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REPORT ON ASBESTOS

ASBESTOS MARKETING 1990 was another strong year for asbestos markets and Cassiar Mining achieved a 5-6% price increase over 1989 levels. The market is expected to remain firm in 1991 as consumption of approximately



Packaged asbestos ready for shipping

1.2 million tonnes is forecast to continue. With the announcement of two mine closures in early 1991, our position as a supplier is improved. Given current production rates, there is some concern regarding restricted global supply in the future.

Demand for asbestos is directly related to demand for building products as the largest application of asbestos continues to be asbestos cement, accounting for 75-85% of global consumption. Demand for building products from Asia and the Middle East will continue to keep the asbestos market buoyant as countries such as Thailand, Malaysia and Japan continue to enjoy strong economic conditions. Although asbestos markets will continue to decrease in Germany and the United States, their overall impact on Cassiar is negligible.

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Cassiar is in a strong position to capitalize on the growth of the Far and Middle East markets, having firmly established itself as a prominent supplier.

As the accompanying pie charts indicate, Cassiar has diversified its sales base over the past decade having shifted its focus from North American markets to overseas markets. Whereas North American sales represented 23% of Cassiar's asbestos sales in 1980, Asian sales represented 27%. In 1990, North American sales totalled only 3%, while Asian sales increased to 45% of Cassiar's sales. The accompanying map of the world indicates Cassiar's diverse customer base.

In terms of demand for asbestos products, it seems that anti-asbestos sentiment has calmed and rationality is once again returning to the market-place. Canada has chosen to regulate the use of asbestos rather than ban it, adopting the notion of "controlled use". This regulatory approach of "controlled use" has been given international approval. In 1986, the International Labour Office (ILO) established a Code of Practise on Safety in the Use of Asbestos, which was endorsed by its 125 member countries. The Code is also supported by a number of international agencies, such as the



World Health Organization (WHO) and the Organization for Economic Cooperation and Development (OECD). Global demand for asbestos products is directly related to these established standards regarding use. There is a wide variety of uses for asbestos, depending on the fibre grade, ranging ASBESTOS SALES 1990 BY COUNTRY

from textiles to filter applications, and pipes to friction materials.

For instance, with cement pipes, the World Health Organization has confirmed its position regarding the use of asbestos cement pipes for drinking-water supply. "We consider it appropriate to continue the use of such pipes for water supply



Location of Cassiar Mining customers

networks. Their use is particularly important in the case of developing countries. There they constitute an economical construction material for supply networks." Asbestos products play a key role in economic development, and a regulated approach to asbestos use is yielding significant benefits in many parts of the world.

Other countries have a different approach. In the United States the ruling of the Environmental Protection Agency that will ban and phase-out almost all current uses of asbestos over the next seven years has been challenged in the courts and a decision is expected later in 1991. It is possible that the ban will be repealed, or sent back for major modification.

Another important recent development involves the update of EEC Asbestos Directives. Although not yet finalized, the EEC has avoided placing a total ban on all uses of asbestos and is recommending that continued use is acceptable under "safe use" practices.

It is important to keep in mind that asbestos is a naturally occurring mineral. The total amount of asbestos emitted from natural sources is much greater than that emitted from industrial sources. As deputy editor of "Science", Mr. Philip Abelson notes: "We live on a planet on which there is an abundance of serpentine and amphibole-containing rocks. Natural processes have been releasing fibres throughout Earth history. We breathe in 1 million fibres a year." As such, risks associated with asbestos must be weighed on a relative basis. The chart below illustrates the Harvard University published estimates of risk from a 1989 symposium on the health risks of asbestos.

After proposing a ban on asbestos, the U.S. Environmental Protection Agency is now accepting some responsibility for over-reaction to asbestos risk, claiming that intact and undisturbed asbestos materials generally do not pose a health risk. As William Reilly, Director of the U.S.

Published estimates of risk from various causes, presented in August, 1989, at a Harvard University symposium on the health risks of asbestos

	OF PREMATURE DEATH
CAUSES	(PER 100,000)
Smoking (all causes).	21,900
Smoking (cancer only)8,800
Motor vehicle	1,600
Frequent airline passe	nger730
Coal mining accidents	441
Indoor radon	
Motor vehicle-pedestr	ian290
Enviromental tobacco smoke/	
living with a smoker	200
Diagnostic X-rays	75
Cycling deaths	75
Consuming Miami or New Orleans	
drinking water	7
Lightning3	
Hurricanes	3
Asbestos in school bu	ildings1



New diesel engine and generator

E.P.A. recently claimed: "An excellent example of a clash between real risks and public perceptions is the current controversy over asbestos in the nation's schools and public buildings... The government and EPA specifically must also accept a share of the responsibility for the misperceptions that have led to unwarranted anxiety and unnecessary asbestos removal."

Clearly the debate continues, but some rationality has reappeared in the marketplace with the weighing of both costs and benefits of asbestos use.

CASSIAR OPERATIONS 1990 was a transition year for Cassiar as the mining of underground ore from the McDame deposit was phased in following the depletion of open pit ore stockpiles. Mining of the remaining recoverable ore from the pit was completed last May under an accelerated mining plan initiated in 1988. All recoverable ore was delivered to the concentrator area by mid-July at which time the tramline was shut down for relocation to the McDame portal elevation in preparation for underground ore.

The open pit ore was depleted in early December and underground ore from the McDame deposit was brought on stream. During the year 1,094,190 tonnes of ore were delivered to the concentrator of which 61,615 tonnes came from the underground. A total of 86,568 tonnes of fibre was produced with 95,200 tonnes being sold for the year.

Commissioning of the underground and associated delivery systems began in mid-November. Pre-production commenced on the 1350 m. level north. This level is scheduled to provide most of the 1991 ore requirements although some tonnage is planned from the 1335 level in the latter part of 1991.

Underground ore reserves, which are presently being re-evaluated are estimated at 18.9 million tonnes at 6.1% recoverable fibre. At the current rate of production this is sufficient for a fifteen year mine life.

While the usual start-up problems have been experienced, the mine achieved budgeted production levels in February. Recoverable fibre to-date has been in excess of 8.0% and indications are that the grade will remain in this range. Fibre production is forecast to average 90,000 tonnes annually.

The total cost for the underground development is \$68 million. The project was financed by a \$20 million loan from the B.C. government, \$12 million from bank



FIBRE PRODUCTION THOUSANDS OF TONNES



financing. and the remainder from internally generated funds.

The mining method chosen for the underground is sub-level block caving which is ideally suited for massive highlyfractured deposits. It provides the opportunity for high production capacity, and once in place, is one of the lower cost underground mining methods.

The method requires heavily supported drawpoints which are driven at regular intervals into the orebody footwall. The drawpoints are then undercut to initiate the cave process after which the ore flows by gravity. Rubber tired load-hauldump machines deliver the ore to a centrally located crusher and orepass. All material is crushed to minus 10 inches prior to being conveyed to the transfer tower at the 1415 m portal where it is trammed to the concentrator.

SEVENTEEN

In developing the McDame underground mine, the Company has endeavoured to take full advantage of advances in hightechnology modelling, control and communication systems and innovative mining equipment. The materials handling system is controlled and monitored by computerized units that incorporate modem links for remote control. The underground radio communications network is linked to the surface radio and telephone systems. The introduction of mechanical roadheader mining machines that



Alpine Miner cutting head

combine boom-mounted cutting heads with muck loading capability, has led to improvements in development performance. Other innovations in the use of mechanized equipment include boom-mounted. remote controlled shotcrete guns and a low profile compact mineral sizer to reduce oversize muck at



Feeder-breaker reducing oversize

the ore-pass. In the engineering field extensive use is made of computerized block modelling, survey techniques and innovative block cave production modelling systems.

WET PROCESSING Cassiar has developed wet processing technology over the past six years. No on-site work was performed on the wet milling plant at Cassiar during the year. Our technical personnel were provided to assist in the start-up of the new Baie Verte Mines Reprocessing Inc. plant in Baie Verte, Newfoundland.

BAIE VERTE In 1990, Princeton acquired a 55% equity interest in Baie Verte Mines Reprocessing Inc. (BVMRI), as a result of a default under a loan agreement. BVMRI owns a wet processing plant in Baie Verte. Newfoundland that recovers asbestos fibre from dry process tailings. BVMRI has access to a tailings pile grading 2.2% recoverable fibre.

Cassiar gained additional process information from the development of this wet mill plant. Cassiar's strategy is to eventually combine Baie Verte's technology with its own wet processing technology at Cassiar. Cassiar currently has a 16 million tonne tailings pile grading 3.5% recoverable asbestos fibre. The benefit of the wet milling process lies in lower energy and mining costs. The process allows the extraction of shorter fibres without the costs of drying the mill feed which is required for conventional dry milling techniques.

A loan of \$4 million was made to BVMRI to allow them to complete the

construction of their \$20 million wet mill and bring it into commercial production. Commercial production was not achieved as scheduled and the company became insolvent. To protect its investment, Princeton, under its loan debenture, appointed a Receiver/Manager to complete the project and operate the facility. The wet mill achieved a commercial production test in August, 1990.

Numerous refinancing plans had been proposed to the other shareholder without success. Early in 1991 the Company instructed the Receiver/ Manager to proceed with an asset sale to meet BVMRI's financial obligation to Princeton and the bank. Princeton has committed to be a bidder for the assets as an ongoing entity.

Based on the original feasibility study estimate, the Baie Verte wet mill is expected to produce 50,000 tonnes of fibre annually. The Company believes that 30,000 tonnes is a more realistic production goal.

CASSIAR REGIONAL

DEVELOPMENT In the early 1950's Cassiar, B.C. was established as a tent camp to house mine employees. Since then the size and nature of the town have changed substantially. Cassiar has evolved from a mining camp to a community.

Because of Cassiar's remote location in



Curling as winter recreation

the Northwest corner of B.C., the normal government infrastructure has not been provided. The Company has been solely responsible for the community's growth having provided the necessary financial support and infrastructure over the years. Cassiar is one of the few towns in the province of B.C. whose electrical power is provided by the Company.

Single family houses, town houses and apartments were built by the Company to accommodate the mine and mill workers and their families. Streets, water, sewer, power and other townsite services were provided by the Company. In addition, an Elementary-Junior-Secondary school, churches, stores, library, post-office, firedepartment, and recreation centre were added.

In 1990 the Company continued to support the community infrastructure with approximately \$3 million in housing expenditures.

Community services have also improved over the years, and Cassiar now hosts a full range of services and amenities. Over the years, the growth of the entire region has been clearly linked to mining activities. Development over time has seen the extension of Highway 37 as a major trans-provincial highway and the establishment of barge dock facilities in Stewart, B.C. for movement of containerized freight between Stewart and North Vancouver.

Since 1952, Cassiar's asbestos mine has been a major contributor to the economic fabric of Northwestern British Columbia. Currently the company employs over 400 people. In addition, some 1200 people are employed indirectly due to the multiplier effect of industrial employment.



Map of British Columbia

Cassiar no longer functions only as a company town, it has evolved into a regional centre for the entire Stikine Area. As tradition continues, Cassiar Mining Corporation remains committed to serving the Northwestern B.C. region.