COMMONWEALTH OF VIRGINIA
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AND DEVELOPMENT
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DIVISION OF MINERAL RESOURCES
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VIRGINIA MINERALS

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A quarterly designed to acquaint the public with the mineral resources and activities of Virginia, and to furnish information on market quotations, new discoveries and developments, and pertinent publications. Distributed free upon request to the Division of Mineral Resources.

NEW TITANIUM PLANT

The Metal and Thermit Corporation's titanium processing plant, located on State Road 677 in western Hanover County, about five miles south of Montpelier, began part-time operation the middle of November. The plant, which has a capacity for producing two tons of concentrates per hour, operates in two shifts, five days a week, but will eventually operate three shifts. The operation is slated to become an important domestic source of rutile. At present, Florida and South Carolina are the only domestic producers and Australia supplies approximately 70 percent of the requirements of the United States.

The corporation began limited mining of its rutile and ilmenite deposit in early September. The ore minerals are recovered from soil and saprolite formed by the weathering of the underlying rocks. In the rocks beneath the weathered material, most of the rutile and ilmenite occurs in pegmatites although both minerals are found to a limited extent in the enclosing rock, which is a quartz-monzonite gneiss.

The plant was formally opened on November 20, when the public was invited to inspect the facilities. The following address was delivered at that time by Mr. Edward W. Martin, President of Metal and Thermit Corporation:

"Ladies and gentlemen, Mr. Gregory (member of House of Delegates), and other distinguished guests, it gives me great pleasure to welcome you to Metal and Thermit's newest plant.

"We expect this plant to become a very important cog in our overall operations.

"We believe, also, that it will prove to be a desirable adjunct to the community. This is an age of swift progress. Our country's population is growing rapidly - its economy is expanding accordingly. Unfortunately, like so many other areas, this beautiful Piedmont section of the Old Dominion can not hope to keep pace with the changing times by continuing indefinitely as a purely rural community. Industrial development within such areas has become a necessity and we are glad to be among the first with an industrial operation in Hanover County.

"As you no doubt already know, we are producing two products here. One is rutile, or titanium dioxide, used in the manufacture of titanium metal and in the coatings of arc welding electrodes. The other is ilmenite, an iron titanium oxide employed in pigments for paint, lacquer, rubber, linoleum and other similar products.

"This type of mining and ore processing is not new to our company. Nor, for that matter, are we strangers to Virginia.

"From 1903 to 1949, through a subsidiary company, American Rutile Corporation, we operated a similar facility at Roseland in Nelson County, Virginia. The operation there was discontinued when the market for rutile declined sharply following World War II.

"Since that time, through another subsidiary, International Titanium Corporation, we have been importing processed rutile at the rate of about 3,000 tons a year from the black sand beaches of Australia - 10,000 miles away.

"Why have we returned to Virginia and resumed mining operations here? One reason is to satisfy the increasing demand for rutile and ilmenite in their traditional uses. Also, we are

looking forward, to a wider use of titanium metal in the future and a resulting increase in the demand for rutile in titanium production.

"Market figures compiled by the United States Bureau of Mines tell us that, from 1947 to 1951, rutile consumption in this country averaged 11,000 tons a year. In 1956, however, 50,000 tons of rutile were consumed. This tremendous increase, amounting to more than 350%, came about in two ways. First, one of the most important uses for rutile is in the coatings of electrodes employed in arc welding. Here, rutile helps both to stabilize the arc, overcoming its tendency to "sputter", and to protect the deposited weld metal from the air while the weld is cooling. The use of arc welding in metal fabrication of every kind is constantly growing and in 1956 nearly 13,000 tons of rutile were consumed in coatings for electrodes. This was more than the total consumption of rutile for all uses five years previously. With arc welding being employed more extensively each year in such fields as shipbuilding and in the construction of heavy machinery, railroad equipment, bridges and structures of all kinds, we expect that, by 1962, consumption of rutile for use in electrode coatings will reach some 20,000 tons annually. Second, and a more recent development, is the demand for rutile in the production of titanium metal which accounted for 30,000 of the 50,000 tons of rutile consumed in 1956.

"The use of titanium is growing because this new metal has a number of unusual properties giving it advantages over standard materials of construction in certain difficult operations. For example:

1. Titanium has an excellent strength-weight ratio when compared with such materials as magnesium, aluminum and steel and when subject to moderate operating temperatures up to 800° F.

2. It has excellent corrosion resistance for many applications which have not been solved by the general line of stainless steels. An outstanding example is its amazing resistance to seawater corrosion.

"Because of these properties, titanium has a wide range of existing and potential applications. It is being used in air frames for both military and civilian planes. In ordnance it is used where lightness, strength, and corrosion resistance are needed. And, manufacturers of marine equipment find titanium a highly desirable material because of its resistance to seawater. A future major use could be in the manufacture of chemical processing equipment where corrosion has been a problem with normally available materials. And, also in the future, new metal alloys containing titanium as a major ingredient may solve some of the needs for materials for jet and atomic applications where high strengths at extreme temperature are requisite.

"Some recent publicity may have tended to create a feeling of pessimism with respect to the metal titanium. This is due to the realization that this new metal has not proven superior to stainless steel for many of the high temperature applications in jet and missile engines. We believe, however, that major markets will continue to develop for its use as a moderate temperature structural and corrosion resistant material, especially if its price, which is currently $2.25 a pound of titanium sponge, continues to fall as a result of more production. Other uses for rutile, accounting for some 7,000 tons in 1956, are in the manufacture of titanium alloys, chemicals, ceramics and glass.

"The market for our other product, ilmenite, also is expanding. Ilmenite is used in the preparation of titanium dioxide as a white pigment in paints, lacquers, varnishes, paper, rubber, plastics, linoleum and textiles. The chief characteristic of titanium pigments is their resistance to water, alkalies, acids and various chemicals. Also, they are non-poisonous and do not turn yellow when exposed to chemical fumes. This is why titanium dioxide pigments are replacing older lead pigments.

"Again referring to Bureau of Mines figures, we find that consumption of ilmenite in the United States has increased from 587,000 tons annually during the period 1947 to 1951, to 865,000 tons in 1956 - an increase of nearly 50%. To meet the demands of these growing markets, our plant here is designed to process some 100 tons of ore an hour. The ore is obtained from our surrounding 800 acre tract of land. We expect to produce in 1958 approximately a half million dollars worth of rutile. By 1959 we anticipate that production will be increased 100% so that in a little over a year, and for some years thereafter, we will be turning out a million dollars worth of rutile annually. Along with the rutile we will produce approximately $100,000 worth of ilmenite a year.

"What about reserves?

"We estimate that we have enough rutile and ilmenite on our property to last from 10 to 20 years - depending, of course, upon market conditions.

"Since World War II, the price of rutile has varied from $100 to $300 a ton. During the last few months, however, it has dropped from an all-time high to its present level of less than $200. We believe that the entry into the field of another domestic producer, with the productive capacity we have here, will help stabilize rutile prices, to the benefit of our customers. Also, to be considered is

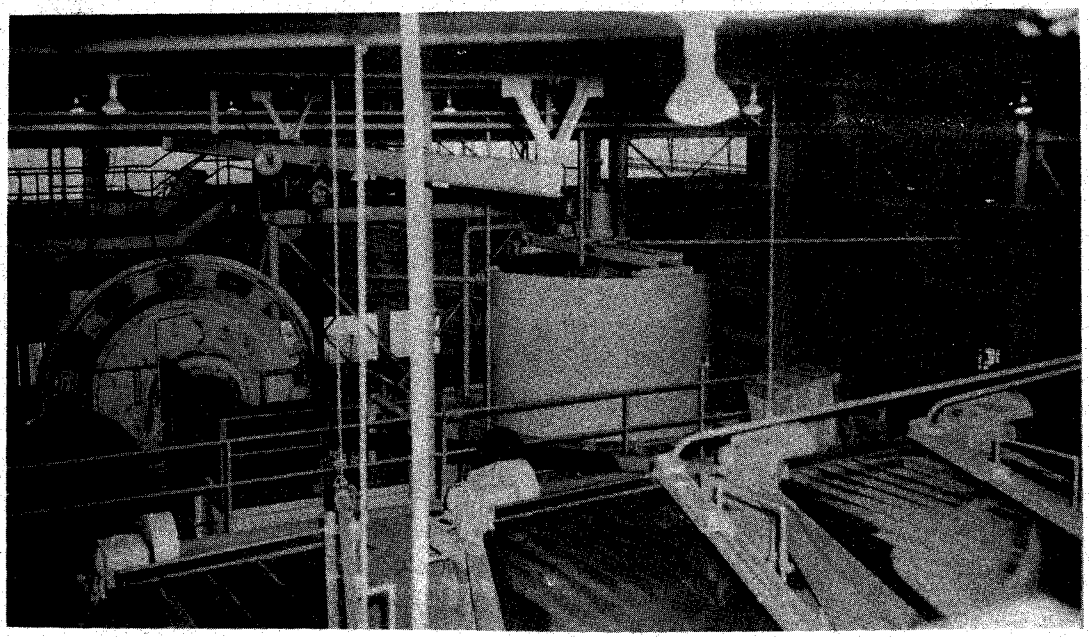

Plate 1. Rod mill (left) used to disintegrate the ore from the crusher; thickener (center), to remove slimes and water; and shaking tables (lower right), to remove quartz and other minerals and to concentrate the rutile and ilmenite.

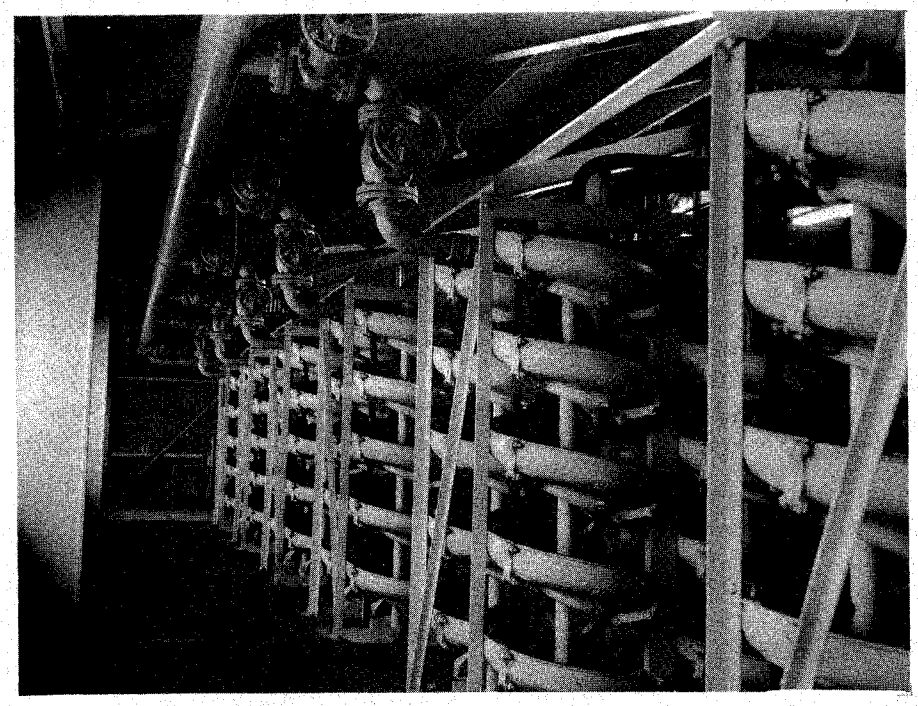

Plate 2. Humphreys spirals used to make the primary separation of rutile and ilmenite from the quartz, feldspar, mica and other minerals in the ore.

the fact that at present Australia produces nearly 90% of the world's rutile, and in the event of another war, the United States could be cut off completely from this source.

"Now, you will be interested, I'm sure, in how we produce rutile and ilmenite. Briefly, the ore is stripped from the ground by bulldozers to depths ranging from one to eighteen feet. It is then brought to a conveyor belt which feeds an outside hopper, and, ultimately the plant itself. Here it is crushed and ground into small particles, then separated by a combination of water, gravity and electrostatic and magnetic processing. Next it is kiln-dried and then bagged for shipment by truck to the railroad at Ashland.

"Another interesting facet of our operation here is the care we take not to contaminate the South Anna River. Our water recycling process operates something like this. We pump water from the river to the plant (where it is used to process the ore) and then send it to our settling basin. Here, in an area of about 20 acres, the refuse material or silt is allowed to settle. The water is then taken from the top and reused in the plant. No water containing silt and refuse is ever returned to the river.

"Although we will employ only 25 to 30 people at the start, we have invested upwards of one and a quarter million dollars in exploration, property, plant and equipment--right here. We know this is a good investment, based on the reasons I have given you. Furthermore, we look upon our new operation here as one which we feel sure will help bolster the industrial growth of Hanover County. And, we hope to become welcome members of the community.

"At this point I would be very remiss if I did not take a moment to pay tribute to the engineering, construction, and operating people in Metal and Thermit Corporation who played such an important part in getting this plant designed, built and into operation. They worked as a fine team together and the results of their combined efforts are evident and they deserve the credit for the plant you are about to inspect.

"My associates and I thank you for joining us on this most important occasion."

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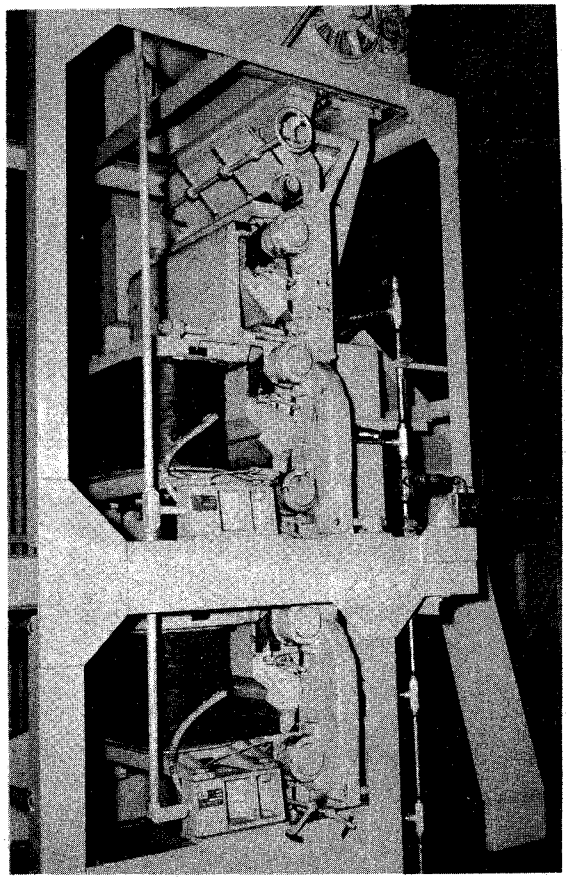

Plate 3. After the concentrate from the shaking tables is dewatered and dried, the ilmenite is separated from the rutile by these magnetic separators.

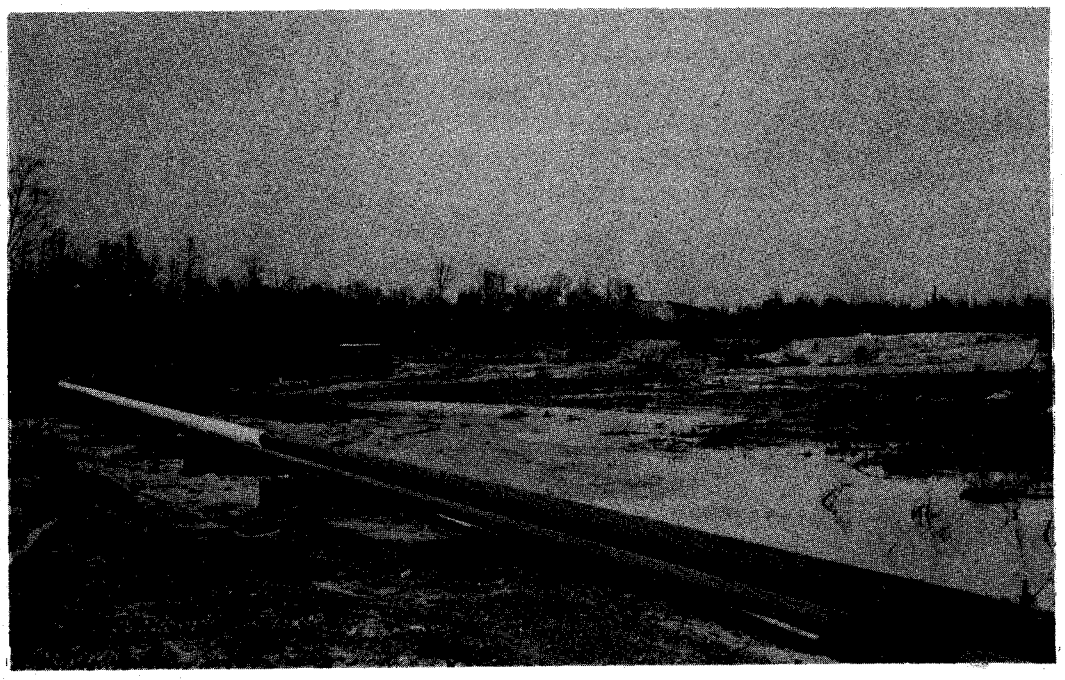

Plate 4. Tailings pond for disposal of rock and soil waste and the prevention of river pollution.

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RECENT TOPOGRAPHIC MAPS

The following topographic maps have been published recently and are available from this office: Charlotte Court House, Gladys, and Great Fox Island. The Charlotte Court House and Gladys maps are 15-minute quadrangles, with a contour interval of 20 feet, and are on a scale of 1:62,500. The Charlotte Court House map covers portions of Appomattox, Prince Edward, and Charlotte counties, and the Gladys map covers portions of Campbell, Pittsylvania, and Halifax counties. The Great Fox Island map is a 7-1/2-minute quadrangle, on a scale of 1:24,000, and covers portions of Accomack County, Virginia, and Somerset County, Maryland.

The Germanna Bridge map, previously on a scale of 1:31,680, is now published on a scale of 1:24,000. This 7-1/2-minute quadrangle has a contour interval of 20 feet and covers portions of Fauquier, Culpeper, and Orange counties.

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NEW STATE MAPS AVAILABLE

Three new maps of Virginia--a base map, a topographic map, and a shaded relief map--have recently been issued by the United States Geological Survey and are now available from this office. The base map shows the location of county and state boundaries, county seats, railroads, cities and towns by black lines, and streams and other water features by blue lines. This map is published on a scale of 1:500,000, is 30 x 64 inches in size, and sells for $1.00. The topographic map, which has a contour interval of 200 feet, shows national forests, parks, monuments, and principal highways, and is printed in a seven-color edition. It is published on a scale of 1:500,000, is 30 x 64 inches in size, and sells for $2.00. The shaded relief map shows the topography of the State, the county and state

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boundaries, county seats, and drainage. This map is published on a scale of 1:500,000, is 30 x 64 inches in size, and sells for $2.00.

A list of geologic, topographic and base maps has been compiled, and is available from the Division of Mineral Resources on request.

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NEWS ITEMS

Dr. Marcellus H. Stow, 55, Robinson professor and head of the geology department at Washington and Lee University, died November 27, at his home in Lexington, Virginia.

Dr. Stow had been a member of the university faculty for 30 years and was geological consultant to the director of the State Department of Conservation and Development. He was a member of the State Advisory Council on the Virginia Economy and was chairman of its geology committee.

Dr. Stow was a past president of the Virginia Academy of Science, and had served as a deputy director of the War Production Board and of the Civilian Production Administration. He was a member of the board of directors of the Southern Research Institute in 1945.

Mr. Donald C. LeVan joined the staff of the Division of Mineral Resources on December 16, 1957. He is a native of Niagara Falls, New York, and attended the University of Buffalo. He received both his Bachelor's degree and Master's degree from the University of Michigan where he was a student from 1948 to 1951.

Mr. LeVan was formerly employed as a geologist by the Pan American Petroleum Corporation. He is a member of the American Association of Petroleum Geologists, and Sigma Gamma Epsilon. He is married and has one son.

NEW BULLETIN ISSUED

Virginia Division of Mineral Resources Bulletin 72, "Geology and Mineral Resources of the Gossan Lead District and Adjacent Areas in Virginia," by Anna J. Stose and George W. Stose, is now available from this office at $2.00 per copy.

The Gossan Lead district is located in southwest Virginia, and is included, for the most part, in Carroll and Grayson counties. The bulletin describes the geology and mineral resources of the district, and contains 233 pages, 61 plates, 51 figures, and 16 geologic sections. Separate copies of the geologic map are also available at the cost of $1.00 per copy.

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NEW PLANTS AND QUARRIES

Clinchfield Coal Company recently reopened a mine known as Moss No. 2 at Clinchfield, Virginia. The mine had been closed since World War I, but exploratory work revealed that metallurgical coal, now much in demand, occurs in the mine.

The company has constructed a modern plant to process the coal. This automatic preparation facility was designed and erected, using float-sink concentrators to remove shale, bone and other refuse from the coal. Operating on two shifts a day, the plant handles 450 tons per hour of run-of-mine coal. The entire operation is automatically controlled by push-buttons from two stations.

Virginia Trap Rock Corporation recently opened a quarry near Leesburg, Loudoun County. The corporation produces, at its plant, which has a capacity of 200 tons per hour, crushed stone for use as roadstone and concrete aggregate. The rock produced is diabase.

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