2327

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 2327 MAP

TECTONIC ANALYSIS OF FRACTURE DENSITY

TO ACCOMPANY GEOLOGICAL SURVEY REPORT

of

H.H. SHEAR, P. ENG.

92I/7W,6E

PHOTOGEOLOGICAL REPORT

by

D.A. CHAPMAN & ASSOCIATES LTD.

on the

SAN JACINTO EXPLORATIONS LTD.

ALAMO CLAIMS 1-6

SKUHUN CREEK AREA

Kamloops Mining Division, B.C.

Latitude: 50° 20'N 50°21½'

Longitude: 121° 00'W 121°00½'

- Deposit
- card began
- plotted

January, 1970.

Map #1 — Property Maps ——— following page
Map #2 — Topography and Geology ——— following Map #1
Map #3 — Fig. 1 — Aerial Tectonic Survey — Rear
Map #4 — Stress Deformation ——— Rear

D.A. Chapman & Associates Limited
#2 • 515 GRANVILLE STREET • VANCOUVER 2, B.C.

January 7, 1970.

Report On Alamo 1-6 Claims

At San Jacinto Explorations' request, D.A. Chapman & Associates Ltd. completed a tectonic analysis of fracture density over the Alamo Group of Mineral Claims. A prior aeromagnetic survey by Geo-X Surveys had been completed over the property.

The tectonic analysis revealed a large area of apparent anomalous deformation stress on Alamo 1 and 3. Coincident with this is a magnetic high as outlined by the aeromagnetic survey. Consequently, a bulldozer trenching program, as shown on maps accompanying this report, was carried out in December, 1969, to attempt to expose bedrock.

Deep overburden and a relatively shallow water table resulted in no bedrock being exposed. In an older trench, termed trench "J", immediately east of the target area, quartz diorite belonging to the Bethlehem intrusives has been exposed. A minor amount of malachite staining was observed along a few fractures in trench "J".

It will be necessary to percussion drill the anomalous area on Alamo 1 and 3 in order to determine whether copper mineralization is present or not. The value of geochemistry here is debatable because of the deep overburden and shallow water table. An Induced Polarization Survey may be useful in pinpointing drill targets.

Respectfully submitted,

H.H. Shear, P. Eng.

HHS:fk

D.A. Chapman & Associates Limited
#2 • 515 GRANVILLE STREET • VANCOUVER 2, B.C.

January 7, 1970

San Jacinto Explorations Ltd., N.P.L.
#708, 850 West Hastings Street
Vancouver 2, British Columbia

Attention: Mr. H.H. Shear, P. Eng.

Dear Sirs:

I have completed a tectonic survey of the Alamo 1-6 claims in the Highland Valley area, Kamloops M.D., British Columbia.

Stress Deformation Isogram Map

This map is the product of a computerized analysis of the unit area density of tension fracture joints observed in vertical aerial photographs at a photo scale of 500' = 1". The rate of visible isostatic traces of the tension joints is analogous to pressure changes in vertical rock columns resulting from fault ruptures, and by analogy, can be used to derive variable rock modulii to determine the super-imposed stress load resulting from the relief of shear stress.

The interpretation of the photographs was done at an earlier date as well as the density count per unit area. This empiric data was used for the computer input.

The significance of the deformation stress peaks is very pertinent to the Highland Valley deposits since all reentrant forms in the batholith will be associated with lateral compressive stresses induced by the collapsing structure. This is the end result of the effect of the induced deformation stress on the lateral pressure columns and is illustrated in the schematic shown in Fig. 1.

The theory and technique of Tectonic Aerial Surveys Geology is attached at the end of this report.

.....2

There are few rock outcrops in the Alamo 1-6 Claims Area. These are quartz diorite and are mapped by Northcote (G.S.C. Memoir) as the younger Bethlehem Quartz Diorite. The rest of the claims area is overburden at depths estimated from 10 - 100 feet.

Copper Mineralization in the form of Malachite was found disseminated along a flat lying fracture at "J" trench.) showing

Observations

1. A large area of increased deformation stress that may be indicative of a reentrant of the older quartz diorite is centred on claims 1 and 3.

2. A long north striking axis of an induced pressure arch lays just to the east of the claims baseline, crossing structures are indicated by conjugate axis. These induced archs result from the unloading stresses created by fault ruptures and it is possible that the structures may contain dyke swarms and/or breccias.

Recommendations

1. Deepen and extend the old trenches to bedrock if possible.

2. A ground magnetometer survey to cover the claims and check the airborne magnetometer survey.

3. An Induced Polarization Survey on E-W lines and covering claims 1-6 is warranted.

Respectfully submitted,

D.A. CHAPMAN & ASSOCIATES LTD.

D.A. Chapman

DAC:fk

Addendum - H.H. Shear, P. Eng.

This report is intended to assist in the field exploration of the claims studied. The isogradients are useful for the correlation of ground and airborne geophysical surveys and the planning of related field programs. The tectonic structural targets are zones of faulting which offer potential traps for mineral localization. Mineralization, if present, would more likely take advantage of areas of increased fracturing or deformation, thus focusing attention to those areas most favourable should reduce exploration costs.

I have personally collaborated and discussed the material contained herin with the author, D.A. Chapman.

Signed this 7th day of January, 1970.

H.H. Shear, P. Eng.

CERTIFICATION

1. I, DOUGLAS A. CHAPMAN, certify that I have practised the art of photogeological interpretation for mineral exploration for more than 15 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 where I practised interpretation and compilation of fracture patterns for structural 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.

Signed this 7th day of January A.D. 1970.

D.A. CHAPMAN,
D.A. CHAPMAN & ASSOCIATES LTD.

D.A. Chapman & Associates Limited
#2 • 515 GRANVILLE STREET • VANCOUVER 2, B.C.

TECTONIC AERIAL SURVEY

THEORY AND TECHNIQUE.

INTRODUCTION:

The objective of the report is to provide information relating to the major or macro tectonic structures in the area surveyed. This information can be used for ground examination by geological prospecting parties to determine a possible economic significance of the structural targets selected.

NATURE OF SURVEY:

The survey is an empirical study of the effects of pressure variations within the earth's crustal surface.

The condition observed is a horizontal plane of the earth's crust where the relative rate of unloading stresses by fracture tension joints is controlled by the degree of surface tension exerted and inherent rock characteristics (modulii). The horizontal stress components of the pressure gradient must create a balanced condition of forces at the crustal surface since this surface in elastic terms (rock mechanics) represents the boundary condition.

In the survey, a unit area is treated as a cross-section of the vertical column of the earth's crust which at the boundary condition adjusts its cross-sectional area by fracturing (tension) or non-fracturing (compression) at a rate consistent with the amount of stress relief necessary to maintain isostatic equilibrium.

Thus the incidence of fracturing (tension) or nonfracturing (compression) is directly proportional to the total vertical upward pressure exerted within the rock column. This total pressure gradient is a modified vertical elongation effect on the column by the pressure, plus the change of pressure necessary to accomodate the lateral components of the deformation stresses exerted through the column.

The deformation or shearing stresses are induced by changes of pressure as a result of increased or relieved stresses, thus any shearing by rupture must affect the vertical pressure of the lateral vertical columns and hence the horizontal components of surface tension across fracture interfaces. It is this effect which is empirically noted and constitutes the basic observation of the survey. Most of the linear traces (lineaments) observed in aerial photographs are the product of surface tension; as such, they can be used to derive the first empiric quantity required for tectonic analysis of the pressure gradient.

NATURE OF SURVEY: (Cont'd)

It should be clearly defined that a linear trace does not imply a corresponding fault or fracture plane exists on the crustal surface. A linear trace by the nature of the forces creating the visible phenomena (surface tension) is an apparent strike line through a system of tension joints or fracture fault planes that align themselves isostatically along paths parallel and normal to the principal stress directions exerted by the pressure gradient. In the aerial photograph the numerous conjugate sets are quite visible due to physiographic changes controlled by the existence of joints and erosonial effects acting upon them. This advantage of viewing the crustal surface from above at a scale comprehensible in magnitude to see alignment of the systematic orientation of lineal joint sets and shear fracture makes it possible to estimate with reasonable success the incidence rate of tension fracturing within the cross sectional areas of the vertical rock columns relative to the existing pressure gradient.

This first empiric is treated analytically to derive parameters (the mathematical equivalent of related rock mechanic postulates that control the data). By determining analogous changes in pressure occuring at a point relative to all surrounding points, a coefficient of the induced tangential (shear) stress can be calculated. Again by analogy with the significance of the parameters used a coefficient of Poisson's Ratio is calculated. This result is iso contoured to show the relative loading or unloading of stresses in lateral rock columns as result of the shearing or deformative stresses occuring within the area. This isogram is the effect on the pressure gradient due to shear faulting. Therefore by assuming a probable zone of shearing where the optimum failure zone should occur due to maximum opposing forces, a probability isograd can be mapped by conversion of deformation values to percent values of prediction.

TECHNIQUE OF DATA COMPILATION:

A clear film overlay is placed over the photograph and the isostatic linear traces are annotated to it.

Since only lineal features are annotated, a stereographic photo pair is not always necessary and interpretation can be done under a direct light and magnification. Stereo experience is a prerequisite so that the observations of leaching, foliage alignment, pot holes at fracture intersections, slumping along fractures and drainage patterns are recongnizable by the person annotating the photograph.

Straight line annotation from point to point is used until a sufficient number of lineal sets create an isostatic web or grid across the surface viewed. A cadence or frequency interval of incidence will become apparent as continued interpretation removes the interference to the eye of one conjugate pattern superimposed on the other.

This method requires a minimal interpretive quality by the person carrying out the survey, but demands a constant observation at the pencil point as linears are traced out. The experience required, is as pointed out earlier, a knowledge of physiography rather than geology.

TECHNIQUE OF DATA COMPILATION: (Cont'd)

Secondly, there are no preferential criterias other than a lineal control, i.e., planar fractures which dip in differing directions across topography are eliminated automatically, since their strike will vary with the dip and intersection of the topography. Surface tension is the only control sought and it is left to the treatment of the data to eliminate inconsistencies, rather than elimination by the interpreter.

The myriad of intersecting lineal sets annotated to the clear overlay is removed from the photograph and placed over a grid system. This allows the organization of the data to a empirical form by a count or estimate of the number of intercepts around the peripheal boundary of the unit area examined.

INTERPOLATION OF LAKE AREAS:

In areas where lakes of small and medium size are situated, interpolation of the net is projected through with reasonable ease. The control used is the frequency and linearity of the surrounding areas and these are projected across from lake shore to lake shore. This is a reasonable interpolation where the lake size does not exceed three grid intervals in width and shoreline control exists around the entire lake area.

PROPOGATION OF LINEAL SYSTEMS THROUGH AREAS OF OVERBURDEN:

Surface tension effects exert a definite control on the surface denudation processes of nature and as a result control to great extent the physiography of the earth's crust.

The tension across fracture interfaces is constantly oscillated by earth tides which result from the earth's motion. In areas where a mantle of relatively unconsolidated detritus has accumulated, continual destruction and removal of the soil directly over the fracture/joint interface occurs at a more rapid rate than the adjacent areas. The granular flow of the material is analogous to grain in a bin where the flow due to gravitation is down the centre of the bin.

The result is leached areas in the soil, water courses, potholes, and lakes which align themselves to the underlying linear controls. All drainage is to a major extent controlled by this phenomena of surface tension and natural foliage avails itself of the required nourishment provided by accumulation within and along the natural sumps created. Trees, when viewed from above, and in the natural state, align themselves in a near uniform orientation to lineal systems.

A second analogy that is pertinent to areas of deep overburden is the increased amplitude of the wave motion of earth tidal forces at the surface, similar to the way that water waves are of greatest amplitude at surface and are dampened at depth under the ocean. This increase of amplitude on surface assures the continued propogation to surface of linear phenomena by intensification of the erosion processes.

GEOPHYSICAL ASPECTS OF SURVEY:

Geologically, the phenomena of fractures is planar strain created by the adjustment of the crustal surface to a volumetric change. This

GEOPHYSICAL ASPECTS OF SURVEY: (Cont'd)

volumetric change of an elastic body involves elastic modulii which will vary with inherent characteristics of differing rock units, they in turn vary with differing pressures or loads, thus any treatment of the data must cope with these variable factors. In this tectonic analysis the data is compensated mechanically by the sampling methods used, and mathematically by geological analogy to produce the deformation isograms.

Common to all geologic structural classifications are the deforming stress effects by pressure changes on the physical characteristics of lateral vertical rock columns during the folding processes. In this sense, physical characteristics of the rock relative to the lateral effect of the deforming stresses are a geophysical measurement, i.e., potential geologic structures associated to pressure/stress zones. These empiric measurements should conform to similar associations of electromagnetic variations that are affected by the same rock characteristics and stresses, and in particular where a thermal/stress flow has been induced.

This link between rock stresses and other geophysical sciences should prove extremely useful in filter processing and evaluation of geophysical surveys by geophysicists, especially where airborne methods are used.

February, 1970.

D.A. CHAPMAN & AASOCIATES LTD.

D. A. Chapman,
President

DAC:fk

D.A. Chapman & Associates Limited
#2 • 515 GRANVILLE STREET • VANCOUVER 2, B.C.

April 21, 1970

San Jacinto Explorations Ltd., N.P.L.
#708, 850 West Hastings Street
Vancouver 2, British Columbia

INVOICE

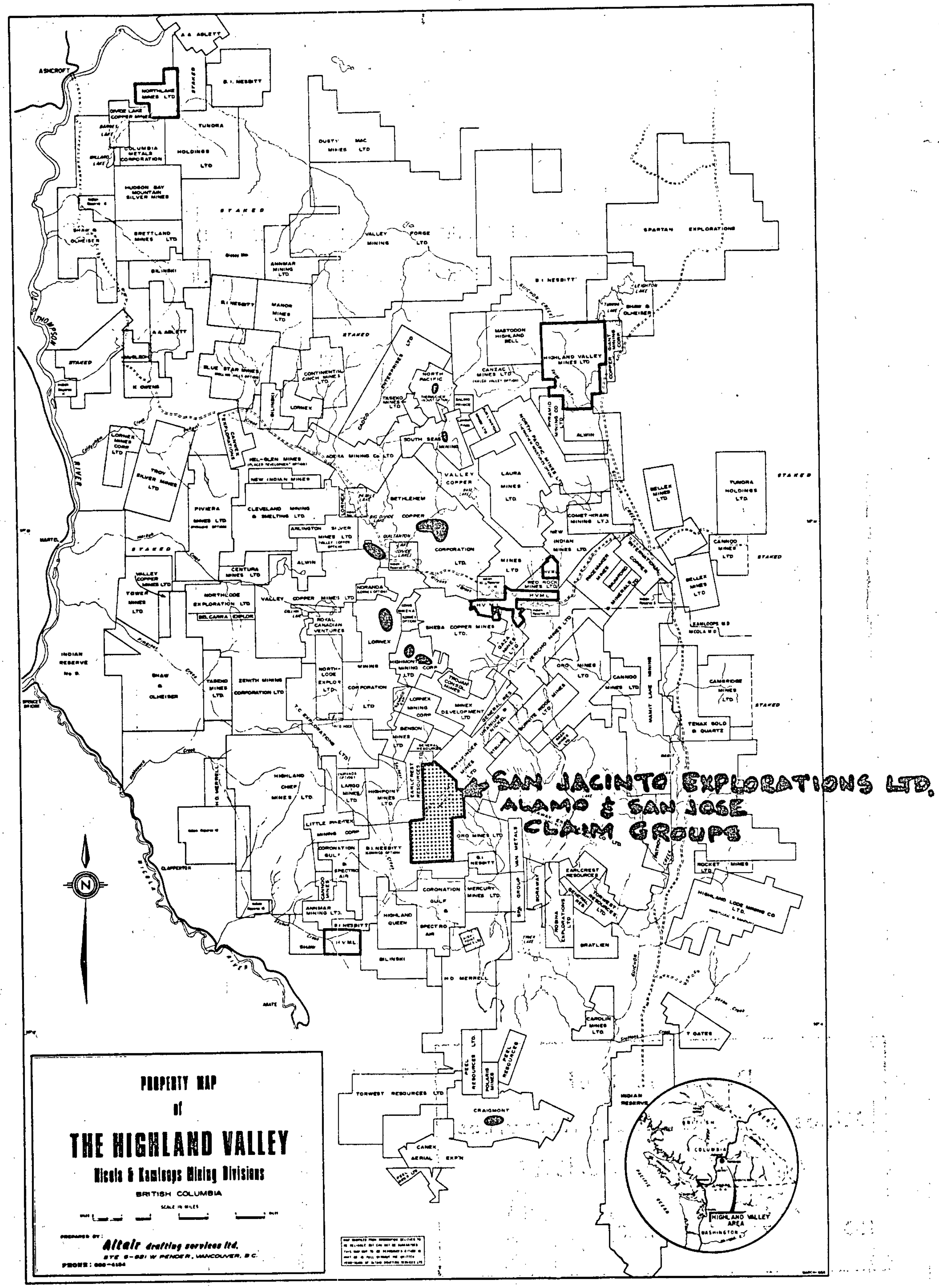
Re: Cost analysis for Aerial Tectonic Survey
Alamo Claims 1-6, Highland Valley Area,
Kamloops M.D., British Columbia

Service Costs - D.A. CHAPMAN & ASSOCIATES LTD.

1.	Fracture/joint interpretation and annotation of aerial photograph @ photo scale 1" = 500' (See footnote.) say 10 hrs. @ $20.00/hr.	= $200.00
2.	Counting procedure and compilation of Empiric Data Input for programme analysis (See footnote.) say 2½ hrs. @ $20.00/hr	= $ 50.00
3.	Computer data correlation and report including disbursements	= $150.00
4.	Computer Programme charge	= $250.00
	Total:	$650.00

Note: Survey was compiled from data interpreted @ photo scale of 500' = 1" and accomodated 7200 observations requiring 6 programs. Thus charges are a portion of the total costs and excluding Item 3 will be deducted from cost of survey including San Jose Claim Group to be compiled at a later date.

Received D.A. Chapman
D.A. Chapman & Associates Ltd.


PROPERTY MAP
of
THE HIGHLAND VALLEY
Nicola & Kamloops Mining Divisions
BRITISH COLUMBIA
SCALE IN MILES
PREPARED BY:
Altair drafting services ltd.
STE 6-821 W PENDER, VANCOUVER, B.C.
SAN JACINTO EXPLORATIONS LTD.
ALAMO & SAN JOSE
CLAIM GROUPS
ASHCROFT
THOMPSON
RIVER
NICOLA
SPARTAN EXPLORATIONS
HIGHLAND VALLEY MINES LTD
BETHLEHEM COPPER CORPORATION LTD.
VALLEY COPPER MINES LTD
LORNEX MINING CORPORATION LTD
SHEBA COPPER MINES LTD.
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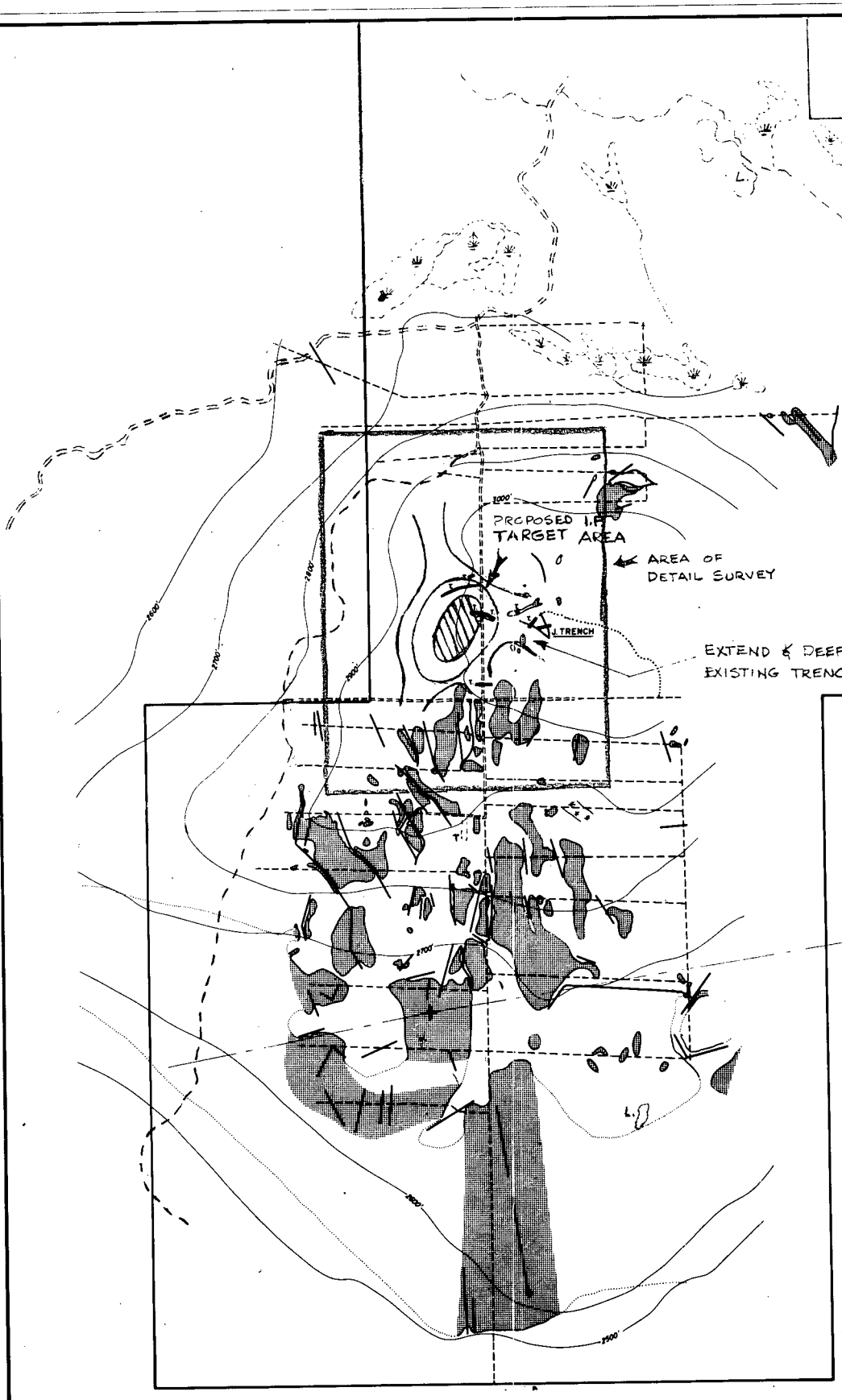
CRAIGMONT
TORWEST RESOURCES LTD
INDIAN RESERVE No. 9
BRITISH COLUMBIA
HIGHLAND VALLEY AREA
WASHINGTON

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT

NO. 2327 MAP #1



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LEGEND

GLACIAL DETRITES -- BOULDER CLAY

QUARTZ DIORITE (Bethlehem)

SYMBOLS

- FAULT LINE
- TRENCH
- ROAD
- RECONNAISANCE TRAVERSE
- GRID USED FOR MAPPING BY CHAIN & COMPASS, OFFSETS BY CHAIN & COMPASS
- OUTCROP & PROJECTED OUTCROP

SAN JACINTO EXPLORATIONS et al

TOPOGRAPHY & GEOLOGY

ALAMO & SAN JOSE CLAIMS

HIGHLAND VALLEY AREA, B.C.

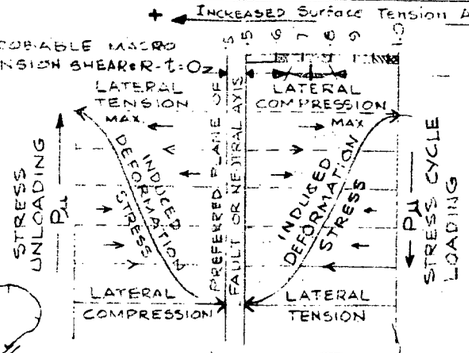
SCALE IN FEET

800 400 0 800 1600 2400

D.A. CHAPMAN & ASSOCIATES LIMITED
FRACTURE DENSITY ANALYSIS
Suite 2-515 Granville St, Vancouver 2, B.C.

MARCH 69

2327



* OPTIMUM FAILURE ZONE (MOHR ENVELOPE)
.706 (LOADING PHASE) — WALL TO WALL OF SHEAR ZONE
.353 (UNLOADING PHASE) —

SCHEMATIC OF ISOGRAM

SHOWING RELATION OF INDUCED LATERAL TENSION AND NON-TENSION OF THE HORIZONTAL COMPONENTS TO THE DEFORMING STRESSES RESULTING FROM THE CHANGE IN VERTICAL PRESSURES CREATED BY STRESS RELIEVED BY FAULT RUPTURES. (P_μ)

SCALE: 1" = 400'

AERIAL TECTONIC SURVEY

ALAMO CLAIMS 1-6

SAN JACINTO EXP. LTD.

HIGHLAND VALLEY AREA
KAMLOOPS M.D., B.C.

D.A. CHAPMAN & ASSOC. LTD. SEPT. 69

STRESS DEFORMATION ISOGRAM MAP

FIG. 1

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT

NO. 2327 MAP #3

LSES

WORK SHEET
COMPUTER DATA
STRESS DEFORMATION
ALAMO CLAIMS 1-6
SAN JACINTO EXPLORATIONS
1"=400'

x OBSERVED VALUE
· INTERPOLATED VALUE.