PLAINTIFF'S EXHIBIT
UC-477

Calidria ASBESTOS
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GRINDING CALIDRIA ASBESTOS PELLETS

The following discussion is intended to assist in equipment selection and planning for use of CALIDRIA Asbestos products in pellet form, to take advantage of their higher bulk density, dust-free nature, and free-flowing properties.

The pellets are cylindrical, about 3/8 in. diameter and up to 3/4 in. long. Bulk density is about 44 lb. per cubic foot. No additives or binders are used; they are held together by natural forces. For some applications, a cracked pellet form is available, in which the pellets have been crushed to minus 3 mesh. Either form has a negligible amount of minus 325 mesh dust, which is the important fraction in airborne contamination.

For size analysis of the ground products, we recommend wet screening by either the Bauer-McNett method or by hand-jigging. Some operator training is necessary in the latter method to obtain reproducible results, particularly in the finer mesh sizes.

Storing and feeding pellets is simplified by their free-flowing, non-abrasive nature. Cone-bottom bins or hoppers with a 90° included angle are self-emptying. Almost any feeding and conveying equipment will work with asbestos pellets. For accurate feeding, a screw feeder or weigh-belt feeder is preferred, rather than vibrating feeders. The pellets can be air conveyed, but due to their granular nature, high air to solids ratios are required and some dust will be generated. Pellets are available in bulk hopper cars holding up to 90 tons, and in 50 lb. or 100 lb. multiwall paper bags. Arrangements can be made for other containers to suit customer requirements.

Dry grinding may be done in a variety of equipment: disc mills, grate hammer mills, air-swept mills, etc. Disc mills are suited to coarser grinds and have the advantage of requiring a minimum of air cleaning equipment. Grate hammer mills, such as the Jeffrey and the Mikro-P, are versatile in application and produce a minimum of "tramp" oversize, but dust collection is necessary and screen maintenance can be a problem, particularly if an extremely fine grind is desired. Air-swept mills, such as the Raymond Vertical and the Bauer Hurricane, are well suited to medium and fine grinding in production operations. Table I summarizes some of the factors involved in selecting dry grinding equipment.

TABLE I

ASBESTOS DRY GRINDING

GRIND	Size Analysis Wet Screen, Cum. % Retained Mesh	65	100	200	325	Grinding Mill Capacities, Tons/24 Hr. Mikro-P #1	#2	#3	#4	Raymond 18"	Vertical Mill 36"
Fine		0.3	0.6	5	10-15	1	2	6	10	4	20
Medium		1	11	37	50	2	4	12	20	10	50
Coarse		13	19	36	55	3	10	32	50	15	80
	Grinding Mill HP., (max.)					10	30	75	125	30	150
	Approx. weight, lb.					650	1,500	2,850	3,800	-	-
	Approx. Price					$1,500	$2,600	$5,000	$7,000	$10,000	$35,000
	Filter Area Required (Mikro-P Pulsaire type)					250	500	1,000	1,500	500	1,500

Due to its fibrous nature, asbestos dust is relatively easy to collect. It conveys well in ducts, does not settle out, and does not tend to blind dust collector bags. Inspiration of liquid water and condensation of water vapor must be avoided, as wet asbestos is very difficult to handle.

Asbestos can be ground wet with water or other process liquids. Choice of equipment will depend on the nature of the liquid and the consistency of the desired mixture. At 4-8% solids in water slurries, for instance, fully liberated asbestos has the consistency of mayonnaise. Below 4% solids, asbestos slurries can usually be moved by centrifugal pumps. Positive displacement pumps, such as Moynos, are recommended in the 4 to 8% solids range. Above 40% solids, asbestos-water mixtures are crumbly, somewhat plastic masses which can be kneaded or mulled, and conveyed in belt, auger, or flight conveyors.

For pumpable consistencies, wet grinding can be done in screened hammer mills such as Fitzpatrick or Reitz, in Cowles dissolvers or Hochmyer mixers, and probably others, depending on the conditions and the results desired. Sonic dispersers can also be used, usually in series with a pre-disperser. At higher solids contents, mixmullers, Banburys, or mixers of the Littleford-Lodige type will be required.

A particularly effective wet grinder for pumpable slurries consists of a high-speed (16,000 FPM tip speed) vertical hammer mill, such as a Reitz, with the grinding chamber enclosed by grooved hard alloy liner plates. Asbestos and process liquid are introduced at the bottom and overflow the top of the grinding chamber. Screen maintenance problems are eliminated, and the grind can be controlled by varying feed consistency, hammer spacing, and residence time.

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