

016050

KERR ADJISON MINES LIMITED
(FOR INTER-OFFICE USE ONLY)

JAN 19 1970

WMS
65

<input checked="" type="checkbox"/>	J.H.S.
<input checked="" type="checkbox"/>	P.M.K.
<input type="checkbox"/>	G.M.H.
<input type="checkbox"/>	R.D.S.
<input type="checkbox"/>	B.C.B.
<input type="checkbox"/>	I.D.B.
<input type="checkbox"/>	M.D.R.
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<input checked="" type="checkbox"/>	(E.C.I.)

To P. M. Kavanagh From W. M. Sirola

Subject Tempelman-Kluit Description of Vangorda and Swim Lakes Deposits for G. S. C. Publication. Date January 15, 1970

BC-5/9

Dirk has requested that we review this manuscript and approve its publication sometime in the future in a Geological Survey of Canada release.

I have discussed this material with Dirk and have pointed out a few minor errors.

Dirk seems to think that there is more barite in the Swim deposit than there is in the Vangorda but this was not borne out in our logging of the Swim Lakes core. However, his determinations were made by a microscope and therefore some of the pale coloured soft grains we had called carbonate may well be barite. He mentions that the Swim Lakes and Vangorda ore occurs in a "quartzitic" horizon but again has not established that it is a true quartzite.

Somewhat to my astonishment, he quotes Chisholm (1967) as demonstrating a lack of correlation between magnetic, aeromagnetic and self-potential anomalies in the vicinity of the Vangorda deposit and suggests that these anomalies do not correspond closely to the sulphide zone. Let's hope that he convinces a lot of people that no correlation does exist! One needs only to look at the Federal Government aeromagnetic map to see precise correlation between the aeromagnetic anomaly and the Vangorda deposit.

As far as I am concerned, there is no reason why Tempelman-Kluit shouldn't publish this information but I thought you might like to see it before giving Dirk a final answer.

*We have advised Tempelman-Kluit that
he can publish these reports as written
except for deletion of the lines concerning
their present dormancy
of the properties.*

Bice
W. M. Sirola.

WMS/1k
Encl.

WMS
Feb 3/70



Department of Energy, Mines and Resources
Ministère de l'Énergie, des Mines et des Ressources
6th Floor, 100 West Pender Street,
Vancouver 3, B. C.

Geological survey of Canada
Commission géologique du Canada

File Number
N° de dossier

December 18th, 1969.

Mr. W. Sirola,
405, 1112 West Pender Street,
Vancouver 1, B. C.

Dear Bill:

I enclose a copy of parts of the Anvil manuscript together with relevant figures pertaining to the Swim and Vangorda massive sulphide bodies for your approval prior to publication. ² Would you be good enough to examine the contents for material and if satisfactory let me know as soon as possible. You may keep the enclosed copies if you wish.

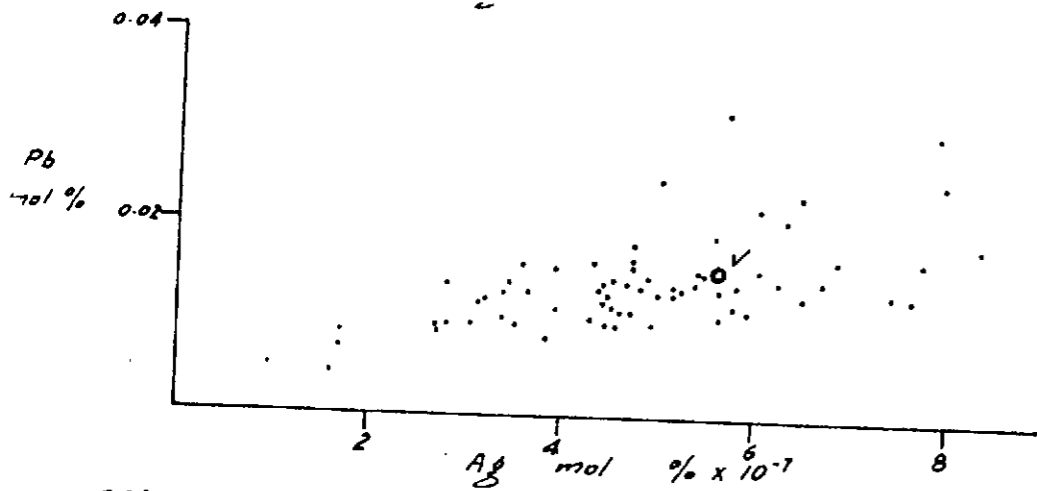
Best wishes for the holidays,

Sincerely,

Dirk Tempelman-Kluft.

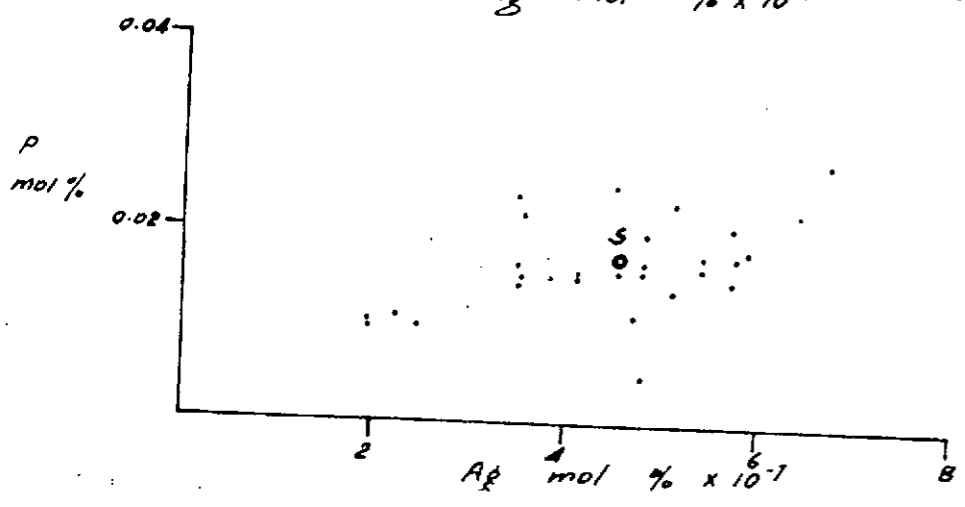
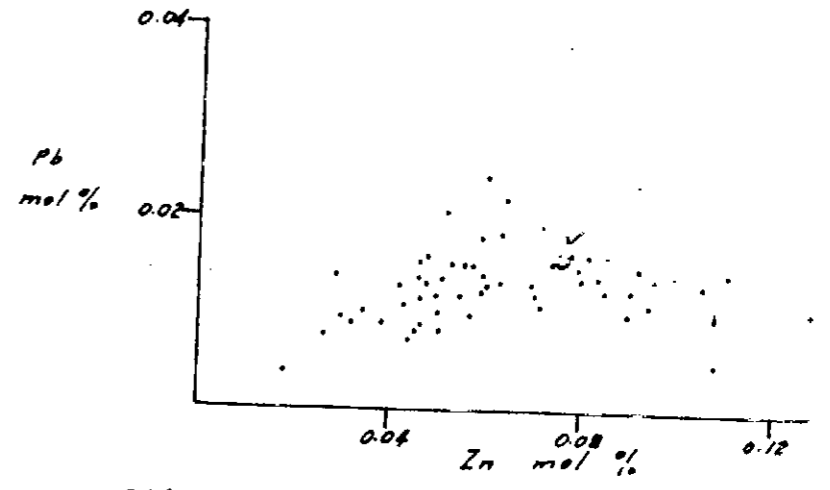
LEGEND

- A. Massive and banded pyritic sulphide ore
- B. Disseminated sulphide minerals in grey quartzite gangue
- C. Pyroclastic rich ore
- D. Buff and white phyllite and schist, minor sulphides
- E. Biotite muscovite schist to muscovite phyllite
- F. Graphite rich schist and phyllite
- G. Tuffaceous looking schist or phyllite
- H. Biotite quartz monzonite and kaolinized equivalents
- J. Porphyritic hornblende diorite
- K. Breccia
- L. Overburden



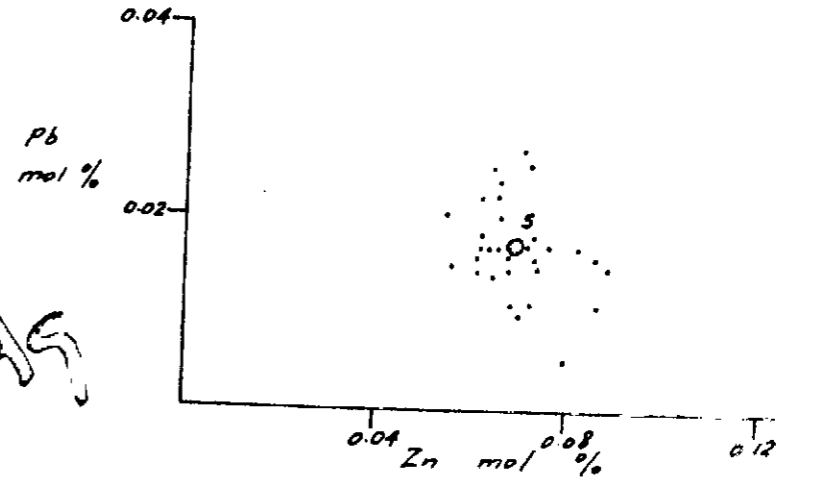
YANGORDA
DEPOSIT

Fig 30

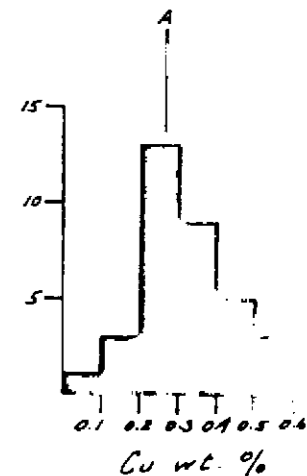
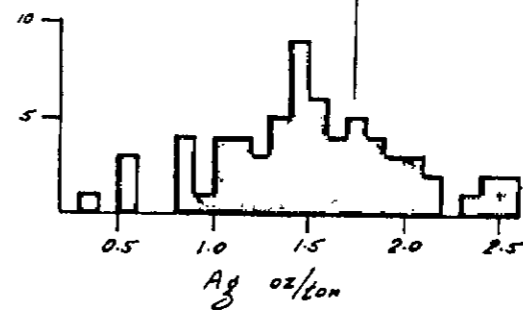
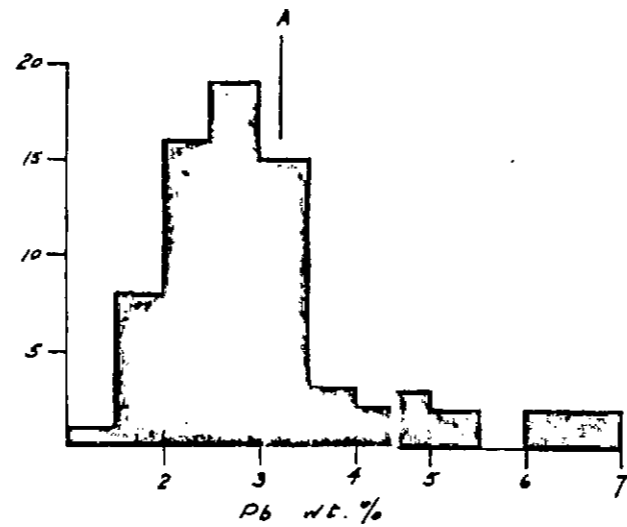
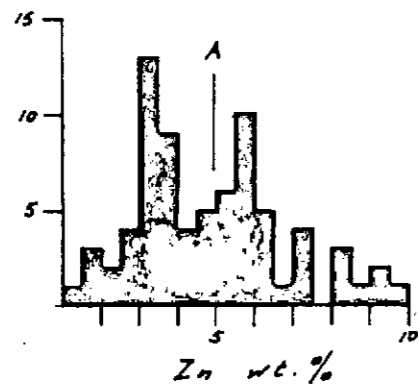


SWIM
DEPOSIT

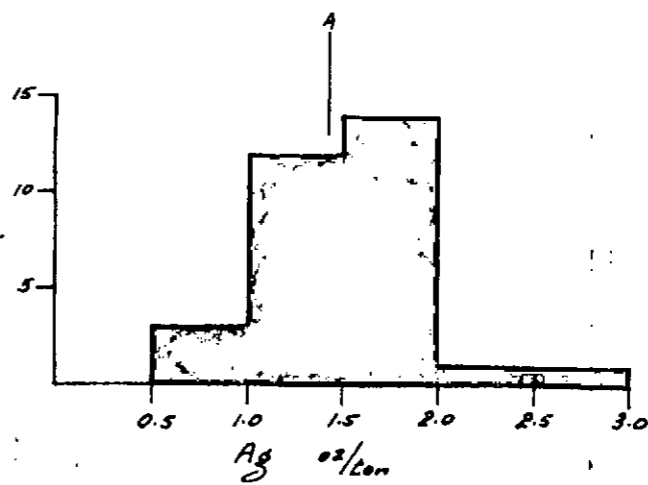
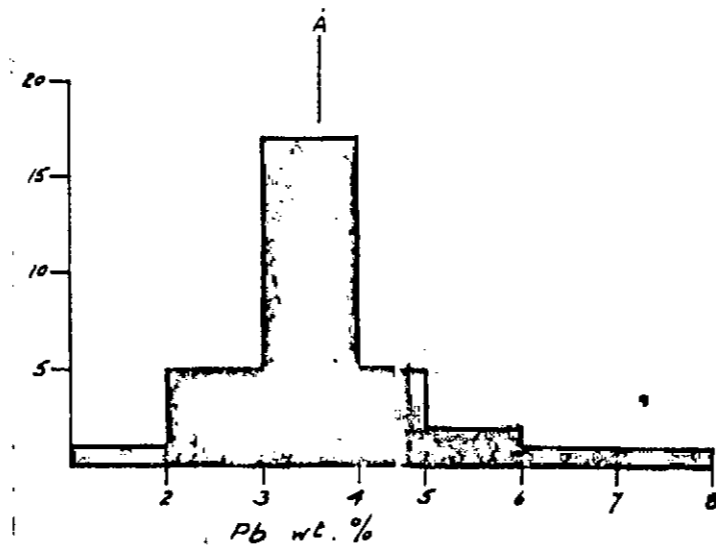
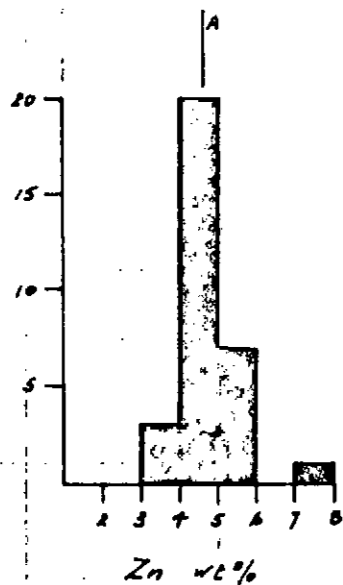
mol ratios
Pb:Zn
Pb:Ag



VANGORDA
DEPOSIT



SWIM
DEPOSIT



~~fig 29~~ fig 29 frequency dist of Pb Zn

SWIM LAKE MASSIVE ZINC-LEAD DEPOSIT

(Also see descriptions by Green, 1965, p. 36; Green, 1966, p. 50; Findlay, 1967, p. 40).

The Swim deposit, about 1 mile west of the northwest end of the largest of the Swim Lakes (see map), was staked in 1963 following an aeromagnetic survey. Ground magnetic, electromagnetic, self potential and gravimetric surveys were carried out over the area in 1964 and the deposit was drilled with ³⁷~~30~~ steep angle and vertical holes (cumulative footage about 15,000 feet) during 1965 and 1966. ~~At present the property is inactive and no further work is planned in the near future.~~ *delete.*

Outcrop is scarce in the vicinity of the Swim deposit and the ore-body itself is not exposed. Scattered float and small outcrops are of grey phyllite and slaty phyllite of unit 3. All information regarding the deposit is derived from the writer's examination of the drill core stored

on the property and from diamond drill hole plans kindly supplied by Kerr-Addison Mines.

The Swim deposit is an irregular, digitate, tabular zone of sulphide minerals in a "quartzite" gangue surrounded by a partial mantle of creamy white phyllitic rocks that are richer in quartz than the phyllite elsewhere in the map-area (fig. 19).

The phyllite surrounding the mineralized and altered zones is medium to dark grey and is made up of quartz, muscovite, graphite and chlorite. Stilpnomelane occurs locally as a minor constituent. Grain size of the minerals is fairly uniform and is generally less than 0.1 mm. Both quartz and muscovite have an average grain size of about 0.05 mm. Recrystallized quartz generally occurs as larger grains, but most of the quartz appears detrital and is not recrystallized. Muscovite aligned along F_2 is generally coarser grained than that along F_1 . Tuffaceous laminae are rare and greenstone (unit 3a) was intersected in only one hole. The tuffaceous rocks are a dull green colour and contain fine grained calcite and chlorite with lesser quartz, albite and muscovite.

The pale coloured phyllite that mantles the sulphide zone is creamy white with a faint greenish cast. It contains quartz and muscovite with minor chlorite and is generally somewhat coarser grained than the phyllite elsewhere. Average grain size is about 0.1 mm. The pale phyllite is distinguished by its light colour, which reflects a general absence of graphite or carbonaceous material. Disseminated pyrrhotite occurs commonly in quartz rich F_1 laminae and these layers outline folds between, and are strung out along the crenulation foliation (F_2).

The sulphide zone itself characteristically contains about 50 per cent sulphide minerals in a gangue of granular grey quartz with minor muscovite. Much of the ore is compositionally layered and laminae rich in quartz and pyrite alternate with thinner layers relatively rich in sphalerite and galena. Layers have gradational boundaries and some pyrite and quartz invariably occur in the zinc-lead layers, whereas sphalerite and galena are generally present in the quartz rich laminae. The sulphide layering is controlled by the foliations of the phyllitic host rocks. Sulphide layering corresponding to F_1 is locally visible and forms small rootless folds between the F_2 planar structures (Fig. 20). A gross layering along F_2 is present throughout (Fig. 21). It generally shows form orientation of quartz, sphalerite and pyrrhotite and these minerals are elongated in this planar structure. Generally the layering that dips relatively steeply

is F_1 and the gentler dipping foliation is F_2 .

The Swim Lake sulphide zone is a discontinuous, roughly tabular, elongate mass that trends northwest and dips northeast at 25°; its long dimension is in the order of 1,500 feet, and its width is nearly 500 feet (Fig. 19). The average thickness of the sulphide body is above 70 feet and its maximum thickness (in one drill intersection) is 280 feet.

Published figures (Northern Miner, March 9, 1967, p. 5) indicate the presence of 5 million tons of mineralized rock containing about 9.5 per cent combined zinc and lead with 1.5 ounces of silver per ton and minor copper and gold. Zinc is the predominant base metal. The central part of the Swim deposit is richest in zinc and lead and the base metal content falls off gradually toward the margins of the ore zone. The thickest sections contain the highest combined metal values and variation in grade appears to be related to variation in the amount of total sulphides.

Mineralogically the Swim deposit is much like the Vangorda. Metallic minerals make up about one half of the volume of the mineralized zone and include, in order of abundance, pyrite, sphalerite, galena, pyrrhotite, marcasite, and chalcopyrite. Arsenopyrite, magnetite and tetrahedrite were also noted; the latter is a very minor constituent. Barite is fairly common in the gangue and may account for about 1 per cent of the volume of the sulphide mass. Gypsum occurs as fine prismatic crystals and is commonly found along fractures. The sulphide minerals are intergrown with quartz and barite and form a granular aggregate of roughly equant anhedral to subhedral grains in which only the proportion of minerals and their grain size changes from place to place. Pyrite forms the largest grains (to 0.5 mm across) and shows greatest tendency toward euhedralism. Average grain size of the sulphide minerals is about 0.1 mm. Chalcopyrite and galena locally replace pyrite. Some chalcopyrite forms exsolution blebs in sphalerite. Marcasite is secondary after pyrrhotite and pyrite. The minerals show little evidence of having been strained and granulation of minerals is uncommon. Streaking and form orientation of sphalerite and pyrrhotite is common. Chalcopyrite tends to be most abundant where pyrrhotite is plentiful, whereas galena is closely associated with sphalerite. Thin, steeply dipping, regular veinlets of chalcopyrite and pyrrhotite cut the layered sulphides locally and transgress their foliation.

Results of the geophysical surveys over the Swim deposit are not

available to the writer, but it is common knowledge that the magnetic response over the Swim body is good, in fact this factor led to the original staking and later discovery of the deposit. Gravimetric results over the deposit are reported to have been conclusive and allow an accurate estimate of the tonnage of the deposit.

VANGORDA CREEK MASSIVE ZINC-LEAD DEPOSIT

(Also see descriptions by Chisholm, 1957, pp. 269-277; Green and Godwin, 1964, pp. 31-32).

Conventional prospecting techniques led to the discovery in 1953 of the Vangorda massive zinc-lead deposit (for location see map), partially exposed in Vangorda Creek. Drilling of more than 150 vertical holes with a cumulative footage in the order of 60,000 feet followed geochemical, gravimetric and electromagnetic surveys (Chisholm, 1957). ~~The property is presently inactive and no further work is planned.~~ (delete)

Drill core, stored at the camp on the Vangorda property, was examined and logged in conjunction with study of a scale model also left on the ground. Although the core is still useful it has been plundered and large sections are now missing. Several representative cross-sections of the Vangorda deposit, based on the writer's examination of the core, are shown in Figure 22.

The Vangorda deposit is an irregular tabular mass of sulphide minerals with a granular quartz gangue, that is enveloped partially by a narrow zone of pale coloured phyllite in turn enclosed in phyllitic rocks of unit 3. The phyllite surrounding the deposit and altered zone is silvery grey and fine-grained and contains roughly equal proportions of quartz and muscovite with lesser chlorite and fine-grained biotite. Quartz forms equant grains about 0.1 mm across and muscovite flakes are generally of similar dimensions. Muscovite grown along F_2 is coarser grained than that along F_1 . Graphite is a common constituent of the phyllite. where it is abundant quartz is the only other mineral and micas are lacking. As elsewhere in the phyllitic rocks the crenulation foliation, F_2 , is well developed and small folds, outlined by bent muscovite and by compositional layering (ie. F_1) occur between these foliation surfaces. Greenstone and tuff (unit 3a) is seen locally near the Vangorda deposit and is made up of chlorite, actinolite,

epidote, albite and quartz.

The pale, white to buff rocks of the enveloping zone differ from the phyllite elsewhere in their colour. Their mineralogy is similar and they contain quartz, muscovite and minor chlorite. They lack graphite, which may account for their light colour. Pyrrhotite and pyrite are widespread though not abundant in the pale phyllite at Vangorda.

The sulphide rich body at Vangorda generally contains about 50 per cent metallic minerals in a gangue of granular grey quartz with minor muscovite. A rude and generally poorly defined compositional layering like that seen in the Swim deposit is seen commonly. It is defined by laminae, an inch to six inches thick, alternately somewhat richer in quartz-pyrite and sphalerite-galena and is emphasized by streaking and form orientation of pyrrhotite, sphalerite, and quartz. As in the Swim deposit this layering is analogous to, and with the same orientation as the foliation F_2 in the enclosing rocks. Compositional banding at angles to this gross layering and apparently corresponding to F_1 in the host rocks is seen locally (Fig. 23, 24). The average grain size of quartz in the sulphide zone is about 0.15 mm.

The "quartzite" gangue of the ore zone does not extend beyond the sulphide deposit and is mineralized where seen. Similarly the "bleached" rocks form an irregular halo around the mineralized mass, but do not continue far from it.

The Vangorda mineralized zone is tabular and flat-lying; its long axis trends northwest and is about 2,500 feet long, its width is about 500 feet and the average thickness is in the order of 70 feet. Maximum thickness of the mineralized zone is about 200 feet. Figure 22 shows the shape of the deposit in cross-section. Variations in thickness of the sulphide zone are also shown on Fig. 22. The sulphides form a more-or-less continuous body, but lenses of mineralization, separated from the main mass, are seen in many drill intersections and although the overall shape of the sulphide zone is tabular, many irregularities occur in detail. The zone of sulphides forms the bedrock surface over much of the deposit and extends to depths of about 300 feet. Drift cover is about 50 feet.

Published tonnage and grade figures for the Vangorda body (Chisholm, 1957) indicate the presence of 9.4 million tons with 3.1% Pb, 4.96% Zn, 0.27% Cu and 1.76 oz. Ag per ton 12.6 million tons of essentially barren sulphides are reported in addition to the base metal zone. Data on variation in the base metal content suggests that the highest concentration

of zinc and lead coincide roughly with the thickest part of the body and that the concentration of these metals decreases toward the margin of the mass.

The mineralogy of the Vangorda deposit is simple, sulphides are estimated to constitute one half of the mineralized zone and of these pyrite is dominant. Sphalerite, galena, pyrrhotite and chalcopyrite are the other volumetrically important sulphide minerals in order of abundance. Magnetite and marcasite are minor constituents. Arsenopyrite and tennantite (Chisholm, 1957) have also been identified among the sulphides. Barite, though not as common in the Vangorda deposit as in the Swim, is an important minor constituent. It generally occurs as large, pale flesh coloured grains surrounded by the other minerals. The proportion of sulphides to gangue (quartz) ranges from roughly 10% to 90%. Pyrite invariably forms the largest grains and occurs as subhedral crystals up to 1 mm across. Average grain size of the sulphides is about 0.15 mm. The sulphide minerals are intimately intergrown with one another and with the granular quartz gangue and form an aggregate of anhedral grains. The proportion of the various minerals in the sulphide zone is fairly uniform and differences in the combined base metal grade of the deposit appear to reflect differences in the amount of total sulphides.

Chisholm (1967) has demonstrated the lack of correlation between magnetic aeromagnetic and self potential anomalies in the vicinity of the Vangorda deposit. He has also shown that these anomalies do not correspond closely to the sulphide zone. He established, however, that a general relationship does exist between geochemically anomalous soils in the area and the sulphide deposit itself and further that there is a precise correlation of the gravimetrically anomalous zone to the massive sulphide deposit. The average specific gravity of Vangorda sulphide ore is about 4.4 which compares with 2.8 for its host rocks.

CHEMISTRY OF THE ORES

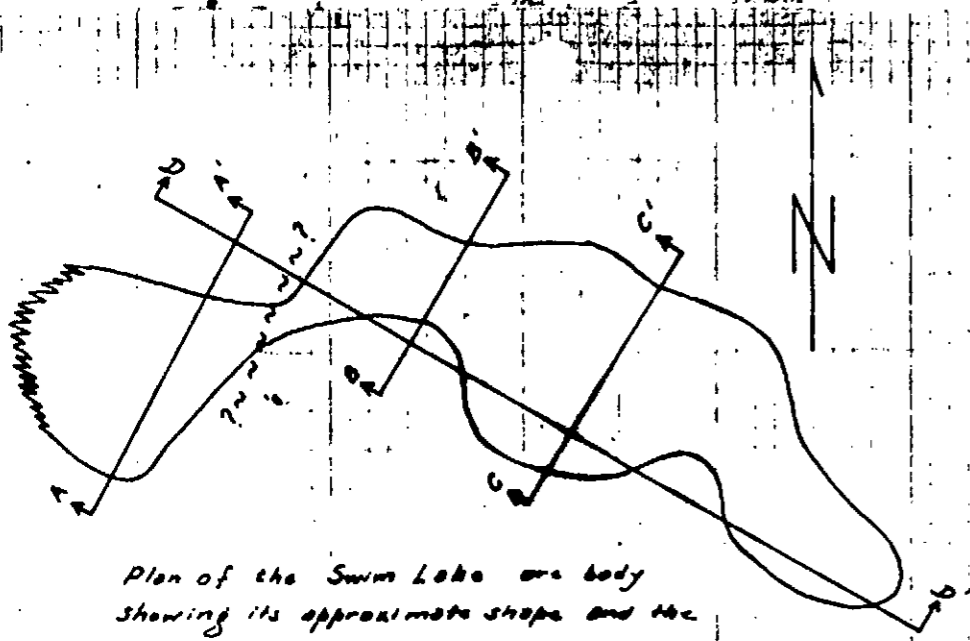
Available data concerning the metal content of the Anvil deposits is briefly examined in the following paragraphs and a comparison is made with similar data for base metals deposits elsewhere. Variations in the content of zinc, lead, silver, and where determined, of copper, are examined individually and in pairs. The data used was supplied by the respective companies and represents average assays for entire drill intersections of each of the three mineral deposits.

Plots of the frequency distribution of each of the three economically important metals are given for the Anvil Range deposits in Fig. 28. They show that each metal has a similar distribution in all three bodies with small differences between the deposits in the modes and range of values. The distribution for each metal is fairly characteristic in all three deposits. Plots of silver and zinc against lead, expressed in mole per cent to avoid exaggeration resulting from the different atomic weights of the elements, are given for each deposit (Fig. 29). These illustrate that the pairs, lead-zinc and lead-silver are related in much the same way in the three deposits with differences only in the degree of correlation between the metals. For instance there is a stronger interrelation between lead and zinc in the Faro than in Vangorda, but lead and silver are more perfectly allied in Vangorda than Faro.

Comparison of the above with data given by Stanton (1958) shows that the Anvil ores are chemically similar to those in a number of "conformable" base metal deposits in other parts of the world. The Anvil material has the low copper content and uniform lead-zinc ratio that characterizes this group of deposits and it shows the fair correlation between lead and zinc (Fig. 30) diagnostic for all of them. It is clear from Fig. 31, in which the average zinc, lead and copper contents of these and a number of "conformable" deposits from other parts of the world are plotted in terms of their molecular ratios, that the Anvil ores belong chemically to the stratabound group of deposits. No data is available with which to compare the behaviour of silver-lead in the Anvil ores with that for ores from elsewhere.

SUMMARY OF THE GEOLOGY OF THE DEPOSIT

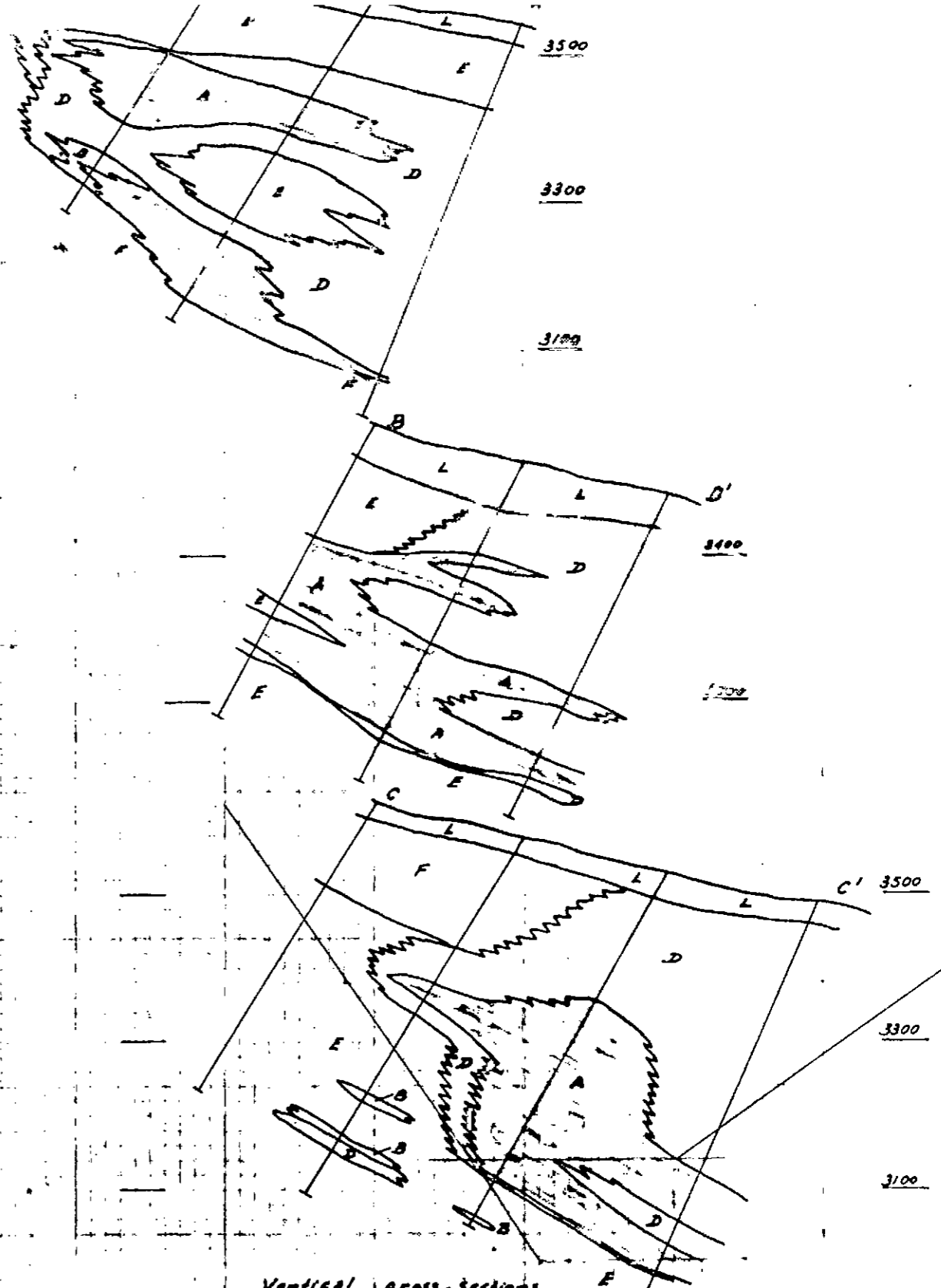
1. The three economically important zinc-lead deposits in Anvil Range are enclosed in phyllitic or schistose rocks of unit 3 that are considered



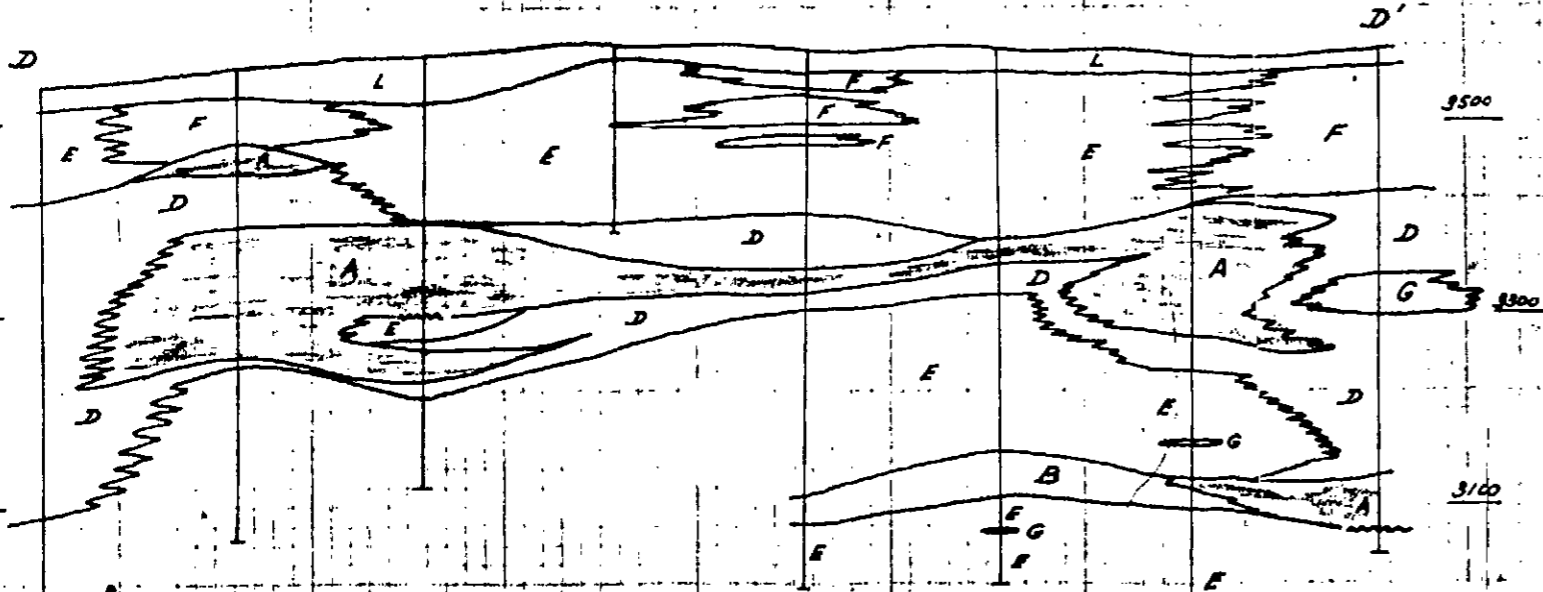
Plan of the Swim Lake ore body showing its approximate shape and the location of cross-sections.



Scale of feet



Vertical cross-sections of the Swim Lake ore zone.



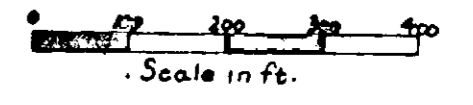
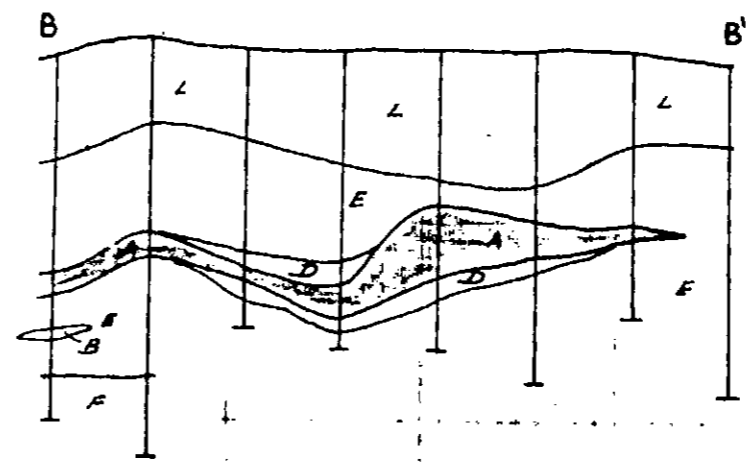
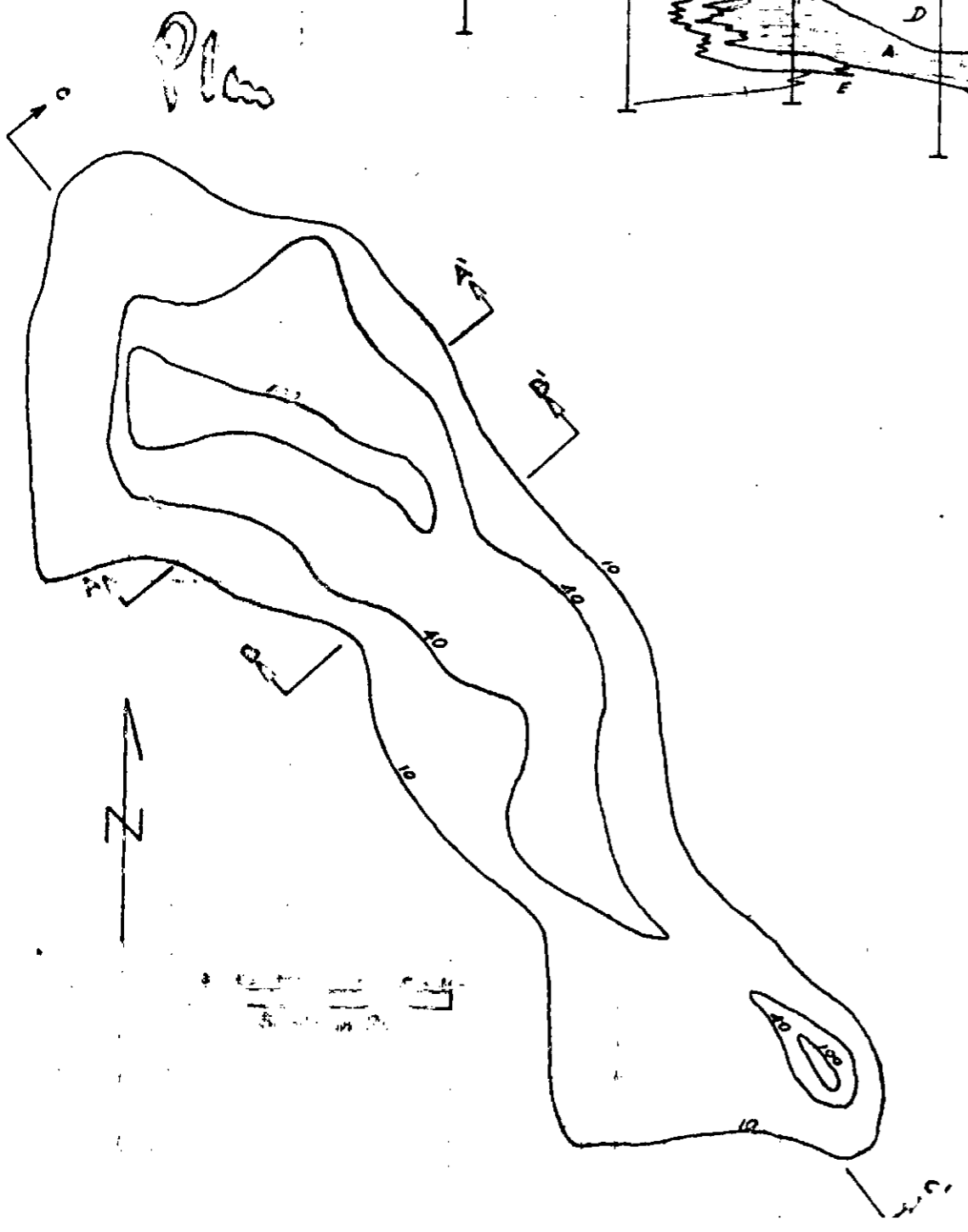
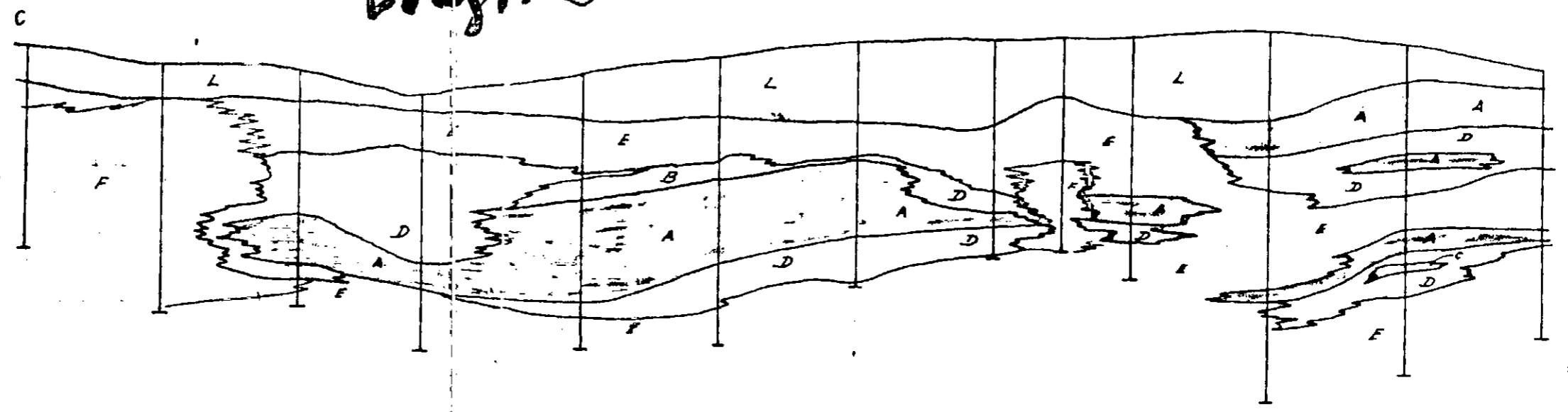
Longitudinal section of the Swim Lake ore zone projected on to a plane dipping 60° to the SSW



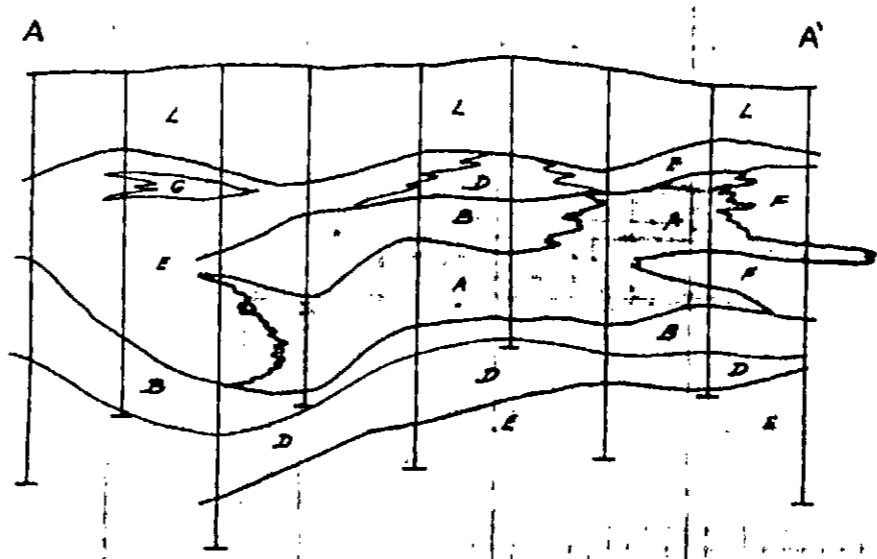
Scale of feet

Vaucluse

Longitudinal section



Cross sections



KERR ADDISON MINES LIMITED

(FOR INTER-OFFICE USE ONLY)

19. Y 5
V.S.
K.C.C.
J.H.S.
E.
R.D.
B.C.H.
S.
R.
H.S.
G.P.S.
K.
E.C.

To..... W. H. Strole From..... P. M. Kavanagh

Subject..... Tempelman-Kluit Publication of Vangorda and Swim Lakes Sections. Date..... October 25th, 1967

This is prompted by your memorandum of October 20th with attachments.

It would be the first time that any Swim Lakes data would be published. I had thought that if we ever prepared a paper on the Swim Lakes deposit that you would be the author of it. Because of that possibility I would wonder whether you would prefer that Tempelman-Kluit not be the first to publish any Swim Lakes data. However if you don't mind him doing so, we also would have no objection.


Paul M. Kavanagh

PMX:sw

OCT 21 1967

COPY

P. M. Kavanagh

W. M. Sirola

Vangorda - Swim Lakes Areas:
Tempelman-Kluit Publication.

October 20, 1967.

Enclosed are a number of sections of the Vangorda and Swim Lakes deposits compiled by Tempelman-Kluit. Dirk has requested permission to publish these and I personally see no objection to his doing so. Would you please let me know whether you agree.

W.S.R.
K.C.G.
✓ J.H.S.
EF
R.D.S.
B.C.B.
P.A.K. ✓
G.V.
R.M.
C.K.M.
J.H.S.
G.P.P.
K.F.L.
L.B.
○ E.C.I.

Bill

W. M. Sirola.

WMS/lk

Encl.



M' MORANDUM

CLASSIFICATION

TO
A

Mr. W. Sirota
Kess Addison

YOUR FILE No.
Votre dossier

OUR FILE No.
Notre dossier

FROM
De

Dick Sembelman-Kheit

DATE

Oct 16, '67

FOLD

SUBJECT
Sujet

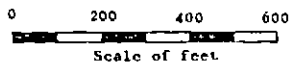
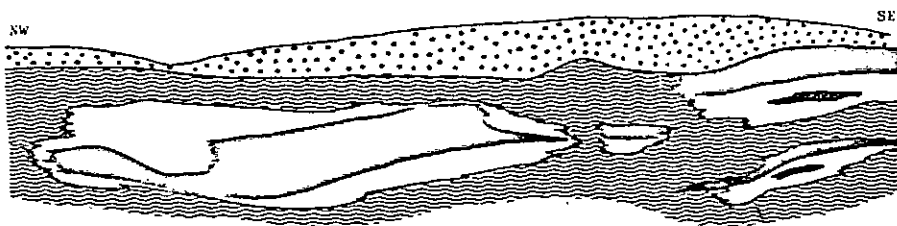
Enclosed diagrams

I enclose 2 prints of diagrams that I hope to publish this spring. Would you please examine the diagram and send it to Dr. Kavanagh for approval for publication. You may keep both prints if you wish. Would appreciate hearing from you as soon as convenient.

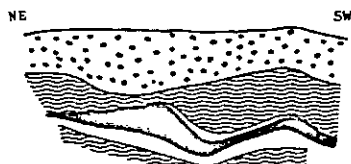
Regards
Dick.

FIGURE 3 VERTICAL CROSS-SECTIONS VANGORDA DEPOSIT

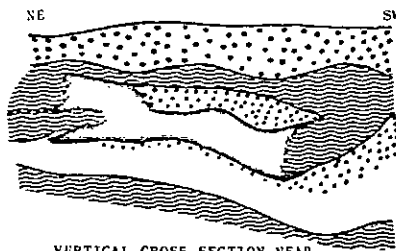
VERTICAL LONGITUDINAL SECTION THROUGH CENTRE OF VANGORDA DEPOSIT



N.B. Because some Vangorda drill core is missing these sections are not as reliable as others.

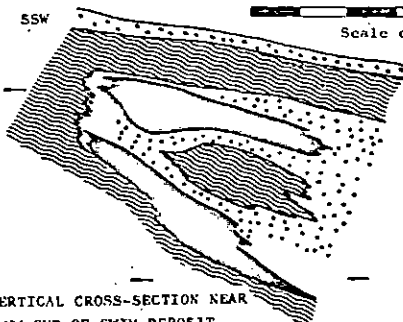
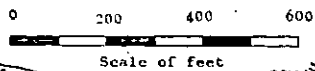
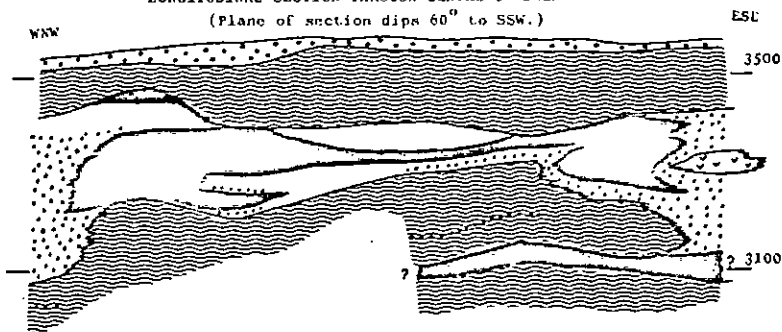


VERTICAL CROSS-SECTION NEAR CENTRE OF VANGORDA DEPOSIT

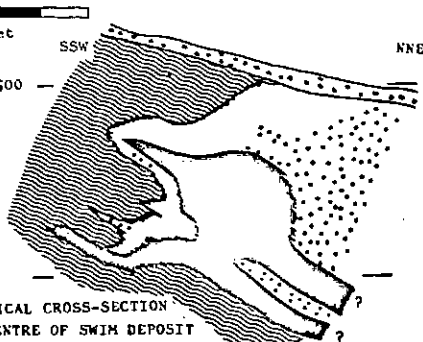


VERTICAL CROSS-SECTION NEAR CENTRE OF VANGORDA DEPOSIT

LONGITUDINAL SECTION THROUGH CENTRE OF SWIM DEPOSIT
(Plane of section dips 60° to SSW.)



VERTICAL CROSS-SECTION NEAR NW END OF SWIM DEPOSIT



VERTICAL CROSS-SECTION NEAR CENTRE OF SWIM DEPOSIT

FIGURE 4 CROSS-SECTIONS SWIM DEPOSIT



Department of Energy, Mines and Resources
 Ministère de l'Énergie, des Mines et des Ressources

Geological Survey of Canada
 Commission géologique du Canada

File Number
 No à rappeler

of 1/5-9

MAY 10 1967

Box 969,
 Whitehorse, Y.T.,
 May 4, 1967.

Kerr Addison Mines Ltd.,
 Suite 1600, 44 King St. W.,
 Toronto, Ont.

Dear Sir:

I enclose a brief report on your property prepared for inclusion in the G.S.C. Paper, "Mineral Industry of Yukon Territory and Southwestern District of Mackenzie, 1966" which will be published in mid-1967. I would appreciate it if you would check it for accuracy and indicate any corrections that may be required. Please return one copy in the addressed envelope provided.

Yours truly,

D.C. Findlay
 D.C. Findlay,
 Resident Geologist,

DCF:ep
 Encl:

W.S.R.	
K.S.J.	
J.H.S.	✓
E.S.	
R.S.	✓
L.S.	
P.M.K.	✓
G.W.M.	
R.C.M.	
C.K.W.	
J.P.S.	
G.P.R.	
K.F.L.	
J.L.B.	
E.C.J.	○

*a copy is attached, showing
 the corrections I have made.*

P.M.K.

May 11/67

Vangorda Mines Limited (62°15'N, 133°12'W)
(Lead-Zinc)

Inactive; see Green and Godwin (1964, pp. 31-32)

Swim Lakes Property (Kerr Addison Mines Limited) (62°12½'N, 133°
02'W)
(Lead-Zinc)

References: Green (1965, p. 36; 1966, p. 50).

During the 1966 season, Kerr Addison Mines Limited continued the drilling program begun last year on their 72-claim Swim Lakes "A" group property, located about 6 miles southeast of the original Vangorda Creek property of Vangorda Mines Limited. The program has involved 30 holes totalling about 14,500 feet. During 1966, 4 machines were utilized and up to 24 men were employed in the operation. Early in 1967, the company announced (Northern Miner, March 9, 1967, p. 5) that the drilling had ~~discovered an ore body~~ *largely delineated a zone containing* of approximately 5,000,000 tons, averaging about 9.5 per cent combined lead and zinc, ~~and~~ *and* 1.5 ounces per ton silver, *and with minor copper and gold values.*