UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

TEXT TO ACCOMPANY:

COAL RESOURCE OCCURRENCE

AND

COAL DEVELOPMENT POTENTIAL MAPS OF THE

MOYER SPRINGS QUADRANGLE, CAMPBELL COUNTY, WYOMING

BY

INTRASEARCH INC.

DENVER, COLORADO

OPEN FILE REPORT 79-037

1979

This report is preliminary, and has not been edited or reviewed for conformity with U.S. Geological Survey standards or stratigraphic nomenclature.

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To Convert	Multiply By	To Obtain
inches	2.54	centimeters (cm)
feet	0.3048	meters (m)
miles	1.609	kilometers (km)
acres	0.40469	hectares (ha)
tons (short)	0.9072	metric tons (t)
cubic yards/ton	0.8428	cubic meters per metric ton
acre feet	0.12335	hectare-meters
Btu/lb	2.326	kilojoules/kilogram (kJ/kg)
Btu/lb	0.55556	kilocalories/kilogram (kcal/kg)
Fahrenheit	5/9(F-32)	Celsius

I. INTRODUCTION

This report and accompanying maps set forth the Coal Resource Occurrence (CRO) and Coal Development Potential (CDP) of coal beds within the Moyer Springs quadrangle, Campbell County, Wyoming. This CRO and CDP map series includes 25 plates (U.S. Geological Survey Open-File Report 79-037). The project is compiled by IntraSearch, Inc., 1600 Ogden Street, Denver, Colorado, under KRCRA Northeastern Powder River Basin, Wyoming Contract Number 14-08-0001-17180. This contract is a part of a program to provide an inventory of unleased Federal coal in Known Recoverable Coal Resource Areas (KRCRA's) in the western United States.

The Moyer Springs quadrangle is located in Campbell County, in northeastern Wyoming. It encompasses parts of Townships 51 and 52 North, Ranges 71 and 72 West, and covers the area: 44°22'30" to 44°30' north latitude; 105°22'30" to 105°30' west longitude.

State Route 59, a secondary highway, parallels the Little Powder River northward to Weston, Wyoming, and to the south it joins U.S. Highway 14-16. A light-duty road extends southward from State Route 59 to Gillette, Wyoming. The Garner Lake Road, another light-duty road, angles across the southeastern corner of the quadrangle. Minor roads and trails that branch from these roads constitute an avenue of access to much of the area. The closest railroad is the Chicago Burlington trackage, 6 mi (10 km) to the south at Gillette, Wyoming.

The Little Powder River flows northward throughout the length of the quadrangle, and its valley floor is approximately 4,100 ft (1,250 m) above sea level. Hay Creek and Rawhide Creek are tributary to the Little Powder River from the west, and drain terrain that attains elevations 300 ft (91 m) above river level. Corral Creek and the East Fork, respectively, fed by Little Pasture Creek and Prairie Creek in the southeastern quadrant, flow into the Little Powder River from the east. The valley floors of Corral Creek, Prairie Creek, and the East Fork of the Little Powder River average approximately 4,200 ft (1,280 m) above sea level. The somber grays, yellows, and browns of outcropping shales and siltstones contrast strikingly with the brilliant reds, oranges, and purple of "clinker," and deep greens of the juniper and pine tree growth.

The 13 to 14 in. (33 to 36 cm) of annual precipitation that falls in this semiarid region accrues principally in the springtime. Summer and fall precipitation usually originates from thunderstorms, and infrequent snowfalls of 6 in. (15 cm) or less generally characterize winter precipitation. Although temperatures ranging from less than $-25^{o}F$ ($-32^{o}C$) to more than $100^{o}F$ ($38^{o}C$) have been recorded near Gillette, Wyoming average wintertime minimums and summertime maximums approach $+5^{o}$ to $+15^{o}F$ (-15^{o} and $-9^{o}C$) and 75^{o} to $90^{o}F$ (24^{o} to $32^{o}C$), respectively.

Surface ownership is divided among fee, state, and Federal categories, with the state and Federal surface generally leased to ranchers for grazing purposes. Details of surface ownership are available at the Campbell County Courthouse in Gillette, Wyoming. Details of mineral ownership on Federal lands are available from the U.S. Bureau of Land Management in Cheyenne, Wyoming. Federal coal ownership is shown on Plate 2 of the Coal Resource Occurrence maps. The nonfederal coal ownership comprises both fee and state coal resources.

The Coal Resource Occurrence and Coal Development Potential program pertains to unleased Federal coal and focuses upon: (1) the delineation of lignite, subbituminous, bituminous, and anthracite coal at the surface and in the subsurface on Federal land; (2) the identification of total tons in place as well as recoverable tons; (3) categorization of these tonnages into measured, indicated, and inferred reserves and resources, and hypothetical resources; and (4) recommendations regarding the potential for surface mining, underground mining, and in-situ gasification of the coal beds. This report evaluates the coal resources of all unleased Federal coal beds in the quadrangle which are 5 ft (1.5 m) or greater in thickness and occur at depths down to 3,000 ft (914 m). No resources or reserves are computed for leased Federal coal, state coal, fee coal, or lands encompassed by coal prospecting permits and preference right lease applications.

Surface and subsurface geological and engineering extrapolations drawn from the current data base suggest the occurrence of approximately 680 million tons (617 million metric tons) of total unleased Federal coal-in-place in the Moyer Springs quadrangle.

The suite of maps that accompany this report set forth and portray the coal resource and reserve occurrence in considerable detail. For the most part, this report supplements the cartographically displayed information with minimum verbal duplication of the CRO/CDP map data.

II. GEOLOGY

Regional. The thick, economic coal deposits of the Powder River Basin in northeastern Wyoming occur mostly in the Tongue River Member of the Fort Union Formation, and in the lower part of the Wasatch Formation. Approximately 3,000 ft (914 m) of the Fort Union Formation, that includes the Tongue River, Lebo, and Tullock Members of Paleocene age, are unconformably overlain by approximately 700 ft (213 m) of the Wasatch Formation of Eocene age. These Tertiary formations lie in a structural basin flanked on the east by the Black Hills uplift, on the south by the Hartville and Casper Mountain uplifts, and on the west by the Casper Arch and the Big Horn Mountain uplift. The structural configuration of the Powder River Basin originated in Late Cretaceous time, with episodic uplift thereafter. The Cretaceous Cordillera was the dominant positive land form throughout the Rocky Mountain area at the close of Mesozoic time.

Outcrops of the Wasatch Formation and the Tongue River Member of the Fort Union Formation cover most of the areas of major coal resource occurrence in the Powder River Basin. The Lebo Member of the Fort Union Formation is mapped at the surface northeast of Recluse, Wyoming, east of the principal coal outcrops and associated clinkers (McKay, 1974), and presumably projects into the subsurface beneath much of the basin. One of the principal characteristics for separating the Lebo and Tullock Members (collectively referred to as the Ludlow Member east of Miles City, Montana) from the overlying Tongue River Member is the color differential between the lighter-colored upper portion and the somewhat darker lower portion (Brown, 1958). Although geologists working with subsurface data, principally geophysical logs, in the basin are trying to develop criteria for subsurface recognition of the Lebo-Tullock and Tongue River-Lebo contacts, no definitive guidelines are known to have been published. Hence, for subsurface mapping purposes, the Fort Union Formation is not divided into its member subdivisions for this study.

During the Paleocene epoch, the Powder River Basin tropic to subtropic depositional environment included broad, inland flood basins with extensive swamps, marshes, freshwater lakes, and a sluggish but active northeastward discharging drainage system, superimposed on a near base level, emerging sea floor. Much of the vast areas where organic debris collected was within a reducing depositional environment. Localized uplifts began to disturb the near sea level terrain of northeastern Wyoming, following retreat of the Cretaceous seas. However, the extremely fine-grained characteristics of the Tongue River Member clastics suggest that areas of recurring uplift peripheral to the Powder River Basin were subdued during major coal deposit formation.

The uplift of areas surrounding the Powder River Basin created a structural basin of asymmetric characteristic, with the steep west flank located on the eastern edge of the Big Horn Mountains. The axis of the Powder River Basin is difficult to specifically define, but is thought to be located in the western part of the basin, and to display a north-south configuration some 15 to 20 mi (24 to 32 km) east of Sheridan, Wyoming. Thus, the sedimentary section described in this report lies on the east flank of the Powder River Basin, with gentle dips of 2° or less disrupted by surface structure thought to relate to tectonic adjustment and differential compaction.

Some coal beds in the Powder River Basin exceed 200 ft (61 m) in thickness. Deposition of these thick, in-situ coal beds requires a discrete balance between subsidence of the earth's crust and in-filling by tremendous volumes of organic debris. These conditions in concert with a favorable ground water table, non-oxidizing clear water, and a climate amenable to the luxuriant growth of vegetation produce a stabilized swamp critical to the deposition of coal beds.

Deposition of the unusually thick coal beds of the Powder River Basin may be partially attributable to short distance water transportation of organic detritus into areas of crustal subsidence. Variations in coal bed thickness throughout the basin relate to changes in the depositional environment. Drill-hole data that indicate either the complete absence or extreme attenuation of a thick coal bed probably relate to location of the drill holes within the ancient stream channel system servicing this low land area in Early Cenozoic time. Where thick coal beds thin rapidly from the depocenter of a favorable depositional environment, it is not unusual to encounter synclinal structure over the maximum coal thickness due to the differential compaction between organic debris in the coal depocenter and fine-grained clastics in the adjacent areas.

The Wasatch Formation of Eocene age crops out over most of the central part of the Powder River Basin and exhibits a disconformable contact with the underlying Fort Union Formation. The contact has been placed at various horizons by different workers; however, for the purpose of this report, in northwestern Campbell County, Wyoming, the contact is positioned near the top of the Roland coal bed as mapped by Olive (1957) and is considered to disconformably descend in the stratigraphic column to the top of the Wyodak-Anderson coal bed (Roland coal bed of Taff, 1909) along the eastern boundary of the coal measures. No attempt is made to differentiate the Wasatch and Fort Union Formations on geophysical logs or in the subsurface mapping program that is a part of this CRO/CDP project.

Although Wasatch and Fort Union lithologies are too similar to allow differentiation in some areas, most of the thicker coal beds occur in the Fort Union section on the east flank of the Powder River Basin. Furthermore, orogenic movements peripheral to the basin apparently increased in magnitude during Wasatch time causing the deposition of friable, coarse-grained to gritty arkosic sandstones, fine to very fine-grained sandstones, siltstones, mudstones, claystones, brown-to-black carbonaceous shales and coal beds. These sediments are noticeably to imperceptibly coarser than the underlying Fort Union clastics.

The Moyer Springs quadrangle is located in an area where more than 90 percent of the surface rocks are classified into the Tongue River Member of the Fort Union Formation and less than 10 percent into the Wasatch Formation. Although the Tongue River Member is reportedly 1,200 to 1,300 ft (366 to 396 m) thick (Olive, 1957), only 300 to 400 ft (91 to 122 m) are exposed in this area. Olive (1957) correlated coal beds in the Spotted Horse coal field with coal beds in the Sheridan coal field (Baker, 1929) and Gillette coal field (Dobbin and Barnett, 1927), Wyoming, and with coal beds in the Ashland coal field (Bass, 1932) in southeastern Montana. This report utilizes, where possible, the coal bed nomenclature used in previous reports.

IntraSearch's correlation of thick coal beds from the Spotted Horse coal field to Gillette points out that the Wyodak coal bed, named the D coal bed by Dobbin and Barnett (1927), is equivalent to the Anderson, Canyon, and all or part of the Cook coal beds to the north and west of the Moyer Springs quadrangle. Due to problematic correlations outside of the Gillette area, the name Wyodak has been informally used by many previous authors to represent the coal beds in the area surrounding the Wyodak coal mine. The Wildcat, Moyer, and Oedekoven coal beds were informally named by IntraSearch (1978b, 1979, and 1978a).

Local. The Moyer Springs quadrangle lies on the eastern flank of the Powder River Basin, where the strata dip gently westward. Outcrops of the Wasatch Formation are located in a small area in the southwestern part of the quadrangle. The sedimentary rocks are tan to light-brown, fine to very fine-grained sandstones, siltstones, mudstones, claystones, brown-to-black carbonaceous shales, and coal beds. The Tongue River Member of the Fort Union Formation crops out over approximately 90 percent of the area. The Fort Union Formation is composed of very fine-grained sandstones, siltstones, claystones, shales, carbonaceous shales, and numerous coal beds.

Surface and subsurface geological control define an unusual depositional area related to the Wyodak coal bed in sections 13, 14, 15, 22, 23, and 24, T. 51 N., R. 72 W. Here, thick coal beds grade laterally into fine-grained clastic rocks that appear to define an ancient, east-west trending river channel. Differential compaction of vegetative material and adjacent clastic rocks resulted in folding and faulting not thought to be related to tectonic adjustment. Structural contours drawn on the top of the Wyodak coal bed (D coal bed of Dobbin and Barnett, 1928) suggest vertical relief, a function of both folding and faulting due to differential compaction, of nearly 200 ft (61 m) in east-central T. 51 N., R. 72 W. (Plate 5). A detailed report on this phenomenon has been published by B. E. Law (1976).

III. DATA SOURCES

Areal geology of the coal outcrops and associated clinker is derived from the Surficial Geologic Map of the Moyer Springs quadrangle by Williams (1978).

The major source of subsurface control, particularly on deep coal beds, is the geophysical logs from oil and gas test bores and producing wells. Some geophysical logs are not applicable to this study, for the logs relate only to the deep potentially productive oil and gas zones. More than 80 percent of the logs include resistivity, conductivity, and self-potential curves. Occasionally the logs include gamma, density, and sonic curves. These logs are available from several commercial sources.

All geophysical logs available in the quadrangle are scanned to select those with data applicable to Coal Resource Occurrence mapping. Paper copies of the logs are obtained, interpreted, and coal intervals annotated. Maximum accuracy of coal bed identification is accomplished where gamma, density, and resistivity curves are available. Coal bed tops and bottoms are picked on the logs at the midpoint between the minimum and maximum curve deflections. The correlation of coal beds within and between quadrangles is achieved utilizing a fence diagram to associate local correlations with regional coal occurrences.

In some parts of the Powder River Basin, additional subsurface control is available from U.S. Geological Survey open-file reports that include geophysical and lithologic logs of shallow holes drilled specifically for coal exploration. A sparse scattering of subsurface data points are shown on unpublished CRO/CDP maps compiled by the U.S. Geological Survey, and where these data are utilized, the rock-coal intervals are shown on the Coal Data Map (Plate 1). Inasmuch as these drill holes have no identifier headings, they are not set forth on the Coal Data Sheet (Plate 3). The geophysical logs of these drill holes were unavailable to IntraSearch to ascertain the accuracy of horizontal location, topographic elevation, and down-hole data interpretation.

The reliability of correlations, set forth by IntraSearch in this report, vary depending upon: (1) the density and quality of lithologic and geophysical logs; (2) the detail, thoroughness, and accuracy of published and unpublished surface geological maps; and (3) interpretative proficiency. There is no intent on the part of IntraSearch to refute nomenclature established in the literature or used locally by workers in the area. IntraSearch nomenclature focuses upon the suggestion of regional coal bed names applicable throughout the eastern Powder River Basin. It is expected and entirely reasonable that some differences of opinion regarding correlations as suggested by IntraSearch exist. Additional drilling for coal, oil, gas, water, and uranium, coupled with expanded mapping of coal bed outcrops and associated clinkers will broaden the data base for coal bed correlations and allow continued improvement in the understanding of coal bed occurrences in the eastern Powder River Basin.

The topographic map of the Moyer Springs quadrangle is published by the U.S. Geological Survey, compilation date, 1971. Land ownership data is compiled from land plats obtained from the U.S. Bureau of Land Management in Cheyenne, Wyoming. This information is current to Ocotber 13, 1977.

IV. COAL BED OCCURRENCE

Fort Union Formation coal beds that are present in all or part of the Moyer Springs quadrangle include, in descending stratigraphic order, the Wyodak, Cook, Wall, Pawnee, Wildcat, Moyer, and Oedekoven coal beds. A complete suite of maps (structure, isopach, mining ratio, overburden/ interburden, identified resources and areal distribution of identified resources) is prepared for each of these coal beds, except for the Cook, Wall, and Pawnee coal beds where insufficient data, thinness, or restricted areal extent preclude detailed mapping.

No physical and chemical analyses are known to have been published regarding the coal beds in the Moyer Springs quadrangle. However, the general "as-received" basis proximate analyses for central and southern Campbell County coal beds are as follows:

All analyses except BTU/LB are reported in percent.

COAL BED	HOLE	ASH	FIXED CARBON	MOSITURE	VOLATILES	SULFUR	BTU/LB
Wyodak (U)	734	6.516	31.825	29.126	32.532	0.924	8167
Wyodak (U)	739-C	5.693	32.248	28.486	31.573	0.500	8182

(U) - U.S. Geological Survey & Montana Bureau of Mines & Geology, 1974.

The Coal Data Sheets, Plates 3a and 3b, show the downhole identification of coal beds within the quadrangle as interpreted from U.S. Geological Survey and Montana Bureau of Mines and Geology drill holes, and geophysical logs from oil and gas test bores and producing sites. Inasmuch as the Wildcat coal bed underlies most of the quadrangle, it is designated as datum for the correlation diagram. Where the Wildcat coal bed is absent, the Moyer coal bed is used as datum.

Subsurface data on the Wyodak coal bed is sparse in the Moyer Springs quadrangle. The existing data indicate the Wyodak coal bed attains a maximum thickness slightly in excess of 120 ft (37 m) in the southwestern part of the quadrangle. The Wyodak coal bed thins to less than 20 ft (6 m) in east-central T. 51 N., R. 72 W., where coal deposition grades laterally into river channel deposition. Throughout much of the quadrangle, the Wyodak coal bed is partially to totally burned: hence, the 5 to 15 ft (1.5 to 5 m) thicknesses shown in the north-central and northeastern parts of the quadrangle on Plate 4, represent but a part of the original, total Wyodak coal bed thickness. The Wyodak coal bed dips gently westward and is distorted by folding and faulting related to large-scale, differential compaction adjustments in east-central T. 51 N., R. 72 W.

The Wildcat coal bed underlies the Wyodak coal bed from 493 to 532 ft (150 to 162 m) and varies in thickness from 0 to 13 ft (0 to 4 m). Subsurface control indicates a broad area of north-south trend through the eastern part of the quadrangle where the coal bed is absent. Structural contours on the coal bed top suggest a gentle dip of 1^{o} to 2^{o} modified by minor anticlinal and synclinal trends. The Wildcat coal bed is more than 500 ft (125 m) beneath the surface over approximately 60 percent of the study area.

The Moyer coal bed varies from 0 to 21 ft (0 to 6 m) in thickness and lies 40 to 166 ft (12 to 51 m) underneath the Wildcat coal bed. The Moyer coal bed is absent from a major part of the northern half of the quadrangle. For the most part, structural configurations on the Moyer coal bed reflect regional west dip with minor flexures superimposed thereon. This coal bed, where present, lies more than 500 ft (152 m) beneath the surface over approximately 60 percent of the quadrangle.

Six to 134 ft (1.8 to 41 m) of sedimentary rocks separate the Oedekoven coal bed from the overlying Moyer coal bed. The Oedekoven coal bed varies from 0 to more than 25 ft (0 to 8 m) in thickness and is absent from a widespread area in the east-central and northern portions of the quadrangle. The area of the pinchout is approximately coincident with areas of noncoal on the Wildcat and Moyer isopach maps. The coal bed is tilted westward with minor flexures on the regional dip. The depth to the Oedekoven coal bed is in excess of 500 ft (152 m) except for a small area in southeastern T. 52 N., R. 72 W., and in the northeastern part of the quadrangle.

V. GEOLOGICAL AND ENGINEERING MAPPING PARAMETERS

The correct horizontal location and elevation of drill holes utilized in subsurface mapping are critical to map accuracy. Intra-Search plots the horizontal location of the drill hole as described on the geophysical log heading. Occasionally this location is superimposed or near to a drill site shown on the topographic map, and the topographic map horizontal location is utilized. If the ground elevation on the geophysical log does not agree with the topographic elevation of the drill site, the geophysical log ground elevation is adjusted to conformance. If there is no indication of a drill site on the topographic map, the "quarter, quarter, quarter" heading location is shifted within a small area until the ground elevation on the heading agrees with the topographic map elevation. If no elevation agreement can be reached, the well heading or data sheet is rechecked for footage measurements and ground elevation correctness. Inquiries to the companies who provided the oil and gas geophysical logs frequently reveal that corrections have been made in the original survey. If all horizontal location data sources have been checked and the information accepted as the best available data, the drill-site elevation on the geophysical log is modified to agree with the topographic map elevation. IntraSearch considers this agreement mandatory for the proper construction of most subsurface maps, but in particular, the overburden isopach, the ratio, and Coal Development Potential maps.

Subsurface mapping is based on geologic data within and adjacent to the Moyer Springs quadrangle area. Data from geophysical logs are used to correlate coal beds and control contour lines for the coal thickness, structure, and overburden maps. Isopach lines are also drawn to honor selected measured sections where there is sparse subsurface control. Where isopach contours do not honor surface-measured sections,the surface thicknesses are thought to be attenuated by oxidation and/or erosion, hence, not reflective of total coal thickness. Isopach lines extend to the coal bed outcrops, the projections of coal bed outcrops, and the contact between porcelanite (clinker) and unoxidized coal in place. Attenuation of total coal bed thickness is known to take place near these lines of definition; however, the overestimation of coal bed tonnages that results from this projection of total coal thickness is insignificant to the Coal Development Potential maps.

Structure contour maps are constructed on the tops of the main coal beds. Where subsurface data are scarce, supplemental structural control points are selected from the topographic map along coal outcrops.

In preparing overburden isopach maps, no attempt is made to identify coal beds that occur in the overburden to a particular coal bed under study. Mining ratio maps for this quadrangle are constructed utilizing a 95 percent recovery factor. Contours of these maps identify the ratio of cubic yards of overburden to tons of recoverable coal. Where ratio control points are sparse, interpolated points are computed using coal structure, coal isopach, and topographic control. On the Areal Distribution of Identified Resources Map (ADIR), coal bed reserves are not calculated where the coal is less than 5 ft (1.5 m) thick, where the coal occurs at a depth greater than 500 ft (152 m), where nonfederal coal exists, or where Federal coal leases and preference right lease applications exist.

Coal tonnage calculations involve the planimetering of areas of measured, indicated, inferred reserves and resources, and hypothetical resources to determine their areal extent in acres. An Insufficient Data Line is drawn to delineate areas where surface and subsurface data are too sparse for CRO map construction. Various categories of resources are calculated in the unmapped areas by utilizing coal bed thicknesses mapped in the geologically controlled area adjacent to the insufficient data lines. Acres are multiplied by the average coal bed thickness and 1,770 (the number of tons of subbituminous C per acre-foot, 13,018 metric tons per hectare-meter), to determine total tons in place. Recoverable tonnage is calculated at 95 percent of the total tons in place.

Where tonnages are computed for the CRO/CDP map series, resources and reserves are expressed in millions of tons. Frequently the planimetering of coal resources on a sectionized basis involves complexly curvilinear lines (coal bed outcrop and 500-foot stripping limit designations) in relationship with linear section bondaries and circular resource category boundaries. Where these relationships occur, generalizations of complex curvilinear lines are discretely utilized, and resources and/or reserves are calculated within an estimated 2 to 3 percent plus or minus accuracy.

VI. COAL DEVELOPMENT POTENTIAL

Strippable Coal Development Potential. Areas where coal beds are 5 ft (1.5 m) or more in thickness and are overlain by 500 ft (152 m) or less of overburden are considered to have potential for surface mining and are 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 is as follows:

$$MR = \frac{t_o\ (0.911)}{t_c\ (rf)}$$

where MR = mining ratio
t_o = thickness of overburden
t_c = thickness of coal
rf = recovery factor
0.911 = conversion factor (cu. yds/ton)

A surface mining potential map is prepared utilizing the following mining ratio criteria for coal beds 5 to 40 ft (1.5 to 12 m) thick:

1. Low development potential = 15:1 and greater ratio.
2. Moderate development potential = 10:1 to 15:1 ratio.
3. High development potential = 0 to 10:1 ratio.

The following mining ratio criteria is utilized for coal beds greater than 40 ft (12 m) thick:

1. Low development potential = 7:1 and greater ratio.
2. Moderate development potential = 5:1 to 7:1 ratio.
3. High development potential = 0 to 5:1 ratio.

The surface mining potential is low for most of the Moyer Springs quadrangle. The Wyodak coal bed is eroded or burned throughout approximately 80 percent of this quadrangle. A small area of high development potential in the southwest part of the area of study is underlain by the thick Wyodak coal bed. The Wildcat, Moyer, and Oedekoven coal beds lie more than 500 ft (152 m) beneath the surface in about 70 percent of the quadrangle. This depth of occurrence causes high mining ratios which produce the low development potential for surface mining. Table 1 sets forth the estimated strippable reserve base tonnages per coal bed for the quadrangle.

Underground Mining Coal Development Potential. Subsurface coal mining potential throughout the Moyer Springs quadrangle is considered low. Inasmuch as recovery factors have not been established for the underground development of coal beds in this quadrangle, reserves are not calculated for coal beds buried more than 500 ft (152 m) beneath the surface. Table 2 sets forth the estimated coal resources in tons per coal bed.

In-Situ Gasification Coal Development Potential. The evaluation of subsurface coal deposits for in-situ gasification potential relates to the occurrence of coal beds more than 5 ft (1.5 m) thick buried from 500 to 3,000 ft (152 to 914 m) beneath the surface. This categorization is as follows:

1. Low development potential relates to: (1) a total coal section less than 100 ft (30 m) thick that lies 500 ft (152 m) to 3,000 ft (914 m) beneath the surface, or (2) coal beds 5 ft (1.5 m) or more in thickness that lie 500 ft (152 m) to 1,000 ft (305 m) beneath the surface.

2. Moderate development potential is assigned to a total coal section from 100 to 200 ft (30 to 61 m) thick, and buried from 1,000 to 3,000 ft (305 to 914 m) beneath the surface.

3. High development potential involves 200 ft (61 m) or more of total coal thickness buried from 1,000 to 3,000 ft (305 to 914 m).

The coal development potential for in-situ gasification on the Moyer Springs quadrangle is low; hence, no CDP map is generated for this map series. The resource tonnage for in-situ gasification with low development potential totals approximately 467 million tons (424 million metric tons) (Table 3). None of the coal beds in the Moyer Springs quadrangle qualify for a moderate or high development potential rating.

Table 1.--Strippable Coal Reserve Base Data (in short tons) for Federal Coal Lands in the Moyer Springs Quadrangle, Campbell County, Wyoming.

(Development potentials are based on mining ratios (cubic yards of overburden/ton of recoverable coal))

Coal Bed	High Development Potential (0-10:1 Mining Ratio)	Moderate Development Potential (10:1-15:1 Mining Ratio)	Low Development Potential (>15:1 Mining Ratio)	Total
Lower Wyodak	10,230,000	160,000	----------	10,390,000
Wildcat	----------	-------	30,300,000	30,300,000
Moyer	----------	-------	840,000	840,000
Oedekoven	----------	-------	8,460,000	8,460,000
	(0-5:1 Mining Ratio)	(5:1-7:1 Mining Ratio)	(>7:1 Mining Ratio)	
Wyodak	153,220,000	-------	---------	153,220,000
TOTAL	163,450,000	160,000	39,600,000	203,210,000

Table 2.--Coal Reserve Base Data (in short tons) for Underground Mining Methods for Federal Coal Lands in the Moyer Springs Quadrangle, Campbell County, Wyoming.

Coal Bed Name	High Development Potential	Moderate Development Potential	Low Development Potential	Total
Wyodak	---------	---------	---------	-----------
Wildcat	---------	---------	98,940,000	98,940,000
Moyer	---------	---------	171,820,000	171,820,000
Oedekoven	---------	---------	195,790,000	195,790,000
TOTAL			466,550,000	466,550,000

Table 3.--Coal Reserve Base Data (in short tons) for In-Situ Gasification for Federal Coal Lands in the Moyer Springs Quadrangle, Campbell County, Wyoming.

Coal Bed Name	High Development Potential	Moderate Development Potential	Low Development Potential	Total
Wyodak	---------	---------	---------	---------
Wildcat	---------	---------	98,940,000	98,940,000
Moyer	---------	---------	171,820,000	171,820,000
Oedekoven	---------	---------	195,790,000	195,790,000
TOTAL			466,550,000	466,550,000

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