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DU PONT OF CANADA EXPLORATION LIMITED

WOP CLAIMS

Report on 1977 Work Programme
for
Teck Mining Group Limited
and
R.E. Chaplin

by K.A. MacLean, P.Eng.

DU PONT OF CANADA EXPLORATION LIMITED

013541

WOP CLAIMS

REPORT ON 1977 WORK PROGRAMME

for

TECK MINING GROUP LIMITED

and

R.E. CHAPLIN

$62^{o}03'N$, $132^{o}20'W$

NTS 105-K-1

by

K.A. MacLean, P.Eng.

Vancouver, BC

January 31, 1978

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1.0 INTRODUCTION

On May 25, 1977, Du Pont of Canada Exploration Limited signed an agreement with Teck Mining Group Limited and R.E. Chaplin which amended previous agreements relating to the Anvil Range Syndicate dated July 2, 1974 and July 29, 1974, concerning the WOP 1-66 mineral claims, Whitehorse Mining Division, Yukon Territory. This agreement allowed Du Pont to continue work on the WOP claims, which were subsequently made part of the project area of a joint venture between Du Pont and Western Mines, called the Tenas Joint Venture.

The project area includes the adjacent TENAS, BELL, MAL and BAR claims owned by Welcome North Mines Limited and optioned to Du Pont, and the newly staked T claims staked by Du Pont and put into the joint venture.

During 1977 a programme of linecutting, gravity surveys, geochemical soil sampling and geological mapping was performed on the venture holdings, which included the WOP group.

This report presents the results of the 1977 programme which pertain to the WOP claim block, and will be of interest to the Teck Mining Group.

1.1 SCOPE OF PROGRAMME

During early 1977, Eastern Associates cut and chained a base line which passes south of the WOP claims through the project area. In the early spring of 1977, C.A. Ager and Associates conducted a gravity survey over much of the combined claim groups using the base line as control. During this survey, most of the WOP claims were covered. During June and July of 1977, Du Pont personnel conducted geological mapping and geochemical soil sampling on the WOP group using the geophysical grid for reference.

In August, Du Pont and Western drilled two holes on a gravity anomaly on the T claims, some 5 km southeast of the WOP group and another hole on the TENAS claims east of their mutual boundary, but no drilling was done on the WOP claims themselves.

The project is continuing, and for this reason the joint venture will continue to hold the WOP group under the terms of the option agreements.

1.2 LOCATION AND ACCESS

The claims are north of the North Canol Road, east of Tenas Creek, about 12 km north of the village of Ross River in the eastern Yukon. They can be reached by truck.

1.3 LIST OF CLAIMS AND EXPIRY DATES

Claims	Grant Numbers	Expiry Date
WOP 1-4	Y79660-63	July 22, 1980
5-7	Y79664-66	*January 27, 1981
8	Y79667	July 22, 1980
9-10	Y79668-69	*January 27, 1981
11-16	Y79670-75	July 22, 1980
17	Y79696	*January 27, 1981
18	Y79697	July 22, 1980
19-20	Y79698-99	*January 27, 1981
21-28	Y79676-83	*January 27, 1981
29-38	Y80208-17	August 16, 1980
39-56	Y80218-35	*January 27, 1981
57-63	Y80236-42	August 16, 1980
64-66	Y80243-45	*January 27, 1981

*These new expiry dates were applied for November 1, 1977 but certificates of work on these claims have not been received yet. Dates were moved to bring all claims in the venture area to a common expiry date eventually.

1.4 TOPOGRAPHY AND VEGETATION

The claims are on the south-facing, gently sloping side of the broad Ross River valley. Vegetation varies from open grassy patches on the steep slopes to spruce stands interspersed with poplar on the permafrost-free portions.

2.0 GRAVITY SURVEY (Mostly taken from Ager, 1977)

2.1 INSTRUMENTATION AND SURVEY PROCEDURE

Station intervals were 60 metres along flagged, chain and compass grid lines spaced 300 to 400 metres apart. Gravity measurements were made using two LaCoste and Romberg Model G gravity meters with reading accuracy of ±0.01 mgal. Instrument and diurnal drift were accounted for by tying-in known base stations within three hour intervals. Pink survey flagging was used to mark survey lines and lime green and pink flagging was used to mark the stations. Station elevations were determined from standard levelling procedures using an electric level device developed by Ager and Associates.

2.2 DATA REDUCTION

Using standard procedures, complete Bouguer gravity maps were calculated and plotted. Terrain effects were calculated to a radius of 600 metres about each station using a computer technique of Ager and Associates. Bouguer slab and terrain densities were taken as 2.80 g/cc as determined from mean rock density measurements of survey area outcrop specimens.

The Bouguer gravity, residual gravity and elevation maps for the WOP claims may be found in the pocket at the back of this report (Section 7.1).

The search concept was designed to detect massive sulphide bodies in the range of 20-60 million tons. This means that gravity responsive for this type of mass is expected to be recognizable and probably will be greater than 1.0 mgal in amplitude, but further geological, geochemical and geophysical parameters may allow subtler anomalies of less than 1.0 mgal to be interpreted.

2.3 INTERPRETATION OF RESULTS

A broad gravity high feature passes through the southern part of the WOP claims and probably represents andesitic units. Confined gravity highs which possibly may represent massive sulphide bodies will represent themselves as gravity high closures or contortions in the gravity gradient. Although Dr. Ager interpreted four gravity highs in the total joint venture project area as possibly representing massive sulphides, none of these was on the WOP group. However, there is a small gravity high closure of about 1 mgal relief which may also be interpreted as a closure or subtle contortion in the gravity gradient which occurs centrally located on the WOP claims; its centre is on line 40E at about 35N. On the initial evaluation and interpretation of the gravity survey results, detailed interpretation of this feature was not carried out, so no projected size, depth to centre or rock density contrast can be given at this time.

3.0 GEOCHEMICAL SOIL SURVEY (After Smith, 1977)

3.1 SAMPLE SPACING AND GRID CONTROL

Approximately 300 soil samples were collected in the WOP portion of the grid by using a grub hoe to reach the "Be" horizon. The data concerning location and site information were recorded on the sample envelopes in the field and later on information sheets. The samples were air-dried in Ross River then sent to Min-En Labs in North Vancouver for analysis using a nitric-perchloric acid digestion and standard atomic absorption procedures during which lead and zinc contents were measured. The geophysical grid lines were used for control and intermediate lines,where required, were put in using topochain and compass. Stations were, in general, on a 100 x 200 metre pattern.

3.2 INTERPRETATION

Sample values at the stations were plotted on the Geochemical Soil Survey map which may be found in the pocket at the back of the report.

3.2.1 Statistical Determinations

Statistical determinations were made on about 1400 analyses from the complete survey grid. Two levels of interest were calculated using the geometric mean and standard deviation for the sample population. The first level of interest, at the geometric mean plus 1 standard deviation, was 40 ppm for lead and 350 ppm for zinc. The second level was at the geometric mean plus 2 standard deviations; this meant that Pb samples above 91 ppm and zinc sites reporting in excess of 627 ppm are anomalous.

3.3 GEOCHEMICAL SOIL SURVEY ANOMALIES

A number of sites (7%) showed values of lead at the first level of interest, about 5% were anomalous in zinc. The pattern is rather irregular but the high sites are generally confined to the central portion of the grid on the WOP claims. Highly anomalous zinc value are found on line 40E from 20 to 40N. This correlates exactly with the gravity feature mentioned in section 2.3.

4.0 GEOLOGICAL SURVEYS

4.1 INTRODUCTION

Outcrop is relatively sparse on the WOP claims, but enough information may be had to indicate that there is an andesite dome in the southeast corner of the block, fringed by proximal and distal sediments and volcano-sediments.

The area was mapped geologically by Du Pont personnel who used the grid lines as control. Their mapping of the whole project area is valuable in interpreting the geological environment of the WOP rocks.

4.2 GEOLOGIC HISTORY

Hypabyssal andesites, andesite flows and tuffs, follwed by intercalated extrusive andesite and rhyolite tuffs, laid down in a subaqueous basin were later overlain by greywackes and phyllites derived from the weathering of the continental platform found further to the northeast.

The youngest rocks are Cretaceous intrusions of quartz monzonite and quartz feldspar porphyry. These rocks are found mostly in the northern part of the area, along the northern boundary of the WOP claims and adjacent TENAS claims.

4.3 GRANITIC ROCKS - UNIT 1

The youngest rocks in the area are the Cretaceous intrusives related to the large batholith to the north. Along the main contact on the adjacent TENAS claims, intruded sediments and volcanics are metamorphosed and riddled with aphitic porphyritic and pegmatitic dykes. Quartz veins and lenses also become more prominent as the intrusive contact is approached from the south. Composition appears to be that of a quartz monzonite and textures vary considerably. Quartz feldspar porphyry is composed of euhedral doubly-terminated quartz crystals, potassium feldspar, hornblende and biotite in a fine to medium grained feldspathic or pale green/grey aphanitic groundmass. Disseminated pyrite can be seen and locally traces of malachite are present.

One small outcrop of this rock type was seen on line 1100W in the northwestern corner of the claim block.

4.4 ANDESITE - UNIT 3

Andesite outcrops are found in the southeast corner of the WOP group and on the adjacent T group, and in the eastern half of the MAL group.

The rocks range from a medium grained hypabyssal equivalent in the cores of the volcanic domes, through massive flow type greenstones to an andesitic tuffaceous member farther out on the dome flanks. This last type commonly intercalates with rhyolites, rhyolitic tuffs and some proximal phyllitic sediments.

The most common variant of the andesite is a fine-grained massive pale to dark green andesitic greenstone which is likely of flow origin. It is of uniform texture and often contains carbonate in the form of calcite or siderite veinlets. Pyrite cubes are commonly associated with the carbonates.

Serpentine and talc alteration are seen, but chlorite characterizes the most common alteration assemblage.

The andesite dome matrix material is usually a medium to coarse-grained, intrusive textured rock, where a pale green to dark grey mottled texture is produced by biotite, amphibole and pyroxene crystals distributed through a matrix of plagioclase and minor quartz. Mafic minerals are well chloritized. Pyroxene and amphiboles are less common in the WOP dome than in other domes along the belt.

Disseminated pyrite is ubiquitous in the volcanics. The core members grade very quickly into massive flow varieties which in turn intercalate with pale green banded to massive rhyolite tuffs and pearly dark grey phyllite; and phyllitic argillites of unit 4.

4.5 RHYOLITES - UNIT 4

These rocks are regarded as being a constituent of the sedimentary package deposited in close proximity to volcanic vents, which in turn are thought to be andesite domes. They can be massive, foliated or banded in texture and rhyolitic in composition. In exposures found on the north side of Ross River, these rocks tend to be very fine-grained and show well-developed seidmentary structures such as load casts and graded bedding. Alternating light and dark bands on weathered surfaces commonly display differential weathering due to their carbonate content and staining techniques reveal calcic and potassic-rich beds are present. The rock is hard and siliceous and often shows the typical powder-white weathered surfaces of rhyolite. Small scale folds are common.

4.6 DISTAL SEDIMENTARY UNIT

These rocks are typically medium to fine-grained, dark grey, laminated phyllitized wackes and dark grey fissile argillaceous phyllite. They are thought to have been laid down during periods of volcanic quiescence on the flanks of dome centres and in the intervening basins.

The greywackes are composed mainly of fine-grained biotite and quartz, and show varying degrees of foliation and development of cleavage. The pearly grey phyllites and argillaceous shales are usually intercalated with a grey to white medium to fine-grained siliceous siltstone. Local graphitic horizons are present.

The distal sediments are generally flat-lying or dip very gently. In small scale, however, there are abundant crenulations of a few millimetres in amplitude and occasional tight isoclinal folds up to 2 cm in amplitude. There are several good outcrops of this unit on line 20W and line 40E on the WOP grid.

4.7 CONCLUSIONS CONCERNING GEOLOGY

The geochemically and geophysically anomalous area centred on 40E/30N has no rock exposures, but outcrops nearby suggest that the underlying rocks could be proximal to the andesite dome in the southeast corner of the claim block.

Two holes drilled in 1974 on WOP 5 and WOP 7 were some 600 m north of the centre of the 1977 anomaly and penetrated to a depth of 150 m. Core consisted of grey phyllite and minor slightly hornfelsed tuffaceous greenstone, and the 1974 gravity anomaly was not explained. Chaplin (July 14, 1975) felt that the cause of the geochemical anomaly was due to pyrrhotite, scheelite and chalcopyrite in near surface bedrock but that deeper holes (500 m) should be drilled to explain the gravity and magnetic anomalies.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The WOP claims are staked over a coincident gravity and geochemical soil anomaly which is proximal to a volcanic dome. The criteria are satisfied that the anomaly is of further interest to the Tenas Joint Venturers. Previous holes were not drilled in the best place, according to the 1977 surveys.

It is recommended that Dr. Ager be asked to provide a detailed interpretation of the gravity feature, if possible. If not enough data is available, then additional gravity surveys should be completed during the next phase, when a crew will be available in the area.

If the interpretation suggests a shallow source of sufficient mass, it should be followed up by an electromagnetic survey, preferably pulse EM, to further define a drilling target, then drilling should be done where indicated.

If the source indicated is interpreted as being deep and of sufficient mass, then there is no choice but to drill on the most favourable line to investigate the cause of the gravity. Costs would be in the $25,000-$35,000 range for a 300 m hole.

6.0 REFERENCES

Ager, C.A. (1974-1): Gravity Survey, WOP and CHAP Claims Grids, Tenas Creek Area, Y.T., November 18, 1974.

Ager, C.A. (1974-2): Gravity Survey, WOP Claims Grid - Addendum, second vertical derivative, December 16, 1974.

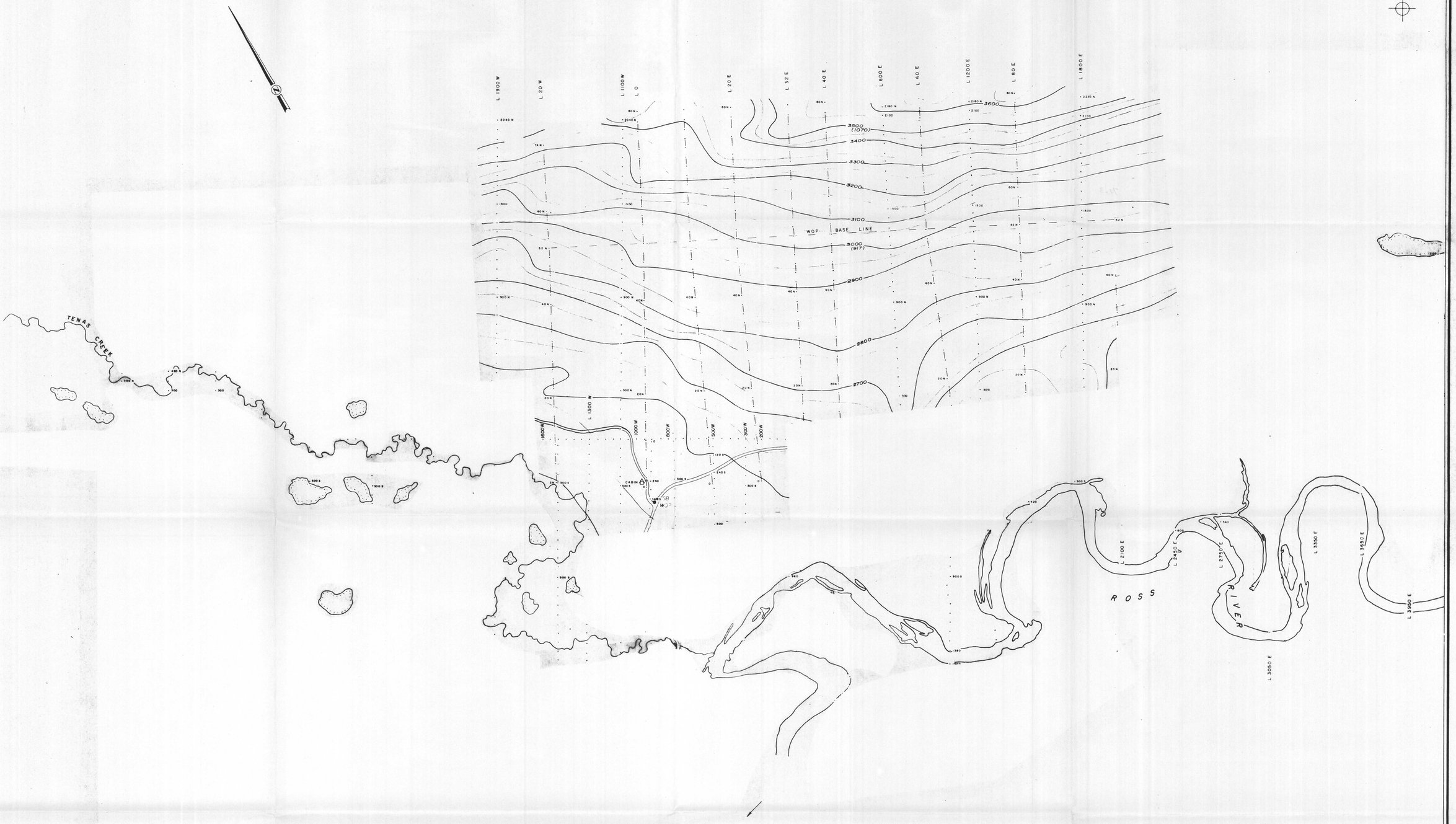
Ager, C.A. (1977): Tenas Creek Gravity Survey, August 2, 1977.

Chaplin, R.E. (1975): Geological, geophysical, geochemical surveys and diamond drill results, WOP mineral claims (Anvil Range Syndicate), July 14, 1975.

Ditson, G.M. et al (1977): Report on the Geology of the T, TENAS, WOP, BAR and MAL claims, November, 1977.

MacLean, K.A. (1977): Diamond Drill Logs, Tenas Project 1977, October, 1977.

Smith, F.M. (1977): Report on the Geochemical Soil Survey of the T, TENAS, WOP, BAR and MAL claims, Tenas Project, October 1977.



LEGEND & NOTES

- ● GB WOP - GRAVITY BASE STATION
- 3000S . SURVEY GRID STATION
- 3500 (1070) TOPOGRAPHIC CONTOUR, INTERVAL = 50 FEET - IN FEET WITH METRIC EQUIVALENT IN BRACKETS - METRIC EQ. INCLUDES GEODETIC ADJUSTMENT
  GEODETIC ADJUSTMENT = 10.12'

WEST | CENTRAL 3-2 | EAST 3-1

SHEET INDEX

DU PONT EXPLORATION CANADA

TENAS PROJECT GRAVITY SURVEY

ELEVATION MAP

C.A. AGER AND ASSOCIATES LTD.

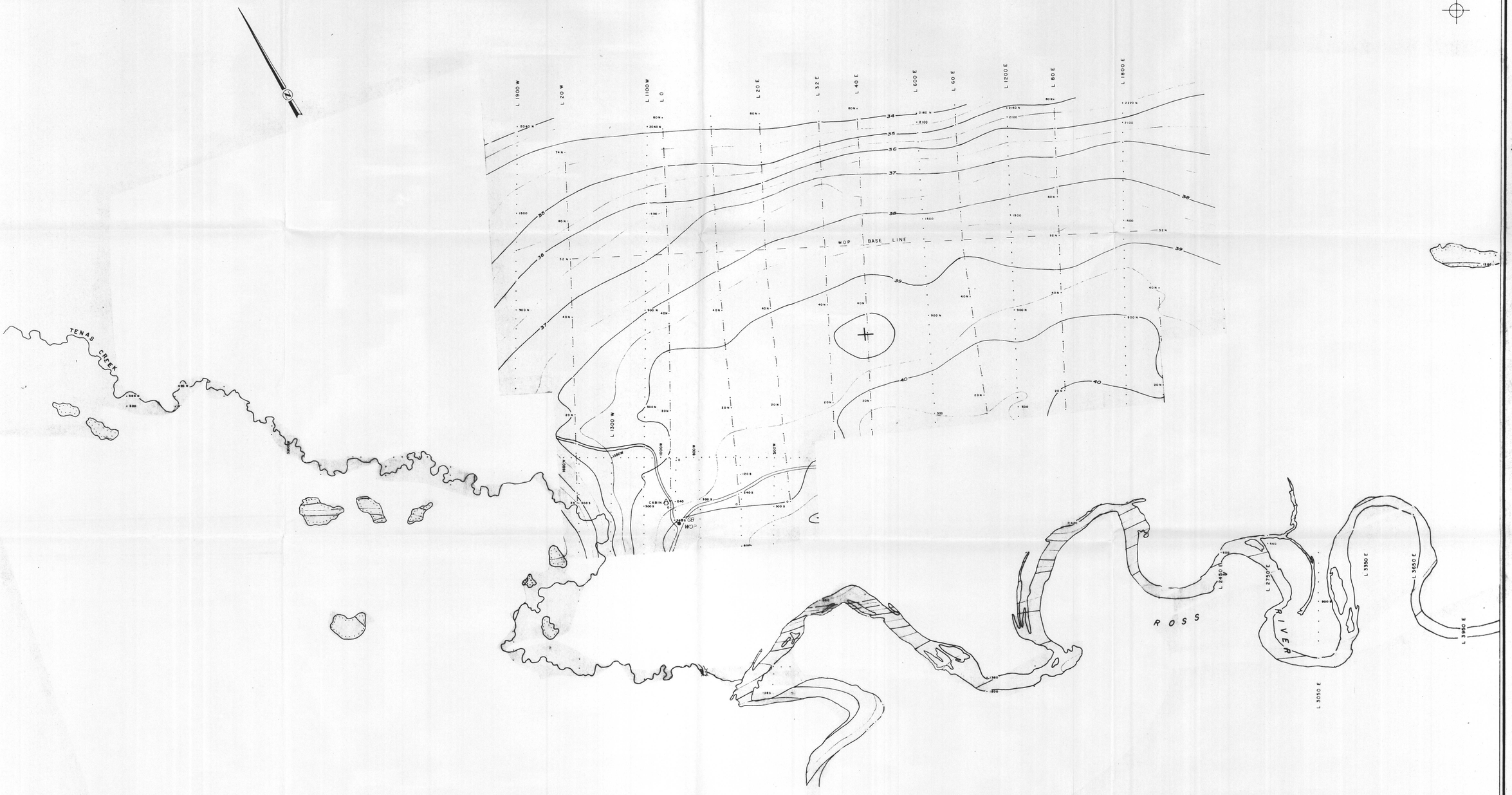
m 300 200 100 0 10,000 500 600 m
SCALE
800 0 400 800
1 INCH = 800 FEET

inches 0 1 2
centimetres 0 1 2 3 4 5

This reference scale bar is accurate when the original image is not scale at the same rate as the original and can be used as a reference for the original size.

YUKON GEOLOGICAL SURVEY

MAPPED BY	C.A. AGER APRIL, JUNE 1977	REVISED	N.T.S. No. 105 K. 1
DATE			ACCT No. TENAS
DRAWN BY	C.H.S.		DRWG No. 3-21 7.1.1
DATE	JULY, 1977		



LEGEND

- ● GB-WOP - GRAVITY BASE STATION
- 3000 E • SURVEY GRID STATION
- ——36—— GRAVITY CONTOUR IN MILLIGALS - CONTOUR INTERVAL = 0.50 M.GALS.

WEST	CENTRAL 4-2	EAST 4-1

SHEET INDEX

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YUKON GEOLOGICAL SURVEY

DUPONT EXPLORATION CANADA

TENAS PROJECT GRAVITY SURVEY

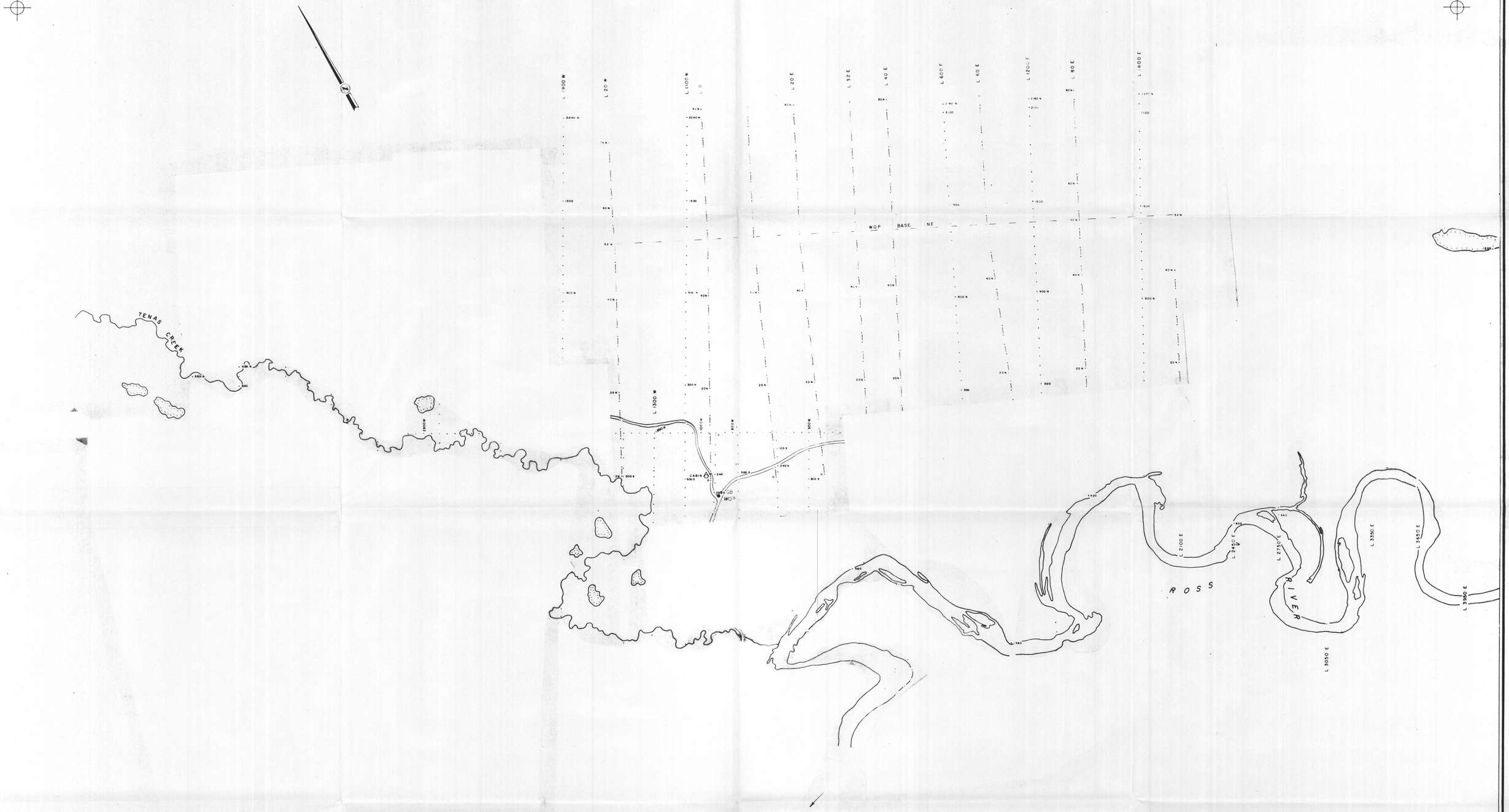
COMPLETE BOUGER GRAVITY

BOUGER DENSITY 2.80 g/cc
ELEVATION FACTOR = 0.19128 mgal/meter
TERRAIN RADIUS = 600 meters

C.A. AGER AND ASSOCIATES LTD.

1: 10,000
SCALE
1 INCH = 800 FEET

MAPPED BY	C.A. AGER	REVISED	N.T.S No. 105 K. 1
DATE	APRIL, JUNE 1977		ACCT No. TENAS
DRAWN BY	C.H.S.		DRWG No. 4-2 7.1.2
DATE	JULY, 1977		



LEGEND

- GB WOP — GRAVITY BASE STATION
- 3000S — SURVEY GRID STATION
- 0.5 — RESIDUAL GRAVITY CONTOUR IN MILLIGALS
- CONDUCTIVE ZONES (AFTER WALCOTT)

WEST	CENTRAL 5-2	EAST 5-1

SHEET INDEX

DUPONT EXPLORATION CANADA

TENAS PROJECT GRAVITY SURVEY

RESIDUAL GRAVITY MAP

C.A. AGER AND ASSOCIATES LTD.

SCALE 1 : 10,000

1 INCH = 800 FEET

MAPPED BY :	C.A. AGER	REVISED	N.T.S. No. 105 K 1
DATE	APRIL, JUNE 1977		ACCT No.: TENAS
DRAWN BY :	C.H.D.		DRWG No.: 5-2 Fig. 3
DATE	JULY, 1977		

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WOP CLAIMS

L 1900 W
L 20 W
L 1100 W
L 0
L 900 W
L 600 W
L 20 E
L 300 W
L 32 E
L 0
L 40 E
L 600 E
L 60 E
L 1200 E
L 80 E
L 1800 E

WOP BASE LINE

L 1300 W

LAKE
LAKE
LAKE
LAKE
LAKE

ROSS RIVER

L 2100 E
L 2450 E
L 2750 E
L 3350 E
L 3650 E
L 3950 E

LEGEND

- T SURVEY GRID - 1977
- TENAS SURVEY GRID - 1974
- WOP SURVEY GRID - 1974
- 26 • 132 — LEAD IN P.P.M. TO LEFT OF SAMPLE POINT; ZINC IN P.P.M. TO RIGHT OF SAMPLE POINT
- CLAIM BLOCK BOUNDARY (APPROXIMATE)

SHEET INDEX

WEST DRWG No. T 77-15 | CENTRAL DRWG No. T 77-14 | EAST DRWG No. T 77-13

DU PONT EXPLORATION CANADA

TENAS CREEK JOINT VENTURE
GEOCHEMICAL SOILS
LEAD & ZINC IN P.P.M.
BAR, BELL, MAL, T, TENAS & WOP CLAIMS
TENAS CREEK AREA, YUKON TERRITORY

SCALE 1:10,000

DATA BY	F.M.S.	REVISED	N.T.S. No. 105 K 1
DATE	Jun. - Jul. '77		ASSY No. 326 - 00
DRAWN BY	K.L.J.		DRWG No. T 77 - 14
DATE	Oct. '77		

7-5-1

This reference scale bar is accurate only for the original maps. It will scale at the same ratio on reduced copies but can be used as a reference for the original size.

YUKON GEOLOGICAL SURVEY

WOP CLAIMS

WOP BASE LINE

L 1900 W
L 20 W
L 1100 W
L 0
L 20 E
L 32 E
L 40 E
L 600 E
L 60 E
L 1300 W
L 2100 E

CABIN

ROSS RIVER

LAKE

LEGEND

5 — DISTAL SEDIMENTS – VERY FINE GRAINED, VERY THIN LAMINAR
– RHYOLITE, TUFFS, PEARLY GREY PHYLLITES (TERRESTRIAL)
BROWN PHYLLITES (VOLCANIC SOURCE) CALC-SILICATES
– GRAPHITIC.

4 — PROXIMAL VOLCANO-SEDIMENT – FINE, MEDIUM GRAINED TURBIDITES WITH HIGH VOLCANIC COMPONENT.
– TUFFS, EXHALITES, RHYOLITES, GREEN, WHITE ETC.
– POSSIBLE HIGH MAGNETITE.

3 — ANDESITE – MASSIVE, HETEROGENEOUS.
– VARIABLE CHARACTER
– CORE MATRIX, POSSIBLE INTERCALATED FLOWS, TUFFS.
– BASIC INCLUSIONS, ASBESTIFORMS, TALCS ETC.

2 — JURASSICS – JASPER, CHERT, RHYOLITE, ANDESITE.

1 — GRANITICS – QUARTZ MONZONITE, QUARTZ FELDSPAR PORPHYRY

SYMBOLS

- OUTCROP
- CONTACT OBSERVED
- CONTACT ASSUMED
- FAULT ASSUMED
- 30 — ATTITUDE OF FOLIATION
- 45 — ATTITUDE OF JOINTING
- CLAIM POST
- T SURVEY GRID – 1977
- TENAS SURVEY GRID – 1974
- WOP SURVEY GRID – 1974
- DIAMOND DRILL HOLE
- CLAIM BLOCK BOUNDARY (APPROXIMATE)

WEST DRWG No. T.77-9 | CENTRAL DRWG No. T.77-8 | EAST DRWG No. T.77-7

SHEET INDEX

inches 0 1 2 — centimeters 0 1 2 3 4 5

This reference scale bar has been added to the original drawing. It is to scale at the same ratio as the image, therefore it may be used as a reference for the original size.

YUKON GEOLOGICAL SURVEY

DUPONT EXPLORATION CANADA

TENAS CREEK JOINT VENTURE
GEOLOGY
BAR, BELL, MAL, T, TENAS & WOP CLAIMS
(PARTS OF)
TENAS CREEK AREA, YUKON TERRITORY

SCALE 1:10,000 — m 300 200 100 0 300 600 m — C NOR FEET

MAPPED BY	F.M.S.	RE-ISED	N.T.S. No. 105 K 1
DATE	Jun.-Jul.'77		ACCT. No. 326-04
DRAWN BY	K.L.J.		DRWG. No. T.77-8
DATE	Aug.'77		

7-3-1