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MCNs 377-80

ANNUAL REPORT

To 13th June 1990

Pine Creek Sheet SD 52.08 Burnside 14/2-II

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SUMMARY

MCNs 377, 378, 379 & 380 cover part of the Howley Anticline approximately 37 km southeast of Adelaide River. Exploration of these claims was undertaken as part of a broader program covering other tenements held by Northern gold in the Howley area and in preparation for the drilling program to be undertaken on the claims in July 1990. Exploration during 1989/90 included geological mapping, site access and preparation, statistical analysis of previous soil sampling and baseline upgrading.

Expenditure on the claim areas during the year was $7,484

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1 INTRODUCTION

1.1 Title

MCN 377, MCN 378, MCN 379 and MCN 380 were granted on 14th June 1983 for a period of 10 years and expire in 1993.

1.2 Location and access

MCNs 377-380 are approximately 40 km south of Adelaide River in the Pine Creek Geosyncline. The claims are known locally as North Ridge prospect. The prospect falls on what is known as the Howley Line, which is a line of gold workings including Dominion Minings Cosmopolitan Howley gold mine (Figure 1).

Access to the claims is via the Stuart Highway and the Metana Camp road.

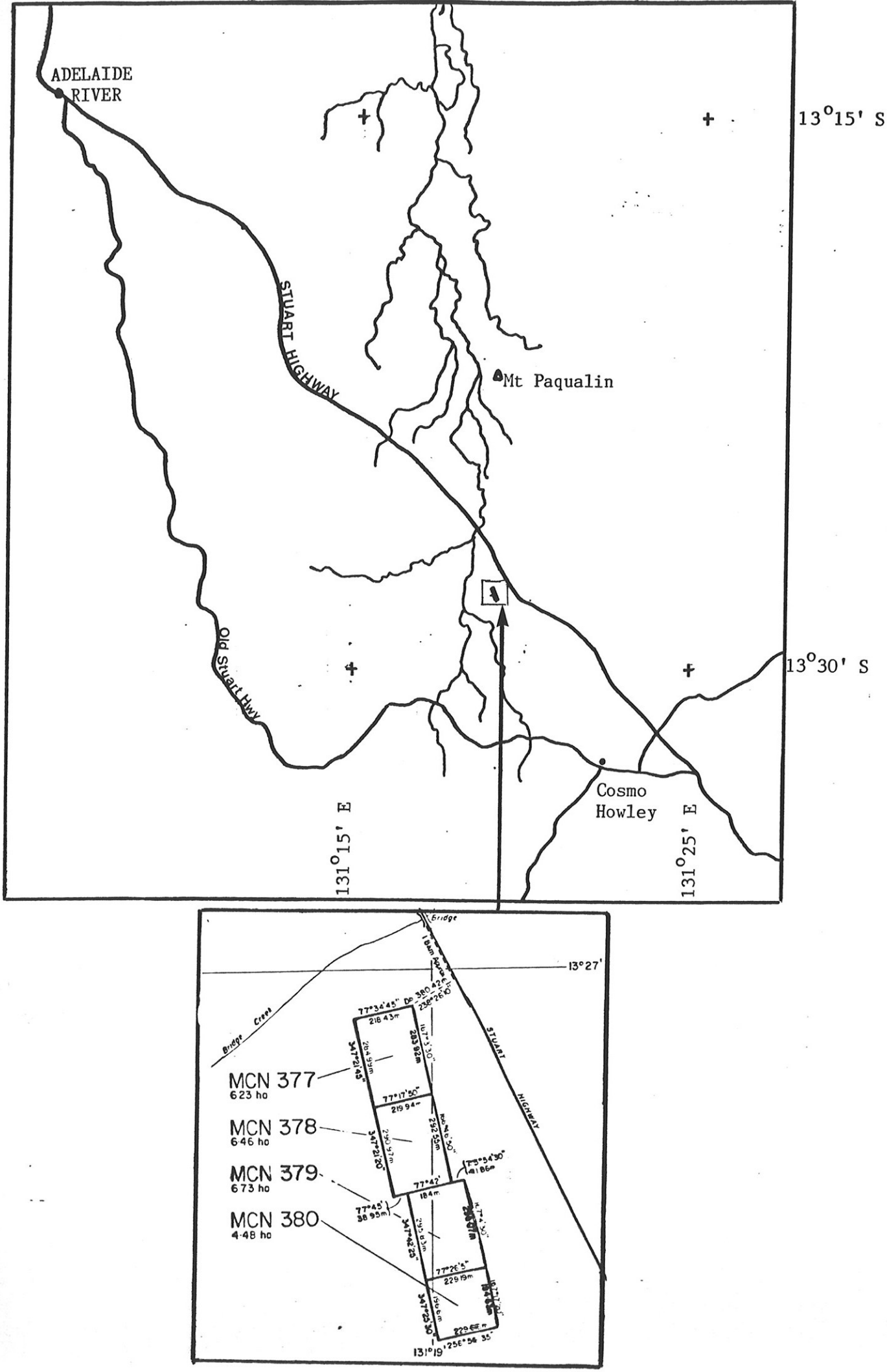


Figure 1. Location Plan

2.0 PREVIOUS EXPLORATION

MCNs 377-380 have been held by Northern Gold since June 1983. Exploration for hardrock gold mineralization since then has included the following -

- costeaning and channel sampling
- Reconnaissance and track upgrading
- Surveying and re-marking of claim boundaries
- RRMIP survey - carried out by Scintrex
- Surveying and pegging a baseline
- Airborne magnetic and radiometric surveying
- Geochemical soil sampling
- Drilling (percussion and RC)

Results of this work are reported in previous annual reports.

Metana Minerals have carried out limited exploration for alluvial gold in the general area of the claims. This work is reported in Russell (1987) and Russell (1988).

3 EXPLORATION COMPLETED

During 1989/90 the area was re-mapped at 1:15,000 scale with an emphasis on structural interpretation as part of a regional mapping program. A fact and interpretive map were produced with the aid of detailed fabric analyses and thin section identification. The mapping was used to review previous data and to test the validity of the exploration concepts used by Northern Gold to date. The 1988 soil sampling program was also reviewed and a detailed statistical analysis carried out on the data. This analyses was used to re-interpret the soil sampling data and to identify any low level anomalous areas that required further work.

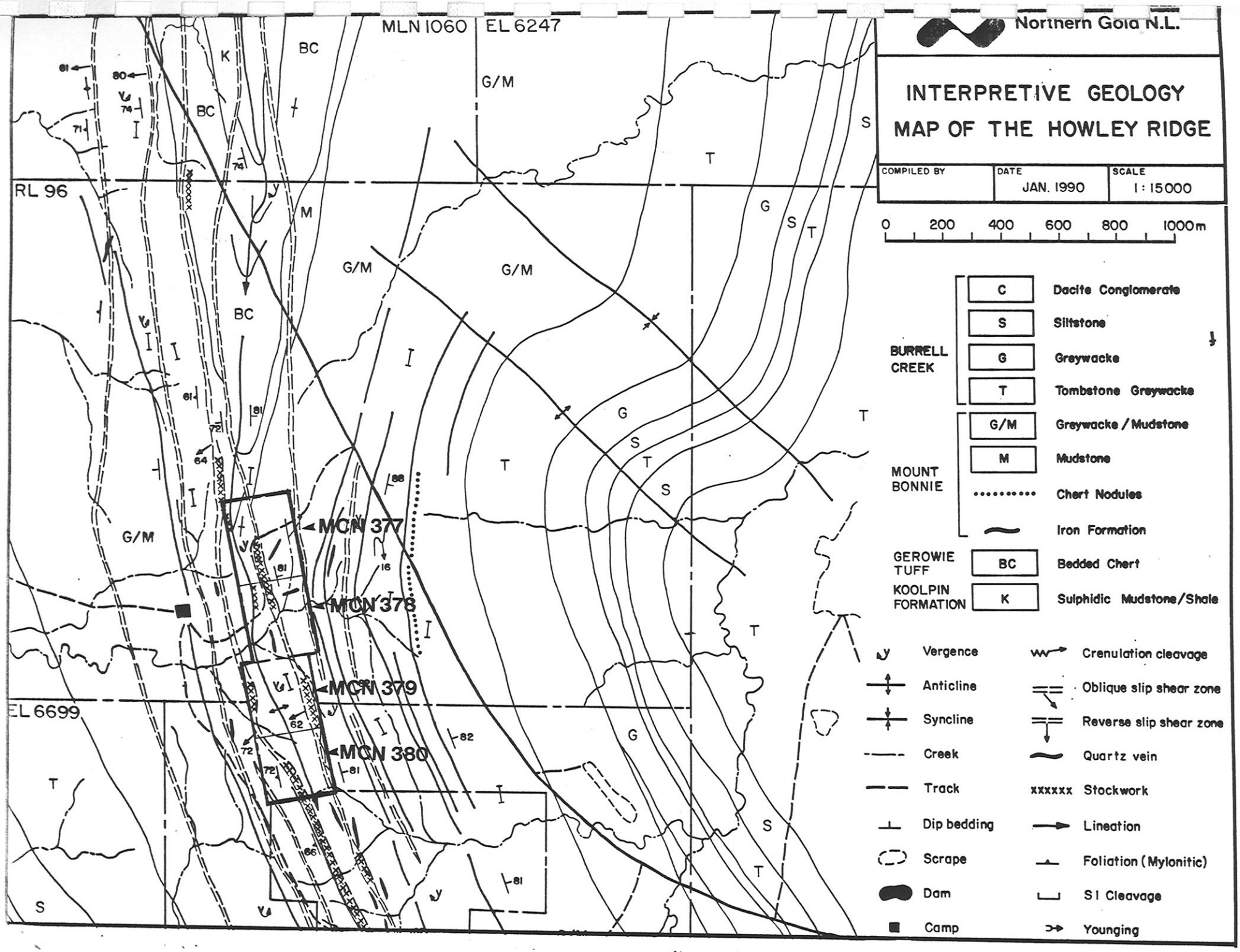
Site preparation and access was also completed in preparation for the drilling program to be undertaken during July 1990.

3.1 Geological Mapping

The Howley Line was mapped using 1:15,000 aerial photographs purchased from Airesearch, a hip chain and compass and using the surveyed grid which was created during the last series of RC drilling. The host rocks to the gold bearing quartz veins belong to the South Alligator Group which have been tightly folded to form the Howley Anticline. These lithologies can be subdivided into two distinct groups which have tentatively been assigned stratigraphic formation names (Figure 2).

3.11. Gerowie Tuff

The lithologies belonging to the Gerowie Tuff lie stratigraphically above the rocks of the Koolpin formation and occur in the northern part of the claims. The eastern limb of the anticline comprises a monotonous sequence of bedded cherts and mudstones.


MLN 1060
EL 6247
RL 96
EL 6699
MCN 377
MCN 378
MCN 379
MCN 380
Northern Gold N.L.
INTERPRETIVE GEOLOGY
MAP OF THE HOWLEY RIDGE
COMPILED BY
DATE
JAN. 1990
SCALE
1 : 15000
0 200 400 600 800 1000m
BURRELL CREEK
C Dacite Conglomerate
S Siltstone
G Greywacke
T Tombstone Greywacke
MOUNT BONNIE
G/M Greywacke / Mudstone
M Mudstone
Chert Nodules
Iron Formation
GEROWIE TUFF
BC Bedded Chert
KOOLPIN FORMATION
K Sulphidic Mudstone/Shale
Vergence
Anticline
Syncline
Creek
Track
Dip bedding
Scrape
Dam
Camp
Crenulation cleavage
Oblique slip shear zone
Reverse slip shear zone
Quartz vein
xxxxxx Stockwork
Lineation
Foliation (Mylonitic)
S1 Cleavage
Younging

The western limb of the fold is defined by a series of bedded cherts, yellow claystones and mudstones. Many of the cherts are finely laminated and contain evidence for the sequence on the western limb of the fold facing west. The cherts of the Gerowie Tuff contain biotite, chlorite, carbonate and garnet. Much of the rocks contain a well developed axial planar cleavage which is overprinted by shear fabrics. The lithologies on the western limb strike 335^{o} and dip 65^{o} to the west whereas the rocks forming the eastern limb strike 002 and dip from 80^{o} to the west to vertical.

3.12. Mt. Bonnie Formation

The rocks which comprise the Mt. Bonnie formation occupy the southern part of the area covered by the claims, and are stratigraphically above the cherts which form the Gerowie Tuff. The first occurrence of the Mt. Bonnie formation is taken to be a coarse-grained greywacke, which forms a distinctive marker horizon along the eastern limb of the anticline. The main rock types consist of alternating mudstones, greywackes and thin BIF horizons. The BIF's contain alternating quartz and iron- rich layers which define a distinctive lamination (taken to be S0). The main constituents of these lithologies are quartz, limonite, hematite, chlorite, magnetite, pyrite and carbonate. The lithologies on the western limb strike 335^{o} and dip 65^{o} to the west whereas the rocks forming the eastern limb strike 002 and dip from 80^{o} to the west to vertical.

3.2. Structural Geology

The structural geology of the Howley area is dominated by two macroscopic structures, the Howley Anticline and a series of anastomozing brittle-ductile shear zones with associated quartz veining.

3.21 Howley Anticline

The Howley Anticline is a macroscopic fold structure which has been identified from Cosmo Howley in the south to Mt. Paqualin in the North. Primary bedding (S0) in the sedimentary units is the form surface to the fold. The fold is best described as a doubly plunging upright, asymmetric, tight, non-cylindrical fold which plunges to the north in the vicinity of the Cosmo Howley mine and plunges to the south in the Bridge Creek area. The fold axis trends to the north west in the Cosmo Howley Mine and trends north in the Bridge creek area. At Bridge Creek the western limb strikes 335^{o} and dips 65^{o} to the west whereas the eastern limb strikes 002 and dips from 80^{o} to the west to vertical. A prominent axial planar cleavage is present in the finer grained sedimentary rock which strikes 010 and is vertical.

3.22 Brittle-Ductile Shear Zones

An anastomozing series of north to northwest trending, sub-vertical, ductile-brittle shear zones deform the earlier fold structures. The shear zones contain a strong stretching lineation which plunges 70^{o} to the southeast, asymmetric structures, C-S structures, asymmetric pressure shadows and en-echelon vein sets. These structures all suggest that the movement along these zones was dominantly west block up. The shear zones strike north to northwest and dip 80^{o} to the west and offset both S0 and S1 structures.

3.23 Mineralization

Gold mineralization along the Howley Ridge occurs in all lithological units, though best grades are associated with iron and carbonaceous rich sedimentary units and dolerite. The mineralization is associated with tension fractures, stockwork zones and laminated

quartz veins. Widespread quartz sulphide carbonate alteration occurs around these zones at depth whereas zones of puggy clay are associated with the gold bearing zones above the water table. The quartz veins are commonly associated with tourmaline, chlorite, carbonate, pyrite, arsenopyrite, rare chalcopyrite, pyrrhotite, galena and sphalerite.

Gold mineralization has a heterogeneous distribution and is confined to elongate zones associated with regional folds or shear zones. Recent mapping suggests that the dominant control on mineralization is structural rather than lithological. The main regional structural controls in the Howley area are a series of reverse N-trending shear zones which are spatially associated with overturned folds. These shear zones have an en-echelon pattern and postdate folding but are deformed by later folds. The mineralization generally occurs in quartz veins parallel to shear fabrics, in stockwork zones where quartz veins occur as tension fractures which have been formed synchronously with shearing and also parallel to either bedding or an axial planar cleavage or as disseminated gold within sheared alteration zones.

3.3 Statistical Analysis of 1988 Soil Sampling

The initial fire assay soil sampling program was separated from the later BLEG sampling program. Both sets of data for the Howley area were plotted on frequency distribution curves and all elements analysed by both methods were plotted as log normal distributions. Consequently all the data was log normalized prior to statistical analysis.

The multi-element data form three groups when statistically analysed: Group 1 contains Pb, Zn As and represents base metal mineralization probably related to syngenetic sulphide in shales. Group 2 contains Cu and As which again is probably related to

syngenetic sulfides in the sediments. Group 3 contains Au and As and is directly related to gold bearing quartz veins in shear zones. Factor analyses of the multi-element data suggest that using the presence of sulphide mineralization as an exploration tool is not appropriate. Analyzing for Au by the BLEG method gave similar but more accurate results as compared with the fire assay analytical method. Statistical analyses of the BLEG data suggests that any value above 3 ppb is anomalous and that upper threshold values are present at 25 ppb, 50 ppb and 75 ppb respectively. Six highly anomalous gold zones including one on MCNs 377-380 have been identified within the Howley District using the threshold values given by the statistical analysis..

A review of the soil sampling carried out in Mineral Claims 377-380 using the threshold values identified by the statistical analyses suggests that further detailed sampling is required to infill the exiting information in the northern claims 377 and 378 and to correlate the results with the mineralization intersected in the 1987-88 drilling program and the proposed 1990 program.

3.4 Site Preparation and Access

In preparation for the drilling program to be conducted in July 1990, a small bulldozer was hired from Oolloo Investments to re-clear the baseline or access roads to the proposed sites and to conduct minor levelling on the sites themselves. As a track rig will be used for the program, very little work was required in the area.

5 CONCLUSION

Exploration of Mineral Claims 377 - 380 was undertaken as part of a broader program covering other tenements held by Northern gold in the Howley area and in preparation for the drilling program to be undertaken on the claims in July 1990. Exploration during 1989/90 included geological mapping, site access and preparation and baseline upgrading.

6 FUTURE WORK

In July 1990 a further RC drilling program will be conducted on Mineral Claims 377-380. An initial 30 holes to 60m depth are planned with a further 16 holes to be drilled if initial results warrant them. Infill soil sampling and further detailed mapping may be conducted and will be programed when the results of the drilling are received.

7.0 EXPENDITURE - June 1989 - June 1990 (unaudited-approx)

Site Preparation and Access	$745
Proposed Drill Program - consumables	$282
Proposed Drill Program - contract geology	$740
Drafting and Computing	$220
Data Analysis	$1,000
Report and Plan Preparation	$200
Detailed Mapping (salaries)	$1,600
Detailed Mapping (vehicle)	$600
General Costs including Accommodation, Maintenance, Travel etc.	$600
Subtotal	$5,987
Regional Office Admin Cost @ 10%	$599
Head Office Admin @ 15%	$898
TOTAL	$7,484

8.0 REFERENCES

Russell, R. 1987. Howley Project, Northern Territory, Annual Report for the period ending 20 January 1987. Metana Minerals internal company report (unpub.).

Russell, R. 1988. Howley Project Area. Alluvial Exploration activity in EL 4836. 21 January 1987 to 20 January 1988. Metana Minerals internal company report (unpub.).