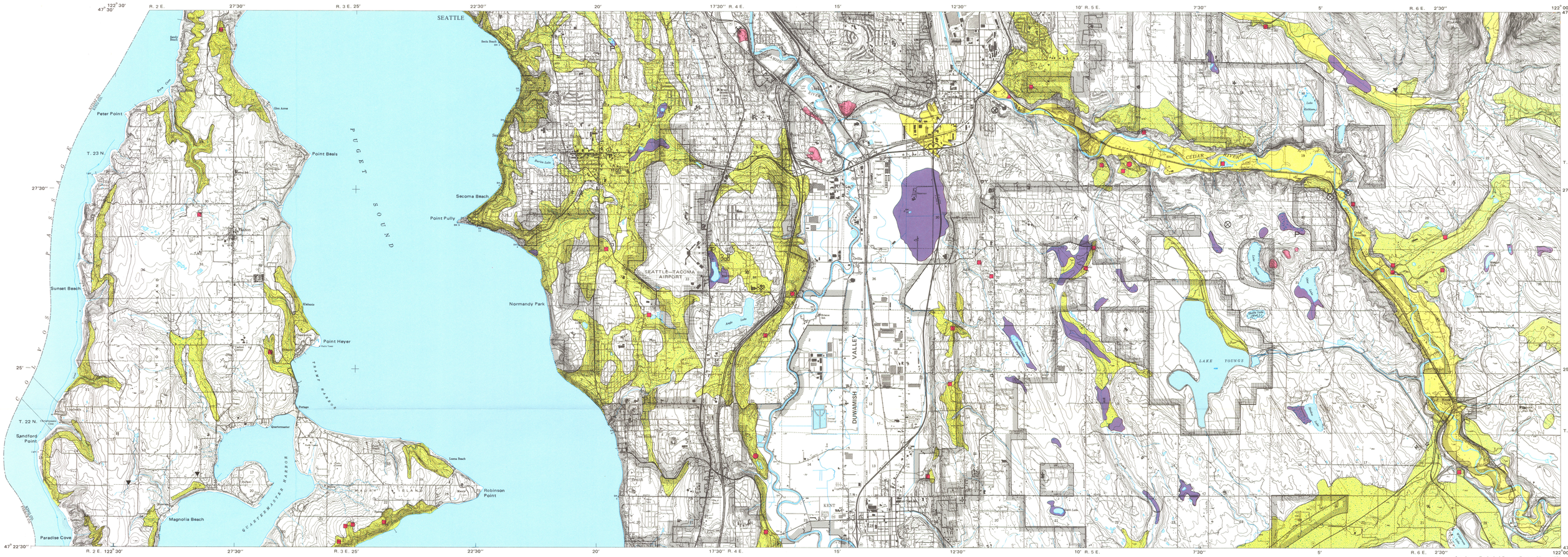
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

FOLIO OF KING COUNTY, WASHINGTON
MAP I–852–D



Base from U.S. Geological Survey, 1949 and 1953 quadrangles
Photorevision as of 1968

Interior — Geological Survey, Reston, Va. — 1975

FIGURE 1.—NONMETALLIC MINERAL RESOURCES AND DEPOSITS

EXPLANATION

Glacial outwash, stratified drift, and associated deposits
Constitutes the best gravel source

Alluvium
Mostly unconsolidated sand and gravel valley fill. River-bar deposits are a good gravel source

Peat bog

Basalt or andesite deposit

Incorporated municipality
Mineral activity may be restricted or inhibited

Protected area
Closed to mineral activity. Comprises watershed, park, and airport lands

Unincorporated urban (suburban) areas
Mineral activity may be discouraged or inhibited

Commercial gravel pit, with processing plant

Commercial gravel pit

Commercial gravel processing plant

Governmental gravel pit

Ceramic clay or sand, foundry sand, or expandable shale deposit

Rock quarry

Peat mining or processing operation

SOURCES OF DATA USED IN COMPILING MINERAL RESOURCES AND DEPOSITS MAP

1. Berg, 1962
2. Livingston, 1971
3. Luzier, 1969
4. Kroft, 1972
5. Mullineaux, 1965
6. Vine, 1969
7. Waldron, 1962

Note: Geology of gravel-bearing units largely adapted from Livingston, 1971

Introduction

"Nonmetallic minerals" (rocks and minerals not produced as sources of metals) is a broad category of economically important minerals. It includes the prosaic but essential rock materials used in almost all construction, and substances such as coal for generation of energy, peat for soil conditioners, and clay for ceramic ware. Nonmetallic minerals are low unit-value, but high-bulk, commodities generally produced and consumed in quantity. To be competitive and to keep the price to the consumer reasonable, mining and transportation costs must be kept low.

Preservation of areas containing nonmetallic mineral resources has been accorded low priority among land-use considerations in King County in the past. This is probably because of the low unit value of nonmetallic minerals, unsightly scars mining operations often leave on the landscape, and lack of detailed information on the quality and quantity of individual deposits. As a result, urbanization has spread across valuable gravel- and coal-bearing areas, effectively precluding their future development. Society can no longer afford the luxury of helter-skelter resource consumption. Nonmetallic minerals must be given careful consideration in overall land-use plans, and provision made for proper sequential usage of mineral-bearing lands.

This report shows (1) location of nonmetallic mineral properties and processing facilities in west-central King County, (2) geologic deposits most significant as sources of the minerals, and (3) generalized land uses in the area; it also briefly describes interrelated problems between land-use trends and utilization of the nonmetallic mineral resources.

Sand gravel

Sand and gravel are by far the most important nonmetallic mineral commodities in west-central King County, both in terms of available resource and current commercial activity. In 1970, about 4.3 million tons of sand and gravel, valued at more than $6.5 million, were produced in King County; an estimated 25 percent of that total was mined in the area shown in figure 1. Sand and gravel aggregate for concrete is an almost universal building material in modern construction practice; gravel also is commonly used for asphalt aggregate in King County where suitable rock sources are rare.

Although sand and gravel are widespread in King County, only a relatively small amount is commercially suitable. The most desirable deposits contain abundant clean gravel of a size usable for concrete without crushing; in most gravelly deposits in this area, excessive sand or finer material limits their value. A further limiting value is the relatively high transportation costs that often make up a major part of what the consumers pay. The maximum economic truck-haul distance in King County is about 6 miles for unprocessed gravel and 7 miles for ready-mix concrete or asphaltic paving mix.

Figure 1 shows the location of existing sand and gravel pits and processing operations and the distribution of geologic units that contain sand and gravel suitable for commercial uses such as concrete and asphaltic aggregate. Glacial outwash deposits provide gravel reserves conservatively estimated at 350 million tons; about 88 million tons also are available from alluvial deposits. The total reserves are equivalent to about a 100-year supply for the entire county at the 1970 rate of consumption (4.3 million tons per year). However, most of the deposits are in or adjacent to urban or suburban areas where extraction may be restricted or prohibited. Within the last two decades, urban development, by encroaching over potential gravel deposits, has effectively eliminated approximately 55 percent of the commercial reserves within the map area.

Quarry rock

Rock suitable for quarrying and within economical hauling distances is in short supply in King County. Most nearby quarry rock is fairly soft, a property which greatly restricts its use. Two basalt deposits in the northwestern part of the map area produce crushed and broken stone for riprap, landscape rock, and various crushed-rock products. However, large riprap and jetty rocks, which are in demand in this region, and high-quality crushed-rock aggregate cannot be made from these deposits because of limiting physical properties of the rock. Although the commercial value of several undeveloped bodies of basalt and andesite shown on the map is not known, pending their appraisal, they should be considered as a potential resource for planning purposes.

Peat

Peat, found in bogs and poorly drained depressions, is widespread in the lowland parts of King County. However, many peat deposits are too small in area or are too thin to be of commercial interest. Only those regarded as having some potential value for recovery are shown on the map. Present peat-mining and processing operations are located at Arbor Lake and Otter Lake.

Possible subsequent uses of mined-out, peat-bearing lands should be considered well in advance to dovetail with the mining methods used. Such uses might include: (1) sites for solid-waste disposal, (2) draining and backfilling of the excavation as a foundation for some structure(s), and (3) construction of a lake for recreational or water-oriented developments. Bow Lake, east of the Seattle-Tacoma International Airport, has been enlarged by the excavation of peat, and its shorelands have been developed for high-value commercial use.

Ceramic materials

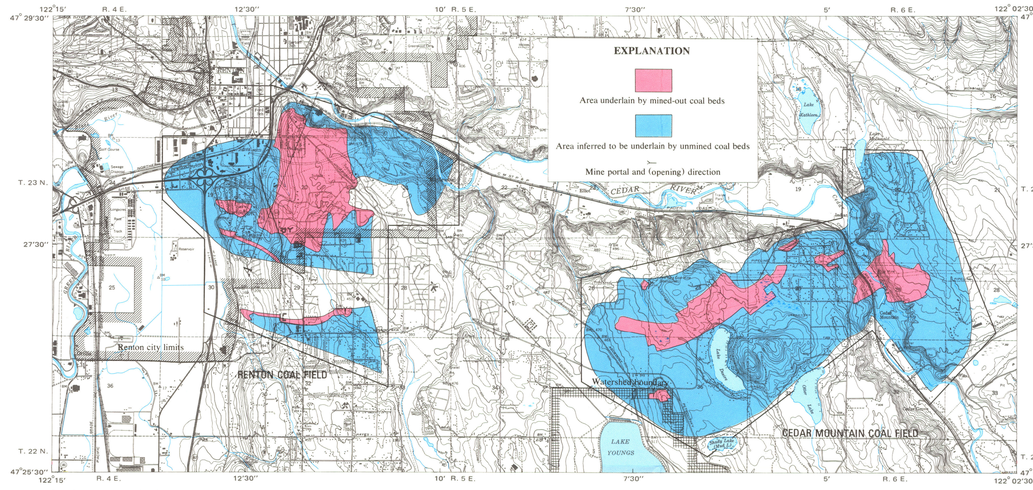
The term "ceramic materials" is here used to designate clay, shale, and sand deposits suitable as ceramic raw material, foundry sand, and expanding-shale aggregate.

Clay for common red- to brown-firing structural ceramic products, such as building bricks and tile, is produced from a deposit in Renton. The "clay" source is actually from shale or claystone bedrock.

A ceramic-additive sandstone, mined near Lake Desire, is combined with clay to reduce plasticity and control shrinkage in the manufacture of ceramic wares. The sandstone pit will soon be engulfed by urban development advancing from the west. The deposit is being mined in a manner that will allow ready real-estate development when extraction is completed. Sand for foundry molds is mined from a bedrock deposit near an urbanizing area north of Otter Lake.

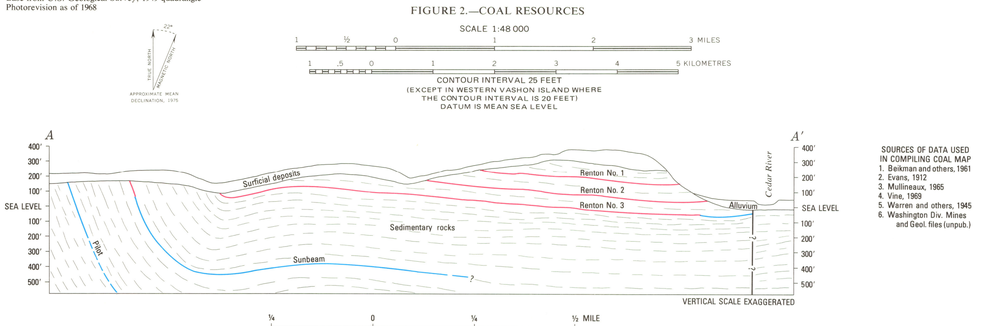
Expanding shale, which bloats on firing, produces a strong, cellular, lightweight, chemically inert material suitable for aggregate in lightweight structural concrete. An undeveloped deposit of expanding shale with possible commercial potential is located near the village of Cedar Mountain.

Although known deposits of ceramic raw materials are limited, the potential for discovery and development of new ceramic raw-material sources is good. Exploration for ceramic shales and sandstones has been difficult, because bedrock is covered by thick glacial deposits and dense vegetation. When the area's coal resources are developed further, it will undoubtedly be possible to evaluate other rocks suitable for ceramic raw materials.



Base from U.S. Geological Survey, 1949 quadrangle
Photorevision as of 1968

FIGURE 2.—COAL RESOURCES



SOURCES OF DATA USED IN COMPILING COAL MAP

1. Beikman and others, 1961
2. Evans, 1912
3. Mullineaux, 1965
4. Vine, 1969
5. Warren and others, 1945
6. Washington Div. Mines and Geol. files (unpub.)

DIAGRAMMATIC SECTION SHOWING RENTON COAL BEDS
Mined-out areas in red; unmined coal beds in blue

Coal resources

Coal mining was an important pioneer industry, starting in the 1850's, and coal is still an important mineral resource in King County. Most of the production occurred between 1900 and 1920, after which it steadily declined until today only a few thousand tons are produced annually—none in the mapped area.

Two principal coal fields, the Renton and Cedar Mountain, are in the mapped area (see fig. 2), and each have yielded about 4 million tons of coal; currently they are not being mined. Lands inferred to be underlain by coal in these fields are shown in blue in figure 2, and those underlain by mined-out workings on one or more of the coal beds are shown in red. Coals in both fields are generally considered subbituminous in rank, though some range up to the more valuable high-volatile C bituminous grade. Production in both fields was from seven coal beds, four of which are shown on the diagrammatic section accompanying figure 2. The two fields combined have a total remaining coal reserve estimated at 117 million tons.

Most of the coal in the Renton field was mined from the No. 3 bed. The total coal reserve in this field is estimated at about 50 million tons, although much of this reserve occurs at appreciably greater depths than the coal mined to date; possible folds and faults in the beds at depth may complicate future development of the field.

The bulk of production from the Cedar Mountain field came from the western and eastern parts. The total reserve in this field is estimated at about 67 million tons. Beds in the Cedar Mountain field are inclined, and the coal-bearing layers are inferred to extend to depths greater than 2,000 feet.

Although coal mining in the mapped area has been dormant for more than 25 years, some provision should be made in regional land-use planning for the future development of this important energy resource. Urbanization has spread over unmined coal reserves as well as over some of the mined-out beds, and urban development over the potential coal fields probably will inhibit future mining in those fields. Some mined areas have subsided due to collapse of underground support columns and workings, and structures at the ground surface have been damaged. The degree of hazard from mine subsidence varies largely with the depth of the old mine workings and with other factors; the fact that the hazard exists should be considered in land-use planning in areas of past and potential future coal mining (figs. 1 and 2). Proposals for urban development in such areas should demonstrate that the problem is recognized and that a hazard does not exist or that it would not constitute a risk.

Conclusion

The Puget Sound region has developed to the point where mineral resources must be considered in managing land use. The public interests require the preservation and development of critical mineral resources. Such development, however, should be properly regulated with regard to all environmental and subsequent use factors.

This map is one of a series being prepared by the U.S. Department of the Interior in cooperation with several agencies to present basic environmental information and interpretations to assist land-use planning in the Puget Sound area.

SELECTED REFERENCES

Beikman, H. M., Gower, H. D., and Dana, T. A. M., 1961, Coal reserves of Washington: Washington Div. Mines and Geol. Bull. 47, 115 p.

Berg, A. B., 1962, Sand and gravel deposits in western King County, Washington: Northern Pacific Railway Co. Mineral Development Div. Map.

Evans, G. W., 1912, The coal fields of King County: Washington Geol. Survey Bull. 3, 247 p.

Kroft, D. J., 1972, Sand and gravel deposits in western King County, Washington: Unpub. M.S. thesis, Univ. of Washington, 62 p.

Livingston, V. E., Jr., 1971, Geology and mineral resources of King County, Washington: Washington Div. Mines and Geol. Bull 63, 200 p.

Luzier, J. E., 1969, Geology and water resources of southwestern King County, Washington: Washington Dept. of Water Resources, Water Supply Bull. no. 28, 260 p.

Mullineaux, D. R., 1965, Geologic map of the Renton quadrangle, Washington: U.S. Geol. Survey Geol. Quad. Map GQ–405.

Rigg, G. B., 1958, Peat resources of Washington: Washington Div. Mines and Geol. Bull. 44, 272 p.

Valentine, G. M., 1960, Inventory of Washington minerals, Part 1—Nonmetallic minerals, 2d ed., revised by M. T. Huntting: Washington Div. Mines and Geol. Bull. 37, pt. 1, 175 p.

Vine, J. D., 1969, Geology and coal resources of the Cumberland, Hobart, and Maple Valley quadrangles, King County, Washington: U.S. Geol. Survey Prof. Paper 642, 67 p.

Waldron, H. H., 1962, Geology of the Des Moines quadrangle, Washington: U.S. Geol. Survey Geol. Quad. Map GQ–158.

Warren, W. C., Norbisrath, Hans, Grivetti, R. M., and Brown, S. P., 1945, The coal fields of King County, Washington: U.S. Geol. Survey preliminary map.

INDEX MAP OF WASHINGTON

MAP SHOWING NONMETALLIC MINERAL RESOURCES IN PART OF WEST-CENTRAL KING COUNTY, WASHINGTON

By
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1975

For sale by U.S. Geological Survey, Denver, Colo. 80225 and Reston, Va. 22092, price $.75