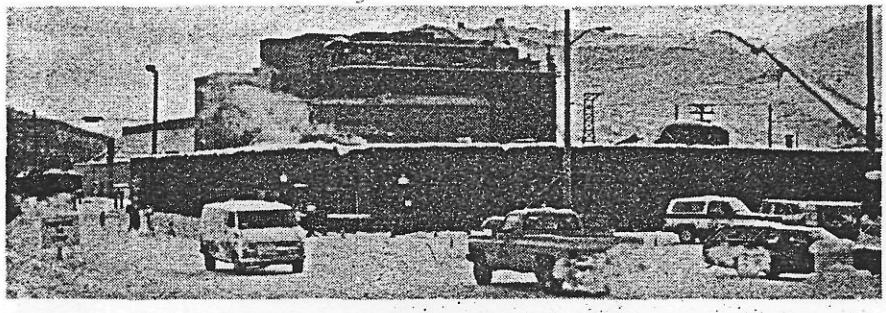
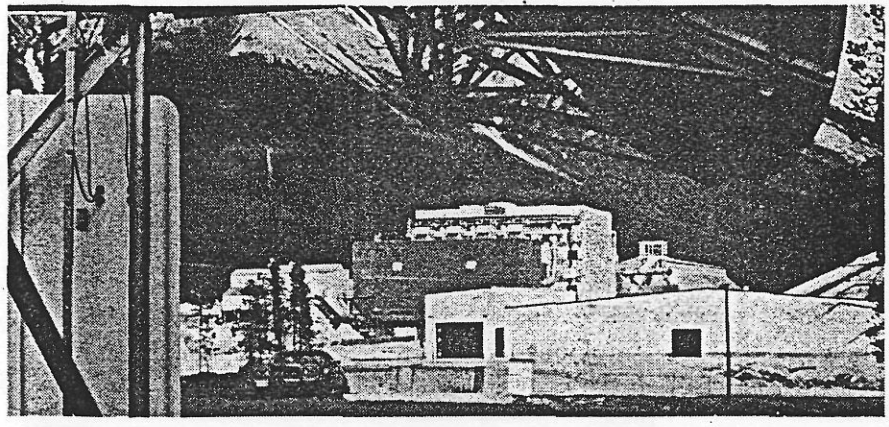
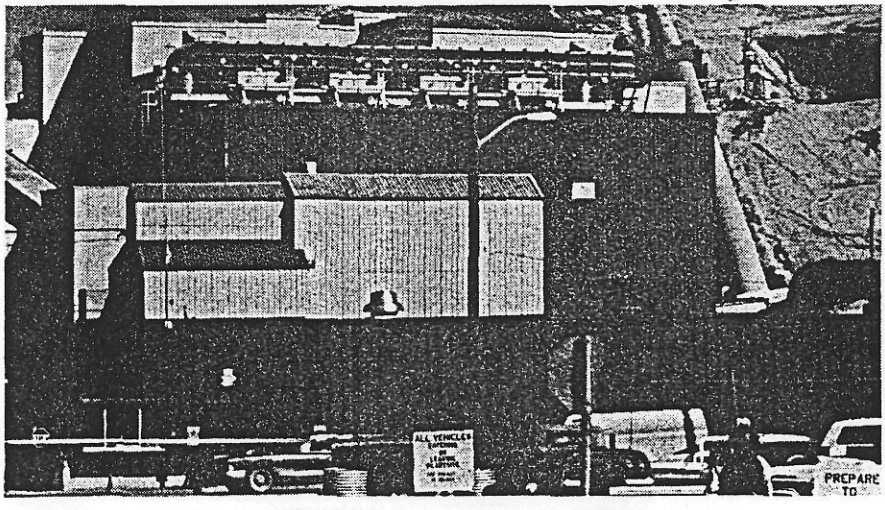
Cassiar Resources improves asbestos operations in British Columbia

Cassiar's milling complex receives raw ore from the mine via a 4700 metre tramline capable of delivering 300 t/h of ore. Since 1975 Cassiar has spent $30-million on environmental control throughout its mine, mill, and transportation operations.







In August 1980 Brinco Limited of Toronto negotiated a six-month option to acquire 59% of the equity of Cassiar Resources Limited. In November it offered $16.15 per share for all of Cassiar's outstanding shares — a transaction valued at $89-million. By 31 December, 98% of Cassiar's stock had been delivered, and early in 1981 Cassiar was merged into the Brinco group of companies.

Cassiar Resources, which is now a division of Brinco Mining Limited of Vancouver, reports a two-year period of intense mining, milling and environmental control activities at its northern British Columbia Asbestos operation.

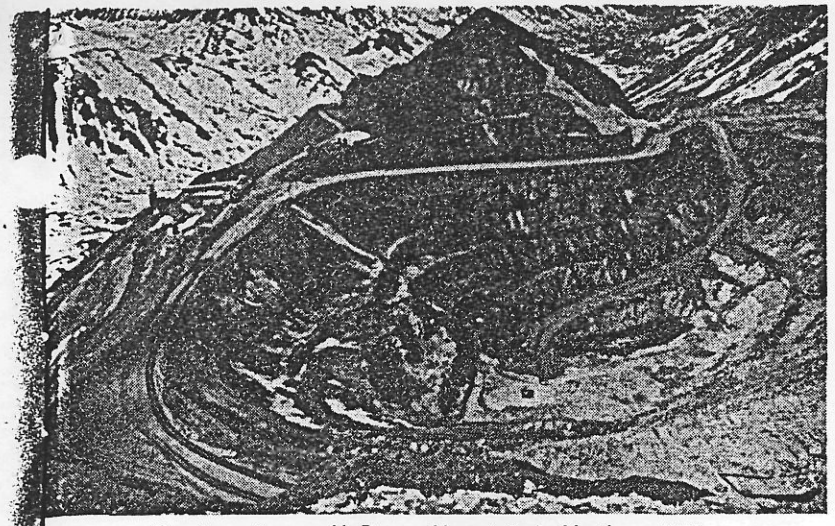
During the years 1980-81 the company has spent some $10-million adding new environmental equipment to its operations and extending the use of previously adopted emission control technology. This $10-million expenditure represents one-third of the $30-million spent on environmental control programs since 1975.

The current environmental improvements include: **(1)** To further reduce dust emissions at the tailings discharge a third pugmill has been installed. This wet agglomeration system prevents dust from escaping into the atmosphere.

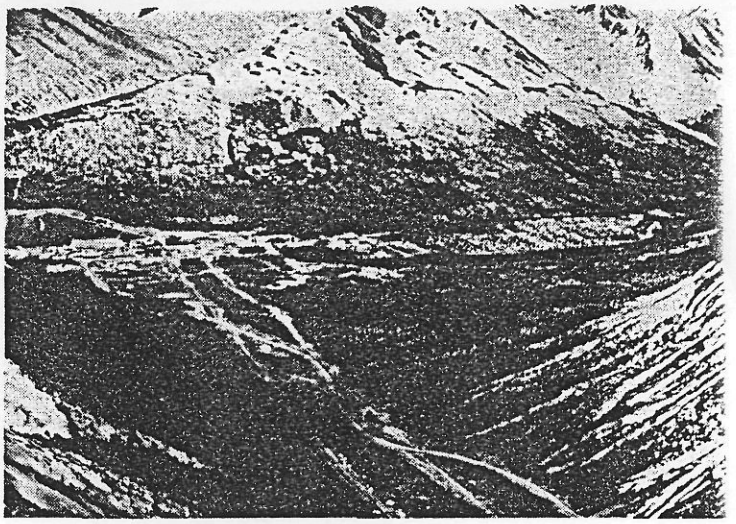
(2) Five baghouses, for a total volume of 100,000 cubic feet of air per minute were installed on the Dry Rock Storage Building. This system prevents asbestos fibre from escaping into the atmosphere.

(3) To meet Energy, Mines and Petroleum Resources requirements of 2 fibres per cubic centimetre, totally enclosed conveyors with drag scrapers have been installed in the Dryer Building. In addition, two baghouses with a total volume of 15,000 cubic feet of air per minute have been installed to "indraft" all equipment, and the conveyor galleries have been totally enclosed.

(4) The fibre count in the



Cassiar mine on McDame Mountain in Northern BC's Cassiar range. Asbestos ore production averages 1,200,000 tonnes annually at 9% recoverable mine grade.



Cassiar Resources' mine, mill and townsite.

Concentrator Building now meets the standard 2 fibres/cc. This was achieved by enclosing all conveyors and modifying the building's ventilation system.

(5) To facilitate good housekeeping and cleaning without the use of brooms, vacuum systems have been installed in both the Tramline Loading and Discharge areas.

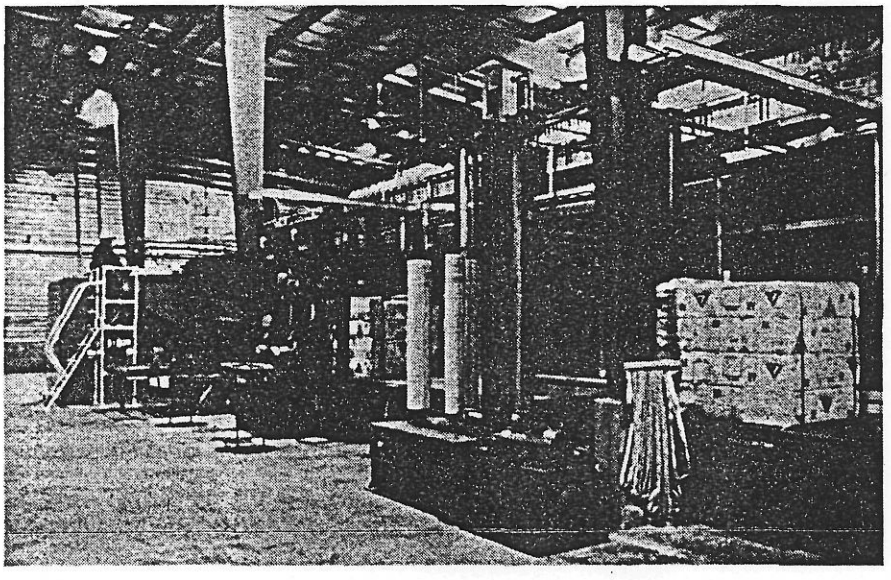
(6) The mine's primary jaw crusher and feed chutes have been totally enclosed and ventilated to capture dust.

(7) Two new techniques to reduce the use of shaker screens have been installed in the Cassiar mill. These consist of totally enclosed vibration-free units called 'fluid bed classifiers', and a second type of totally enclosed stationary screening unit known as a 'paddle trommel'. Current plans call for the installation of this mining dust emissions control equipment in the mine's original mill which was built in 1954. When these installations have been completed the original mill (which was supplemented by a larger mill in 1970) will process and convey fibre within the standard 2 fibres/cc. Finally, to guarantee total control of dust emissions in the 1954 mill the original positive pressure air system is now being revamped by the installation of new air equipment which will be on stream by middle November, 1981.

MILLING

A $4-million program is underway to further improve asbestos recovery circuits which, in addition to further raising the mill's environmental standards, will increase the recovery of the shorter grades of fibres.

Cassiar's shrink-wrap equipment automatically seals one short ton pallet of asbestos fibre consisting of 20,45.5kg bags, creating a virtually air-tight package for shipment to some 100 customers in more than 45 countries throughout the world.



A new Rotary Dryer has been installed at a cost of $2.2-million, replacing two smaller dryer units. The new installation has moisture analysing capabilities and heat sensing devices which enable it to operate automatically despite fluctuations in the moisture content of the ore, which is delivered to the dryers by Tramline at a rate of 280 tonnes an hour. A project to provide a twenty percent saving in fuel used for drying ore will be completed by early 1982. This saving will be achieved by recovering the latent heat from the cooling water from Cassiar's electrical generating diesel plant.

One-hundred-thousand metric tonnes of asbestos fibre that Cassiar Resources produces yearly is packaged by automatic bag placers from nine pressure packers into polywoven bags. The open bags proceed along Mathew's conveyors through an automatic sewing machine to seal shut the bags. From the sewing machine these bags continue along the Mathew's conveyors into an area of the mill known as Shrinkwrap. Here an automatic scanner identifies the grade of fibre by a code stamped on the side of each bag and allocates each grade to a separate conveyor line. When sufficient bags have accumulated on a conveyor line to complete a pallet containing a metric tonne of fibre, it is palletized by an automatic palletizer. This palletizer uniformly places the sewn edge of the bag towards the centre of the pallet thereby reducing the possibility of contamination.

Once a pallet is complete it moves along a conveyor where it is wrapped on all six sides with four-mil plastic before entering an oven which shrinks the plastic — making a virtually air-tight one tonne package. When this process is complete a forklift transfers each plastic wrapped tonne of fibre to an 8000 tonne capacity warehouse where it is stored pending shipment to market.

Cut out this list of Goodyear Plioweld applicators for easy reference:

BRITISH COLUMBIA

Accurate Rubber Products Limited
1277 #5 Road, VANCOUVER, B.C.
604-274-9955 Telex 04355821

Elliott Rubber & Plastics Ltd.,
305 Chilcoten Rd., Box 112, KAMLOOPS, B.C.
604-372-1433

R. Wales & Son
12131 Vulcan Way, RICHMOND, B.C.
604-273-8608

ALBERTA

Caproco Corrosion Prevention Ltd.,
6120 - 76th Avenue, EDMONTON, Alberta
403-466-1167

Continental Petroleum Rubber Co. Ltd.,
9725 - 62nd Avenue, EDMONTON, Alberta
403-437-1260 Telex 0372948

Unit Liner Western Limited,
7072-72 Avenue, EDMONTON, Alberta
403-468-4433

MANITOBA

Elliott Rubber & Plastics Ltd.,
430 Nightingale Rd., WINNIPEG, Manitoba
204-837-5420

ONTARIO

CVL Industries Limited,
40 John Street, THOROLD, Ontario
800-263-7260

Elliott Rubber & Plastics Ltd.,
P.O. Box 1265, SUDBURY, Ontario
705-522-6730

Elliott Rubber & Plastics Ltd.,
P.O. Box 95, ELLIOT LAKE, Ontario
705-848-3133

Gaco Sternson Limited
54 Morton Ave., E., BRANTFORD, Ontario
519-759-0270 Telex 06181256

L.A. Rubber & Plastics Limited,
3466 Landmark Road, BURLINGTON, Ontario
416-335-3711

Rematech Industries Inc.
R.R. #1, 25 Fielding Road, P.O. Box 660,
Coppercliff, Ontario P0M 1N0
705-682-4401 Telex 067-7351

Snowden Rubber Industries
842 Farewell Ave., OSHAWA, Ontario
416-728-1658 Telex 981238

QUEBEC

Rematech Industries Inc.
11405 - 6th Avenue,
Rivière-des-Prairies, MONTREAL, P.Q.
514-648-1080 Telex 05-828779

Rematech Industries Inc.
3667 Boul. Hamel, QUEBEC, P.Q.
418-872-3433 Telex 051-31570

Rematech Industries Inc.
1893 rue Gagnon, SEPT ISLES, P.Q.
418-962-3011

MINE STRIPPING CUT-BACK

After completing a mine planning review in late 1980 it was found that if the mine continued stripping at its then current rate, waste removal would surpass requirements. As a result, waste production was cut from 6.7-million bank cubic yards to 4.5-million for 1981, and 5.1-million for 1982. No layoffs resulted from this cut-back.

UNDERGROUND EXPLORATION

In an attempt to delineate an orebody with the view to establishing additional mining reserves, the mine has embarked on an exploration drilling program below the present open pit. To date 21,000 feet of drilling for core samples has been completed. The results have been encouraging and an engineering feasibility study will be carried out during 1982.

MINE SAFETY

With a strong support from management, unions and employees, Cassiar Resources has been the recipient of the top safety award for large open pit mines in British Columbia for the past two consecutive years.

Supplementary to this achievement, the Cassiar Operation's active mine rescue team went on to the Provincial Mine Rescue Competition held in Kamloops last June, to take first place in the open pit category.

COMMUNITY PROGRESS

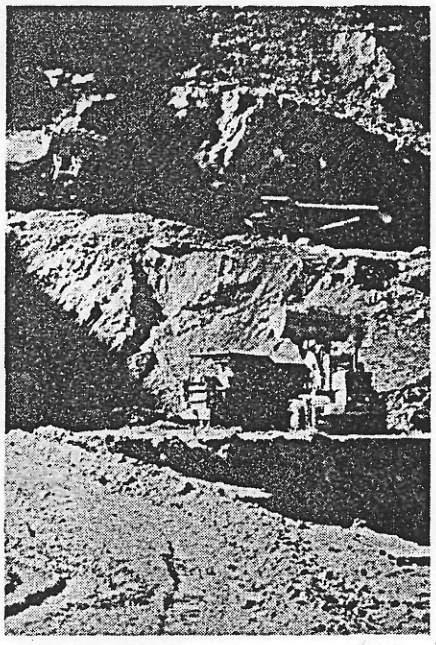
An extension to the company retail store was completed in November 1980, which doubled the space available for the dry goods department. This enabled the store to offer a greater variety of goods to the people of Cassiar and the surrounding area.

A new Government building was completed in January 1981, and it now houses the Government Agent, ICBC Office, the Liquor Store, the Department of Human Resources, and the Public Health Unit. In addition, School District 87 offices were moved from Fort St John to Cassiar in late 1980, and they are now housed in its own recently completed building.

The community's new theatre seats 300 and it shows first-run 35mm films. The Cassiar Concert Society also present live performances from the stage which adds to the cultural life of the community.

During recent years four new apartment type buildings have been completed, to upgrade the accommodation facilities for single persons.

During the past four years a modern sewage collection system and a central sewage treatment plant have been constructed to service the town of Cassiar and the plantsite. Approximately 12,000 feet of main trunk sanitary sewer lines and 15,000 feet of secondary lines have been installed.



Cassiar Resources produces some of the finest quality asbestos fibre in the world. It represents some $90-million in BC exports annually, and employs a work-force of 650 people.

MARKETING

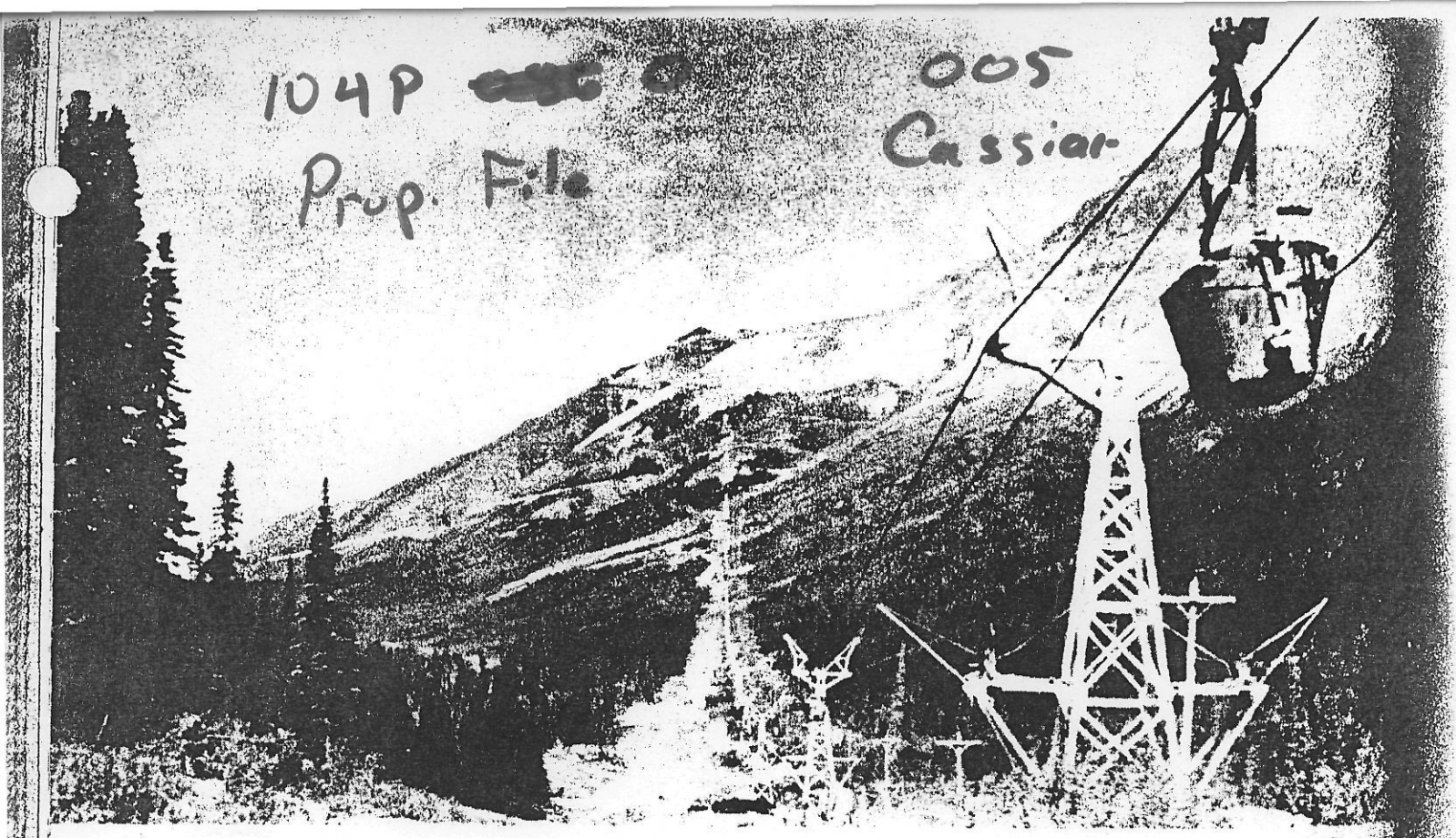
Cassiar's Marketing Division continued to maintain its position despite a general decline in world-wide sales due to economic conditions and a marked reduction of activity in the construction industry. Marketing manager John Oughtred reported, however, that, "Asbestos prices generally have been weakening, but we have been able to stabilize our selling price".

Working directly through agents and personal sales contacts, Cassiar's Marketing Division is responsible for selling high quality asbestos fibre to some one-hundred customers in more than forty-five countries throughout the world.

The highest percentage of Cassiar sales in 1980 were made to Asian countries which purchased 27% of the mine's production. Continental Europe purchased 26%; North America, 23%; Australia, 17%; South America, 6%; and the Middle East, 1%.

Some 80% of Cassiar's fibre is used in the manufacture of asbestos cement products. The remaining 20% is used in the manufacture of building products, friction materials, fillers, and plastic reinforcements.

While world demand for asbestos weakened during 1980, Cassiar sold 105,431 tonnes of fibre, only 1800 tonnes less than its production for the year. *WM*



104P Prop. File 005 Cassiar

Looking north up the tramline toward the asbestos mine on McDame Mountain.

Western Miner Aug. 1964

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By FRED H. STEPHENS
Associate Editor, Western Miner

104P/SW

CASSIAR ASBESTOS CORPORATION

L I M I T E D

CASSIAR ASBESTOS CORPORATION LIMITED added a new product to its line of asbestos fibres, when on July 15, 1964, the company turned out its first Grade AY asbestos which is equivalent to a high Group 5 product and is expected to command a price of approximately $120 per ton. It is planned to produce between 10,000 and 15,000 tons a year of the new AY grade, for which a substantial market exists. When the previous lowest-grade of mill product, AX, was commenced, the yearly output was only 1000 tons, but this has since been expanded to 18,000 tons a year.

Cassiar recorded sales of $14,219,504, an all-time high, in 1963. There is little doubt 1964 sales will equal the figure and it is likely they will surpass it. Milling is being maintained at approximately the same rate but improvements at the rock-rejection plant have upgraded the quality of the millfeed with a resulting increase in the production of fibre.

The mine is situated on McDame Mountain in north-central British Columbia. A first-class all-weather gravel road, 86 miles in length, connects the mine and town with the Alaska Highway at Mile 649, thirteen miles west of Watson Lake, Yukon. The road to Cassiar now extends well to the south of the mine and is being built from both ends to emerge at the Port of Stewart, which is currently experiencing a boom as a result of the production plans of Granduc Mines Ltd.

History

The existence of the Cassiar asbestos deposit was known for many years but it was not until 1950 that four prospectors, Sittler, Nelson, and the Kirk brothers, staked it. Improvements in transportation and economics made the property sufficiently attractive to cause major mining and exploration companies to make examinations and surveys with the result that Conwest Exploration Co. Ltd. obtained an option and immediately commenced development. Mining and processing were in progress in August 1952 when Western Miner first visited Cassiar.

The mill treated 150 tons daily in 1953 and, as experience was gained the capacity was gradually expanded to its present 2000 tons. It is to be noted that full capacity is rarely utilized and that the average throughput is just above 1600 tons daily. Preliminary beneficiation in the rock-rejection plant is creating a higher quality millfeed and thus increasing production without requiring full use of mill capacity.

Geology

The orebody is located at elevation 6200 feet on a spur off McDame Mountain. (On our latest visit in 1964, some 500 feet had been taken off the peak of the mountain through the removal of ore and waste.) It occurs as a large lenticular shoot about 500 feet wide and 1200 feet long within a serpentine body which dips at approximately 45 degrees to the east. The fibre occurs as innumerable veins or seams up to three inches in width in the serpen-

tine rock. The asbestos is a fiberized form of serpentine technically known as the mineral chrysotile, which is a magnesium silicate with chemically-combined water of the same composition and specific gravity as the serpentine rock. The fibres constitute from 8% to 10% of the rock in which they occur and run crosswise across the veins.

Tramline

At the outset, ore was trucked directly from the pit to the mill, a distance of six miles over steep and inadequate roads. A 180-degree concave steel chute was then erected to lower the ore to the 4800-ft. elevation, where it was loaded on the mill-bound trucks. The chute, however, became constantly clogged and was abandoned in 1956 in favour of a 14,600-ft. aerial tramline which extends from the 5800-ft. elevation in two sections to the mill on the valley floor at 3525 feet. A third section travels around the outside-storage area at the mill.

The maximum capacity is 2400 tons daily with each of the 180 buckets carrying ¾ ton net weight. The ore can be dumped directly into a hopper at the mill after which it is crushed, dried, and stored in the 110,000-ton dry-rock storage building, from which it is reclaimed for treatment in the mill. Little if any use has been made of outside storage facilities since mining has been conducted on a year-round basis. With the load in favour of the descent the tramline generates 80 kilowatts when in operation.

Mining

A great deal of long-fibre asbestos has been picked from the ore benches ever since the commencement of operations. This summer it was noted that this procedure is as yet practiced and a number of students are given seasonal employment gathering this valuable product.

The ore in place was originally mined on 15-ft. benches in the exposed outcrop. Joy TM-400 wagon drills, Eimco loaders, International TD-24 tractors and 10-ton trucks, were the principal items of equipment at that time. It soon became apparent that a substantial waste-stripping programme was necessary in advance of mining to free the ore as it dipped into McDame Mountain. To meet this situation, the benches were increased to 30-ft. intervals and additional equipment was purchased to accelerate the work. This included three Northwest shovels, with capacities of ¾, 1½, and 2½ cubic yards respectively, to which has been added a 3½ cu. yd. P & H diesel and a 4½-cu. yd. P & H electric shovel; six model 802 16-cu. yd. Kenworth Dart trucks; and seven model 95 19-cu. yd. International "Payhaulers". The present ratio of stripping is approximately 4 - 1. In the year 1963 stripping aggregated 2,824,197 while the tonnage mined was 756,574.

Four Canadian Ingersoll-Rand drill-masters equipped with 5-in. diameter tungsten-carbide bits are used for primary blast holes in both waste and ore. Forcite cartridges and ammonium nitarte-fuel oil mixture are the main explosives in use. Polyethylene bags are used as containers for explosives in wet holes. A tractor-mounted Crawl-IR drill using 3½-in. tungsten-carbide bits has been found particularly adaptable to drilling in steep and rough terrain.

The ore is transported to the primary crusher which is 42 in. by 48 in. in size and capable of operation throughout the winter. Secondary crushing is performed by two 4-ft. Symons units in the rock-rejection circuit. A rotary dryer is being installed ahead of the rock-rejection plant to remove ice and water and thus materially increase the fibre-carrying capacity of the tramline.

Mine Model

The mine model as displayed in the Cassiar office is an achievement of the engineering staff. The company's programme for the following twenty years is clearly outlined. With little variation, except for a gradual increase in the ratio of stripping, it is expected to continue along the lines presently obtaining. It is policy to maintain stripping five years in advance of mining. One of the features most attractive to extended open-pit extraction is the ease with which waste material can be disposed. When asked if there was any future plan to make use of underground mining methods, the mine manager replied that such a decision was at least twenty years away.

Milling

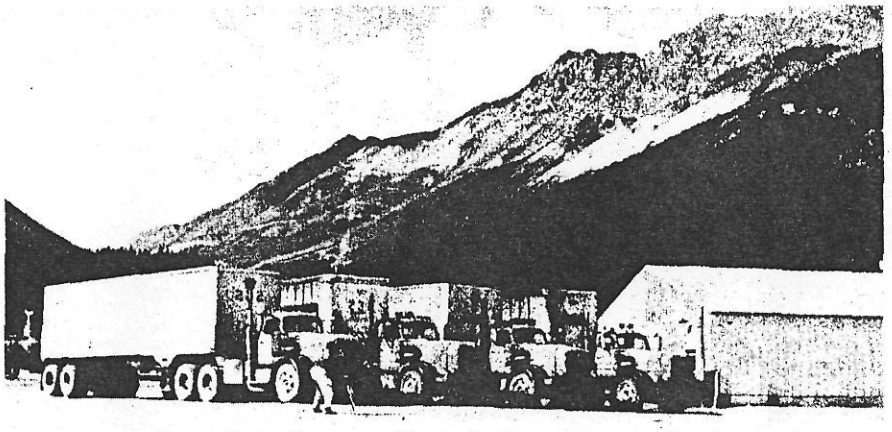
The ore is again crushed on arrival at the mill and subjected to further drying treatment to remove as much of the remaining moisture as possible. It is then delivered by conveyor to the large covered dry-rock storage building of Bailey-bridge truss and Permasteel construction. It is then withdrawn as required for further treatment through draw points to the conveyors in the reclaim tunnels.

The following detail is taken from previously published information. Some additions have been made to conform with changing practice.

Here begins the actual process of separating the fibre from the serpentine rock. This process is based on the fact that, as the fibre is crushed and handled, it gradually expands or fluffs up so that it becomes lighter than the rock from which it is to be separated. The mill feed is passed over horizontally-gyrating screens, during which time the fibre tends to float on the surface. Because of its lightness, it is possible to separate it or draw it off by means of air suction or aspiration, a process very similar to the action of a vacuum cleaner. The rock is further crushed in order to free fibres not released in the first crushing stage. The separated fibre is then carried by air through ducts to cyclone collectors and thence over a series of gyrating or rotary screens which clean and grade the fibre. Exhauster fans handle over 200,000 cubic feet of air per minute in this aspiration process.

A Wheelabrator dust-collecting system filters the air for re-circulation through the mill. This system makes it possible to keep a comfortable temperature in the mill in the severe winter period. Previously, milling operations were severely restricted when the temperature fell below minus 20 degrees Fahrenheit.

Tailing consisting of minus ¼-in. material is stacked by two conveyor systems which at the upper end are equipped with high-speed flingers to scatter the tailing in a 40-ft. radius and build up two large tailing piles.



Some of the Transport Division's fleet of vans at Cassiar.

There is some short fibre contained in the tailing which might be economically recoverable if the mine were located close to a market for the material. It is too low-priced however to bear the cost of transportation from Cassiar to existing market points.

After the fibre has been cleaned of all rock and dust and separated into grades of different fibre lengths, it is collected into bins ready for bagging. It is drawn from these bins and compressed into bags containing 100 lb. and marked with the proper grade. These bags are stacked on pallets holding 20 bags or one ton, which are then carried by fork lifts to a fibre-storage building ready for shipment. A fleet of trucks operated by the company's Transport Division carries the pallets to Whitehorse for shipment via the White Pass & Yukon's railway and ocean vessel to North Vancouver. The White Pass company also trucks some of Cassiar's asbestos product to Whitehorse and a White Pass subsidiary, Loiselle Transport Limited, has hauled shipments to the Pacific Great Eastern terminal at Fort St. John, B.C., when urgent delivery was requested by customers.

The value of the fibre in a ton of ore is roughly calculated at $20. The end product however varies widely in value ranging from the low of $120 per ton for the new AY fibre to $1500 for the hand-picked crude spinning-grade material.

The ratio of mill employees to those engaged in mining is greater than is the case at most open-pit metal mines. With the well-equipped and staffed laboratory included, this ratio is considerably higher for it is essential to the operation that stringent quality control be maintained at all times. The flow sheet is in a constant state of flux as the demand for specific products changes.

Plantsite Services

Power has to date been supplied by seven Ruston and Hornsby diesel electric engines developing 2700 k.w. or 4000 h.p. Some are equipped with exhaust heat exchangers, furnishing low-pressure steam to assist the two 150 h.p. Inglis steam plant boilers, one of which is fired by wood and the other by oil. A new 950 k.w. diesel-electric engine is being added to the power plant.

A well-equipped heavy-duty equipment garage, with ancillary facilities at the pits, maintains and repairs all mobile equipment such as shovels, bulldozers, trucks, drills, etc. There are also a combined electrical and machine shop, a carpenter and paint shop, and a sheet-metal shop. All are housed in Permasteel prefabricated buildings insulated with Limpet asbestos coating. A spacious modern warehouse provides storage for the large inventory required at such an isolated site.

Townsite

The present population of Cassiar is a little over 1000. The townsite is situated in a beautiful valley. Panabode dwellings and bunkhouses provide adequate and attractive accommodation for the 447 employees. Financial assistance is available to those who wish to build their own homes on company property. The messhouse is operated under contract by Cordner, Hubert and Bond Ltd. of Montreal, with J. A. "Jim" Rivard in charge at Cassiar.

A licensed lounge and billiard room, an athletic field, a two-sheet curling rink, and ski tow provide recreational facilities. There is a community centre embracing an auditorium, library, and club rooms. Anglican and Roman Catholic churches are on the townsite. The company store, managed by J. A. Sutherland, carries a wide variety of merchandise which is retailed at surprisingly low prices to residents. E. Semyroz is postmaster. A three-man branch of the Royal Bank of Canada is headed by Archie Campbell.

An ultra-modern six-bed hospital is equipped to handle all but the most serious cases of illness and accident. Dr. P. R. Didcott is in charge assisted by four nurses and a records clerk. Educational facilities provide all grades to IX. A constable of the R.C.M.P. is stationed at Cassiar.

Personnel

Cassiar Asbestos Corporation at midsummer 1964 carried a staff of 87 and hourly-rated employees to the number of 326. In addition there were 34 employees of the caterer.

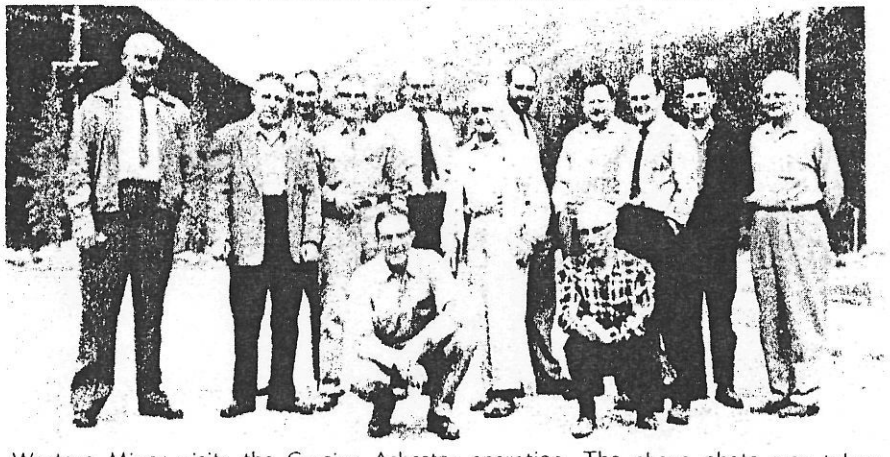
Principal members of the front office staff included J. G. Berry, general superintendent; C. E. Bronson, assistant general superintendent; and W. L. Johnson, office manager. Other office staff includes J. H. Thornicroft, chief accountant; K. J. Mulloy, C. Spoke, J. Hrynchuk, D. O. Acason, and E. Melnyk, accountants; H. Zieger and J. Shelton, junior accountants; G. T. Parker, timekeeper, and J. Bunce, assistant timekeeper; E. Lavigne, A. Borsato, and H. McAndrew, typists; and P. Brewer, stenographer.

The engineering staff includes A. C. Caron, chief engineer; G. Trowsdale, assistant chief engineer; J. St. Georges, plant engineer; G. Graham-McKie, draughtsman; H. K. Chan, surveyor-draughtsman; G. Anderson and D. Hudgeon, surveyors; and E. Koeberling, clerk. W. N. Plumb, chief geologist, heads the geological staff, assisted by V. Sorokowsky, mine geologist; R. A. Dodge (at present directing Cassiar's exploration of the Clinton Creek asbestos deposit north of Dawson, Y.T.), field geologist; E. V. Jackson, assistant geologist (also at Clinton Creek); and G. Truscott and G. Vanclieaf, junior technicians.

Safety and Personnel: A. G. C. Church, safety engineer and personnel director; C. McKenzie, typist; and F. Clarke, assistant (personnel).

Mine: T. L. Horsley, mine superintendent; J. R. Murdoch, assistant mine superintendent; R. L. McKenzie, general mine foreman; D. Ritchat, mine foreman - equipment; H. A. Beyer, mine foreman; and D. Demitri, W. Byron, H. Howden, and A. Johnson, shift bosses.

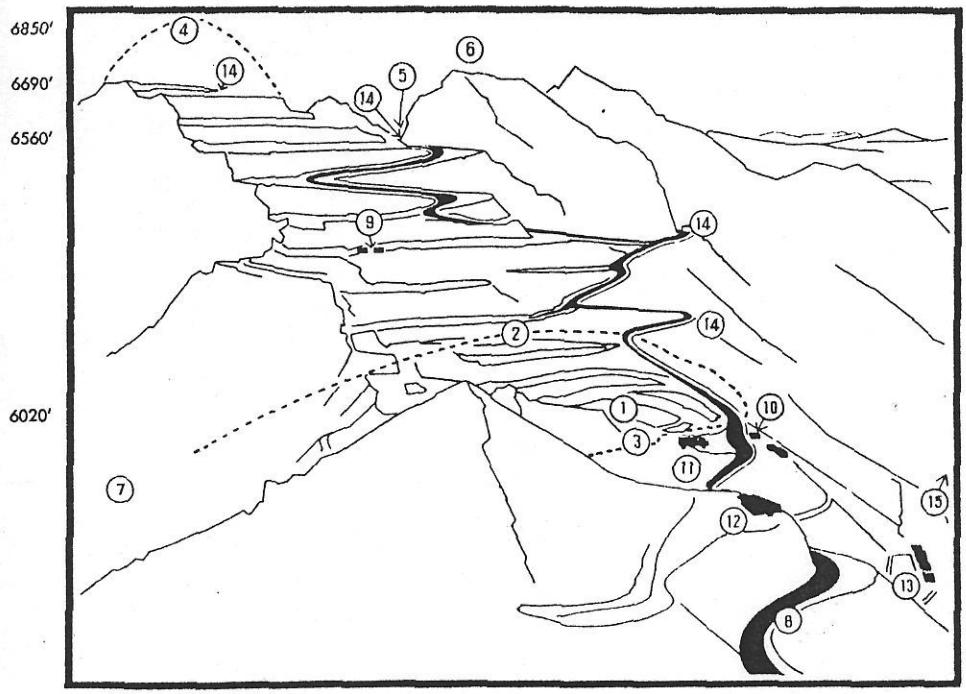
Mill: A. C. Beguin, mill superintendent; D. C. Cook, assistant mill super-



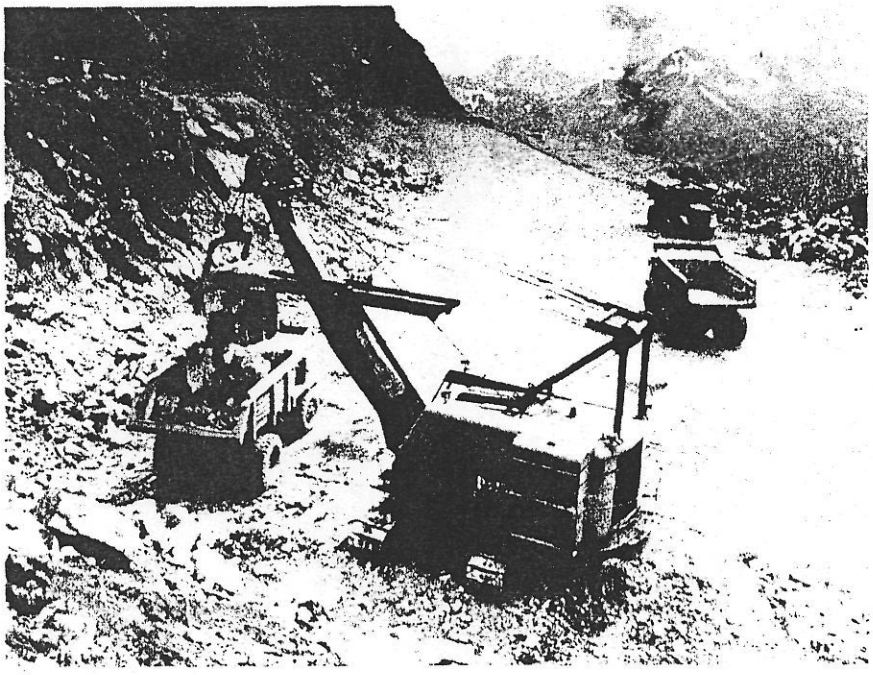
Western Miner visits the Cassiar Asbestos operation. The above photo was taken June 27, 1964, by Andre C. Beguin, mill superintendent. Standing, from left: Fred H. Stephens, Western Miner; R. R. Stevens, purchasing agent; T. L. Horsley, mine superintendent; R. A. Pasiaud, mechanical superintendent; C. E. Bronson, plant and assistant general superintendent; Craigie Hood, surface and construction superintendent; Dr. P. R. Didcott, resident physician; W. N. Plumb, chief geologist; J. G. Berry, general superintendent; S. Maibaum, assistant equipment superintendent; and W. L. Johnson, office manager. Kneeling, A. P. Powell (left), Electrical superintendent; and Cam Church, safety engineer and personnel manager.

THE CASSIAR MINE

Aerial Photograph of Mine Workings Looking South-East
Taken from a Helicopter, September, 1962 by C. E. Bronson.



1. Ore pit at 6020' elevation.
2. Ore-waste contact on the hanging wall of the orebody dipping at 45° into the hill.
3. Ore-waste contact on footwall of the orebody.
4. North Peak at elevation 6690'. Original elevation 6850'. Note ore and waste benches rising from ore pit to North Peak.
5. Saddle at elevation 6560'. Waste disposal on East side of Mountain.
6. South Peak at elevation 6791'.
7. Cirque Valley — Talus fibre in valley bottom.
8. Main road from Mill.
9. Two drills working on waste bench 6395'.
10. Old Crusher.
11. Ore truck approaching crusher.
12. Mine service garage.
13. Rock rejection plant and tramline loading station.
14. Waste disposal points.
15. Plant and townsite 3 miles south at elevation 3500'.



Open-pit mining on McDame Mountain.

The Cassiar community hall is housed in a Permasteel building.

intendent; J. J. Forbes, shift foreman; S. Kuchcinski, R. Duri, P. Ripco, and A. Pinto, shift bosses; and A. Linset, clerk-stenographer. B. H. Donner is supervisor and Miss L. Wilson, clerk-typist, in the laboratory which is housed within the mill building.

Mechanical: R. A. Pasiaud, superintendent; J. Elwell, assistant master mechanic; G. Brewer, tramline foreman; and K. Schultz, sheet-metal-shop foreman. A. P. Powell is electrical superintendent.

Equipment Garage: G. Edwards, superintendent; S. Maibaum, maintenance foreman; J. Stumpf, shop foreman; R. F. Lovell, warehouse supervisor; A. Callender, shop foreman; and G. Badry and M. Kehoe, ledger clerks.

Surface: Craigie Hood, superintendent; F. Krebs, assistant superintendent; H. Lewak, carpenter-shop foreman.

Warehouse: R. R. Stevens, purchasing agent; R. Hewett, chief warehouseman; and F. Cresney, W. Robbins, and D. Millar, ledger clerks.

Conclusion

The value of Cassiar's asbestos production in 1963 was as great as the value of the Province's entire industrial-mineral production in 1962. It contributes about 80% of the total in this field, in which sulphur is the only other product worthy of mention. The Cassiar operation has not only contributed to the provincial and national economies through the new wealth created, it has been a material factor in opening the north-central portion of British Columbia and adjoining parts of the Yukon Territory. With reserves ample for a minimum of twenty years' operation, the future of Cassiar Asbestos Corporation is as secure as human agency can provide within the bounds of good mining practice.

Before proceeding north to accept a position in the Cassiar mill in 1953, Andre Beguin told the writer that a couple of years of experience in an asbestos mill would augmuent his record in the field of reduction metallurgy of minerals. Reminded of this remark on our recent visit, Andre replied "Asbestos presents an eternal challenge. Flow sheets must be altered to accommodate market demand, weather conditions, geological occurrences, and the availability and quality of fibre-bearing ore. I have been here eleven years and can truthfully state I continue to find the project as fascinating as it was in the beginning."

Acknowledgement

Every assistance was given the author by Messrs. J. G. Berry, C. E. Bronson, W. N. Plumb, V. Sorokowsky, A. C. Beguin, and W. L. Johnson at Cassiar; Earl K. McArthur, superintendent of the Transport Division at Whitehorse; and by the company's president, J. D. Christian, in a later interview. Existing records were made available and guides and conveyance were provided to all the interesting sectors of the operation. W. G. Hamilton of the White Pass & Yukon Route also assisted materially with information on transportation.

REDSTONE REPORTS GOOD CORES

IN a report to shareholders July 29, 1964, J. A. Harquail, president of Redstone Mines Ltd., gives detail on the 14,000-ft. wire-line drilling contract the company has scheduled for the 1964 season. Eight holes have been driven to test the H-C zone along a strike length of 900 feet.

Hole No. 28, drilled under No. 4 which last year showed 25 ft. of 2.0% copper, cut three mineralized sections: 13.0 ft. assaying 0.8% Cu., 10.3 ft. assaying 1.7% Cu., and 32.4 ft. running 3.2% Cu. The last intersection includes a core length of 22.4 ft. carrying 4.0% Cu. and is translated into a true width of 20 ft. at a vertical depth of 550 feet below surface. Mineralization is chalcopyrite with a significant amount of bornite.

Hole 34, located 150 feet to the north of hole 28, intersected 11.5 ft. of 1.3% Cu. The main mineralized beds seem to have been cut off by faulting. Another hole, No. 27 some 450 ft. to the south of hole 28, cut a 13-ft. length of 2.8% Cu. at a vertical depth of 450 feet.

A significant hole 36, Mr. Harquail reports, has just been driven to its original target depth close to No. 27. The new hole was designed to test the downward extension of the beds. Several mineralized sections were cut and a bottom zone of about 30 feet in length contained impressive amounts of chalcopyrite and bornite over some 12 feet. Assays had not been received at press time. This intersection is at a vertical depth of about 700 feet below surface and is the deepest intersection obtained in drilling to date. Mr. Harquail adds that experience in drilling shows the bornite content of the ore increases with depth.

The Ridge zone is an extension of the H-C zone to the northeast and it has been tested with six holes along a strike length of 900 feet. The zone can be traced on surface to the north for about 2500 feet where it extends into the Saddle zone. Last year, hole 3 cut a true width of 20 ft. of 2.6% Cu. Hole 35 was recently driven to test the zone 300 feet down dip. Unfortunately the hole had to be abandoned because of caving ground; it is now being replaced by hole 37 from the same drill station.

Four holes were drilled along the South End zone with inconclusive results. No. 18, located 2200 feet south of No. 27, cut a true thickness of 8.5 feet grading 1.8% Cu. No. 20, some 400 feet to the south, was abandoned because of caving ground. The drilling programme is presently employing two wire-line machines. Eight prospectors are working out of four camps within a 120-mile radius of Plateau Lake, north of Canada Tungsten Mining Corporation's mine and mill at Tungsten N.W.T. A reconnaissance geochemical survey along the mineralized belt is scheduled for August.