# DEPARTMENT OF THE INTERIOR UNITED STATES GEOLOGICAL SURVEY

# MISCELLANEOUS FIELD STUDIES MAP MF-1369-C PAMPHLET ACCOMPANIES MAP



	EXPLANATION
	High-silica sand resources at surface
	Shale resources covered by 1 ft to 2000 ft (0.3 to 600 m) of rock
	Shale resources at surface
•	Base-metal anomaly in soil or rock
<b>3</b> 28	Shale-sample locality (additional localities shown in Lesure and others, 1977, plate 2C)
父	Abandoned pit
	<ul> <li>Axis of syncline</li> </ul>
	<ul> <li>Approximate boundary of Ramseys Draft Wilderness Study Area</li> </ul>

----- Approximate boundary of Ramseys Draft Addition

### STUDIES RELATED TO WILDERNESS

The Wilderness Act (Public Law 88-577, September 3, 1964) and related acts require the U.S. Geological Survey and the U.S. Bureau of Mines to survey certain areas on Federal lands to determine their mineral resource potential. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a mineral resource potential survey of the Ramseys Draft Addition, which is a roadless area adjoining Ramseys Draft Wilderness Study Area in the George Washington National Forest, Augusta and Highland Counties, Virginia. The area was classified as a further planning area during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

#### SUMMARY

Ramseys Draft Addition comprises 13,475 acres (5453 ha) and adjoins Ramseys Draft Wilderness Study Area on the northwest, northeast, and southeast (fig. 1) in the George Washington National Forest. Ramseys Draft Addition (hereinafter also termed study area or Addition) is in the Valley and Ridge Province of west-central Virginia, about 18 mi (29 km) northwest of Staunton.

The only apparent mineral resources are moderate amounts of sand and gravel along the main streams, abundant sandstone suitable for construction material, and abundant shale suitable for brick, tile, and other low-grade ceramic materials (fig. 2).

No known coal beds occur in the part of the rocks of Mississippian age preserved in the study area.

The possibilities of oil are low because of high thermal maturity of the rocks; structural conditions are possibly good for gas accumulation, but no drilling has been done in or near enough to the study area to evaluate the gas potential.

No metallic mineral resources of economic significance have been identified in or near the study area. Two small low-grade uneconomic redbed base-metal deposits were located by geochemical studies (fig. 2). Such mineralization, although typical for the rock types present, apparently in this area forms deposits that are too small to be economic.

#### GEOLOGY

Ramseys Draft Addition is part of a northeast-trending syncline in Upper Devonian and Lower Mississippian sedimentary rocks whose trough is centered along Ramseys Draft Wilderness Study Area (Lesure and others, 1977; Lesure, 1982a). Several thousand feet of interlayered olive-gray, fine-grained sandstone and dusky-yellow to olive-gray shale and siltstone of the Jennings Formation of Late Devonian age are exposed along Shenandoah Mountain on the western edge of the study area and along the foothills east of Bald Ridge on the eastern edge of the study area. Much of the intervening higher country is underlain by as much as 2,000 ft (600 m) of distinctive grayish-red and greenish-gray, fine- to medium-grained sandstone and shale of the younger Hampshire Formation, also of Late Devonian age. Five small areas along the axis of the syncline at the northeast end of the study area are underlain by the lower few hundred feet of pale orange to brown, medium- to coarse-grained sandstone of the Pocono Formation of Mississippian age. A few alkalic igneous dikes. several feet thick and as much as several hundred feet long, cut the sedimentary rocks in the northern part of the study area. The relatively broad syncline comprising the rocks of the Ramseys Draft area plunges gently to the northeast. The Jennings Formation has been further folded into small anticlines and synclines on the limbs of the major fold. This simple structural picture is more complicated at depth where several nearly flat thrust faults have caused crustal shortening and repetition of beds (fig. 3).

Ridge. The private lease was acquired prior to the Federal Government's purchase of the mineral rights and expired in November 1980. The Federal leases that expired in October 1980 were for land in the southeast corner of the Addition (fig. 4).

An application has been submitted for a Federal oil and gas lease covering the southern part of the Ramseys Draft Wilderness Study area and Addition; a second application is for an area that lies about 1.5 mi (2.4 km) northwest of the Addition (fig. 4). No action had been taken on these applications as of December 1981. According to the Bureau of Land Management, the lands previously covered by leases east of Bald Ridge will be offered for lease in the future.

# ECONOMIC EVALUATION

# High-silica sand

Analyses of chip samples taken across two exposures of sandstone of the Pocono Formation show that the sandstone contains higher percentages of aluminum (Al), iron (Fe), magnesium (Mg), and titanium (Ti) than considered suitable for high-silica sand (Lesure and others, 1977, p. C33). The rock could be used, however, as low-quality glass sand.

# Shale

Within the study area, the Jennings Formation and to a lesser extent the Hampshire Formation contain beds of shale that are best exposed along U.S. Highway 250 on the flanks of Shenandoah Mountain. Twenty composite chip samples were collected continuously across shale outcrops for the mineral evaluation of the Ramseys Draft Wilderness Study Area (Lesure and others, 1977, p. C33). Four additional samples, from shale beds not evaluated during the previous investigation, were collected for the present study (fig. 2). All samples were submitted for preliminary ceramic tests, raw property determinations, and preliminary bloating tests.

The tests indicate that these shales are suitable for the manufacture of structural clay products including floor and wall brick, sewer pipe, and quarry tile. Only one sample (no. 328) expanded during the fast-fire bloating test, which indicates that some of the shale may be suitable for lightweight aggregate when fired between 1,200° and 1,250°C.

Until the early 1960s, brick plants were operated in both Buffalo Gap, 10 mi (16 km) to the southeast, and Staunton, 18 mi (29 km) to the southeast. The nearest plants operating now are in Glasgow, Rockbridge County, and Somerset, Orange County, Va., both over 50 mi (80 km) from the study area (Le Van, 1974, p. 6-7). Although useable, the shale within the study area is considered to be too far from marketing areas to compete economically with more readily available material.

### Stone, sand, and gravel

Sandstone suitable for crushed stone, riprap, or possibly dimension stone is the principal mineral resource in the study area. Commercial potential is low because of distance to market and the ready availability of similar material nearer to markets.

Small deposits of sand and gravel occur in the valley floor of North River, but production was limited to use as road metal or ballast in local construction. Because more accessible construction materials are available in the larger river valleys of the region, sand and gravel within the study area is deemed of little economic value.

# Natural Gas

No test wells have been drilled in Ramseys Draft Wilderness Study Area or in the Addition. The Pocono, Hampshire, and Jennings Formations have petroliferous equivalents deeply buried under the Appalachian Plateau to the west in West Virginia, but in the study area the thermal maturity of these rocks (the combined effects of heat and pressure to which the strata have been subjected since their deposition) exceeds the temperature at which oil is decomposed and expelled from source or reservoir rocks (Wallace de Witt, USGS, written commun., 1975). The more deeply buried Cambrian to Middle Devonian sedimentary rocks, at least to the depth of the Broadtop decollement (Jacobeen and Kanes, 1974), a major detachment thrust-fault zone, are within the thermal range capable of containing natural gas.





Addition, as of December 1981.

#### GEOCHEMICAL SURVEY

Reconnaissance geochemical sampling for the Ramseys Draft Addition includes 90 stream-sediment, 145 soil, and 44 rock samples analyzed for 31 elements by semiquantitative spectrographic analysis methods and for zine by atomic absorption (Lesure and others, 1977; Lesure, 1982b; Motooka and others, 1981). The resulting data outline one area on McMannaway Run in the Hampshire Formation containing higherthan-background amounts of lead, copper, and zinc in rock samples, and another area on the west slope of Shenandoah Mountain, near the northern end of the Addition, that contains anomalous lead in residual soil on the Jennings Formation (fig. 2). The mineralized rock of the McMannaway area contains 150 to 1,500 parts per million (ppm) lead, 70 to 150 ppm Cu, and 40 to 450 ppm Zn in a zone about 50 ft (15 m) long and 6 ft (2 m) wide. At the other locality two soil samples from one sample site contain 300 to 500 ppm lead but samples within 50 ft (15 m) in either direction along the ridge contain background concentrations of 10 to 30 ppm lead. Both sites probably contain only subeconomic amounts of the metals, but the discoveries are of scientific interest.

#### MINES AND PROSPECTS

There has been no known commercial mineral production from within or near the Ramseys Draft Wilderness Study Area or the Addition. A small pit inside the wilderness study area (fig. 2) furnished sand, gravel, and shale as road metal for U.S. Forest Service Road 68, and a nowinactive quarry about 0.7 mi (1.1 km) northeast of the Addition boundary along U.S. Forest Service Road 95 (fig. 2) supplied shale and sandstone for local road metal. No other pits, mines, or prospects are known within or in the vicinity of the Ramseys Draft Addition.

The Federal Government owns all of the surface rights within the Ramseys Draft Addition and about 70 percent of the mineral rights under it (fig. 4).

#### OIL AND GAS LEASES

About 1 percent of the Ramseys Draft Addition was under Federal oil and gas leases as of December 1981 (fig. 4). These active leases cover land along the northwest and northeast boundaries of the Addition. A private lease was held by Washington Gas Light Company on the entire wilderness study area between November 1970 and October 1972. Crab Run Gas Company, a subsidiary of Washington Gas Light Company, had either private or Federal oil and gas leases on all the area east of Bald

Relatively little is known about the rocks below the major detachment zone, about 9,000 ft (2,700 m) below Ramsevs Draft Addition (fig. 3). Scant drilling on anticlines to the west in the Valley and Ridge Province has demonstrated the presence of complexly folded and faulted rocks at depth (Perry, 1964). Near-surface anticlines and synclines have been displaced westward several miles along the major detachment thrust fault, and these surface structures cannot be projected accurately across the fault without abundant geophysical data. The few wells that have been drilled through the major detachment fault have not found oil or gas below the detachment zone.

Crab Run Gas Company has conducted seismic investigations along U.S. Route 250 from just south of Ramseys Draft Wilderness Study Area to a point east of West Augusta, Va. On the basis of these data, the company is of the opinion that the Wilderness Study Area, because of its synclinal structure, has no potential for the accumulation of oil or gas. If oil or gas accumulation exists this far south along the Bergton-Crab Run anticline, it will be to the east of Bald Ridge (F. H. Jacobeen, Jr., Crab Run Gas Company, written commun., February 1975). No geophysical data are available for the area covered by oil and gas leases to the east and west of Ramseys Draft Wilderness Study Area.

The potential for oil and gas under the Ramseys Draft Addition cannot be fully evaluated at present. The possible presence of structural traps, minor anticlines, or high-angle faults on the limbs of the syncline (fig. 3) has been suggested by Perry (1978), but can be adequately determined only by a carefully designed geophysical and drilling exploratory program.

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Figure 1.--Index map showing Ramseys Draft Wilderness Study Area and Addition.

MINERAL RESOURCE POTENTIAL MAP OF THE RAMSEYS DRAFT ADDITION, AUGUSTA AND HIGHLAND COUNTIES, VIRGINIA By Frank G. Lesure<sup>1</sup> and Peter C. Mory<sup>2</sup> 1982

<sup>1</sup>U.S. Geological Survey <sup>2</sup>U.S. Bureau of Mines





limestones; & - Waynesboro Formation (Cambrian).

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