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Impact of Governmental Regulations on the Mineral Producing and Consuming Industries

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Suppliers and users of mineral raw materials in the ceramics industries have been unjustly subjected to economically ruinous government regulations as a result of gross errors in mineral definition. The asbestos standard through incorrect definition has already caused great economic hardship, as will the planned silica and talc documents unless a strong unified stand is taken by the mineral industries.

Although a host of regulatory burdens have been heaped on the mineral industry over the last decade, this paper will be limited to the impact of regulations concerning asbestos and proposed or impending regulations of a similar nature limiting exposure to a number of other mineral dusts.

Ironically, the impact of government asbestos regulation is being felt more by the non-asbestos-producing and using segments of the mineral industries than by those few operations in the U.S. in which asbestos fiber is actually being produced and/or consumed on a commercial scale.

For example, Reserve Mining Company in Minnesota, a producer of taconite Fe ore for the steel industry, after almost a decade of court battle with state and federal environmental authorities has been forced to design a zero effluent land disposal system for its taconite-wastes and dust-control systems throughout all its operations with all the costly safeguards required for control of asbestos-containing wastes. This happened despite extensive testimony by mineral experts that the material in question was not asbestos.

The Gouverneur Talc Company, mining tremolitic talc in St. Lawrence County, northern New York State, has been waging a costly struggle with the U.S. Occupational Safety and Health Administration for almost eight years in an attempt to introduce into asbestos regulations appropriate and correct mineral definitions and methods of analysis—amendments that would vindicate the company from scientifically unsubstantiated accusations that its talc contained asbestos.

The quarry and crushed stone industry has more recently come under fire as an "asbestos" producer. Trace quantities of chrysotile discovered in some serpentine ore bodies such as the Rockville Quarry in Maryland have brought about the usual hysteria now commonly associated with the word "asbestos," resulting in costly paving over of gravel roads, removal of crushed stone from playgrounds and bicycle trails, and a number of other expensive operations of questionable value to the health of the people supposedly affected.

It is just a matter of time before the regulators get around to the rest of the mining operations and the industries using their products. The Homestake Gold Mine in South Dakota, the major U.S. gold producer, has been studied by the National Institute for Occupational Safety and Health (NIOSH), the research arm

of both OSHA and the Mine Safety and Health Administration. NIOSH investigators claim to have found asbestos in the form of fibrous cummingtonite-grunite particles in mine atmospheres at Homestake, and have attributed their finding of an excessive rate of lung cancer among the miners to this form of the mineral. NIOSH continues to hold this position in spite of a more recent independent study by J. C. McDonald et al. in which an excessive rate of cancer was not found to exist among an even larger and more comprehensive cohort of Homestake workers.

In due time they will discover that amphibole minerals are common in Cu, Ag, and Pb-Zn bearing ores and, in fact, in almost all hard rock and many soft rock ore bodies. Because of OSHA's simplistic definition of asbestos fibers, these operations too will become suspect and be investigated and subjected to the cost-intensive regulation specifically developed for the asbestos mining industry.

At the heart of the problems annoying the mineral industry is the federal government's definition of what is an asbestos fiber and the methods of detection and analysis they have adopted based on this definition.

Despite expert testimony from noted mineral scientists, such as Zussman, Hurlbut, etc., the judge in the Reserve Mining trial chose to describe particles of cummingtonite-grunite ore in Reserve's taconite wastes as "indistinguishable from amosite asbestos," therefore hazardous and subject to the same regulations designed for asbestos-containing materials. Only a clear-cut lack of provable health problems in the Duluth area of Minnesota saved the operation from being closed down until a land disposal system could be built and put into operation.

Similar government findings and subsequent regulations of mine wastes could conceivably take place in the vast Cu mining industries of the West, which process ores containing similar amphibole varieties of minerals in appreciable quantities. If an asbestos fiber is any mineral particle of the amphibole group with a 3:1 aspect ratio, then it is impossible to mine, mill, and process almost any mineral ore without producing "government asbestos."

If the words "mineral fiber" are substituted for the word "asbestos," as was recently proposed by the former Mine Enforcement and Safety Administration (now MSHA) in an attempt to amend its asbestos regulations, then we are faced with the impossible situation of the complete U.S. mineral industry's being subjected to the stringent and economically burdensome rules originally developed to take care of a serious and proved health hazard to the workplace and the environment. All crushers and grinders become "fiber producers" since even grinding ordinary beach sand produces these "government fibers." Many synthetic mineral fibers in ceramic applications could also fall into this category.

Fortunately, time is on the side of the regulated, and considerable progress has been made in the struggle to force the government into adopting appropriate scientific definitions and analytical methods in the almost eight years since the first asbestos standard was published in 1972.

When OSHA's official analytical laboratory in Salt Lake City first analyzed a sample of New York State tremolitic talc in 1974, a result of 50-60% "fibrous tremolite" was reported. After considerable effort on the part of the talc producer to familiarize the laboratory with accepted methods of asbestos analysis, the amount of asbestos found in the same talc dropped to 10%.

Following a visit by the company's mineralogist to the Salt Lake City laboratory in 1976, at which time the standard methods of detection of minerals by the petrographic microscope were demonstrated, the asbestos content of the talc dropped to 2%. Subsequent court challenges of the OSHA method of analyzing talc for asbestos resulted in a finding by the OSHA laboratory in 1978 of six

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asbestos particles per 1000 counted in a bulk sample of talc. Anyone who has observed tremolitic talc particles under the microscope can readily conclude from these numbers that the true asbestos content of the talc, if indeed the six particles counted are asbestos particles and not cleavage fragments, lies somewhere in the realm of trace or negligible on a weight basis. And this particular type of talc, which is not beneficiated to any significant degree, has not changed in general mineral composition since it was first mined in 1948.

It is quite possible that similar improvements in analytical technique will demonstrate that Reserve Mining's taconite wastes contain little or no asbestos and the same could apply to the Homestake ores. But official government regulations for asbestos have not been changed significantly since they were promulgated, and not all regulatory agency laboratories are necessarily following identical analysis techniques. The nature of the technique alone, coupled with the controversy over asbestos fiber definition still leaves the mineral industry uncertain as to whether or not "government asbestos" will be found in its ore or finished products.

Furthermore, there is uncertainty over the next mineral or group of minerals the regulators will decide to pounce upon. Since asbestos minerals are silicates, all silicates have come under suspicion—zeolites, talc, kaolin, pyrophyllite, wollastonite, attapulgite, feldspars—most of which are used to some degree by the ceramic industry. This is of particular concern since over 90% of the earth's crust is composed of silica and silicate minerals. Any of these that can be construed to produce elongated fragments when processed may possibly come under special scrutiny. Zeolites in particular have come under recent attack through the discovery of high mesothelioma incidence in two Turkish towns. Local rocks and volcanic ash were searched for asbestos and when elongate mineral particles, later identified as two varieties of zeolite, were found, the search ended and zeolites were pronounced to be as dangerous as asbestos. Extrapolations of this type from three or four extremely rare forms of common minerals to cleavage fragments and crystal particulates of similar dimension are scientifically unacceptable.

OSHA has been promising a silica standard for years. The holdup is OSHA's realization that the term "silica" covers a number of different mineral forms, each with a possibly distinct biological reactivity ranging from hazardous to inert. A proposed PEL of 50 μg crystalline quartz/ m^3 air in the workplace could have a serious effect on the use of products containing free silica in the ceramic industry. Cristobalite or tridymite produced during the firing of ceramic bodies carry half of the TLV levels of quartz.

A talc criteria document, referring to talc free of quartz and asbestos, is being developed by Stanford Research International under contract with NIOSH. Eventually OSHA will receive the document and institute a talc standard development process, with publication possible in a year or two. The NIOSH-proposed permissible limit of 1.5 $\mu\text{g}/\text{m}^3$ for talc is considered extremely low and certainly costly to maintain in the workplace. Documentation to justify this low level for essentially pure talc is extremely limited and subject to question.

I would like to conclude by asserting that hazardous products, whether mineral or organic chemicals, should be controlled in the workplace so that employees enjoy the freedom from hazard they are entitled to. On this point there is no disagreement between the regulators and those who are regulated. Where the point of contention arises is the attempt by the regulator to use a broad brush to include all the "maybe's," the similar or associated materials for which they have little or no medical data but which they feel sure "might" be dangerous, and the continuing efforts to reduce all dust exposures, even remotely harmful, to zero.

In addition, contention arises as a result of a lack of expertise in the subject to be regulated. There are no mineralogists in OSHA or NIOSH, but they profess to know all about minerals, especially how to define an asbestos fiber and how to analyze for it. Anyone who challenges them is made to feel that he has no regard for the safety and health of the worker.

Government regulation has already cost the mineral industry millions upon millions of dollars, reflected in higher costs and prices of the products you use. If we could see any concrete evidence that these regulations, specifically those associated with the control of alleged asbestos in the nonasbestos mining industry, contributed to the safety and health of the people exposed to mineral dusts, we could find it profitable and rewarding to cooperate with the regulators instead of always seeming to be at war against them.

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