VIRGINIA MINERALS

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT
Richmond, Virginia

Published quarterly by the DIVISION OF MINERAL RESOURCES, James L. Calver, Commissioner
Natural Resources Building, McCormick Road, Charlottesville, VA. 22903

Vol. 18 MAY, 1972 No. 2

# ADDITIONAL PLEISTOCENE MOLLUSKS OF VIRGINIA[1]

Horace G. Richards[2] and Lyle Campbell[3]

## INTRODUCTION

Marine Pleistocene mollusks have been known for many years from numerous localities of southeastern Virginia, probably the first specimens having been obtained from excavations for the Dismal Swamp Canal. Some 36 species of Gastropoda (snails) and 43 of Pelecypoda (clams) have been listed in two technical publications of the senior author and were summarized and figured in two previous issues of *Virginia Minerals* (Richards, 1936, 1952, 1966, 1967).

Recently, the junior author, being stationed with the U. S. Navy at Virginia Beach, Virginia, had the opportunity to resume the collecting of fossils from several localities in the Norfolk-Virginia Beach area, which was begun while at William and Mary College, Williamsburg, Virginia. The principal localities studied are the following:

(1) Womack Pit, 0.25 mile southeast of the intersection of Kempsville and Indian River Roads, Virginia Beach, Virginia.

(2) E. V. Williams-Pavab pit, North Witch Duck Road, behind Zayre's Department store, Virginia Beach, Virginia.

(3) Beach replenishment dredgings from Owl Creek Marina, found on beach near 17th Street, Virginia Beach, Virginia.

The specimens were sent to the Academy of Natural Sciences, Philadelphia, Pennsylvania, for checking, and a representative set is deposited in that museum. The two authors also spent several days in the field in September, 1971.

In addition to the species collected by the two authors, additional new records for the Virginia Pleistocene are listed from the collections of Old Dominion University, Norfolk, Virginia, made by Dr. Randall Spencer and his students (indicated by ODU in the text). Certain microgastropods are omitted from this article, or referred only to genus.

The result has been the addition of 33 species to the known Pleistocene mollusk fauna of Virginia. Some of these records have little significance, since they have been reported from localities both north and south of the State. Other species have special significance, and will be discussed in the concluding section of this paper.

The localities studied in this survey have previously been referred to the Pamlico Formation by Richards, and were referred to the Norfolk Formation by Oaks and Coch (1963). In any case, they probably date from the Sangamon interglacial stage. Appreciation is expressed to Richard White for photographing the fossils.

[1] Aided by a grant from the Penrose Fund of the American Philosophical Society.

[2] Academy of Natural Sciences, Philadelphia, Pennsylvania 19103.

[3] Formerly William and Mary College, Williamsburg, Virginia and Franklin and Marshall College, Lancaster, Pennsylvania; now in the U. S. Navy.

## LOCALITY DESCRIPTIONS

The list of the additional species of Pleistocene mollusks not previously reported in Virginia follows. The locality description, distribution during Pleistocene time, and the present distribution is given for each species.

### Gastropoda

*Epitonium angulatum* (Say)
Figure 16
Womack pit; southeast wall below worm-rock reef
Pleistocene distribution: Maryland, South Carolina
Recent distribution: Connecticut to Texas

*Epitonium humphryesii* (Kiener)
Not figured
Womack pit; north wall, channel in worm-rock reef
Pleistocene distribution: New Jersey, Maryland, North Carolina, South Carolina
Recent distribution: Massachusetts to Texas

*Epitonium multistriatum* (Say)
Not figured
Womack pit; north wall, channel in worm-rock reef
Pleistocene distribution: Maryland, North Carolina, South Carolina
Recent distribution: Massachusetts to Florida

*Epitonium candeanum* d'Orbigny
Figure 17
Womack pit; north wall below worm-rock reef
Pleistocene distribution: Previously unreported
Recent distribution: North Carolina to West Indies

*Pyramidella crenulata* (Holmes)
Not figured
Womack pit; below reef (ODU)
Pleistocene distribution: North Carolina, South Carolina
Recent distribution: South Carolina to West Indies

*Turbonilla interrupta* Totten
Not figured
Womack pit; north wall, channel in worm-rock reef
Pleistocene distribution: Massachusetts to South Carolina
Recent distribution: Maine to West Indies

*Odostomia* sp.
Not figured
Womack pit

*Rissoina* sp.
Not figured
Womack pit; channel in worm-rock reef

*Triphora nigrocincta* (Adams)
Not figured
Womack pit; southeast wall below worm-rock reef
Pleistocene distribution: New Jersey, Maryland
Recent distribution: Massachusetts to Florida

*Cerithiopsis greeni* (Adams)
Not figured
Womack pit; north wall channel in worm-rock reef
Pleistocene distribution: Massachusetts
Recent distribution: Cape Cod to Florida

*Trophon clathratus* (Linné)
Not figured
Womack pit; below reef (ODU)
Pleistocene distribution: Quebec, Massachusetts
Recent distribution: Nova Scotia to Hatteras (deep water)

*Columbella (Anachis) translirata* Ravenel
Figure 18
Womack pit; north and south walls below worm-rock reef
Pleistocene distribution: Previously unreported
Recent distribution: North Carolina to Florida

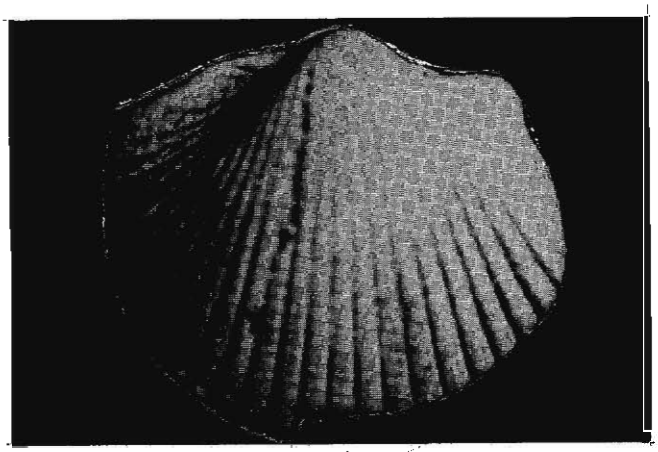


Figure 1. **Dinocardium robustum** (Solander) X 2

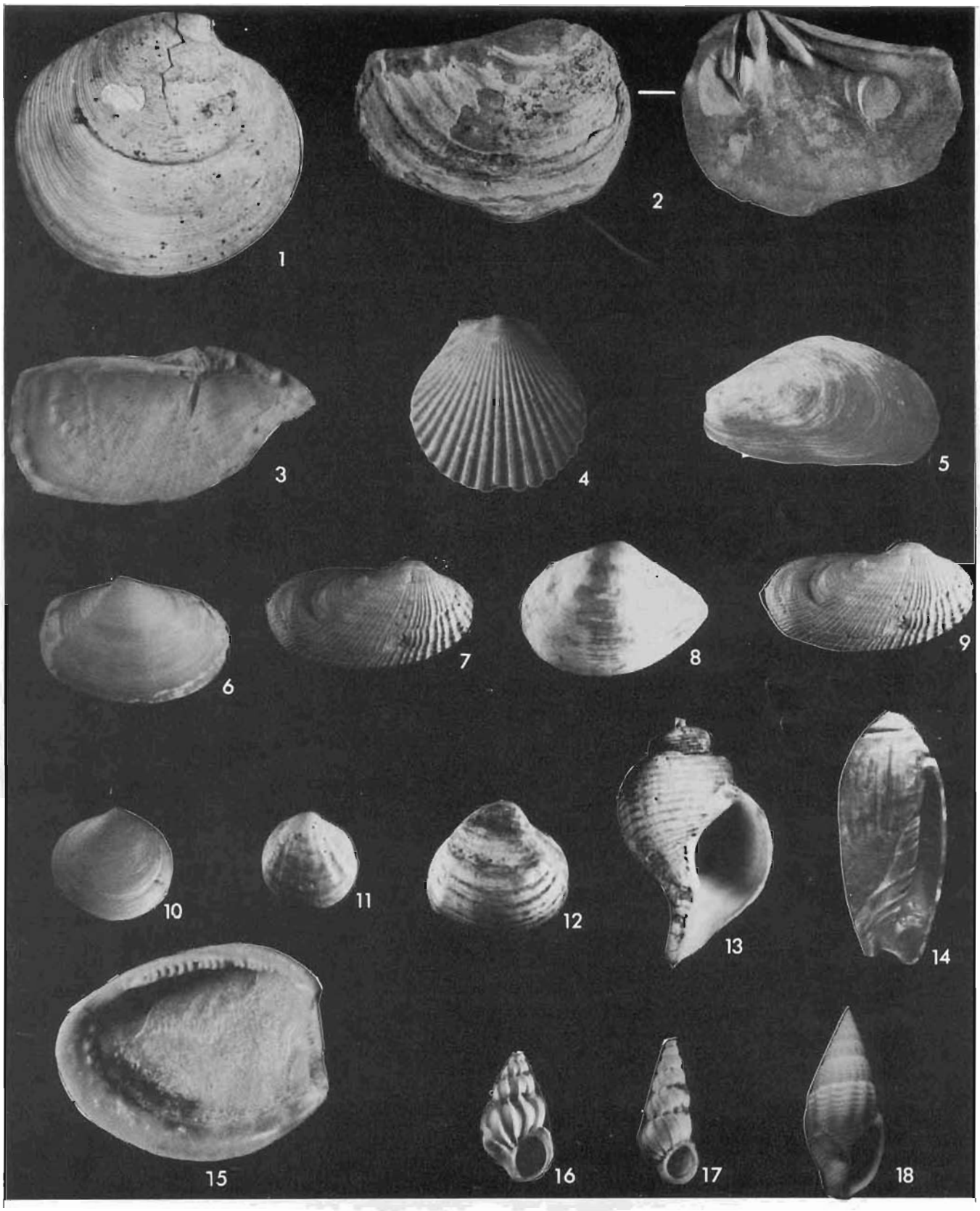
## EXPLANATION OF PLATE 1

Figure

1. *Dosina discus* (Reeve) X 1
2. *Pandora gouldiana* Dall X 2
3. *Barnea truncata* (Say)
4. *Argopecten gibbus* (Linne)
5. *Modiolus americanus* (Leach)
6. *Periploma laenum* Conrad X 2
7, 9. *Petricola pholadiformis* Lamarck X 2
8. *Macoma constricta* Bruguiere X 0.67
10. *Diplodonta punctata* (Say) X 2
11. *Lucina amiantus* Dall X 2
12. *Polymesoda caroliniana* (Bosc) X 1.5
13. *Colus stonei* (Pilsbury)
14. *Oliva sayana* Ravenel X 2 1/3
15. *Nucula major* Richards
16. *Epitonium angulatum* (Say) X 2
17. *Epitonium candanum* d'Orbigny X 2
18. *Columbella (Anachis) translirata* Ravenel X 2

All specimens figured are Pleistocene and natural size unless otherwise indicated.

PLATE 1



*Colus stonei* (Pilsbry)
*(Neptunea stonei)*
Figure 13
Womack pit; north and southeast wall; E. V. Williams pit
Pleistocene distribution: Massachusetts, Long Island, New Jersey; North Carolina (regarded as probably dating from the Wisconsin glacial stage)
Recent distribution: extinct

*Oliva sayana* Ravenel
Figure 14
Dredged from Owl Creek for beach replenishment
Pleistocene distribution: North Carolina, South Carolina
Recent distribution: North Carolina to Florida

### Pelecypoda

*Nucula major* Richards
Figure 15
On beach near 17th Street, Virginia Beach in material pumped from Owl Creek for beach replenishment
Pleistocene distribution: New Jersey
Recent distribution: extinct
(Previously known only from a broken specimen from excavations for the Cape May Canal, New Jersey. Closely related to *N. shaleri* from the Miocene or Pliocene of Marthas Vineyard, Massachusetts)

*Argopecten gibbus* (Linné)
Figure 4
North wall Womack pit; channel in worm-rock reef
Pleistocene distribution: New York to Florida
Recent distribution: Nova Scotia to Texas and West Indies

*Mytilus edulis* (Linné)
Not figured
Womack pit; below reef (ODU)
Pleistocene distribution: Artic to South Carolina
Recent distribution: Greenland to Carolinas

*Modiolus americanus* (Leach)
Figure 5
North wall, Womack pit; pairs common in very top of worm-rock reef
Pleistocene distribution: Previously unreported
Recent distribution: North Carolina to West Indies

*Pandora gouldiana* Dall
Figure 2
North wall Womack pit; top of worm-rock reef; rare
Pleistocene distribution: Massachusetts, New Jersey, Maryland
Recent distribution: Gulf of St. Lawrence to North Carolina

*Periploma laenum* Conrad
Figure 6
North wall Womack pit; channel in worm-rock reef
E. V. Williams-Pavab pit; fragments rare
Pleistocene distribution: Previously unreported
Recent distribution: Nova Scotia to off North Carolina

*Polymesoda caroliniana* (Bosc)
Figure 12
Spoil pile at Womack pit; possibly recent
Pleistocene distribution: North Carolina, South Carolina
Recent distribution: Virginia to northern Florida and Texas

*Diplodonta punctata* (Say)
Figure 10
E. V. Williams-Pavab pit
Pleistocene distribution: New Jersey to South Carolina
Recent distribution: North Carolina to Brazil

*Lucina amiantus* Dall
Figure 11
North wall Womack pit; channel in worm-rock reef
Pleistocene distribution: North Carolina, South Carolina
Recent distribution: North Carolina to West Indies

*Mysella planulata* (Stimpson)
Not figured
E. V. Williams-Pavab pit
Pleistocene distribution: Maryland, North Carolina to Florida
Recent distribution: Massachusetts to North Carolina

*Dinocardium robustum* (Solander)
Text Figure 1
E. V. Williams pit; fragments rare
Pleistocene distribution: North Carolina to Florida
Recent distribution: Virginia to northern Florida

*Aligena elevata* (Stimpson)
Not figured
E. V. Williams-Pavab pit
Pleistocene distribution: New Jersey, South Carolina
Recent distribution: Massachusetts to North Carolina

*Dosinia discus* (Reeve)
Figure 1
Southeast wall Womack pit; fossiliferous sand below worm-rock reef
Pleistocene distribution: North Carolina to Florida and Texas
Recent distribution: Virginia to Gulf of Mexico, Bahamas

*Macrocallista nimbosa* Lightfoot
Not figured
Womack pit (one juvenile specimen)
Pleistocene distribution: North Carolina, Texas
Recent distribution: North Carolina to Gulf of Mexico

*Petricola pholadiformis* Lamarck
Figures 7, 9
Womack pit; top of worm-rock reef; rare
Pleistocene distribution: Massachusetts to Georgia
Recent distribution: Gulf of St. Lawrence to Gulf of Mexico and southward

*Tellina alternata* Say
Not figured
0.5 mile east of intersection Holland and Kempsville Road (ODU)
Pleistocene distribution: North Carolina, Florida
Recent distribution: North Carolina to Gulf of Mexico

*Macoma constricta* (Bruguière)
Figure 8
Southeast wall Womack pit; fossiliferous sand below worm-rock reef; E. V. Williams-Ferrell Farm pit in fossiliferous silt
Pleistocene distribution: South Carolina
Recent distribution: North Carolina to West Indies

*Mya arenaria* Linné
Not figured

Womack pit; southeast wall, below worm-rock reef
Pleistocene distribution: Hudson Bay to South Carolina
Recent distribution: Arctic to Florida

*Barnea truncata* (Say)
Figure 3
North wall Womack pit; channel in worm-rock reef; found in living position with periostracum and accessory plate
Pleistocene distribution: New Jersey, Maryland, South Carolina, Florida
Recent distribution: Maine to Gulf of Mexico

## DISCUSSION

As a whole, the additional records from the Virginia Pleistocene suggest a warm sea as was indicated by the species previously reported from the Norfolk (or Pamlico) Formation of the State. Species which are especially significant because their present range is only south of Virginia are *Modiolus americanus, Lucina amiantus, Macrocallista nimbosa, Macoma constricta, Tellina alternata, Diplodonta punctata, Epitonium candeanum, Columbella translirata, Oliva sayana,* and *Pyramidella crenulata.*

A few species, such as *Nucula major, Colus stonei,* and *Trophon clathratus,* indicate cooler water, and seem out of line with the rest of the fauna. They could be slightly younger, suggesting the beginning of the Wisconsin glacial stage. In this connection, it might be interesting to note that some authors have suggested that there was a rapid rise in sea level at the end of the Sangamon interglacial, or at the beginning of the Wisconsin glacial stage, caused by a great surging of the Antarctic ice (Hollin, 1970). This might account for the presence of the cold water species in the Norfolk (or Pamlico) Formation.

## REFERENCES

Hollin, J. T., 1970, Antartic ice surges: Antarctic Jour. of the U. S., vol. 5, p. 155-156.

Oaks, R. Q., Jr., and Coch, N. K., 1963, Pleistocene sea levels, southeastern Virginia: Science, vol. 140, p. 979-983.

Richards, H. G., 1936, Fauna of the Pleistocene Pamlico Formation of the southern Atlantic Coastal Plain: Geol. Soc. America Bull., vol. 47, p. 1611-1656.

——1952, Studies on the marine Pleistocene: Amer. Philos. Soc. Trans., vol. 52, p. 1-141.

——1966, Pleistocene Pelecypoda of Virginia: Virginia Minerals, vol. 12, p. 18-24.

——1967, Pleistocene Gastropoda of Virginia: Virginia Minerals, vol. 13, p. 15-19.

⚒ ⚒ ⚒ ⚒ ⚒

# OIL AND GAS DEVELOPMENT IN VIRGINIA DURING 1971

David M. Young[1]

A total of 2,632,976 Mcf (thousand cubic feet) of natural gas was produced in Virginia during 1971, which was a decrease of about 236,126 Mcf from 1970 production. Reported production was from four southwestern Virginia counties: Buchanan County, 702,711 Mcf; Dickenson County, 410,745 Mcf; Tazewell County, 1,510,940 Mcf; and Wise County, 8580 Mcf. Oil production from Lee County totaled 594 barrels from three wells.

Development and exploratory drilling by the Columbia Gas Transmission Corporation (formerly United Fuel Gas Company), which was started in 1970, continued during 1971 with the drilling of 13 wells having a combined total footage of 57,769 feet. Additionally, two wells were drilled by other operators bringing the total footage drilled during 1971 to more than 64,000 feet.

[1] Chief geologist, Clinchfield Coal Company, a division of The Pittston Company. Everett J. Dishman, Jr., Virginia Division of Mines and Quarries and Marshall Miller, Virginia Division of Mineral Resources furnished production and drilling data.

The 13 wells drilled by Columbia Gas Transmission had a combined total openflow after fracture of more than 21,000 Mcf in the Berea and Maxon sands and Big Lime (Greenbrier). An important deep test was drilled to "basement" in Accomack County to a total depth of 6272 feet.

Four operators in Buchanan County produced 702,711 Mcf of gas: Ashland Oil, Incorporated, 529,845 Mcf; Cabot Corporation, 37,663 Mcf; Columbia Gas Transmission Corporation, 88,252 Mcf; and P & S Oil and Gas Corporation, 46,951 Mcf.

Eleven wells were drilled in Buchanan County during 1971 by the Columbia Gas Transmission Corporation with a combined total openflow after induced fracturing of 20,196 Mcf from the Berea and Maxon sands and Big Lime. Footage drilled totaled 47,712 feet.

In Dickenson County the Clinchfield Coal Company delivered 403,035 Mcf of gas to the Kentucky-West Virginia Gas Company and used 7710

Mcf in field operations for production of 410,745 Mcf.

One new well was completed in Dickenson County by the Columbia Gas Transmission Corporation with an openflow of 933 Mcf after induced fracturing of the Berea sandstone. Total depth of the well was 4379 feet.

In Lee County oil production in the Ben Hur and Rose Hill fields declined to 594 barrels in 1971. This small production was from one well in the Ben Hur field and two in the Rose Hill field.

There was no drilling or workover activity in Lee County during 1971, although a few wells are still waiting on stimulation attempts or plugging.

Tazewell County continued as the leading gas producer in southwestern Virginia for 1971 with a total of 1,510,940 Mcf as reported by two operators: Consol-Ray, 996,529 Mcf, and Columbia Gas Transmission Corporation, 514,411 Mcf.

One well was drilled by the Columbia Gas Transmission Corporation in Tazewell County to a total depth of 5678 feet. The well was fractured and as of March 15, 1972 was being swabbed and tested, after having an initial openflow of 660 Mcf in the Berea sandstone.

The Westmoreland Coal and Coke Company produced 8580 Mcf of gas for local use from two wells in Wise County. There was no drilling activity during the year.

The J & J Enterprises Inc. E. G. Taylor No. 1-G was completed in May, 1971 near Temperanceville about 8 miles south of the Virginia-Maryland boundary. The well was drilled to a total depth of 6272 feet in the "basement" complex after penetrating the entire section of Coastal Plain sediments and more than 100 feet of Triassic "red beds." A detailed description was published in *Virginia Minerals*, volume 18, number 1, February, 1972.

Late in 1971, Ernest Lippert started drilling the Clarence D. Gaddy No. 1 in Charles City County southeast of Richmond. It has been reported that the well is one of several shallow tests planned for the area.

Table 1.—Summary of Virginia drilling during 1971.

| Operator | Lease | Well No. | Total Depth (feet) | Status |
|---|---|---|---|---|
| Accomack County | | | | |
| J and J Enterprises Inc. | E. G. Taylor | 1-G | 6,272 | Plugged and abandoned |
| Buchanan County | | | | |
| Columbia Gas Transmission Corp. | G. T. Ramey Heirs | 9515 | 3,840 | Gas well* |
| " | R. C. and D. H. Bell | 9633 | 4,564 | Gas well |
| " | The Pittston Company | 9634 | 4,615 | Gas well |
| " | The Pittston Company | 9635 | 4,588 | Gas well |
| " | R. C. and D. H. Bell | 9636 | 4,184 | Gas well* |
| " | The Pittston Company | 9637 | 4,340 | Gas well* |
| " | Lynn Camp Coal Corp. | 9639 | 4,328 | Gas well* |
| " | Lynn Camp Coal Corp. | 9640 | 4,213 | Gas well* |
| " | Bull Creek Coal Co. | 9641 | 3,995 | Gas well* |
| " | The Pittston Company | 9643 | 4,472 | Gas well |
| " | The Pittston Company | 9645 | 4,573 | Gas well* |
| Charles City County | | | | |
| Ernest Lippert | Clarence D. Gaddy | 1 | —— | (Incomplete) |
| Dickenson County | | | | |
| Columbia Gas Transmission Corp. | The Pittston Company | 9642 | 4,379 | Gas well |
| Tazewell County | | | | |
| Columbia Gas Transmission Corp. | New River and Pocahontas Consolidation Coal Co. | 9632 | 5,678 | Testing after fracture (3-15-72) |

*Wells completed in early 1972.

## THE MINERAL INDUSTRY IN VIRGINIA IN 1971[1]

### PRELIMINARY DATA

Total value of mineral output in 1971 in Virginia was $348.1 million, a decline of $26.2 million according to estimates by the Bureau of Mines, United States Department of the Interior. The value was 7 percent less than the $374.3 million reported in 1970. The decline was due principally to a 44-day bituminous coal strike during October and November.

The production of bituminous coal, the leading commodity in terms of both tonnage and value, was 4 million tons and $20.1 million less than in 1970. Production of natural gas declined slightly, while petroleum output was unchanged.

[1] Prepared by Leonard W. Westerstrom, U. S. Bureau of Mines.

Production of stone, next to coal in importance to the mineral economy of Virginia, declined slightly. Crushed stone comprised virtually all of the total output. Sand and gravel, compared with 1970, was 4.0 percent higher in production and value. Production of portland cement was lower in 1971, but its value increased slightly, while masonry cement increased substantially both in production and value.

Lead production totaled 3350 tons in 1971, down only 6 tons from the 1970 output; its value, however, declined 11.7 percent. Production of zinc was 638 tons less than in 1970, but its total value increased 1.4 percent. Production of titanium concentrate fell sharply. Ilmenite was the only titanium mineral produced, and its output was used primarily in the manufacture of pigments.

Table 2.—Mineral production in Virginia.[1]

| Mineral | 1970 Quantity | 1970 Value (thousands) | Preliminary 1971 Quantity | Preliminary 1971 Value (thousands) |
|---|---|---|---|---|
| Clays ..... thousand short tons | 1,633 | $ 1,672 | 1,874 | $ 2,061 |
| Coal (bituminous) ..... do ..... | 35,016 | 246,181 | 30,967 | 226,059 |
| Gem stones ..... | NA | 7 | NA | 7 |
| Lead (recoverable content of ores, etc.) ..... short tons | 3,356 | 1,048 | 3,350 | 925 |
| Lime ..... thousand short tons | 1,046 | 14,090 | 835 | 11,251 |
| Natural gas ..... million cubic feet | 2,805 | 864 | 2,800 | 862 |
| Petroleum (crude) ..... thousand 42-gallon barrels | 1 | W | 1 | W |
| Sand and gravel ..... thousand short tons | 11,126 | 15,229 | 11,569 | 15,837 |
| Soapstone ..... short tons | 3,760 | 9 | W | W |
| Stone ..... thousand short tons | 35,415 | 60,477 | 33,290 | 58,058 |
| Zinc[2] (recoverable content of ores, etc.) ..... short tons | 18,063 | 5,534 | 17,425 | 5,611 |
| Value of items that cannot be disclosed: Aplite, cement (portland and masonry), feldspar, gypsum, iron oxides (pigment material), kyanite, salt, titanium concentrate, and values indicated by symbol W ..... | — | 29,210 | — | 27,404 |
| Total ..... | — | $374,321 | — | $348,075 |

NA Not available. W Withheld to avoid disclosing individual company confidential data.

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.

## NEW PUBLICATION

A new List of Publications of the Division of Mineral Resources is available. This up-to-date listing includes the Division's publications and geologic maps, the availability of topographic quadrangle maps in Virginia, and an index. The List of Publications is available free of charge.

Virginia Division of Mineral Resources
Box 3667
Charlottesville, VA 22903

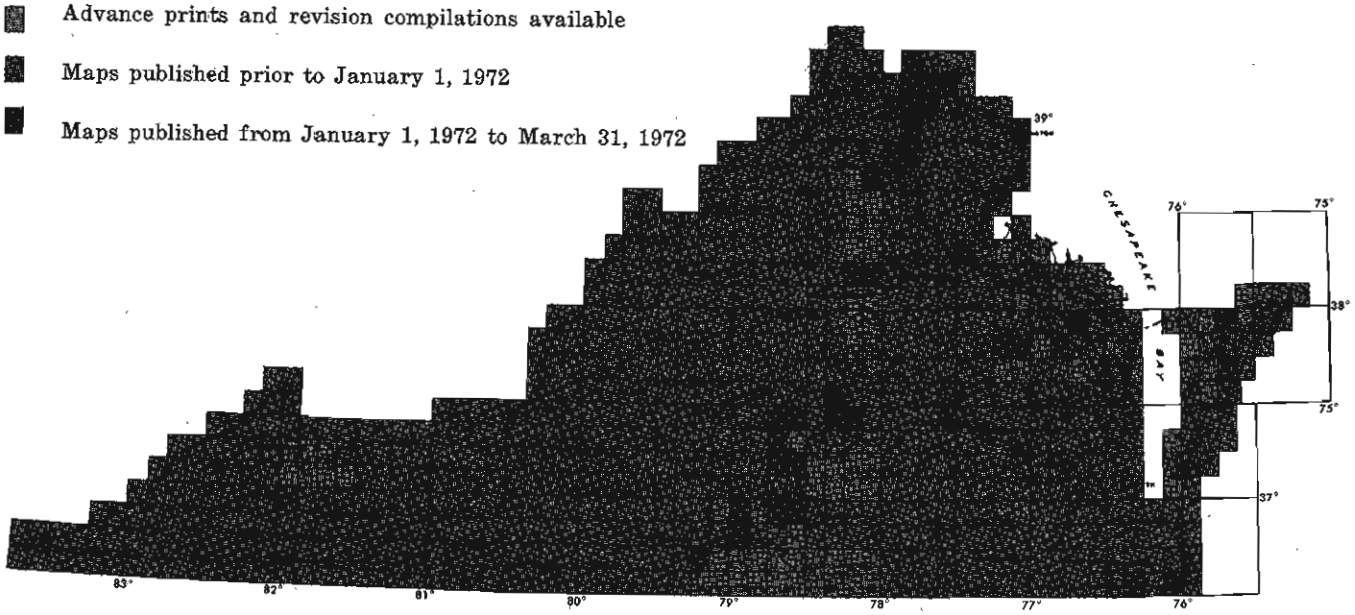
Second-class postage paid at
Charlottesville, Virginia.

Return Postage Guaranteed

## TOPOGRAPHIC MAPS

7.5-MINUTE QUADRANGLE TOPOGRAPHIC MAPS

- Advance prints and revision compilations available
- Maps published prior to January 1, 1972
- Maps published from January 1, 1972 to March 31, 1972




### Maps published from January 1, 1972 through March 31, 1972

| | | | | |
|---|---|---|---|---|
| Abilene | *Creeds | Halifax | Marshall | *Rockville |
| Accomac | Cumberland | Haynesville | Massies Corner | Round Hill |
| Andersonville | Drakes Branch | Hillcrest | Nathalie | Saxe |
| Ashby Gap | Drewrys Bluff | Holiday Lake | Orange | Saxis |
| Aylett | Dunnsville | Ingram | Orlean | Waterford |
| Beulahville | *Fredericksburg | *Lake Drummond SE | Pamplin | |
| Bluemont | Gold Hill | Lincoln | Purcellville | |
| *Charlestown | Gordonsville | Madisonville | Rectortown | *Updated map |

### 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. Updated maps, on which recent cultural changes are indicated, are now available for certain areas of industrial, residential, or commercial growth. Published maps are available at 50 cents each from the Virginia Division of Mineral Resources, Box 3667, Charlottesville, VA 22903.