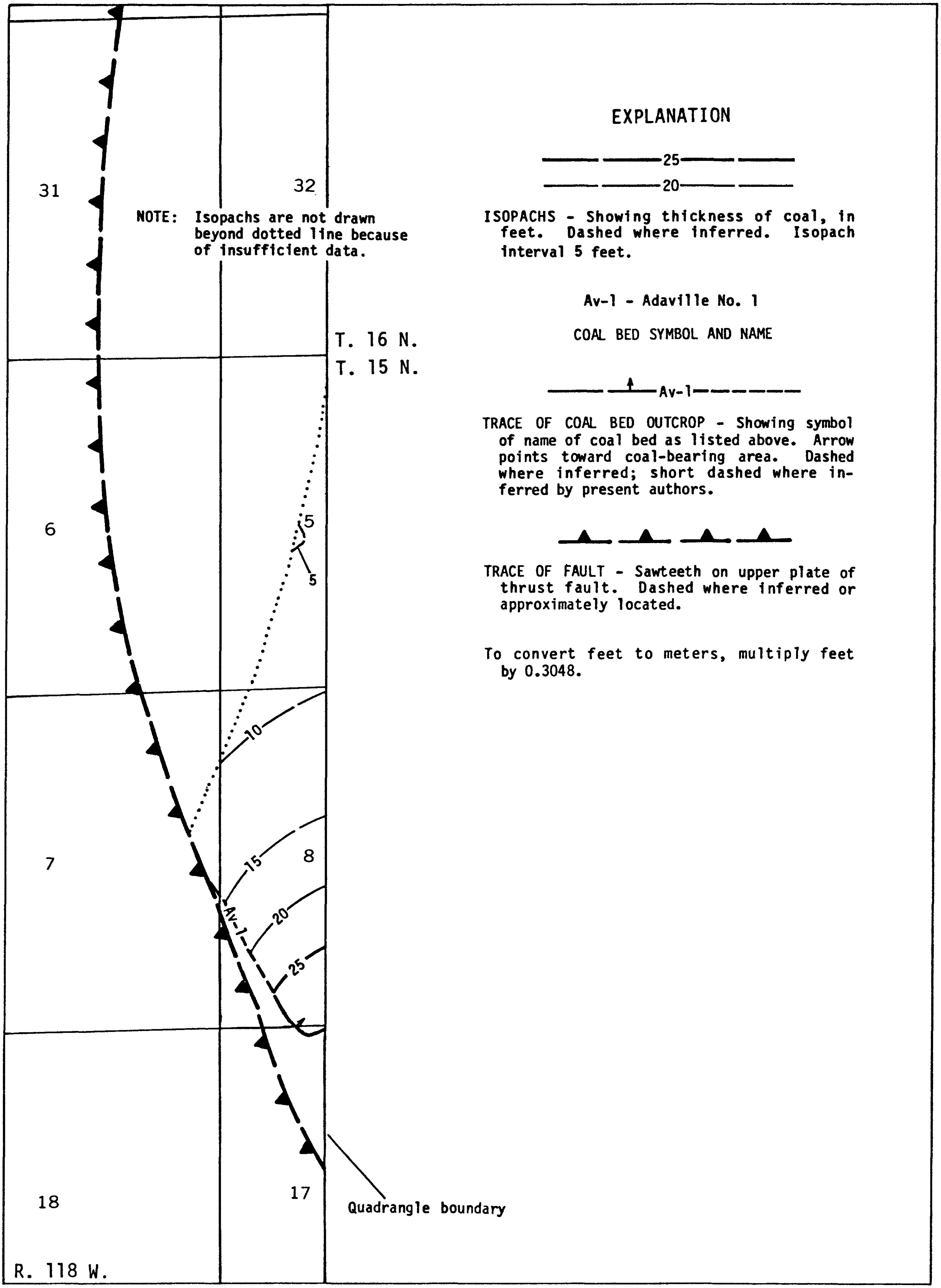
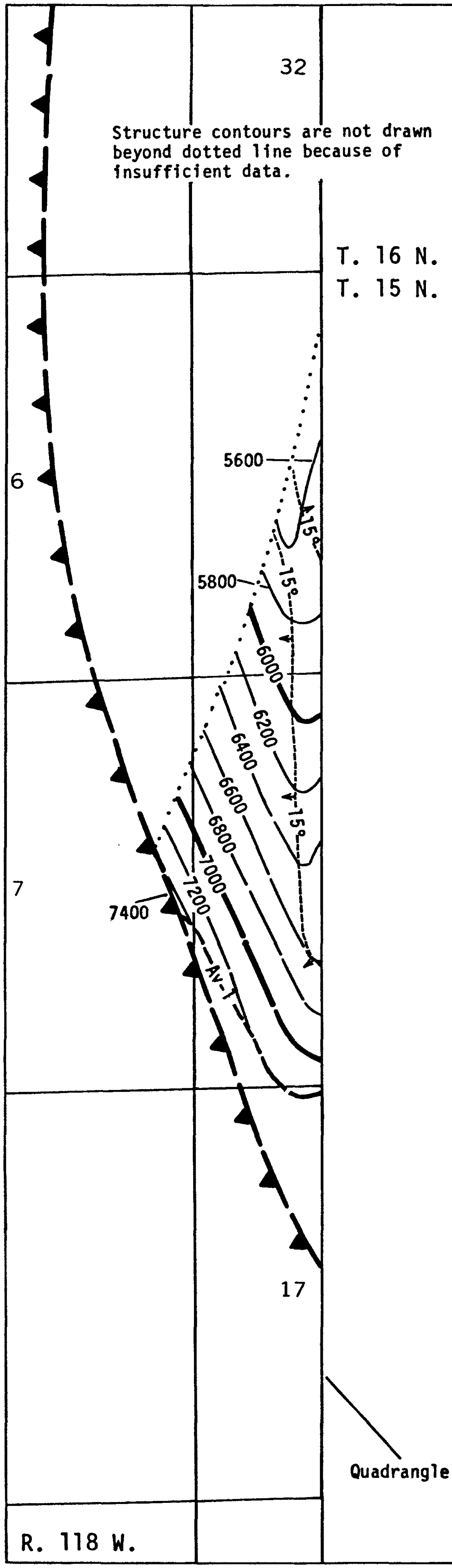


FIGURE 1. — Isopach map of the Adaville No. 1 coal bed.



EXPLANATION

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 is 200 feet (61 m). Datum is mean sea level.

Av-1 - Adaville No. 1

COAL BED SYMBOL AND NAME

Av-1

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

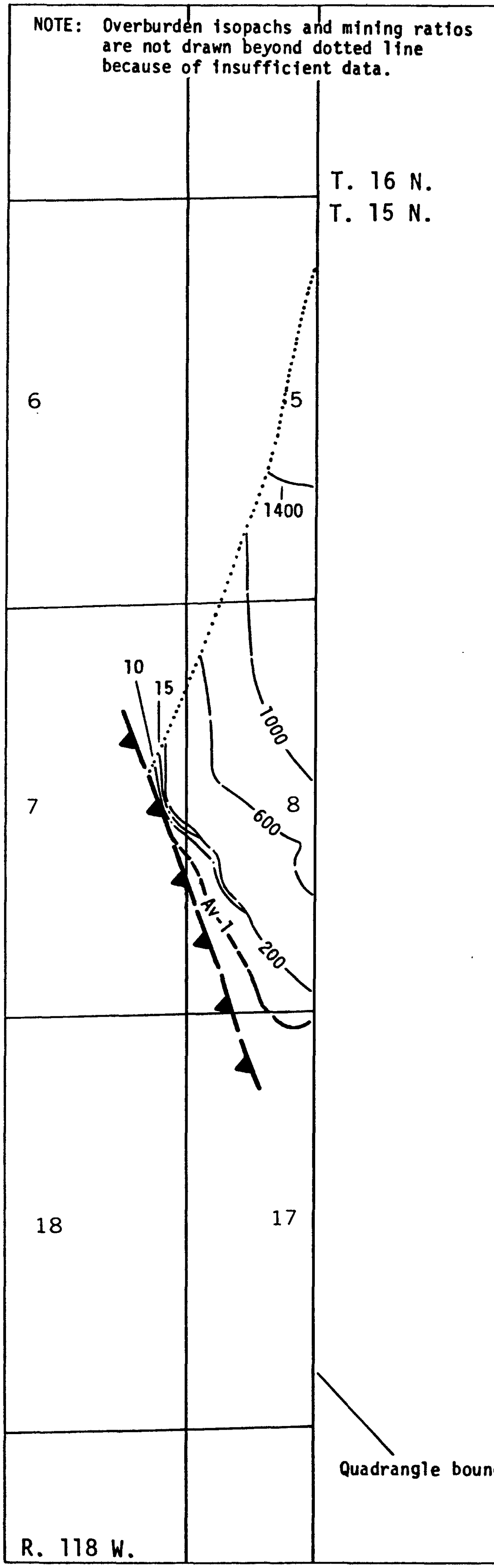
15°

SUBSURFACE MINING LIMIT - Showing areas where dips of coal beds are greater than 15° and subsurface mining by conventional methods is not considered feasible. Reserve Base tonnages are calculated beyond limit; Reserve tonnages are not. Arrow points toward area where dips are greater than 15°.

TRACE OF FAULT - Sawteeth on upper plate of thrust fault. Dashed where inferred or approximately located.

To convert feet to meters, multiply feet by 0.3048.

FIGURE 2. — Structure contour map of the Adaville No. 1 coal bed.



EXPLANATION

600

OVERBURDEN ISOPACHS - Showing thickness of overburden, in feet, from surface to top of coal bed. Dashed where vertical accuracy possibly not within 50 feet. Isopach interval is 200 feet (61 m) over strippable coal and 400 feet (122 m) beyond the stripping-limit.

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.

Av-1 - Adaville No. 1

COAL BED SYMBOL AND NAME

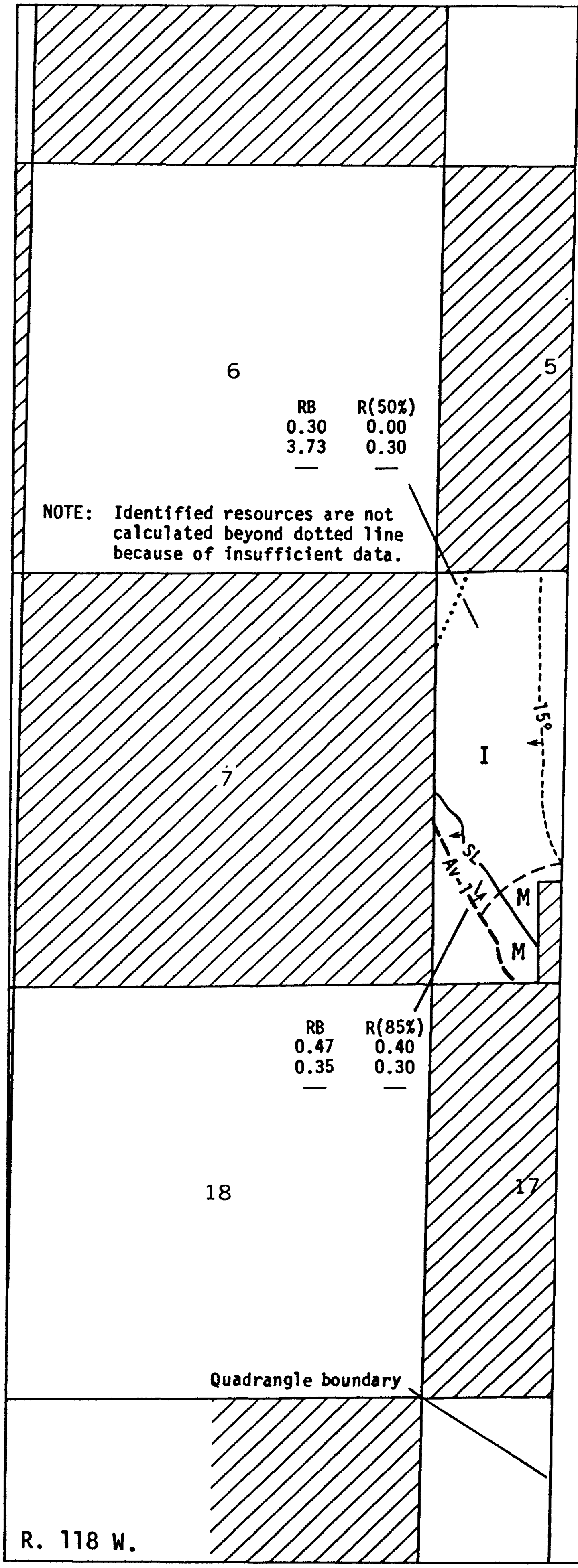
Av-1

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

TRACE OF FAULT - Sawteeth on upper plate of thrust fault. Dashed where inferred or approximately located.

To convert feet to meters, multiply feet by 0.3048.

FIGURE 3. — Overburden isopach and mining ratio map of the Adaville No. 1 coal bed.



EXPLANATION

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

Av-1 - Adaville No. 1

COAL BED SYMBOL AND NAME

——Av-1——

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

—— SL ——

STRIPPING-LIMIT LINE - Boundary for surface mining (in this quadrangle, the 200-foot-overburden isopach). Arrow points toward the area suitable for surface mining where the recovery factor is 85 percent, and away from the area suitable for subsurface mining (down dip to the 3,000-foot-overburden isopach) where the recovery factor is 50 percent.

----15º----

SUBSURFACE MINING LIMIT - Showing areas where dips of coal beds are greater than 15° and subsurface mining by conventional methods is not considered feasible. Reserve Base tonnages are calculated beyond limit; Reserve tonnages are not. Arrow points toward area where dips are greater than 15°.

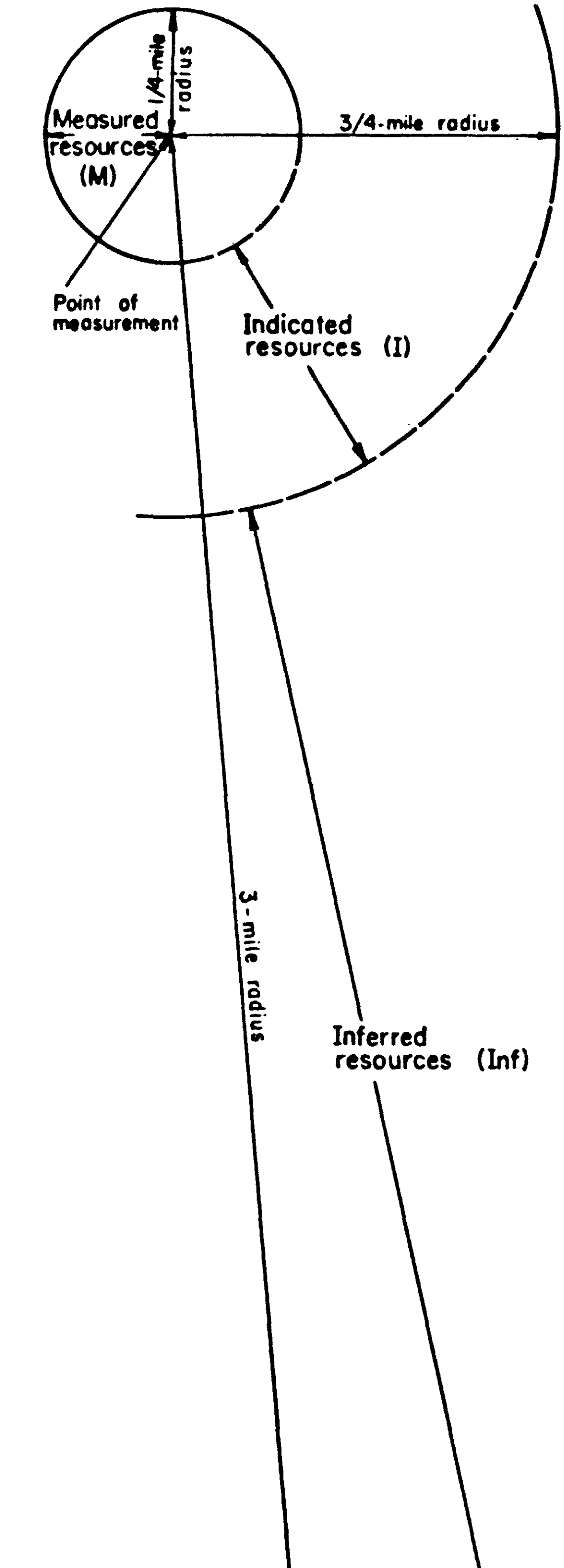
RB	R(85%)	
0.47	0.40	(Measured)
0.35	0.30	(Indicated)
—	—	(Inferred)

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. Reserves have been calculated for a constant thickness of 12 feet for areas where the coal beds are more than 12 feet thick. Therefore, in some instances, underground Reserves may be less than 50 percent of the Reserve Base.

To convert feet to meters, multiply feet by 0.3048.

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

FIGURE 4. — Areal distribution and identified resources map of the Adaville No. 1 coal bed.



BOUNDARY LINES - Enclosing areas of measured (M), indicated (I), and inferred (Inf) coal resources. Dashed where projected from adjacent quadrangles.

To convert miles to kilometers, multiply miles by 1.609.

FIGURE 4. — Continued.

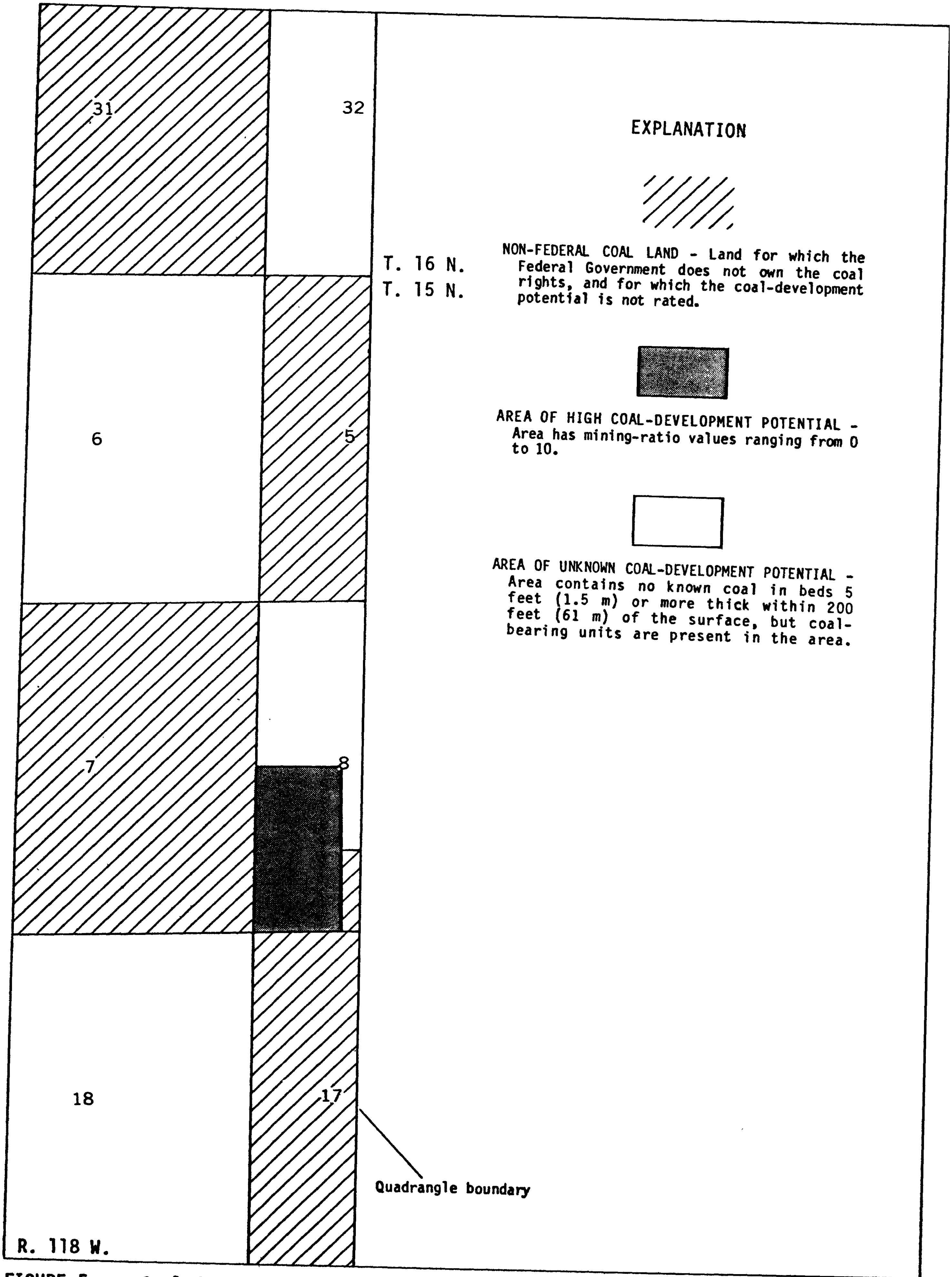


FIGURE 5. — Coal development potential map for surface mining methods.

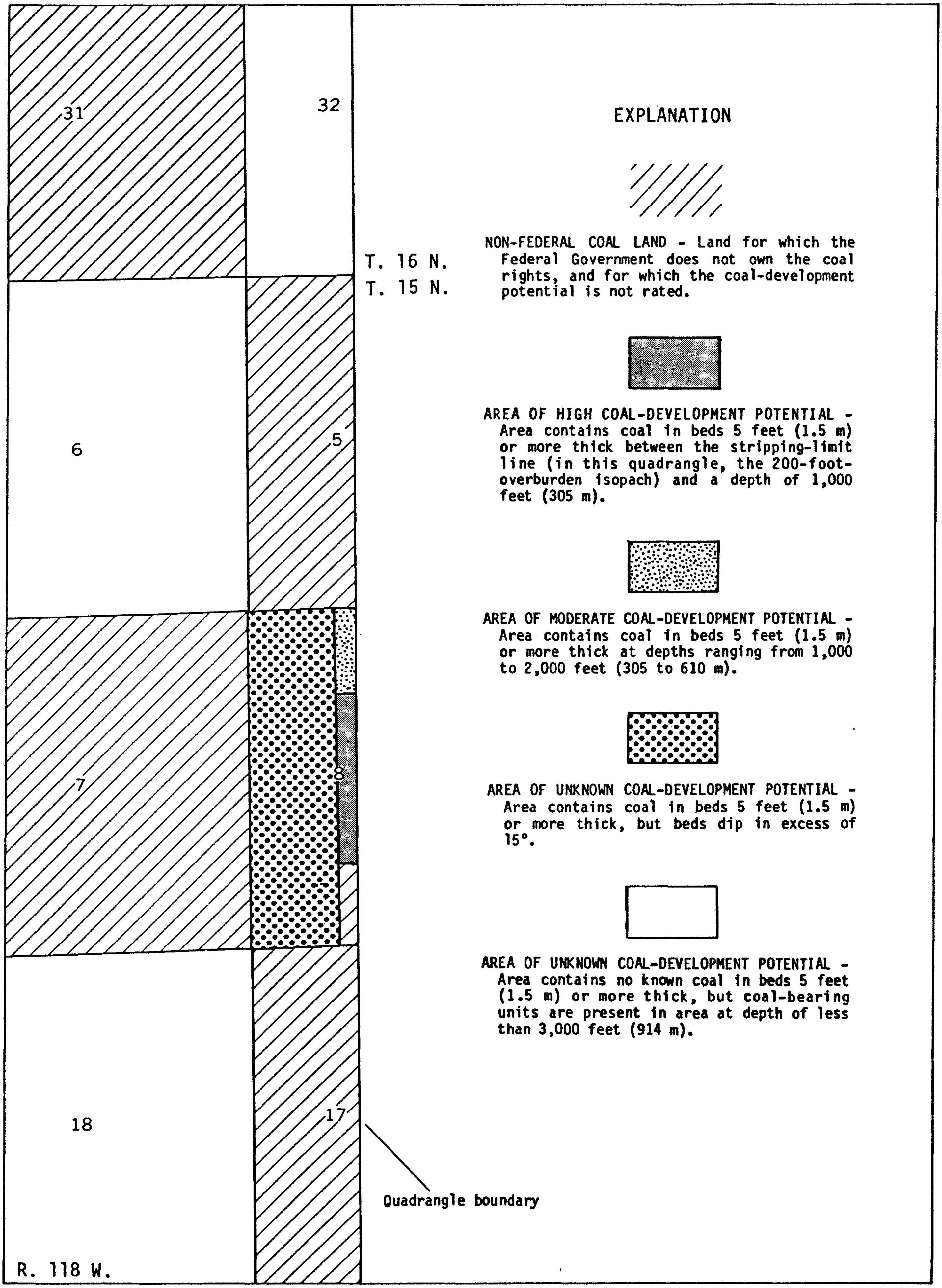


FIGURE 6. — Coal development potential map for subsurface mining methods.

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