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REPORT ON D.D.H. # 85-1

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(no personal liability)
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1. INTRODUCTION

During 1985 diamond drill hole Bar 85-1 was initiated in order to test the Sullivan time horizon for a Sullivan type ore body. The objective of the hole was to intercept the large mineralized apron associated with such an ore body, and then follow the apron to the ore body with additional drill holes. This program was based upon an uncomplicated sub-basinal model which subsequently has been found to be more complicated and now includes a NNW trending graben structure. D.D.H. Bar 85-1 is within this structure.

The hole was postponed at 1265 m. (4148 ft.), an estimated 85 m. (280 ft.) above the targeted Sullivan time horizon. The hole is to be extended to the target depth in the fall.

2. MODELING

The initial model used in targeting the Bar 85-1 drill hole was that of a simple, uncomplex sub-basin formed by a transverse fault in a spreading ridge environment. In analagous situations in modern day basins these spreading ridges follow some linear trend and the tensional stress built up by them is periodically taken up by cross-cutting transverse faults. It is the down-faulting caused by these transverse faults that forms a sub-basin necessary for the accumulation of sulfide bodies. The Sullivan ore body sits within such a sub-basin. Contemporaneous with these spreading ridges is the injection of sills into unconsolidated sediment. These sills supply the heat needed to drive a hydrothermal convective cell required to leach lead and zinc from surrounding sediments and concentrate them as sulfides on the sea floor. Another importance of the transverse fault is that it acts as a heat sink for the convective cell.

Thus, for exploration purposes it is desirable to identify spreading ridges and transverse faults in the field, especially where they intersect. In the Aldridge the spreading ridge centers are identified by zones of tourmalinite and albite alteration, while the transverse faults are marked by major faults with displacement in the order of tens of thousands of feet, putting Creston Fm. in contact with the Middle Aldridge Fm. The idea is that tourmalinite and albite alteration is caused by hydrothermal action along a spreading ridge. Thus, where tourmalinite or albitization forms a linear trend it is believed to mark the axis of a spreading ridge. The transverse faults are thought to be reflected today by major faults representing ancient

zones of weakness. The idea that these faults were active during Aldridge time is supported by evidence which indicates thickening of the Aldridge sediment wedge towards the fault. On the Bar Group of claims all of these features are seen with the added attraction that the Sullivan time horizon is known to carry sulfides within this basin. It was the purpose of D.D.H. Bar 85-1 to test the Sullivan time horizon and for reasons that will follow it is felt that the hole is now in rocks equivalent to transitional hangwall sequence at the Sullivan mine.

The significance of the Sullivan time horizon as a stratigraphic target is two fold. First, the obvious is that the Sullivan ore body occurs at that horizon, and secondly, it represents a period of quiessence where turbidite deposition was slow enough to allow the formation of an ore deposit.

3. MARKER INFORMATION

The Aldridge Fm. consists of a repetitive series of turbidite flows. Turbidite flows form thick discontinuous sheets of sand and silt that are effectively uncorrelatable. Thus correlation is made with the use of varved marker horizons. These markers are several to tens of feet thick and consist of thinly laminated, light and dark colour banded, siltstone. Varved markers have been correlated laterally for at least 150 miles and they represent the only reliable way of determining stratigraphic position in the Aldridge relative to the Sullivan time horizon. These varved markers were used to maintain stratigraphic control in D.D.H. Bar 85-1. Marker information in the hole is as follows:

Marker Interval # 1
128m to 156m (420 - 512 ft.)
Laminations at:

129.80 - 131.30 m
133.92 - 134.69 m
150.19 - 150.25 m
151.09 - 151.29 m
153.10 - 153.37 m
155.13 - 155.50 m

Match # 1 at 134.45m to a marker known to be about 915m (3000 ft) above the Sullivan time horizon.

Marker Interval # 2
168m to 174m (552 - 568 ft.)
Laminations at:

348.94 - 349.15 m
(1144.5 - 1145.21 ft.)
Match # 2 at 348.99m and 349.15m to a marker known to be 817m (2700 ft.) above the Sullivan time horizon.

Marker Interval # 3
383m to 388m (1256 - 1273 ft.)
Laminations at:

383.23 - 383.93 m
385.76 - 387.83 m

Marker Interval # 4
435m to 439m (1427 - 1440 ft.)
Laminations at:

435.67 - 437.19 m
437.80 - 437.95 m
438.41 - 438.71 m
Match # 3 at 435.67m to a marker known to be about 732m (2400 ft.) above the Sullivan time horizon.

Marker Laminations at:

463.72 - 464.03 m	(1521 - 1522 ft.)
500.98 - 501.39 m	(1643 - 1644 ft.)
550.57 - 551.16 m	(1805 - 1807 ft.)
555.29 - 555.51 m	(1821 - 1822 ft.)
635.18 - 635.30 m	(2083 - 2084 ft.)
668.77 - 669.23 m	(2193 - 2195 ft.)

The last marker to be matched to a known one was at 435.67m, the known marker it matches sits apporximately 732m (2400 ft.) above the Sullivan time horizon. That puts the intereection of the Sullivan time horizon at 436m + 732m = 1186m (3900 ft.). Additional thickness added by a thick sill adds 164m (537 ft.) to the section, moving the intercept depth down to approximately 1350m (4300 ft.), which is about 85m (280 ft.) beyond the bottom of the hole, presently at 1265m (4148 ft.). There may be some thickening of this intercept depth due to anomalous sediment thickness in the hole as is evidenced by 'washed' markers and slumping. Faulting could also add stratigraphy, although this is doubtful since several fault zones observed in the hole have not added or subtracted significant stratigraphy between marker horizons. One exception occurs between match # 1 and match # 2 where the stratigraphy between them is 76m (249 ft.) greater than the ideal section. This thickening is due to a

thrust fault at 235m (770 ft.). Other faults observed showed normal and occassionally oblique movement, and they were steeply dipping, 70 degrees or greater (true dip).

4. DISCUSSION AND CORRELATION

It is thought that D.D.H. Bar 85-1 with its termination depth at 1265m (4148 ft.) is in a sequence of rocks equivalent to the transitional hanging wall rocks at the Sullivan Mine. Evidence for this is three-fold:

1. Marker Evidence
2. Correlation to hanging wall rocks in a neighboring Cominco Drill hole.
3. Correlation to the Sullivan hanging wall rocks themselves.

First, the last marker to be matched to a known one was at 435.67m and as previously discussed it puts the target depth at 1350m (4430 ft.).

Secondly, comparison of D.D.H. Bar 85-1 to the assessment report log from Cominco D.D.H. Bar 82-1, 2 Km to the east and south shows a very good correlation between the two holes. In 82-1 the Sullivan time horizon appears to have been intercepted at 928m (3045 ft.). Above this intercept was an interval of quartz arenite beds at about 845m underlain by a thicker interval of medium to thick bedded turbidites and slump deposits. This is very similar to the stratigraphic sequence found in D.D.H. Bar 85-1; even the style of mineralization (primarily disseminated pyrrhotite) described in Cominco's log is identical to that in D.D.H. Bar 85-1. Unfortunately the mineralization at the Sullivan time horizon is not described in Cominco's 82-1 log.

Thirdly, the bottom part of D.D.H. Bar 85-1 also correlates well with the hangwall rocks at the Sullivan mine. These rocks contain an interbedded series of graded turbidites with thick mudstone tops, that contain numerous disharmonic folds, boudins, and slumps indicative of penecontemporaneous soft sediment deformation (i.e. interbedded turbidites, interturbidites and slumps).

A fourth point taken from Bob Gifford's 'Progress Report on the Bar Property, B.C.' also supports the idea that the hole now sits in rocks equivalent to the transitional hanging wall rocks at the Sullivan mine. That point is quoted from page one of his report:

> "The final 680 feet of drillhole is lacking in marker-type units. This could conform to the transitional interval above Sullivan time. Such conditions higher in the stratigraphy would be unusual."

It is important to note that D.D.H. Bar 85-1 was correlated to D.D.H. 82-1 and the Sullivan hanging wall rocks upon the basis of a sequence of interbedded turbidites (quartz wackes, wackes), interturbidites (siltstones, mudstones) and slump deposits (convoluted siltstones and mudstones). This sequence of rocks, its overall sand to silt ratio, and its sedimentary features make it distinctly unique in D.D.H. Bar 85-1. Similarly it is relatively unique in the log descriptions of D.D.H. 82-1, and according to literature available on the Aldridge Fm. and the Sullivan Mine it is a relatively unique sequence of rocks throughout the Aldridge Fm. Therefore, a reasonable amount of confidence can be used in correlating this sequence of

rocks between the three localities. The uniqueness of this rock interval is due to the fact that it represents the transition from Middle to Lower Aldridge and therefore is distinctive from either formation.

It should be noted that within the hangwall series of rocks at the Sullivan Mine are several bands of massive sulfide, one such band may be represented by a very fine grained section at 1076.52 to 1076.98m in D.D.H. Bar 85-1. This interval consists of very thin biotite rich laminations with approximately 15% disseminated pyrrhotite. It is a peculiar looking rock with no equivalents anywhere in the hole.

Conversely, it may be possible that the hole has gone through the Sullivan time horizon, and is now in the Lower Aldridge. This is unlikely since neither marker information nor gross lithological information support that possibility. Marker information puts the hole above the Sullivan time horizon, while the rocks in the bottom of the hole are to thickly bedded and contain a sand/silt ratio higher than would be expected in the Lower Aldridge. The Lower Aldridge is thin bedded with siltstones and mudstones and thus has a low sand/silt ratio.

5. MINERALIZATION

Encouragement is seen, in about the last 50m of Bar 85-1, in the marked increase in pyrrhotite as wisps, blebs, disseminations, and very thin laminae. In this interval bands 1 to 3 cm wide containing 10 to 35% pyrrhotite are commonplace. Associated with this mineralization are small amounts of chalcopyrite (< 1%) and sometimes trace amounts of sphalerite. Another feature first observed in this interval is the common association of quartz and/or chlorite alteration along pyrrhotite laminae, which may indicate hotter brines or greater hydrothermal activity during deposition, implying proximity to the vent source. The last 1.5m of the hole contains about 10% pyrrhotite as disseminations, wisps and blebs. Samples are being prepared for thin-section and assay.

6. SUMMARY

The purpose of D.D.H. Bar 85-1 was to test the Sullivan time horizon. Due to limitations of the drill the hole was stopped at 1265m (4148 ft.), the question then arises, 'Has the hole tested the Sullivan time horizon or does it require deepening to test the Sullivan time horizon?'. Marker information suggests that the hole needs to be deepened about 85m (280 ft.) to 1350m (4430 ft.) to reach the Sullivan time horizion.

There is the possibility that the hole has passed the Sullivan time horizon and is in the Lower Aldridge. This is an unlikely possibility as shown by a sequence of interbedded turbidites, interturbidites and slump deposits in roughly the last 100m of D.D.H. Bar 85-1. This sequence of rocks has been correlated to a very similar sequence of rocks in the immediate hanging wall in D.D.H. 82-1, and the hanging wall in the Sullivan mine. This sequence of rocks is relatively unique to any other sequence in either the Middle or Lower Aldridge Formations because it represents the transition from one formation to the other. Therefore it can be correlated with reasonable confidence.

Figure # 1 shows the correlation of a generalized section of this transitional interval of rocks. Estimating the depth to the Sullivan time horizon from the correlation of this transitional interval without the use of markers is dubious. Although the interval is correlative, correlating a specific bed is impossible, thus estimates to the target depth are better made with marker information.

7. COMPLICATIONS IN BASINAL MODELING

Previously mentioned was the fact that some complications were encountered in the simplistic sub-basinal model. It is now believed that D.D.H. Bar 85-1 has been drilled in a graben structure representing an ancient sea floor trough. This conclusion is made upon the basis of drill hole data and government mapping. In Bar 85-1, 164m (537 ft.) of dioritic-gabbroic sill was encountered at 892m or about the then expected depth of the Sullivan time horizon. However, just 2 Km to the east and south, Cominco's D.D.H. 82-1 encountered no sill and hit the Sullivan time horizon at 928m (the collars of the two holes are at about the same stratigraphic level). Also, 10Km to the south government mapping by Trygve Hoy shows a thick (340m) sill bounded by N.W. and N.E. tending faults. Below the sill is apparent downfaulting of the Aldridge between the two faults relative to outside of them. However, there is no apparent displacement of turbidites across the faults above the sill. Also, the thick sill occurs only between the two faults and not outside of them. This implies the existence of a down-faulted graben structure which was filled with sill and sediment. Furthermore, marker data in D.D.H. 85-1 indicates that the Sullivan time horizon should be intersected at about 1350m (4430 ft.) which is 422m (1384 ft.) deeper than the intercept depth in D.D.H. 82-1 implying a down-faulted block which was filled with sill and sediment creating an anomalous thickness of section.

Therefore, because of the restriction of the thick sill between the fault boundaries, the lack of sill in D.D.H. 82-1, and because of the down-faulting of the Lower-Middle Aldridge contact between the two faults and in D.D.H. 85-1

relative to D.D.H. 82-1, the conclusion is drawn that there is a graben structure running through the property in a N.N.W. direction.

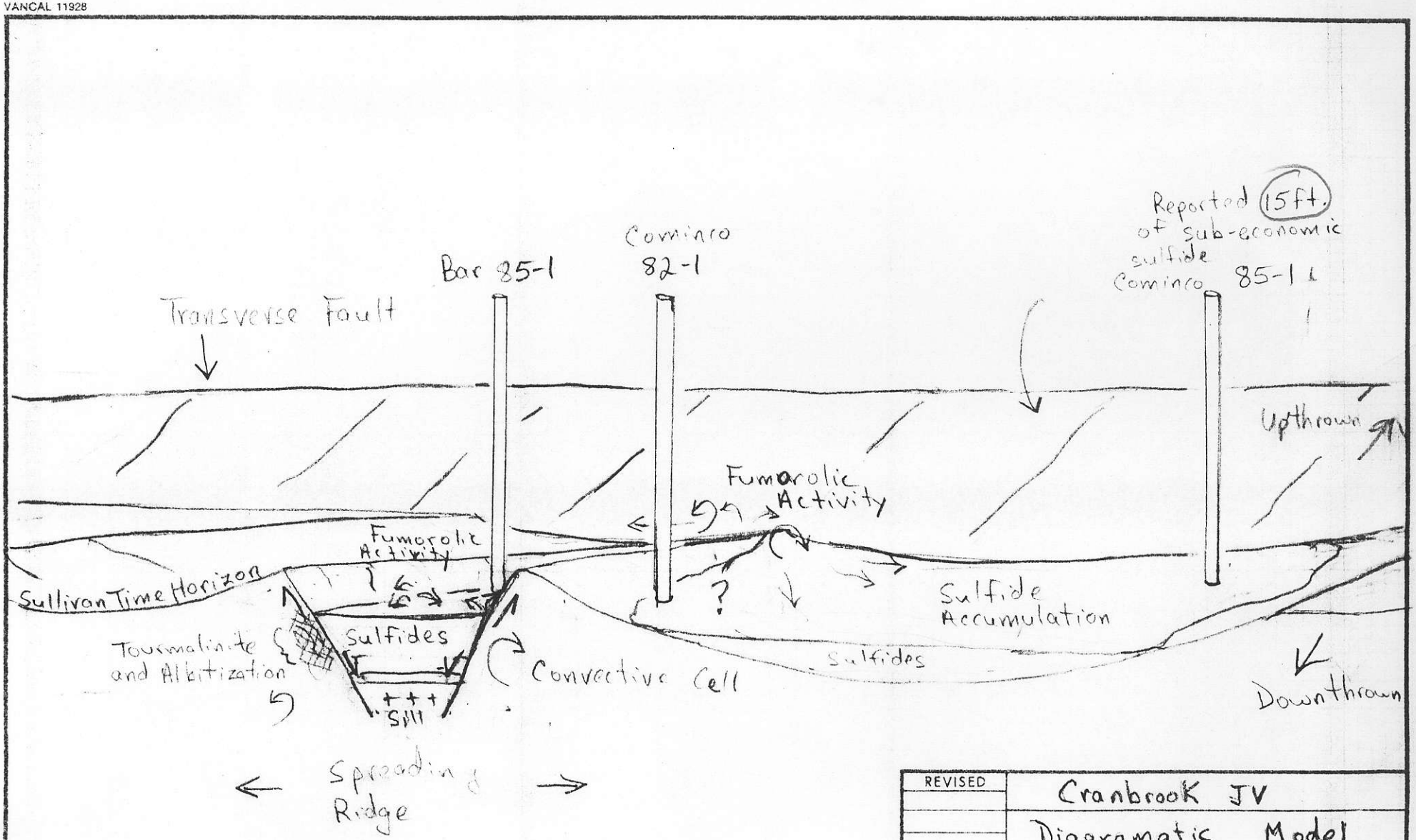
The graben structure is an important development because any massive sulfides that may be intersected have the potential to be abnormally thick. Also there are now two and possibly three areas where an ore body could have collected; the graben, the sub-basin to the east, and a possible sub-basin to the the west. A sketch of this model is shown in Figure # 2.

8. RECOMMENDATIONS

Marker information indicates that the Sullivan time horizon is at 1350m, or another 85m downhole. The lithological character of the rocks puts the last 100m of the drill hole in the Sullivan hanging wall series.

It is recommended that the hole be extended another 200m in order to test the Sullivan time horizon. It is necessary to drill the 115m past the projected target depth in order to account for anomalous thickening, and to test the footwall rocks which have a high potential for massive sulfides.

VANCAL 11928



REVISED	Cranbrook JV
	Diagramatic Model Representation
PROJ. No 140	SURVEY BY: DATE: July 25/85
N.T.S. 82/G5	DRAWN BY: SCALE: —
DWG. No. 2	NORANDA EXPLORATION
	OFFICE:

N S

D.D.H. C-85-1

CASING

Gabbro Sill

Proximal turbidites, thick A with thin C to E

Gabbro Sill
Proximal turbidites, thick A with thin C to E

Distal turbidites with thin B to E

Proximal turbidites, thick A, C & E
Distal turbidites, thin A, C, D & E
Intermediate turbidites, thick C to E zone A
Mavie Marker
Distal turbidites, D & E
Proximal to intermediate turbidites A C, D & E
Distal turbidites, thin A, C, D & E
'B' Hive
Proximal to intermediate turbidites, thin to medium A, C, D & E
Proximal turbidite, thick A, thin C & E
Distal to intermediate turbidites A, C, D & E thin to medium beds
Proximal turbidites, thick to medium A, thin C
Intermediate to distal turbidites, medium A, medium to thin C to E
Fracture Zone

Proximal turbidites, thick to massive A, thin C to E

Distal turbidites, thin A, C & E

Proximal turbidites, thick to massive A, thin C

Distal turbidites, thin A, C & D
Proximal turbidites, thick A, thin E
Distal to intermediate turbidites, thin to medium A & C
Distal turbidite, thin A, C & E
Proximal turbidite, medium to thick A, minor C

Distal turbidites, thin to medium A, C & E

Proximal turbidites, medium A, minor C & D
Hiawatha marker
Proximal turbidite, medium A, minor C & D
Hiawatha Marker
Distal to intermediate turbidites, thin to medium A, C & E
Pseudo Marker
Proximal turbidites, thick A, thin E
Pseudo Marker

Proximal turbidites, thick A, thin C, D & E

Intermediate turbidites, thin to medium A, thin E
Marker

Proximal turbidites, thick to medium A, thin C to E

Distal to intermediate turbidites, thin to medium A, D & E
Proximal turbidites, thick to massive A, thin E
Marker
Proximal turbidites, thick A, thin E
Intermediate turbidites, thin to medium A, D & E
Marker
Proximal turbidite, thick A
Distal turbidite, thin to medium A, C to E

Proximal turbidite, thick A
Distal to intermediate turbidites, thin to medium A, C & E

Proximal turbidites, medium A, thin C, D & E

Marker
Proximal turbidites, thick to massive A

Intermediate A, thin to medium A, D & E

Marker
Intermediate turbidites, thin to medium A, D & E

Proximal turbidite, thick A, thin E

Intermediate turbidite, thin to medium A, D & E
Marker

Intermediate turbidites, thin to medium A, C, D & E

Proximal turbidites, thick to massive A, thin E

Intermediate turbidites, thin to medium A, C, D & E

Intermediate to distal turbidites, thin A, B, C, D & E

Proximal turbidites, thick A, thin E
Intermediate to distal turbidites, thin to medium A, C & E
Altered A, abundant biotite & plagioclase
Distal turbidites, thin to medium A, C & E
Proximal turbidite, thick A, with E to P
Altered, chloritic, sill
Proximal turbidites, thick A

Proximal turbidites, thin to medium A with mud flows

Distal turbidites, thin A, C & E

Proximal turbidites, medium to thick A, thin E, minor band C

Distal turbidites, thin A, C & E

Sill- Dioritic to gabbroic, gradational contact
Highly siliceous sediment inclusion

Sill- Dioritic to gabbroic

Mudstone brecciated and chloritized
Fault Zone

Sill- Dioritic to gabbroic

Altered zone
Fault Zone

Sill- Dioritic to gabbroic

Highly siliceous sediment inclusion
Sill- Gabbroic
Alteration zone, granophyre or pyroclastic unit ?

Sill- Dioritic to gabbroic
fault in quartz wacke
Proximal turbidite, thick A, with thin C & E
Distal turbidite, thin A, C & E
Proximal turbidites, thick A, thin E
Distal thin A, C & E
Intermediate turbidite thin A & C
Proximal turbidite, thick A
Intermediate turbidite, thin to medium A & C
Proximal to intermediate, thick to medium A, thin C & E
Distal to intermediate turbidite with round coarse 'Quartz' and 'Feldspar' 'Porphyroblast' spots
Proximal turbidite, thick A, thin C & E. Minor slumping
Distal turbidite, thin A, C & E
Proximal turbidites, thick to massive A, thin C.
Distal and inter-turbidites, thick E
Proximal turbidites, thick A, thin E
Intermediate to distal turbidites, thin to medium A, D & E

Proximal turbidites, thick to medium A, thin D & E, minor slumping.

Intermediate turbidites, thin to thick A, thin to medium C & E
Distal turbidites, thin to medium A, D & E, slumping
Intermediate turbidites, medium to thick A, C, & E
Proximal turbidites, thick A, thin D & E.
Distal turbidites, thin A, D & E
Proximal turbidites, thick A, thin E
Distal to intermediate turbidites, medium to thin A, D & E
Proximal turbidites, thick A, thin E
Distal turbidites, thin A, D & E

Proximal to distal turbidites, thick A with medium D & E

Distal to inter-turbidites, thin beds and thick laminations of D & E
Proximal to distal turbidites, thick A, medium D & E, minor slumping
Intermediate to proximal turbidites, thick to thin A, thin E
Proximal turbidites, thick A, thin D & E. with regular medium to thick slumps
Distal turbidites, thin to medium A, D & E

Intermediate turbidites, series of medium fining-up (A to E) sequences
Proximal turbidites, thick to massive A, thin E

?

1263.59M

SCALE

20 Metres
0
20
40
60 Metres

PRELIMINARY MAP

REVISED	CRANBROOK PROJECT
	D.D.H. C-85-1
PROJ. No. 3140	SURVEY BY: DATE: June/85
N.T.S.	DRAWN BY: SCALE: 1:1000
DWG. No.	NORANDA EXPLORATION
	OFFICE: Vancouver