LOW COST FUEL FROM DEGASIFICATION OF COALBEDS

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INTRODUCTION

Coalbed degasification can provide significant quantities of low cost fuel with none of the difficult problems associated with other processes for unusual fuel production. The most compelling reasons for coalbed degasification focus on conservation, compatibility, and predictability, but other positive factors such as the use of existing technology, low cost of production, proximity to markets, favorable environmental circumstances, immediate availability, and a resultant enhancement in the ease and safety of producing coal are no less important.

The scientific and technical basis for coalbed degasification as a source of pipeline quality gas has already been established. All that now remains is the refinement of the techniques of gas production from coalbeds and further evaluation of the gas content of the lower rank deep subbituminous coalbeds of the Western States and of the anthracite of eastern Pennsylvania. The current work on coalbed degasification is a natural consequence of a methane control research program initiated by the U.S. Bureau of Mines in 1964 to develop methods of making coal mines safe from explosions of methane-air mixtures.

GAS CONTENT OF COALBEDS

The gas content of coalbeds, mostly methane, can be directly determined by measurement of samples of freshly collected coal cores ( ). It is becoming clear now that the amount of methane in coal is roughly proportional to the rank of the coal and the depth of the coal. Although most of the studies to date have been conducted in bituminous coals, there is no reason to expect that much of what Mott postulated ( ) about the methane produced during coalification will not be supported by further investigation. Certainly the deeper Pittsburgh, Pocahontas, Beckley, Mary Lee, and Hartshorne coalbeds all contain enough gas to warrant serious consideration.

The composition of coalbed gas is compatible with pipeline quality gas. Kim's report ( ) gives analyses of 13 coalbed gases, only one of which had a heat of combustion less than 900 Btu/ft^3.

The absence of H_2S and SO_2 in coalbed gas makes it especially desirable because no special gas scrubbing is required before mixing with other pipeline gas.

CONSERVATION

The gas in coalbeds, especially in minable coalbeds, will be lost ultimately, unless degasification is practiced. More than 200 million cubic feet a day of methane is lost in the exhaust from bituminous coal mines. Almost all of this gas could be collected for use.

A ton of bituminous coal will yield about 25 million Btu upon combustion. If the average content of 250 ft^3 of gas per ton of bituminous coal were to be recovered, this would amount to a 1 pct increase in our fuel resources for such coals; but since only a fraction of coal in any coalbed is extracted and nearly all the gas can be recovered, the increase in usable resources attributable to the contained gas is more like 3 pct of the produced coal. In an age of declining productivity, a 3 pct increase is indeed significant.

PREDICTIBILITY

Coalbeds can be located readily. The major bituminous coalbeds are well delineated and the deeper coalbeds are only now being exploited in this country. The gas content of an entire coalbed can be estimated and the resource base evaluated with only a modest investment as compared with that required for conventional gasfield exploration.

The Bureau of Mines has developed methods for routinely determining the gas content of coalbeds and as our techniques become more refined and a larger data base is established, even less effort will be required to estimate accurately the gas that can be recovered from bituminous coalbeds in the United States.

USE OF EXISTING TECHNOLOGY

The technology developed by the oil and gas industry can be applied now to produce gas from permeable coalbeds such as the Pittsburgh coalbed in western Pennsylvania and West Virginia, the Mary Lee coalbed in Alabama, and the Beckley coalbed in West Virginia. Gas wells have been producing gas from the Pittsburgh coalbed for many years ( ) on structural highs, much as from favorable gas sands. We know now that such geologic structures are not essential. The gas wells drilled into coalbeds are not very productive initially but with hydraulic stimulation, a well established oilfield technique, productivity can be increased from 5- to 20-fold ( ).

Early experimental work has already shown that it will be possible to produce from more than one coalbed from a single borehole. It is not uncommon for several coalbeds to be found within a few hundred feet of vertical stratigraphic section. Almost all coal-bearing strata contain multiple beds and although multiple seam mining is not common in the United States as it is Europe, it is now being practiced with more frequency in the states of Kentucky, central Pennsylvania, Ohio, and West Virginia.

Even old ideas for producing oil from strata by horizontal drilling is being successfully applied to producing gas from coalbeds. Two notable examples are experiments conducted in the Pittsburgh coalbed by the Bureau of Mines where two sets of horizontal holes drilled radially into the coalbed from shaft bottoms have already produced more than 1 billion cubic feet of pipeline quality gas ( ).

Another technique, widely used by the petroleum industry, for producing oil from offshore oilfields by drilling angle holes from sites on the mainland, has been successfully applied to extracting gas from coalbeds.

The recitation of these successful efforts does not mean that further development work is unnecessary. It means only that refinements in these methods must be sought and that such refinements require no massive investment in research and development.