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THE SOUTH'S POSITION IN THE MINERAL INDUSTRY[1]

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THE mineral industry has been ranked equal in financial importance to transportation, being exceeded only by agricultural pursuits. The world average for the five years preceding 1931 was $12,000,000,000 worth of minerals annually. In 1931 the figure dropped to $8,000,000,000.

In the United States the average annual mineral production has averaged $5,500,000,000 up to 1931, or a little less than 50 per cent. of the world's total. In 1931 it dropped to $3,250,000,000.

To produce $6,000,000,000 worth of minerals in the United States (and we have produced $6,500,000,000 worth) means that 2,000,000 workers were directly employed and 10,000,000 indirectly. If we include refining and fabrication valued at $15,000,000,000 we add 10,000,000 more workers. Distribution valued at $20,000,000,000 adds 5,000,000 more, and we find at last that in so-called good times the mineral industry accounts for the livelihood of 27,000,000 workers, who handle a total of $41,000,000,000 worth of mineral goods. In the 40 years from 1886 to 1926 the per capita mineral production in the United States increased from $7.78 to $53.34, or seven-fold. It dropped back to $47 in 1929 and $39 in 1930.

The last quarter of a century has seen most of this development. It is estimated that more fuel and more metals have been used during the last twenty-five years than during all the time that went before.[2]

What has been the South's contribution to this inter-

[1] Presidential address delivered on April 13 before the Alabama Academy of Science, twelfth annual meeting, State Teachers College, Florence, Alabama.

[2] Scott Turner, "The Mineral Industry," U. S. Bureau of Mines, Information Circulars Nos. 6643 and 6682.

esting and gigantic picture of the mineral industry in the United States? In round numbers the South accounted for 40 per cent. of the total mineral value ($973,938,000 in the South in 1932, compared with a country total of $2,443,000,000 in 1933.)

In the past twenty years the South has increased its mineral output by more than 160 per cent., while the rest of the country showed a gain of about 20 per cent. Petroleum and natural gas have accounted for most of this expansion. In 1910 the South produced less than 80,000,000 barrels of crude oil. In 1933, under regulated procedure, the South produced 622,625,000 barrels, or about 69 per cent. of the country's total output. Very little natural gas was used in the South in 1910, but by 1932 more than 1,063 billion cubic feet were consumed in the South. Gas and oil pipe lines now connect the producing Southwest fields and lower central South with many cities, including Birmingham, Chicago and many others. The South produces 68 per cent. of the country's total gas output and consumes about 58 per cent. of the total.

In 1933, the South mined 155,250,000 tons of coal, over 40 per cent. of the country's total. This figure was a slight increase over 1932 and was the first increase noted for several years.

In 1933, the South mined 2,159,000 tons of iron ore, and 2,197,000 tons of pig iron were produced. Scrap accounted for the difference.

Increased production in 1934 over the last few preceding years occurred also in coke, bauxite, lime, sulfur and fluorite.[3]

The South's mineral position is potentially very strong, and its minerals constitute one of its greatest assets. They are capable of supplying the raw material for almost any type of chemical industry. Many authorities are agreed that the South is destined to be the center of the nation's chemical manufacturing industry. Dr. Herty's recent triumphs with southern pine, coupled with the fact that federal funds may be available for such projects, means that newsprint paper and rayon manufacture from southern pine are probably a certainty. Bromine from sea-water in North Carolina is now being accomplished by the Ethyl-Dow Corporation in a $3,000,000 plant. The Southern Alkali Corporation has just invested $7,000,000 in a plant at Corpus Christi, Texas. A similar plant of like size was built last year by the Mathieson Alkali Works near Lake Charles, Louisiana. The TVA projects are in the offing.

A large part of more than forty minerals and their immediate products are supplied by the South. It produces practically all the bauxite, sulfur, phosphate rock, barite, lead ore and fuller's earth; over 50 per cent. of the feldspar, fluorspar, mica, zinc ore; one third of the asphalt, raw clay and lime; and about 14 per cent. of the steel and iron ore produced in the United States. The coal area of the South is double that of Europe, and five times that of Europe, excluding Russia. The red iron ore reserves of Alabama in 1925, as estimated by Burchard,[4] were 1,470,000,000 tons of first grade and 500,000,000 tons of second grade. Brown iron ore adds another 15,000,000 tons. At the 1927 rate of consumption this will last 335 years. He further estimates that there are more than 3,366,000,000 tons of coking coal, or more than enough to smelt all the iron ore.

The South has about 30 per cent. of the country's water power, and 21 per cent. of the stream capacity, according to the U. S. Geological Survey.

These facts look encouraging for the South, and much has been done in the past twenty years. Science has enabled the South to dominate the sulfur and phosphate industries. Synthetic nitrates made in the South have made this nation independent of foreign nitrate sources. A proper crop diversification, scientific utilization of its minerals and a return of a certain percentage of the unemployed to agricultural pursuits for a living and not for wealth will hasten the restoration of the South to a self-sustaining position equal to or greater than that enjoyed prior to the Civil War. Research on natural resources has hardly begun in the South.

The Present Mineral Policy of the United States

Future progress with this type of research means, among many other things, that our national mineral policy must be conducive to a constructive procedure. A brief survey of our present policy will not be amiss at this point.

The United States has always exerted less political control on minerals than any of the principal mineral-bearing nations. Private capital and initiative have always been permitted to develop their holdings in any way they pleased. Close examination will show, however, that increasing political attention has been given to the problem. After approximately nine tenths of the public land had been alienated from the government the United States General Leasing Act of 1920 was enacted to protect the remaining one tenth. This act placed marked restrictions on the freedom of acquiring and developing mineral resources by private capital. This act applies to all public lands known to have coal, petroleum, oil shale, phosphates and sodium and potassium salts. Ownership of the minerals was retained by the government and private capital was

[3] See Bluebook of Southern Progress for 1934, *Manufacturer's Record*, Baltimore, Md.

[4] E. F. Burchard, in *Iron Age* for March 24, 1927, pp. 847–853.

allowed access to them only in limited areas, and royalties were demanded. Before and since the act there have been further special withdrawals of minerals and mineral lands, such as potash, oil for naval purpose, helium for dirigibles, and others. The public mind was severely incensed at the naval oil scandals a few years back. In 1930 the leasing act was amended to permit leases of government lands to participate in unit operation of oil pools. This affected the South in Oklahoma and Texas by allowing all holders of lands above the sub-surface pool to share alike in expense and profit. There is more or less agreement among the leaders of the mineral industry that some such plan should be adopted by all mineral land-holders. Some think governmental supervision would be sufficient, while others favor governmental control.

The leasing act also contains a provision against the free participation of foreigners in the exploitation of our minerals, it being provided that foreigners shall not participate if their countries exclude Americans from similar participation.

The state of Minnesota now imposes such restrictions that comparatively few new leases on state iron ore lands have been made in recent years.

The acquisition of mineral deposits in the Philippines is limited to Filipinos and American citizens. Also, coal there can be mined only by leasing from the government. Still further, the Philippine government has taken direct financial participation in a company organized to develop coal resources.

Under the great land grants formerly given to railway and other companies the issuance of patents in the past few years has been made most difficult where the lands are suspected to be mineral-bearing. Suits have been brought by the government for recovery of minerals on lands previously patented under a land grant (vs. Southern Pacific R. R.).

Attempts have been made under the Sherman and Clayton Acts and by state anti-trust legislation to prevent monopolies. As mergers occur they are closely scrutinized to prevent monopolies. These rulings are doubtless preventing several super-combinations. The United States took legal action under the anti-trust laws against the Franco-German potash combine, winning what Leith[5] called a "hollow victory." The State Department has discouraged loans to the German potash industry and other foreign monopolies of raw materials.

The government has used commissions several times to control the coal industry. Much the same has been done with oil. The restriction of oil production now under way was suggested by the Federal Oil Conservation Board and is being in part carried out through the intervention of state governments. Nationalization of coal has been suggested by radical political parties and introduced in measures before Congress.

Taxes and tariffs are not to be overlooked as an indication of public control. Some of our minerals are now carrying heavy burdens of state taxation over and above those imposed on other business, on the specified or implied ground that the minerals really belong to the people, and, if allowed to remain in private ownership, they should be made to contribute special tax funds. Taxes of this variety are effecting the distribution of ore production in the Lake Superior region; and helping to eliminate the small miner in eastern Pennsylvania by the anthracite tax; and raising commodity prices by the Texas and Louisiana taxes on oil and sulfur; and causing similar results in Alabama by the tax on coal and iron ore; and doing similarly in Montana by the tax on coal and oil. Tariffs of ever-increasing size and number on mineral imports has been the policy of the government for the protection of new home mineral industries in order to make the country self-sustaining. The present administration is less inclined toward such a tariff policy; but the shipment of large quantities of German coke into Boston and German-made wire to Birmingham indicate that something needs to be done. Whether this shall be tariffs or government restriction or some other scheme is not quite clear just now.

In a few cases our government has participated directly in mineral development, as in drilling for potash in the Permian basin of Texas and adjoining states; the production of helium from natural gas in Texas and Kansas, and other projects.

These few remarks alone will serve to indicate the growing part the government is taking in the protection and development of our mineral resources. Let us turn our attention now to a new policy which has just been proposed to the President.

THE PROPOSED NEW MINERAL POLICY

This nation has been one of the last to realize the inevitable fact that mineral resources are exhaustible and not replaceable, and as this realization has slowly dawned upon the mind politic there has been a growing tendency toward government control, as I have just briefly outlined. However, such a haphazard program can not be continued indefinitely. The people must be made to see the facts, and our government must adopt some definite feasible mineral policy. The happy days of "skimming the cream" off of our mineral wealth are about over. High mining costs and relatively lower yields are with us.

The present administration is not unmindful of this, and accordingly President Roosevelt appointed in 1934

[5] Leith, "World Minerals and World Politics," McGraw-Hill.

a National Resources Board to survey the entire field of our natural resources. This board in April of that year appointed a Planning Committee for Mineral Policy consisting of Harold L. Ickes, *chairman;* C. K. Leith, geologist, University of Wisconsin, *vice-chairman;* W. C. Mendenhall, director, U. S. Geological Survey; John Wellington Finch, director, U. S. Bureau of Mines, also a geologist; and J. W. Furness, chief, Economics Branch, U. S. Bureau of Mines, and seven others. This planning committee has made its preliminary report covering, first, the need of a national mineral policy, second, a suggested policy in the domestic field, and third, the international aspects of the mineral policy. This report was released in mid-December, 1934.

In introducing this report the committee calls attention to the importance of the mineral industry and also to the fact that it has developed without the aid of any consistent mineral policy. The committee points out that the facts that warrant special consideration for the mineral industry, and a unified policy for its guidance, are:

(1) That minerals are exhaustible and non-reproducible; (2) that some minerals do not exist in the United States in quantities adequate for national welfare; (3) that others exist in present surplus; (4) that geographic distribution is fixed by nature and can not be changed by enactment thereby determining trade routes and trade areas, both domestic and foreign; (5) that there are special hazards, both physical and economic, in mining; and (6) that closing down a mine may result in losses far more serious than closing down a factory.

The *Engineering and Mining Journal*[6] points out that:

The most important public question rising from these conditions, recognized as basic by the committee, is that of conservation. The committee on mineral policy does not interpret conservation as hoarding but rather as an efficient and orderly use of minerals in the interest of the common good and national welfare, both in war and peace; and without unnecessary waste either of physical resources or the human elements involved in its extraction.

This newly proposed policy strikes a new and sympathetic note for the mineral industry. It points to a relationship between government and industry that should be mutually beneficial. It signals economic stability for the mineral industry and at the same time a conservation of natural resources. In short, the new policy proposes, according to a recent editorial in the periodical just cited, "self-control by the industry under public supervision of capacity, production, stocks, and sometimes of price, with periodic forecasts of demand by a governmental agency. . . ." This same editorial writer continues by saying, "This type of control is particularly appropriate to an industry dealing with a natural resource rather than a manufactured product, and is deemed necessary to stabilize the industry and protect the interests of the consumer, the wage earner, and the nation's long-time concern for conservation."

This proposed method of control is essentially that which has been attempted under the codes, even though it has not been fully realized. The committee recommends that the experience gained under NRA be used as a guide to future action. If one can place confidence in the published views of leaders in the mineral industry and the American Mining Congress then he is forced to conclude that the industry itself favors the extension of modified NRA control. Therefore "with evident harmony on the fundamentals of the problem, it should not be difficult to work out satisfactory details."

The Outlook for the Future of the Mineral Industry

The almost certain adoption of the proposed mineral policy so briefly outlined above sets one to speculating just what immediate effect it will have on the mineral industry in this country, and especially in the South.

It is confidently expected, in Washington, that this congress will establish a new National Planning Board to be named by the President as a permanent agency for the study of land, water-power and mineral problems of national concern. This recommendation is the most important item of the entire National Resources Board's voluminous report.[7] "Regardless of the economic or technical detail authorized by law, the setting up of a principle of national planning will mean the acceptance by the Government of the responsibility for a resources policy" (*Engineering and Mining Journal*). This has been a theory since the days of Theodore Roosevelt and Gifford Pinchot.

The Bureau of Mines will probably remain very largely a fact-finding agency, with enlarged funds and increased activity, regardless of the scope of the new policy board. An early increase in the funds available to the economics branch of the Bureau is to be expected. This means that more complete and prompt statistical services will doubtless result. The Science Advisory Board emphasizes the need for $16,000,000 to stimulate research and this is also important to mineral industries, because it includes a plan for the study of "mineral resources in their economic, social, and political relations, and particularly in regard to

[6] *Engineering and Mining Journal,* January, 1935.

[7] Report of the Planning Committee for National Policy, Part IV, pp. 58. National Resources Board, 1935.

conservation." Presumably this fund will be administered by the new National Planning Board.

The United States Geological Survey is scheduled to increase its activities tremendously, especially in the topographic branch, since the topographic mapping of the country is far from being completed and a good topographic base map is a recognized necessity for all research on natural resources.

The South can expect perhaps more than her proportionate share of this new research. The trend toward a chemical development of the South's resources is evident on every hand, as has been shown. Further development will depend upon the limitations set by the new policy, and this looks favorable at the present time. With the expected increased confidence it is reasonable to expect capital to be attracted southward. Let us hope that a scheme will be devised whereby state geological surveys will be materially strengthened financially, so that their long-delayed programs can be accomplished. Many of the funds now being spent for relief work could better be allocated for mineral location and research.

Since the war between the states the mineral industry in the South has been hampered not only by a lack of capital but several things that follow naturally from such a shortage; such as numerous small, poorly developed, widely scattered mines; and an emphasis on metals rather than non-metals. The development of coal, oil and gas in response to the heavy demand has far surpassed the other non-metals, but non-metallics have suffered most from inefficiencies of mining, milling and marketing. Yet long after metallics have been depleted the non-metallics will remain as strong valuable products.

The newly proposed mineral policy should encourage technological research in metallurgy, ceramics and industrial chemistry, and these researches will doubtless prove the value of many mineral deposits of medium and low grade, hitherto unworkable in the South and elsewhere.

To further this industrial march and to give these minerals the same impetus already acquired by coal, oil and gas, salt and sulphur, it is essential that the entire South be studied as a unit; that markets and centers of production be correlated; that basic freight rates and methods of assessments and taxation receive collective consideration; and that the great fuel supply of the South, coupled with its unexcelled water powers, should be utilized in the fabrication of raw material into finished products carrying higher class freight rates, but reaching new centers of distribution; employing men in a thousand small towns rather than in a few large cities; and offering increased valuations of property as an offset to constantly mounting taxes.[8]

The present slump is only temporary, if we can judge from history. In 70 years (1860–1929 inclusive) the population of the United States increased four times, agriculture production increased about six times, manufacturing increased about 22 times, while the mining output increased 60 times. Therefore, if our standards of living are to improve, as we expect they will, mineral production must also increase.

So in this march of events the South is definitely on its way. Just where we are going is not always quite clear, but let us hope that with the aid of the proposed new national mineral policy, intelligent conservation and a more thorough understanding of the limitations of nature, as well as her bounties, the South may continue to increase her "place in the sun."

THE GEOLOGIC AND THE COSMIC AGE SCALES[1]

THE AGE OF THE EARTH FROM SEDIMENTATION

THE method of estimating geologic time on the basis of sedimentation was of great value in the development of geology in the nineteenth century because it led to a better understanding of geologic processes and caused geologists to resist the distortion of their developing ideas of geologic history threatened by certain physical theories whose validity was insistently claimed by eminent authorities. The older calculations were, however, low minimal values produced under the influence of limitations urged by physicists, and based on the adoption of the comparatively high present rate of deposition as a constant rate and the neglect of critical considerations of certain factors which demand material time additions to the then accepted figures.

While the sedimentation method has a sound theoretical basis, it is, for the whole geologic record, complex and difficult of application, fundamentally because of varying rates, and the fact that to arrive at dependable approximate average rates for the different periods requires an extensive knowledge of the prevalent conditions during such periods that will be available only at some future date. At the present time we may say that a first rough approximation of specific rates for separate divisions of geologic history, taking into consideration formerly neglected factors, gives results of the same order of magnitude as the method based on radioactivity for the time from the

[1] Abstracts of the six papers of the joint Symposium of the Astronomical Society of the Pacific and the American Physical Society, University of California at Los Angeles, June 26, 1935.

[8] "The Undeveloped Mineral Resources of the South." American Mining Congress, 1928.