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THE MINERAL INDUSTRY IN VIRGINIA IN 1965[1]

PRELIMINARY DATA

The value of minerals produced in Virginia increased in 1965, reaching $242 million, 2 percent greater than a high established in 1964, according to estimates by the Bureau of Mines, United States Department of the Interior. Of the 19 commodities produced in 1965, 11 increased in production, 6 decreased, and 2 were unchanged. Lead and zinc both declined in production but increased in total value because of higher unit prices. The combined production of masonry and portland cement increased in output, but declined in value. Other increases in value were reported for clay, coal, feldspar, iron, kyanite, natural gas, and titanium. The largest decrease was in the production of lime. Other declines were reported in output of aplite and gypsum.

Bituminous coal continued as the most important commodity produced in terms of value. Production (33.4 million tons) was 5 percent greater than that of 1964, the previous record year. The value of stone declined slightly, but production increased 1 percent. Crushed basalt and dimension granite production was virtually unchanged; crushed granite was up 11 percent. Production of crushed limestone, leader of the stone types, dropped slightly from 1964, as did miscellaneous dimension stone, crushed sandstone, and slate. Output of crushed marble increased 5 percent. Miscellaneous crushed stone, calcareous marl, dimension sandstone, and slate output were essentially unchanged from that of 1964. Government-and-contractor production of granite and limestone decreased. Sand and gravel production continued to increase, exceeding that of 1964, the previous year of record output, by 2 percent. The production of aplite decreased 7 percent and that of clay increased 6 percent. Clay output was at a record high. The leading market for aplite was the glass industry. Most of the clay was used in manufacturing building brick. Feldspar production in Bedford County was 5 percent more than that of 1964. Crude gypsum production, used in plasterboard and other products, declined 8 percent. Kyanite production increased 5 percent over that of 1964. The production of lime in both quantity and value was 23 percent below 1964. Lime was used by the chemical industry, and for agricultural and building purposes. The production of salt was relatively unchanged. Soapstone production, for use chiefly in insecticides and foundry facings, was the same as 1964.

The production of iron-oxide pigment material increased in both volume and value for the second consecutive year. Because of a higher unit price, the value of lead production increased 10 percent while the tonnage declined 9 percent, compared with last year. Titanium-ore concentrates (ilmenite and rutile) continued in great demand as production increased 13 percent and value, 11 percent over that of 1964. The production of zinc declined 3 percent; however, the value increased 4 percent to $5.9 million.

[1] Prepared by Harold F. York, U. S. Bureau of Mines, Pittsburgh, Pa.

Table 1.—Mineral production in Virginia[1]

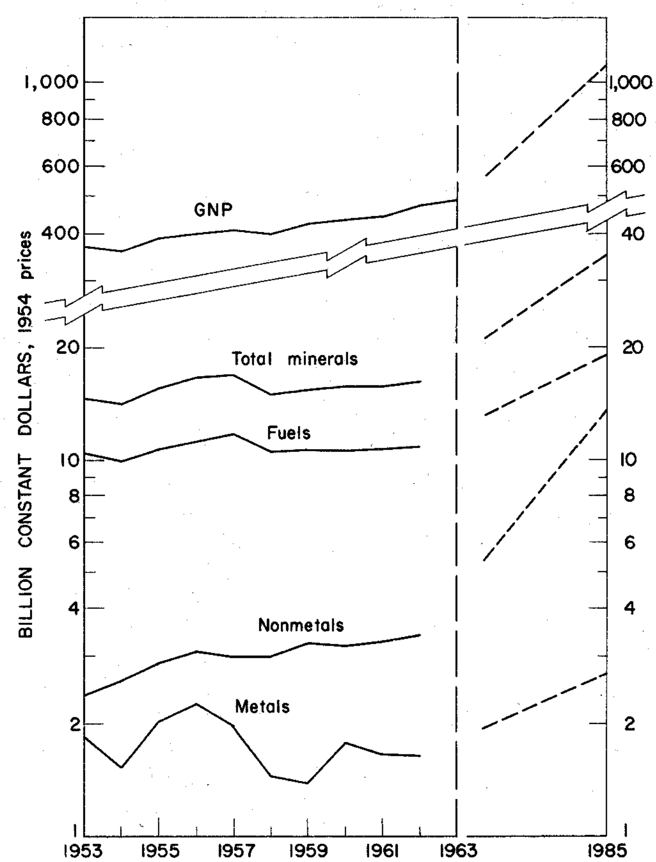
Mineral	1964		Preliminary 1965	
	Quantity	Value (thousands)	Quantity	Value (thousands)
Clays .... thousand short tons	1,440	$ 1,614	1,520	$ 1,700
Coal (bituminous) .... do	31,654	123,123	33,360	(4)
Gem stones	(2)	6	(2)	7
Lead (recoverable content of ores, etc.) .... short tons	3,857	1,010	3,529	1,115
Lime .... thousand short tons	780	9,781	597	7,485
Sand and gravel .... thousand short tons	10,588	13,722	10,800	14,100
Soapstone .... short tons	3,775	9	3,775	9
Stone .... thousand short tons	30,407	52,153	30,795	51,915
Zinc (recoverable content of ores, etc.)[3] .... short tons	21,004	5,700	20,451	5,931
Value of items that cannot be disclosed: Aplite, portland cement, masonry cement, feldspar, gypsum, iron ore (pigment material), kyanite, petroleum (crude), salt, titanium concentrate (ilmenite and rutile), and values indicated by footnote 4	—	29,818	—	159,212
Total	—	$236,936	—	$241,474

[1] Production as measured by mine shipments, sales, or marketable production (including consumption by producers).
[2] Weight not recorded.
[3] 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.
[4] Figure withheld to avoid disclosing individual company confidential data.

PROJECTED VALUE OF MINERAL PRODUCTION[1]

U. S. population should increase 40 percent by 1985, and gross national product should grow 3.8 percent per year for a projected value of 1,119 billion constant 1954 dollars. This growth rate for GNP is substantially above the 2.9 percent average per year sustained from 1929 to 1960. Concomitant with increase in the total economy, as shown in [accompanying] figure . . . , total mineral output should more than double, and output of energy in the United States should increase 45 percent by 1985. Metals production should rise two-thirds above current levels, and nonmetals output should quadruple that of 1962. The physical quantity of crude material produced in 1985 may also be higher proportionately owing to the declining grade of material mined. For example, more than 2 tons of crude ore will be required to produce 1 ton of usable iron ore. In addition to the substantially greater quantities of material projected to be produced by 1985, which are estimated at more than double the production of 1962, larger portions of the increased output will be processed than heretofore. . . . The percentage of

[1] Excerpt from "Water Use in the Mineral Industry," by Alvin Kaufman and Mildred Nadler: U.S. Dept. of the Interior, Bureau of Mines, Information Circular 8285, 1966.



Value of mineral production and gross national product, 1953-63 and 1985.

usable iron ore beneficiated has increased steadily over the past 10 years. It is anticipated that this will continue so that by 1985, 100 percent of these ores will be treated. This is based on the assumption that blast furnace technology is advancing so fast that the physical and chemical specifications for furnace feed will be much stricter in the years ahead and also on the assumption of a decline in the grade of ore mined.

Bituminous coal has also had an upward trend in percentage processed, and it is anticipated that by 1985, 75 percent of this material will be washed, compared with the current 64 percent. This also assumes that there will be a greater need to provide clean and sized coal for use in large and efficient electric powerplants, but that some small coal producers will remain.

Sand and gravel production already includes a major percentage of processed material. Some 86 percent is currently processed; it is anticipated that this will rise to 95 percent by 1985. Some pit-run material will be produced by small operators for nonspecialized uses. Continuing depletion of high-grade sources near urban centers may accelerate the trend toward more washing because producers will be forced to use lower grade deposits to remain within economic shipping distance of consumers.

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MANAGEMENT OF WATER RESOURCES[1]

Ground water—that which is stored in the mantle and rocks of the earth—is imperfectly known and incompletely used. Yet in total volume it is manyfold greater than the water contained in all lakes and in all reservoirs built by man.

Awareness of ground water as a manageable resource goes back only a generation, to the adaptation of some simple physical laws to the flow of water in geologic formations. Thus far, exploration of this resource has been piecemeal, largely to resolve local problems arising from immediate exploitation. Urgent research objectives are to develop sound methods for comprehensive exploration and management, recognizing not only the traditional view that an aquifer is a potential source of water, but also that in many instances it can serve simultaneously as a distribution conduit and as a reservoir free from loss by evaporation or destruction by sedimentation. Because the ground can also store and yield heat, a ground-water reservoir can aid in temperature control.

A surface reservoir is considered highly effective if it can store water for use over a two-year period. In contrast, the effective storage term of a ground-water reservoir can be decades long. The potential of ground-water management, as a major supplement to surface-water management, is therefore great provided adequate means and principles can be developed.

Thus, the essential objective of future exploration is to delineate, describe, and map ground-water reservoirs in terms of their adaptability to various means of management. More sophisticated knowledge of their properties holds promise that these reservoirs can yield substantial added supplies of water at relatively low cost.

This objective, however, is in large part contingent on research into (1) more effective means for defining the limits and hydrologic properties of aquifers, including refined geophysical methods: (2) means for managing the reservoirs—to what extent recharge can be increased from natural sources or induced artificially, including recharge by treated wastes or by excess runoff; how the reservoir will respond to various plans of management; how the ground-water reservoir can best supplement if not supplant a surface reservoir; and how incursion of ocean water or connate brines may be prevented.

Man's use of water or of his natural environment—in the home or factory or on the farm—nearly always degrades either the quality of the unconsumed water or the environment, or both. For example, use of the land leads both to erosion of that land and to siltation of the water.

Advancing civilization compounds man's concern over his health. Biologic wastes long were a threat to his longevity, but these now can be managed effectively. But chemical wastes constitute a rapidly expanding hazard—from household detergents, insecticides, fertilizers, and many industrial materials and products. The last two decades have added the disturbing prospect of radioactive contaminants.

The extent to which man's degradation of water quality impairs subsequent reuse or endangers health depends in part on the geology and the hydrology of the environment. Both these factors of the environment must be understood

[1] Excerpt from "Research for Water Resources Development," by W. B. Langbein, *in* "Water Resources Symposium": University of Alabama Extension News Bulletin, Reprint Series 5, 1963.

thoroughly if wastes are to be managed effectively, because the earth is the only place in or on which wastes can be stored or dispersed, and because the large majority of wastes, including the radioactive, are discharged as liquid solutions or suspensions and so may enter and move freely in the earth's hydrologic cycle.

As water moves through the hydrologic cycle—in streams, through the ground, in the oceans, or in the atmosphere—it entrains and transports also the products of earth weathering. These contaminants and man's wastes both react with the geologic environment; some reactions are helpful to waste management, some adverse.

Alone, dilution and dispersion in the environment are not an adequate means of managing wastes under all circumstances, for there are reactions that lead to concentration. Thus, according to conventional principles, a body of ground water moves as a mass down the hydraulic gradient. But no aquifer is homogeneous and its variations in permeability create preferred paths of water movement. This selectivity may aggravate, or hasten, contamination along the principal paths of flow. Chemical reactions must be considered also. Ionic adsorption and exchange may remove contaminants from water and concentrate them to earth materials. . . .

With present technology, waste treatment must be combined with dilution water to assure a satisfactory quality. The outlook is that tremendous quantities of reservoir storage will have to be built for this purpose alone if water of good quality is to be maintained. In view of the cost and conflicts involved in reservoir construction, it is important to develop an alternative course of action. Research is therefore needed to develop methods of reducing the need for dilution water.

As these few examples suggest, the long-term security of man on this planet depends on how well the earth can accommodate both man and his wastes.

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NEW PUBLICATION

Report of Investigations 7, "Geology of the Vesuvius Quadrangle, Virginia," by H. J. Werner will be ready for distribution during the early part of May. Price: $1.75.

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. These decisions define the usage on maps and other publications of Federal agencies. The following information was taken from recently published decisions by the Board.

Unapproved variant names, spellings, or applications are listed following the word "Not." These may include former names or spellings no longer used, names derived by the application of policies other than those approved by the Board, misspellings, and names misapplied to all or part of the subject feature. While the Board disapproves the independent use of these names, it does not restrict their parenthetical use following approved names.

An asterisk (*) preceding a name represents a change in an earlier decision; a dagger (†) preceding a name indicates modification of the text of a former decision.

Coordinates are given for the mouth of streams, canyons, gulches; the foot of glaciers; the center of bays, islands, lakes, populated places; the summit of mountains, peaks, hills; the extremities of points and capes and such linear features as ranges, ridges, canals, channels.

Communications about domestic names should be addressed to: J. O. Kilmartin, Executive Secretary, Domestic Geographic Names, U. S. Geological Survey, Washington, D. C. 20242.

Arnolds Knob: mountain peak, on Potts Mountain, with an elevation of 3,923 feet, 4.5 miles E.N.E. of Waiteville, W. Va., and 13 miles W. of New Castle, Va.; Craig Co., Va., and Monroe Co., W. Va.; 37°29′30″N., 80°20′40″ W. Not: Arnold Knob.

Berrytown: settlement, 3.5 miles S.S.W. of Elkton and 13 miles E.S.E. of Harrisonburg; Rockingham Co., Va.; 38°22′00″N., 78°39′30″W. Not: Yancey.

Bleakhorn Creek: stream, 1.3 miles long, heads just S. of Crittenden, flows E.N.E. to the mouth of the Nansemond River, at the James River, 5 miles S.W. of Newport News; Nansemond Co., Va.; 36°54′40″N., 76°28′-55″W. Not: Blinkhorn Creek.

Christians Creek: stream about 27 miles long, heading at about 38°02′25″ N., 79°11′35″ W. and flowing generally northeastward to the Middle River about 8 miles east-northeast of Staunton; Augusta County, Virginia; 38°11′34″ N., 78°56′05″ W. Not: Christian Creek.

Craig Springs: settlement, 7 miles E.N.E. of Waiteville, W. Va., and 10 miles W. of New Castle, Va.; Craig Co., Va.; 37°29′05″N., 80°17′22″W. Not: Craig Healing Spring, Craig Healing Springs.

Davis Mill Creek: stream about 4 miles long, heading at about 37°45′30″ N., 79°12′40″ W. and flowing generally west-southwestward to the Pedlar River about 5 miles east-northeast of Buena Vista and 25 miles north-northwest of Lynchburg; Amherst County, Virginia; 37°44′58″ N., 79°16′02″ W. Not: Mill Creek.

DeWitt: village about 4 miles southwest of Dinwiddie and 14 miles southwest of Petersburg; Dinwiddie County, Virginia; 37°02′-18″ N., 77°38′38″ W. Not: De Witt, Dewitt.

Eidson Creek: stream about 8 miles long, heading at about 38°04′33″ N., 79°12′27″ W. and flowing generally north-northeastward to the Middle River about 5 miles west-northwest of Staunton; Augusta County, Virginia; 38°10′45″ N., 79°09′38″ W. Not: Baker Creek.

Ellett: village, 3.5 miles S.E. of Blacksburg and 4.5 miles N.N.E. of Christiansburg; Montgomery Co., Va.; 37°11′30″N., 80°22′15″W.

Ellett Creek: stream, 13 miles long, heads on Pilot Mountain at 37°03′00″N., 80°24′35″W., flows E.N.E. to the South Fork Roanoke River at the settlement of Alleghany Springs; Montgomery Co., Va.; 37°07′37″N., 80°16′00″W. Not: Elliott Creek.

Hale Lake: lake to be formed by damming the waters of Wolfpen Branch about 0.5 mile northwest of the village of Comers Rock and 16 miles southwest of Wytheville; named for Camet R. Hale (1896-1962), a lifelong resident and conservationist of the area; Grayson County, Virginia; 36°45′18″N., 81°14′45″W.

Hales Bottom: community on the Bluestone River about 1.5 miles northwest of Bluefield; Tazewell County, Virginia; 37°15′55″N., 81°17′-45″W. Not: Mullins.

Harmon Run: stream about 5 miles long, heading at about 37°46′20″N., 80°04′00″W. and flowing generally eastward to the Jackson River about 2 miles south of the center of Covington; Alleghany County, Virginia; 37°45′56″N., 79°59′31″W. Not: Harmon Branch, Harmons Run.

Hoges Chapel: settlement, 7.5 miles E. of Pearisburg and 13 miles N. of Radford; Giles Co., Va.; 37°19′15″N., 80°36′00″W. Not: Hoges Store.

**Jones Run Falls:* waterfall, on Jones Run, in Shenandoah National Park, 0.5 mile upstream from the junction of Jones Run with Doyles River and 17 miles N.W. of Charlottesville; Albemarle Co., Va.; 38°13′46″N., 78°42′17″W. Not: Big Falls (former decision).

Keys Gap: pass, at an elevation of about 910 feet, across the Blue Ridge about 4.5 miles south-southwest of Harpers Ferry and 5.7 miles east-southeast of Charles Town; Jefferson County, West Virginia, and Loudoun County, Virginia; 39°15′40″N., 77°45′45″W. Not: Keyes Gap, Key's Gap, Vestal's Gap.

Lowmoor: village in the valley of the Jackson River about 3.5 miles southwest of Clifton Forge; reported to be named for the Low and Moor families; Alleghany County, Virginia; 37°47′20″N., 79°52′45″W. Not: Low Moor.

†*Mechumps Creek:* stream about 9 miles long, heading at about 37°45′24″N., 77°28′16″W. and flowing generally eastward to the Pamunkey River about 1.5 miles east of Hanover and 16 miles north-northeast of Richmond; Hanover County, Virginia; 37°45′33″ N., 77°20′16″W. Not: Goddin Run, Machump Creek, Machump's Creek, Mechums Creek, Mecumps Creek, South Mechumps Creek.

**Mechunk Creek:* stream about 18 miles long, heading at about 38°07′13″N., 78°17′09″W. and flowing generally southward to the Rivanna River about 12 miles southeast of Charlottesville; Albemarle and Fluvanna Counties, Virginia; 37°55′55″N., 78°18′40″ W. Not: Mechum Creek (former decision), Merchant Creek.

New Ellett: community, 1 mile N.E. of Ellett and 3.5 miles S.E. of Blacksburg; Montgomery Co., Va.; 37°12′00″N., 80°21′45″W. Not: Ellett (q. v.), Ellett Station.

Peterfish Run: stream, 4.5 miles long, heads in Peterfish Gap at 38°28′35″N., 78°41′13″W., flows E.N.E. to the South Fork Shenandoah River just W of Shenandoah; Rockingham Co., Va.; 38°29′04″N., 78°37′52″W. Not: Dovel Run, Harnsberger Creek.

Piney Ridge: ridge, 3 miles long, trends N.E.-S.W. 4 miles S. of Waiteville, W. Va., and 13 miles N. of Blacksburg, Va.; Craig Co., Va.; 37°25′00″N., 80°24′30″W. Not: Little Piney, Piney Mountain.

Shacklefords: settlement about 4 miles east-northeast of the town of West Point and 40 miles east of Richmond; King and Queen County, Virginia; 37°33′05″N., 76°43′57″W. Not: Centerville, Shakelford's, Shackleford's.

Simpsons: community about 13 miles southeast of Christiansburg and 19 miles south-southwest of Salem; Floyd County, Virginia; 37°02′15″ N., 80°12′20″W. Not: Locust Grove.

Slayden Creek: stream about 3 miles long, heading at about 37°46′17″N., 77°27′05″W. and flowing generally southeastward to Mechumps Creek about 4 miles east of Ashland and 14 miles north-northeast of Richmond; Hanover County, Virginia; 37°45′02″ N., 77°24′28″W. Not: North Mechumps Creek, Slayden Swamp.

Stonehouse Creek: stream about 4 miles long, heading on the southeast side of Piney Mountain and flowing generally southward to the Buffalo River about 18 miles north-northeast of Lynchburg; Amherst County, Virginia; 37°39′43″N., 79°06′46″W. Not: Stonewall Creek (q. v.).

Stonewall Creek: stream about 2 miles long, heading at about 37°41′45″N., 79°08′30″W., and flowing generally southeastward to Stonehouse Creek about 18 miles north-northeast of Lynchburg; Amherst County, Virginia; 37°40′22″N., 79°07′12″W.

Swift Run: settlement, 3.5 miles S.E. of Elkton and 23 miles N. of Charlottesville; Rockingham Co., Va.; 38°22′05″N., 78°34′52″W. Not: Swiftrun.

White Rock Branch: stream, 3.5 miles long, heads at 37°26′35″N., 80°28′03″W., flows W. to Stony Creek 6 miles S.W. of Waiteville, W. Va.; Giles Co., Va., and Monroe Co., W. Va.; 37°26′30″N., 80°31′10″W. Not: Epling Draft, Stony Creek.

Yards: village on the Bluestone River about 4 miles northwest of Bluefield, Virginia; Tazewell County, Virginia, and Mercer County, West Virginia; 37°17′32″N., 81°18′37″W. Not: Flat Top, Flattop, Flat Top Yards, Flattop Yards.

NEW BUSINESS EDITOR OF ECONOMIC GEOLOGY

Virginia Polytechnic Institute is to be congratulated in their acceptance of the responsibility to serve the geologic profession with the appointment of Dr. Richard V. Dietrich as Business Editor of the journal, *Economic Geology.* This journal is a publication of the Society of Economic Geologists, a worldwide organization, and contains articles oriented to the scientific aspects of metallic and nonmetallic ore deposits. The following excerpt is from *Economic Geology,* vol. 61, 1966, p. 429:

"Dr. Morris M. Leighton, Business Editor of ECONOMIC GEOLOGY since 1943, has asked the Directors of the Economic Geology Publishing Company to be relieved of the duties of his office, and the Board has reluctantly honored his request. The Business Editor shares with the Editor the principal responsibility for getting the Journal to its 5,600 subscribers in more than 111 countries, eight times a year. In addition, he has managed the publication and distribution of the semi-annual *Annotated Bibliography of Economic Geology* and monographs. . . .

"With the change in the Business Editorship of ECONOMIC GEOLOGY, the office . . . [was] transferred from Urbana, Illinois, to Blacksburg, Virginia. . . . All communications to the Business Editor should be addressed to: Prof. R. V. Dietrich, Department of Geological Sciences, Virginia Polytechnic Institute, Blacksburg, Virginia 24060."

OIL AND GAS DEVELOPMENT IN VIRGINIA DURING 1965

David M. Young[1]

The outstanding feature of development in Virginia during 1965 was the completion of the first year of gas delivery from Tazewell County. This amounted to 2,442,905 Mcf from 12 wells completed in 1961, 1964, and 1965. All gas production in Virginia in 1965 totaled 4,210,086 Mcf, an increase of 2,328,315 Mcf over the total of 1,881,771 Mcf produced during 1964. Oil production from the Rose Hill and Ben Hur fields in Lee County amounted to 3617 barrels, a decrease of 2211 barrels from the total of 5828 barrels produced in 1964. Drilling activity declined with only 6 well completions. One of these, Shell Oil Company *et al.* No. 1 R. J. Whetzel, drilled in Rockingham County to a total depth of 14,176 feet, is the deepest hole drilled in Virginia to date; the well was plugged and abandoned (See *Virginia Minerals*, vol. 12, no. 1, p. 6-7).

Drilling of one well was begun in Buchanan County in 1965, and there were no new well completions. A total of 1,175,549 Mcf of gas was produced as follows: Ashland Oil and Refining Company (formerly United Producing Company), 829,667 Mcf; Cabot Corporation, 72,483 Mcf; P. & S. Oil and Gas Corporation, 57,792 Mcf; and United Fuel Gas Company, 215,607 Mcf.

There was no drilling in Dickenson County during 1965. The Clinchfield Coal Company, Division of The Pittston Company, delivered 591,632 Mcf of gas to the Kentucky-West Virginia Gas Company.

Rockingham County has been the site of sporadic exploratory drilling since 1930. Fifteen wells have been completed with 5 shut in as potential Oriskany gas producers and 10 plugged and abandoned. A total combined openflow of more than 12,000 Mcf was reported for the 5 shut-in wells. Depths to the Oriskany sand range from 2985 to 3759 feet.

Five gas wells were completed from the Berea sandstone in Tazewell County in 1965. One of these, completed early in the year, was reported with 1964 results. The 5 wells had a combined total openflow after fracture of 7259 Mcf. Gas production from Tazewell County totaled 2,442,905 Mcf of which the Consolidation Coal Company produced 1,084,312 Mcf and the United Fuel Gas Company 1,358,593 Mcf. Tazewell County production accounted for 58 percent of all gas produced in Virginia in 1965.

[1] Chief Geologist, Clinchfield Company, Division of The Pittston Company, Dante, Virginia. Oliver W. Lineberg, State Oil and Gas Inspector, furnished production figures for Buchanan, Lee and Tazewell counties.

Table 1.—Well completions in Virginia during 1965.

Company	*Lease*	*Well No.*	*Total Depth*	*Initial Openflow (Mcf)*	*Final Openflow (Mcf)*	*Status*
Tazewell County						
Consolidation Coal Company	Faraday	8	5555	400	1007	Gas well
Do.	do.	9	4925	30	790	Do.
Ashland Oil and Refining Company	Youngstown Mines Corp. *et al.*	1	5900	792 (blew down)	33	May plug and abandon
United Fuel Gas Company	New River and Pocahontas Consolidated Coal Co.	33(9355)	5025	1699	4108	Gas well (Reported for 1964)
Do.	do.	34(9364)	5705	696	1321	Gas well
Rockingham County						
Shell Oil Company *et al.*	Whetzel	1	14,176	—	—	Dry Hole PP&A

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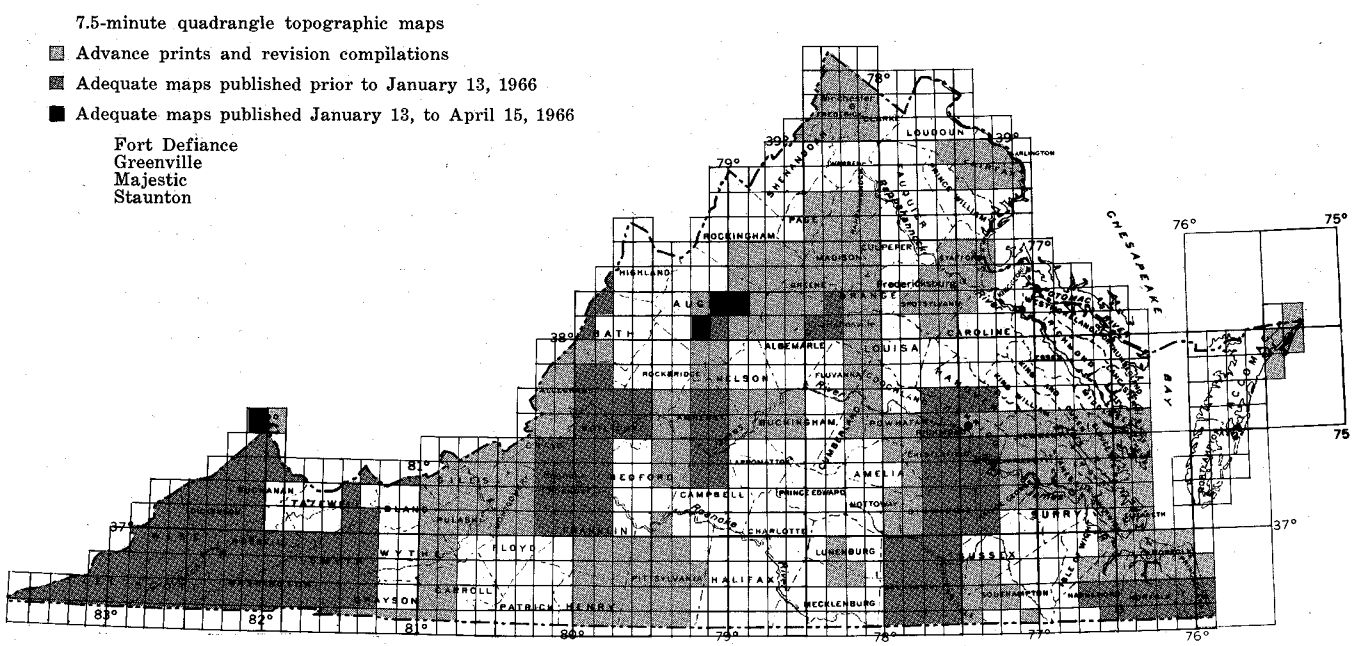
TOPOGRAPHIC MAPS



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 30 cents each from the Virginia Division of Mineral Resources, Box 3667, Charlottesville, VA 22903.