with minor textural variations, but transgressive biomicrite facies occur locally. Mud texture, scarcity of fossils and other allochems, thin lamination, and probable algal-mat structures suggest sedimentation in a tidal-flat environment; dolomitization was pervasive and probably before lithification.

Fracture- and breccia-controlled pitchblende-coffinite ores are associated with epigenetic pyrite and marcasite; magnesium, iron, sulfur, molybdenum, and lead are enriched in the ore and uranium is independent of organic carbon. One surface expression of ore is ochercolored, leached, porous gossan, characterized by residual silica and limonite and by high radioactivity but low uranium.

Guides to this type of deposit appear to include upthrust faulting, a thick section of brittle rocks attached to the basement, nearby radioactive plutonic or volcanic rocks, and presence of anomalous iron, magnesium(?), sulfur, and molybdenum. Sulfides, carbon, or hydrocarbons are possible reductants.

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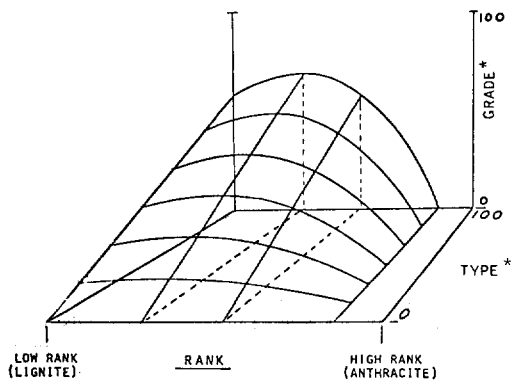
Coal Characterization for Optimum Utilization

Coal is a sedimentary rock composed principally of macerals, subordinately of minerals, and containing water-filled pores. Macerals are solid, organic substances derived from plant tissues and exudates that have been incorporated into the earth's crust, compacted, hardened, and chemically altered by biologic and geologic processes.

Differences in the relative proportions of minerals and macerals, and in the relative proportions of progenitors of the different macerals are established in the peat swamp. In addition, sulfur is emplaced during or shortly after accumulation of peat. Different types of coals result from these depositional or diagenetic variations. Successive layers of a given coal seam may consist of distinctive coal types as a result of altered environmental conditions. Thus, it is necessary to sample a coal seam carefully to avoid obtaining a biased sample.



* GRADE = Yield of Liquids as % of D.A.F. Coal

* TYPE = Reactive Ingredients as % of D.A.F. Coal

GENERALIZED SURFACE RESPONSE INDICATING HOW COAL RANK AND COAL TYPE INFLUENCE COAL GRADE (here expressed as yield of liquids from liquefaction)

Following deposition, relatively mild diagenetic and metamorphic processes alter the composition of the maceral progenitors, leading to increasing rank of the coal. The metamorphic alteration results largely from thermally induced chemical reactions which increase in severity with increasing depth of burial. Concomitantly, pressure reduces porosity and moisture-holding capacity, and increases hardness. Differences in type are retained irrespective of rank.

Both rank and type influence coal grade (value) orthogonally. Thus, though the rank of a coal may be suitable for a particular use, the type may be entirely unsuitable; the reverse may also be true.

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Carbon Isotopic Signature as Criterion for Interpreting Origin of Synsedimentary Cements, Patch Reef Facies, Enewetak Atoll

Data collected from Enewetak Atoll suggest multigenerated synsedimentary cements of the patch-reef facies. The most common cement occurs as micritic aragonite in coralgal boundstones. Isopachous fibrous cements consist of parallel to subparallel crystals uniformly lining all sides of a cavity. These cements are present in subtidal marine environments and suggest early precipitation.

Organic matter occurs coincident with the precipitation of these marine cements. The source of the organic matter may be due partly to neomorphic replacement of aragonite to low Mg calcite. The $\delta^{13}C_{PDB}$ values range from -6 to -12 ppm. Previous work by Gross and Tracey concluded that abnormally light $\delta^{13}C$ values were produced by a 1:1 reaction of isotopically light ($\delta^{13}C - 22$ ppm) soil gases dissolved in meteoric water and transported throughout the rock with the cements. Our data suggest that soil gases in the carbonate soils of Enewetak are isotopically much heavier than terrigenous soils. We conclude that the isotopically light $\delta^{13}C$ values are partly attributed to the organic matter trapped in the aragonite lattice.

In contrast, radial fibrous aragonite cement occurs locally filling voids of mollusk shells. The cement consists of fibrous crystals radiating from a central point forming hemispherical nodules that are characterized by undulatory extinction. These cements are isotopically heavier than the above and do not contain organic matter. We conclude that they are inorganically precipitated synsedimentary cements.

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Sedimentary Characteristics and Processes of Current-Dominated Epicontinental Shelf, Northern Bering Sea, Alaska

The northern Bering Sea is a large epicontinental shelf area of less than 50 m depth that is dominated by a mean northward current toward Bering Strait. Bathy-