

COAL RESOURCE RATING CRITERIA

The following resource rating criteria are organized on a scale of 1 - low to 5 - high and are based on the potential for substantial coal discoveries. A rating of 1 indicates a low potential for substantial coal discoveries; a rating of 5 is the highest possible rating under this system. The criteria are through 5, and in some cases, more than one letter is used, as in "2b". These letters are only explanatory, they do not indicate a rating.

The areas outlined in heavy black on the map have been calculated according to the U.S. Geological Survey resource classification system (U.S.G.S. Circular 887), using available surface and subsurface data. The size and reliability of data available determine how the resource potential is calculated (see "Coal Resource," Glossary).

1 Very low to low possibility for substantial coal discoveries; sedimentary and other rock units not known to host coal; these "barren" units vary from map to map; this rating based almost entirely on published general, broad-brush geological maps.

2 Low to medium possibility for substantial coal discoveries; these ratings based mostly on published general, broad-brush geology:

- a** units with very minor coal shows elsewhere; possibly favorable rocks but no coal known at location;
- b** queried rock unit or undifferentiated group (two or more rock units mapped together, so presence of coal-bearing unit is uncertain);
- c** cover of recent (Quaternary) unconsolidated sediments suspected of being overlain by a formation that hosts coal elsewhere;
- d** Tertiary basin; most of the coal on the Seward Peninsula is lignite (lower quality coal) found within Tertiary-aged sedimentary rocks confined in areas called basins (see "basin," Glossary); therefore, all such basins on the Peninsula potentially contain coal deposits;
- e** unverified report of coal occurrence; off-hand reference to coal in published geological report; other second-hand or unconfirmed reports.

3 Medium to high possibility for substantial coal discoveries:

- f** coal bearing formation close to exposed coal, e.g. other end of basin or syncline (see 2d, above, and Glossary) from known coal deposits;
- g** scattered, small surficial coal shows or float (see Glossary) that may be weathering out of a hidden coal deposit;
- h** "mined out" or formerly subeconomic sites where future investigation may reveal usable coal resources;
- i** Cretaceous basin (see 2d, above, and Glossary): composed of Cretaceous-aged rocks known elsewhere to contain medium to large tonnages of good quality (subbituminous to bituminous) coal; rated higher than 2d both because of likely higher coal quality and because of high tonnage potential demonstrated, for example, by the large Cretaceous-aged Cape Beaufort coal field.

4 Known coal, lesser occurrences, and/or less well studied than 5's:

- j** marginal because of low rank (low Btu), low tonnage, structural complexity, or thin beds (even if coal is good quality and present in large amounts, thin beds may mean too much added waste).
- k** indicated and inferred resources (see Glossary) of 5's in favorable geology.
- m** may include cases where drilling has disclosed some coal but where its extent is still unknown.

5 Known coal, medium to large measured resources (see Glossary) of usable quality coal. There is a large size difference between the smallest and largest but even the smallest is known to contain reserves that might be mineable under the right conditions. For example, the Chicago Creek coal deposit, on the Seward Peninsula, contains only one known thick bed of coal and is considered a topographic basin (see Glossary); estimated tonnage for this deposit is a fraction of those calculated for the Deadfall syncline; and the Chicago Creek coal is lignite, while the Deadfall syncline coal is of higher, bituminous rank. Nevertheless, Chicago Creek rates a 5 as easily as the Deadfall syncline, for it contains potentially marketable coal, in adequate tonnage, close to tidewater.

EXPLANATION

COAL RESOURCE RATING CRITERIA

The following resource rating criteria are organized on a scale of 1 - low to 5 - high and are based on the potential for substantial coal discoveries. A rating of 1 indicates a low potential for substantial coal discoveries; a rating of 5 is the highest possible rating under this system. The criteria are through 5, and in some cases, more than one letter is used, as in "2b". These letters are only explanatory, they do not indicate a rating.

The areas outlined in heavy black on the map have been calculated according to the U.S. Geological Survey resource classification system (U.S.G.S. Circular 887), using available surface and subsurface data. The size and reliability of data available determine how the resource potential is calculated (see "Coal Resource," Glossary).

1 Very low to low possibility for substantial coal discoveries; sedimentary and other rock units not known to host coal; these "barren" units vary from map to map; this rating based almost entirely on published general, broad-brush geological maps.

2 Low to medium possibility for substantial coal discoveries; these ratings based mostly on published general, broad-brush geology:

- a** units with very minor coal shows elsewhere; possibly favorable rocks but no coal known at location;
- b** queried rock unit or undifferentiated group (two or more rock units mapped together, so presence of coal-bearing unit is uncertain);
- c** cover of recent (Quaternary) unconsolidated sediments suspected of being overlain by a formation that hosts coal elsewhere;
- d** Tertiary basin; most of the coal on the Seward Peninsula is lignite (lower quality coal) found within Tertiary-aged sedimentary rocks confined in areas called basins (see "basin," Glossary); therefore, all such basins on the Peninsula potentially contain coal deposits;
- e** unverified report of coal occurrence; off-hand reference to coal in published geological report; other second-hand or unconfirmed reports.

3 Medium to high possibility for substantial coal discoveries:

- f** coal bearing formation close to exposed coal, e.g. other end of basin or syncline (see 2d, above, and Glossary) from known coal deposits;
- g** scattered, small surficial coal shows or float (see Glossary) that may be weathering out of a hidden coal deposit;
- h** "mined out" or formerly subeconomic sites where future investigation may reveal usable coal resources;
- i** Cretaceous basin (see 2d, above, and Glossary): composed of Cretaceous-aged rocks known elsewhere to contain medium to large tonnages of good quality (subbituminous to bituminous) coal; rated higher than 2d both because of likely higher coal quality and because of high tonnage potential demonstrated, for example, by the large Cretaceous-aged Cape Beaufort coal field.

4 Known coal, lesser occurrences, and/or less well studied than 5's:

- j** marginal because of low rank (low Btu), low tonnage, structural complexity, or thin beds (even if coal is good quality and present in large amounts, thin beds may mean too much added waste).
- k** indicated and inferred resources (see Glossary) of 5's in favorable geology.
- m** may include cases where drilling has disclosed some coal but where its extent is still unknown.

5 Known coal, medium to large measured resources (see Glossary) of usable quality coal. There is a large size difference between the smallest and largest but even the smallest is known to contain reserves that might be mineable under the right conditions. For example, the Chicago Creek coal deposit, on the Seward Peninsula, contains only one known thick bed of coal and is considered a topographic basin (see Glossary); estimated tonnage for this deposit is a fraction of those calculated for the Deadfall syncline; and the Chicago Creek coal is lignite, while the Deadfall syncline coal is of higher, bituminous rank. Nevertheless, Chicago Creek rates a 5 as easily as the Deadfall syncline, for it contains potentially marketable coal, in adequate tonnage, close to tidewater.

SUMMARY: CANDLE QUADRANGLE

EXPLANATION

COAL RESOURCE RATING CRITERIA

The following resource rating criteria are organized on a scale of 1 - low to 5 - high and are based on the potential for substantial coal discoveries. A rating of 1 indicates a low potential for substantial coal discoveries; a rating of 5 is the highest possible rating under this system. The criteria are through 5, and in some cases, more than one letter is used, as in "2b". These letters are only explanatory, they do not indicate a rating.

The areas outlined in heavy black on the map have been calculated according to the U.S. Geological Survey resource classification system (U.S.G.S. Circular 887), using available surface and subsurface data. The size and reliability of data available determine how the resource potential is calculated (see "Coal Resource," Glossary).

1 Very low to low possibility for substantial coal discoveries; sedimentary and other rock units not known to host coal; these "barren" units vary from map to map; this rating based almost entirely on published general, broad-brush geological maps.

2 Low to medium possibility for substantial coal discoveries; these ratings based mostly on published general, broad-brush geology:

- a** units with very minor coal shows elsewhere; possibly favorable rocks but no coal known at location;
- b** queried rock unit or undifferentiated group (two or more rock units mapped together, so presence of coal-bearing unit is uncertain);
- c** cover of recent (Quaternary) unconsolidated sediments suspected of being overlain by a formation that hosts coal elsewhere;
- d** Tertiary basin; most of the coal on the Seward Peninsula is lignite (lower quality coal) found within Tertiary-aged sedimentary rocks confined in areas called basins (see "basin," Glossary); therefore, all such basins on the Peninsula potentially contain coal deposits;
- e** unverified report of coal occurrence; off-hand reference to coal in published geological report; other second-hand or unconfirmed reports.

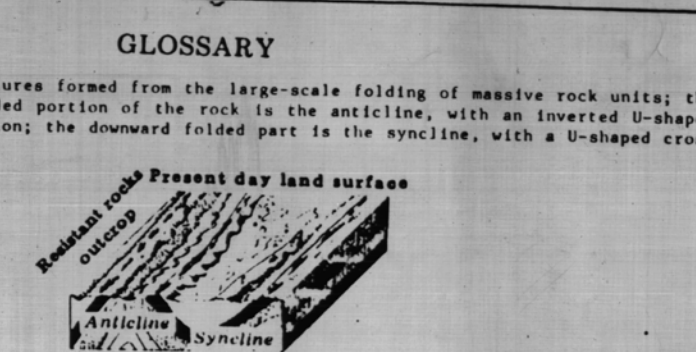
3 Medium to high possibility for substantial coal discoveries:

- f** coal bearing formation close to exposed coal, e.g. other end of basin or syncline (see 2d, above, and Glossary) from known coal deposits;
- g** scattered, small surficial coal shows or float (see Glossary) that may be weathering out of a hidden coal deposit;
- h** "mined out" or formerly subeconomic sites where future investigation may reveal usable coal resources;
- i** Cretaceous basin (see 2d, above, and Glossary): composed of Cretaceous-aged rocks known elsewhere to contain medium to large tonnages of good quality (subbituminous to bituminous) coal; rated higher than 2d both because of likely higher coal quality and because of high tonnage potential demonstrated, for example, by the large Cretaceous-aged Cape Beaufort coal field.

4 Known coal, lesser occurrences, and/or less well studied than 5's:

- j** marginal because of low rank (low Btu), low tonnage, structural complexity, or thin beds (even if coal is good quality and present in large amounts, thin beds may mean too much added waste).
- k** indicated and inferred resources (see Glossary) of 5's in favorable geology.
- m** may include cases where drilling has disclosed some coal but where its extent is still unknown.

5 Known coal, medium to large measured resources (see Glossary) of usable quality coal. There is a large size difference between the smallest and largest but even the smallest is known to contain reserves that might be mineable under the right conditions. For example, the Chicago Creek coal deposit, on the Seward Peninsula, contains only one known thick bed of coal and is considered a topographic basin (see Glossary); estimated tonnage for this deposit is a fraction of those calculated for the Deadfall syncline; and the Chicago Creek coal is lignite, while the Deadfall syncline coal is of higher, bituminous rank. Nevertheless, Chicago Creek rates a 5 as easily as the Deadfall syncline, for it contains potentially marketable coal, in adequate tonnage, close to tidewater.

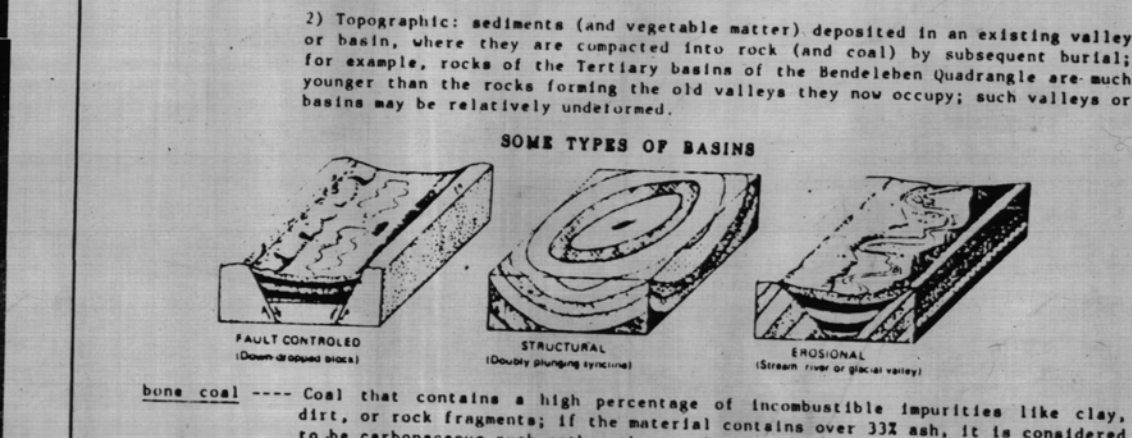


GLOSSARY

anticline - Rock structure formed from the large-scale folding of massive rock units; the upward folded portion of the rock is the anticline, with an inverted U-shaped cross section; the downward folded part is the syncline, with a U-shaped cross section.

basin - 1) Structural: a syncline that dips toward in all directions (see "syncline"); usually formed by the oblique intersection of non vertical, or downfaulting, topography is largely coincidental; for example, rocks (and coal) of the relatively flat environment, were buried by continued sedimentation, and were topography of these basins is a product of differential weathering of the various rock types of which they are composed.

2) Topographic: sediments (and vegetable matter) deposited in an existing valley or basin, where they are compacted into rock (and coal) by subsequent tectonic forces; rocks of the Tertiary basins of the Seward Peninsula are much younger than the rocks forming the old valleys they now occupy; such valleys or basins may be relatively undisturbed.



SOME TYPES OF BASINS

basin - 1) Structural: a syncline that dips toward in all directions (see "syncline"); usually formed by the oblique intersection of non vertical, or downfaulting, topography is largely coincidental; for example, rocks (and coal) of the relatively flat environment, were buried by continued sedimentation, and were topography of these basins is a product of differential weathering of the various rock types of which they are composed.

2) Topographic: sediments (and vegetable matter) deposited in an existing valley or basin, where they are compacted into rock (and coal) by subsequent tectonic forces; rocks of the Tertiary basins of the Seward Peninsula are much younger than the rocks forming the old valleys they now occupy; such valleys or basins may be relatively undisturbed.

bituminous - A coal rank consisting of subbituminous, bituminous A, bituminous B, and anthracite. Bituminous coals are characterized by their high volatile content and their high heating value.

bituminous A - A coal rank consisting of subbituminous A, bituminous A, and bituminous B. Bituminous A coals are characterized by their high volatile content and their high heating value.

bituminous B - A coal rank consisting of bituminous B and anthracite. Bituminous B coals are characterized by their high volatile content and their high heating value.

coal - A sedimentary rock consisting of carbonaceous material, usually in the form of thin layers or beds, which can be used as a fuel. Coal is formed from the remains of plants that have been buried and compressed over millions of years.

coal seam - A layer of coal within a rock formation. Coal seams are usually horizontal or slightly inclined.

coal strike - The direction in which a coal seam extends horizontally. Coal strike is usually parallel to the direction of the coal seam's dip.

coal dip - The angle a coal seam makes with the horizontal. Coal dip is usually between 1 and 10 degrees.

coal resource - The amount of coal that is known to exist in a particular area. Coal resources are usually expressed in terms of tons or billions of tons.

coal reserve - The amount of coal that is known to exist in a particular area and that is available for use. Coal reserves are usually expressed in terms of tons or billions of tons.

coal field - A large area of coal resources. Coal fields are usually named after the location where they were first discovered.

coal quality - The characteristics of coal that determine its usefulness as a fuel. Coal quality is usually expressed in terms of heating value, volatile content, and ash content.

coal rank - The classification of coal based on its heating value and volatile content. Coal ranks are usually expressed in terms of subbituminous, bituminous, and anthracite.

coal seam - A layer of coal within a rock formation. Coal seams are usually horizontal or slightly inclined.

coal strike - The direction in which a coal seam extends horizontally. Coal strike is usually parallel to the direction of the coal seam's dip.

coal dip - The angle a coal seam makes with the horizontal. Coal dip is usually between 1 and 10 degrees.

coal resource - The amount of coal that is known to exist in a particular area. Coal resources are usually expressed in terms of tons or billions of tons.

coal reserve - The amount of coal that is known to exist in a particular area and that is available for use. Coal reserves are usually expressed in terms of tons or billions of tons.

coal field - A large area of coal resources. Coal fields are usually named after the location where they were first discovered.

coal quality - The characteristics of coal that determine its usefulness as a fuel. Coal quality is usually expressed in terms of heating value, volatile content, and ash content.

coal rank - The classification of coal based on its heating value and volatile content. Coal ranks are usually expressed in terms of subbituminous, bituminous, and anthracite.

coal seam - A layer of coal within a rock formation. Coal seams are usually horizontal or slightly inclined.

coal strike - The direction in which a coal seam extends horizontally. Coal strike is usually parallel to the direction of the coal seam's dip.

coal dip - The angle a coal seam makes with the horizontal. Coal dip is usually between 1 and 10 degrees.