Letter Report on 94E/6
CHAPPELLE PROPERTY, Black Lake, B.C.

for Du Pont of Canada Exploration Ltd.
by J.J. Crowhurst, P.Eng.

673283 Aug. 5, 1976

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BACON & CROWHURST LTD.
CONSULTING ENGINEERS

August 6, 1976.

Mr. D.A. Barr,
Du Pont of Canada Exploration Ltd.,
1500 Alberni St.,
Vancouver, B.C.

Dear Sir:

Pursuant to your request, I visited the Chappelle property at Black Lake in northern British Columbia on August 3rd and 4th. I was escorted through the mine workings by Mr. K.A. MacLean with whom I discussed all aspects of the operation.

Confirming our conversation of this morning, please note the following remarks:

(1) Ore Reserves

I understand that these will be reviewed and brought up-to-date during the next two or three weeks. In the meantime, however, I have assumed that the general shape and outline will be as supplied to me by Du Pont Exploration (Longitudinal Section Vein 'A', as revised during October 1975). (Figure 1)

It is to be noted in this regard that the gold and silver grade of mineralization is relatively high. This fact is, therefore, of paramount importance for the determination of the correct mining method and the relative economics.

The ore zones will be steep-dipping and will probably average about 10' in width with a maximum of possibly 35'. The minimum width is assumed to be of the order of 6'.

Individual blocks may be as much as 200' in length with a minimum of 50'. The vertical extent of these blocks will probably be not more than 125'.

All of these reserves lie above the 5400 crosscut adit level, and will extend from the surface downward for about 150'-175'.

(2) Mining Methods

Three alternatives have been considered, namely open pit, cut & fill, and shrinkage stoping.

(a) Open Pit

It is recommended that an open pit, covering the surface section of the 'A' vein, be designed and the economics studied.

I have sketched a representative cross-section (see Figure 2 attached) for the purpose of determining the approximate waste to ore ratio, although this must be considered as an estimate only, subject to proper confirmation later. It will be noted that the strip ratio might be of the order of 10:1 using a 45° wall slope.

Should these figures be corroborated, it would appear that the open pit approach presents a most desirable way of extracting the ore from the surface downward for the first 50'.

The bench height should be kept at not more than 15', and probably 10', in order to provide selective mining and to ensure that as much flexibility as possible is achieved for the purposes of minimizing dilution and obtaining full recovery of the valuable minerals. As a rough guess, I would estimate the overall dilution will be from 12% to 15% of the ore in place.

This open pit should produce about 25,000 tons of ore in total and could be completed during the summer months in one season with the ore being stockpiled adjacent to the concentrator.

(b) Cut & Fill

Weak walls on both sides of the mineralized zones together with the irregular plan and section outline of stoping sections (see Figures 2, 3 & 4) suggest the application of flat back cut & fill methods.

Stope development would consist of raises driven from the 5400 level upward to the surface to serve as ore passes in the lower part, and service-ventilation entrances in the upper part of each raise.

To keep the area of unsupported exposed wall rocks to a minimum, flat holes drilled by jacklegs (or light drill carriages) are recommended to break the ore.

To support the wall rocks before fill is introduced, shotcreting and/or rock bolts with wire mesh screen can be considered, if such is necessary. Rock bolts without screen would not be practical.

Broken ore can be moved to the ore passes by either compressed air-driven rubber tire mobile equipment (such as the T2GH Atlas Copco dumper - see description attached) or by slusher hoist-hoe scraper combinations.

Fill would consist of sized gravel obtained from borrow pits in nearby slide areas. This would be dumped down the raises and distributed by the mobile equipment and/or scrapers.

A thin concrete floor, four to six inches thick, would be poured (or blown) over the top of the fill to serve as suitable footing for the mobile equipment, and to save as much as possible of the fines. These fines would undoubtedly contain high values in precious metals; sweeping for a final clean-up would probably be desirable.

In the absence of final information as to a stope layout plan, it is difficult to estimate how many stoping areas would be required; it is anticipated that sufficient extra detail will be available shortly to firm up the preliminary ideas. It is suggested, however, that five or six such stopes should be prepared, to produce in the order of 100 tons per working day. It can be expected that not more than 15 tons per shift, average production, will result from each stoping area, on a continuous basis. Four such stopes, therefore, must be in use on the average all the time, with two spares to allow for mechanical delays, interruptions in the cycle of operations, and time for decisions as to selection of ore and waste segments.

(c) Shrinkage Stoping

From observations of the numerous fractures in the wall rocks, and the off-setting fault patterns everywhere visible (see Figure 4) it is recommended that shrinkage stoping should not be used.

Dilution of the ore by wall rock waste would be excessively large during the time when the stope has been finished and when the ore remaining in the stope, as it progresses upward, has to be removed.

It is admitted that shrinkage stoping under proper conditions is cheaper than cut & fill methods, but the ensuing dilution and loss of control of the wall rocks would more than offset such an advantage, in our opinion.

In addition, it can be expected that irregular flat-lying bulges and offsets in the ore will be encountered. These are very difficult to extract in a conventional shrinkage stope and add greatly to the operating costs.

(3) Concentrator & Plant Location

Topographic maps should be studied in detail, but it would appear from a preliminary look that the concentrator and its related services could be placed in the general area of the present camp. This should be less than a mile from the 5400 level portal, by road, and is close to the floor of the valley. It is in an area free from snowslides, and would be on the road from Black Lake to the mine.

As shown by at least one diamond drill hole, it is possible that more ore will be found below the 5400 adit level. This would, however, be extracted by either a lower adit level or a decline, or a combination of both. In any event, the ore would be brought to the surface above the proposed mill location.

Water supply would be obtained from the small lake to the west or northwest, situated high on the hill, or from the small creek a short distance from the present camp. It is understood this is partially spring fed, and flows on a year-round basis.

Tailings disposal could be cheaply arranged by diking in the floor of the valley leading down to Black Lake. It would appear ample area is present to construct the proper facilities close to the concentrator.

(4) Access & Camp Location

It is understood that the Department of Mines of the Province of British Columbia is studying, and is interested in the extension of the present gravel road leading north from Fort St. James to Germansen Landing and Johansen Lake. Such an extension could reach the Finlay River, cross it close to Black Lake and, eventually, give road access to the Chappelle mine.

It is suggested, however, that this will probably not be completed for some time to come, and that other means of transportation should be considered by Du Pont Exploration. Two possibilities exist:

One would be to improve and extend the present airstrip on Black Lake; this cannot be discarded without a close study of all the various economics involved, after more detailed plans are made for production.

The second would be to construct a second airstrip in the Sturdee River valley. A suitable location was studied some years ago, and possibilities exist for a plus 5000 foot strip to be quite cheaply built. This would involve an additional four to five miles of connecting road to join the present Black Lake-Chappelle Mine road, but would permit the use of much larger aircraft (Hercules, for example) than can be used on the present Black Lake airstrip, with resulting economies.

In either case, the present road would be improved and made suitable for all-weather traffic; some four to five miles of reconstruction and, perhaps, relocation of certain sections would be necessary.

It is suggested that the camp to house the mine and plant employees could be located in the connecting valley within walking distance from the concentrator. Several alternatives can be studied in the immediate area.

Assistance has been obtained in past years from the British Columbia Government Roads and Trails Plan relative to road access to Chappelle. It is understood that this can be reinitiated and that, perhaps, even some consideration may be given to financial assistance toward airstrip improvement or new construction. This can be discussed with the various officials involved, and the possibilities reviewed relative to the capital cost of placing the property in production.

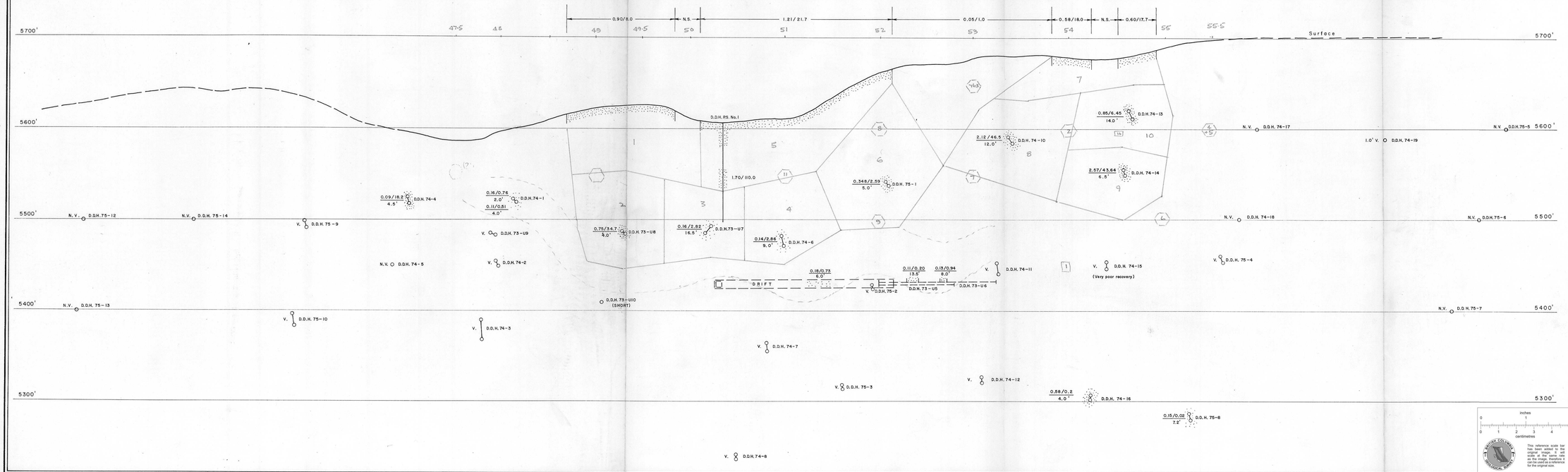
Similarly, it is suggested that the Department of Transport of the Government of Canada be contacted to ascertain whether they would offer financial assistance or technical advice. It would appear that it would be greatly to the advantage of the various aircraft movements in northern British Columbia if a good airstrip, capable of supporting large aircraft, were to be established in the general area, since none now exists. The use of the Black Lake airstrip by various exploration companies since its construction verifies the need.

We appreciate your contacting our firm for this preliminary study, and trust this is the information you require at the present time. We shall, of course, be glad to pursue the matter further at your convenience and wish to thank you for placing your confidence in us.

Respectfully submitted,
BAGON & CROWHURST LTD.

J. J. Crowhurst

J. J. Crowhurst, B.A.Sc., P.Eng.



LEGEND

	Au-Ag MINERALIZATION (STRONG, WEAK)
0.85/18.0 / 4.0'	ASSAY, Au/Ag IN OZ./TON OVER WIDTH
	DIAMOND DRILL HOLE PIERCE POINT THROUGH VEIN ON SECTION.
V.	VEIN INTERSECTED
N.V.	VEIN NOT INTERSECTED
N.S.	NOT SAMPLED

FIGURE 1.

DU PONT EXPLORATION
CANADA

LONGITUDINAL SECTION, VEIN 'A'

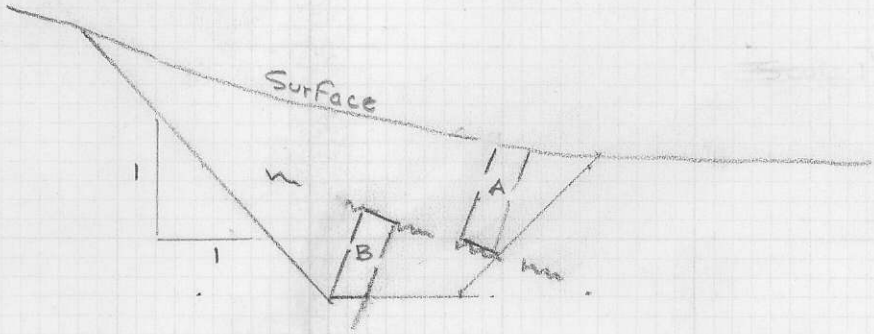
LOOKING NORTHWEST

CHAPPELLE PROPERTY

OMINECA MINING DIVISION, BRITISH COLUMBIA

50 25 0 50 100
SCALE : 1 INCH = 50 FEET

MAPPED BY :	D.A.B.	REVISED :	N.T.S. No.: 94 E 6
DATE :	Sept. '74	Oct. '75	
DRAWN BY :	K.L.J.	....	ACC'T No.: 301 - 00
DATE :	Sept. '74	....	DWG. No.: C.74 - 15.



	Sq. Ft
Total Area	5490
Less:-	
"A" - 35x10 = 350	
"B" - 28x10 = 280	
	630
Waste - Net	4860
Waste / ore ratio =	7.72

ORE SECTIONS

Shown as "A" & "B"

wwww

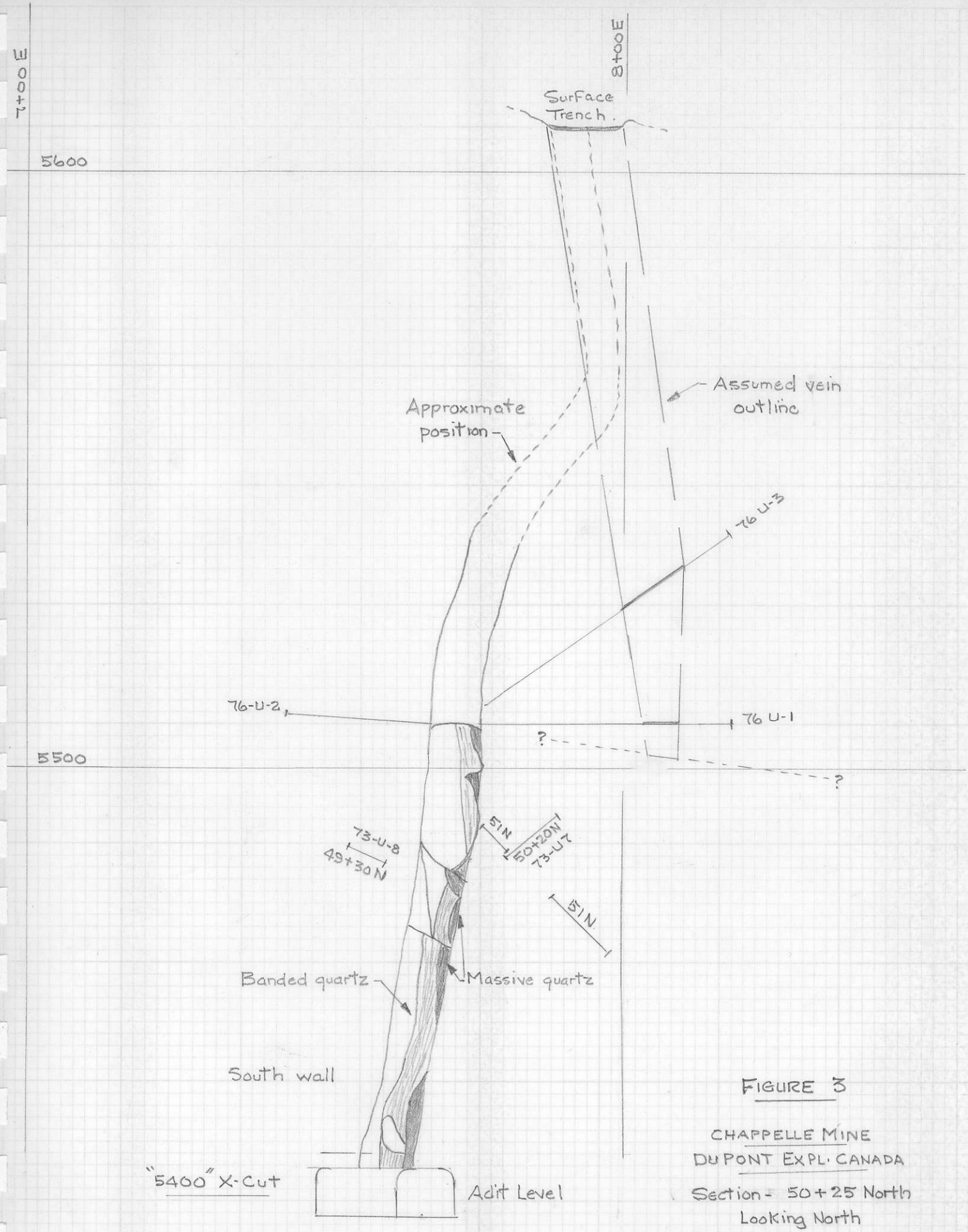
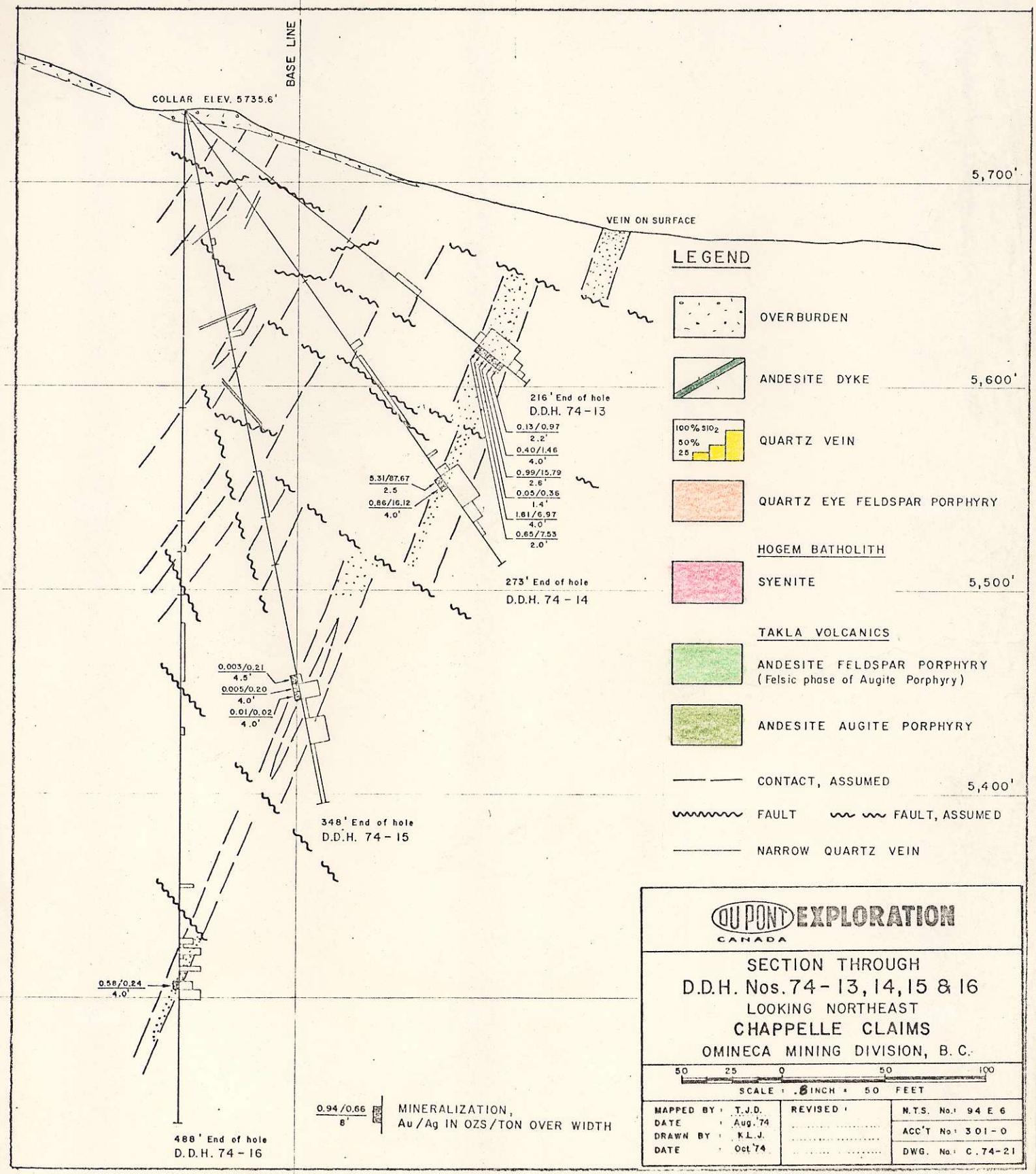


FIGURE 3

CHAPPELLE MINE
DUPONT EXPL. CANADA

Section - 50+25 North
Looking North
Scale 1"=20' Aug 76
JJC.

PRINTED ON CLEARPRINT 1000 H



SECTION 54+50 North
(Mine Grid)
FIGURE 4

Dumpers

[illegible] dumpers are available in three models: **T2GH, CAVO 310** and **CAVO 511**.

The T2GH dumper [illegible] drive on the large front wheels and [illegible] steering on the small rear wheels. Steering is done through an air-powered gearing.

CAVO 310 and CAVO 511 are provided with two traction gears, each fitted with a separate motor. The [illegible] wheels [illegible] are mechanically synchronized by the traction gears. The dumpers are steered by [illegible] the traction motors. [illegible] sensors are [illegible] the same speed [illegible] opposite direction. Crotating the dumpers [illegible] are the most [illegible] giving [illegible] measure of manoeuvrability.

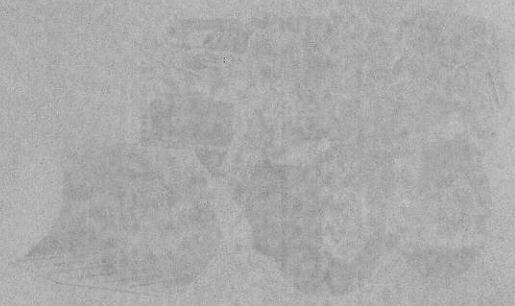
All dumpers are equipped with [illegible] motors for traction as well as [illegible] movements.

General features

Both loaders and dumpers [illegible] facilitate dismantling for [illegible] through narrow shafts. The [illegible] are provided with conveniently placed simple controls, and the lubricator meters [illegible] motors, cylinders, etc., thus reducing the need for manual lubrication to only [illegible] new points. The lubricator has an air filter and a quick-acting valve that vents the control and [illegible] to ensure full safety when the [illegible] is [illegible].

As a further safety measure the machines are provided with a firm and strong [illegible] which when locked in position prevents the machine from tipping over. [illegible] has been given to sealing components from water and dirt. The machines are now equipped for remote control operation. [illegible] advantage in confined stopes exposed to falls, but also a benefit generally to the operator who can work the machine without having to ride it.

The capacity figures given in the table are guiding values only, obtained from numerous work studies; the capacity of a loader depends a great deal on the planning of the work.



CAVO 511

Dumpers

Type		T2GH		CAVO 310		CAVO 511	
Bucket capacity	m³ – cu.yd.	0.12	4.2	0.13	4.5	0.5	[illegible]
Body capacity	l – cu.ft.	0.75	26.5	1.0	35.3	2.2	[illegible]
Traction motor	hp	10		2×10		2×12	
Bucket motor	hp*	12		12		2×20	
Hydraulic pump	hp	—		—		12	
Travelling speed	m/s – ft/s	1.5	4.9	1.4	4.6	[illegible]	[illegible]
Hose connection	″	1–1½″		1½″		2″	
Air consumption	m³/min – cfm	6	175	8	280	15	530
Net loading capacity	m³/h – cu.yd/hr	30	39	40	52	[illegible]	98
Net weight	kg – lb	2,300	5,100	3,050	6,700	6,000	13,[illegible]
Ground clearance (unloaded)	mm – in.	120	5	125	5	230	[illegible]

* at a working pressure of 6 kg/cm² (85 psi)

To accompany letter report dated 9 August 1976 - J. J. Crowhurst, P. Eng. to Mr. D. Barr, Dupont Exploration -Canada.