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# "ASBESTOS"

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One should always wish success where faith and persistence are being applied. The present owners of Copperopolis asbestos -- a local newspaper item dated December 4, 1959, says the purchase price was \$4,620,000 for about 500 acres -- have drilled a reported 55 diamond drill holes averaging 200' to 250' deep, with the deepest 600'. The tonnage figure given out is 15,000,000 tons proven, which vastly exceeds any earlier tonnage estimates known to the writer. As no technical data on the drilling results are being made public at present, there is no immediate way to analyze this latest 15,000,000 figure. One supposes it must have been built up by the drilling and thus represent fiber zones which do not outcrop, for despite the extensive bulldozing to clear brush and make a few shallow trenches, the writer did not see any significant new surface ore from that mapped 17 years ago.

The best fiber zone as known in 1943 was oval in shape with the longer axis not more than 350' and the short axis somewhat less. This orebody extends in depth to some point unknown to the writer but the deeper material is out of reach of economic open pitting. Elsewhere on the property there are pockets and lenses of fiber, many showing good Canadian-type, cross-fiber chrysotile, but none with any persistence either along the strike at surface or at depth, at least as originally drilled in the War years. It would be a pleasure to welcome a new asbestos producer, if, indeed, the picture of tonnage available has changed through recent work.

**NAPA COUNTY** — Some 20 twisting and up-and-down miles north of Napa is the short-fiber chrysotile deposit which Kohler and Chase controlled for a number of years. The writer studied it during World War 2 when the search for workable chrysotile in California was at its most urgent. New owners are at present experimenting with fiber recovery using special air separation equipment, the goal being, presumably, to get a cleaner short fiber than the Canadian Group 7 type being shipped in quantity from the east to the west coast. Any method which will cheaply remove dust from short milled fibers will, of course, be welcomed everywhere.

Concerning the deposit itself somewhat the same com-

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ment is possible as at Copperopolis. Seventeen years has not changed in any way the amount of fiber that can be seen at surface. On average the fiberized serpentine is low-grade and the zones with more fiber are usually closely associated with zones of low-grade material or barren rock. The problem of how to maintain a good ore grade when mining 1,000 or more tons a day in an open pit has probably not yet been solved. The best fiberized rock is at present being gouged out of pockets or lenses and no regular working mine benches have been established.

Studying geology in the immediate area of this mountainous Napa county deposit presents some difficulties as there is overburden just about everywhere. Where the serpentine mass has been bulldozed to rock surface in a rather small area, perhaps 200' wide and 400' long along a ridge-top, and also in road cuts and a few scattered prospect cuts, the overburden ranges from a few feet to about 20 feet. Elsewhere there is no way of telling by eye how much overburden there is, or, for that matter, how much good fiber or barren rock underlies this ubiquitous cover. Optimism is scarcely warranted that much better ore will be found when the 'dozing of overburden has been extended.

Where the geology is visible the impression gained was (and remains) that not only is the serpentine well sheared but also that there has been displacement by steep faults. The sharp changes in the appearance of the serpentine from zone to zone, and similarly from fibrous zones to barren rock, give reason enough to expect faulting. Other evidence is that short lenses of high-grade ore with well-developed ribbon structure seem to have been cut off sharply from their probable extensions as originally formed. The amount of ore with rich ribbon structure now found is not great enough to markedly affect the average fiber content of the ore as it will be mined.

The writer is not aware that any spaced diamond drilling has ever been done on this deposit. Possibly some is now contemplated. Obviously formally engineered exploratory work will be necessary to build up tonnages of proven ore in this uniformly overburdened area. In any event, no drilling was in evidence at the time of the visit, February.



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1960. A shovel was at work cutting a short bench on the steep mountain slope a few hundred feet west of the old mill building (which now has new additions) and somewhat above it. A fiber zone of merit may or may not be found as considerable overburden must first be removed to find out what lies below. The question, however, is somewhat academic as a mining method will first have to be established, involving removal of the up-slope overburden, before any ore in quantity can be won from the bench level being established.

The best fiber zones seen in the ridge-top area as now cleaned off consist of sheared serpentine with scattered fiber veinlets with no special orientation, as in most Canadian-type chrysotile deposits. Few veinlets exceed 1/16th inch in width and the number of them along the strike (about east-west apparently) or across the strike in any zone varies greatly from place to place. One would be straining to express a percentage fiber content over a particular face of the many exposed faces. Over all the exposed faces in the bulldozed areas it is possible to say with certainty that the material on average is low-grade, probably too low-grade to be ore under any circumstance if not upgraded by some method prior to milling.

**FRESNO AND SAN BENITO COUNTIES** — Some 20 airline miles north of Coalinga in the Diablo Range an unusual and most interesting asbestos development is underway. The fiber is chrysotile but compacted in the long geologic past by great heat and pressure, and probably active hot solutions, to the form commonly known as "mountain leather". In North America specimens of such leather have been found from Alaska to Mexico but because of the small amounts available, the material has always been treated as a "mineralogical curiosity", without economic significance. The very large tonnages, now potentially ore tonnages, north of Coalinga bid fair to change the heretofore lowly economic status of compacted or compressed chrysotile asbestos. Among other uses, a market for the closely sized, dust free, tough asbestos product (very small sheets or mats mixed with "unit" chrysotile fibres) seems possible as fillers in plastic and asphalt floor tiles.

The California type compacted asbestos, perhaps



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*bonded asbestos* would be a good descriptive term as the fibers are held rather tightly together by tale, has been met with in quantity once before and studied by the writer, at Stragari in Yugoslavia in 1952. The Yugoslavs were originally concerned with trying to reduce the bonded asbestos to more or less "unit" fibers, such as are produced in all asbestos mills. Experience finally showed that whereas the bond holding the fibers together could be broken to a degree by high-speed fiberization and give a fair per cent of short unit fibers, the product at any mesh size still contained many sheets, which we might call *fibermats*. It was ultimately shown that the mixture of fibermats and fibers not only was a good, usable product but also that for some uses it was a superior product. So similar is the California bonded chrysotile to the Yugoslavian that there is good reason to suppose that its development will follow a like pattern. Several California industries presumably would be happy to have a large local source of good, short fiber chrysotile whether in fibermats or fibers, and hence it is likely that a new asbestos mining and milling business is in the making.

Two companies hold the best of the fiber-bearing lands, Union Carbide (Nuclear Division) and the Mike-Ron Corporation, a subsidiary of Basic Resources, Inc. Together the holdings are said to exceed 12,000 acres, divided about equally.

Some comments on the geology and nature of the ore may be of interest. The ore occurs in well fractured to highly sheared zones in a serpentine rock mass some twelve miles long and up to four miles wide. The original rock appears to have been a pyroxenite intrusive. The thin, compressed fiber sheets are found along the fractures and shear planes sometimes so abundantly as to make up 30% to 40% of the material mined. The average "ore" grade will be less, quite possibly between 10% and 20% as mined, and with easy screen concentration to raise mill heads above these figures. Cheap open pit mining by power shovel alone will be possible to whatever depth weathering (and thus rock softening) has gone, over 70' as shown so far by the shallow drilling. Indicated tonnages are large as the fiber zones in the weathered serpentine are 50' to several hun-



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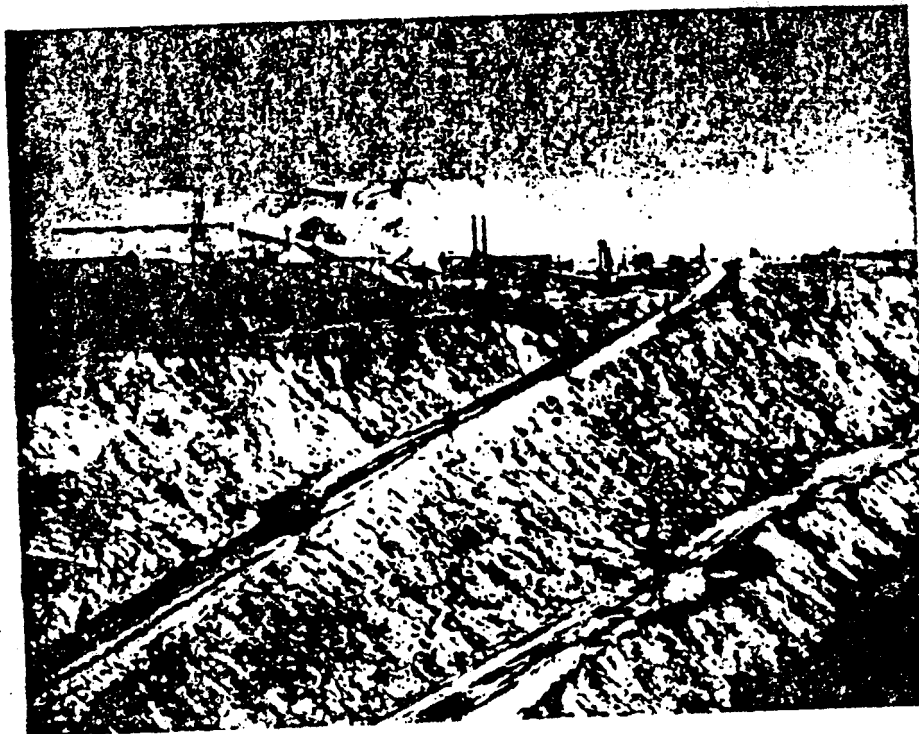
dred feet wide and in one place, at least, on the Mik-Ron Corporation property as followed by the writer, over a mile long.

The writer visited every known occurrence of chrysotile in California during World War 2 but missed hearing about and hence seeing the Diablo Range's very special product. Apparently its true nature was either not recognized, or anyhow not reported in the literature, by the several geologists intent on their important, wartime studies of many cinnabar and chromite deposits, two minerals also genetically related to the serpentine mass. The New Idria cinnabar property is still a famous producer and is only a short distance from the chrysotile occurrences. The operators of some of the war-encouraged chromite mills were frequently annoyed and inclined to roundly berate the "leather" bits which fouled up their wet circuits. These same leather bits now become a useful industrial mineral — and so marches mineral progress with no one ever knowing for sure when a diluent in any ore will become itself an ore. It has happened before.

The bonded chrysotile sheets or mats are interesting to observe at close range both in the ground and during milling processes which are being developed especially for them. Where the serpentine host rock has been "blockily" fractured and the very thin sheets lie along the fractures, any one sheet can measure several square inches in area. The color is white to greenish when dry. Where the serpentine is highly sheared, actually schistose in appearance, the fiber-mats are often so small as to escape detection by eye as they and the sheared serpentine rock are both soft and green when wet, always the case in the bulldozed trenches and shallow drillholes being used to outline the fiberized zones. Drying and various crushing and screening processes serve to remove the fiber-mats and leave behind rock particles and most of the dust. Basic Resources, Inc. has another subsidiary doing the pilot milling in Coalinga and the extraordinarily clean product so far produced and to be supplied to industry researchers is based on air separation on a screen of their own design.

As noted previously, the milling process serves to loosen a fair amount of chrysotile fibers from the fiber-mats so that

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in the potential plastic tile filler products (possibly -35 - 80 mesh, and a -80 mesh) both forms of chrysotile are present. This combining of the two can give a good bulk density averaging, if required, less than 10 pounds per cubic foot, while at the same time, it is reported, giving a strength to the tiles greater than either form of asbestos used separately. Altogether the economic possibilities of Coalinga bonded chrysotile asbestos seem attractive, and the writer, among many others, will be interested to follow this new development.

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JOHNS-MANVILLE CORPORATION has licensed THE FLINTKOTE COMPANY to manufacture high and low pressure asbestos-cement pipe long marketed by J-M under the trade name "Transite" and will design and engineer new Flintkote production facilities for this purpose, it was announced jointly on March 29, 1960, by A. R. Fisher, Johns-Manville Chairman, and I. J. Harvey, Jr., Flintkote Chairman.

Mr. Harvey said Flintkote is planning on entering the asbestos-cement pipe field with two new plants -- one in the East and one in the West. He added that these products would be merchandised under the brand name "Orangeburg" through the Orangeburg Manufacturing division, a leading producer of fibre and plastic pipe and conduit acquired by Flintkote in November 1958.

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GREENE, TWEED & COMPANY has published a catalog and price list on Palmetto® molded packings (MP-160). This new catalog and price list opens with a two-page section devoted to Greene, Tweed's V-type packing, the Palmetto Pyramid; followed by individual page descriptions of the Palmetto; U-Ring, Kup, and Pisto-Ring.

Copies of this catalog—and related bulletins on other Palmetto molded products; Self-Lubricating, Fabric, Foil, Plastic, and Filament Packings; Gasketing and Gaskets—are available from Greene, Tweed & Company, North Wales, Pennsylvania.

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