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T E C T O N I C   S U R V E Y

&

P H O T O G E O P H Y S I C A L   S T U D Y

FOR

EXPLORATION SERVICES SUPPORT GROUP

A N Y O X   B. C.

S K E E N A   M I N I N G   D I V I S I O N

BUCK CLAIM GROUP

CANADIAN ZEOLITE LTD.

P R E L I M I N A R Y   R E P O R T

TO ACCOMPANY

Isogradient Mapping of Apparent Density/Unit Area

BY

D.A. CHAPMAN

April 1996

RESULTS OF PHOTOGEOPHYSICAL SURVEY - BUCK CLAIMS, ANYOX B.C.

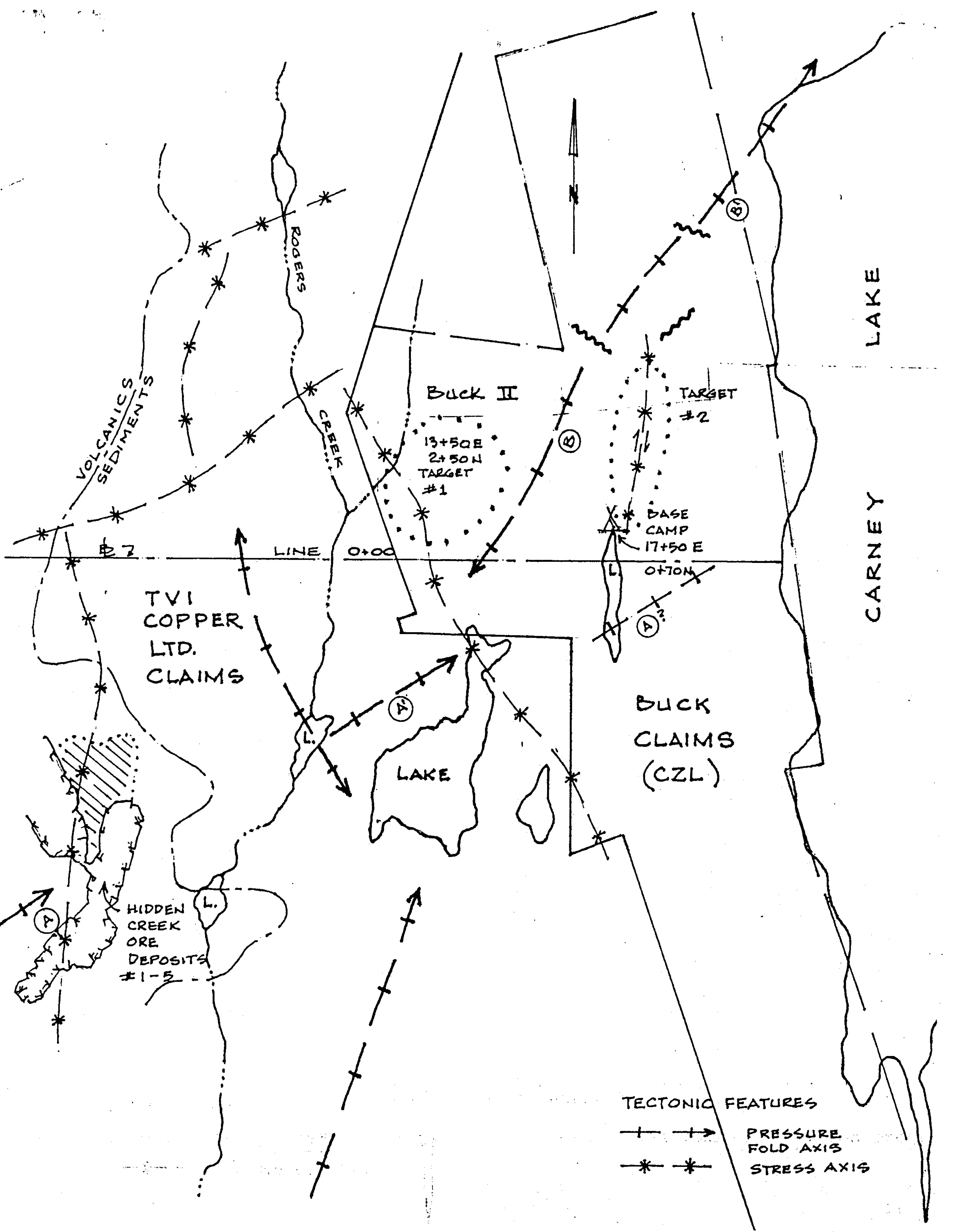
Preliminary Report on projected Exploration Targets.

The tectonic survey covered the area of the Hidden Creek Mine at Anyox, B.C and adjacent area of the Buck Claims. The Anyox ore pits being approx. 3500 feet southwest from the Buck II Claim. For the purpose of this survey the geological data was compiled at a scale of 1:5000. Photogeophysical data of visible isostatic fracture trace patterns are then compiled as empiric coefficients. The data per unit area is manipulated to provide the stress equivalents for relative deformation of the underlying cylinderical rock columns related to the tectonic effect of axial stress unloading across the crustal surface. (See Theory of Tectonic Analysis to accompany this report.)

There are two seperate surveys; one is to determine the relative amplitude or total intensity of the stress folds and the second a derivative to determine resultant shear couples induced as a result of lateral varying tectonic stress effects. The axial trends of pressure folds and their stress axes defined by the survey were transferred to a composite geological map showing the resultant probability isogradient for tension/shear couple occurences. Indicated tectonic axes being determined relative to the total stress range of the induced crustal deformation.

The anomolous tectonic stress feature of the survey was the breached Pressure Dome in which the #1 to #5 orebodies lie. This pressure high peaked in the surveyed area at a juncture of a mapped stressfold crossing the N-S Hidden Creek Anticline, (see Sharpe and Grove, 1980 and 1983). A parallel antithetic E-W synclinal trough was also mapped 2000 feet north of the orepits. These are geological features of the 'ore controls' which correlate to the tectonic study to provide a target projection of the probable geological/structural factors for an exploration program on the adjacent Buck II Claim.

The stress axis and resultant pressure ridge as determined by this survey, is an ENE trend of pressure folding marked **A-A'** on the map to accompany this report. The Hidden Creek orebodies lay within the breached apex of the anticlinal stress axis and this induced pressure ridge A-A'. The projection of crossfolding plunges northeast and a second breached pressure dome is indicated on the Buck II Claim underlain by sediments draped over the volcanic sequence of the 'ore zone target'. This second pressure dome is marked **B-B'**. There is a reasonable probability that a similar ore structure zone will be found at depth under the marker horizons of chert known to overly the targeted orebearing sequence. Using the 1987 Baseline 0+00 as map control, the selected target area would be centered at **sta 13+50 E and line 2+50 North** in an intersecting Shear Couple Zone. A small elongated lake straddling sta 17+50 E and Line 0+00 is easily accessible for a helicopter base camp should surface evidence warrant a diamond drill test.



ROGERS
CREEK
VOLCANICS
SEDIMENTS
BUCK II
13+50E
2+50N
TARGET
#1
TARGET
#2
BASE
CAMP
17+50 E
0+70N
LINE 0+00
TVI
COPPER
LTD.
CLAIMS
LAKE
BUCK
CLAIMS
(CZL)
HIDDEN
CREEK
ORE
DEPOSITS
#1-5
LAKE
CARNEY
N
TECTONIC FEATURES
PRESSURE
FOLD AXIS
STRESS AXIS

1. It is recommended a two-man field geology team be used to follow this survey up with geological traverses across the 2+50 N Line from Sta 12+00 E eastward to Carney Lake. Samples of **in situ** rock chips should be taken for rock geochemistry as well as for geologizing the traversed area. Mineralization where found should be surface explored for zoning 'markers' of the down dip, subsurface target being sought.

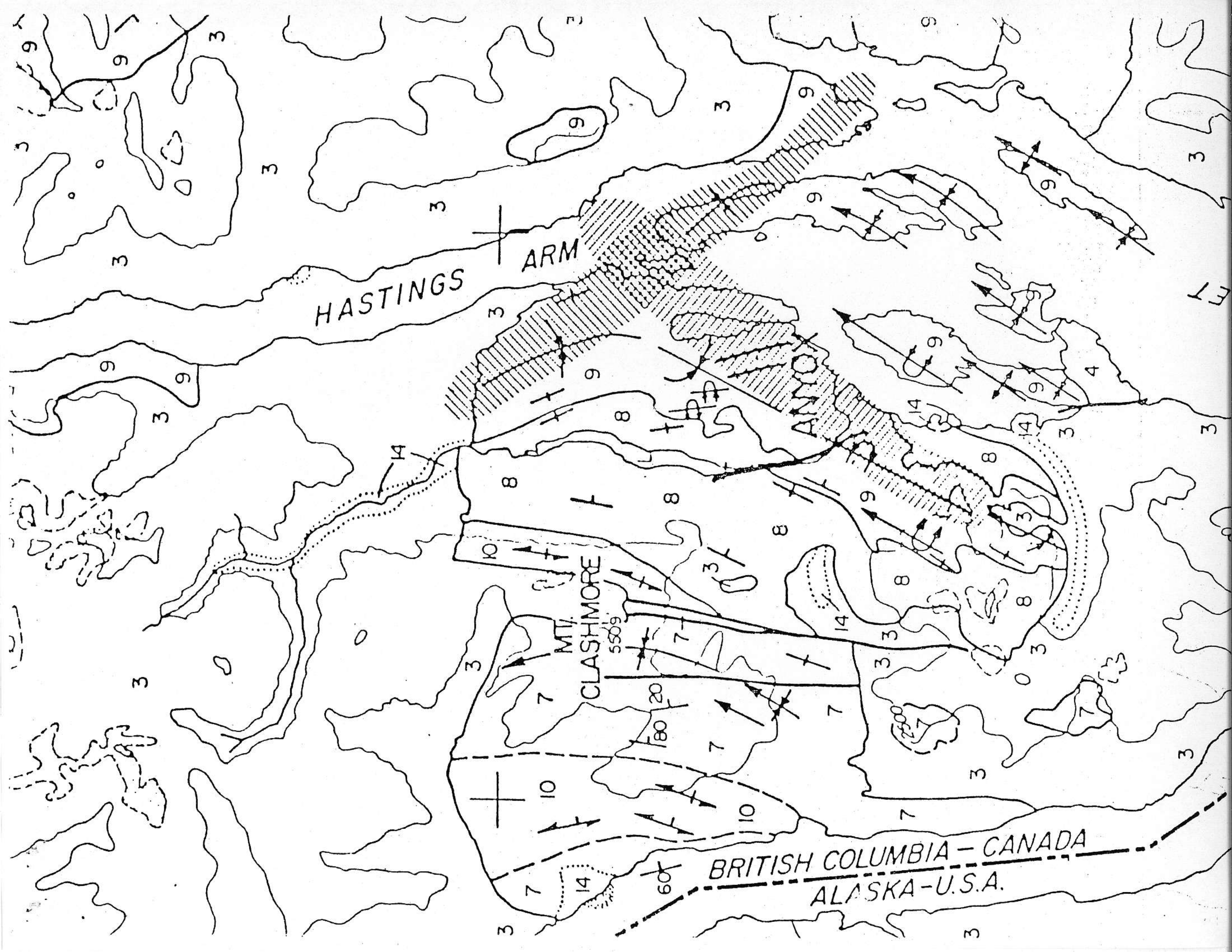
2. Using a magnetometer and base station, magnetic readings should be taken along the traverse relative to the 2+50 N Line, reversing the traverse and criss-crossing back to base camp along the 0+00 Baseline should provide sufficient data to contour the magnetic field within the zone of search. Where significant 'kicks' are noted, the strike and dip of the anomaly should be sought out by closer spaced readings using the vertical magnetic seperation technique to determine depths.

Note; a VLF-EM instrument is warranted if step 2 indicates a probable shear stucture. A recce grid across the structure should be run on 30 meter intervals, 300 meters out either way to provide data for a Fraser Filter, use reading spreads of 10m, 25m, and 50m to determine dip, width and depth to the suspected structure. These reconnaissance surveys of the target area would provide adequate field data to spot a drillhole station for two holes with a reasonable expectation of positive results.

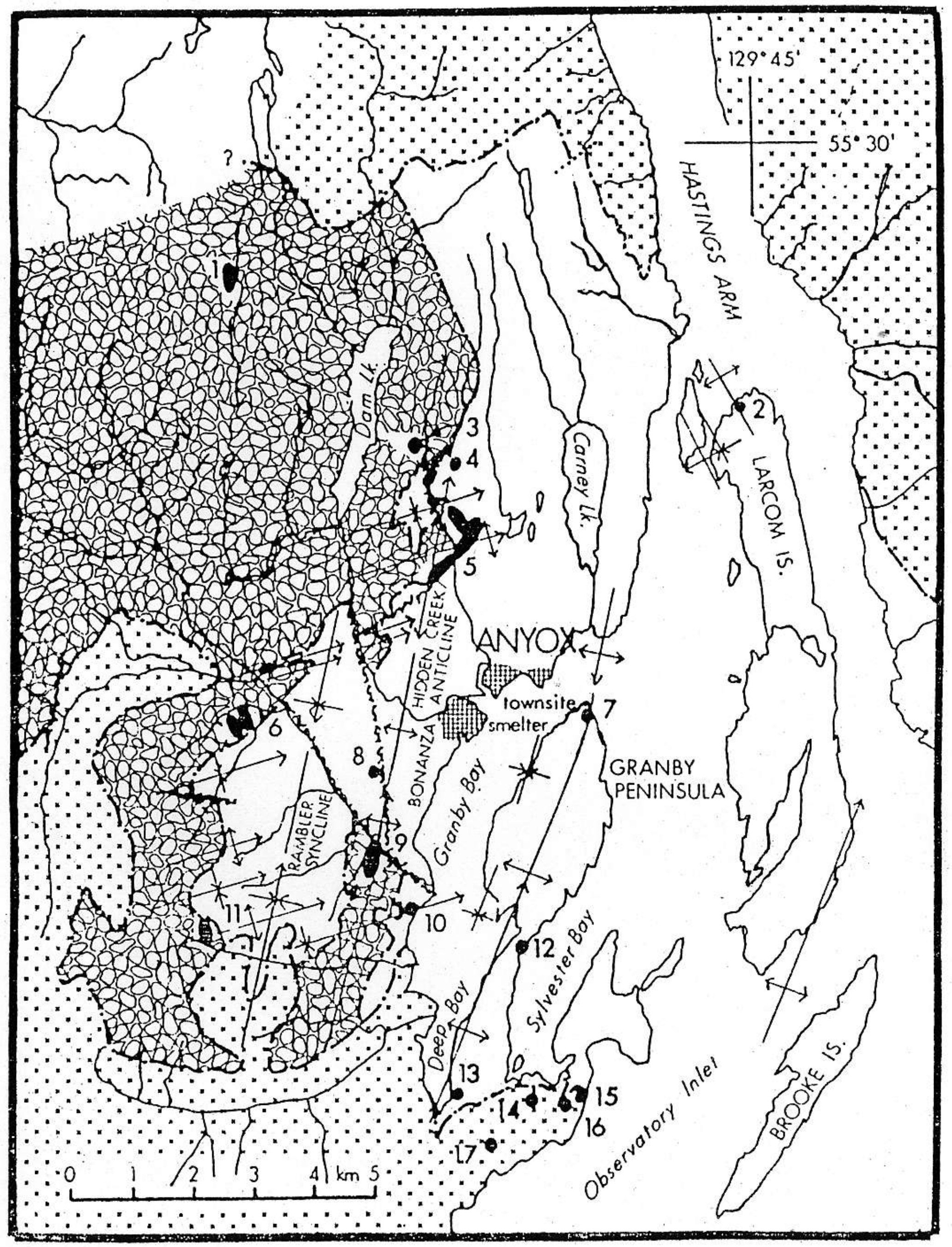
Mineralization may have accessed this claim area by transcending the defined shear zone from west to east outward from the large quartz/pyrite/sphalerite zone at sta 3+50 N and 3+50 E. The target area at sta 12+50 E may be quartz-veined structures in sediments within a major shear intersection distanced from the 'mezothermal zone' of the Hidden Creek orebodies. These shear structures may host epithermal vein deposits similar to Granby Pt. gold quartz. Traversing of two lines as recommended should provide geologic and geophysical confirmation if this is so.

If mineralizers emenated from below and westward along the basal contact, then iron rich orezones will relate to an induced stress axis striking N-S, east of the small lake at sta 17+50. It is possible this more easterly structure breached the domal feature B-B' from below and creating a pipe-like structure in the overlying sediments around sta 18+50 E and 4+00 N. Another interpretation would be a folded stratigraphic structure similar to the Hidden Creek Ore, down dip from the surface contact, and at a depth between 500 to 1500 feet. There should be a significant vertical gradient magnetic anomaly (±) associated with the mineralized flanks of the folds if the underlying orezone target was mineralized.

From the photogeophysical study and geologized cross sections typical of the Anyox ore deposits there is a highly probable structural and geological expectation for similar type orezones to be hosted under sediments overlying the Buck Claims warranting the drill test and exploration program for the targeted area.



HASTINGS ARM
ANYOX
MT. CLASHMORE
5509
BRITISH COLUMBIA – CANADA
ALASKA-U.S.A.



LEGEND

- COAST RANGE BATHOLITH
- SEDIMENTARY SEQUENCE
- PILLOW BASALTS SEQUENCE

SYMBOLS

	MINERAL OCCURRENCES	COMMODITIES	MINFILE NUMBERS
1	EDEN	Cu, Zn	103P-026
2	LARCOM ISLAND QUARTZ	Si	103P-227
3	DEADWOOD QUARTZ	Si	103P-243
4	QUARTZ	Si	
5	HIDDEN CREEK MINE	Cu, Zn, Pb, Co	103P-021
6	DOUBLE ED	Cu, Zn	103P-025
7	GRANBY POINT QUARTZ	Si, Au	103P-022
8	RAMBLER QUARTZ	Si	103P-226
9	BONANZA MINE	Cu, Zn, Pb	103P-023
10	BLACK BEAR	Si	
11	REDWING	Cu, Zn, Pb	103P-024
12	GOLDLEAF	Au, Si	103P-028
13	GOLSKEISH	Si, Au	103P-027
14	MOLLY MAY — WEST ZONE	Mo	103P-228
15	MOLLY MACK	Mo	103P-228
16	MOLLY MAY — EAST ZONE	Mo	103P-228
17	MOLLY MAY — SOUTH ZONE	Mo	103P-228

Figure 29-1. Geology of the eastern Anyox pendant (with compilation from Sharp, 1980 and Grove, 1983).

Sharp (1980) documented thin, interbedded carbonaceous phyllite to graphitic schist layers in the basal 300 metres of the sedimentary sequence; he reports that discontinuous exposures of this rock type extend from the Hidden Creek mine to the Bonanza mine. Several thin, dark grey to black limestone beds are preserved within the immediate hangingwall of the ore deposits. Higher in the sedimentary sequence there are dark grey to black, thin-bedded to massive limestone beds, limestone lenses and nodules within grit beds, and calcite-cemented sandstones and grits. No macrofossils have been found in the Anyox pendant.

A thick section of massive sandstone beds exposed along the west shoreline of Granby Peninsula may correlate with a similar exposure reported by Bancroft (1918) east of Carney Lake. Coarse grits to fine pebble conglomerates crop out on the southwest end of Larcom Island and on the southeast end of Doben Island.

Sedimentary structures are well exposed in these strata. Graded beds are abundant; rounded, symmetric ripple marks were noted in two exposures; truncated crossbeds are well preserved in the pebble conglomerates at the southwest end of Larcom Island. Crossbed orientations indicate an eastward source for the clastic material.

The features of this flysch sequence suggest a deep water, reducing environment in which clastic sedimentation rates greatly exceeded those of chemical carbonate deposition. We found no diagnostic evidence to establish the tectonic setting.

STRUCTURE

There are numerous exposures of small-scale folds and axial plane cleavage in the sedimentary sequence and the ore horizon cherts; the volcanic sequence shows little evidence of ... Figure 29-1 illustrates the interpreted overall structure ... are plotted on a 1:25 000 scale topographic ... may ... available for reference by contacting the author. Field ... indicates two phases of deformation: a major F... event ... large scale, north-northeast-trending open folds with st... dipping axial surfaces (Fig. 29-3); a later F... fold event ... smaller scale east-northeast-trending tight folds with nea... axial surfaces and local axial planar cleavage.

Phase 1 fold structures include the Rambler syncline ... Hidden Creek Bonanza anticline (Figs. 29-1 and 29-3). Th... anticlinal limb is flat to gently westward dipping, the east... vertical to steeply eastward dipping. This pattern also ... other phase 1 anticlines. These early major folds have ... fold axes, so the Rambler syncline, for example, is canoe ... longitudinal section. The Hidden Creek-Bonanza anti... saddle shaped structure between the two orebodies, bu... doubly plunging anticlinal dome at Hidden Creek mine.

Since limbs of early folds are either near horizontal ... vertical, they have been selectively eroded by recent glaci... flat lying limbs, which are more resistant, underlie al... major topographic features — Granby Peninsula and the ... of Rogers Creek, and Larcom Island.

Phase 2 folds are most easily recognized along the ... sedimentary contact, and along the west side of Larcom I... 29-1). These folds are tight with near-vertical, east-north... ing axial planar cleavage, and gently east-northeast plun... Topography and selective erosion have combined to ... outcrop pattern of the contact trace so that some of these fo... to be isoclinal (Fig. 29-1).

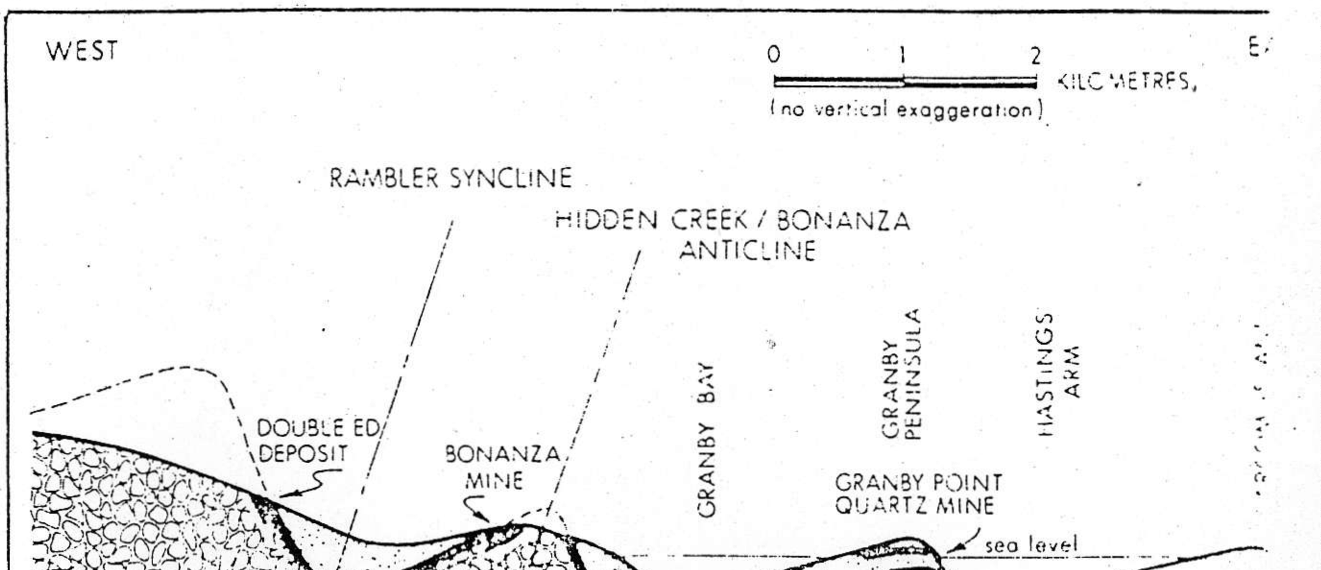


Figure 29-3. Schematic east-west cross section in the southeastern Anyox pendant

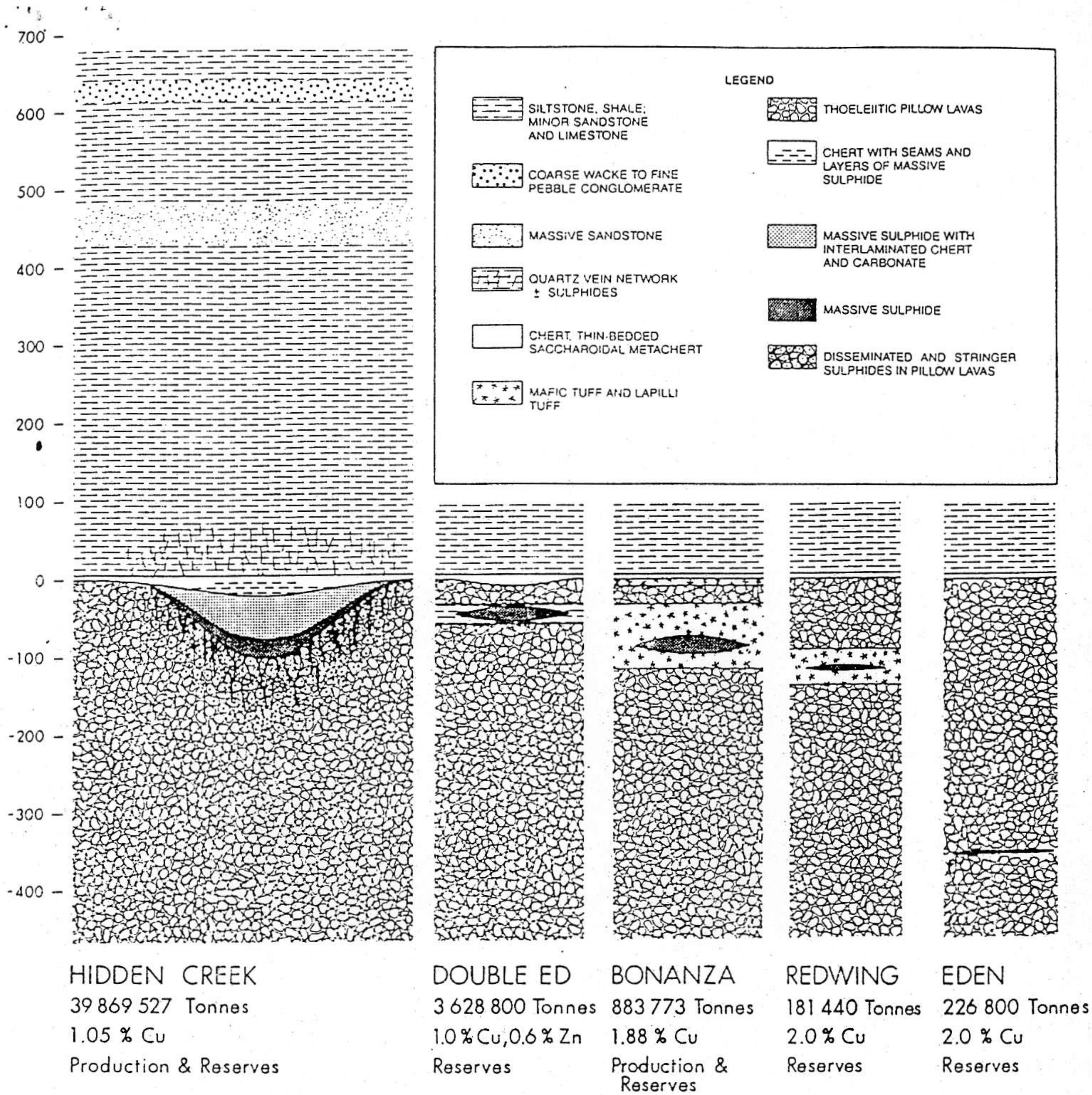


Figure 29-2. Schematic stratigraphic columns through five deposits (including compilation from Sharp, 1980).

ORE HORIZON CHERT

Chert is preserved as thin to thick-bedded, foliated, saccharoidal quartzite. The rock varies in colour from ivory to light grey depending on the amount of included tuffaceous material. Chert crops out along the volcanic-sedimentary contact throughout the Anyox pendant, although Sharp (1980) reports it is locally discontinuous. The chert may be interbedded with tuffaceous layers and the unit varies in thickness from a few tens of centimetres to over 1 metre. An abnormal thickness of chert is exposed in two areas; overlying the Double Ed deposit where the cherty strata thickens to 3 metres, and overlying and within the Hidden Creek deposit where the chert averages 30 metres in thickness and reaches 75 metres in one location where it is interlayered with massive sulphides and tuff (Sharp, 1980).

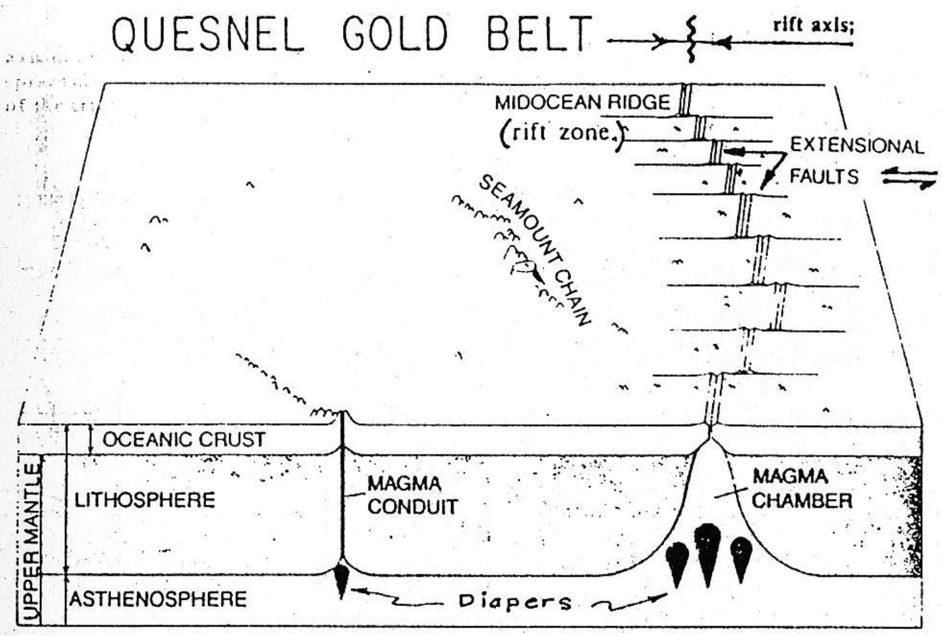
Chert is readily distinguished from massive, white bull quartz veins by its saccharoidal texture, prominent foliation, and pale grey to ivory colour (Plate 29-1). Further, chert is commonly interbedded with mafic tuffs and clastic sedimentary rocks.

SEDIMENTARY SEQUENCE

The hangingwall sedimentary strata comprise a flysch sequence of fine-grained, thin to medium-bedded shales and siltstones with minor carbonate and coarse clastic units. The formation is at least 700 metres thick. Its eastern limits were not examined in the study but no chert beds were identified within this sequence and no distinctive marker units were noted in the lower part of the formation.

RIFT ZONE DEVELOPMENT:

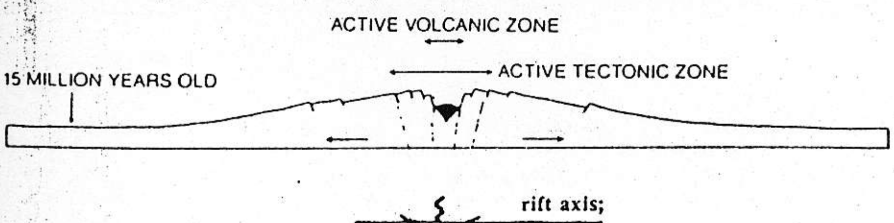
QUESNEL GOLD BELT



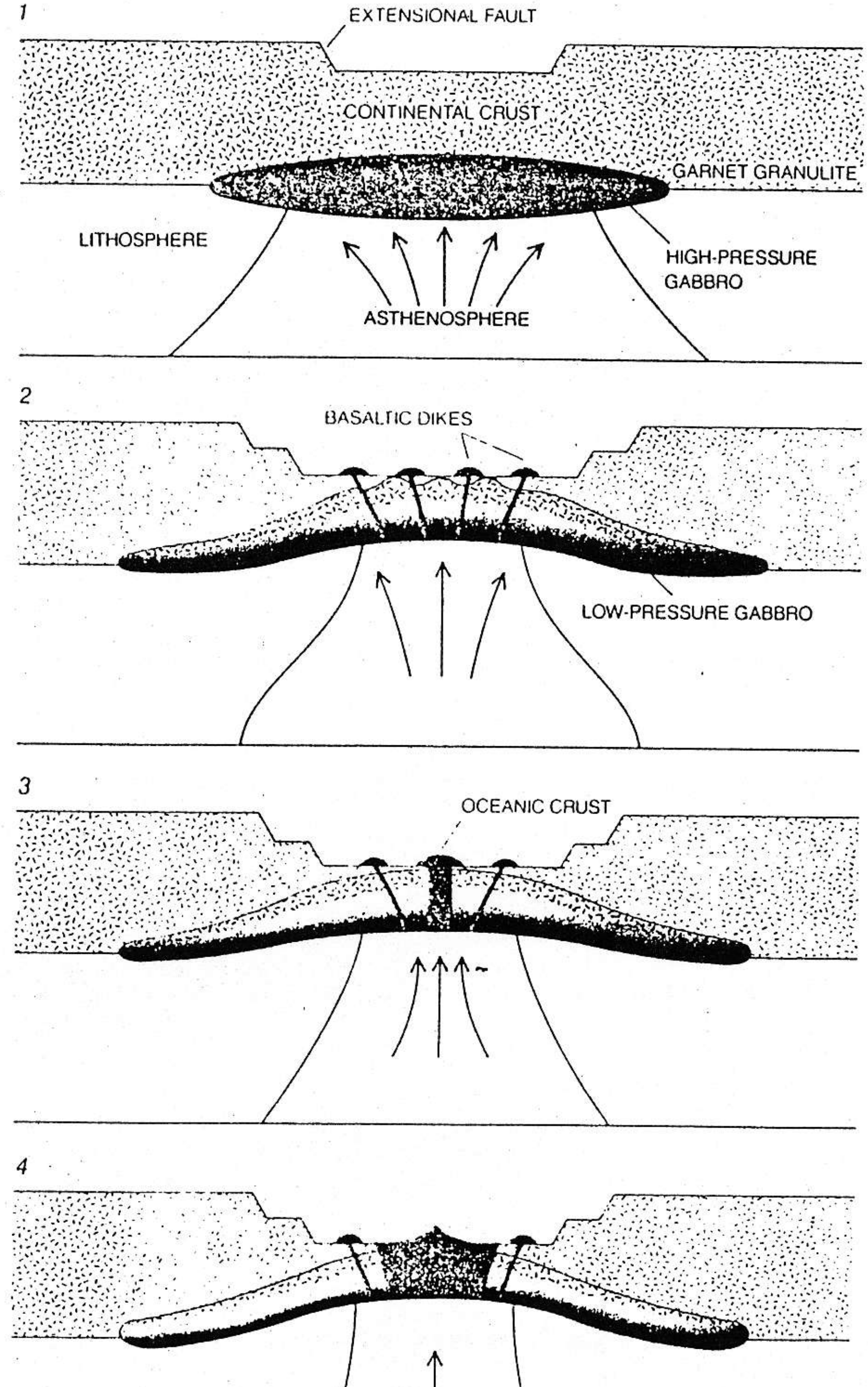
TWO PLACES ON THE OCEAN FLOOR where volcanic eruptions take place are shown in this idealized view. Basaltic magma originating in the earth's upper mantle, more than 100 kilometers below the surface, rises slowly in the form of giant blobs called diapirs, which supply both the comparatively shallow magma chambers underlying active midocean ridges (*right*) and the feeder columns responsible for isolated volcanic structures known as seamounts (*left*).

STAGES OF RIFTING

The ridges respond to the stretching of the crust at the axis in two ways, depending on how a state of isostatic equilibrium is attained: through widespread fissuring near the axis of the fast-spreading ridge and through large-scale movements of the crust along major faults facing the axis of the intermediate- and slow-spreading ridges.



RATE OF SPREADING of a midocean ridge is reflected both in its topography and in the width of its active volcanic and tectonic zones.



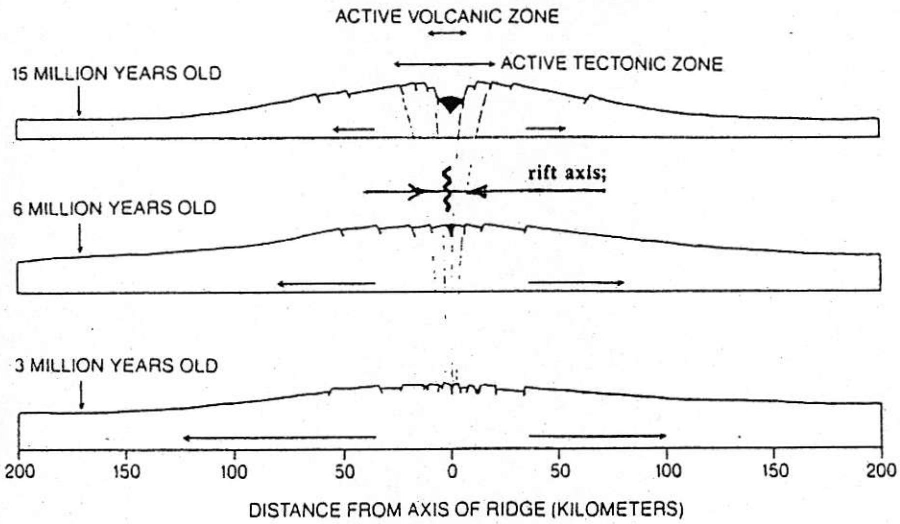
The first stage in the evolutionary sequence is typified by the East African rift valleys (*1*), where the continental crust is being underplated by gabbros. The gabbros are crystallizing under high pressure and are mingling with the garnet granulites that make up the base of the continental crust.

STAGES OF RIFTING

From the desk of: **Douglas A. Chapman**

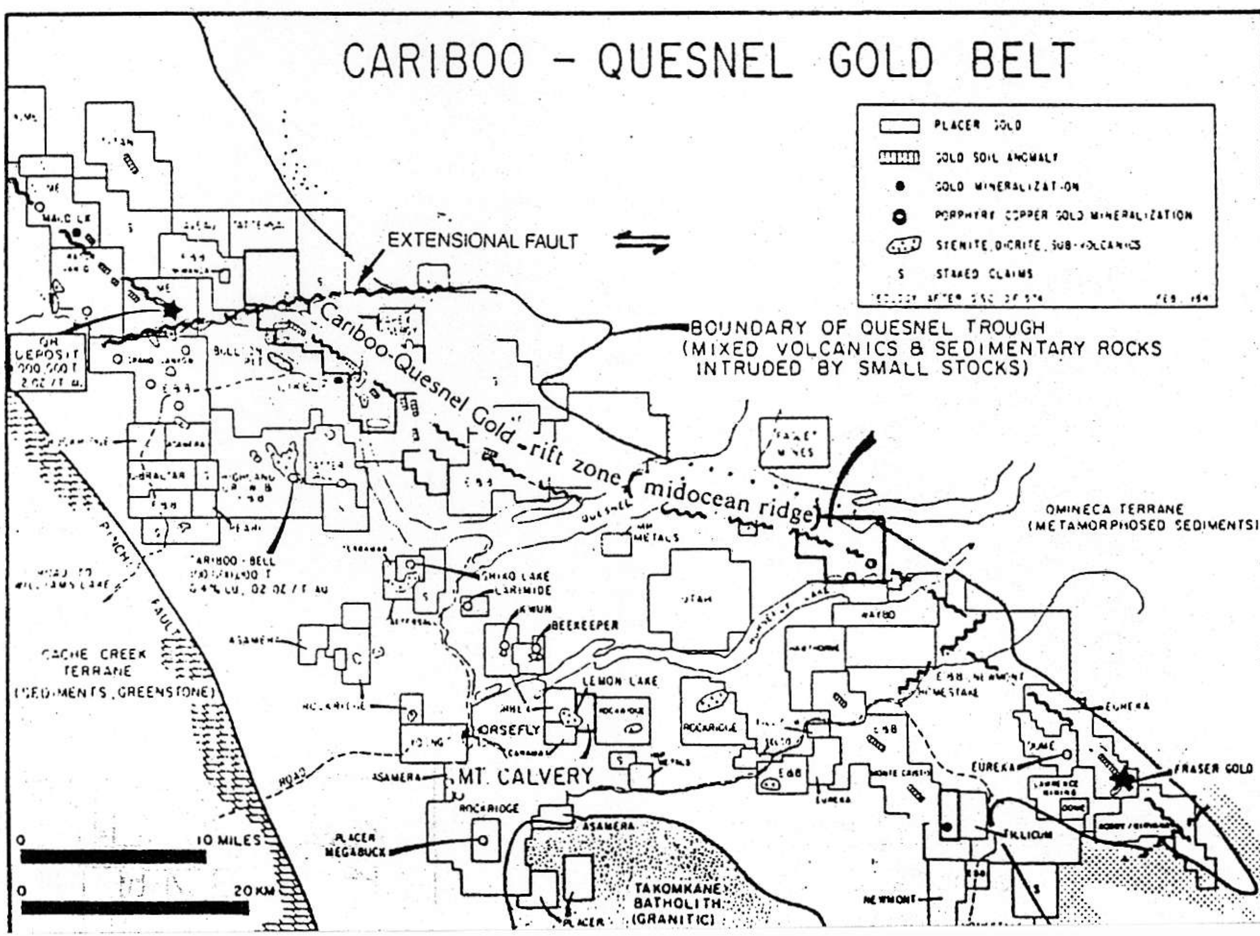
STAGES OF RIFTING

The ridges respond to the stretching of the crust at the axis in two ways, depending on how a state of isostatic equilibrium is attained: through widespread fissuring near the axis of the fast-spreading ridge and through large-scale movements of the crust along major faults facing the axis of the intermediate- and slow-spreading ridges.



RATE OF SPREADING of a midocean ridge is reflected both in its topography and in the width of its active volcanic and tectonic zones.

The recently recognized 150km long, northwest-trending Cariboo-Quesnel Gold Belt is located in south central British Columbia.



N E W S   R E L E A S E

Canadian Zeolite Ltd. has acquired the Buck II Claim and adjoining mineral claims located in the Skeena Mining Division at Anyox, B.C. The company plans 3000 ft. of test drilling to explore a targeted zone on this claim. Canadian Zeolite's Buck Claims are located north and east of the recently drilled TVI Copper ore zone, (1993). TVI Copper indicated open pit reserves at 26.7 million tons of 1.08% Copper.

Known geology and tectonic structural control of the Anyox orebodies was assimilated into a photogeophysical study to cover the mine and the area east of the #1 to #5 ore deposits. It was used to locate a target model of probable structure and geology which could host a similar type of ore deposit.

A tectonic axis which apexes and plunges east and under the Buck II Claim is a major structural control of the Hidden Creek Ore Deposits which occur at tectonic junctures underlying silicified cappings in a cherty, volcanic/sedimentary contact. The company claims are underlain by sediments but it is probable that an east dipping contact zone with the volcanic basalts underly these draped sediments. This structural control along which the tectonic target on the Buck II Claim is located, has a reasonable geological expectation for mineralization occuring at a depth of approximately ±500-1000 feet and has been selected for follow up exploration and drilling.

The Anyox mine was operated by Granby Consolidated Mining and Smelting Co. Ltd. between 1914 and 1935, producing 24,000,000 tons of ore grading 1.5% Cu and 0.005 oz/ton Au. (Cominco Project Report Jan/88). The exploration area is 5 miles by road from tidewater at Granby Bay on Observatory Inlet on Hastings Arm, south of Stewart in northern B.C.

The sedimentary beds surfacing on the claim area provide a second possible 'orezone' and structural target, ie, similar rocks underly the Granby Point Mine due south and along strike on the Granby Peninsula. Quartz veins are found in the argillite beds at Granby Point where the vein width varies from a few cm to more than 4 ft thick. Silica quartz production shipped to Granby's Smelter was 133,650 tons averaging 0.068 oz/ton Au and 2.5 oz/ton Ag.

An immediate follow-up field program of exploration geophysics and surface prospecting has been initiated to quickly confirm drill sites to test the possibilities of the targeted structural zone and a depth to the underlying sedimentary/volcanic contact.

T H E O R I E S   O F   T E C T O N I C

S U R V E Y S

R E S U L T I N G   F R O M

P H O T O G E O P H Y S I C A L   S T U D I E S

O F

I S O S T A T I C   S U R F A C E   T R A C E S

Isogradient Mapping of Apparent Density/Unit Area

D. A. CHAPMAN

1996

DEFINITIONS.

Mechanics:- The study of the effects of forces on bodies. The effects may be acceleration, velocity, and displacement; or the forces may produce changes in volume and shape; finally, fracture or flow may result.

Rock Mechanics:- The study of the effect of forces on rocks. The principal effects of interest for the geologist and geophysicist are the changes in shape and the dynamic aspects of changes in volume and shape. In mineral exploration its usefulness would apply to the phenomena influencing the predictability of fracture and flow with changes in the volume and shape of rocks such as shear zones, dykes or folded complexes.

Thus, the subject of rock mechanics involves - the analysis of loads or forces applied to the rocks - the analysis of the internal effects in terms of either stress, strain, or stored energy (rebound stress) - and finally, the analysis of the consequences of these internal effects, i.e. fracture, flow or simply deformation of the rock.

Stress:- The internal force per unit area when the area approaches zero. It is useful to reserve "pressure" for the average external normal force per unit area, even though the pressure at a boundary will equal the normal stress in the material at that point.

Normal Stress:- The component of stress normal or perpendicular to the plane on which it is acting.

Shear Stress:- The component of stress tangential or parallel to the plane on which it is acting.

Deformation:- Absolute or relative movement of a point on a body or the change in a linear dimension.

Strain:- The unit of deformation or the deformation per unit length or width.

Normal Strain:- Deformation per unit length in the direction of deformation.

Shear Strain:- Deformation per unit length where the length over which deformation occurs is at right angles to the direction of the deformation.

Poisson's Effect:- The lateral deformation resulting from longitudinal stress.

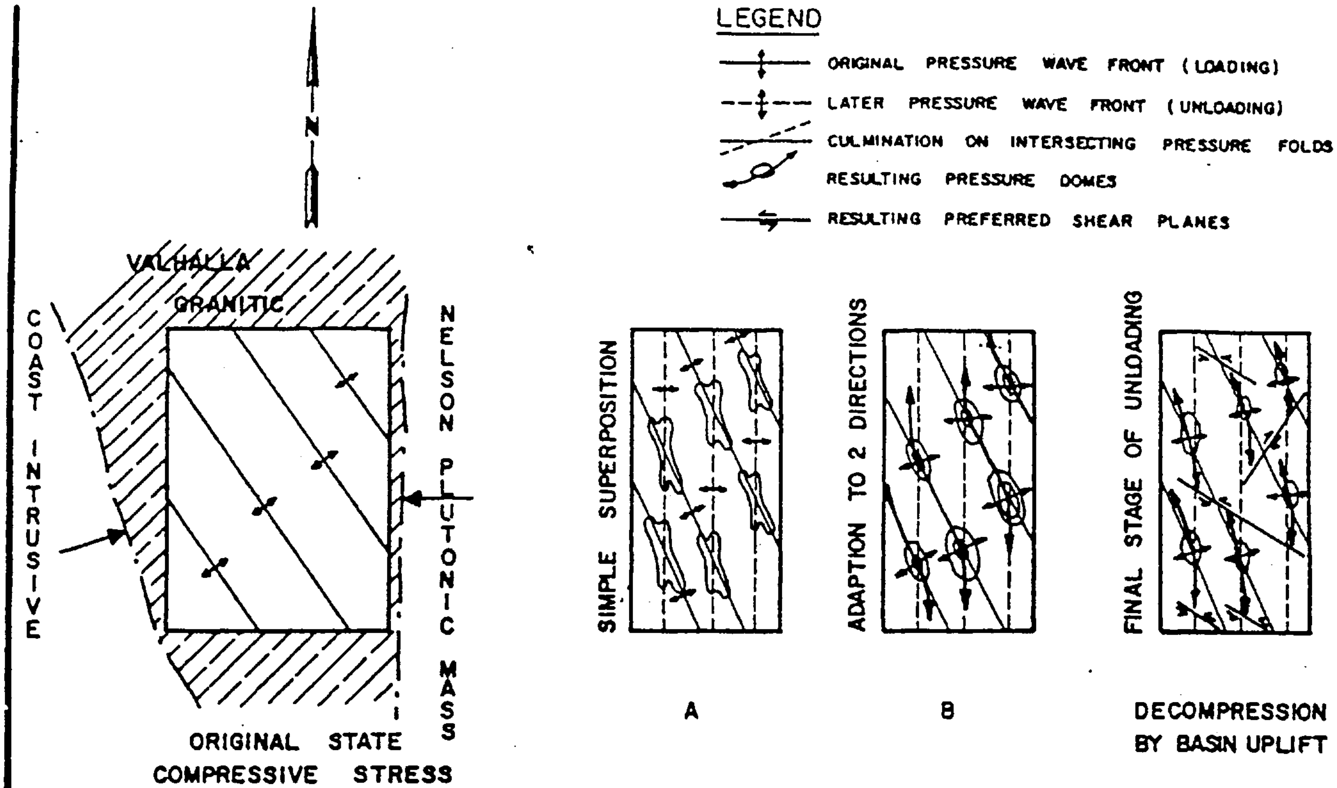


Fig. 3 PRESSURE FOLD SYSTEM
(INTERFERENCE OF TWO CONSECUTIVE FOLDING PHASES)

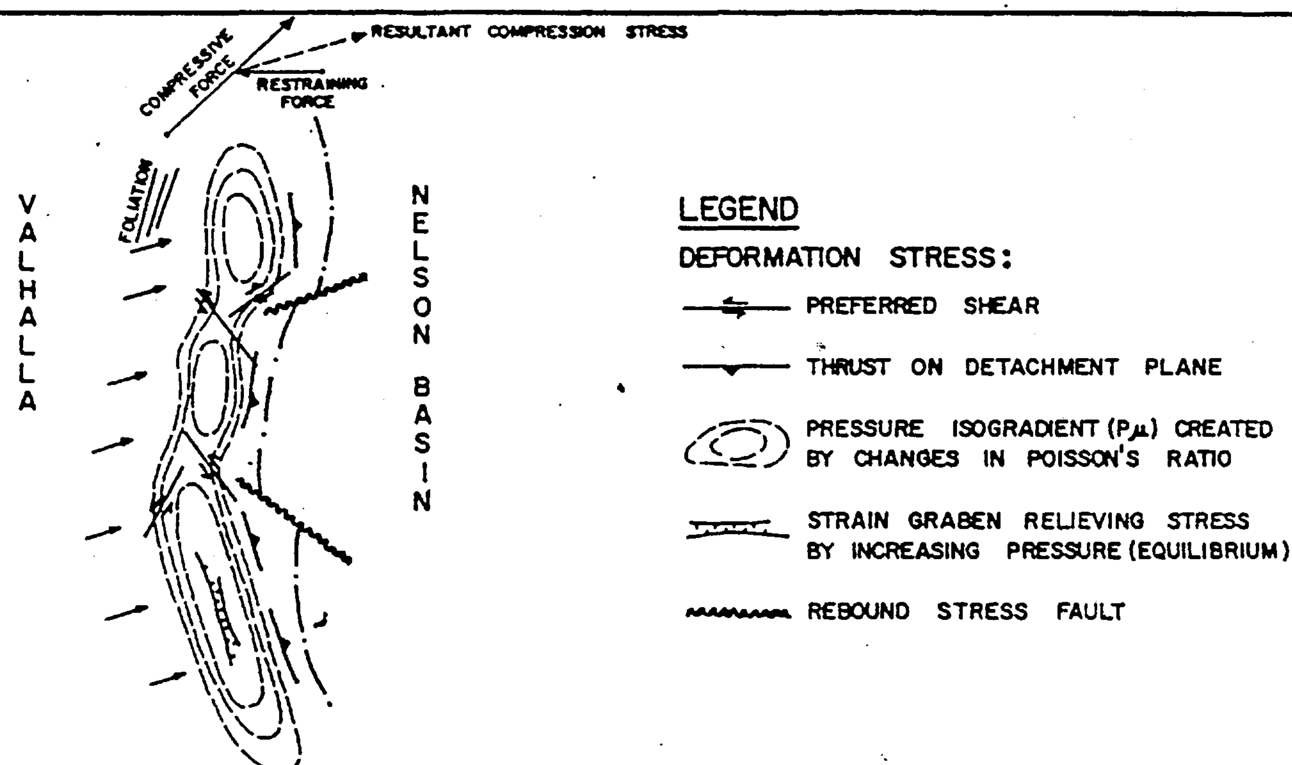


Fig. 4 INFLUENCE OF BASIN STRUCTURE ON SUBSEQUENT PRESSURE FOLDS

HYPOTHETICAL STRUCTURE PROBABILITY

D.A. CHAPMAN & ASSOCIATES LIMITED
FRACTURE DENSITY ANALYSIS
SUITE No. 2 - 515 GRANVILLE ST.
VANCOUVER 2, B.C.

THEORY OF TECTONIC ANALYSIS

Tectonics, Stress, and Rock Mechanics.

Tectonics are characteristic of geological construction of the earth's surface by structural stresses of the earth due to deformation. Forces that produce such structures across the crustal surface of the earth are called tectonic forces. Lineal tectonic features are seen in aerial photographs as an isostatic trace across the earth's surface. These 'linears' are the product of tensile forces produced from the horizontal components of the stresses which act across the boundary surface of the crust.

Shear tension zones result from internal deformation stress tangential to the boundary surface. The surface tension is relative from point to point observed and will vary due to the pressure differential of the underlying rock column, relative to adjacent and surrounding vertical rock columns, ie, the unloading axial forces at the surface boundary create a varying surface tension across fracture/faults apparent as isostatic linear traces visible in airphotos.

Variable rock pressures within each vertical rock column are in horizontal equilibria and normal to the pressure boundary. The induced surface tension is relative to the tangential stress acting on fault/fractures according to shear modulii produced by the lateral changes in vertical rock pressures unloading at the boundary surface. Lateral varying tectonic forces act through each area of the surface plate under the varying axial stress loads existing in each vertical cylindrical column of the earth's crust and is the quantitative basis of an empirical tectonic analysis resulting from a photogeophysical study of **isostatic trace systems apparent in aerial photographs.**

Visible changes in axial pressure result from relief of the stress load inherent in the formation of the underlying rock and the physical evolution of the stresses within the crustal block to reach equilibria. The mechanical effects of these forces produce changes in volume and shape related to shear couples; until finally, fault/fracture, plastic flow, or vulcanism result from load relief of the cylindrical rock columns. The principal effects of interest to the geologist and geophysicist are the changes in shape and the dynamic aspects of changes in volume or shape of rocks, such as folded complexes, shear zones, dykes and intrusive masses which access these breaches of the crust.

Rock Mechanics is the study of the effects of forces on rocks, The effects of stress in their change of shape are dynamic aspects of volumetric change resulting from the thermodynamics of the earth and the physical forces it produces. In mineral exploration its usefulness would apply to the tectonic phenomena influencing the predictability of fault/fracture zones which penetrate the crustal block and create the mineralized plumbing systems and structural traps that host orebodies.

Photogeophysics.

The database of photogeophysics is quantitative and objective, but visual surface tension phenonema are visual and therefore subjective interpretations from qualitative observations. The quantative values observed are based upon an empiric estimate of the density of fault/fracture intersections per unit of area across the boundary surface plate of the aerial photograph viewed. The resulting isograms are relative values of an empiric of unit area density based on theoretical derivatives formulated from the study of rock oylinders reacting to stresses applied under axial loading ie, the Young's Modulus Stress Effect related to axial unloading varies relative to the horizontal tension produced at the earth's surface to maintain equilibrium. The derivatives are products of lateral varying macro-tectonic effects and are indicative of the crustal tectofacies of underlying rock units. (Tectofacies - lateral varying tectonic effects within or across a lithofacies or similar rock type.)

The principal axioms of tectonic analysis are:

1) the earth's crust is a physical boundary normal to the mechanical forces of pressure/stress within.

2) as a physical boundary, a condition of tangential equilibrium within exists with the lateral vertical and horizontal stress components of force at and across the boundary surface.

3) the surface plane viewed is of a semi-infinite elastic solid consisting of an infinite series of vertical, parallel, and adjacent cylindrical rock columns.

4) by empiric substitution and analogy some formula of rock mechanics can be applied.

Isogradients.

The surface tension curve existing at the surface plane is similar to the enveloping curve of Mohr, ie, $t_{max} = (f)\ S_{normal}$,

transformed; function $(f) = t_{max} / S_{normal}$ (or strain effect)

and, equilibrium; $1 = t_{max} / (f)\ S_n$, where 1 = unit

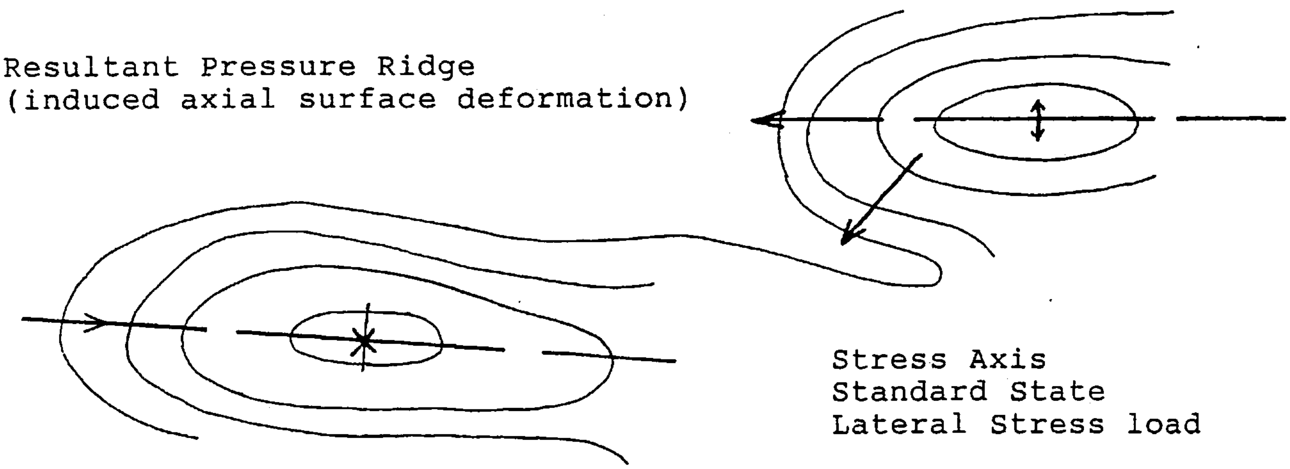
area at the boundary surface of the standard state, being the shear modulus and a measure of the ability of the underlying rock's cross-sectional area to resist shearing stresses produced by axial loading of each rock column. An isogram resembling this curve is produced from an empiric photo-coefficient using isostatic treces and the shear stress logic of Mohr to determine coefficients of normal tensile variance acting across vertical planes of a semi-infinite elastic solid, the isotopic stress model of the crustal block viewed is relative to the axial unloading of the cylindrical columns within the area surveyed.

Isogram #1 - Resultant Deformation Stress

Vertical Isogradient = $P + P_u$

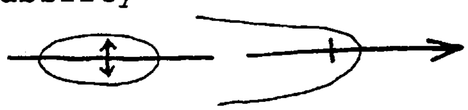
Equilibrium = Stress normal to surface
= $(f)t_{max}$ @ stress boundary

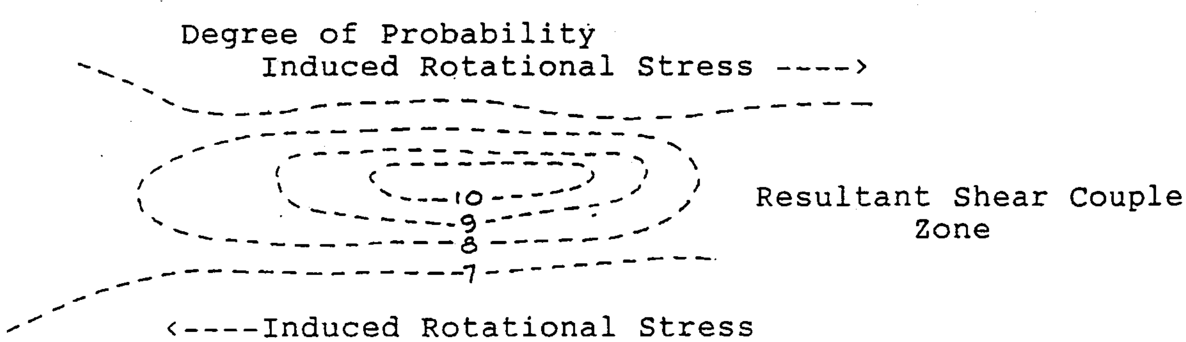
LateraL Isogradient = Sum of Induced Hor. Stresses
Relative to Steady Stress State

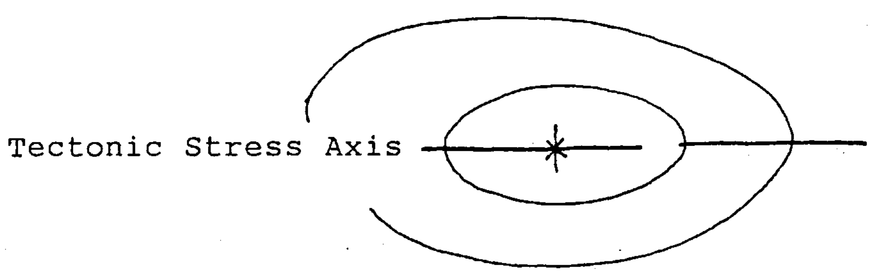


Isogram #2 - Shear/Tension Probability

Tectonic Pressure Ridge







Resultant Deformation

The first isogradient is a product of shear stress, ie, the resulting component of induced tensile surface stress tangential to or parallel to the plane on which it is acting. The axial shear strain equivalent, is the deformation per unit area of the cylinderical column where the length over which the deformation occurs is at right angles to the direction of deformation. This is the anistropic effect of pressure unloading produced at the boundary plane surface of the orustal block, (a surface boundary of a semi-infinite elastic solid). Anisotropy produced in the rock columns is induced by changes in tangential stress resulting in axial unloading of the tectonically stressed lateral and adjacent vertical cylindrical rock columns relative to the standard state of stress in the elastic solid.

Isogram #1, is the horizontal surface strain produced by Young's Modulus Effect on rock columns. It is a visible tensile factor relative to the Shear Modulus relief of the underlying tectonic facies, (lateral varying tectonic effect of the rock columns), and is an observable phenoména of visible fault/fracture jointing systems. The isogram produced is an empirical estimate of the surface tension associated with visible fracture joint density per unit of cross sectional area of each underlying rock column. The isogradient, (an Axial Load Diagram of induced surface pressure), is the incremental sum of the normal stress differential produced and the relative standard stress component within the crustal block normal or perpendicular to the plane on which it is acting. The isogradient is the relative strain or deformation per unit length in the direction of deformation, and in the case of a semi-infinite elastic solid the deformation induced is by a change of pressure only. This mu coefficient of induced pressure resolves at the boundary surface with the normal tensile stress components and is analogous to the sum of the increments the steady stress and the variable *pressure/stress* ratios that result from axial unloading and shear coupling. The unloading strain is a summation of a primary load into the oenter of each cylindrical rock column at a relative equivalent of the standard or steady pressure/stress state, ie, median stress for every rock cylinder.

In the vertical rock columns of the theoretical crustal block, stress* is considered to be an internal force/unit area when the area approaches zero, and *pressure (the induced strain), is reserved for an external normal force/unit of area at the cross sections of the hypothetical cylinders. The pressure at the boundary surface will equal the normal pressure/stress per unit area in the rock cylinder at that point. The normal stress for each cylinder will be equal to the sum of the increments of the axial stress load applied and will vary according to the deformation stress induced by axial stress unloading.

Isogram #1 is a three dimensional plane surface of the induced shear coefficients produced by induced axial shear strain.

Tension/Shear Probability

The second isogradient is maximum at the point where the Mohr Envelope breached the surface and is where shear tension structures would occur as a result of a horizontal zone subjected to a resultant shear couple. The probable surface trace of this axis is a tectonic structure indicated by the lateral tectonic effects and may be a structural conduit for mineralizers, magmatic intrusions, orebodies, etc., depending on the geological factors. Mineralization transcends from the floor of the crustal block up into adjacent zones of maximum tension across fracture planes and voids created by tectonic shear couple tension.

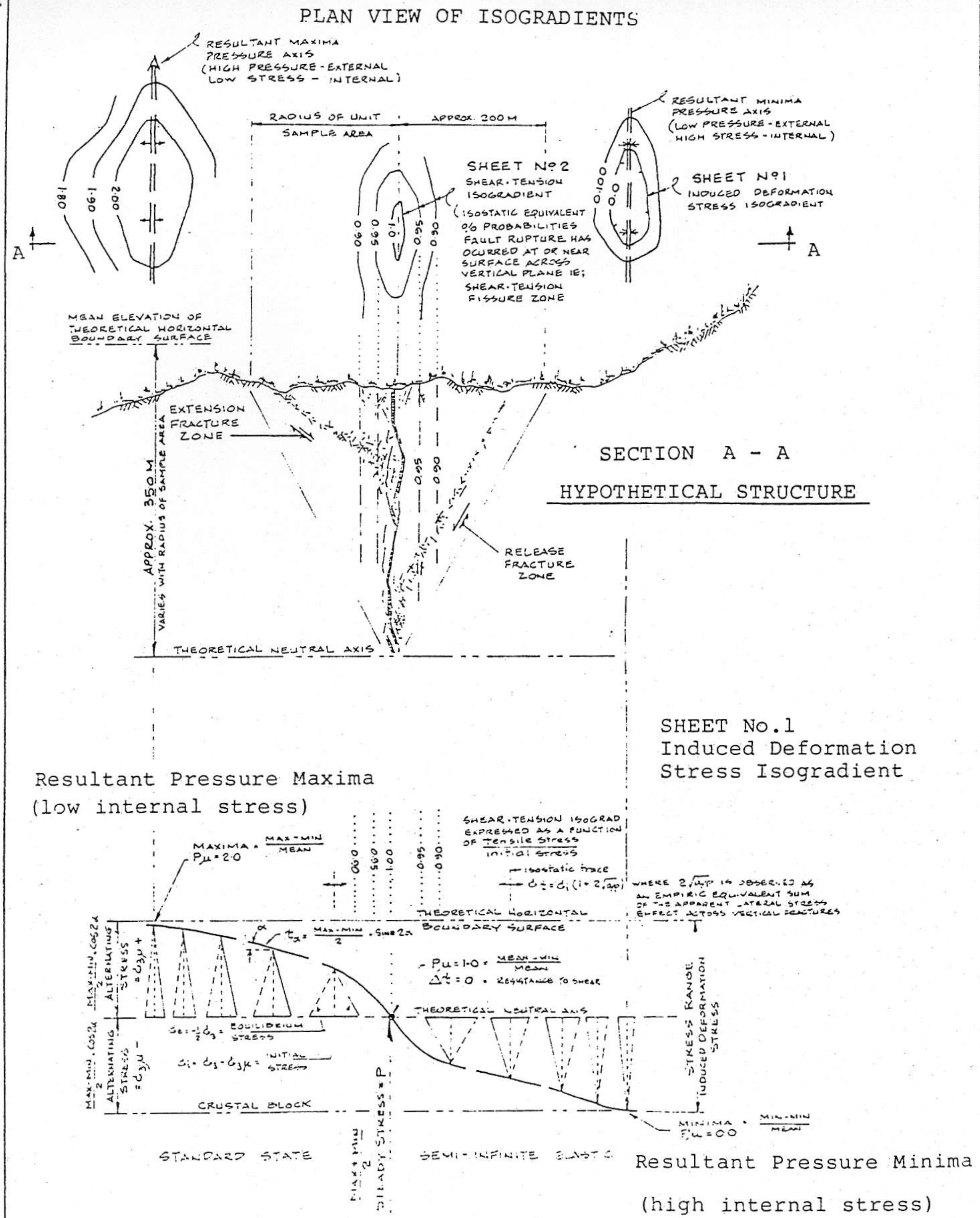
Isogram #2, the relative probability isogradient, is a two dimensional plan of the lateral probability a tension shear fault occured across the vertical planes of a **shear couple zone** in the crustal area. They are surface zones of maximum percentile probability where a differential of shear stresses indicate a minimal resistance to tangential shearing forces acting on the vertical planes of the crustal block examined.

The Shear Couple produced by the deforming stresses creates tension shear structures within the zone that range from 100% lateral tensile stress to 0% at either axis. Where rupture occurs stress is relieved by faulting, the resultant increased lateral stress load induces increased vertical pressure and lower lateral stress on one side of the fault and decreased vertical pressure and higher lateral stress on the other side.

The Shear Couple Zone evolves with the basal tectonic forces that construct the crustal block and are therefore available as conduits for magmatic solutions and emenations that mineralize and the resultant tectonic deformation creates the impounding structural traps that host ore zones. The Shear Couple Zone is the prime target area for mineral exploration. The structure of most in situ orebodies originate with these tectonic forces that breach the crustal block.

A tectonic anomaly is created when the boundary surface of the elastic model of the crustal surface exceeds anisotropic equilibrium with the induced deformation stress. The result is a breached pressure/stress dome wich forms pressure ridges and focuses on an enclave of the relieved stress axis. This induced surface zone of isostatic recovery to crustal equilibrium will cover a much wider area surrounding the originating disturbanoe creating fracture patterns of apparent linear joint systems of variable density per unit area.

Tectonic analysis of isostatic fault/fracture traces is a primary structural tool of the exploration geologist and geophysicist, and a useful photogeophysical survey to determine correlating reconnaissance and geochemical results from field and/or other airborne methods to reduce the area and therefore the cost of intensive and more expensive ground follow up.



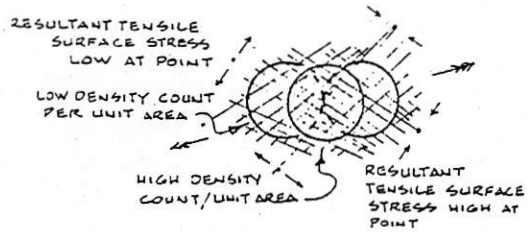
STRESSES ACTING ON CYLINDERICAL ROCK COLUMNS

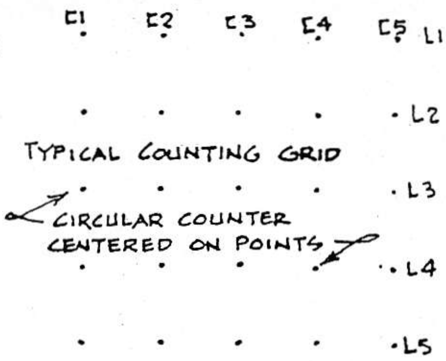
DIRECTION OF PRINCIPAL STRESS PERPENDICULAR TO PLANE OF DRAWING

JC *Explorations Ltd.*

FOR TEXT OF EXPLANATORY NOTES SEE PAGES A-1 to A-8

ESTIMATED DENSITY EMPIRIC AS ANNOTATED
TO AN AERIAL PHOTO OVERLAY FOR COUNTING

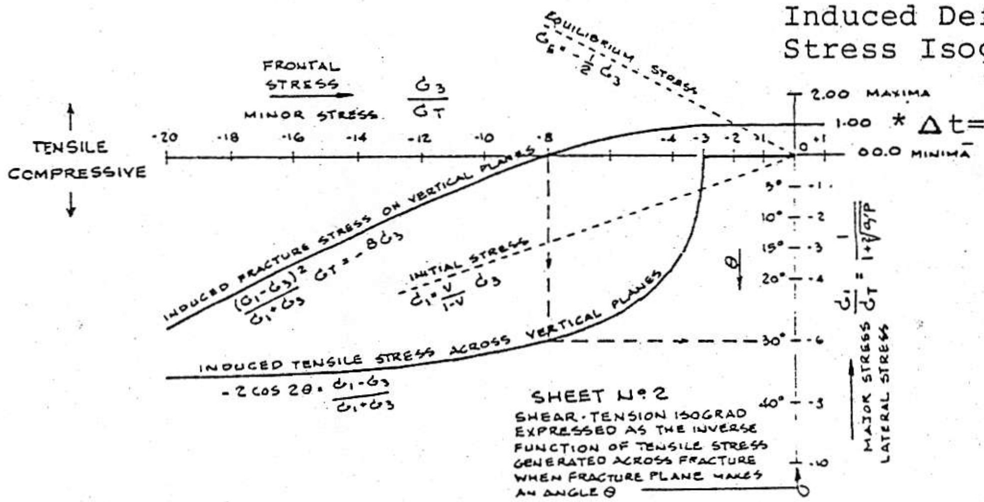




The Empiric Value of the Estimated Density/Unit Area of Fault/Fracture is a visual count of the Variable Surface Tension Effect seen in Aerial Photographs as Isostatic Traces or Lineals apparent to the Observer.

PRINCIPAL STRESS DIAGRAM AND THE RELATIONSHIP OF VARIOUS PARAMETERS NECESSARY FOR FAULT/FRACTURE TO OCCUR IN THE CRUSTAL BLOCK.

SHEET No.1
Induced Deformation
Stress Isogradient



* Δt=0 @ Boundary Surface

IT HAS BEEN ESTABLISHED BY ROCK MECHANICS THAT THE GREATEST TENSILE STRESS GENERATED AT THE CRACK EDGE (FAULT/FRACTURE PLANE) IS EQUAL TO $\sigma_T = \sigma_1 (1 + 2\sqrt{a/p})$ WHERE

σ_1 = MAJOR STRESS - MOST POSITIVE

σ_3 = MINOR STRESS - LEAST POSITIVE

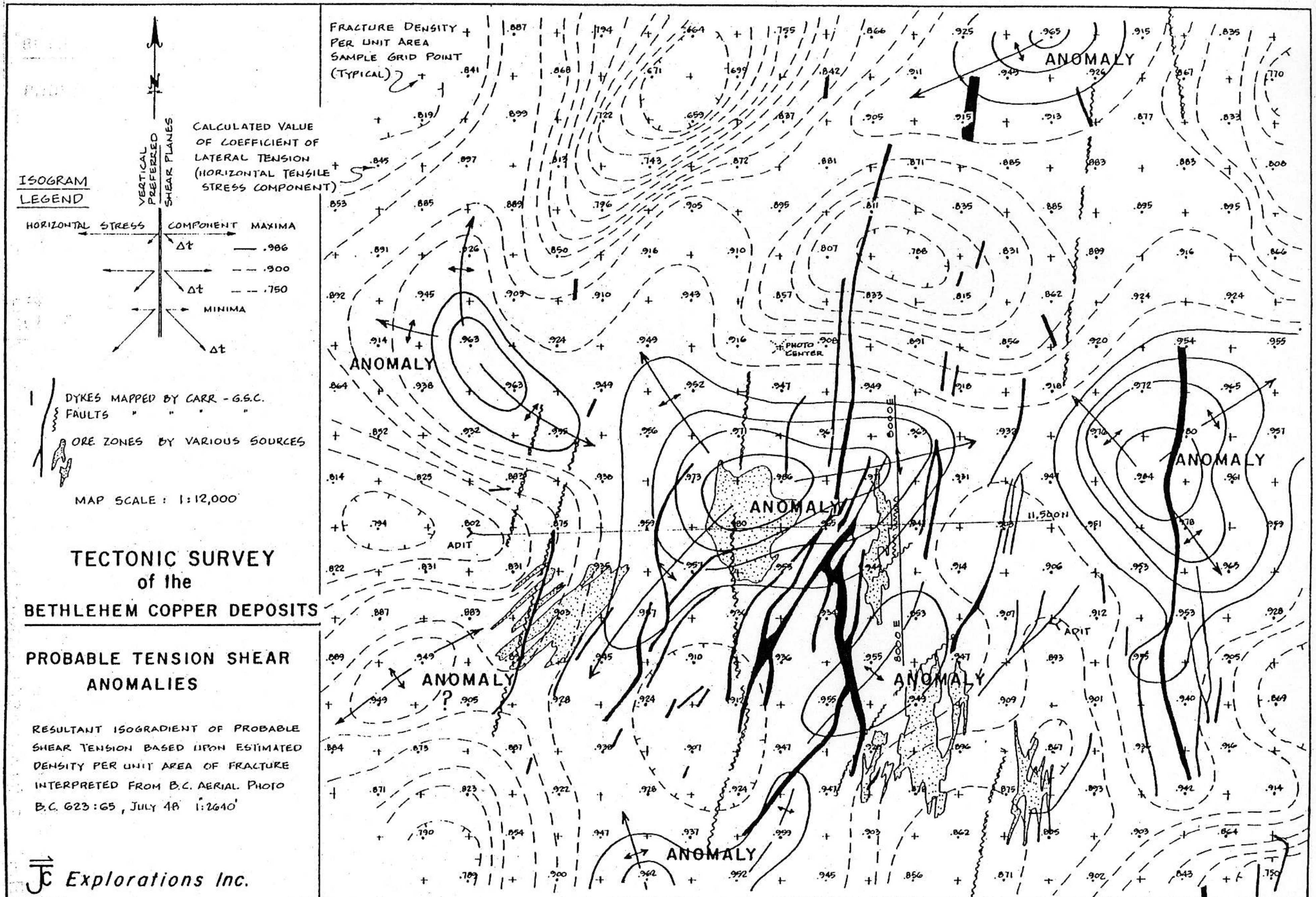
a = 1/2 LENGTH OF FAULT/FRACTURE

p = RADIUS OF CURVATURE FAULT/FACE EDGE

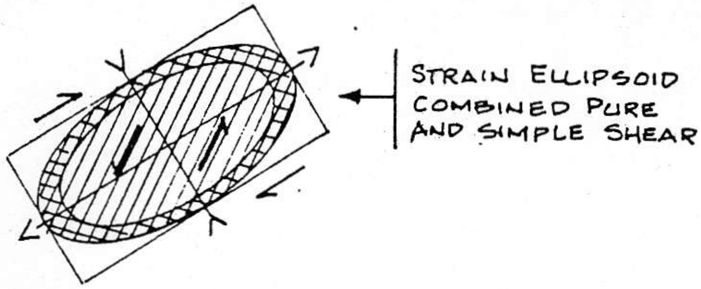
* Δt= change of Tangential Stress = 0

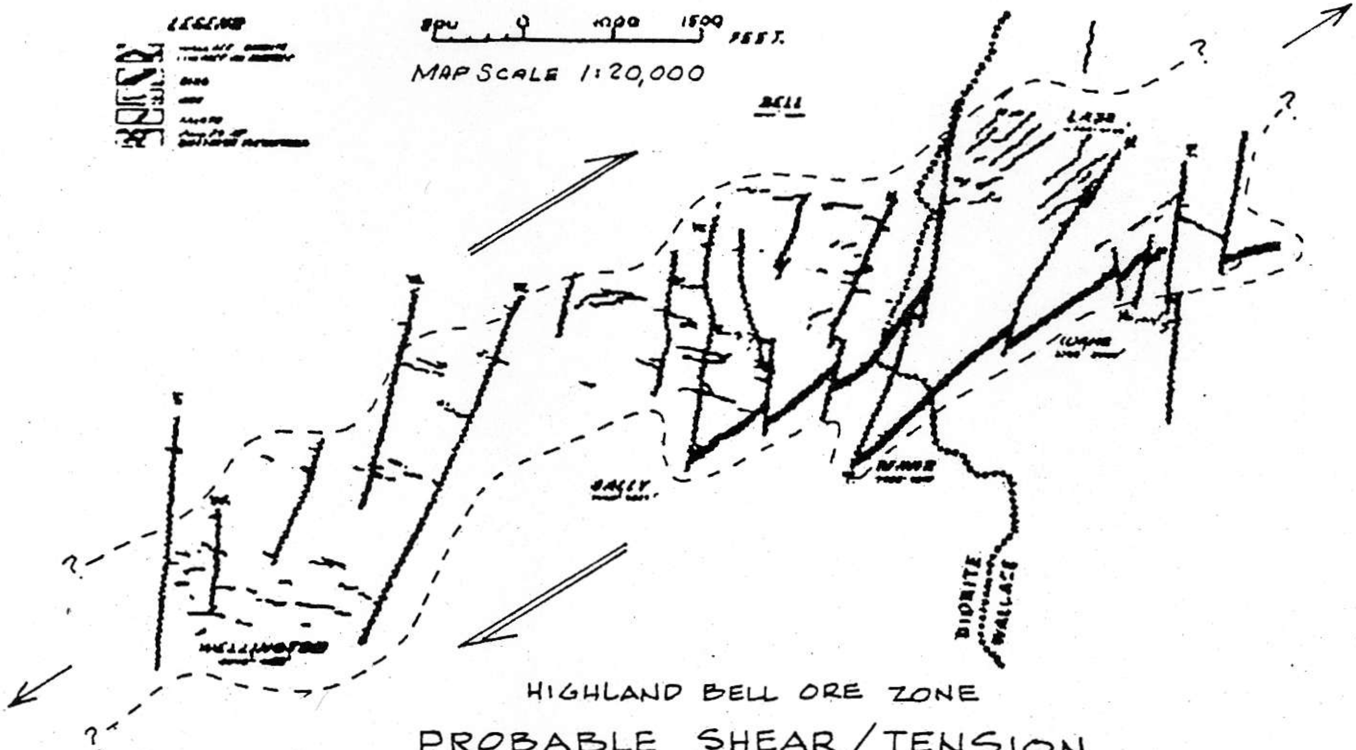
For Text of Explanatory Notes See Pages A-1 to A-3

PLATE 2



ISOGRAM LEGEND
VERTICAL PREFERRED SHEAR PLANES
N
CALCULATED VALUE OF COEFFICIENT OF LATERAL TENSION (HORIZONTAL TENSILE STRESS COMPONENT)
HORIZONTAL STRESS COMPONENT MAXIMA
Δt
.986
.900
.750
MINIMA
DYKES MAPPED BY CARR - G.S.C.
FAULTS " " "
ORE ZONES BY VARIOUS SOURCES
MAP SCALE : 1:12,000
TECTONIC SURVEY of the BETHLEHEM COPPER DEPOSITS
PROBABLE TENSION SHEAR ANOMALIES
RESULTANT ISOGRADIENT OF PROBABLE SHEAR TENSION BASED UPON ESTIMATED DENSITY PER UNIT AREA OF FRACTURE INTERPRETED FROM B.C. AERIAL PHOTO B.C. 623:65, JULY 48 1:2640'
JC Explorations Inc.
FRACTURE DENSITY PER UNIT AREA SAMPLE GRID POINT (TYPICAL)
ANOMALY
PHOTO CENTER
ADIT
11,500N
8000E
ANOMALY ?

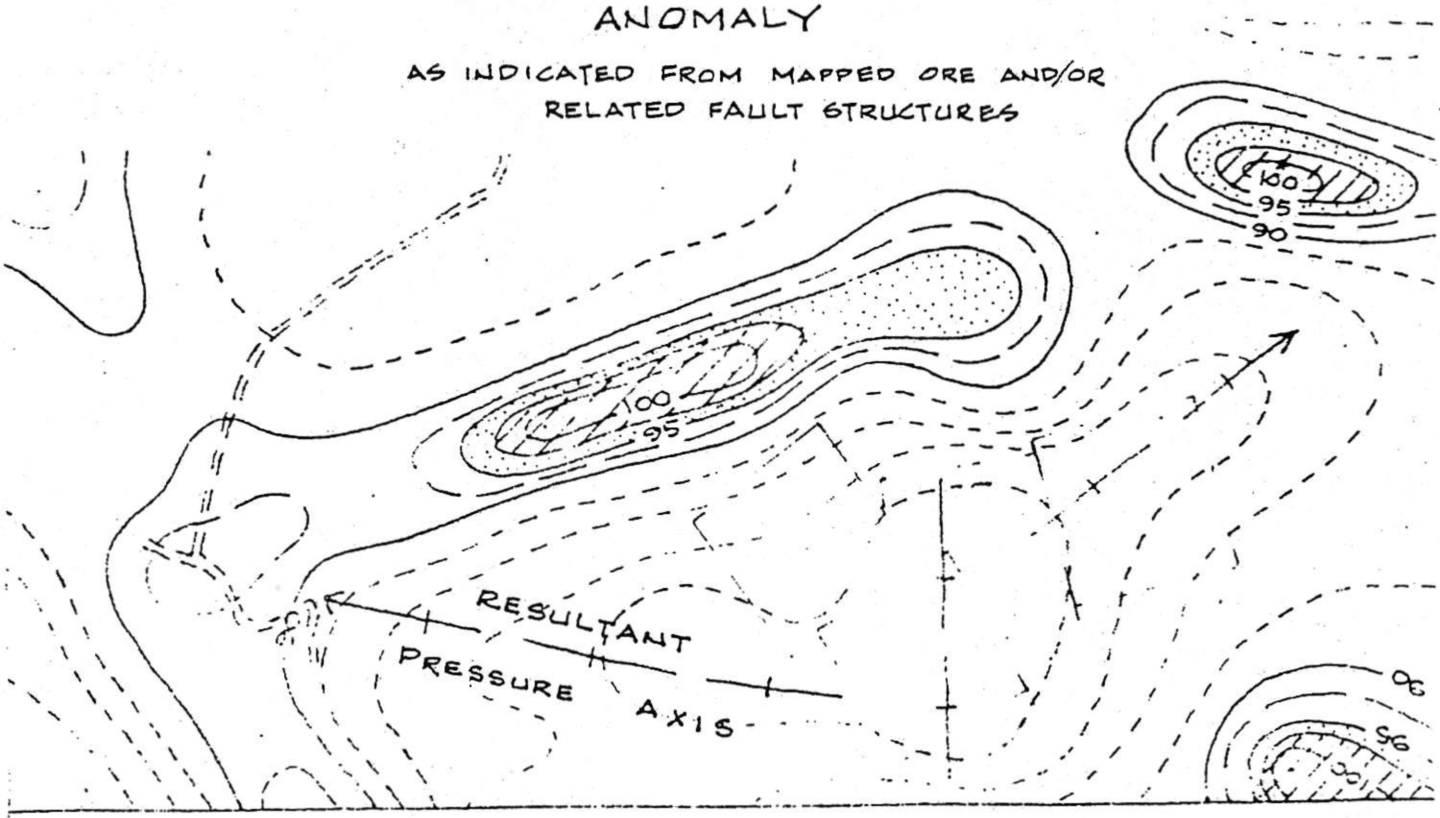




HIGHLAND BELL ORE ZONE

PROBABLE SHEAR/TENSION ANOMALY

AS INDICATED FROM MAPPED ORE AND/OR RELATED FAULT STRUCTURES



PROBABLE SHEAR/TENSION ANOMALY

AS INDICATED BY PHOTOGEOPHYSICAL STUDY

JC Explorations Ltd.

CERTIFICATION

1. I Douglas A. Chapman, certify that I have practised the art of photogeological interpretation for mineral exploration for more than 5 years.

2. I received a Technical Diploma in 1949 from the Vancouver Technical School.

3. From 1950 to 1955 I was engaged in mapping and surveys using both ground and airborne methods; first, with the Canadian Government and, secondly, with Photographic Surveys (Western) Ltd. in Vancouver.

4. From 1955 to 1959 I was engaged by Blanchet and Associates Ltd. in Calgary, Alberta, where I practised interpretation and compilation of fracture patterns for structural studies; studies related to oil exploration.

5. From 1961 to 1964 I was engaged by Chapman, Wood and Griswold Ltd. and assisted Mr. Blanchet in the formation of their air photo department as well as carrying out studies relating to tectonics and their association to mineral deposits.

6. In 1965 I formed D.A. Chapman & Associates Ltd. to provide air photo interpretation for mining exploration and, primarily, exploration reports to assist consulting engineers in planning field programmes.

7. In 1978 I formed J.C. Explorations to provide similar services as D.A. Chapman & Associates Ltd.

Signed this day of , A.D. 198

PHOTOGEOLOGICAL REPORT

on

CRAIGMONT ORE BODY

HIGHLAND VALLEY AREA

NICOLA MINING DIVISION, BRITISH COLUMBIA

50°121' SW

by

D. A. CHAPMAN & ASSOCIATES

Phone 261-0445

February,1973

COMMENTS ON SURVEY RESULTS

The interpretation of the photographs was made in 1965 from airphotos flown circa 1948 at a photo scale approximately 2,640' = 1". The empiric input for the computer programme has not been changed from the original fracture/fault joint system estimate or count. The programme and it's treatment of that input has been changed on a number of occasions based on increased knowledge of the phenomena and changing concepts from photogeological observations to the geophysics of rock mechanics and their significance to the crustal relationship of fracture/ fault joint systems.

The sole aim of Tectonic Analysis of Fracture Density is to define and communicate an objective solution of the data. As an isogram the complexity of rock mechanics is reduced to it's simplest statements to delineate the surface area where prospecting is most likely to be rewarded with positive results.

To communicate the resultant information three maps are produced from the computer print-out. Plate No. 3, the "Tectonic Map" is a summation of the results derived from the coefficients of tangential and normal stress mapped in Plates 1 & 2, Plate No. 3 is the primary field guide for prospecting the surface. The zones marked on Plate 3 are the surface areas where shearing has breached the rock and provided the maximum density of fracture voids resulting from the deformation stresses.

For this presentation, the complement values of the tension component of stress acting across vertical plane interfaces has been shown as a short dashed line or isobar. If Plate No.2 were overlain Plate No.3 it would be seen that the contours delineate the axiis of *the preferred shear vertical planes. In this study only, they are shown to illustrate the relation of the subsurface intrusion to the tension fault plane relieving the strain. See Note 2, Plate No.3.*

The solid contours are what is normally shown on Plate No. 3 for prospecting. They are the contoured value of the triaxial stress which exists in the crustal surface as a result of the differential of stress/ strain, they are indicative of the unrestrained shearing forces acting through the underlying rock creating rupture tangential to the surface and relative to the planes of preferred shear. Penetration by dykes up and into these zones of minimal resistance is possible as is indicated by the intrusive dyke at surface. See Note. 1, Plate No. 3.

All vertical planes cut the surface. Rupture along and across these vertical planes will occur when the lateral pressures across the preferred interface plane is minimal. This effect of the apice at depth to relieve the strain has been reflected at surface.

Examination of the prospect along and within the surface areas defined would not have found the intrusive whereas the fault axis defined on Plate No. 2 would have indicated a fault or scarp line present. For this reason it is recommended that all vertical axiis structures be walked out when prospecting. If a reconnaissance magnetometer was carried a kick would have registered. The surface dyke would have been noted and possibly mineralization within the surface zone. Once found the procedure would be to relate surface effects to preferred shear axis. The coefficients indicate the tangential surface shear plane dips to the north *and west and at some point in depth would intersect the vertical fault wall. Thus having found mineralization at surface the search should continue from there to the fault wall to the north and west, using geophysics and geochemistry where necessary or by a drill line if warranted.*

Both zones interrelate to the principal stress directions and where a positive sign of the differential of Plate No. 1 - Plate No. 2 is shown a subsurface intersection of the two shear planes is possible down the dip. Negative signs indicate a tensile stress across the horizontal surface by the increased pressure residual and in the case of late mineralizing occurrence the fractur voids created by this tension are available, but these fractures would pinch out at vertical depth.

The isogradient of tangential shear planes can be viewed in a similar manner to a horizontal plan of geologic bedding planes. The Mohr shear surface can be visualized as a marker bed for the tangential or deformation stress vectors.

The survey shows a relationship of the ore zone to the intrusive and the shearing planes produced by the deformation stress. It also shows an affinity for the dyking phenomena for these planes. The subsurface ore has occur as a replacement zone controlled along the eastwest axial strike of the folded limestones. Based on tectonic analysis and mapped geology it is probable that mineralization occurred along favourable prepared axial folds of the bedding during stages of the hydrothermal action and the injection of mineralizers into the overlying zone of tensile fracture voids created by the relief of the stresses.

A hypothetical chronology of the tectonic events would be as follows: .

1. Folding of the viscose limey beds occurred during the early stages of the Guichon intrusive caused by movement of the shear fault striking north and the present contact fault striking southeast and north of the ore-body. These movements produced the antithetic folds in the limey beds.
2. Further movement at later stages and under more clastic conditions ruptured the folds along their axiis and structurally preparing them for replacement by the solutions ejected from the floor of the intrusive preceding or in conjunction with the root of the apice that now cuts the limey beds at subsurface.
3. Penetration by the intrusive upwards producing shearing and brecciation and eventually the strain fault at surface that strikes northeast and generally controls the northern limit of the fracture flooding in the open pit area.

The hypothesis is presented as a feasible evolution of the ore and the geological environment and to indicate why the area is detected by tectonic analysis of the fracture/fault system. Economic ore zones occur where the tectonic stresses create a favourable and accessible ore trap and in the case of Craigmont are enhanced by the geologically favourable bedding folds in the limey beds. These zones are not random but generally interrelate to the source of the mineralization along the shearing planes which offer the paths of least resistance to the source.

The technique leads itself to all forms of exploration tools and provides a basis of tieing together the information provided by the geophysics and geochemistry to a map which has a common denominator related to mineralization, i.e. pressure/stress and the resultant ground preperation of the ore host rock.

Dependent on the known economic factors of a prospect the mapping accuracy of the isograms is a relative cost to the survey. Good ground control to baseline surveys is essential for the accurate correlation of all data.

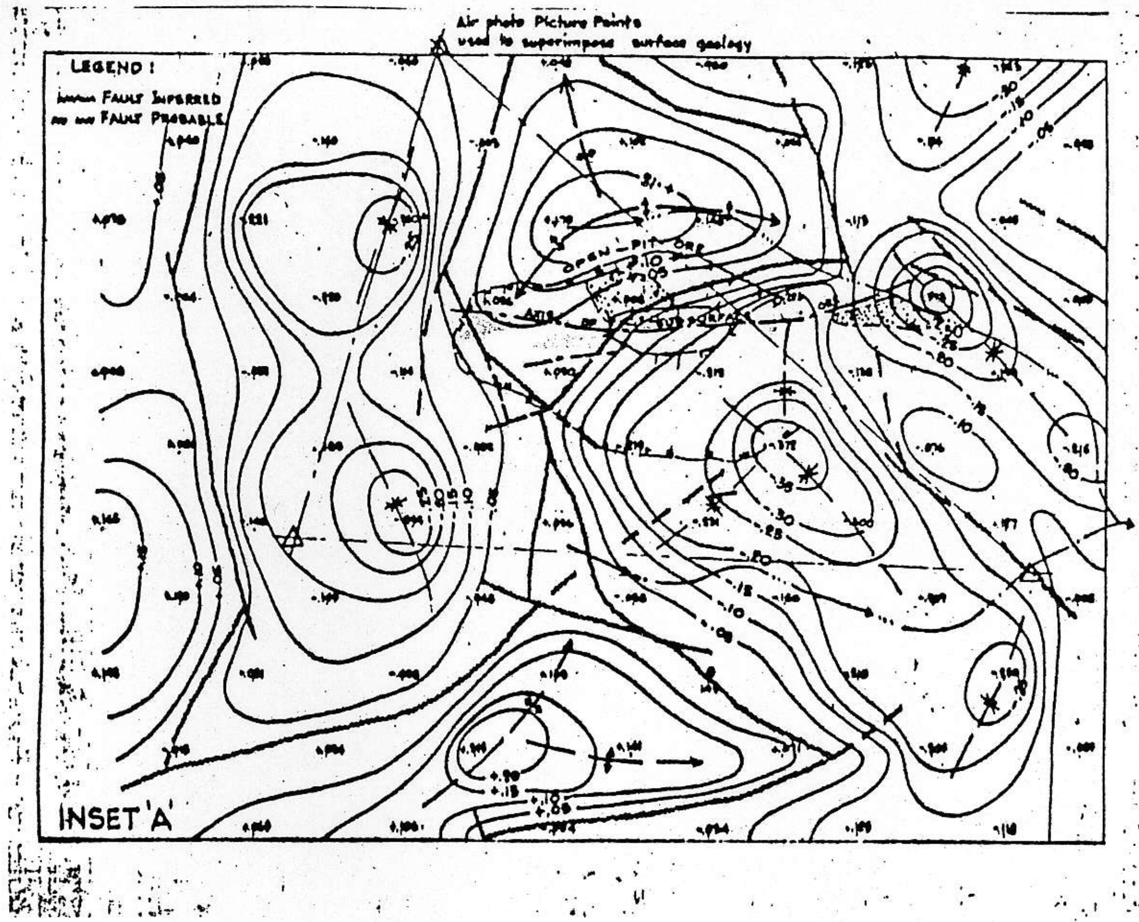
Provided the extra costs are warranted, the tectonic survey can pick up shearing and any significant mineralization related to subsurface intrusion to a detail or accuracy required by the client.

The cost of a survey covering approximately 150 claims would be
$6,000 $40
about $3,000.00 or ~~$20.00~~/claim. For smaller claim areas the cost per claim is higher down to a minimum fee of $1,500.00.

For more information about this exploration method please call or write:

D. A. CHAPMAN & ASSOCIATES LTD.
3513 W. 31st Avenue,
Vancouver 8, B.C.

Phone: 261-0445



EXPLORATION TARGETS BASED ON SHEAR TENSION ISOGRADIENT