The present availability and location of mineral resources in Fairfax County is of great importance to local land-use planners and the concerned public. Planning for future availability and utilization of critical rock and mineral commodities is contingent on wise and timely decisions by current planners and land-use decision makers. Current problems addressed by expedient, short term solutions may lead to costly, long term, often irreparable environmental damage and lost economic opportunities. This map and report show available economic rock and mineral resources, their location, current uses, and expected future needs, so that wise decisions can be made by regulatory agencies now to insure that the identified resources will be available when needed.

The decision to use or not use an available resource depends on many factors, including the possible environmental disruption to air, water, and landscape. Wise planning and regulation in advance of extraction may reduce or avoid anticipated damages.

The rock and mineral resources of Fairfax County are used as sources for construction material, highway fill, and building stone. The principal quarries, pits, mines and prospects are shown on the map and keyed to a locality list. During 1975-76 diabase was quarried for rip-rap, fill and crushed stone; granite quarried for aggregate, crushed stone, rip-rap, and fill; and sand and gravel were extracted for construction uses. Some resources necessary for future construction are adequate quantities of crushed stone and sand and gravel at or near the surface located close to the area of use. The county has large reserves of some industrial materials, but new sources may be needed to fulfill economically the requirements of future construction. As urbanization expands into rural or undeveloped areas, potential mineral deposits may be preempted, unless such deposits are recognized and preserved in the land use planning process. Extraction of rock or sand and gravel may be only a temporary stage in efficient land use. After extraction, the land can be restored to agriculture, used for recreational areas, building sites, or possibly solid waste disposal.

Minor deposits of metallic or non-metallic minerals are distributed throughout Fairfax County, but these occurrences are mainly of historical, mineralogical, or geological interest; their locations are shown by symbols designating abandoned mines or prospects accompanied by letter symbols indicating the type of deposits.

CRUSHED STONE

Diabase

Diabase, a dark colored igneous rock suitable for crushed stone, underlies much of western Fairfax County and extends into adjacent Loudoun County. Diabase makes excellent aggregate because it is tough, has uniform texture, and is resistent to chemical weathering.

Crushed diabase is used principally as binder-filler for asphalt paving, as base course for highways, for road metal, and for concrete aggregate. Physical properties and engineering characteristics are described by Gooch, et. al. (1960).

Two diabase quarries (Locality 1) about 3 miles west of Centreville, produced large tonnages of crushed stone, but much more was brought in from several quarries nearby in Loudoun County. Diabase was formerly quarried for local use from several small abandoned pits, most of which are now overgrown or abandoned. The near-surface part of the spoon-shaped diabase body that surrounds Herndon covers about six square miles in Fairfax County, about 60% of which is partly urbanized. About 40% of a similar body near Centreville that covers an area of about eight square miles in Fairfax County, is urbanized, partly urbanized or otherwise committed to parkland and other uses. A square mile area excavated to a depth of 50 feet contains about 130 million tons of diabase suitable for crushed stone, about 35 years supply at current rates of consumption in the County.

Baked Zone

The baked zone, or contact metamorphic aureole, forms a belt of altered sedimentary rocks surrounding the diabase intrusive rock bodies. The baked zone averages about 1/2 mile wide and is present along the inner and outer margins of the diabase bodies at Herndon and Centreville. The specific physical characteristics of the rocks of the baked zone are dependent on the original lithology and distance from the intrusive heat source; thus each type has somewhat different properties. Baked siltstone and shale have been locally used as a source of fill and roadbed material, and several quarries in Loudoun County produce part of their crushed stone output from this zone. Engineering tests are required at each potential quarry site to ascertain whether required characteristics are present in the rocks.

Granite

Granite is quarried from the moderately foliated Occoquan Granite or Adamellite (Seiders, et. al., 1975) near Occoquan. In 1976 the quarry covered 10 acres, was 350 feet (107 m) deep, and had an anticipated life of about 10 years at current rates of production. The chief use is for aggregate, crushed stone, rip-rap and fill. Similar granites crop out near the surface in southern Fairfax County, but core-drilling and engineering tests are required to ascertain acceptable quality. Much of the area underlain by granite is mantled by a blanket of saprolite as much as 100 feet (30 m) thick.

Serpentinite

Serpentinite was formerly quarried for crushed stone and aggregate at a small, long-abandoned quarry on Leigh Mill Road near Great Falls. Similar material quarried in nearby Montgomery County, Maryland, was the chief source of crushed stone in 1975 (Froelich, 1975). Serpentinite in Fairfax County occurs chiefly in narrow, elongate tabular bodies; the largest of these near Reston, is partly urbanized. Most narrow bodies and the borders of the large bodies are sheared, partly altered to soapstone, may contain fibrous asbestos, and are therefore unsuited as a major future source of crushed stone.

Building Stone

Abandoned quarries in schist, gneiss, greenstone and granite are widely scattered throughout Fairfax County. The bedrock exposed in the quarries is foliated and jointed, characteristics that undoubtedly facilitated quarrying. The rock was reportedly used locally for flagstone, building stone, veneer, slate, fill and rip-rap. Extensive reserves of rock sillilar to that formerly quarried remain at shallow depth, but many accessible sites are now used as streamside parks and for residential developments. Extensive areas of Occoquan Granite are readily accessible in southern Fairfax County, should greater use of this attractive stone become desirable.

SAND AND GRAVEL

Upland and Coastal Plain Deposits

Sand and gravel were formerly dug from numerous pits in the eastern part of the County, but none of the pits was active in 1976. The upland area formerly blanketed by extensive sand and gravel deposits that exceeds 20 feet (6 m) in thickness was about 33 square miles; gravel and sand were removed from about 2 square miles, about 25 square miles in the deposits are urbanized, leaving about 6 square miles of material potentially available for use. In some areas beneath these upland sand and gravel deposits the Cretaceous sands and pebbly sand deposits of the underlying Coastal Plain sediments were formerly dug for local use as construction materials.

Sand-sized quartzose material that formed as saprolite on deeply weathered Occoquan Granite, has been dug at Fort Belvoir west of Accotink Creek. Large areas underlain by similar material remain.

Alluvium

Sand and gravel deposits of limited extent are present along the Occoquan and Potomac Rivers, Difficult Run, Pohick, Popes Head, and Accotink Creeks. The alluvial deposits probably average 20 feet (6 m) thick and contain much clay and silt. Clean quartzose sandy alluvium is common in stream deposits draining areas underlain by Occoquan Granite, such as South Run and Sandy Run. Any plan to extract these deposits must be weighed against the scenic values, recreational uses, and effects on surface water quality of the rivers and creeks. Perhaps more important, these deposits may contain a significant volume of clean, potable, shallow ground water which is relatively secure from airborne pollutants and possibly suitable as an emergency supplemental supply of drinking water.

MINOR DEPOSITS OF HISTORIC INTEREST

Gold

Gold was mined underground from quartz veins in schist bedrock and saprolite and from alluvial placer workings at the Kirk (Bullneck) Mine (Locality 9) between 1890 and 1939 on Bullneck Run (Ulke, 1939). Gold flakes were panned from stream gravels in Bull Run about 300 m. south of U.S. Route 66 (Bernstein, 1976).

Copper

Copper carbonates, silicates, and sulfides (malachite, chrysocolla azurite, chalcopyrite) were mined on a small scale in the 1880's at the Theodora copper mine near Herndon (Locality 8). Other minor disseminated copper occurrences are common in the baked zone adjacent to diabase intrusives near Chantilly, but none are known to have been mined (Bernstein, 1976). Malachite is associated with serpentinite at Jenkins Farm Prospects (Locality 10) (Bernstein, 1976).

Iron

Magnetite and specular hematite are commonly associated with copper minerals, as well as barite and pyrite. Magnetite is reportedly associated with chlorite, and chromite in serpentinite near Dranesville and in the abandoned quarry (Locality 5) on Leigh Mill Road (Bernstein, 1976). Pyrite and other sulfide minerals are disseminated in phyllite and metasiltstone exposed in the railroad cut near Clifton (Locality 18).

Talc

Talc (steatite or soapstone) was prospected and mined locally at the Jenkins Farm Prospects (Locality 10) and near Turkey Run north of George Washington Memorial Parkway. Talc is associated with serpentinite and chrysotile asbestos, as well as chlorite and minor iron and copper minerals (Bernstein, 1976).

Clay

Commercial clay deposits or potential deposits are not common in Fairfax County. The Cretaceous Potomac Group of the Coastal Plain contains abundant clay beds, but they are highly expansive and unsuited to brick manufacture due to their high montmorillonite content. Fresh and weathered red Triassic shale which may be suitable for light-weight aggregate or in the manufacture of common brick, terra cotta pipe, and tile products is fairly common south of Dulles Airport. Specific localities sampled are noted on the map and keyed to the locality list. Some areas of saprolite on slate, schist, and phyllitic schist may provide clay of satisfactory characteristics for common brick. Clay derived from deep weathering of the Quantico Slate was formerly dug near Lorton.

USES OF THE MAP

The chief use of the map is to enable a rapid evaluation of the mineral resources in Fairfax County. Used in conjunction with the Bedrock Map*, the distribution of a rock unit that was formerly quarried can be readily determined; used with the Thickness of Overburden Map*, accessible areas that are economically acceptable for establishing new quarries in similar rock units can be evaluated. Specific quarry site selection would require detailed investigations, including evaluation of local terrain, accessibility, rock quality, county zoning and land-use ordinances, and evaluation of environmental impacts.

*in preparation

ENSURING THE ACCESSABILITY OF MINERAL RESOURCES - A PRACTICAL PLANNING OPTION

The need for construction materials in Fairfax County is increasingly apparent from skyrocketing construction costs, despite the fact that many of the needed resources are available within the County. If these resources are to be developed with an attendent savings in construction costs, planners and citizens must be aware of the extent of environmental disruption accompanying their development, and balance that disruption against the higher costs of imports. If the option of ensuring the future availability of construction materials in Fairfax County is selected, a series of actions is required in advance of extraction. First, future needs must be forecast and analyzed; second, potential resource sites of adequate size must be identified, inventoried, classified and ranked; third, resource sites with economic potential must be protected from preemptive uses, although interim temporary uses are possible pending further extraction; and fourth, reclamation plans for sites of depleted resources should consider sequential land uses (such as for recreation or solid-waste disposal) that take advantage of the topographic, hydrologic, and geologic characteristics of each site. This analysis should consider the need to reserve adequate space for processing plants, access roads, buffer zones, and corridors for high-load electrical lines. Effective protection of resources presently remote from urban areas may depend on the preparation of land-use plans long before requests are received from developers.

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EXPLANATION

Some rock units that are widespread are not mapped separately; in these areas only prospects, pits and quarries are shown. For the boundaries of these units see the Bedrock Map of Fairfax County (in preparation).

Unconsolidated and Partly Consolidated Materials

- Al — Alluvium - Sand, gravel, silt and clay; in stream valleys; coarse fraction mainly quartz, quartzite and crystalline rock fragments; well to poorly sorted; only extensive areas shown; commonly water-saturated; valleys subject to environmental degradation; possible source of shallow ground-water.
- Gv — Gravel and Sand - Cobbles, pebbles, boulders and sand, locally with silt and clay; moderately well to poorly sorted; commonly caps ridges and hills or in terraces; coarse fraction mainly quartz, quartzite and chert.

Bedrock (Generally firm and consolidated where unweathered)

- Db — Diabase - tough, crystalline, massive, jointed; major source of crushed stone
- Bz — Baked zone - contact metamorphic aureole of hornfels; hard, tough, fused shale, sandstone, conglomerate, siltstone; formerly used locally as source of crushed stone
- Sp — Serpentinite - tough, massive to foliated; potential source of road metal
- Gr — Granite - layered to foliated, locally massive, crystalline, micaceous; quarried for building stone, fill and rip-rap; saprolite locally used as source of "sand".

ss	sandstone	p	phyllite
cgl	conglomerate	sd	sand
s	schist	q	quartz veins
mg	metagraywacke	cl	clay
g	gneiss		
ma	mafic rock (metabasalt and/or metagabbro)		

SITES OF PITS AND QUARRIES

Letter symbol indicates commodity: Au - gold; Cu - copper; Fe - iron; ta - talc (soapstone); as - asbestos (anthophyllite)

? Queried where commodity and/or location uncertain

Dg — Gravel pit, active or abandoned; Dg indicates ground disturbed by extracting gravel

Gr — Quarry, active, granite

Quarry, inactive or abandoned

X — Prospect, Borrow Pit, Reported Locality, or Mine

5 — Locality Number - Keyed to Locality List

SCALE 1:48 000

1 0 1 2 3 MILES

1 5 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL FEET
DATUM IS MEAN SEA LEVEL

Map Showing Mineral Resources of Fairfax County, Virginia

Availability and Planning for Future Needs

by

A. J. Froelich

1976

LOCALITY LIST

- *1. Centreville (Fairfax or Sisler's) diabase quarry (Gooch, 1960; Trapp, 1968; Medici, 1972; Bernstein, 1976)
- *2. Occoquan (Lorton) granite quarries (Bernstein, 1976)
- +3. Ft. Belvoir granite quarry (Huffman, Froelich and Force, 1975)
- +4. Great Falls schist and metagraywacke quarry (U.S. Dept. of the Interior, 1970)
- +5. Leigh Mill serpentinite quarry (Bernstein, 1976)
- +6. Sisler's quarry (mafic) (Bernstein, 1976)
- +7. Difficult Run quarry (schist and gneiss)
- +8. Theodora copper mine (The Virginias, 1880; Bernstein, 1976)
- +9. Kirk (Bullneck) gold mine (Ulke, 1939; Reed and Reed, 1969; Bernstein, 1976)
- +10. Jenkins Farm copper and soapstone mine (Bernstein, 1976)
- 11. Herndon diabase sill (Bz - Baked zone of contact metamorphism-hornfels)
- 12. Centreville diabase sill (Bz - Baked zone of contact metamorphism-hornfels)
- +13. Tysons Corner gravel outlier
- +14. Upland gravel deposits (Tertiary and Quaternary)
- +15. Sand and gravel (Cretaceous-Coastal Plain deposits)
- +16. Clay (Triassic, potential for brick or tile - Calver, Hamlin and Wood, 1961)
- +17. Clay (schist, slate or phyllite, potential for common brick - Calver, Hamlin and Wood, 1961)
- +18. Pyrite and other sulfides (phyllite and metasiltstone volcaniclastics - Drake, A. A., Jr., 1976, pers. comm.)

*Active quarry, 1976

+Accessible mine, pit, prospect or quarry (1976)