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TOPOGRAPHIC MAPS AND THEIR USES

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A topographic map is a graphic representation of a definite part of the earth's surface, drawn to scale and with information depicted by standard colors and symbols. Several different types of these maps showing areas in Virginia are available. There are over 850 different uses in 22 categories for topographic maps, according to a list compiled by the Topographic Division, U. S. Geological Survey.

Topographic maps portray both natural and manmade features. A topographic map is comparable to an aerial view of any given area. Each map, depending upon its scale and intended usage, pictures a definite portion of our planet. Information on these maps is shown by standard colors: water features, blue; manmade objects, black; woodland, green; major highways, red; and the shape and elevation of the land surface, brown. Symbols are used to differentiate the various cultural features such as houses, dams, schools, churches, piers, and other structures. The relationship of horizontal distances on the map to those on the earth's surface is shown by the map scale. On a map with a scale of 1:24,000, one unit on the map represents 24,000 of the same units on the ground; for example 1 inch on the map equals 24,000 inches on the ground (Figure 1). Elevations above mean sea level are depicted by numbered contour lines and by spot elevations of certain significant locations. Each contour line consists of a series of points, all of equal elevations above sea level (Figure 2). Place names are presented on these maps in accordance with accepted local usage. The date shown in the lower right-hand corner indicates when the map was field inspected or last revised. Other marginal data include the assigned name of the topographic quadrangle, scale, contour interval, magnetic declination, names of adjoining quadrangle maps, and names of the organizations preparing the map.

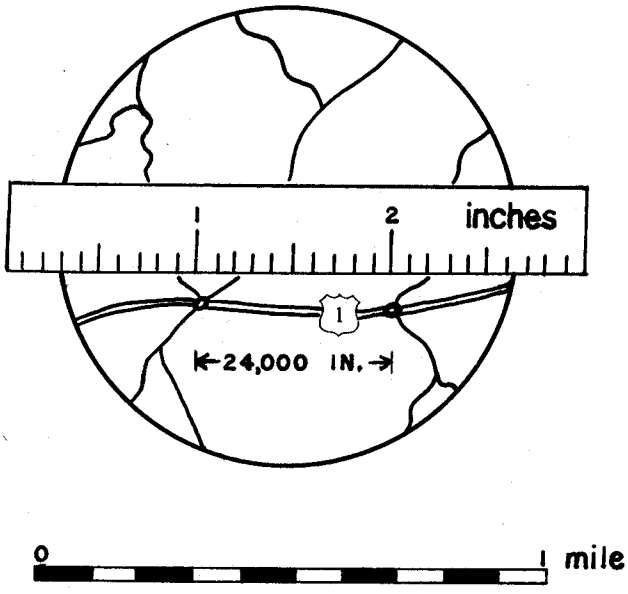


Figure 1. Map scale. The scale of this map portion can be shown graphically as a bar scale, as a fraction (1/24,000), or as a ratio (1:24,000).

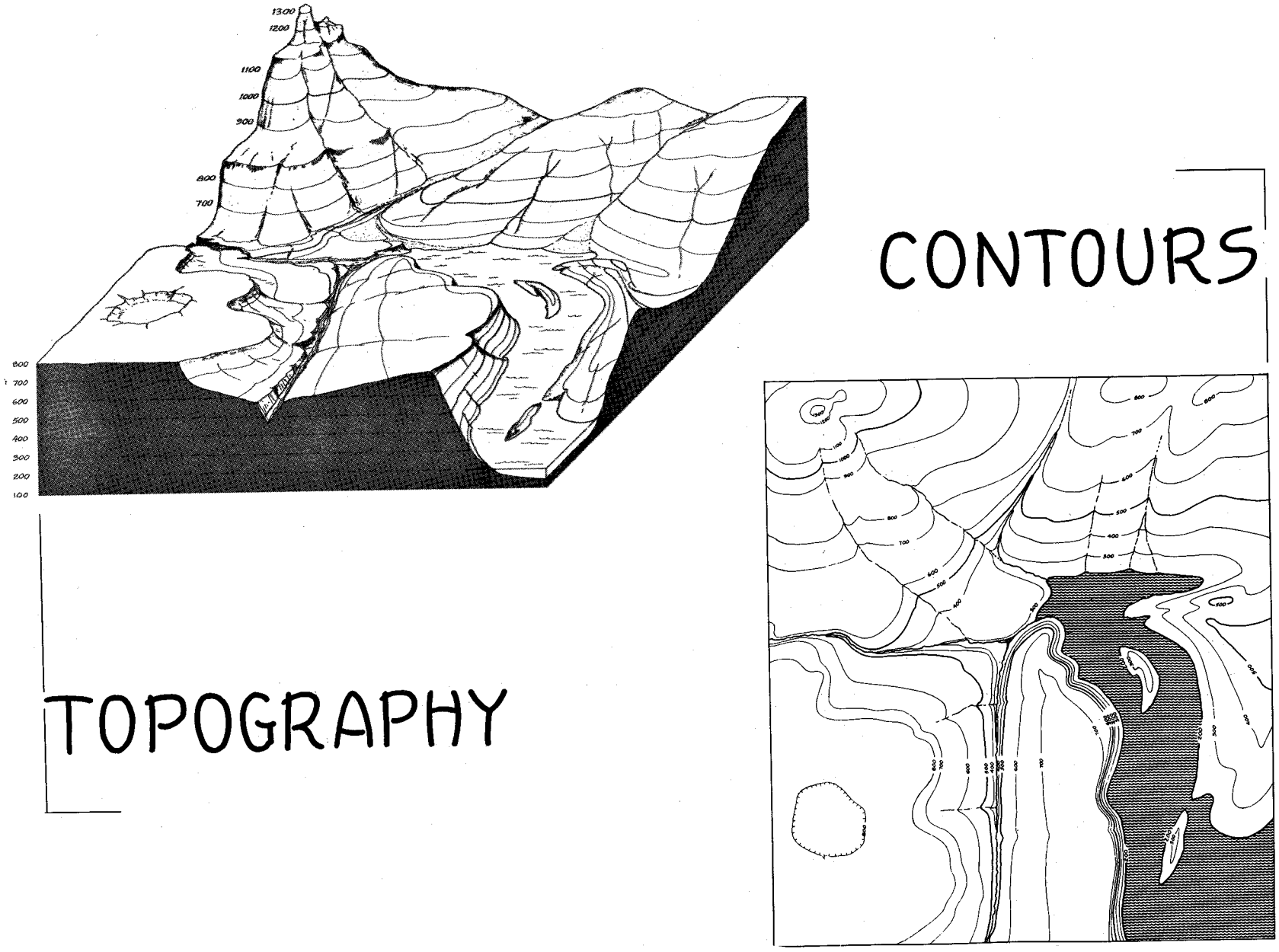


Figure 2. Relationship of contours to topography. Contour lines show in two dimensions the three-dimensional aspect of the earth's surface.

There are 11 different types of topographic maps available for areas in Virginia. The most significant types are: 1:250,000 series, where 1 inch represents about 4 miles on the ground; 1:62,500 series, where 1 inch represents about 1 mile; and 1:24,000 series, where 1 inch represents about 0.4 mile (Figure 3). The 1:250,000 series is published either as flat paper maps or as plastic relief maps (with an exaggerated vertical to horizontal scale ratio of 4:1). The 1:62,500 series includes selected quadrangles with relief shading, which makes the map appear three dimensional. The 1:24,000 series has the greatest amount of information depicted and can be obtained with a green overprint that indicates woodland. Other maps include those showing Shenandoah National Park and Colonial National Monument, and base maps depicting the culture, topographic features, and relief of Virginia.

A topographic map at the scale of 1:24,000 takes about 3 years to prepare, and the cost averages $15,000 each. Two preliminary-stage maps are made during the compilation of each map. The first, called a "before field completion" stereocompilation, has cultural features, streams, and topography indicated. The second stage, or "after field completion" composite, has the information of the first, plus place names of the area. Copies of either map stage are available for purchase at 50 cents each from the U. S. Geological Survey, Topographic Division, 1109 N. Highland Street, Arlington, Va. 22210. Prints of aerial photographs from which the maps are made may also be obtained from that office.

Limitations, as well as advantages, of topographic maps should be considered in the use of these maps. Information is current only to the date of the map. A comparison of new maps with old maps may show that place names have changed or been deleted, or that roads have been renumbered and/or changed in route. Streams may differ in geographic position, and as a result of the use of more accurate methods of determining horizontal and vertical control, landform shapes may differ. Because the paper on which maps are printed is affected by changes in temperature or humidity, scale measurements may differ across the face of the map. Accuracy of locating points on topographic maps is prescribed under the National Map Accuracy Standards. For maps of 1:24,000 scale, 90 percent of well-defined points must be within 40 feet of their horizontal position and within one-half contour interval of their vertical position. If a map is enlarged, scale measurements may be in error due to the exaggerated positions of certain points, which at the original scale were shifted from their true positions to obtain clearance from other adjacent graphic symbols or were enlarged in size so they could be shown on the map.

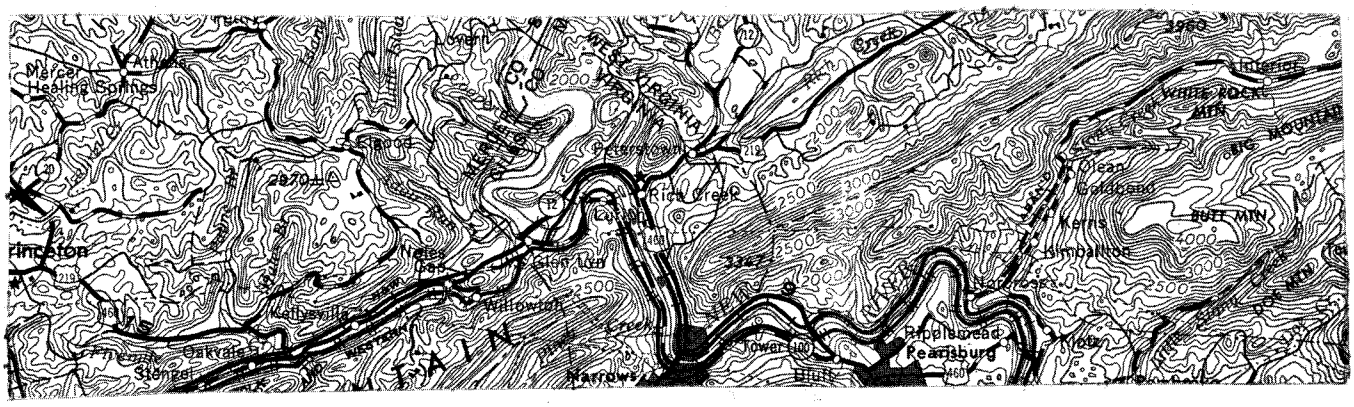
Topographic maps are useful for many purposes. Geologists and geographers use topographic maps to study the reasons behind the appearance of the earth's surface. The former study the materials that make up the earth's exterior, whereas the latter are concerned mainly with the effects of physical or manmade processes. An analysis of contour configurations and drainage courses will often reveal the relative resistance to erosion of the underlying materials. The position of populated places will often be seen to be due to the surrounding terrain; towns are often located at gaps through mountains, near rapids at the upstream end of navigation, and in areas which afford protection from the weather.

On the farm, maps can be used as an aid to determine where to plant crops or cut timber, or how to plan drainage systems for the collection or dispersal of water. Locations and methods for checking the effects of erosion can be determined. Farm-land and acreage-allotment appraisers use maps as bases on which to plot information. Aerial crop-dusting flight lines can be planned from maps.

Topographic maps are used in the communications industry to design the locations of microwave towers, transmission towers, and underground conduits and cables. Knowledge of the land surface is necessary to plan the most economical construction route and to locate towers at high elevations to obtain optimum transmission range. Telephone rates are in part based on the distances between phone stations, which can be determined from maps. A telephone company engineer, by using maps to locate sites for microwave stations, found he could accomplish in a few hours at the office what would take a week in the field.

Workers in disaster relief and control employ maps to determine access routes to aid victims. Debris-disposal areas can be delineated from maps. Damaged housing can be relocated on sites selected by map inspection. Favorable locations for control and prevention of damage from wind, fire, and water can be determined from maps.

Maps are used by foresters to determine routes for reaching certain stands of trees, either for



1:250,000 SERIES

1:62,500 SERIES

1:24,000 SERIES

Figure 3. Topographic map series. Equal-size portions of maps from three different series are illustrated. The 1:250,000 series shows a large area with little specific detail. The 1:24,000 series shows a smaller area in much greater detail. Each series has its uses.

purpose of study, selective cutting, or fire fighting. Recreational areas with their attendant roads, buildings, and telephone and electrical lines can be planned and located from maps. Base data for forest and grazing surveys may be plotted on topographic maps. Watershed-area studies utilize topographic maps.

Practically all engineering studies involving the surface of the earth use topographic maps. These include location and/or construction of airports, drainage systems, dams, tunnels, pipelines, harbors, industrial plants, property boundaries, and quarries. Topographic maps are also used for development of projects for flood control, land reclamation, and soil-erosion control. From these maps can be determined the exact geographic position by longitude and latitude and the elevation above sea level of most points or places. Contour lines enable the engineer to visualize the topographic relief for making preliminary studies concerned with excavating or filling tracts of land for building-site preparation, construction of roads, or drainage control.

A study of topographic maps is the initial step in highway construction to determine the cheapest, safest, and most usable position of the intended road. Information for highway-cost estimates dealing with how many bridges, how many cuts and fills, and how much right-of-way must be purchased is obtained from maps. A consulting engineer has said that the use of a topographic map in selecting a bridge site resulted in a saving of 40 percent of the total cost of the bridge.

Any area for which people desire industrial development has a prime selling point when topographic maps are available. On these can be indicated the locations of favorable building sites, the proximity to transportation lines, the availability of water, and the number of populated places from which a labor force can be obtained. Data for detailed studies showing the nature of the underlying rocks and soils at building sites, the position of competing industries, the availability of employee housing and recreational facilities, and the location of customers can be compiled on these maps. Unmapped areas receive little consideration for industrial-site investigation because of difficulties in conducting the search.

City and county planning boards use topographic maps to determine for zoning purposes which areas are most suitable for future industrial, commercial, and residential development. They also use maps to plot the most usable locations for fire stations, police stations, water reservoirs, and schools. Planning for new streets and sewerage, electric, and gas conductors is dependent upon the cheapest and most efficient use of the topography. The locations of election, fire, and tax districts can also be shown on these maps.

There are many military uses for topographic maps. Sites for airfields, army posts, training areas, munitions manufacture and storage, firing and bombing ranges, and maneuver areas are selected from maps. The planning and assessment of offensive action from bombing and troop movement are based on the terrain located in the enemy area. Intelligence data on enemy actions and capabilities are derived from maps and other sources.

Studies of sites for power plants and transmission lines include inspection of topographic maps to determine favorable terrain. Knowledge of drainage configurations and profiles derived from maps can be used to estimate the amount of water power available at any locality and the volume of reservoir that will occur behind a dam. The most efficient and economical placement of a power plant will be affected by the locations of metropolitan and industrial areas, which are shown on maps.

Maps are also used extensively by many other persons. Topographic maps are used by Boy Scout leaders, clergymen, vacationers, prospectors, real estate developers, fishermen, hunters, mountain climbers, and spelunkers. Boy Scouts use maps for teaching map reading and compass use, planning hiking and camping trips, and developing an awareness of what their area is like. Clergymen use them to conduct church censuses and to locate new parishoners. A study of maps before and during a vacation trip will provide a "bird's-eye" view of the country through which a person travels. The use of topographic maps can enable vacationers to find the less traveled roads and out-of-the-way places.

Prospectors may locate on maps likely areas to look for minerals, determine how to get to them, and describe their prospects from geographic locations on the map. Real estate developers use maps to locate tracts near populated areas which have suitable terrain for developing building lots. This includes looking for areas without flooding problems, with easy access to all-weather roads, and with adequate supplies of water. The developer also uses maps to find localities suitable

for weekend cabins, for parks, and for industry. Hunters and fishermen consult maps to locate areas where wildlife may be plentiful, generally away from the main roads, and detailed maps are needed to determine access routes. The type of terrain is of paramount importance to the mountain climber. He is seeking steep-sided peaks on which to test his skill. The location of these and the way to get to them is depicted on maps. A spelunker looks for depression contours, streams that end by seeping underground, or the word "cave" indicated on topographic maps.

Maps can be used as evidence in legal cases. They show the location of political boundaries that determine to which political entity taxes are due, which regulatory body has jurisdiction, and which areas people are located in for census counts. Quadrangle maps have been used as an authoritative source of historical changes in stream channels and of official locations of water courses.

As of January 1, 1968, there were available for areas in Virginia 14 maps at the scale of 1:250,000, 57 at the scale of 1:62,500, and 495 at the scale of 1:24,000. Currently these maps cost 75 cents, 50 cents, and 50 cents each, respectively, and may be purchased from the Topographic Division, U. S. Geological Survey, 1109 N. Highland Street, Arlington, Va. 22210 or the Virginia Division of Mineral Resources, Box 3667, Charlottesville, Va. 22903. An index to topographic maps of Virginia, which shows the names and locations of available maps, may be obtained from either of these offices. The following dealers in Virginia also sell topographic maps, usually at somewhat higher prices: David E. Willing, W. & W. Sporting Center, Kilmarnock; J. P. Bell Co., 816 Main Street, Lynchburg; E. Smola Co., 134 Twenty-fifth Street, Newport News; Henry Eagleton Co., 430 Boush Street, Norfolk; Cooper-Trent, Inc., 1705 Chamberlayne Avenue, Richmond; Malcolm Blueprint & Supply Corp., 632 Second Street SW, Roanoke.

Investigate the various types of topographic maps that are available, examine the information portrayed, and plan to use them in your work or recreation. They will reveal new dimensions and knowledge of any area.

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NEW PUBLICATION

Mineral Resources Report 8. ANALYSES OF CLAY AND RELATED MATERIALS — EASTERN COUNTIES, by Stanley S. Johnson and Miles E. Tyrrell; 232 p. Price: $1.50

This report contains the results of tests and determinations of properties required to evaluate the potential ceramic and nonceramic uses of 132 samples of clay and related materials which were collected in 27 counties in eastern Virginia. Tests indicate that 82 samples are potentially suitable for use in one or more structural clay products or lightweight aggregate. Three samples were found to have possible nonceramic applications. The present report, which includes approximately 25 percent of the total land area in Virginia, is the fourth in a series related to a ceramic testing program in the State.

GEOGRAPHIC NAMES IN VIRGINIA

It is the purpose of the United States Board on Geographic Names to render formal decisions on new names, proposed changes in names, and names that are in conflict which are submitted for decision by individuals, private organizations, or government agencies. Communications about geographic names should be addressed to: J. O. Kilmartin, Executive Secretary, Domestic Geographic Names, U. S. Geological Survey, Washington, DC 20242.

Earlehurst: community, 4 miles southwest of Crows and 9.5 miles south-southeast of White Sulphur Springs, West Virginia; Alleghany County, Virginia; 37°40′10″ N., 80°14′05″ W. Not: Earlhurst.

Hughes Draft: stream, 7 miles long, heads at 37°56′25″ N., 80°04′20″ W., flows east-northeast to the Jackson River 11.5 miles north of Covington; Alleghany and Bath counties, Virginia; 37°57′03″ N., 79°58′38″ W. Not: Hughes Creek.

Johnsons Creek: stream, 9 miles long, heads at 37°54′18″ N., 80°03′33″ W., flows south to Ogle Creek at Callaghan; Alleghany County, Virginia; 37°48′40″ N., 80°04′17″ W. Not: Johnson Creek, Little Ogle Creek.

Spring Branch: stream, 4.5 miles long, heads at 37°54′17″ N., 80°02′53″ W., flows southwest to Johnsons Creek 3.5 miles north-northwest of Callaghan; Alleghany County, Virginia; 37°51′25″ N., 80°05′48″ W. Not: Little Ogle Creek, Thorny Branch.

NEWS NOTES

Dolphin Stone, A Division of West Sand and Gravel Company, Inc., is developing a quarry in the Petersburg Granite near Dolphin, Brunswick County. The company will produce aggregate for use in highway construction and concrete. Production is scheduled to begin in February 1968, and most of the stone will be shipped by rail.

L. S. Sorber and Company began production of washed sand and gravel at a pit near Woodford, Caroline County, in October 1967. The output is used in asphalt and for other highway construction.

MINERAL PRODUCTION IN VIRGINIA—1967

PRELIMINARY DATA

The value of mineral output in Virginia rose to a new high of almost $291 million in 1967, based on preliminary figures released by the U. S. Bureau of Mines (Table 1). This value was 6 percent greater than the $274 million reported in 1966, the previous record high-value year. Record-breaking production of coal more than offset slight value declines in most of the other mineral commodities. The 6 percent increase in the value of Virginia's mineral output compares favorably with preliminary data for other southeastern states and the Nation (Table 2).

Table 2.—Comparison of value of mineral production for 1966 and 1967 and percent of increase.

	1966 Value (thousands)	Preliminary 1967 Value (thousands)	% Increase
United States	$22,900,000	$23,800,000	3.8
Virginia	274,297	290,738	6.0
West Virginia	891,800	936,093	5.0
North Carolina	71,878	75,284	4.7
Kentucky	498,357	517,876	3.9
Florida	295,447	299,624	1.4
South Carolina	45,593	46,029	1.0
Tennessee	182,584	182,745	0.1
Alabama	249,778	249,828	0.0
Georgia	148,597	145,633	-2.0
Maryland	74,161	71,722	-3.3

Table 1.—Mineral production in Virginia.[1]

Mineral	1966 Quantity	1966 Value (thousands)	Preliminary 1967 Quantity	Preliminary 1967 Value (thousands)
Clays ..... thousand short tons	1,486	$1,813	1,410	$1,700
Coal (bituminous) ..... do	35,565	153,341	38,000	W
Gem stones	NA	7	NA	7
Lead (recoverable content of ores, etc.) ..... short tons	3,078	930	3,000	840
Lime ..... thousand short tons	840	10,486	867	10,820
Natural gas ..... million cubic feet	4,249	1,275	5,400	1,625
Petroleum (crude) ..... thousand 42-gallon barrels	1	W	1	W
Sand and gravel ..... thousand short tons	17,191	16,635	14,500	14,900
Soapstone ..... short tons	3,989	10	3,600	9
Stone ..... thousand short tons	34,151	55,550	33,549	55,196
Zinc[2] (recoverable content of ores, etc.) ..... short tons	17,666	5,123	19,000	5,282
Value of items that cannot be disclosed: Aplite, cement (portland and masonry), feldspar, gypsum, iron ore (pigment material), kyanite, salt, titanium concentrate (ilmenite and rutile), and values indicated by symbol W	—	29,127	—	200,359
Total	—	$274,297	—	$290,738

W Withheld to avoid disclosing individual company confidential data.
NA Not available.
[1] Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
[2] Recoverable zinc valued at the yearly average price of Prime Western slab zinc, East St. Louis market. Value established after transportation, smelting, and manufacturing charges have been added to the value of ore at the mine.

Virginia Division of Mineral Resources
Box 3667
Charlottesville, VA 22903

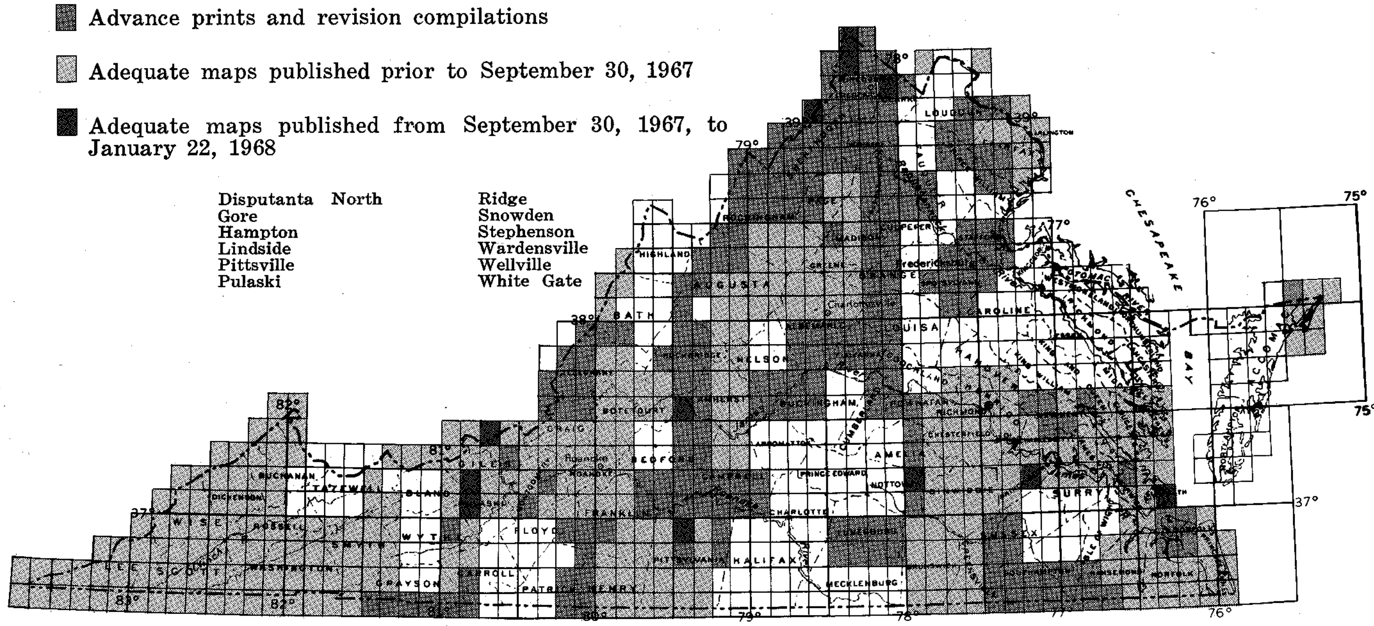
Return Requested

TOPOGRAPHIC MAPS

7.5-Minute Quadrangle Topographic Maps

- Advance prints and revision compilations
- Adequate maps published prior to September 30, 1967
- Adequate maps published from September 30, 1967, to January 22, 1968

Disputanta North	Ridge
Gore	Snowden
Hampton	Stephenson
Lindside	Wardensville
Pittsville	Wellville
Pulaski	White Gate



ADVANCE PRINTS AND REVISION COMPILATIONS

Advance prints and copies of revision compilations are available at 50 cents each from the U. S. Geological Survey, Topographic Division, 1109 N. Highland St., Arlington, VA 22210.

PUBLISHED MAPS

State index is available free. Published maps are available at 50 cents each from the Virginia Division of Mineral Resources, Box 3667, Charlottesville, VA 22903.