Chapter PN

# COAL RESOURCES, POWDER RIVER BASIN

By M.S. Ellis,[1] G.L. Gunther,[2] A.M. Ochs,[2] S.B. Roberts,[1] E.M. Wilde[3], J.H. Schuenemeyer,[1] H.C. Power,[4] G.D. Stricker,[1] and Dorsey Blake[1]

*in* U.S. Geological Survey Professional Paper 1625-A

[1] U.S. Geological Survey

[2] Consultant, U.S. Geological Survey, Denver, Colorado

[3] Montana Bureau of Mines and Geology, Butte, Montana

[4] University of Delaware, Newark, Delaware

## Contents



### Figures



### Tables





Click here or on this symbol in the toolbar to return.

Tables—continued





Click here or on this symbol in the toolbar to return.

# COAL RESOURCES—WYODAK-ANDERSON COAL ZONE, POWDER RIVER BASIN, WYOMING AND MONTANA

## WYODAK-ANDERSON COAL ZONE RESOURCE ESTIMATES—AN OVERVIEW

- Coal resources are calculated using the specific gravity of the coal calculated from apparent coal rank, which is the weight of coal per unit volume, net coal thickness, and areal extent of the coal.

- Resource tables for the Wyodak-Anderson coal zone in the Powder River Basin include coal and overburden thickness categories from Wood and others (1983), which are based on apparent coal rank. Additional categories have been added to provide more detail. Resources are also reported by State, county, Federal coal and surface ownership, and 7.5-minute quadrangle.

- Following USGS published guidelines (Wood and others, 1983) coal resource estimates are divided into measured, indicated, and inferred categories according to relative abundance and reliability of data.

- Where data are widely spaced a hypothetical resource may be extrapolated.

- Measured resources are tonnage estimates of coal in the coal zone within a radius of 0.25 mi of a control point where the net thickness of coal is measured.

- Indicated resources are tonnage estimates of coal that is within a radius of 0.25-0.75 mi of a control point where the net thickness of the coal is measured.



Click here or on this symbol in the toolbar to return.

1999 Resource assessment of selected Tertiary coal beds and zones in the Northern Rocky Mountains and Great Plains region, U.S. Geological Survey Professional Paper 1625-A

- Inferred resources are tonnage estimates of coal that is within a radius of 0.75-3 mi of a control point where the net thickness of the coal is measured.

- Hypothetical resources are tonnage estimates of coal that is beyond a radius of 3 mi of a control point where the net thickness of coal is measured.

- These resource categories assume a high to low degree of geologic certainty. A statistical method, which measures levels of uncertainty (confidence limits) for the Wyodak-Anderson resource estimates in the Powder River Basin, is also included in this study.

- Resource estimates are reported in millions of short tons with two significant figures.

## WYODAK-ANDERSON COAL ZONE COAL RESOURCES

The lateral extent (study limit) of the Wyodak-Anderson coal zone is based on published geologic maps by Kent and Berlage (1980), Bryson and Bass (1973), Robinson and Culbertson (1984), Warren (1959), and Baker (1929). The study limit was generalized in some areas to include small areas of Wyodak-Anderson coal outside of the main boundary. The contact of Cretaceous and Tertiary rocks (Love and Christiansen, 1985; Ross and others, 1955) was used for a boundary in some areas where more detailed geologic and coal outcrop maps were not available. The entire study area is about 5,972,000 acres (2,416,786 hectares) in size.

Wyodak-Anderson coal resources in the Powder River Basin of Wyoming and Montana were calculated using several software packages and custom programs. Details of the methodology used are given in Ellis and others (1999, in press).



Click here or on this symbol in the toolbar to return.

To calculate Wyodak-Anderson coal resources data was compiled in a StratiFact* (GRG Corporation, 1996) relational database. The coal beds in the Wyodak-Anderson coal zone, including the Anderson, Dietz, Canyon, Monarch, Werner, Wyodak, Smith, Swartz, Sussex, School, and Badger coal beds (see an explanation of coal-bed nomenclature in the chapter on Fort Union coal in the Powder River Basin (chapter PS), were correlated in the database. A custom program was used to calculate the net coal thickness at each data point (drill hole or measured section) location.

The net coal thickness and overburden were gridded, and isopach maps were produced using EarthVision* software (Dynamic Graphics, Inc., 1997). The grid for the coal thickness was made using an isopach grid option (special handling of 0 values and terminated data) and 300 x 300-meter grid spacing.

The spatial parameters for querying coal resources (for example, 7.5-minute quadrangle (fig. PN-1) map area (U.S. Geological Survey National Mapping Division unpublished data, undated), Federal coal and surface ownership (fig. PN-2) (Biewick and others, 1998), and reliability, coal thickness (fig. PN-3), and overburden (fig. PN-4) categories) were created on individual layers as ARC/INFO* (ESRI, 1998a) polygon coverages. The coverages were unioned to make one polygon coverage with many attributes for each polygon. The polygons in the union coverage were edited in ARC/INFO* and ArcView* (ESRI, 1998b).

Coal resources were calculated using the EarthVision* (EV) volumetrics tool, which calculates tonnages in each union coverage polygon using the net coal thickness grid, the area of each polygon, and a conversion factor of 1,770 short tons per acre-ft for subbituminous rank coal (Wood and others, 1983). Data from

the EV volumetrics report and the union coverage polygon attribute table were combined in Excel* (Microsoft, 1997) spreadsheet software. Data for polygons containing Wyodak-Anderson clinker (fig. PN-5) (Kanizay, S.P., 1978; Heffern and others, 1993; Boyd and others, 1997; and Heffern unpublished data, undated), Wyodak-Anderson mine and lease areas (fig. PN-5) (Bureau of Land Management, 1996; Kennecott Energy and others, undated; and Dunrud and Osterwald, 1980), or areas of net coal less than 2.5 ft thick were deleted from the data set. Lease areas may include public and/or state leases in addition to Federal leases. Resource tables were created using data from the remaining polygons (tables PN-1, PN-2, and PN-3). The final resource area (fig. PN-5) (area that met all coal resource criteria) was about 5,414,000 acres (2,190,971 hectares) in area.

*Commercial software package.

## CONFIDENCE LIMITS FOR WYODAK-ANDERSON COAL ZONE COAL RESOURCES

A confidence interval is a statistic designed to capture uncertainty associated with a point value estimate. In this study we computed 90-percent confidence intervals on the volume (total resource in millions of short tons) of coal in the Wyodak-Anderson coal zone in the measured, indicated, inferred, and hypothetical categories.

The three main potential sources of error that might bias the confidence intervals are preferential sampling, measurement errors, and model fitting. The probabilistic interpretation of a confidence interval is based upon a random sample, which does not apply in this situation, because there is preferential sampling in those areas deemed to be minable. Measurement error can be caused by an error in recording

the coal bed thickness or in the definition of coverage areas. Modeling fitting variability and bias result from the choice of models and fitting procedures.

Confidence limits for coal resources of the Wyodak-Anderson coal zone in the Powder River Basin were calculated by J.H. Schuenemeyer and H.C. Power. The data set that they used contained net coal measurements from 4,462 locations. This data set included drill hole or measured section data for locations that contained Wyodak-Anderson coal (no 0 values) and data that were representative of the entire coal zone (no terminated holes).

The confidence limits were derived through a complex series of steps. These steps included modeling coal thickness trends and removing the coal thickness trends using a nonparametric regression algorithm called loess (with span=0.5), using residual thickness to compute a semivariogram, and fitting the semivariogram to an exponential model. Parameter estimates were sill=529.75 $ft^2$, nugget=212.04 $ft^2$, and range=2.357 miles. Standard deviations of coal thickness were obtained from the semivariogram model. Differences in point densities were compensated for by calculating sample size, called a pseudo *n*, within each reliability category and calculating the variability of volume for each of the reliability categories. Volumes of Wyodak-Anderson coal were then calculated at a 90-percent confidence interval with measurement error. Some of the parameters used and results of the confidence interval calculations are shown in tables PN-5 and PN-6. A detailed description of the methodology used is given in Schuenemeyer and Power (in press) and in Ellis and others (1999, in press).

## REFERENCES CITED


Baker, A.A., 1929, Sheridan coal field, northward extension: U.S. Geological Survey Bulletin 806-B, p. 15-67.

Biewick, L.R.H., Urbanowski, S.R., Cain, Sheila, and Neasloney, Larry, 1998, Land status and Federal mineral ownership in the Powder River Basin, Wyoming and Montana: a digital data set for geographic information systems: U.S. Geological Survey Open-File Report 98-108, coverage scale 1:100,000.

Boyd, C.S., and Van Ploeg, A.J., 1997, Geologic map of the Gillette 30' x 60' quadrangle, Campbell, Crook, and Weston Counties, northeastern Wyoming: Wyoming State Geological Survey Map Series 49, scale 1:100,000.

Bryson, R.P., and Bass, N.W., 1973, Geology of the Moorhead coal field, Powder River, Big Horn, and Rosebud Counties, Montana: U.S. Geological Survey Bulletin 1338, 116 p.

Bureau of Land Management, 1996, Powder River Basin Coal Production—1995 (N. Braz, C. Gaskill, and R. Nelson compilers): U.S. Department of the Interior, Bureau of Land Management, Casper, Wyoming, file D\drawings\wo-map.dwg.

Dunrud, C.R., and Osterwald, F.W., 1980, Effects of coal mine subsidence in the Sheridan, Wyoming area: U.S. Geological Survey Professional Paper 1164, p.7, figure 4.

Dynamic Graphics, Inc., 1997, EarthVision, v.4: Dynamic Graphics, Inc., 1015 Atlantic Ave., Alameda, CA 94501.

Ellis, M.S., Gunther, G.L., Flores, R.M., Ochs, A.M., Stricker, G.D., Roberts, S.B., Taber, T.T., Bader, L.R., and Schuenemeyer, J.H., 1999, Preliminary report on coal resources of the Wyodak-Anderson coal zone, Powder River Basin, Wyoming and Montana: U.S. Geological Survey Open-File Report 98-789A, 49 p. (digital version available at http:greenwood.cr.usgs.gov/pub/open-file-reports/ofr-98-0789-a/).

Ellis, M.S., Gunther, G.L., Flores, R.M., Stricker, G.D., Ochs, A.M., and Schuenemeyer, J.H., in press, Preliminary report on the methodology for calculating coal resources in the Wyodak-Anderson coal zone, Powder River Basin, Wyoming and Montana: U.S. Geological Survey Open-File Report 98-789B.

ESRI-Environmental Systems Research Institute, Inc., 1998a, ARC/INFO, v. 7.1.1: Environmental Systems Research Institute, Inc., 380 New York Street, Redlands, CA 92373, USA.

_____ 1998b, ArcView, v.3.0a: Environmental Systems Research Institute, Inc., 380 New York Street, Redlands, CA 92373, USA.

GRG Corporation, 1996, StratiFact, relational database software, v. 4.5: GRG Corporation, 4175 Harlan Street, Wheatridge, CO 80033-5150, USA.

Heffern, E.L., Coates, D.A., Whiteman, Jason, and Ellis, M.S., 1993, Geologic map showing distribution of clinker in the Tertiary Fort Union and Wasatch Formations, Northern Powder River Basin, Montana, U.S. Geological Survey Coal Investigations Map C-142, scale 1:175,000.

Kanizay, S.P., 1978, Preliminary geologic map of the Sheridan area, northwestern Powder River Basin, Wyoming, U.S. Geological Survey Miscellaneous Field Studies Map MF-1043, scale 1:50,000.

Kennecott Energy, and Peter Kiewit and Sons, undated, Maps showing lease boundaries, extent of mining, and areas planned for future mining in the Decker Coal Mine: scales 1:48,000 and 1:24,000.

Kent, B.H., and Berlage, L.J., 1980, Geologic map of the Recluse 1 x 2 degree quadrangle, Campbell and Crook Counties, Wyoming: U.S. Geological Survey Coal Investigations Map C-81-D, scale 1:100,000.

Love, J.D., and Christiansen, A.C., 1985, Geologic map of Wyoming: U.S. Geological Survey, scale 1:500,000.

Microsoft, 1997, Excel spreadsheet software, v. Office 97: Microsoft Corporation, 1 Microsoft Way, Redman, WA 98052.

Robinson, L.N., and Culbertson, W.C., 1984, Map showing isopachs of coal and overburden of the Canyon coal bed, Birney 30’ x 60’ quadrangle, Big Horn

and Rosebud Counties, Montana: U.S. Geological Survey Coal Investigations Map C-96-B, scale 1:100,000.

Ross, C.P., Andrews, D.A., and Witkind, I.J., 1955, Geologic map of Montana: U.S. Geological Survey and Montana Bureau of Mines and Geology, scale 1:500,000.

Schuenemeyer, J. H., and Power H., in press, Uncertainty estimation for resource assessment—An application to coal: Mathematical Geology.

Warren, W.C., 1959, Reconnaissance geology of the Birney-Broadus coal field, Rosebud and Powder River Counties, Montana: U.S. Geological Survey Bulletin 1072-J, p. 561-585.

Wood, G.H., Jr., Kehn, T.M., Carter, M.D., and Culbertson, W.C., 1983, Coal resource classification system of the U.S. Geological Survey: U.S. Geological Survey Circular 891, 65 p.

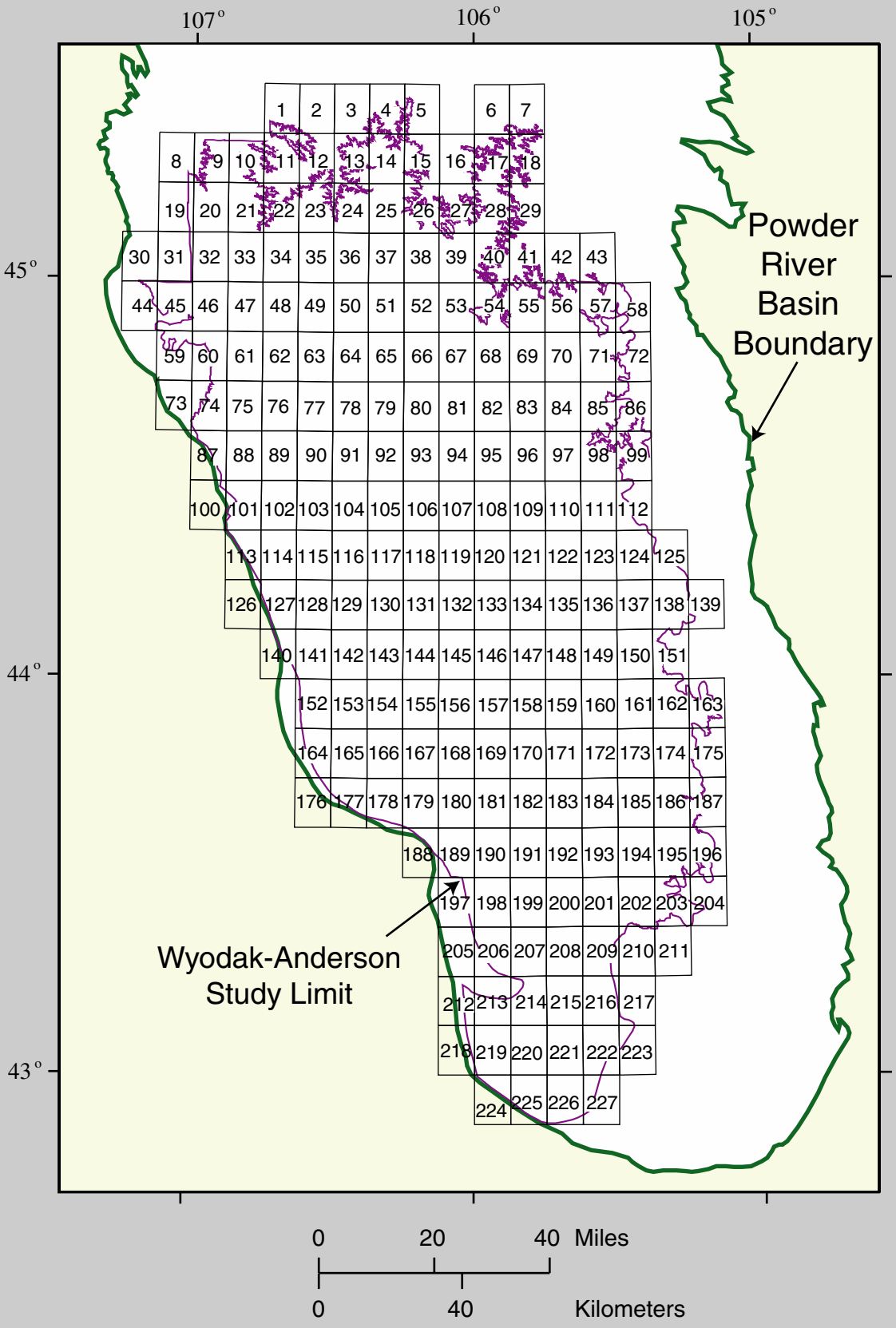
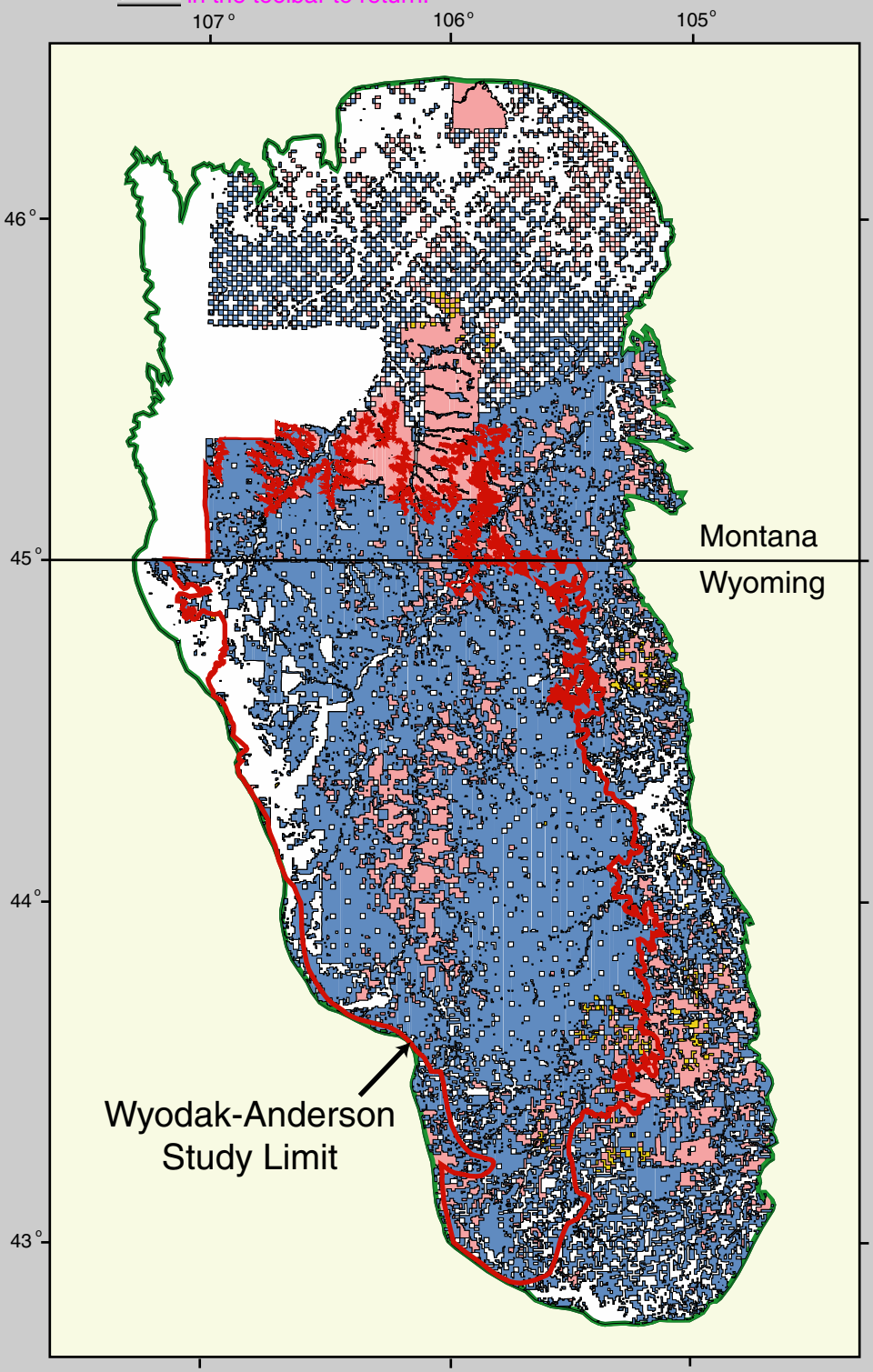



Figure PN-1. Location of 7.5-minute quadrangle maps in the Wyodak-Anderson study limit.

Click here or on this symbol
in the toolbar to return.




Federal coal = Subsurface
Federal management of all minerals, coal only, or oil, gas, and coal

Federal surface = Federal surface ownership

- Federal coal and Federal surface
- Federal coal, but no Federal surface
- No Federal coal, but Federal surface
- No Federal coal or Federal surface

Figure PN-2. Federal coal and surface ownership in the Powder River Basin.

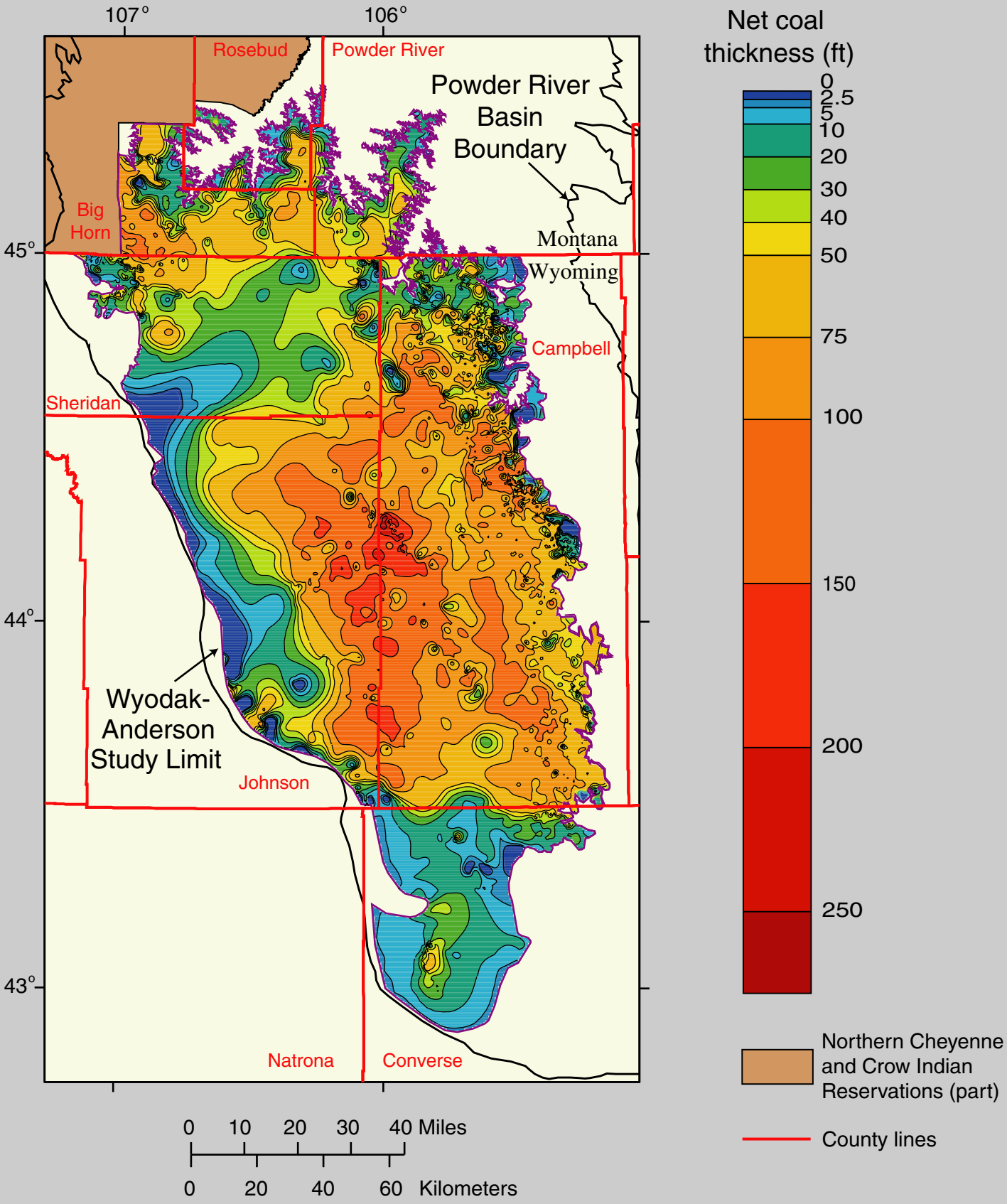



Figure PN-3. Wyodak-Anderson net coal isopach map.

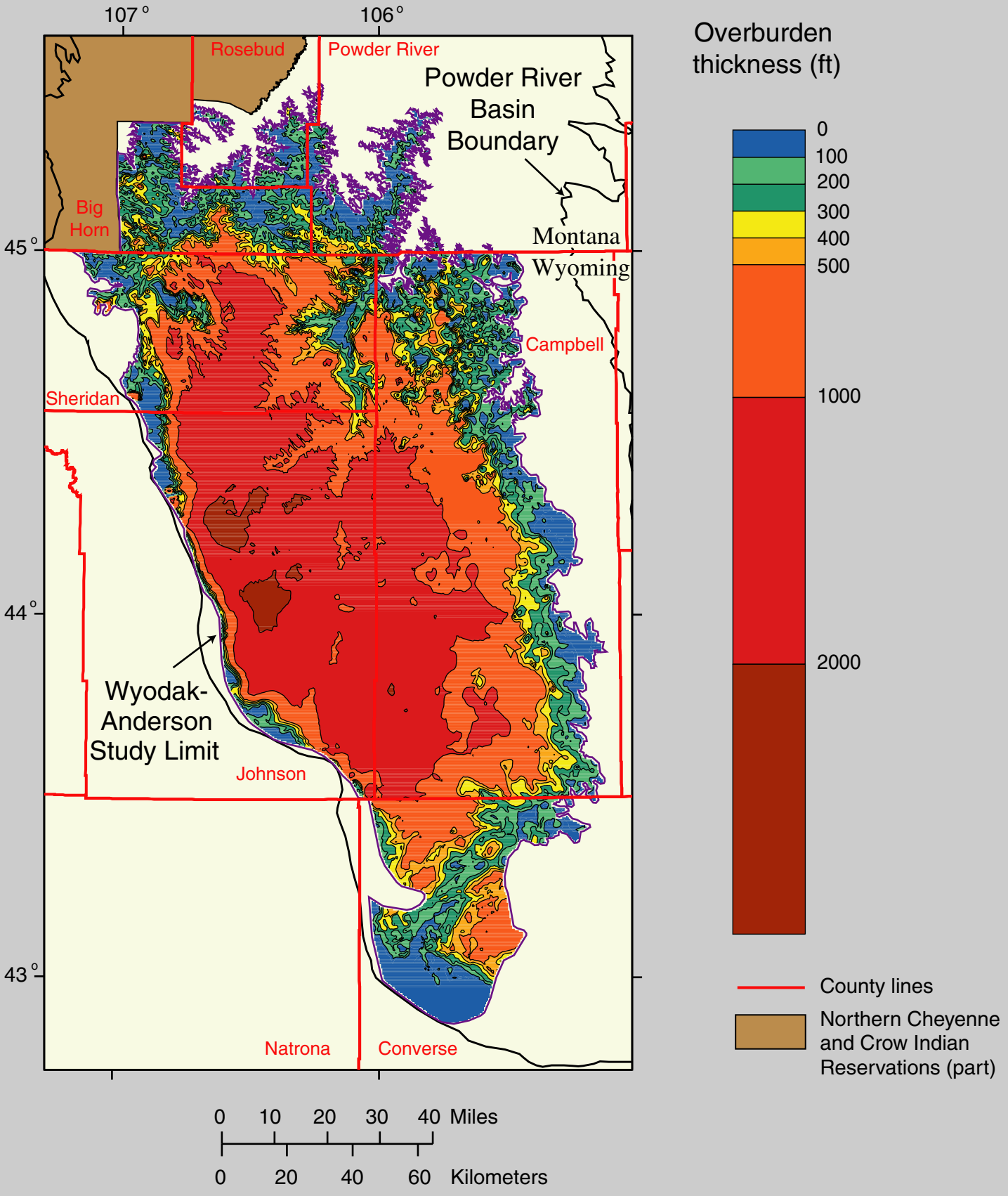
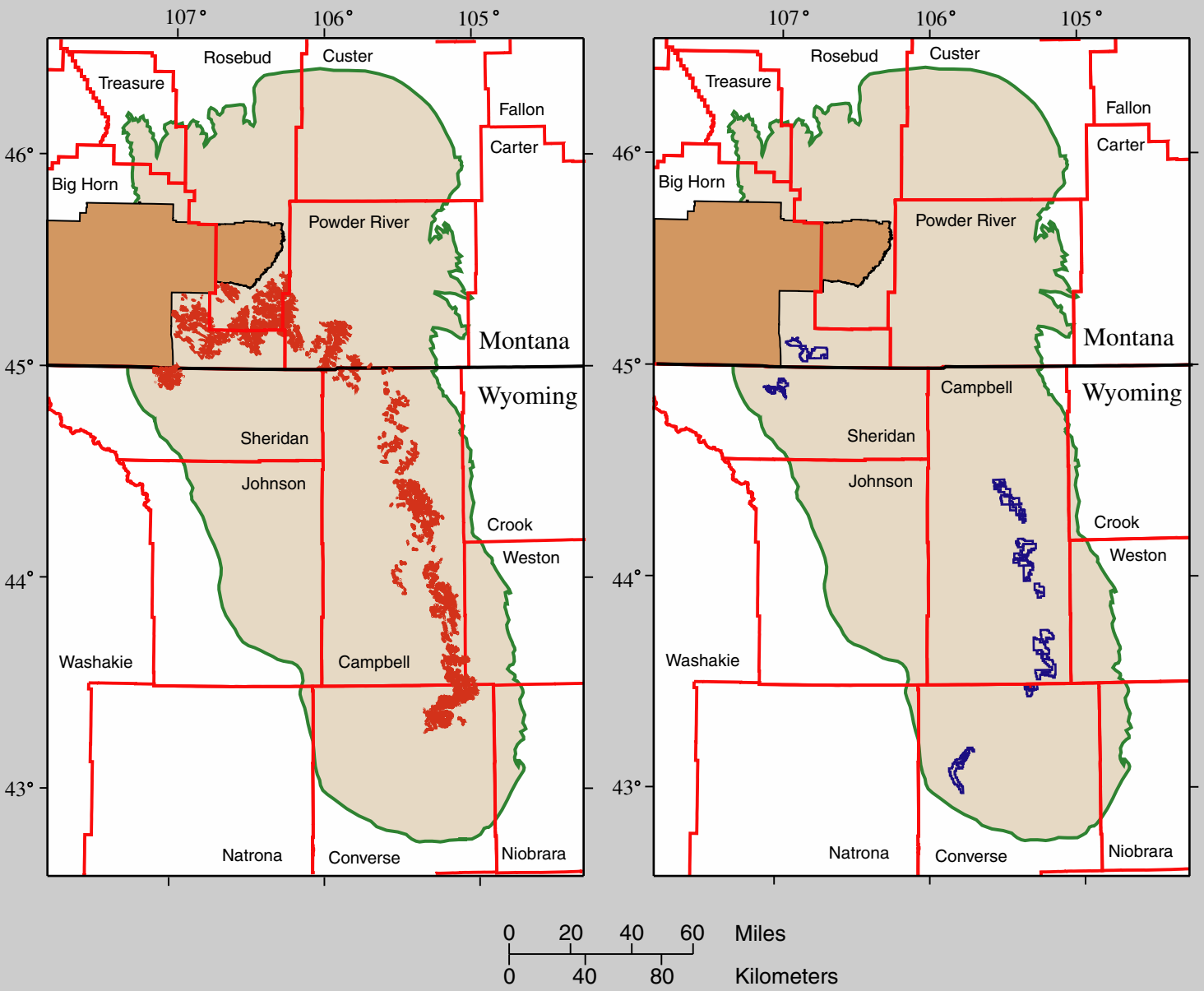



Figure PN-4. Wyodak-Anderson overburden isopach map.




KEY

- Powder River Basin boundary
- County lines
- State line
- Wyodak-Anderson clinker
- Wyodak-Anderson mines and lease areas
- Northern Cheyenne and Crow Indian Reservations (part)
- Resource area (Area meeting resource criteria--does not include areas with mines, leases, clinker, or net coal < 2.5 ft thick)

Index Map Showing Area Included in Resource Calculations

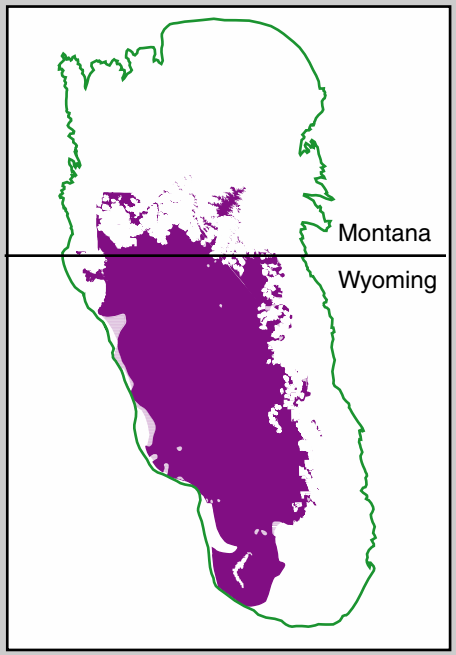



Figure PN-5. Wyodak-Anderson clinker, mine and lease areas, and resource area, Powder River Basin, Wyoming.

Table PN-1. Wyodak-Anderson coal resources in the Powder River Basin, Wyoming and Montana, reported by State, county, overburden thickness (fig. PN-4), net coal thickness (fig. PN-3), and reliability categories. Resources are shown in millions of short tons (MST) with two significant figures. Zeros (0) indicate that no coal resources were calculated within those categories. The table does not include resources in Wyodak-Anderson mine or lease areas, areas containing Wyodak-Anderson clinker, or areas where coal is less than 2.5 ft thick (fig. PN-5). Resource numbers will not sum to match totals due to independent rounding

| State | County | Overburden thickness | Net coal thickness | Reliability categories (distance from control point) | | | | Total (MST) |
|---|---|---|---|---|---|---|---|---|
| | | | | Measured (<1/4 mi) | Indicated (1/4-3/4 mi) | Inferred (3/4-3 mi) | Hypothetical (>3 mi) | |
| Montana | BIG HORN | 0-100 ft | 2.5-5 ft | 0 | 0.35 | 2.3 | 0 | 2.7 |
| | | | 5-10 ft | 0.26 | 0.20 | 10 | 0 | 10 |
| | | | 10-20 ft | 21 | 54 | 79 | 0 | 150 |
| | | | 20-40 ft | 120 | 420 | 240 | 0 | 780 |
| | | | >40 ft | 650 | 2,100 | 1,100 | 0 | 3,900 |
| | | 0-100 ft total | | 790 | 2,600 | 1,500 | 0 | 4,900 |
| | | 100-200 ft | 2.5-5 ft | 0 | 0.29 | 0.76 | 0 | 1.0 |
| | | | 5-10 ft | 0 | 1.9 | 6.6 | 0 | 8.4 |
| | | | 10-20 ft | 11 | 41 | 36 | 0 | 89 |
| | | | 20-40 ft | 92 | 350 | 220 | 0 | 670 |
| | | | >40 ft | 1,000 | 3,200 | 1,400 | 0 | 5,700 |
| | | 100-200 ft total | | 1,100 | 3,600 | 1,700 | 0 | 6,400 |
| | | 200-500 ft | 2.5-5 ft | 0.14 | 0.40 | 0.076 | 0 | 0.61 |
| | | | 5-10 ft | 0 | 4.1 | 0.55 | 0 | 4.6 |
| | | | 10-20 ft | 2.9 | 28 | 64 | 0 | 95 |
| | | | 20-40 ft | 27 | 140 | 430 | 0 | 600 |
| | | | >40 ft | 1,500 | 7,300 | 5,100 | 0 | 14,000 |
| | | 200-500 ft total | | 1,500 | 7,500 | 5,600 | 0 | 15,000 |
| | | >500 ft | 2.5-5 ft | 0 | 0.25 | 0 | 0 | 0.25 |
| | | | 5-10 ft | 0.75 | 1.2 | 0 | 0 | 2.0 |
| | | | 10-20 ft | 0.95 | 0.15 | 0 | 0 | 1.1 |
| | | | 20-40 ft | 3.4 | 1.1 | 0 | 0 | 4.5 |
| | | | >40 ft | 190 | 1,100 | 1,400 | 0 | 2,700 |
| | | >500 ft total | | 200 | 1,100 | 1,400 | 0 | 2,700 |
| | BIG HORN total | | | 3,600 | 15,000 | 10,000 | 0 | 29,000 |

Table PN-1. Wyodak-Anderson coal resources—continued

| State | County | Overburden thickness | Net coal thickness | Reliability categories (distance from control point) | | | | Total (MST) |
|---|---|---|---|---|---|---|---|---|
| | | | | Measured (<1/4 mi) | Indicated (1/4-3/4 mi) | Inferred (3/4-3 mi) | Hypothetical (>3 mi) | |
| Montana | POWDER RIVER | 0-100 ft | 2.5-5 ft | 0.42 | 1.0 | 19 | 4.1 | 25 |
| | | | 5-10 ft | 2.3 | 15 | 110 | 13 | 140 |
| | | | 10-20 ft | 59 | 260 | 450 | 32 | 800 |
| | | | 20-40 ft | 220 | 930 | 670 | 93 | 1,900 |
| | | | >40 ft | 200 | 730 | 760 | 40 | 1,700 |
| | | 0-100 ft total | | 490 | 1,900 | 2,000 | 180 | 4,600 |
| | | 100-200 ft | 2.5-5 ft | 0 | 0 | 3.8 | 0.52 | 4.3 |
| | | | 5-10 ft | 0.55 | 6.6 | 39 | 4.3 | 51 |
| | | | 10-20 ft | 2.0 | 47 | 140 | 14 | 200 |
| | | | 20-40 ft | 30 | 180 | 370 | 50 | 630 |
| | | | >40 ft | 130 | 730 | 730 | 7.1 | 1,600 |
| | | 100-200 ft total | | 160 | 970 | 1,300 | 75 | 2,500 |
| | | 200-500 ft | 2.5-5 ft | 0 | 0 | 0.7 | 0 | 0.70 |
| | | | 5-10 ft | 0 | 2.0 | 8.9 | 1.4 | 12 |
| | | | 10-20 ft | 0 | 3.4 | 27 | 9.2 | 40 |
| | | | 20-40 ft | 9.5 | 88 | 180 | 24 | 300 |
| | | | >40 ft | 200 | 1,100 | 2,200 | 0 | 3,500 |
| | | 200-500 ft total | | 210 | 1,100 | 2,400 | 34 | 3,800 |
| | | >500 ft | >40 ft | 0 | 0.53 | 0 | 0 | 0.53 |
| | | >500 ft total | | 0 | 0.53 | 0 | 0 | 0.53 |
| | POWDER RIVER total | | | 860 | 4,100 | 5,700 | 290 | 11,000 |
| | ROSEBUD | 0-100 ft | 2.5-5 ft | 0.38 | 0.47 | 6.3 | 1.5 | 8.6 |
| | | | 5-10 ft | 11 | 31 | 66 | 30 | 140 |
| | | | 20-40 ft | 29 | 120 | 180 | 0 | 320 |
| | | | >40 ft | 62 | 330 | 220 | 0 | 610 |
| | | 0-100 ft total | | 120 | 590 | 610 | 56 | 1,400 |
| | | 100-200 ft | 2.5-5 ft | 0 | 0.46 | 4.2 | 0.094 | 4.8 |
| | | | 5-10 ft | 2.4 | 15 | 24 | 8.3 | 50 |
| | | | 10-20 ft | 7.2 | 34 | 79 | 16 | 140 |
| | | | 20-40 ft | 9.4 | 89 | 110 | 0 | 210 |
| | | | >40 ft | 75 | 340 | 340 | 0 | 750 |
| | | 100-200 ft total | | 94 | 470 | 560 | 25 | 1,200 |

Table PN-1. Wyodak-Anderson coal resources—continued

| State | County | Overburden thickness | Net coal thickness | Reliability categories (distance from control point) | | | | Total (MST) |
|---|---|---|---|---|---|---|---|---|
| | | | | Measured (<1/4 mi) | Indicated (1/4-3/4 mi) | Inferred (3/4-3 mi) | Hypothetical (>3 mi) | |
| Montana | ROSEBUD | 200-500 ft | 2.5-5 ft | 0 | 0 | 0.61 | 0 | 0.61 |
| | | | 5-10 ft | 0.097 | 6.2 | 9.6 | 4.0 | 20 |
| | | | 10-20 ft | 0 | 20 | 61 | 7.0 | 89 |
| | | | 20-40 ft | 3.4 | 3.9 | 19 | 0 | 26 |
| | | | >40 ft | 11 | 82 | 27 | 0 | 120 |
| | | 200-500 ft total | | 15 | 110 | 120 | 11 | 250 |
| | ROSEBUD total | | | 230 | 1,200 | 1,300 | 92 | 2,800 |
| Montana total | | | | 4,700 | 20,000 | 17,000 | 380 | 42,000 |
| Wyoming | CAMPBELL | 0-100 ft | 2.5-5 ft | 3.6 | 9.6 | 57 | 12 | 83 |
| | | | 5-10 ft | 24 | 36 | 83 | 33 | 180 |
| | | | 10-20 ft | 140 | 140 | 300 | 32 | 620 |
| | | | 20-40 ft | 380 | 780 | 1,100 | 0 | 2,300 |
| | | | >40 ft | 1,900 | 4,400 | 2,900 | 420 | 9,600 |
| | | 0-100 ft total | | 2,500 | 5,300 | 4,500 | 490 | 13,000 |
| | | 100-200 ft | 2.5-5 ft | 1.1 | 5.4 | 14 | 0.58 | 21 |
| | | | 5-10 ft | 6.9 | 32 | 31 | 5.6 | 76 |
| | | | 10-20 ft | 55 | 180 | 140 | 2.7 | 380 |
| | | | 20-40 ft | 290 | 880 | 660 | 3.3 | 1,800 |
| | | | >40 ft | 3,200 | 6,800 | 1,800 | 0 | 12,000 |
| | | 100-200 ft total | | 3,500 | 7,900 | 2,600 | 12 | 14,000 |
| | | 200-500 ft | 2.5-5 ft | 3.5 | 9.5 | 5.3 | 0.73 | 19 |
| | | | 5-10 ft | 31 | 49 | 23 | 0.96 | 100 |
| | | | 10-20 ft | 120 | 360 | 200 | 0 | 680 |
| | | | 20-40 ft | 540 | 1,400 | 830 | 0 | 2,800 |
| | | | >40 ft | 9,300 | 29,000 | 11,000 | 20 | 49,000 |
| | | 200-500 ft total | | 10,000 | 30,000 | 12,000 | 22 | 52,000 |

Click here or on this symbol in the toolbar to return.

Table PN-1. Wyodak-Anderson coal resources—continued

| State | County | Overburden thickness | Net coal thickness | Reliability categories (distance from control point) | | | | Total (MST) |
|---|---|---|---|---|---|---|---|---|
| | | | | Measured (<1/4 mi) | Indicated (1/4-3/4 mi) | Inferred (3/4-3 mi) | Hypothetical (>3 mi) | |
| Wyoming | CAMPBELL | >500 ft | 2.5-5 ft | 0.25 | 3.8 | 9.0 | 0 | 13 |
| | | | 5-10 ft | 2.3 | 18 | 59 | 0 | 79 |
| | | | 10-20 ft | 1.3 | 37 | 160 | 0 | 200 |
| | | | 20-40 ft | 120 | 390 | 1,400 | 49 | 1900 |
| | | | >40 ft | 13,000 | 57,000 | 120,000 | 6,900 | 200,000 |
| | | >500 ft total | | 13,000 | 58,000 | 130,000 | 6,900 | 200,000 |
| | CAMPBELL total | | | 29,000 | 100,000 | 140,000 | 7,500 | 280,000 |
| | CONVERSE | 0-100 ft | 2.5-5 ft | 0.10 | 0.36 | 1.8 | 190 | 200 |
| | | | 5-10 ft | 1.6 | 21 | 80 | 620 | 720 |
| | | | 10-20 ft | 41 | 280 | 570 | 380 | 1,300 |
| | | | 20-40 ft | 92 | 440 | 650 | 22 | 1,200 |
| | | | >40 ft | 46 | 100 | 280 | 0 | 430 |
| | | 0-100 ft total | | 180 | 850 | 1,600 | 1,200 | 3,800 |
| | | 100-200 ft | 2.5-5 ft | 0.33 | 1.1 | 15 | 30 | 46 |
| | | | 5-10 ft | 1.4 | 17 | 89 | 120 | 230 |
| | | | 10-20 ft | 47 | 230 | 370 | 54 | 700 |
| | | | 20-40 ft | 76 | 360 | 440 | 88 | 960 |
| | | | >40 ft | 65 | 270 | 100 | 0 | 440 |
| | | 100-200 ft total | | 190 | 880 | 1,000 | 300 | 2,400 |
| | | 200-500 ft | 2.5-5 ft | 1.6 | 7.3 | 92 | 92 | 190 |
| | | | 5-10 ft | 20 | 97 | 290 | 710 | 1,100 |
| | | | 10-20 ft | 70 | 350 | 960 | 530 | 1,900 |
| | | | 20-40 ft | 41 | 260 | 730 | 230 | 1,200 |
| | | | >40 ft | 150 | 480 | 230 | 0 | 860 |
| | | 200-500 ft total | | 280 | 1,200 | 2,300 | 1,600 | 5,300 |
| | | >500 ft | 2.5-5 ft | 2.3 | 14 | 16 | 2.4 | 35 |
| | | | 5-10 ft | 20 | 120 | 430 | 430 | 1,000 |
| | | | 10-20 ft | 22 | 150 | 590 | 1,000 | 1,800 |
| | | | 20-40 ft | 1.3 | 20 | 350 | 340 | 710 |
| | | | >40 ft | 0 | 0 | 190 | 0 | 190 |
| | | >500 ft total | | 45 | 300 | 1,600 | 1,800 | 3,700 |
| | CONVERSE total | | | 700 | 3,200 | 6,500 | 4,900 | 15,000 |

Click here or on this symbol
in the toolbar to return.

Table PN-1. Wyodak-Anderson coal resources—continued

| State | County | Overburden thickness | Net coal thickness | Reliability categories (distance from control point) | | | | Total (MST) |
|---|---|---|---|---|---|---|---|---|
| | | | | Measured (<1/4 mi) | Indicated (1/4-3/4 mi) | Inferred (3/4-3 mi) | Hypothetical (>3 mi) | |
| Wyoming | JOHNSON | 0-100 ft | 2.5-5 ft | 0 | 2.3 | 3.3 | 10 | 16 |
| | | | 5-10 ft | 0 | 5.6 | 13 | 9.9 | 28 |
| | | | 10-20 ft | 5.4 | 15 | 52 | 26 | 99 |
| | | | 20-40 ft | 33 | 62 | 42 | 10 | 150 |
| | | | >40 ft | 32 | 82 | 150 | 0 | 270 |
| | | 0-100 ft total | | 71 | 170 | 260 | 56 | 560 |
| | | 100-200 ft | 2.5-5 ft | 0 | 2.3 | 2.0 | 10 | 15 |
| | | | 5-10 ft | 0 | 4.0 | 4.3 | 12 | 20 |
| | | | 10-20 ft | 2.0 | 5.3 | 17 | 8.5 | 33 |
| | | | 20-40 ft | 9.2 | 42 | 100 | 7.9 | 160 |
| | | | >40 ft | 30 | 130 | 220 | 0 | 380 |
| | | 100-200 ft total | | 41 | 180 | 350 | 39 | 610 |
| | | 200-500 ft | 2.5-5 ft | 0 | 2.9 | 4.7 | 36 | 44 |
| | | | 5-10 ft | 0.036 | 7.0 | 17 | 85 | 110 |
| | | | 10-20 ft | 5.6 | 25 | 74 | 38 | 140 |
| | | | 20-40 ft | 23 | 72 | 440 | 23 | 560 |
| | | | >40 ft | 32 | 310 | 1,300 | 16 | 1,600 |
| | | 200-500 ft total | | 61 | 410 | 1,800 | 200 | 2,500 |
| | | >500 ft | 2.5-5 ft | 1.6 | 6.6 | 33 | 88 | 130 |
| | | | 5-10 ft | 5.7 | 49 | 500 | 420 | 970 |
| | | | 10-20 ft | 20 | 130 | 1,500 | 1,200 | 2,900 |
| | | | 20-40 ft | 85 | 620 | 5,000 | 3,200 | 9,000 |
| | | | >40 ft | 6,800 | 32,000 | 96,000 | 7,700 | 140,000 |
| | | >500 ft total | | 6,900 | 33,000 | 100,000 | 13,000 | 160,000 |
| | JOHNSON total | | | 7,100 | 34,000 | 110,000 | 13,000 | 160,000 |
| | SHERIDAN | 0-100 ft | 2.5-5 ft | 0.053 | 8.2 | 2.2 | 22 | 33 |
| | | | 5-10 ft | 12 | 40 | 11 | 37 | 100 |
| | | | 10-20 ft | 36 | 170 | 120 | 40 | 370 |
| | | | 20-40 ft | 45 | 230 | 420 | 5.5 | 700 |
| | | | >40 ft | 100 | 350 | 740 | 0 | 1,200 |
| | | 0-100 ft total | | 200 | 790 | 1,300 | 110 | 2,400 |

Table PN-1. Wyodak-Anderson coal resources—continued

| State | County | Overburden thickness | Net coal thickness | Reliability categories (distance from control point) | | | | Total (MST) |
|---|---|---|---|---|---|---|---|---|
| | | | | Measured (<1/4 mi) | Indicated (1/4-3/4 mi) | Inferred (3/4-3 mi) | Hypothetical (>3 mi) | |
| Wyoming | SHERIDAN | 100-200 ft | 2.5-5 ft | 1.4 | 4.1 | 2.0 | 15 | 23 |
| | | | 5-10 ft | 4.6 | 11 | 14 | 51 | 81 |
| | | | 10-20 ft | 22 | 62 | 90 | 54 | 230 |
| | | | 20-40 ft | 98 | 410 | 660 | 46 | 1,200 |
| | | | >40 ft | 290 | 620 | 850 | 81 | 1,800 |
| | | 100-200 ft total | | 420 | 1,100 | 1,600 | 250 | 3,400 |
| | | 200-500 ft | 2.5-5 ft | 1.4 | 8.1 | 7.6 | 16 | 33 |
| | | | 5-10 ft | 6.7 | 23 | 20 | 49 | 98 |
| | | | 10-20 ft | 34 | 160 | 530 | 180 | 910 |
| | | | 20-40 ft | 260 | 1,100 | 3,400 | 370 | 5,100 |
| | | | >40 ft | 840 | 3,700 | 6,500 | 220 | 11,000 |
| | | 200-500 ft total | | 1,100 | 4,900 | 11,000 | 840 | 17,000 |
| | | >500 ft | 2.5-5 ft | 0.51 | 3.0 | 4.7 | 87 | 95 |
| | | | 5-10 ft | 4.9 | 33 | 73 | 580 | 690 |
| | | | 10-20 ft | 23 | 140 | 760 | 1,600 | 2,500 |
| | | | 20-40 ft | 120 | 790 | 7,800 | 5,200 | 14,000 |
| | | | >40 ft | 310 | 1,800 | 8,600 | 1,300 | 12,000 |
| | | >500 ft total | | 450 | 2,700 | 17,000 | 8,700 | 29,000 |
| | SHERIDAN total | | | 2,200 | 9,600 | 31,000 | 9,900 | 52,000 |
| Wyoming total | | | | 39,000 | 150,000 | 290,000 | 35,000 | 510,000 |
| Grand total (MST) | | | | 44,000 | 170,000 | 300,000 | 36,000 | 550,000 |

Table PN-2. Wyodak-Anderson coal resources in the Powder River Basin, Wyoming and Montana, reported by State and by 7.5-minute quadrangle map area (see location map (fig. PN-1) and quadrangle key (table PN-4)). Resources are shown in millions of short tons (MST) with 2 significant figures. The table does not include resources in mine or lease areas, areas containing Wyodak-Anderson clinker, or areas where coal is less than 2.5 ft thick (fig. PN-5). Resource numbers will not sum to match totals due to independent rounding

| State | 7.5-minute quadrangle map | Total (MST) |
|---|---|---|
| Montana | ACME | 160 |
| | BAR N DRAW | 150 |
| | BAR V RANCH | 320 |
| | BAR V RANCH NE | 740 |
| | BEAR CREEK SCHOOL | 2,700 |
| | BIRNEY | 74 |
| | BAY HORSE | 2.1 |
| | BIRNEY DAY SCHOOL | 2.2 |
| | BIRNEY SW | 130 |
| | BLACK DRAW | 51 |
| | BLOOM CREEK | 65 |
| | BOX ELDER DRAW | 89 |
| | BRADSHAW CREEK | 1,100 |
| | BROWNS MOUNTAIN | 60 |
| | CABIN CREEK NE | 150 |
| | CABIN CREEK NW | 150 |
| | CEDAR CANYON | 130 |
| | CLUBFOOT CREEK | 2.4 |
| | COOK CREEK BUTTE | 81 |
| | DECKER | 1,900 |
| | FORKS RANCH | 2,700 |
| | FORT HOWES | 160 |
| | GOODSPEED BUTTE | 43 |
| | GREEN CREEK | 56 |
| | HALF MOON HILL | 1,600 |
| | HAMILTON DRAW | 2,400 |
| | HODSDON FLATS | 210 |
| Montana | HOLMES RANCH | 2,700 |
| | KING MOUNTAIN | 22 |
| | KIRBY | 1,700 |
| | LACEY GULCH | 1,100 |
| | MONARCH | 1.2 |
| | MOORHEAD | 43 |
| | O T O RANCH | 140 |
| | OTTER | 630 |
| | PEARL SCHOOL | 4,600 |
| | PHILLIPS BUTTE | 600 |
| | PINE BUTTE SCHOOL | 3,400 |
| | POKER JIM BUTTE | 1,000 |
| | QUIETUS | 3,500 |
| | REANUS CONE | 360 |
| | ROUNDUP DRAW | 110 |
| | SAYLE | 1,100 |
| | SAYLE HALL | 2,600 |
| | SONNETTE | 46 |
| | SPRING CREEK RANCH | 47 |
| | SPRING GULCH | 790 |
| | STROUD CREEK | 1,000 |
| | TAINTOR DESERT | 1,100 |
| | THREE BAR RANCH | 39 |
| | THREEMILE BUTTES | 3.4 |
| | TONGUE RIVER DAM | 250 |
| Montana total | | 42,000 |

Table PN-2. Wyodak-Anderson coal resources—continued

| State | 7.5-minute quadrangle map | Total (MST) | State | 7.5-minute quadrangle map | Total (MST) |
|---|---|---|---|---|---|
| Wyoming | ACME | 2,700 | Wyoming | CALF CREEK | 3,400 |
| | ALTA CREEK | 6.0 | | CARR DRAW | 7,800 |
| | ANTELOPE DRAW | 59 | | CEDAR CANYON | 2,700 |
| | APPEL BUTTE | 5,000 | | CLEARMONT | 1,500 |
| | ARPAN BUTTE | 2,800 | | COAL BANK DRAW | 64 |
| | ARTESIAN DRAW | 4,600 | | COAL DRAW NORTH | 1,200 |
| | ARVADA | 2,200 | | COAL DRAW SOUTH | 230 |
| | ARVADA NE | 3,700 | | COAL HILL | 1,300 |
| | BAKER SPRING | 4,200 | | COON TRACK CREEK | 51 |
| | BANNER | 93 | | CORRAL CREEK | 1,600 |
| | BAR N DRAW | 2,900 | | COYOTE DRAW | 1,400 |
| | BAY HORSE | 0.25 | | CRAZY WOMAN RANCH | 2,700 |
| | BEAR CREEK | 680 | | CROTON | 6,200 |
| | BEAR DRAW | 6,700 | | DEAD HORSE LAKE | 1,300 |
| | BEAUCHAMP RESERVOIR | 29 | | DOUBLE TANKS | 7,500 |
| | BETTY RESERVOIR | 1,700 | | DRY CREEK RESERVOIR | 570 |
| | BIG HORN | 520 | | DRY FORK RANCH | 7,300 |
| | BLACK DRAW | 1,200 | | DUGOUT CREEK NORTH | 840 |
| | BOBBY DRAW | 67 | | DUGOUT CREEK SOUTH | 2.7 |
| | BOGIE DRAW | 6,900 | | EAGLE ROCK | 4,200 |
| | BOON | 3,400 | | ECHETA | 4,900 |
| | BOWMAN FLAT | 7,000 | | ELAINE DRAW | 620 |
| | BOX ELDER DRAW | 1,200 | | FATS DRAW | 7,300 |
| | BROWN RANCH | 750 | | FAWN DRAW | 2,600 |
| | BUFFALO | 1600 | | FIGURE 8 RESERVOIR | 670 |
| | BUFFALO NE | 3,300 | | FLOATE DRAW | 5,900 |
| | BUFFALO RUN CREEK | 880 | | FLY DRAW | 250 |
| | BUFFALO SE | 3,900 | | FORT RENO | 3,600 |
| | CABIN CREEK NE | 1,400 | | FORT RENO SE | 7,600 |
| | CABIN CREEK NW | 2,500 | | FORTIN DRAW | 390 |
| | CABIN CREEK SE | 2,400 | | FOUR BAR J RANCH | 4,600 |

Table PN-2. Wyodak-Anderson coal resources—continued

| State | 7.5-minute quadrangle map | Total (MST) | State | 7.5-minute quadrangle map | Total (MST) |
|---|---|---|---|---|---|
| Wyoming | FOURMILE RESERVOIR | 2,000 | Wyoming | LEITER | 1,600 |
| | FREDRICK DRAW | 4,500 | | LEUENBERGER RANCH | 480 |
| | GARDNER GULCH | 2,000 | | LINCH | 390 |
| | GILBERT LAKE | 80 | | LITTLE BEAR CREEK | 1.2 |
| | GILLAM DRAW EAST | 1.1 | | LITTLE THUNDER RESERVOIR | 5,700 |
| | GILLETTE EAST | 2,400 | | LIVINGSTON DRAW | 5,700 |
| | GILLETTE WEST | 4,900 | | MACKEN DRAW | 670 |
| | GLENROCK NW | 96 | | MARSH DRAW | 330 |
| | GREASEWOOD RESERVOIR | 4,700 | | MITCHELL DRAW | 6,000 |
| | GUMBO HILL | 390 | | MONARCH | 690 |
| | HILIGHT | 3,500 | | MOORHEAD | 1.8 |
| | HOE RANCH | 4,600 | | MORGAN DRAW | 9,700 |
| | HOLDUP HOLLOW | 770 | | MOYER SPRINGS | 530 |
| | HOMESTEAD DRAW | 480 | | NEGRO BUTTE | 9,200 |
| | HOMESTEAD DRAW SW | 2,700 | | NEIL BUTTE | 2,200 |
| | HORSE HILL | 1,100 | | NORTH BUTTE | 8,000 |
| | HOUSE CREEK | 4,700 | | NORTH RIDGE | 78 |
| | HULTZ DRAW | 240 | | O T O RANCH | 2,200 |
| | HYLTON RANCH | 590 | | OLIVER DRAW | 36 |
| | JEFFERS DRAW | 4,500 | | OPEN A RANCH | 430 |
| | JEWELL DRAW | 3,900 | | ORIVA | 4,400 |
| | JONES DRAW | 1,700 | | ORIVA NW | 5,100 |
| | JULIO DRAW | 2,800 | | PATSY DRAW | 33 |
| | JUNIPER DRAW | 7,900 | | PEPSSON DRAW | 5,500 |
| | KAYCEE NE | 110 | | PINE GULCH | 5,100 |
| | KLINE DRAW | 3,200 | | PINE TREE | 4,200 |
| | LAKE DE SMET EAST | 2,200 | | PINEY CANYON NW | 110 |
| | LAKE DE SMET WEST | 380 | | PINEY CANYON SW | 520 |
| | LAREY DRAW | 3,800 | | PITCH DRAW | 1,100 |
| | LARIAT | 5,200 | | PLEASANTDALE | 5,300 |
| | LASKIE DRAW | 9,500 | | PLOESSERS DRAW | 5,700 |

Click here or on this symbol
in the toolbar to return.

Table PN-2. Wyodak-Anderson coal resources—continued

| State | 7.5-minute quadrangle map | Total (MST) | State | 7.5-minute quadrangle map | Total (MST) |
|---|---|---|---|---|---|
| Wyoming | PROVENCE RANCH | 2,000 | Wyoming | SOUTH BUTTE | 5,300 |
| | PURDY RESERVOIR | 35 | | SOUTH FORK RESERVOIR | 900 |
| | RANCHESTER | 180 | | SPOTTED HORSE | 5,400 |
| | RATTLESNAKE DRAW | 4,000 | | STORY | 7.5 |
| | RAWHIDE SCHOOL | 4,300 | | SUICIDE HILL | 1,100 |
| | RECLUSE | 3,400 | | SUSSEX | 1,900 |
| | RED HILL | 630 | | T A RANCH | 310 |
| | RENO FLATS | 4,300 | | T A RANCH NE | 1,400 |
| | RENO JUNCTION | 6,000 | | TAYLOR RANCH | 2,600 |
| | RENO RESERVOIR | 3,100 | | TECKLA | 3,700 |
| | RESERVOIR CREEK | 2,600 | | TECKLA SW | 4,800 |
| | ROCKY BUTTE | 100 | | THE GAP | 3,800 |
| | ROCKY BUTTE GULCH | 6,200 | | THE GAP SW | 3,200 |
| | ROCKY BUTTE SW | 240 | | THE NIPPLE | 7,300 |
| | ROLLING PIN RANCH | 7,000 | | THOMPSON DRAW | 720 |
| | ROSS | 770 | | THREE BAR RANCH | 1.2 |
| | ROSS FLAT | 1,200 | | THREEMILE CREEK RESERVOIR | 6,400 |
| | ROUGH CREEK | 1,500 | | TRABING | 450 |
| | ROUNDUP DRAW | 1,500 | | TRUMAN DRAW | 6,200 |
| | S R SPRINGS | 1,300 | | TURNERCREST | 2,900 |
| | SADDLE HORSE BUTTE | 370 | | TWENTYMILE BUTTE | 4,600 |
| | SAVAGETON | 5,600 | | UCROSS | 2,700 |
| | SAWMILL CANYON | 33 | | ULM | 710 |
| | SCAPER RESERVOIR | 5,900 | | VERONA | 630 |
| | SCOTT DAM | 5,600 | | WAGS PINNACLE | 5,800 |
| | SEVEN L CREEK EAST | 59 | | WESTON SW | 100 |
| | SHERIDAN | 1,100 | | WHIPPLE HOLLOW | 400 |
| | SHULER DRAW | 1,500 | | WHITE TAIL BUTTE | 1,500 |
| | SOLDIER CREEK | 1,100 | | WILDCAT | 4,100 |
| | SOMERVILLE FLATS EAST | 6,800 | | WYARNO | 2,700 |
| | SOMERVILLE FLATS WEST | 7,300 | Wyoming total | | 510,000 |
| | | | Grand total (MST) | | 550,000 |

Table PN-3. Wyodak-Anderson coal resources in the Powder River Basin, Wyoming and Montana, reported by State and by Federal coal and surface ownership (fig. PN-2) (Biewick and others, 1998). Resources are shown in millions of short tons (MST) with 2 significant figures. The table does not include resources in mine or lease areas, areas containing Wyodak-Anderson clinker, or areas where coal is less than 2.5 ft thick (fig. PN-5). Resource numbers will not sum to match totals due to independent rounding

| State | Federal ownership | Total (MST) |
|---|---|---|
| Montana | No Federal coal or surface ownership | 3,900 |
| | No Federal coal ownership, but Federal surface ownership | 2.9 |
| | Federal coal ownership, but no Federal surface ownership | 32,000 |
| | Federal coal and surface ownership | 6,700 |
| Montana total | | 42,000 |
| Wyoming | No Federal coal or surface ownership | 64,000 |
| | No Federal coal ownership, but Federal surface ownership | 1,900 |
| | Federal coal ownership, but no Federal surface ownership | 360,000 |
| | Federal coal and surface ownership | 79,000 |
| Wyoming total | | 510,000 |
| Grand total (MST) | | 550,000 |

Click here or on this symbol
in the toolbar to return.

Table PN-4. Key to 7.5-minute quadrangle maps in the Wyodak-Anderson study limit, Powder River Basin. See coal resources listed by quadrangle area (table PN-2) and quadrangle location map (fig. PN-1)

| Number | 7.5-minute quadrangle map | Number | 7.5-minute quadrangle map | Number | 7.5-minute quadrangle map |
|---|---|---|---|---|---|
| 1 | COOK CREEK BUTTE | 31 | BAR V RANCH | 61 | WYARNO |
| 2 | CLUBFOOT CREEK | 32 | PEARL SCHOOL | 62 | JONES DRAW |
| 3 | BIRNEY DAY SCHOOL | 33 | DECKER | 63 | S R SPRINGS |
| 4 | GREEN CREEK | 34 | HOLMES RANCH | 64 | SHULER DRAW |
| 5 | KING MOUNTAIN | 35 | PINE BUTTE SCHOOL | 65 | GARDNER GULCH |
| 6 | THREEMILE BUTTES | 36 | FORKS RANCH | 66 | FAWN DRAW |
| 7 | SONNETTE | 37 | QUIETUS | 67 | CABIN CREEK SE |
| 8 | SPRING CREEK RANCH | 38 | BEAR CREEK SCHOOL | 68 | KLINE DRAW |
| 9 | KIRBY | 39 | SAYLE HALL | 69 | RESERVOIR CREEK |
| 10 | TAINTOR DESERT | 40 | BRADSHAW CREEK | 70 | HOMESTEAD DRAW SW |
| 11 | BIRNEY SW | 41 | MOORHEAD | 71 | WHITE TAIL BUTTE |
| 12 | BIRNEY | 42 | THREE BAR RANCH | 72 | ROCKY BUTTE SW |
| 13 | BROWNS MOUNTAIN | 43 | BAY HORSE | 73 | BEAVER CREEK HILLS |
| 14 | POKER JIM BUTTE | 44 | RANCHESTER | 74 | BIG HORN |
| 15 | FORT HOWES | 45 | MONARCH | 75 | BUFFALO RUN CREEK |
| 16 | GOODSPEED BUTTE | 46 | ACME | 76 | VERONA |
| 17 | PHILLIPS BUTTE | 47 | BAR N DRAW | 77 | ULM |
| 18 | HODSDON FLATS | 48 | CEDAR CANYON | 78 | CLEARMONT |
| 19 | BAR V RANCH NE | 49 | O T O RANCH | 79 | LEITER |
| 20 | HALF MOON HILL | 50 | ROUNDUP DRAW | 80 | ARVADA |
| 21 | TONGUE RIVER DAM | 51 | BOX ELDER DRAW | 80 | ARVADA |
| 22 | SPRING GULCH | 52 | CABIN CREEK NW | 81 | ARVADA NE |
| 23 | LACEY GULCH | 53 | CABIN CREEK NE | 82 | LAREY DRAW |
| 24 | STROUD CREEK | 54 | BLACK DRAW | 83 | SPOTTED HORSE |
| 25 | HAMILTON DRAW | 55 | DEAD HORSE LAKE | 84 | RECLUSE |
| 26 | OTTER | 56 | CORRAL CREEK | 85 | PITCH DRAW |
| 27 | REANUS CONE | 57 | HOMESTEAD DRAW | 86 | OLIVER DRAW |
| 28 | SAYLE | 58 | ROCKY BUTTE | 87 | STORY |
| 29 | BLOOM CREEK | 59 | HULTZ DRAW | 88 | BANNER |
| 30 | LITTLE BEAR CREEK | 60 | SHERIDAN | 89 | HORSE HILL |

Table PN-4. Key to 7.5-minute quadrangle maps, Wyodak-Anderson study limit—continued

| Number | 7.5-minute quadrangle map | Number | 7.5-minute quadrangle map | Number | 7.5-minute quadrangle map |
|---|---|---|---|---|---|
| 90 | UCROSS | 120 | CARR DRAW | 150 | THE GAP SW |
| 91 | JULIO DRAW | 121 | JEFFERS DRAW | 151 | SADDLE HORSE BUTTE |
| 92 | ARPAN BUTTE | 122 | ORIVA | 152 | ANTELOPE DRAW |
| 93 | JEWELL DRAW | 123 | GILLETTE WEST | 153 | ELAINE DRAW |
| 94 | LARIAT | 124 | GILLETTE EAST | 154 | PROVENCE RANCH |
| 95 | CROTON | 125 | FORTIN DRAW | 155 | HOE RANCH |
| 96 | TRUMAN DRAW | 126 | KLONDIKE RANCH | 156 | THE NIPPLE |
| 97 | WILDCAT | 127 | T A RANCH | 157 | FATS DRAW |
| 98 | CALF CREEK | 128 | T A RANCH NE | 158 | WAGS PINNACLE |
| 99 | WESTON SW | 129 | CRAZY WOMAN RANCH | 159 | PEPSSON DRAW |
| 100 | STONE MOUNTAIN | 130 | PLOESSERS DRAW | 160 | THREEMILE CREEK RESERVOIR |
| 101 | LAKE DE SMET WEST | 131 | JUNIPER DRAW | 161 | EAGLE ROCK |
| 102 | LAKE DE SMET EAST | 132 | LASKIE DRAW | 162 | NEIL BUTTE |
| 103 | BUFFALO NE | 133 | MORGAN DRAW | 163 | ROUGH CREEK |
| 104 | FREDRICK DRAW | 134 | SCOTT DAM | 164 | DRY CREEK RESERVOIR |
| 105 | FLOATE DRAW | 135 | FOUR BAR J RANCH | 165 | FOURMILE RESERVOIR |
| 106 | MITCHELL DRAW | 136 | APPEL BUTTE | 166 | SOLDIER CREEK |
| 107 | LIVINGSTON DRAW | 137 | THE GAP | 167 | FORT RENO |
| 108 | ECHETA | 138 | COYOTE DRAW | 168 | FORT RENO SE |
| 109 | TWENTYMILE BUTTE | 139 | COON TRACK CREEK | 169 | NORTH BUTTE |
| 110 | ORIVA NW | 140 | PURDY RESERVOIR | 170 | SAVAGETON |
| 111 | RAWHIDE SCHOOL | 141 | TRABING | 171 | GREASEWOOD RESERVOIR |
| 112 | MOYER SPRINGS | 142 | BROWN RANCH | 172 | ROCKY BUTTE GULCH |
| 113 | NORTH RIDGE | 143 | BOON | 173 | RENO JUNCTION |
| 114 | BUFFALO | 144 | BOWMAN FLAT | 174 | HILIGHT |
| 115 | BUFFALO SE | 145 | NEGRO BUTTE | 175 | OPEN A RANCH |
| 116 | PINE GULCH | 146 | BOGIE DRAW | 176 | KAYCEE NE |
| 117 | BEAR DRAW | 147 | DOUBLE TANKS | 177 | FIGURE 8 RESERVOIR |
| 118 | SOMERVILLE FLATS WEST | 148 | PLEASANTDALE | 178 | SUSSEX |
| 119 | SOMERVILLE FLATS EAST | 149 | SCAPER RESERVOIR | 179 | HOUSE CREEK |

Table PN-4. Key to 7.5-minute quadrangle maps, Wyodak-Anderson study limit—continued

| Number | 7.5-minute quadrangle map | Number | 7.5-minute quadrangle map | Number | 7.5-minute quadrangle map |
|---|---|---|---|---|---|
| 180 | DRY FORK RANCH | 196 | PINEY CANYON SW | 212 | SEVEN L CREEK EAST |
| 181 | ROLLING PIN RANCH | 197 | SAWMILL CANYON | 213 | FLY DRAW |
| 182 | SOUTH BUTTE | 198 | ROSS | 214 | SOUTH FORK RESERVOIR |
| 183 | BAKER SPRING | 199 | ROSS FLAT | 215 | SUICIDE HILL |
| 184 | RATTLESNAKE DRAW | 200 | MACKEN DRAW | 216 | RED HILL |
| 185 | LITTLE THUNDER RESERVOIR | 201 | COAL DRAW NORTH | 217 | PATSY DRAW |
| 186 | RENO RESERVOIR | 202 | BETTY RESERVOIR | 218 | BEAUCHAMP RESERVOIR |
| 187 | PINEY CANYON NW | 203 | DUGOUT CREEK NORTH | 219 | GUMBO HILL |
| 188 | LINCH | 204 | COAL BANK DRAW | 220 | COAL HILL |
| 189 | TAYLOR RANCH | 205 | GILLAM DRAW EAST | 221 | HOLDUP HOLLOW |
| 190 | ARTESIAN DRAW | 206 | MARSH DRAW | 222 | WHIPPLE HOLLOW |
| 191 | PINE TREE | 207 | THOMPSON DRAW | 223 | BOBBY DRAW |
| 192 | TURNERCREST | 208 | BEAR CREEK | 224 | GLENROCK NW |
| 193 | RENO FLATS | 209 | COAL DRAW SOUTH | 225 | HYLTON RANCH |
| 194 | TECKLA SW | 210 | ALTA CREEK | 226 | LEUENBERGER RANCH |
| 195 | TECKLA | 211 | DUGOUT CREEK SOUTH | 227 | GILBERT LAKE |

Click here or on this symbol
in the toolbar to return.

Table PN-5. Data used for computation of confidence intervals within reliability categories for Wyodak-Anderson coal resources in the Powder River Basin. Volume refers to the calculated resource in millions of short tons (MST). NA, not applicable

| Parameter | Reliability category | | | | Entire area |
|---|---|---|---|---|---|
| | Measured | Indicated | Inferred | Hypothetical | |
| Area (in square meters) | 1,488,759,443 | 5,670,020,546 | 11,140,313,431 | 3,612,068,158 | 21,911,161,578 |
| Percent of area | 7 | 26 | 51 | 16 | 100 |
| Acres (area x 0.0002471) | 367,880 | 1,401,092 | 2,752,831 | 892,561 | 5,414,365 |
| SD (standard deviation (in ft) from semivariogram model) | 18.38 | 22.78 | 26.67 | 26.89 | NA |
| Acre feet (acres x SD) | 6,759,910 | 31,921,428 | 73,423,804 | 24,000,492 | NA |
| Volume standard deviation (MST) | 227 | 1,634 | 10,675 | 43,028 | 55,564 |
| Pseudo *n* | 2,928 | 1,239 | 152 | 1 | NA |

Table PN-6. Estimates of uncertainty (calculated with measurement error) for Wyodak-Anderson coal resources in the Powder River Basin. To show detail, resources are reported in millions of short tons (MST) with four significant figures

| Parameter | Reliability category | | | | Entire area |
|---|---|---|---|---|---|
| | Measured | Indicated | Inferred | Hypothetical | |
| Total calculated resource (MST) | 43,670 | 167,700 | 303,700 | 35,610 | 550,700 |
| Lower 90% confidence limit (MST) | 43,300 | 165,000 | 286,100 | 0 | 459,300 |
| Upper 90% confidence limit (MST) | 44,050 | 170,400 | 321,200 | 106,400 | 642,100 |