UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

COAL RESOURCE OCCURRENCE

AND

COAL DEVELOPMENT POTENTIAL

OF THE

HOMESTEAD DRAW SOUTHWEST QUADRANGLE

CAMPBELL COUNTY, WYOMING

BY

INTRASEARCH INC.

DENVER, COLORADO

OPEN-FILE REPORT 78-655
1978

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CONVERSION TABLE

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

The report and accompanying maps set forth the Coal Resource Occurrence (CRO) and Coal Development Potential (CDP) of coal beds within the Homestead Draw Southwest Quadrangle, Campbell County, Wyoming. The CRO and CDP map series includes 44 plates (U. S. Geological Survey Open-File Report 78-655). 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 federal coal in Known Recoverable Coal Resource Areas (KRCRA) in the western United States.

The Homestead Draw Southwest Quadrangle is located in Campbell County in northeastern Wyoming. It encompasses all or parts of Townships 55, 56, and 57 North, Ranges 73 and 74 West, and covers the area: 44°45' to 44°52'30" north latitude; 105°37'30" to 105°45' west longitude.

A county-maintained gravel road trends north-south through the center of the Homestead Draw Southwest Quadrangle. This road extends northward to Moorhead, Montana, and southward to Recluse, Wyoming. Two miles (3 km) south of Recluse it joins U. S. Highway 14-16. Two other gravel roads branch from the north-south road, in the southwestern part of the area and in the northwestern sector. Minor roads and trails provide access to much of the area. The closest railroad is the Burlington Northern trackage 20 miles (32 km) to the south.

Bitter Creek flows northwestward throughout most of the Homestead Draw Southwest Quadrangle. The East Fork, Chalk Prong, and Armstrong Prong of Bitter Creek are tributary to the main drainage in the northeastern part of the area. Northwestward-flowing SA Creek drains the southwestern portion of the area. These creeks drain terrain that attains elevations of 200 to 300 feet (61 to 91 m) above creek level. Their valley floors are approximately 3900 feet (1189 m) above sea level. The somber grays, yellows, and browns of outcropping shales and siltstones contrast strikingly with the brilliant reds, oranges, and purples of "clinker", and deep greens of the juniper and pine tree growth.

The thirteen to fourteen inches (33 to 36 cm) of annual precipitation that falls in this semi-arid region accrues principally in the springtime. Summer and fall precipitation usually originates from thunderstorms, and infrequent snowfalls of six inches (15 cm) or less generally characterize winter precipitation. Although temperature ranges from less than -25°F (-32°C) to more than 100°F (38°C) have been recorded near Arvada, Wyoming, average wintertime minimums and summertime maximums approach +5° to +15°F (-15° to -9°C) and 75° to 90°F (24° to 32°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 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 non-federal coal ownership comprises both fee and state coal resources.

The Coal Resource Occurrence and Coal Devlopment Potential program 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, subsurface mining, and in-situ gasification of the coal beds. This report evaluates the coal resources of all coal beds in the quadrangle which are five feet (1.5 m) or greater in thickness and occur at a depth up to 3000 feet (914 m).

Surface and subsurface geological and engineering extrapolations drawn from the current data base suggest the occurrence of approximately 7.2 billion tons (6.5 billion metric tons) of total coal-in-place in the Homestead Draw Southwest Quadrangle.

The suite of maps that accompany this report set forth and portray coal resources and reserve occurrence in considerable detail. For the most part, this report intends to augment the cartographically displayed information with minimum word duplication of said 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. Approximately 3000 feet (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 feet (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 drainage system, superimposed on a near base level, emerging sea floor. 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 miles (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 two degrees or less disrupted by surface structure thought to relate to tectonic adjustment and differential compaction.

The surface drainage system existent during Fort Union time in the Wyoming portion of the Powder River Basin displayed a near base level profile with discharge northeastward. During Tongue River time, the flat landmass was near sea level. A tropical to subtropical climate existed, and much of the vast areas where organic debris collected was within a reducing depositional environment.

Some coal beds in the Powder River Basin exceed 200 feet (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 stablilized 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 hole 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 western Campbell County, Wyoming, the contact is positioned at 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 (Roland 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 and brown to black carbonaceous shales. These sediments are noticeably to imperceptibly coarser than the underlying Fort Union clastics.

The Homestead Draw Southwest Quadrangle is located in an area where surface rocks are classified into the Tongue River and Lebo Members of the Fort Union Formation, and the Wasatch Formation. Although the Tongue River Member is reportedly 1200 to 1300 feet (366 to 396 m) thick (Olive, 1957), only 200 to 300 feet (61 to 91 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. The Smith coal bed was named by Taff (1909), and the Swartz coal bed was named by McKay and Maples (1973). Baker (1929) assigned names to the Anderson, Canyon, and Wall coal beds. In this report, the Dietz No. 1 coal bed of Hayes (1973) is considered to be the Canyon coal bed because the Dietz No. 1 coal bed pinches out northwest of the Powder River. The Cook coal bed was named by Bass (1932), and the Pawnee and Cache coal beds were named by Warren (1959). IntraSearch (1978a) informally named the Oedekoven coal bed.

Local. The Homestead Draw Southwest Quadrangle lies on the eastern flank of the Powder River Basin, where the strata dip gently

westward. Scattered outcrops of the Wasatch Formation occur in the central and southwestern part of the quadrangle. The Wasatch Formation consists of friable to coarse-grained to gritty, arkosic sandstones, fine- to very fine-grained sandstones, siltstones, mudstones, claystones, brown to black carbonaceous shales, and coal. The Tongue River Member of the Fort Union Formation crops out over the entire quadrangle. The Fort Union Formation is composed of very fine-grained sandstone, siltstone, claystone, shale, carbonaceous shale, and numerous coal beds.

A major northeast-trending fault with 5 to 10 feet (1.5 to 3 m) of vertical displacement occurs in the center of the quadrangle. The structural contours on the tops of the Anderson, Canyon, Cook, Wall, Pawnee, and Cache coal beds define a structural low associated with this fault. A smaller northeast-trending fault vertically displaces strata 5 feet (1.5 m) in the southwestern part of the area.

III. Data Sources

Areal geology of the coal outcrops and associated clinker is derived from the Preliminary geologic map of the Croton 1 SW (Homestead Draw SW) Quadrangle (Hayes, 1973). Differences in coal bed interpretations between Hayes and IntraSearch result from regional correlations by IntraSearch. The coal bed outcrops are adjusted to the current topographic maps in the area.

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 eighty 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.

The topographic map of the Homestead Draw Southwest 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 October 13, 1977.

IV. Coal Bed Occurrence

Fort Union Formation coal beds that are present in all or part of the Homestead Draw Southwest Quadrangle include, in descending stratigraphic order, the Smith, Swartz, Anderson, Canyon, Cook, Wall, Pawnee, Cache, and Oedekoven. 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 Swartz where insufficient data precludes detailed mapping.

The following table gives the general "as received" basis proximate analyses for northern Campbell County, Wyoming coal beds. Corehole 746 is located in the Homestead Draw Southwest Quadrangle, in the southeast quarter of the southeast quarter of Section 8, T.55N., R.55W.

COAL BED NAME		ASH	FIXED CARBON	MOISTURE	VOLATILES	SULPHUR	BTU/LB
Smith (P)		6.440	31.390	35.370	26.800	0.450	7125
Anderson (U)	Hole 746	6.317	31.113	32.583	29.986	0.327	7498
Canyon (P)		4.290	32.852	35.100	27.758	0.307	7298
Cook (P)		4.620	34.410	33.640	27.330	0.250	7766
Wall (U)	Hole 7426	9.542	29.322	32.150	28.985	0.500	7279
Pawnee (U)	Hole 7424	7.880	31.029	31.910	29.183	0.386	7344
Cache (P)		8.910	31.290	32.390	27.410	0.250	7418

(P) - Proprietary Data
(U) - U. S. Geological Survey & Montana Bureau of Mines and Geology - 1974.

The Coal Data Sheet, plate 3, shows the downhole identification of coal beds within the quadrangle as interpreted from geophysical logs from oil and gas test bores and producing sites. The Canyon coal bed is designated as datum for most of the correlation diagram. In areas where no records are available for the Canyon coal bed, the Anderson coal bed is datum. The Canyon coal bed shows the thickest single bed occurrence throughout the quadrangle.

The suite of coal beds on Homestead Draw Southwest Quadrangle is definitively developed in the extreme southern part of the area. None of the coal beds are split here, except for the Pawnee which is readily identifiable by a characteristic doublet on electric logs. As the coal beds extend northward, the Pawnee non-coal interval increases, and both the Canyon and Cook coal beds divide into two splits in the northeastern sector. Comparison of in-progress correlation and nomenclature data with Bion H. Kent and Robert G. Hobbs (U. S. Geological Survey personnel) indicates preliminary interpretative agreement of downhole data at the Sinclair Oil and Gas, Bradshaw-Herr Federal Unit #1, SE,SE,SE, Sec. 26, T56N, R74W, and the Kissinger Petroleum Co. #16-16 Pat-ST, SE,SE,SE, Sec. 16, T56N, R74W. In the Kissigner test bore, the Lower Cook coal bed is informally referred to by Mr. Hobbs as the "Blue Marker" coal bed.

Whereas in the southwestern part of the quadrangle the Cook coal bed is positioned in close proximity to the Wall coal bed, to the northeast it closely underlies the Canyon coal bed. The position of the Cook coal

bed between the overlying Canyon and the underlying Wall coal beds varies extensively. The differential subsidence and the variable rate and amount of clastic deposition necessary to produce these phenomena create some parameters for a depositional environment of considerable complexity.

The Smith coal bed is eroded from approximately 60 percent of the quadrangle. Subsurface control indicates that the Smith reaches a maximum thickness of approximately 12 feet (4 m) in the southwest and southeast part of the area and thins northward to less than five feet (1.5 m) in thickness (plate 4).

The Swartz coal bed lies 91 to 107 feet (28 to 33 m) below the Smith coal bed. The four drill holes in which the Swartz coal bed is observed are all located in the southwest quadrant. In three of the drill holes, the Swartz coal bed is 4 feet (1.2 m) thick. In the fourth drill hole, the Swartz coal bed is split into two units, each 5 feet (1.5 m) thick, separated by a rock interval of 3 feet (0.9 m). Due to insufficient thickness and data, the Swartz coal bed is not mapped.

The Anderson coal bed occurs 45 to 106 feet (14 to 32 m) below the Swartz coal bed, and varies in thickness from approximately 10 to 40 feet (3 to 12 m). The bed thins to the west and thickens to the east.

A major northeast-trending fault vertically displaces strata 5 to 10 feet (1.5 to 3 m) in the center of the quadrangle. This fault

is paralleled by a very small syncline north of the fault, and by an anticline south of the fault. The northern half of the quadrangle is anticlinal in structure. A small northeast-trending fault occurs in the southwest quadrant.

The Canyon coal bed lies 128 to 237 feet (39 to 72 m) below the Anderson coal bed. The Canyon coal bed reaches a maximum thickness of 40 feet (12 m) in the southwestern edge of the quadrangle. In the northern part of the area the Canyon coal bed splits into an upper and a lower unit separated by up to 185 feet (56 m) of clastic debris. The mimimum thickness of the Canyon coal bed occurs in the region of the split where the combined thickness of the upper and lower units thins to 19 feet (6 m). Like the Anderson coal bed, the Canyon coal bed is cut by a northeast-trending fault in the center of the Homestead Draw Southwest Quadrangle. In the northeast quadrant, this fault terminates in a northeast-trending syncline. A small fault in the southwestern part of the area continues the trend of the major central fault.

The Cook coal bed occurs 30 to 251 feet (9 to 77 m) below the Canyon coal bed and averages approximately 22 feet (7 m) in thickness. It varies from 14 to 33 feet (4 to 10 m) in thickness. The Cook coal bed does not crop out within this quadrangle, and throughout some of the area, it is in excess of 500 feet (152 m) beneath the surface (plate 21). Significant structural features on the Cook coal bed include a narrow anticline and a narrow syncline which parallel two

northeast-trending faults in the center and southwestern part of the quadrangle.

The Wall coal bed is separated from the overlying Cook coal bed by 14 to 176 feet (4 to 54 m) of clastic sediments. This coal bed varies from 3 feet (10 m) in the northeastern part of the quadrangle to 14 feet (4 m) in the southeastern corner of the quadrangle. The Wall coal bed does not crop out within the Homestead Draw Southwest Quadrangle, and occurs in excess of 500 feet (152 m) beneath the surface throughout most of the area. The Wall coal bed shows a gentle dip to the west. A steeply dipping syncline occurs just north of a major northeast-trending fault in the center of the area. A small northeast-trending fault vertically displaces strata in the southwest quadrant.

Fourteen to 118 feet (4 to 36 m) of sedimentary rock separate the overlying Wall coal bed from the Pawnee coal bed. From its maximum thickness of 30 feet (9 m) in the southcentral part of the area, the Pawnee thins northward and pinches out along the northern quadrangle boundary. The Pawnee coal bed occurs in excess of 500 feet (152 m) beneath the surface throughout most of the Homestead Draw Southwest Quadrangle. Two northeast-trending faults vertically displace the strata of the Pawnee coal bed. From structural highs in the northern and southern halves of the quadrangle, the strata dip steeply into a syncline just north of the major fault.

Forty-six to 157 feet (14 to 48 m) beneath the Pawnee coal bed,

the Cache coal bed varies from 0 to 18 feet (0 to 5 m) in thickness. The bed is thickest in the northeastern sector and it pinches out to the west and northwest. The Cache coal bed dips to the west. A steeply dipping syncline occurs along the western boundary of the quadrangle. Two northeast-trending faults cut the Cache coal bed.

The Oedekoven coal bed occurs 231 to 409 feet (70 to 125 m) below the Cache coal bed. In the southeastern and southwestern corners of the quadrangle, it attains a maximum thickness of 10 feet (3 m). The Oedekoven coal bed pinches out in the central and northern part of the area. Two northeast-trending faults, one in the central part and one in the southwestern part of the quadrangle, vertically displace the gently westward dipping Oedekoven coal bed.

V. Geological and Engineering Mapping Parameters

Subsurface mapping is based on geologic data within and adjacent to the Homestead Draw Southwest 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. Structure contour maps are constructed on the tops of the main coal beds. Where subsurface data is 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% recovery factor. Contours on these maps identify the ratio of bank 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 feet (1.5 m) thick, where the coal occurs at a depth greater than 500 feet (152 m), and where non-federal coal exists.

Coal tonnage calculations involve the planimetering of areas of measured, indicated, inferred, and hypothetical resources to determine their areal extent in acres. Acres are multiplied by the average coal bed thickness and 1750 (the number of tons of lignite A per acre-foot; 12,874 metric tons per hectare-meter) to determine total tons in place. Recoverable tonnage is calculated at 95% of the total tons in place. North of the Homestead Draw Southwest Quadrangle, in the Montana portion of the Powder River Basin, a recovery factor of 85 percent is utilized because of the general northward thinning of economic coal beds. 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 boundaries 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 two to three percent plus or minus accuracy.

VI. Coal Development Potential

Strippable Coal Development Potential. Areas where coal beds are 5 feet (1.5 m) or more in thickness or are overlain by 500 feet (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 (bank cubic yards of overburden per ton of recoverable coal). The formula used to calculate mining ratios is as follows:

$$MR = \frac{t_o\ (0.922)}{t_c\ (rf)}$$

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

A surface mining potential map was prepared utilizing the following mining ratio criteria:

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 surface mining potential is high for most of the Homestead Draw Southwest Quadrangle. This high development potential results from the interrelationship between thick, multiple coal bed occurrences and moderate topographic relief in this quadrangle. Beneath the topographically high regions, both the Smith and Anderson coal beds are near the surface, creating the high development potential. In valleys such as Bitter Creek, thick Canyon and Cook coal beds, lower in the stratigraphic sequence, display low overburden to coal ratios and underlie the surface at shallow depths, thus developing a high potential for surface mining. Table 1 sets forth the strippable reserve tonnages per coal bed for the quadrangle.

Underground Mining Coal Development Potential. Subsurface coal mining potential throughout the Homestead Draw Quadrangle is considered low. Table 2 sets forth the 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 feet (1.5 m) thick buried from 500 to 3000 feet (152 to 914 m) beneath the surface. This categorization is as follows:

1. Low development potential relates to a total coal section less than 100 feet (30 m) thick, or coal beds that lie 500 feet (152 m) to 1000 feet (305 m) beneath the surface.

2. Moderate development potential is assigned to a total coal section from 100 to 200 feet (30 to 61 m) thick, and from 1000 to 3000 feet (305 to 914 m) beneath the surface.

3. High development potential involves 200 feet (61 m) or more of total coal thickness buried from 1000 to 3000 feet (305 to 914 m).

The coal development potential for in-situ gasification on the Homestead Draw 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 3.2 billion short tons (2.9 metric tons - Table 3). None of the coal beds in the Homestead Draw 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 Homestead Draw Southwest Quadrangle, Campbell County, Wyoming.

Development potentials are based on mining ratios (bank 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
Smith	73,580,000	2,920,000	-	76,500,000
Anderson	829,350,000	107,490,000	3,660,000	940,500,000
Lower Canyon	16,810,000	7,100,000	-	23,910,000
Canyon	901,330,000	671,590,000	15,770,000	1,588,690,000
Cook	120,840,000	231,400,000	451,060,000	803,300,000
Wall	3,460,000	81,930,000	233,710,000	319,100,000
Pawnee	-	-	92,300,000	92,300,000
Cache	-	-	-	-
Oedekoven	-	-	-	-
TOTAL	1,945,370,000	1,102,430,000	796,500,000	3,844,300,000

Table 2.--Coal Reserve Base Data (in short tons) for underground mining methods for Federal coal lands in the Homestead Draw Southwest Quadrangle, Campbell County, Wyoming.

Coal Bed Name	High Development Potential	Moderate Development Potential	Low Development Potential	Total
Smith	-	-	-	-
Anderson	-	-	-	-
Canyon	-	-	47,300,000	47,300,000
Cook	-	-	476,500,000	476,500,000
Wall	-	-	1,021,200,000	1,021,200,000
Pawnee	-	-	1,001,000,000	1,001,000,000
Cache	-	-	505,000,000	505,000,000
Oedekoven	-	-	128,000,000	128,000,000
Total	-	-	3,179,000,000	3,179,000,000

Table 3.--Coal Resources Base Data (in short tons) for In-Situ Gasification for Federal Coal Lands in the Homestead Draw Southwest Quadrangle, Campbell County, Wyoming.

Coal Bed Name	High Development Potential	Moderate Development Potential	Low Development Potential	Total
Smith	-	-	-	-
Anderson	-	-	-	-
Canyon	-	-	47,300,000	47,300,000
Cook	-	-	476,500,000	476,500,000
Wall	-	-	1,021,200,000	1,021,200,000
Pawnee	-	-	1,001,000,000	1,001,000,000
Cache	-	-	505,000,000	505,000,000
Oedekoven	-	-	128,000,000	128,000,000
Total	-	-	3,179,000,000	3,179,000,000

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