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VOL 1

Geophoto Minerals Report 1970/38-38A  
Proposals on Comet-Kosminsky Prospect  
for 1970-1971  
Texins Development Pty. Ltd.

Proposals on Comet-Kosminsky  
Prospect for 1970-71 - TEXINS  
Development

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**MICROFILMED**

31st July, 1970.

MEMORANDUM:

TO: R.H. Barton.  
 FROM: J.H. Rattigan.  
 RE: Kosminsky-South Comet Prospect

The following reports 1970/38 and 38A relate to the Kosminsky-South Comet sector of the Comet Line.

A long strike length of mineralised country has been roughly indicated, and strike and lateral extensions are known or inferred.

No tonnage has been proved in a mining sense, hence there is as yet no ore in the accepted sense. However, positive factors are:

1. The grade, range and general tenor of ore have been indicated.
2. Ideas on thickness and length have been gained.
3. An idea on response to geochemical anomaly and geophysical anomaly has been gained, and a huge geochemical halo is obviously present.
4. A tonnage of 3,000,000 tons of mineralised ground seems a possible target for testing from surface to 1,200' ASL with further possibilities on strike, laterally and at depth.

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5. Thus the Dundas prospects offer a viable target size for testing in an attempt to prove mineable tonnage at a scale necessary to mine low to moderate grades indicated.

It is, however, clearly necessary to discount any optimistic projection for the following factors:

1. Ore is vein type and occurs as shoots in lodes. Richer shoots will lens out laterally and in depth. Lodes and shoots are multiple.

2. If shoots only are mined, stopes for mining would be, on present exploration, narrow (<12 feet) and rather unattractive working places for the present generation of miners. Moreover, tonnage offered in any individual shoot would be small, and impersistence of shoots would not add to attractiveness of mining. New shoots would have to be constantly proved and developed.

3. However, wider zones of low grade material occur in many of our drill holes. The mineralisation herein consists of rich, narrow veins and veinlet stockwork zones separated by weakly mineralised country.

It is possible that this ground could be dropped in wider stopes and sorted by modern sorters so that much of the waste need not be sent to mill.

Habit of ore in depth is not known.

4. Marketing factors (price and sales) relating to main metals, Pb, Zn, Ag.

The conclusion is that the prospect is still an exploration target of significance. However, until more drilling is available to outline full geometry of lodes, shoots and mineralised zones, a proper mining feasibility study is not practicable although preliminary studies should be made at earliest to check proposals on exploration.

J.H. Rattigan.

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GEOPHOTO MINERALS REPORT 1970/38

KOSMINSKY-SOUTH COMET TARGET APPRAISAL

AT JUNE 30TH, 1970.

BY

J.H. RATTIGAN

TEXINS DEVELOPMENT PTY. LTD.

INTRODUCTION

The following is a summary of relevant data available at this date on Kosminsky-South Comet drilling.

USE OF TERMS

Mining geologic terms are used with the sense outlined as follows:

Ore: Mineralised rock is not strictly ore until it has been or can be mined, milled, treated, transported and marketed at a profit.

"Ore" is used below to convey highly mineralised rock that may be ore, i.e. from wider intersections and grade of about 7% Pb equivalent or better.

Proved: Ore reserves are not proved until a block of ground has been sampled on all sides or, in the case of narrow tabular bodies, penetrated at such close spaced intervals that statistically there is little room for error between calculated grades and actual worked tonnages and grades. "Ore" at Kosminsky is not yet proved.

Indicated: Ore reserves are said to be indicated on lesser information and give the scale of target reasonably well outlined by drilling or development, but which must be proved up.

The Kosminsky-South Comet mineralisation is indicated by surface oxidized cap, some old adits and shafts and a single line of drill holes penetrating lodes at single points below the land surface.

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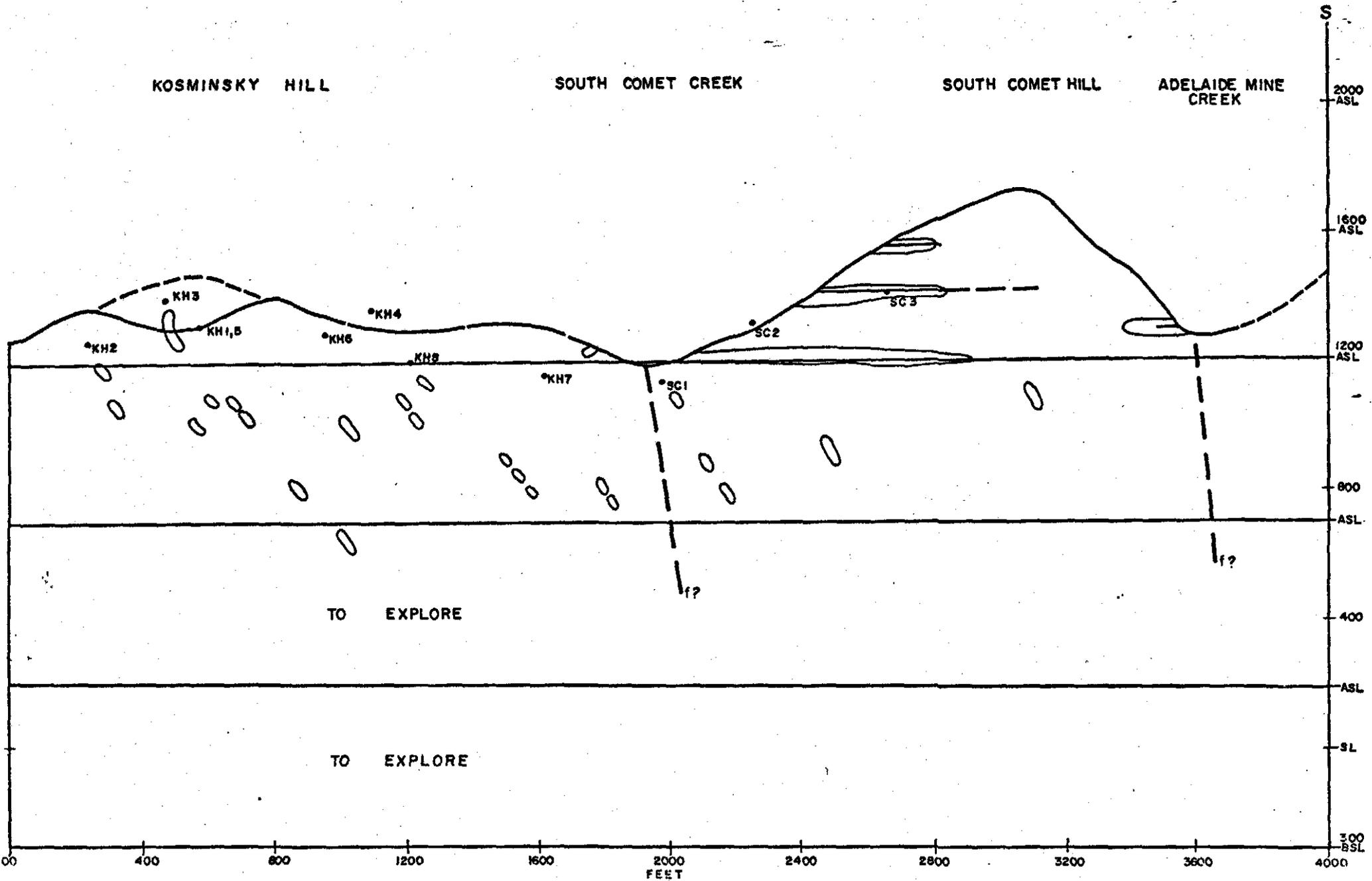
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KOSMINSKY HILL

SOUTH COMET CREEK

SOUTH COMET HILL

ADELAIDE MINE CREEK



SKETCH LONG SECTION COMET  
 Scale: 1 inch = 400 feet

5 cm

• PROJECTED DRILL COLLAR.  
 ○ KNOWN "ORE" INTERSECTIONS PROJECTED

Drawing No. 1/237

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Lode: Is the whole zone of altered rock in which ore shoots lie. It refers to the whole altered channelway and depositional zone in the case of epigenetic deposits. It is not synonymous with ore.

Ore Shoot: Refers to a body containing the actual volume of highly mineralised rock that can be mined at profit.

True Width: Refers to true thickness measured by a line normal to (T.W.) the walls of a lode, vein or ore shoot respectively.

THE PROSPECT

The prospect consists of a southern part of the Comet-Kosminsky-South Comet Line (Geophoto Minerals Report 1969/55). It lies on and beneath two hills ranging to about 1,770 feet above sea level (ASL) on the peak of South Comet Hill separated by South Comet Creek at about 1,200 feet ASL.

The figure (drawing 1/237) attached, conveys the present picture in long section.

Sulphides of Pb and Zn, (highly argentiferous in the case of high Pb lodes and high cadmium bearing in the case of Zn lodes) are the potential ore minerals.

Both Pb and Zn and intermixed lodes occur and no control is yet known for the occurrence of each type.

On average lead predominates over zinc in the ratio of 1.7/1.0 in drilling so far but this ratio could change.

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Oxidised cap is not strong on these hills in contrast to the Comet sector to the north and primary sulphides occur in places at grass roots. Some gossanous caps do occur but full oxidation below about 60 feet is not expected.

The sulphides are extremely coarse grained and should present no extreme separation difficulties. The deposits so far met with are all fissure deposits although strata bound deposits remain a strong exploration objective.

Gangue is chiefly carbonate - a highly ferruginous ankerite or siderite is common - and slate or carbonate country rock.

#### APPRAISAL OF DATA

The following listed data relate to global calculations (rather than calculations from hole to hole) from drilling and covering richer mineralised intersections. The calculations were made from a longitudinal section, average intersection length corrected to inferred approximate true width and average assays of intersections weighted for length. This report is to be considered as a target appraisal (i.e. to see whether a target of viable size is still within our grasp) rather than a mine geologic appraisal which involves many facets of detailed geometry that we do not yet have data on, so that proper tween-hole "ore" geometry is not known. The latter must wait for additional lateral and deeper drilling before mining analysis can be made after construction of cross sections, longitudinal sections, projections and models on this data.

Strike and dip of lodes at various points is not yet positively known. The inferred thickness was calculated for a body dipping at  $70^{\circ}$  in a direction normal to each drill hole. This figure of 18' is very much a global approximation but is of the correct order where greatest geometric data on ore is available at South Comet Hill.

At Kosminsky-South Comet Prospect, sampling through the lodes at 50 feet centres (by drilling or development) is considered necessary before the ore reserves are considered proven. This is a huge task and need not all be necessarily done prior to mining.

The target tonnage for viability according to the Schanz-Juilland report of April 1st, 1970, is 6,000,000 tons with an additional equivalent amount indicated. This tonnage of fully proven ore seems overlarge for commencing operations and I would think 3,000,000 tons of fully proved ore (\$60+ million gross) to be adequate (to amortise exploration, mining and mill capitalisation and some years operations) provided additional (but reasonably assured) ore that can be proved up fully out of cash flow is indicated.

The nature of lode and ore shoot habit is not clear. Multiple intersections are met with in most holes. These may represent separated parallel or en echelon lodes; or branching lodes from a main fissure; or even in some cases faulted repetitions.

However, the frequency of intersection and multiple intersection at average spacing of about 270 feet along strike on present drilling gives great expectation that intervening sections will likewise yield similar results with respect to grade and intersection thickness. Only mineralised intervals that grade significantly at 5 feet intersection lengths or greater are considered here. Many other mineralised intersections occur and some may make ore at intervals along the line.

To date, drills have penetrated and proved mineralisation for more than 1,000 feet below the topmost hill on the Kosminsky-South Comet line of lodes. The lodes are still brecciated and show open "ore" fillings and replacements. It is therefore a reasonable

expectation that lode channels may have been open for mineralisation to depths of half the already proved vertical range (1,000+ feet) and possibly to as much as 1,000 feet below the level penetrated by drills.

Whether this is so remains, however, to be proved by drilling. Thrust faulting if present at depth (whether pre-ore or post-ore) could eliminate "ore" occurrences at depth. There is some chance of such a thrust sheet but only drilling will establish this.

PRECIS OF DATA - KOSMINSKY-SOUTH COMET DRILLING

1. Inclined holes.	Total 11. (KH DDH 1, 2, 3, 4, 5, 6, 7, 8; SC DDH 1, 2, 3).
2. Inclined hole footage.	8,343 feet.
3. Vertical hole and footage.	One only (KH DDH 2A); 427 feet.
4. Range of intersection lengths considered.	5 feet - 65 feet.
5. Average intersection length (10 inclined holes)	21.4 feet.
6. Average grade (weighted for varying intersection lengths) over 9 inclined holes for which assays are complete.	Pb 4.15% ) grade will vary Zn 2.45% ) from this when Ag 2.25 oz/ton) weighted for geometry.

- 7. Approximate value of average grade (\$US) - current metal prices (metal in ground basis - not recovery basis - present prices). \$27 (+ sweetener such as Cd).
- 8. Strike length of drill indications. 2,700 feet +
- 9. Strike Extensions: This length is open ended on southern extensions for 600 feet to Adelaide Mine Creek and probably faulted extensions exist on northern extensions beyond Kosminsky Hill, and southern extensions south of Adelaide Mine Creek.
- 10. Lode Habit: Multiple lodes in fault zones. Whether these are in parallel, en echelon or branching fissures, it is not yet known. Cross faulting of lodes is suspected and some fault repetitions may exist.
- 11. Lateral extensions: Many indicated or suspected lines of lode.
- 12. Range of Elevation of Land Surface (over indicated strike of 2,700 feet). 570 feet

13. Deepest Vertical Penetration by drills beneath highest point in land surface (over indicated strike).	1,130 feet.
14. Deepest penetration below lowest point in land surface (about 1,200 feet ASL)	560 feet
15. <u>Possible better mineralised tonnage</u>	
(a) <u>Tons per vertical foot per hundred feet of strike</u> (based <sup>on</sup> factors of 10 c.ft. in place = 1 ton "ore" and of 18 ft. true width of mineable intersections).	180
(b) <u>Tons per vertical foot per 2,700 feet indicated strike length.</u>	4,860
(c) <u>Tons above 1,200 feet ASL</u> (lowest surface topographic level), (to be qualified by stoped and oxidised ore of yet unknown quantity)	
1) North slopes South Comet Hill	450,000
2) Kosminsky Hill	270,000

16.	(d) <u>Tons from 700 feet ASL</u> <u>to 1,200 feet ASL</u> (over 2,700 feet).	2,430,000
	(e) <u>Total tons over strike</u> length of 2,700 feet (needs discounting for stoped and oxidised material)	3,150,000
17.	<u>Tons less well indicated on</u> <u>Southern Extension</u>	
	(a) Tons above 1,200 feet ASL - south slope South Comet Hill (indicated only by SC3 and Adelaide Mine Creek workings)	270,000
	(b) Tons ASL 700 feet to 1,200 feet ASL south slope South Comet Hill	540,000
18.	<u>Possible mineralised ground</u> <u>beneath Kosminsky and South</u> <u>Comet Hills</u>	
	(a) Possible tons from 300 feet BSL to 700 feet ASL (yet to be indicated by exploratory drilling)	4,860,000
	(b) Tons 300 feet BSL to 700 feet ASL, South Comet Hill	1,080,000

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SUMMARY

1. Roughly Indicated Better Mineralised Ground

On and beneath Kosminsky Hill and South Comet Hill we have the following prospective tonnage already indicated - to be discounted by oxidised "ore" and some limited stoped "ore".

Above ASL 1,200 feet (lowest point landsurface)

- 1) South Comet Hill north slope 450,000
- 2) South Comet Hill southern extensions 270,000
- 3) Kosminsky Hill 270,000

Below 700 feet ASL to 1,200 feet ASL (i.e. drilled zone)

- 1) Kosminsky Hill-South Comet Hill north slope 2,430,000
- 2) Kosminsky Hill-South Comet southern extensions 540,000

3,960,000

2. Untested deep zones

Untested zones from 300 feet BSL to 700 feet ASL

- 1) Kosminsky-South Comet Crest 4,860,000
- 2) South Comet Crest - Adelaide Creek Mine 1,080,000

Total 5,940,000

3. Total target Kosminsky-South Comet Hill 9,900,000 tons of US\$27+ ore.

4. This target exists in the Kosminsky-South Comet Prospect alone and one third of it is roughly indicated as mineralised ground but not proved.

This target tonnage from a single prospect compares reasonably well with the Schanz-Juillard expectations of economic viability.

5. This target does not include lateral extensions of similar ore types which must eventually be considered in the mineral economics of the district.

- 1) Northern extensions - Kosminsky Hill, 5,000 feet exploration strike length;
- 2) Southern extensions - Adelaide Mine Creek south to permit border;
- 3) Comet-North Comet - 7,000 feet exploration strike length;
- 4) Kosminsky Hill West lateral extensions, where drilling has already established drill intersections with good values - 8,000 feet strike length;
- 5) Ainslie-King Dundas Lodes east of Kosminsky;
- 6) Banner Cross where wide lodes were encountered in past;
- 7) Adelaide; Red Lead; Anderson; Hasset and other prospects in the Zeehan sector of the permit;
- 8) Any expectations from Sylvester or other Heemskirk targets.

#### CONCLUSIONS AND RECOMMENDATIONS

1. The length, some widths of mineralisation, success and frequency of drilling intersections indicate that the Kosminsky-Comet is a large target on which further steps on the path to mining should be made in stages. However, when mining ore reserve calculations are made, much of intersections may be discounted because of narrowness or weakly mineralised bands.

2. A target tonnage of the order of 3,000,000 tons \$US27 ore could be broadly indicated by drilling at shallow depths. This tonnage will not be proved technically until fill-in drilling is completed at close spacing.

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3. A target tonnage approaching 10,000,000 tons of \$US 27 ore of Pb, Zn and Ag remains to be tested. The geologic nature of ore occurrence is not well known as yet so that this tonnage is speculative but a real possibility.
4. Extensions on strike and many lateral targets (with indicated mineralisation) exist and remain to be tested for further tonnage additional to that of Kosminsky-South Comet.
5. The average intersection grade is not bonanza but should be viable if the indicated tonnage can be proved, and readily won at profit if untested extensions and deeps also prove up. The presence of sweeteners (for example in the form of Cadmium, the highly priced associate of Zinc) have not been considered in the value of the ore though assays of several intersections suggest that this metal alone could be present to the value of \$3 to \$8 per ton in sections of the most zinc rich ore.
6. A huge drill footage, possibly to the order of 300,000 feet of drilling, may be needed to fully prove the zone indicated but much of this could be deferred until cash flow from a mine eventuated. When the nature of ore habit is more fully known and partial development is done the holes can be sited to best advantage economically at surface or underground.
7. Provided the geologic situation is suitable in depth, and provided grades persist laterally and with depth, the Kosminsky-South Comet prospect alone may justify a mine of the order envisaged by the Schanz-Juilland report.

The outlying prospects add greatly to the attractiveness of the Zeehan area and whilst detailed proving of the Kosminsky is under way, exploratory drilling should also be carried out on these other prospects as they might materially alter the scale of operations eventually possible.

8. Early discussions should be made with the Government Departments of Mines and Lands, Tasmania, on the matter of our possible needs in the way of land and water for a possible mine and township, and transportation routes. This is necessary so that any parliamentary or legal action necessary in the future may not stifle developmental plans at any critical stage.

9. Capital approvals for earth moving equipment for access routes and rig shifting should be sought at an early date.

#### FORWARD PROGRAMS

The following programs are recommended. There will need to be some flexibility in these programs depending on resources available and day to day problems in utilising resources. Resources should be devoted to a blending of listed programs that will hasten the policy objective of proving a mine.

#### PROVING AND EXPLORING

1. Prove blocks already indicated on Kosminsky Hill and South Comet Hill from surface to 700 feet ASL by spacing intersections at 100 feet lateral and vertical centres.
2. Diamond drill to indicate or disprove "ore" from 200 feet ASL to 700 feet ASL.
3. Should Program 2 be successful, diamond drill to indicate ore from 300 feet BSL to 200 feet ASL.

- 4. Diamond drill lateral extensions, e.g.
  - 1) Kosminsky West (important intersections already met).
  - 2) Ainslie-King Dundas Line.
  - 3) Adelaide Mine area including Red Lead, Andersons etc.
  - 4) Platt-West Comet Line.
  - 5) Hassett Line.
  - 6) Bonanza Line.
  - 7) Comet-North Comet Section.

OPERATIONAL PLANNING

Quite apart from eventual mining feasibility, engineering planning for surface operations in exploration and preliminary development, particularly access routes, is now necessary. The first steps should be:

- 1. detailed survey of Comet-Kosminsky Hills:
- 2. planning semi-permanent access routes to best advantage for drill sites;
- 3. planning and construction of routes to potential mine and mill sites, dam sites and water supply routes, town sites, external access etc.

MINING FEASIBILITY

- 1. The general scheduled plan of the Schanz-Juilland report should be maintained with progressive data collection and decision points.

There is probably need for review of the cost estimates especially in the field of prove-up drilling.

2. At this point in time an inspection in the field and examination of Geophoto geologic and drill and assay data by a competent mining engineer is desirable to advise on operational planning, possible alternative mining methods etc. and to generally assist at arriving at the correct decisions.

Some modern underground mines have recently been established in Australia and at least three in West Tasmania. Of these, Renison with trackless mining and haulage, and now working shallow dipping sheets, is close to Dundas. However, at Cobar, New South Wales, newly established operations involve a trackless mining operation and shaft haulage. This situation (as with a reputedly similar and very efficient moderate scale underground operation at Cleveland, north of Dundas) may fit the steeply dipping Dundas lodes better than conventional methods. Considerable ore can, however, possibly be reached from adits in the hilly country.

3. Bulk samples should be gained for mill treatment experimentation through existing adits and shafts. A local miner might do this on a contract basis.

OPTION

Present data suggest that the option from J. Smyth over 64 acres of lease at Great South Comet should be taken up. However, timing is not critical with this as the option has a considerable period to run.

J.H. Rattigan  
June, 1970.

**GEOPHOTO MINERALS REPORT 1970/38A**

**PROPOSALS ON COMET-KOSMINSKY FOR 1970-1971.**

**TEXINS DEVELOPMENT PTY. LTD.**

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PROPOSALS ON COMET-KOSMINSKY PROSPECT FOR 1970-1971

I. INTRODUCTION

1. The Kosminsky-South Comet Prospect (see Geophoto Minerals Report 1970/38) is a significant Pb-Zn-Ag prospect on which mineralisation has been proved by drilling over a considerable strike length.

2. This drilling has only indicated that a mineable tonnage of ore may be available, but does not conclusively prove this.

3. Economic studies show that the grades indicated are such that a moderate to large scale mining and milling operation conducted efficiently would succeed on such grades provided a market is found for Pb, Zn and Ag.

II. PROPOSALS FOR IMMEDIATE ACTION

1. The most important step in the exploration sequence now is to prove that large mineable tonnage at adequate grade exists at Dundas.

2. The geological problem involves whether ore shoots within lodes are sufficiently extensive or repetitious over most of the strike length (as present drilling has indicated) to be extracted

economically, at the scale envisaged in the Schanz-Juilland report.

For this purpose the following steps are proposed:

- (1) Cease drilling on the Kosminsky Prospect until:-
  - a) geological plans and sections are brought up to date;
  - b) reliable interpretations on correlation of mineralised intersections and the distribution of "ore" shoots can be made;
  - c) interpretation of faults.
- (2) Proper topographic survey of whole area and re-gridding to a mine grid oriented more closely to the mean strike of lodes.
- (3) Drilling to grid cross sections to intersect lodes at carefully chosen levels and lateral spacings (100 feet in upper levels) so that data can be most meaningful (statistically) in ore reserve calculations.

3. It should be realised that our early drilling to date has been exploratory with holes placed on the basis of:-

- (1) very limited geologic data and unknown ore body location;
- (2) limited access;
- (3) limited funds for providing and maintaining access in difficult terrain. Much of the drilling was done in very bad winter weather conditions.

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For this reason holes were planned, and have achieved, the prime objective of indicating a long strike length of mineralised country. The holes were placed at times for expediency under prevailing weather and financial conditions, rather than to proper grid normal to the strike of lodes (which is still not really established in all cases).

In general, hoped-for intersections were regularly spaced along a suspected line of strike (except for two holes where other factors were considered) and hole sites and azimuths chosen by financial expediency to achieve spaced intersections.

III. GEOLOGY

1. The geology is complex and it is proposed that Paterson be relieved from the field at earliest to plot and assist interpretation of data at head office.
2. Many problems of formation, fault and lode correlation and "ore" geometry need attention before resuming drilling. These include:
  - i) examination of data for hangingwall and footwall lodes parallel to the main Kosminsky and Great South Comet Lodes. This may need testing by probing country beyond that penetrated by the existing drill pattern.

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III. GEOLOGY (cont.)

- ii) the number of lodes and their correlation;
- iii) fault pattern and characteristics.

Models, plans, cross and long sections need to be completed prior to this work.

IV. DRILLING

1. The drilling and sampling methods for a huge proving footage must be closely examined and proper planning done for cost effectiveness.

2. Diamond drilling has been remarkably efficient and cheap in view of the terrain and climatic hazards.

However, as the existing pattern was shallow and was dictated by financial expediency, and used existing access to the limit, it must not be assumed that future drilling will be as cheap.

3. Controlled drilling is now necessary. This, because of proper site location, and maintenance of hole azimuth and inclination to the target level and block position, will mean increased cost.

4. Deeper drilling will also add to costs.

5. Diamond drilling is not essential for every hole. Some deeper drilling should be angled core drilling but some centres could be done by alternative sampling methods provided reasonable assay samples in lode are recovered.

6. Shallower prove-up drilling, particularly fill-in centres,

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can probably be done most cheaply by a rotary rig, track mounted, with rotary percussion (down-hole hammer) and rotary rock bit capacity. We will have sufficient knowledge of lode position in prove-up drilling to make open hole to near lode and core (if other type sampling is impracticable) through lode for assay sample.

7. Drilling proposed would involve several types of program conducted simultaneously:

- (1) Proving ground on the backs of No. 1 South Comet adit level (1,200' ASL) and to 500 feet below this level (700' ASL) at 100 foot centres. Shallow (to 200 feet) holes may be considered for percussion or rotary drilling though ground may be wet.
- (2) Indicating ore in the deeper blocks from 200' ASL to 600' ASL at 200 foot centres.
- (3) Indicating hanging wall and footwall "ore" beyond that known - geologically selected exploratory holes.
- (4) Indicating lateral extensions or on new lodes in the Dundas Permit - geologically selected exploratory holes.
- (5) Indicating ore in deep blocks from 300' BSL to 200' ASL - exploratory holes at 400 foot centres.

8. These programs are designed:

- (1) to prove mineable tonnage at the order of grades already met;
- (2) to indicate as fully as possible additional tonnage so that the best economic scale of working and treatment can be had after feasibility studies.

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9. A table is presented giving comparisons of estimated drill costs with alternative drilling layouts. Actual footage and costs of drilling proposals will be revised when Paterson is free to assist with this work. A topographic survey will be necessary for accurate estimates.

10. Capital approvals for drilling would involve the following:

- (1) Directional Survey Instrument.           \$A 5,000
- (2) Rotary rig with hammer capacity  
    (more flexible than Schramm).
- (3) Additional diamond drills.
- (4) On site warehouse and core shed,  
    and men's quarters.

V. PROJECT PLANNING AND FEASIBILITY

When geologic study is complete a decision should be made on the scale of further capital and expense money necessary for proving according to an economic report, updated on all data.

It is considered essential that an engineering-metallurgical-geological project group staffed by experienced personnel in each section be gathered if all decisions on go-aheads are favourable. Even should consultants be used on feasibility an in-house feasibility study group is essential to control consultants program.

On our present staffing and budgeting situation I think it would be realistic to envisage the following short term schedule:

- (1) Complete geological report - September 30th, 1970.
- (2) Drill layout and methods - September 30th, 1970.
- (3) Brief check mining inspection and appraisal by September 30th, 1970.
- (4) Operational planning and construction of access and surface works - continuous from present date.
- (5) Exploratory probing - one rig continuous from present date.
- (6) Prove up drilling on main Kosminsky Line. Commence October 1st, 1970 with 2 rigs, rising to 4 in December, 1970.

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- (7) If results of 6. continue to be positive, metallurgical testing should be commenced from January 1st, 1970. 1971?
  - (8) If results of 6. (with 5. and 7.) continue to be good by March 30th, 1971, a feasibility project team should be established and be actively engaged thereafter.

J.H. Rattigan.

**TABLE I. COMPARISONS OF DRILLING COSTS - PROVING CAMPAIGNS**

Type of drilling and block drilled		No. of holes		Total footage estimated	Approx. estimated Cost \$A
		DDH	Rotary		
I Diamond drilling only	Ia. Proving at 100' centres, ASL 700' to ASL 1,200'	185	-	67,000	670,000
	Ib. Indicating at 200' centres, ASL 200' to ASL 700'	36	-	38,000	380,000
	Ic. Indicating at 400' centres, BSL 300' to ASL 200'	10	-	16,000	160,000
	<b>Total Case I</b>	<b>231</b>	<b>-</b>	<b>121,000</b>	<b>1,210,000</b>
II Replacing Ia above partly by shallow hammer holes then coring through lode with some DD for geological control	IIa Rotary hammer	-	111	30,000	75,000
	Diamond 700' ASL to 1,200' ASL	74	-	35,000	350,000
	IIb As for Ib	36	-	38,000	380,000
	IIc As for Ic	10	-	16,000	160,000
	<b>Total Case II</b>	<b>120</b>	<b>111</b>	<b>119,000</b>	<b>965,000</b>
III Similar to II but with some deeper rock bit rotary holes*at 400' centres  *If rock bit drilling is feasible in type of ground	IIIa As for IIa	74	111	30,000 35,000	75,000 350,000
	IIIb Diamond holes at 200' ASL	18	-	20,000	200,000
	Rotary rock bit holes at 500' ASL	-	18	14,000	56,500
	IIIc Diamond holes at 300' BSL	5	-	10,500	110,000
	Rotary rock bit holes at SL	-	5	6,000	24,000
<b>Total Case III</b>	<b>97</b>	<b>134</b>	<b>115,300</b>	<b>815,000</b>	

These figures are illustrative only and are based on one pattern from level ground at 1,200' ASL. In actual case topography and extra drill holes above 1,200' ASL must be considered. Other patterns and drill types are possible. Costs are based on \$10 per foot for Diamond Drilling, \$2.50 per foot for Hammer Drilling and \$4 per foot for rock bit drilling.

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# CONFIDENTIAL

GEOPHOTO MINERALS REPORT 1970/38

(PRELIMINARY)

KOSMINSKY-SOUTH COMET TARGET APPRAISAL

AT JUNE 30TH, 1970.

BY

J.H. RATTIGAN

TEXINS DEVELOPMENT PTY. LTD.

INTRODUCTION

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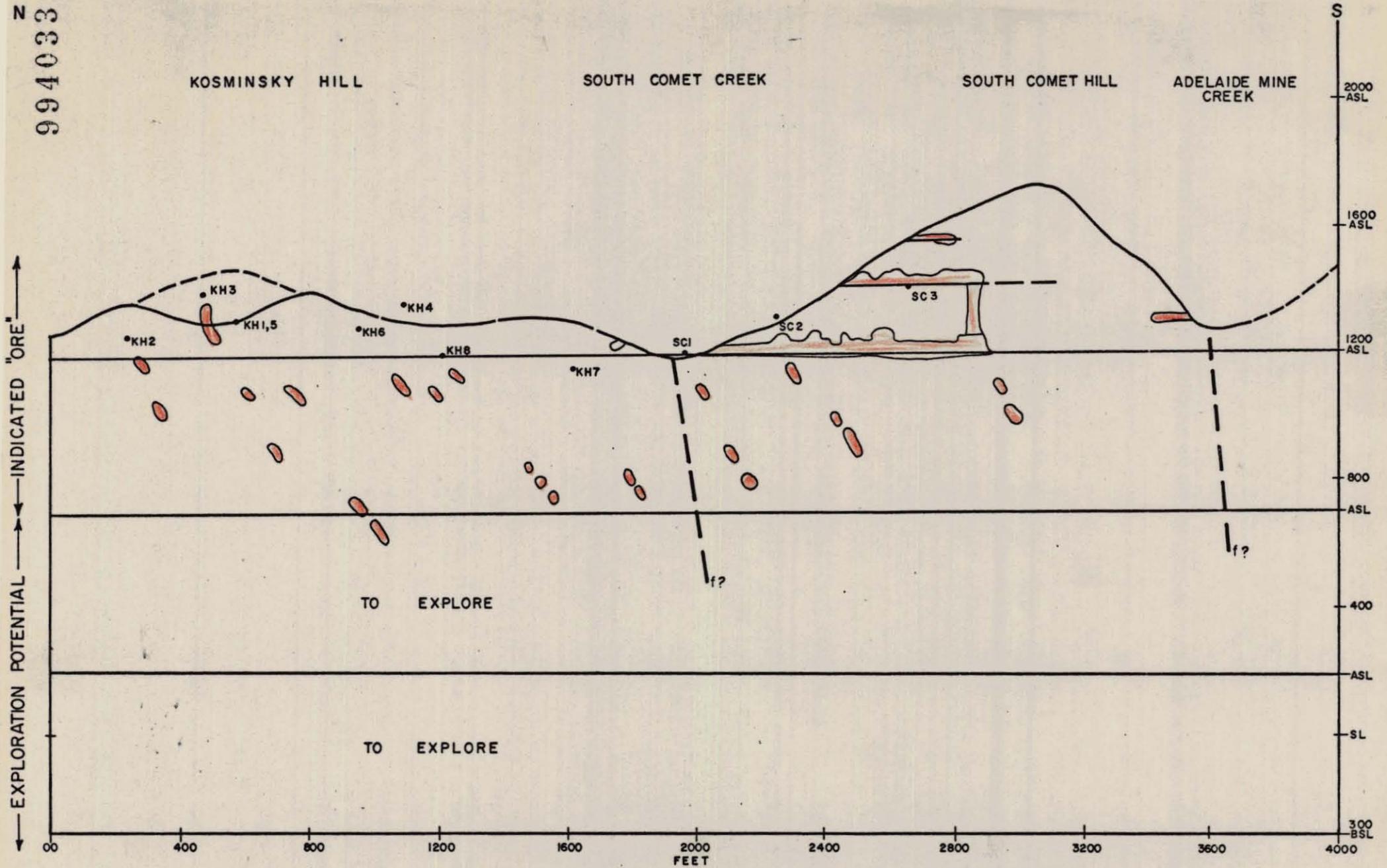
"Ore" is used below to convey highly mineralised rock that may be ore, i.e. from wider intersections and grade of about 7% Pb equivalent or better.

Proved: Ore reserves are not proved until a block of ground has been sampled on all sides or, in the case of narrow tabular bodies, penetrated at such close spaced intervals that statistically there is little room for error between calculated grades and actual worked tonnages and grades. "Ore" at Kosminsky is not yet proved.

Indicated: Ore reserves are said to be indicated on lesser information and give the scale of target reasonably well outlined by drilling or development, but which must be proved up.

The Kosminsky-South Comet mineralisation is indicated by surface oxidized cap, some old adits and shafts and a single line of drill holes penetrating lodes at single points below the land surface.

994033



SKETCH LONG SECTION COMET

Scale: 1 inch = 400 feet.

5 cm

- PROJECTED DDH COLLAR.
- KNOWN "ORE" INTERSECTIONS PROJECTED.

Lode: Is the whole zone of altered rock in which ore shoots lie. It refers to the whole altered channelway and depositional zone in the case of epigenetic deposits. It is not synonymous with ore.

Ore Shoot: Refers to a body containing the actual volume of highly mineralised rock that can be mined at profit.

True Width: Refers to true thickness measured by a line normal to (T.W.) the walls of a lode, vein or ore shoot respectively.

#### THE PROSPECT

The prospect consists of a southern part of the Comet-Kosminsky-South Comet Line (Geophoto Minerals Report 1969/55). It lies on and beneath two hills ranging to about 1,770 feet above sea level (ASL) on the peak of South Comet Hill separated by South Comet Creek at about 1,200 feet ASL.

The figure (drawing 1/237) attached, conveys the present picture in long section.

Sulphides of Pb and Zn, (highly argentiferous in the case of high Pb lodes and high cadmium bearing in the case of Zn lodes) are the potential ore minerals.

Both Pb and Zn and intermixed lodes occur and no control is yet known for the occurrence of each type.

On average lead predominates over zinc in the ratio of 1.7/1.0 in drilling so far but this ratio could change.

Oxidised cap is not strong on these hills in contrast to the Comet sector to the north and primary sulphides occur in places at grass roots. Some gossanous caps do occur but full oxidation below about 60 feet is not expected.

The sulphides are extremely coarse grained and should present no extreme separation difficulties. The deposits so far met with are all fissure deposits although strata bound deposits remain a strong exploration objective.

Gangue is chiefly carbonate - a highly ferruginous ankerite or siderite is common - and slate or carbonate country rock.

#### APPRAISAL OF DATA

The following listed data relate to global calculations (rather than calculations from hole to hole) from drilling and covering richer mineralised intersections. The calculations were made from a longitudinal section, average intersection length corrected to inferred approximate true width and average assays of intersections weighted for length. This report is to be considered as a target appraisal (i.e. to see whether a target of viable size is still within our grasp) rather than a mine geologic appraisal which involves many facets of detailed geometry that we do not yet have data on, so that proper tween-hole "ore" geometry is not known. The latter must wait for additional lateral and deeper drilling before mining analysis can be made after construction of cross sections, longitudinal sections, projections and models on this data.

Strike and dip of lodes at various points is not yet positively known. The inferred thickness was calculated for a body dipping at  $70^{\circ}$  in a direction normal to each drill hole. This figure of 18' is very much a global approximation but is of the correct order where greatest geometric data on ore is available at South Comet Hill.

At Kosminsky-South Comet Prospect, sampling through the lodes at 50 feet centres (by drilling or development) is considered necessary before the ore reserves are considered proven. This is a huge task and need not all be necessarily done prior to mining.

The target tonnage for viability according to the Schanz-Juilland report of April 1st, 1970, is 6,000,000 tons with an additional equivalent amount indicated. This tonnage of fully proven ore seems overlarge for commencing operations and I would think 3,000,000 tons of fully proved ore (\$60+ million gross) to be adequate (to amortise exploration, mining and mill capitalisation and some years operations) provided additional (but reasonably assured) ore, that can be proved up fully out of cash flow, is indicated.

The nature of lode and ore shoot habit is not clear. Multiple intersections are met with in most holes. These may represent separated parallel or en echelon lodes; or branching lodes from a main fissure; or even in some cases faulted repetitions.

However, the frequency of intersection and multiple intersection at average spacing of about 270 feet along strike on present drilling gives great expectation that intervening sections will likewise yield similar results with respect to grade and intersection thickness. Only mineralised intervals that grade significantly at 5 feet intersection lengths or greater are considered here. Many other mineralised intersections occur and some may make ore at intervals along the line.

To date, drills have penetrated and proved mineralisation for more than 1,000 feet below the topmost hill on the Kosminsky-South Comet line of lodes. The lodes are still brecciated and show open "ore" fillings and replacements. It is therefore a reasonable

expectation that lode channels may have been open for mineralisation to depths of half the already proved vertical range (1,000+ feet) and possibly to as much as 1,000 feet below the level penetrated by drills.

Whether this is so remains, however, to be proved by drilling. Thrust faulting if present at depth (whether pre-ore or post-ore) could eliminate "ore" occurrences at depth. There is some chance of such a thrust sheet but only drilling will establish this.

PRECIS OF DATA - KOSMINSKY-SOUTH COMET DRILLING

1. Inclined holes.	Total 11. (KH DDH 1, 2, 3, 4, 5, 6, 7, 8; SC DDH 1, 2, 3).
2. Inclined hole footage.	8,343 feet.
3. Vertical hole and footage.	One only. (KH DDH 2A); 427 feet.
4. Approximate average drilling cost (to May 31st).	\$7.50 per foot.
5. Range of intersection lengths considered.	5 feet - 65 feet.
6. Range of true widths considered.	4.2 feet - 54.6 feet.
7. Average intersection length (10 inclined holes).	21.4 feet.
8. Possible true width corresponding to 21.4 feet I.L. = 18 feet (calculated on 70° lode dip towards drill hole and a drill hole dip of 55°. As hole flattens the effect is one of increasing T.W. When hole is not normal to strike T.W. is less.	18 feet

- |   |   |
|---|---|
| 9. Average grade (weighted for varying intersection lengths) over 9 inclined holes for which assays are complete.   | Pb 4.15%<br>Zn 2.45%<br>Ag 2.25 oz/ton. |
| 10. Approximate value of average grade (\$US) - current metal prices (metal in ground basis - not recovery basis).  | \$27 (+ sweetener such as Cd).          |
| 11. Strike length of drill indications.   | 2,700 feet +                            |
| 12. <u>Strike Extensions</u> : This length is open ended on southern extensions for 600 feet to Adelaide Mine Creek and probably faulted extensions exist on northern extensions beyond Kosminsky Hill, and southern extensions south of Adelaide Mine Creek. |   |
| 13. <u>Lode Habit</u> : Multiple lodes in fault zones. Whether these are in parallel, en echelon or branching fissures, it is not yet known. Cross faulting of lodes is suspected and some fault repetitions may exist.                                       |   |
| 14. <u>Lateral extensions</u> : Many indicated or suspected lines of lode.  |   |

15. <u>Range of Elevation of Land Surface</u> (over indicated strike of 2,700 feet).	570 feet
16. Deepest Vertical Penetration by drills beneath highest point in land surface (over indicated strike).	1,130 feet
17. Deepest penetration below lowest point in land surface (about 1,200 feet ASL)	560 feet
18. <u>Indicated "Ore" reserves</u> (based on a line of single drill holes only vertically beneath any point on the land surface).	
(a) <u>Tons per vertical foot per hundred feet of strike</u> (based on factor 10 c.ft. in place = 1 ton "ore" and at 18 ft. true width of total "ore" intersection).	100
(b) <u>Tons per vertical foot per 2,700 feet indicated strike length.</u>	4,860
(c) <u>Tons above 1,200 feet ASL</u> (lowest surface topographic level), (to be qualified by stoped and oxidised ore of yet unknown quantity)	
1) North slopes South Comet Hill	450,000
2) Kosminsky Hill	270,000

18.	(d) <u>Tons from 700 feet to 1,200 feet</u> (reasonably indicated by drilling over 2,700 feet).	2,430,000
	(e) <u>Total tons reasonably well indicated to date</u> (needs discounting for stoped and oxidised material).	3,150,000
19.	<u>Tons less well indicated</u>	
	(a) Tons above 1,200 feet ASL - south slope South Comet Hill (indicated only by SC3 and Adelaide Mine Creek workings)	270,000
	(b) Tons ASL 700 feet to 1,200 feet south slope South Comet Hill	540,000
20.	<u>Potential mineralised ground beneath Kosminsky and South Comet Hills</u>	
	(a) Possible tons from 300 feet BSL to 700 feet ASL (yet to be indicated by exploratory drilling)	4,860,000
	(b) Tons 300 feet BSL to 700 feet ASL, South Comet Hill -	1,080,000

SUMMARY1. Reasonably Indicated

On and beneath Kosminsky Hill and South Comet Hill we have the following prospective tonnage already indicated - to be discounted by oxidised "ore" and some limited stoped "ore".

Above ASL 1,200 feet (lowest point landsurface)

1) South Comet Hill north slope	450,000
2) South Comet Hill southern extensions	270,000
3) Kosminsky Hill	270,000

Below 700 feet ASL to 1,200 feet ASL (i.e. drilled zone)

1) Kosminsky Hill-South Comet Hill north slope	2,430,000
2) Kosminsky Hill-South Comet southern extensions	540,000
	<u>3,960,000</u>

2. Untested deep zones

Untested zones from 300 feet BSL to 700 feet ASL

1) Kosminsky-South Comet Crest	4,860,000
2) South Comet Crest-Adelaide Creek Mine	1,080,000
Total	<u>5,940,000</u>

3. Total target Kosminsky-South Comet Hill 9,900,000 tons of US\$27+ ore.

4. This target exists in the Kosminsky-South Comet Prospect alone and one third of it is reasonably well indicated but not proved.

This target tonnage from a single prospect compares reasonably well with the Schanz-Juilland expectations of economic viability.

5. This target does not include lateral extensions of similar ore types which must eventually be considered in the mineral economics of the district.
- 1) Northern extensions - Kosminsky Hill, 5,000 feet exploration strike length;
  - 2) Southern extensions - Adelaide Mine Creek south to permit border;
  - 3) Comet-North Comet - 7,000 feet exploration strike length;
  - 4) Kosminsky Hill West lateral extensions, where drilling has already established drill intersections with good values - 8,000 feet strike length;
  - 5) Ainslie-King Dundas Lodes east of Kosminsky;
  - 6) Banner Cross where wide lodes were encountered in past;
  - 7) Adelaide; Red Lead; Anderson; Hasset and other prospects in the Zeehan sector of the permit;
  - 8) Any expectations from Sylvester or other Heemskirk targets.

#### CONCLUSIONS AND RECOMMENDATIONS

1. The length, widths of mineralisation, success and frequency of drilling intersections indicate that the Kosminsky-Comet is a large target on which further steps on the path to mining should be made in stages (See - Schanz-Juilland Report, April 1st, 1970. page 32).
2. A target tonnage of the order of 3,000,000 tons \$US27 ore has been broadly indicated by drilling at shallow depths. This tonnage will not be proved technically until fill-in drilling is completed at close spacing.

3. A target tonnage approaching 10,000,000 tons of \$US 27 ore of Pb, Zn and Ag remains to be tested. The geologic nature of ore occurrence is not well known as yet so that this tonnage is speculative but a real possibility.
4. Extensions on strike and many lateral targets (with indicated mineralisation) exist and remain to be tested for further tonnage additional to that of Kosminsky-South Comet.
5. The average grade is not bonanza but should be viable if the indicated tonnage can be proved, and readily won at profit if untested extensions and deeps also prove up. The presence of sweeteners (for example in the form of Cadmium, the highly priced associate of Zinc) have not been considered in the value of the ore though assays of several intersections suggest that this metal alone could be present to the value of \$3 to \$8 per ton in sections of zinc rich ore.
6. A huge drill footage, possibly to the order of 300,000 feet of drilling, may be needed to fully prove the zone indicated but much of this could be deferred until cash flow from a mine eventuated. When the nature of ore habit is more fully known and partial development is done the holes can be sited to best advantage economically.
7. Provided the geologic situation is suitable in depth, and provided grades persist laterally and with depth, the Kosminsky-South Comet prospect alone may justify a mine of the order envisaged by the Schanz-Juilland report.

The outlying prospects add greatly to the attractiveness of the Zeehan area and whilst detailed proving of the Kosminsky is under way, exploratory drilling should also be carried out on these other prospects as they might materially alter the scale of operations eventually possible.

8. Early discussions should be made with the Government Departments of Mines and Lands, Tasmania, on the matter of our possible needs in the way of land and water for a possible mine and township, and transportation routes. This is necessary so that any parliamentary or legal action necessary in the future may not stifle developmental plans at any critical stage.

9. Capital approvals for earth moving equipment for access routes and rig shifting should be sought at an early date.

#### FORWARD PROGRAMS

The following programs are recommended. There will need to be some flexibility in these programs depending on resources available and day to day problems in utilising resources. Resources should be devoted to a blending of listed programs that will hasten the policy objective of proving a mine.

#### PROVING AND EXPLORING

1. Prove blocks already indicated on Kosminsky Hill and South Comet Hill from surface to 700 feet ASL by spacing intersections at 100 feet lateral and vertical centres.
2. Diamond drill to indicate or disprove "ore" from 200 feet ASL to 700 feet ASL.
3. Should Program 2 be successful, diamond drill to indicate ore from 300 feet BSL to 200 feet ASL.

4. Diamond drill lateral extensions, e.g.
  - 1) Kosminsky West. (Important intersections already met).
  - 2) Ainslie-King Dundas Line.
  - 3) Adelaide Mine area including Red Lead, Andersons etc.
  - 4) Platt-West Comet Line.
  - 5) Hassett Line.
  - 6) Bonanza Line.
  - 7) Comet-North Comet Section.

#### OPERATIONAL PLANNING

Quite apart from mining feasibility, engineering planning for surface operations in exploration and preliminary development, particularly access routes, is now necessary. The first steps should be

1. detailed survey of Comet-Kosminsky Hills;
2. planning semi-permanent access routes to best advantage for drill sites;
3. planning and construction of routes to potential mine and mill sites, dam sites and water supply routes, town sites, external access etc.

#### MINING FEASIBILITY

1. The general scheduled plan of the Schanz-Juilland report should be maintained with progressive data collection and decision points.

There is probably need for review of the cost estimates especially in the field of prove-up drilling.

2. At this point in time an inspection in the field and examination of Geophoto geologic and drill and assay data by a competent mining engineer is desirable to advise on operational planning, possible alternative mining methods etc. and to generally assist at arriving at the correct decisions.

Some modern underground mines have recently been established in Australia and at least three in West Tasmania. Of these, Renison with trackless mining and haulage, and now working shallow dipping sheets, is close to Dundas. However, at Cobar, New South Wales, newly established operations involve a trackless mining operation and shaft haulage. This situation (as with a reputedly similar and very efficient moderate scale underground operation at Cleveland, north of Dundas) may fit the steeply dipping Dundas lodes better than conventional methods. Considerable ore can, however, possibly be reached from adits in the hilly country.

3. Bulk samples should be gained for mill treatment experimentation through existing adits and shafts. A local miner might do this on a contract basis.

#### OPTION

Present data suggest that the option from J. Smyth over 64 acres of lease at Great South Comet should be taken up. However, timing is not critical with this as the option has a considerable period to run.

J.H. Rattigan  
June, 1970.