INTERIM REPORT OF THE
VIRGINIA COAL AND ENERGY COMMISSION

TO
THE GOVERNOR
AND THE GENERAL ASSEMBLY OF VIRGINIA

Senate Document No. 24

COMMONWEALTH OF VIRGINIA
Department of Purchases and Supply
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Richmond, Virginia

December 1975

TO: Honorable Mills E. Godwin, Jr., Governor of Virginia

and

The General Assembly of Virginia

I. INTRODUCTION

In February, 1974, an ad hoc committee was formed as an outgrowth of discussions of the potential for coal gasification and liquefication in the Commonwealth. Chaired by Senator Michael, this Board met informally several times during the year, its members serving on a voluntary basis, and filed a report to the Governor and General Assembly for the 1975 Session with Senate Joint Resolution No. 109. The purpose of this resolution was to give formal status to the board with the allocation of funds for its use. The legislation was passed creating the Virginia Coal and Energy Commission to study the development and utilization of Virginia's coal, including exploration, mapping and transportation.

SENATE JOINT RESOLUTION NO. 109

Creating a commission to study the development and utilization of Virginia coal; allocating funds therefor.

WHEREAS, the ad hoc Virginia Coal and Energy Board was formed in February of nineteen hundred seventy-four to work specifically on coal gasification and related areas; and

WHEREAS, this Board has met on numerous occasions, has worked diligently and has submitted a report to the Governor and the nineteen hundred seventy-five Session of the General Assembly; and

WHEREAS, there is a need to continue the work of this Board

to further the study of the development and utilization of coal as Virginia's number one energy resource; now, therefore, be it

RESOLVED by the Senate, the House of Delegates concurring, That there is hereby created the Virginia Coal and Energy Commission. The Commission shall study all aspects of coal as an energy resource of the Commonwealth and make specific suggestions or legislative recommendations on exploration, mapping, development and transportation of coal. The Commission shall specifically continue the study on coal liquefaction and gasification and make appropriate recommendations.

The Commission shall be composed of nineteen members, five to be appointed by the Speaker of the House of Delegates from the membership thereof, two to be appointed by the Committee on Privileges and Elections of the Senate from the membership of the Senate and twelve to be appointed by the Governor from the State at large. The Commission shall be composed, insofar as it may be practicable, of the same persons who were members of the ad hoc Virginia Coal and Energy Board in nineteen hundred seventy-four. The members so appointed shall elect from their membership a chairman and a vice-chairman.

Legislative members of the Commission shall receive such compensation as set forth in § 14.1-18 and all members shall be reimbursed for their actual expenses incurred by them in the performance of their duties in the work of the Commission. For such other expenses as may be required, including secretarial and other professional assistance, there is hereby allocated from the general appropriations to the General Assembly the sum of three thousand dollars. All agencies of the State shall assist the Commission in its work.

The Commission shall submit to the Governor and the General Assembly an interim report no later than November one, nineteen hundred seventy-five, and a final report no later than November one, nineteen hundred seventy-six.

The members of the Virginia Coal and Energy Commission are as follows: J. Harry Michael, Jr., Charlottesville; Charles D. Dunford, Vice Chairman, Tazewell; George F. Barnes, Tazewell; Edmond M. Boggs, Richmond; Cecil W. Bolling, Pound; Charles A. Christophersen, Richmond; B. V. Cooper, Norton; J. Paul Councill, Jr., Franklin; Garry G. DeBruhl, Critz; Ernst W. Farley, Jr., Richmond; Dr. Herbert O. Funsten, Williamsburg; Joseph A. Johnson; Abingdon; Mark R. Kilduff, Richmond; Harden Lacy; Richmond; Louis R. Lawson, Jr., Richmond; Rufus V. McCoy, Jr., Clintwood; Marvin M. Sutherland, Richmond; W. Ward Teel, Christiansburg; and W. Luke Witt, Richmond.

II. WORK OF THE COMMISSION

The Commission met in Richmond in September when they were addressed by Mr. Lawrence Chase, Head, Office of Coal,

Federal Energy Administration on the demethanization of coal beds. This is an important area which the Commission is investigating during the course of its study. The second meeting of the Commission was held in Richlands in conjunction with the Virginia Coal Show and a public hearing held at Southwest Virginia Community College in Richlands on the use of coal, emphasizing in particular coal gasification and liquefaction. The public hearing also dealt with the problems incurred in coal production today.

III. AREAS OF STUDY

A. Demethanization of Coal Beds.—Methane gas (CH4), such as is present in large quantities in many coal mines in Virginia, i.e. Pocahontas No. 3 seam in Buchanan County, which is the largest source in Virginia, is removed to protect the lives of the workers, but is also an energy source of high potential. As much as 500,000 mcf (thousand cubic feet) of methane are extracted through vertical liberation holes per year. This quantity is, however, a very small percentage of the methane gas present which is ever utilized. In many instances, the only equipment necessary for utilization of methane on the local level are a pressure gauge and pilot light. Some companies, notably Island Creek Coal, have their own drilling operations to release this gas. There are natural gas pipelines which run near Richlands, but there is no way to tap into them. A local pipeline in the area of Southwest Virginia would be advantageous in an effort to capture the methane gas for utilization. There is the possibility that the Federal Power Commission might take its ceiling off natural gas prices which will make the prospect of the demethanization of coal beds even more attractive to the Commonwealth.

Methane gas, which is explosively dangerous, has been driven out of the mine with air, thus impeding its recovery. Based on an estimated selling price of one dollar per mcf (the Holling-Glenn amendment to a current Senate bill fixes emergency intrastate gas at $1.30 to $2.00 per mcf), gas currently vented in Virginia's coalfields represents an annual loss of approximately $10 million and approximately 10 percent of Virginia's natural gas consumption for 1975.

The natural methane present in some of Virginia's coal beds is of a high quality and comparable in heating capacity to natural gas. For example, four Virginia mines work the Pocahontas No. 3 coal bed which yields a gas content of 97 percent methane and has a heating capacity of 99 percent that of natural gas.

Methane extraction consists basically of venting the gas through shafts or boreholes in unmined areas of the coal bed. Horizontal boreholes which traverse greater lengths of the coalbed and intercept more natural fracture lines yield larger total flow rates, approximately 100 to 300 foot cubed/day per linear foot of borehole (several inches in diameter) than vertical boreholes. Borehole lengths are usually 800 to 3,000 feet. The optimum distance between vertical boreholes is approximately 1,500 feet;

four such boreholes can drain 25 acres of a coal bed.

A five to twenty-fold increase in borehole production is obtained by hydraulic fracturing of the coalbed. As an example, in a test on the Pocahontas No. 3 bed in Buchanan County, an 8 inch diameter, 1,500 foot vertical borehole was drilled into an unmined section of the bed and the casing pressure cemented. Gelled water fluid carrying sand and chemical additives was injected into the borehole at approximately 10 bbl/min. Vertical fracturing of the bed occurred at a pressure approximately 1 - 4 thousand lb/in squared and the sand was carried into the fracture, approximately 1/8" - 2" wide. After several hours, the additives caused the gel to break down and the fluid returned to the viscosity of water and was pumped out of the hole, leaving the sand to prop open the fracture. No adverse effects occur with this process. Fractures extend from the bottom to the top of the coal bed, and are of the order of approximately 500 feet; the possibility of an explosion with this system is remote.

Methane output does not decrease below approximately 1/3 of the maximum over a period of several years in all the above processes. Typical average methane output per day for several boreholes is: 80 mcf from each of 7 horizontal 3" dia. 700' long holes (Pittsburgh coalbed, Pa.), one vertical borehole after fracturing: 50 mcf, (Mary Lee Coalbed, Ala.), 12 mcf (Pocahontas #3, Va.), 25 mcf (Pittsburgh Coalbed, Pa.), 4 mcf (#6 Coalbed, Ill.).

A study of removing methane from a longwall gob area in Pocahontas #3, Va. 3 months prior to mining indicated a high rate of methane liberation, 400 mcf/day average over a 15 month period from a single 9 inch diameter vertical borehole 2200 feet deep. At a $1/mcf, this would have produced approximately $200,000, versus a borehole cost of approximately $70,000 ($3/ft.).

Pumping water out of methane boreholes is important; coal bed permeability to methane increases sharply with decreasing water saturation. Some boreholes may be used after mining for electrical and communications conduits.

Virginia has, in addition to its large bituminous deposits in the southwest, smaller anthracite deposits in Rockingham, Augusta, and Pulaski counties, and also small bituminous deposits in the Richmond-Manakin-Midlothian area. The anthracite deposits should be rich in methane; gas wells with initial potentials of 100-1000 mcf/day were completed several decades ago in Rockingham County. These additional coal areas may have some potential for methane production. Methane extraction is of primary concern to the Virginia Coal and Energy Commission which is encouraging its extraction and utilization. The question of whether or not methane gas is legally a mineral right merits considerable attention and might possibly be solved through as escrow arrangement.

B. Coal liquefaction and gasification.

The Commission has also been in the process of investigating the prospect of coal liquefaction and gasification in the

Commonwealth. At present the most widely utilized process for gasifying coal is the German Lurgi process which was put into effect initially during World War II. This has since been refined to become more and more feasible. The problem confronting Virginia as regards this process is that it needs non-caking western lignite for its fuel source whereas caking coal which is not acceptable is in the State of Virginia. There are experiments being done in Westfield, Scotland where caking coals are used in the Lurgi furnace. However, the results of this "slagging gasification process" are inconclusive at this time.

The federal Energy Research and Development Administration is offering 50 percent grants for experiments with high BTU gasification. As of 1975 there are four coal gasification plants in the United States making synthetic gas. Because of the nature of the coal in Virginia it would seem that investigation of liquefaction might be more productive. Coal gasification is a costly process, approximately $3.00 to $4.00 per 1 million BTU range; coal is presently selling for 80 cents per 1 million BTU. This is an indication that Virginia possibly may not need gasification because of its low-sulphur content. A methanization facility is part of the "end process" at the Lurgi furness in Scotland producing 9500 BTU in a fuel that can be burned commercially.

Coal liquefaction is more easily adaptable to coal found on the East coast of the United States while converting high sulphur coal into clean fuel. Although there may be some particular reserves and large boundaries of coal adaptable to coal gasification and liquefaction, it is generally accepted that the majority of reserves in Virginia presently in use or planned for mining are of high quality and low in sulphur, and the advisability of converting these better fuel reserves to gasification and liquefaction, with the ensuing conservation cost, would not be economical. Virginia reserves could move directly to cake or chemical processing or to electric utility purposes.

The future usage of coal in Virginia will be 50 percent for metallurgy using high quality, low sulphur coal, and 50 percent for electricity generation using steam quality coal. Approximately 75 percent of the coal in Virginia is under 1 percent in sulphur content.

C. Federal coal mine regulations.—The State of Virginia has an abundance of coal which is not being utilized due to the many federal restrictions required by governmental agencies, preventing millions of tons of coal a year from being mined. Illustrations of such restrictions are as follows:

(1) Federal Coal Mine Act, 1969, Section 317 (a) requires a barrier three hundred feet in diameter around gas wells, which requirement is excessive. The law further provides that the Secretary may permit a lesser barrier if such a lesser barrier meets State requirements. Until recently, MESA had classified a "dry hole" in the same category as a producing well, but this has finally been resolved,

(2) Federal CMA, 1969, Section 305 which requires only stated

permissible equipment to be operated in all mines, is prohibiting the small mines located above the water table from operation,

(3) Federal CMA, 1969, Section 303(g) requires bleeder entries in all mines which are classed as "gassy" mines. However, in mines above the water table these bleeder entries do not contribute to safety in all cases. Millions of tons of coal are being left to meet this requirement of the federal Act, and

(4) "Roof Control Plans" of MESA require coal to be left in a number of cases without making any contribution to safety while prohibiting full pillar recovery.

IV. FUTURE AREAS OF STUDY

The Commission anticipates its continuation during the forthcoming biennium to study further coal and its usages in the State of Virginia and related areas such as: (1) the manufacture of low BTU gas from coal, (2) mineral rights of methane extracted from above and below coal seams, (3) the possibility of electric power generation, (4) using local methane gas sources, (5) better defining Virginia's coal reserves.

V. RECOMMENDATIONS

After considerable deliberation during the past year, the Commission would like to offer the following recommendations:

1. That the Virginia Coal and Energy Commission be continued for the next biennium with funds for its use further to explore what State action can be taken to encourage the better utilization of coal in the Commonwealth.

2. That legislation be enacted to create a coal research facility at Virginia Polytechnic Institute and State University, to be supported through federal funding, i.e. Energy Research and Development Administration, further to investigate the technical feasibility of better coal usage. See attached legislation.

3. That the Commission seek out proposals to resolve the question of mineral rights of methane obtained both above and below the coal seams be resolved so that the gas may be extracted and utilized without further delay.

4. That the coal mines throughout the Commonwealth be encouraged to utilize diluted methane, and that small industries should locate in these areas to take advantage of the possibilities of usage of this gas.

5. That interstate pipelines be allowed to be used to transport intrastate gas at intrastate prices so that any methane or natural gas pumped into any natural gas system which entered any other

state would be treated as intrastate gas.

6. That unnecessary restrictions now being required by government agencies, especially federal, which are preventing the use of millions of tons of coal annually be removed such as:

A. Requirement of a barrier of 300 feet in diameter around gas wells;

B. Requirement of stated permissible equipment being used in all mines, which is prohibiting the small mines located above the water table from operating;

C. Requirement of bleeder entries in all mines when they are needed in the gassy mines and not in all mines above the water table, where they do not contribute to safety.

Respectfully submitted,

J. Harry Michael, Jr., Chairman

Charles D. Dunford, Vice Chairman

George F. Barnes

Edmond M. Boggs

Cecil W. Bolling

Charles A. Christophersen

B. V. Cooper

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