Property File
104K 079

019966

GOLDEN BEAR PROJECT

NORTH AMERICAN METALS CORP. - CHEVRON MINERALS LTD. JOINT VENTURE

1990 EXPLORATION
(HOMESTAKE MINERAL DEVELOPMENT COMPANY OPERATOR)

BY

D.G. REDDY M.Sc.
J.M. SMITH M.Sc.
B.W.R. McDONALD M.Sc.

March, 1991

GOLDEN BEAR PROJECT
1990 Exploration

EXECUTIVE SUMMARY

This report provides details of the 1990 exploration program and recommendations for 1991 exploration work on the Golden Bear Mine property. Golden Bear mine is a 50%-50% joint venture project between North American Metals Corp. (NAMC) and Chevron Minerals Ltd. (CML). Homestake Mining (B.C.) Limited (now 175595 Canada Inc.) holds 73.3% ownership of NAMC. The 1990 Golden Bear exploration program was contracted to Homestake Mineral Development Company (HMDC) and the total expenditure as of December 31, 1990 was $756K (Appendix A).

The field season extended from May 5 to October 3, 1990 and resulted in the addition of 103,239.0 tonnes @ 15.4 g/t Au to the Golden Bear mineral inventory. This new mineral inventory comes from two zones: the Internal Sliver Zone, 58,075.1 tonnes @ 14.9 g/t Au (64,022.8 short tons @ 0.435 opt Au) with a cutoff of 7 g/t Au over 1.8 m width threshold + 15% dilution at 2 g/t Au grade; and the Slide Base Zone, 45,163.9 tonnes @ 16.1 g/t Au (49,789.3 short tons @ 0.470 opt Au) with a cutoff of 7 g/t Au over 1.8 m width threshold + 40% dilution at 2 g/t Au grade (McDonald, 1990). Calculation of the mineral inventory utilized 1990 drilling, compilation work, underground chip sampling and test-hole results.

The compilation work, in conjunction with re-logging core and interpretive work, focused on updating surface plans, mine level plans, cross-sections and longitudinal sections through the Bear Main zone, Bear North area, and the Bear South area.

The Bear South grid was established for a ground geophysical survey (VLF-EM, Resistivity, Mag, HLEM) and 1:1,000 scale mapping. The mapping and geophysics defined several structures (Razor Back Fault, West Bear Fault, Splay Fault & Gully Fault) west of the Bear Main Fault. The geophysics also helped corroborate the trend of the Bear Main Fault that had been based on detailed mapping of road cuts. The highest assay from the Bear South grid rock chip sampling was 1.4 g/t Au, 0.2 g/t Ag over 0.30 m from the West Bear Fault.

Sampling of road cuts along the Zed Road, where the Bear Fault structure was definable, graded up to 17.1 g/t Au, 24.7 g/t Ag over 0.4 m but gold assays were otherwise generally low. Several high silver values were reported. High silver grades have been observed to indicate extensions of significant ore bearing structures in the Bear Main deposit. Assays of road-cut samples from Foster's Fault were up to 0.4 g/t Au, 9.8 g/t Ag over 1.0 m but were generally low for gold and silver.

Mapping at 1:1,000 scale, as well as rock and soil sampling, was conducted along the Open Pit Haul Road. 1:10,000 scale reconnaissance traverses were carried out at Troy Ridge, Sam Creek, and Muse Ridge (on the south side of Bearskin Lake).

Diamond drilling on the Bear Main, Internal Sliver, and Footwall Faults from three areas (Bear North surface, Bear North underground, and Bear South) totalled 2295.12 m (19 holes). Drilling from surface (711.98 m, 7 holes) and underground (844.61 m, 9 holes) in the Bear North area was intended to intersect the Bear Main Fault, Internal Sliver Fault and the Footwall Fault at structurally favourable locations, usually at the confluence of two of these structures. Bear North

drill results included:

Hole	g/t Au,	g/t Ag	/m(tt)	Structure
90-135	12.0,	19.7	/5.38	Internal Sliver FW & Footwall Fault
90-136	9.9,	6.7	/2.38	Bear Main & Internal Sliver HW
90-137	14.7,	13.0	/4.87	Internal Sliver HW & Internal Sliver FW
90-139	39.8,	41.4	/1.92	Internal Sliver HW & Internal Sliver FW
90-141	8.7,	0.1	/4.19	Bear Main Fault
90-UG-88	6.7,	37.2	/2.10	Bear Main Fault
90-UG-90	3.6,	5.5	/4.15	Internal Sliver Fault
90-UG-92	6.5,	4.4	/0.67	Bear Main Fault
90-UG-96	7.8,	6.4	/0.61	Bear Main Fault

(see Tables 3.3.1 and 3.3.2 for complete results). When the 1990 drill results were combined with the compiled data, new interpretations, chip sampling and test holes, the previously stated additions to the mineral inventory were delineated.

Surface drilling in the Bear South area (738.53 m, 3 holes) was an initiation of a program to track the southern end of the Bear Fault and identify any possible new reserve in this area. The Bear Fault was identified in each case and when combined with the Bear South detailed mapping and ground geophysics, the zone had been traced 120 m south of the previously defined position. Bear South drill results included:

Hole	g/t Au,	g/t Ag	/m(tt)	Structure
90-142a	7.0,	0.4	/1.01	Slide material
90-142a	19.7,	13.9	/0.47	Slide material
90-142a	5.0,	24.3	/0.21	Bear Main Fault
90-143	1.4,	Tr	/0.05	Bear Main Fault
90-143	0.4,	2.9	/0.29	Footwall Fault
90-144	0.8,	Tr	/0.18	Bear Main Fault
90-144	0.2,	0.4	/1.43	Footwall Fault

Several layers of limonitic, carbonatized mafic volcanic rock within the slide debris carry significant grades (see Table 3.3.3 for complete results).

The three significant areas of mineralization along the Ophir Break are the: 1) Bear; 2) Fleece Bowl; and 3) Totem Zones. Parallel structures to the Bear Main Fault, such as the Internal Sliver Fault and Footwall Fault provide targets with very good potential for delineation of additional tonnages proximal to present mine workings. There is also a very good potential for finding new north-striking structures parallel to the Ophir Break.

The need to identify additional minable reserves and to locate a significant new ore body requires a large several year commitment to exploration at three levels. The exploration proposal includes all areas recommended for work in 1991. Generative work consists of compilation and regional work on the Ophir Break on Muse Ridge (south of Bearskin Lake), the Bearskin Creek valley, along the southern end of the Ultramafic Fault, and the Sam Creek area. Detailed, target definition work focuses on the Bear North area, Troy Ridge, Fleece Bowl, and the West Bear Fault. Drill targets are the Bear South area, Troy Ridge, and the Bear North (underground) areas. The proposed budget in this report of $1.98M addresses the need for this type of multilevel exploration program. Expenditures are to be split equally between the joint venture partners.

TABLE OF CONTENTS

Page

EXECUTIVE SUMMARY ii

TABLE OF CONTENTS iv

LIST OF TABLES vi

LIST OF FIGURES vii

1. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS 1
    1.1 SUMMARY 1
    1.2 CONCLUSIONS 6
    1.3 RECOMMENDATIONS FOR 1991 8
        1.3.1 OBJECTIVES 9
        1.3.2 REGIONAL EXPLORATION (Generative Work) 10
        1.3.3 GRID SCALE EXPLORATION (Target Definition) . 11
        1.3.4 DIAMOND DRILL TARGETS 11

2. INTRODUCTION 16
    2.1 LOCATION AND ACCESS 16
    2.2 CLAIM STATUS 16
    2.3 PROPERTY GEOLOGY 20
    2.4 MINERALIZATION 26
    2.5 WORK HISTORY 30

3. 1990 EXPLORATION PROGRAM 34
    3.1 SCOPE AND LOGISTICS OF EXPLORATION 34
    3.2 PROPERTY EXPLORATION 37
    3.3 1990 EXPLORATION TARGET AREAS 42
        3.3.1 BEAR NORTH (24000N - 24550N) 42
            Introduction 42
            Geology 42
            Previous Exploration 48
            1990 Activities and Results 48
            Conclusions 60
        3.3.2 BEAR MAIN 62
            Introduction 62
            Geology 62
            Previous Exploration 64
            1990 Activities and Results 65
            Conclusions 66
        3.3.3 BEAR SOUTH (south of 23700N) 67
            Introduction 67
            Geology 67
            Previous Exploration 71
            1990 Activities and Results 73
            Conclusions 85

Page

3.3.4 INTERNAL SLIVER 89
Introduction 89
Geology.....89
Previous Exploration.....91
1990 Activities and Results.....92
Conclusions.....94
3.3.5 SLIDE BASE ZONE.....95
Introduction.....95
Geology.....95
Previous Exploration.....95
1990 Activities and Results.....96
Conclusions.....97
3.3.6 OPEN PIT HAUL ROAD.....98
Introduction.....98
Geology.....98
Previous Exploration.....101
1990 Activities and Results.....102
Conclusions.....102
3.3.7 TROY RIDGE.....104
Introduction.....104
Geology.....104
Previous Exploration.....107
1990 Activities and Results.....111
Conclusions.....111

4. REFERENCES.....114

APPENDIX A: 1990 EXPLORATION BUDGET LEDGER.....116

APPENDIX B: LIST OF 1990 TECHNICAL PAPERS ON THE GOLDEN BEAR MINE PROPERTY.....118

APPENDIX C: GOLDEN BEAR PROJECT PROPERTY LEGEND CODES MEMO AND UPDATES.....119

APPENDIX D: 1990 EXPLORATION EXECUTIVE SUMMARY MEMO OF JANUARY 15, 1991.....126

LIST OF TABLES

Page

Table 1.0.1 Maximum manpower requirements for the 1991 Golden Bear exploration proposal. 13

Table 1.0.2 Summary for the 1991 Golden Bear exploration proposal. 14

Table 1.0.3 Itemized expenditures for the 1991 Golden Bear exploration proposal. 15

Table 2.2.1 Claim groups and expiry dates for the Golden Bear property. 19

Table 2.5.1 Golden Bear project drill hole summary. 33

Table 3.1.1 Exploration and target areas examined in 1990.....35

Table 3.3.1 Golden Bear 1990 Bear North surface diamond drill hole summary. 51

Table 3.3.2 Golden Bear 1990 Bear North underground diamond drill hole summary. 55

Table 3.3.3 Golden Bear 1990 Bear South surface diamond drill hole summary. 82

Table A.0.1 Golden Bear joint venture deferred exploration subledger December 31, 1990.....117

LIST OF FIGURES

Page

Figure 1.1.1 Golden Bear summary photograph showing areas of 1990 surface drilling and other exploration work 2

Figure 1.1.2 Areas of focus for 1990 exploration and other significant features for 1990 and 1991 exploration. 3

Figure 2.1.1 Location map of northwestern British Columbia showing the Golden Bear Mine property, the mine access road and proximity to Highway #37. ... 17

Figure 2.2.1 Claim location map for the Golden Bear property, showing Minfile mineral showings and prospects. 18

Figure 2.3.1 Generalized geology map of the Golden Bear property. 21

Figure 2.3.2 Generalized stratigraphic section of the main lithologies on the Golden Bear property. 22

Figure 2.4.1 Photograph and cross-section of the Bear Main Fault and associated structures. 28

Figure 2.4.2 Longitudinal section of the Bear Main Zone showing areas of 1990 and proposed 1991 drilling, and zones of confluence of the main mineralized structures. 29

Figure 3.1.1 Location map of areas of 1990 work on the Golden Bear property. ..... In Pocket

Figure 3.2.1 Photograph of Muse Ridge showing the large east-dipping fault zone that is the southern extension of the Ophir Break. 38

Figure 3.2.2 Photograph of the large east-dipping fault zone on the north side of Muse Ridge. 39

Figure 3.2.3 Photograph of the notch in Muse Ridge where the fault zone transects the ridge. 39

Figure 3.2.4 Photograph of the Sam Creek area between the Sam Creek Glacier and the Totem Zone. 41

Page

Figure 3.2.5 Photograph of the south side of the Sam Creek valley showing the deeply eroded creek where the West Wall Fault strikes across the south side of the valley. 41

Figure 3.3.1a Photograph of the Bear North area showing the 1990 surface drill pad locations and the open pit. 43

Figure 3.3.1b Photograph of the Bear North area showing the gabbro and limestone talus and slide material masking outcrops within this area 43

Figure 3.3.2 Bear North surface plan showing 1990 drilling and local geology based mostly on open pit information. 44

Figure 3.3.3 Bear North underground 1400 m level plan showing 1990 drilling and local geology. 45

Figure 3.3.4 Bear North generalized cross-sections based on drilling and underground geologic data. 46

Figure 3.3.5 Bear North area composite longitudinal section showing locations of intersections on all structures by 1990 surface and underground drilling. 49

Figure 3.3.6 Summary of Bear South grid detailed mapping and 1990 drill hole locations. 68

Figure 3.3.7 Summary of Bear South grid ground geophysics (VLF-EM and HLEM). 75

Figure 3.3.8 Bear South generalized cross-section at approximately 23580N based on 1990 drilling and surface work. 81

Figure 3.3.9 Bear South area composite longitudinal section showing locations of possible intersections on the Bear Main Fault to date and proposed 1991 drill intersections. 84

Figure 3.3.10 Level plan showing Internal Sliver 1990 work and interpretations.....90

Figures 3.3.11a,b,c Internal Sliver longitudinal sections showing locations of drill intersections and areas outlined as a mineral inventory in 1990.....In Pocket

Page

Figure 3.3.12 1:5000 summary diagram of the work on the Open Pit Haul Road carried out in 1990.....99

Figure 3.3.13 Oblique photograph of the Open Pit Haul Road showing highlights of the 1990 mapping.....100

Figure 3.3.14 Location map of the Troy Ridge area summarizing previous work and proposed 1991 work.....105

Figure 3.3.15 Photograph of Troy Ridge area showing gabbro bluffs in fault contact with limestone.....106

Figure 3.3.16 Photograph of a carbonate wedge on Troy Ridge.....106

Figure 3.3.17 Photograph of extremely carbonatized and ankeritic mafic volcanic rock from the Troy Ridge area.....108

Figure 3.3.18 Troy Ridge cross-sections A-A′ and B-B′ parallel to drill holes.....110

1. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

1.1 SUMMARY

This report provides details of the 1990 exploration program and recommendations for 1991 exploration work on the Golden Bear Mine property. The 1990 Golden Bear exploration program was contracted to Homestake Mineral Development Company (HMDC) and the total expenditure as of December 31, 1990 was $ 756K (Appendix A).

Exploration fieldwork on the Golden Bear Mine property between May 5 and October 3, 1990 focused on the Bear Main Fault and other parallel north-striking structures. The program included pre-field season data compilation and updating of cross-sections. On-site work included re-logging drill core, diamond drilling in three areas (Figs. 1.1.1 and 1.1.2), Bear South grid establishment, ground geophysics (VLF-EM, Resistivity, HLEM, Mag), 1:1,000 scale mapping, rock chip and channel sampling, underground sampling, and 1:10,000 scale reconnaissance traverses.

The main objectives of the 1990 exploration program were:

1) to replace reserves depleted by 1990 mining with new reserves from areas with drill indicated potential which could be available for production in the short term;

2) to evaluate other, larger targets which might add in the order of 150,000 to 500,000 tons to known reserves.

Compilation work and re-logging of core concentrated on updating surface plans, mine level plans, cross-sections and longitudinal sections through the Bear Main Zone, Bear North area, and Bear South area prior to drilling.

During the field season a total of 2,295.12 metres of core were drilled in nineteen holes. Seven holes (711.98 m) were drilled from surface in the Bear North area, nine holes (844.61 m) were drilled from underground in the Bear North area, and three holes (738.53 m) were drilled from surface in the Bear South area (Figs. 1.1.1 and 1.1.2). A total of 1,695 drill core samples, 213 drill core samples from old core, 502 rock chip and channel samples, and 30 soil samples were collected and analyzed.

Bear North drill holes, both surface and underground, were planned to intersect the Bear Fault, Internal Sliver Fault and Footwall Fault at structurally favourable locations. A 40 m long cross-cut at 24150N on the 1400 m

Figure 1.1.1 Golden Bear summary photograph showing areas of 1990 surface drilling and other exploration work.

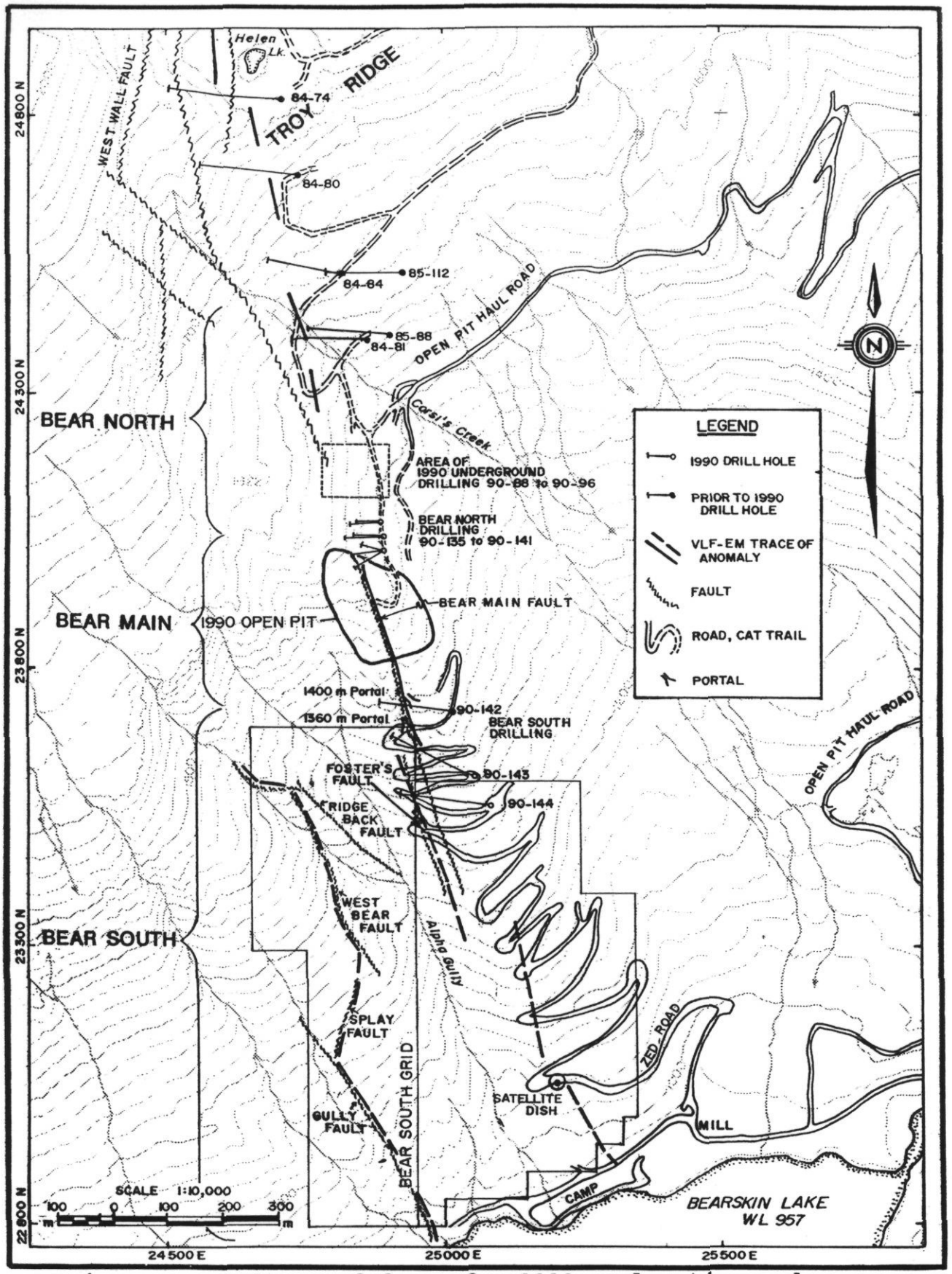


Figure 1.1.2 Areas of focus for 1990 exploration and other significant features for 1990 and 1991 exploration.

level was excavated to provide a drill station for the underground drilling.

Ongoing re-interpretation of Bear North sections between 24200N and 24420N indicates several targets for exploration drilling and some areas that may require definition drilling.

Surface drilling in the Bear South area was an initiation of a program to track the southern end of the Bear Fault and identify any possible new reserve in this area. The Bear Fault was identified in each drill hole. Drill information combined with the Bear South detailed mapping and ground geophysics, has traced the structure 120 m south of the previously defined position. Bear South drilling also indicated that several layers of limonitic, carbonatized mafic volcanic rock within the slide debris carry significant grades (see Tables 3.3.1, 3.3.2 and 3.3.3 for complete drilling results).

The Bear South grid was established for ground geophysical surveys and 1:1,000 scale mapping. The mapping and geophysics defined several structures (Razor Back Fault, West Bear Fault, Splay Fault and Gully Fault) west of the Bear Main Fault. The geophysics also helped corroborate the trend of the Bear Main Fault that had been based on road cut exposures and detailed mapping. The highest assay from the Bear South grid rock chip sampling was 1.4 g/t Au, 0.2 g/t Ag over 0.30 m from the West Bear Fault.

Sampling of road cuts along the Zed Road where the Bear Fault structure was definable graded up to 17.1 g/t Au, 24.7 g/t Ag over 0.40 m, but, gold assays were generally low. Several high silver values were reported. High silver grades have been observed to indicate extensions of significant ore bearing structures in the Bear Main deposit. Assays of road cut samples from Foster's Fault were up to 0.4 g/t Au, 9.8 g/t Ag over 1.0 m, but, were generally low.

Detailed sampling of gossanous and intensely carbonate altered mafic volcanic rock was conducted on surface along new exposures in roadcuts leading to the Bear North surface drill stations. The highest assay from road cut sampling was 2.4 g/t Au, 4.3 g/t Ag over 1.0 meter.

1:1,000 scale mapping, as well as rock and soil sampling, was conducted along the Open Pit Haul Road. Several gossanous zones of carbonatized mafic volcanic rock were identified and the highest assays were 0.7 g/t Au, trace g/t Ag over 1.0 m and trace g/t Au, 6.5 g/t Ag over 0.60 m. Anomalous float samples up to 4.5 g/t Au, 1.0 g/t Ag and soil samples up to 2,820 ppb Au, 0.6 ppm Ag from gossanous areas of slide material have been attributed to downslope dispersion of low grade mineralized material from

the Troy Ridge - Helen Lake area. The material was probably transported during glacial activity and landslide movement.

1:10,000 scale reconnaissance traverses were conducted on Troy Ridge, Sam Creek, and Muse Ridge (south of Bearskin Lake). On Troy Ridge, an area of intense carbonatization and ankeritic mineralization indicates large volumes of hydrothermal fluids passed through this zone. Rock chip sampling returned low gold values but anomalous zones indicated by previous soil geochemical surveys in this area warrant further investigation. A sample of silicified brecciated carbonate with minor pyrite assayed 0.5 g/t Au, trace g/t Ag over 0.3 m.

The Sam Creek area has distinct potential indicated by anomalous soil and rock sampling up to 9,000 ppb Au (Walton, 1985) and proximity to a strike change in the Ophir Break. Float samples taken during a traverse assayed up to 0.4 g/t Au, 1.8 g/t Ag.

A large fault structure on Muse Ridge, on the south side of Bearskin Lake, is coincident with the southern extension of the Ophir Break. The fault zone is up to 6 m wide and has anomalous arsenic (up to 232 ppm As) and mercury (up to 0.330 ppm Hg) values as well as local concentrations of base metals. Assays for gold and silver of samples taken in 1990 were low, but previous assays were as high as 3.0 g/t Au.

Parallel structures to the Bear Main Fault, such as the Internal Sliver and Footwall Faults provide targets with very good potential for delineation of additional tonnages proximal to present mine workings. A good potential also exists for finding other mineralized zones along the Ophir Break between the Bear, Fleece Bowl and Totem Zones. There is also a very good potential for finding new north-striking structures parallel to the Ophir Break.

The need to identify additional minable reserves and to locate a significant new ore body requires a large, several year commitment to exploration at three levels. The exploration proposal includes all areas recommended for work in 1991. Generative work consists of compilation and regional work on the Ophir Break on Muse Ridge (south of Bearskin Lake), the Bearskin Creek valley, along the southern end of the Ultramafic Fault, and the Sam Creek area. Detailed, target definition work focuses on the Bear North area, Troy Ridge, Fleece Bowl, and the West Bear Fault. Drill targets are the Bear South area, Troy Ridge, and the Bear North areas. The proposed budget in this report of $ 1.98M addresses the need for this type of multilevel exploration program while focusing on the higher priority targets. Expenditures are to be split equally between the joint venture partners.

1.2 CONCLUSIONS

The 1990 field season was successful in:

1) outlining new additions to the mineral inventory from the Internal Sliver Zone and the Slide Base Zone;

2) initiating the search for a new large reserve; and

3) generating drill targets and areas worthy of further investigation in 1991.

The first objective was achieved by drilling on roughly 25 metre centres on the Bear Main, Internal Sliver, and Footwall structures north of the area currently outlined on the Bear Main zone for underground mining. The program resulted in the addition of 103,239.0 tonnes @ 15.4 g/t Au to the Golden Bear mineral inventory. This new mineral inventory comes from two zones: the **Internal Sliver Zone**, 58,075.1 tonnes @ 14.9 g/t Au (64,022.8 short tons @ 0.435 opt Au) with a cutoff of 7 g/t Au over 1.8 m width threshold + 15% dilution at 2 g/t Au grade ; and the **Slide Base Zone**, 45,163.9 tonnes @ 16.1 g/t Au (49,789.3 short tons @ 0.470 opt Au) with a cutoff of 7 g/t Au over 1.8 m width threshold + 40% dilution at 2 g/t Au grade (McDonald, 1990). Calculation of the mineral inventory utilized 1990 drilling, compilation work, underground chip sampling and test-hole results.

The second objective was initiated by drilling on the south extension of the Bear Main Fault and by detailed mapping and geophysics on the Bear South grid. This particular target will require further testing to track the structure southwards to the Bear South target areas.

Targets with most potential for defining additional tonnages to add to the mineral inventory are the northern extensions of the Bear Main Fault, the Internal Sliver Fault, and the Footwall Fault. Compilation work has indicated potentially significant zones on each of these structures north of the Bear Main ore body. Exploration drilling is required to further test these zones.

Target areas considered capable of hosting a significant new reserve of 150,000 to 500,000 tonnes and therefore requiring exploration drilling are the Bear South area and Troy Ridge. Targets in these areas are shear zones with associated carbonatized mafic volcanics next to carbonate rocks. Locally anomalous gold grades and the proximity of a proven ore body are encouraging factors. Previous drill testing was wide spaced, to shallow depths, or non-existent.

Areas with potential to become targets for exploration drilling and therefore warranting detailed investigation, are Muse Ridge (on the south side of Bearskin Lake), Fleece Bowl, West Bear Fault, Sam Creek, and within the Bearskin Creek Valley. Each of these areas contains, or is on strike with, a significant potentially mineralized structure that has anomalous gold grades.

1.3 RECOMMENDATIONS FOR 1991

The Golden Bear Mine property encloses 116.62 square kilometers in a highly prospective geological setting for gold mineralization. The area has recently become the center for extremely active exploration as more companies move northwards from the Telegraph Creek to the Tulsequah map sheet.

The Golden Bear mine property itself contains several prospects and target areas aligned on regional scale faults and associated with intense hydrothermal alteration. Some of these targets have undergone only preliminary investigation.

The previous focus of exploration in and around the Bear Main ore body was aimed at proving a minable ore reserve. This has meant that efforts to develop significant targets any distance from this zone, even those readily accessible from current facilities, have been postponed.

Several significant targets close to the mine and within the Bearskin Creek drainage require immediate assessment and follow-up work to bring them to the drill target stage and beyond within the projected life span of current operations.

Work is also required immediately adjacent to the Bear Main Zone and within the Ophir Break to further test the remainder of the originally estimated 1.6 million tonne mineral inventory. Areas included in this original inventory have the potential to become minable reserves in the short term. Some of these areas can be accessed from existing mine workings.

As the mine has a projected life of 3 to 5 years from the time of this report there is an urgency to the exploration effort at Golden Bear Mine. Not only is a significant new reserve required to sustain economic operation, but this reserve must be found in the near future to allow sufficient lead time to both delineate and then develop the reserve.

A concentrated effort over the next two years is required to assess new target areas on the property and extend the life of the Golden Bear Mine. Exploration potential of the property, both on the ore bearing structure and in the surrounding area, is considered to be very good and the chances for success are high.

The 1991 exploration program is outlined in the following sections. Tables outlining the maximum manpower requirements (Table 1.0.1), a summary of the drilling

footages and costs, accommodation requirements (Table 1.0.2), and an itemized budget estimate (Table 1.0.3) follow the descriptions of the proposed work program.

1.3.1 OBJECTIVES

This program proposal is designed to meet the objective of exploring the property-scale potential of the area while continuing with detailed work in the Bear North, Troy Ridge and Bear South areas.

The primary goals of the 1991 program are:

1) to outline areas proximal to present mine workings which have potential for a tonnage of ore at least sufficient to sustain an additional year of operation;

2) to maintain efforts on a larger scope of identifying or drilling targets with potential to at least equal reserves which exist in the Bear Main Zone.

A program of surface and underground diamond drilling, mapping, prospecting and contour soil sampling is proposed. This surface work is viewed as part of a significant two year effort to perform an assessment of the potential of the Golden Bear Mine property and to identify new targets for drill testing in 1992. The proposed program includes a component of underground drilling which is intended to identify sufficient reserves to extend the immediate mine life by a period of at least one year.

Further compilation work in 1991 may cause the objectives or target areas outlined in the following sections to change significantly before the 1991 program is implemented.

The following list of targets is divided into three categories based on their level of definition:

1) Generative Work - includes property scale prospecting, mapping, and sampling of highly prospective areas based on anomalous geochemical results or favourable structural or other geologic evidence. This work will lead to definition of localized targets for detailed follow-up work.

2) Target Definition - includes detailed mapping, chip sampling, grid soil sampling, ground-based geophysics, and trenching of localized alteration, geochemical or geophysical anomalies or local areas of favourable geology. This work leads to development of drill targets.

3) Drill Targets - include areas with clearly identified potential based on previous detailed target assessment.

Each of the above categories is comprised of a prioritized list of viable targets which require work as outlined below.

1.3.2 REGIONAL EXPLORATION (Generative Work)

1) Compilation of data from property scale mapping and prospecting prior to start of the summer season. This will allow maximum use of previous data and may identify significant field targets for examination.

Compilation/field preparation	2-3 people, 3 months

2) Prospecting, chip sampling and 1 : 5,000 scale mapping of the Ophir Break south of Bearskin Lake. A zone of intense shearing and carbonate alteration south of Bearskin Lake coincides closely with the projected southern trend of the Ophir Break. This area requires work in the near future.

Prospecting	1 person, 2 weeks
Channel/contour sampling	2 people, 2 weeks
1:5,000 scale mapping (J. Oliver)	1 person, 3 weeks

Helicopter support is required

3) Follow-up prospecting, stream sediment sampling and contour soil sampling is required in areas east and west of the Bear Main Zone in the Bearskin Creek Valley. This work is intended to investigate faults parallel to the Ophir Break which may have potential for mineralization. The southern extension of the Ultramafic Fault is a target of particular interest in this work.

Prospecting/compilation follow-up	1 person, 3 weeks
Contour/Ridge/stream sampling	2 people, 4 weeks

Helicopter support is required

4) Follow-up of favourable structural and geochemical results in the Sam Creek area is necessary to determine the potential of the northern extension of the Ophir Break in more detail.

Prospecting/compilation follow-up	1 person, 1 week
Contour/Ridge/Stream sampling	2 people, 2 weeks

Helicopter support required

5) Follow-up of compilation results yet to be defined

Prospecting/follow-up	1 person, 1 week

1.3.3 GRID SCALE EXPLORATION (Target Definition)

1) Detailed 1:1,000 scale structural mapping, detailed channel sampling and trenching are required in the Bear North area between the Bear Main Zone and Troy Ridge. This area has produced excellent geochemical results which have not been traced to a definitive source and displays spectacular wallrock alteration and vein stockworks.

Gridding	2 people, 2 weeks
Mapping	1 person, 2 weeks
Channel sampling/trenching	2 people, 1 week

2) Fleece Bowl area requires detailed structural mapping at 1:1,000 scale and soil sampling in appropriate areas. Detailed channel sampling to provide lithogeochemical information may be warranted.

Gridding	2 people, 2 weeks
Mapping	1 person, 3 weeks
Grid/Contour sampling	2 people, 2 weeks
Channel Sampling	2 people, 1 week

3) The West Bear Fault, which runs sub-parallel to the Bear Main Zone and is 200 m to the west, corresponds to a zone of intense carbonate alteration which should be chip sampled to provide lithogeochemical data.

Channel sampling	2 people, 1 week

4) Follow-up of compilation results as yet undetermined.

Prospecting/sampling	1 person, 1 week
Sampling	1 person, 1 week

1.3.4 DIAMOND DRILL TARGETS

1) Testing of the Bear South area between the 1360 m portal and Bearskin Lake should be continued to allow assessment of four distinct target areas with potential to host significant tonnage. This area of the Ophir Break remains almost entirely untested.

16 holes approx. 800 ft each = 12,800 feet

Strategy: Test the Ophir Break south of the Bear Main Zone. Use structural, geophysical, and geochemical indicators to track mineralizing conduits to areas of dilatancy associated with carbonate wedges where gold could have precipitated. Hole spacing should be 150 m

in areas distal to identified targets and 100 m in areas of targets.

2) Troy Ridge area, north of the Bear North area, comprises a zone of intense tectonic activity and hydrothermal fluid flow. Volcanic rocks are intensely carbonate altered with abundant fuchsite and well developed carbonate-quartz stockwork veins. Gold analyses in soil samples have returned high values in this area. Drill testing has been minimal and may not have included all structures with potential.

   5 holes approx. 1,000 ft each = 5,000 feet

   Strategy: Test structures and zones of intense alteration in Troy Ridge area where in proximity to carbonate/volcanic contact. Testing to be done late in season after investigation of surface geology has been completed.

3) The area north of 24150 N section in the Bear North area contains several wide-spaced drill intersections on at least 3 significant parallel structures which require further definition to outline ore blocks. This area has an exploration drift along its entire length and can be drill tested with little further underground development.

   15 holes approx. 350 ft each = 5,250 feet
   2 - 40 meter diamond drill cross-cuts = 80 meters

   Strategy: Test the Bear North area along strike from the Bear Main Zone. The budgeted footage should allow the Bear North area to be tested at 25 m to 50 m intervals along at least half of its length between the Bear Main Zone at 24050 N and the current end of development at 24535 N.

Table 1.0.1 **MAXIMUM MANPOWER REQUIREMENTS FOR THE 1991 GOLDEN BEAR EXPLORATION PROPOSAL.**

Title	# of Mandays Field Work Available	Employment Period	Hiring Requirement (# people)
Project Geologist	N/A	Jan-Dec	1
Assist. Proj. Geol.	N/A	Jan-Dec	1
Geologist	317	Feb-Nov	1
		May-Nov	1
		June-Aug	2
Geological Assist.	398	May-Aug	2
		June-Aug	5
Surveyor/Computer Operator	120	May-Nov	1
Draftsman/Geological Assist.	120	May-Aug	1

Total geology crew: 15

Table 1.0.2 **SUMMARY FOR THE 1991 GOLDEN BEAR EXPLORATION PROPOSAL.**

Total Peak Geology Crew	15 people
Surface Diamond Drill Footage	17,800 ft
Underground Diamond Drill Footage	5,250 ft
Total Maximum Accommodation Requirement At Any Time	28 people
Total Budget for Surface Drilling	$800,500.00
Total Budget for UG drilling	$234,000.00
Total Budget for 1991	$1,982,700.00

Figure 1.0.3 **ITEMIZED EXPENDITURES FOR THE 1991 GOLDEN BEAR EXPLORATION PROPOSAL.**

Surface Diamond Drilling	$800,500.00	40.4%
Supervision and Wages	348,000.00	17.5%
U/G Diamond Drilling	234,000.00	11.8%
Air Support	100,000.00	5.0%
On-Site Assays	60,000.00	3.0%
Camp Accommodation*	57,300.00	2.9%
Roads and Trails	55,000.00	2.8%
U/G Development	50,000.00	2.5%
Travel	46,000.00	2.3%
Field Materials	42,000.00	2.1%
Off-Site Assays	33,500.00	1.7%
Vehicle/Equipment Expense	32,000.00	1.6%
Claim Costs	30,000.00	1.5%
Drafting	25,000.00	1.3%
Office Supplies	18,000.00	0.9%
Trenching	15,000.00	0.8%
Contractors	11,000.00	0.5%
Rentals and Leases	10,500.00	0.5%
Office Rental	9,600.00	0.2%
Communications (phone & fax)	4,800.00	0.2%
Fees	500.00	0.03%
TOTAL	**1,982,700.00**	100%

* This figure includes accommodation costs for housing all personnel in existing bunkhouse facilities at $25/day/person. This budget does not account for the cost of additional accommodations or office space, over and above those already in place, which may be required to house the number of people this program will demand.

2. INTRODUCTION

2.1 LOCATION AND ACCESS

The Golden Bear Mine property is located in northwestern British Columbia in the Atlin Mining Division at latitude 58° 13′ north and longitude 132° 17′ west (Tulsequah map sheet 104K). The mine is approximately 140 km west of Dease Lake and 160 km southeast of Atlin (Fig. 2.1.1).

The property covers 11662.1 hectares (28817.7 acres) of irregular, glaciated highlands separated by rugged, deeply incised valleys on the east side of the Chechidla Range in the Coast Mountains. Elevations range from 600 to 2200 m and most of the property is above tree line.

The claim block is south of Tatsamenie Lake and roughly centered on Bearskin Lake (Fig. 2.2.1). Bearskin Lake, locally known as "Muddy Lake", is within the northeast flowing Bearskin Creek drainage, a tributary of the Samotua River.

Access to the mine is by road, fixed wing aircraft or helicopter. The private, 155 km all-weather mine access road joins the Dease Lake - Telegraph Creek road. A 1070 m (3500 ft) gravel landing strip and the 1500 m (4920 ft) long lake accommodate fixed-wing aircraft. Float planes can operate on Bearskin Lake between early June and late October. Ski-equipped aircraft can be used on the lake between late November to early May. A heli-pad is situated just west of the camp.

2.2 CLAIM STATUS

The Golden Bear property consists of 27 claims (408 units covering 10,200 hectares) and one mining lease (covering 1462.1 hectares) held in the name of North American Metals (B.C.) Inc. (Fig. 2.2.1). The claim groups and their present expiry dates are listed in Table 2.2.1.

The Tan 7, Bear 1N, Bear, Bear 3S, and Totem claims were converted to Mining Lease #40, effective October 30, 1989. The primary term of the lease is 30 years and subject to an annual rental fee.

The Mining Lease and the Bear 4, Totem 2, Bear 2, Bear 3N, Bear 1S, and Sam 1 claims were last grouped on February 15, 1990 as the "Bears" group.

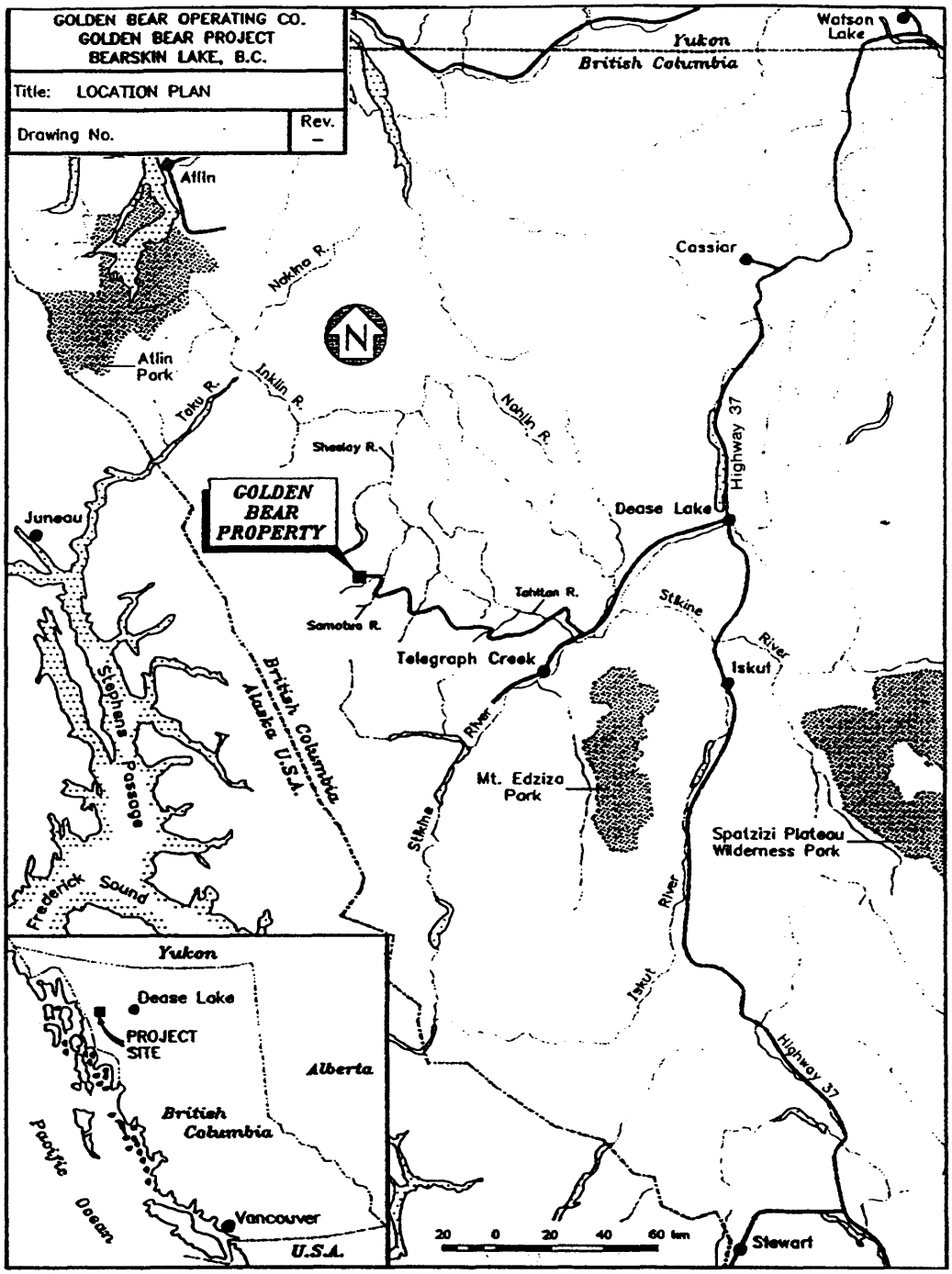


Figure 2.1.1 Location map of northwestern British Columbia showing the Golden Bear Mine property, the mine access road and proximity to Highway #37.

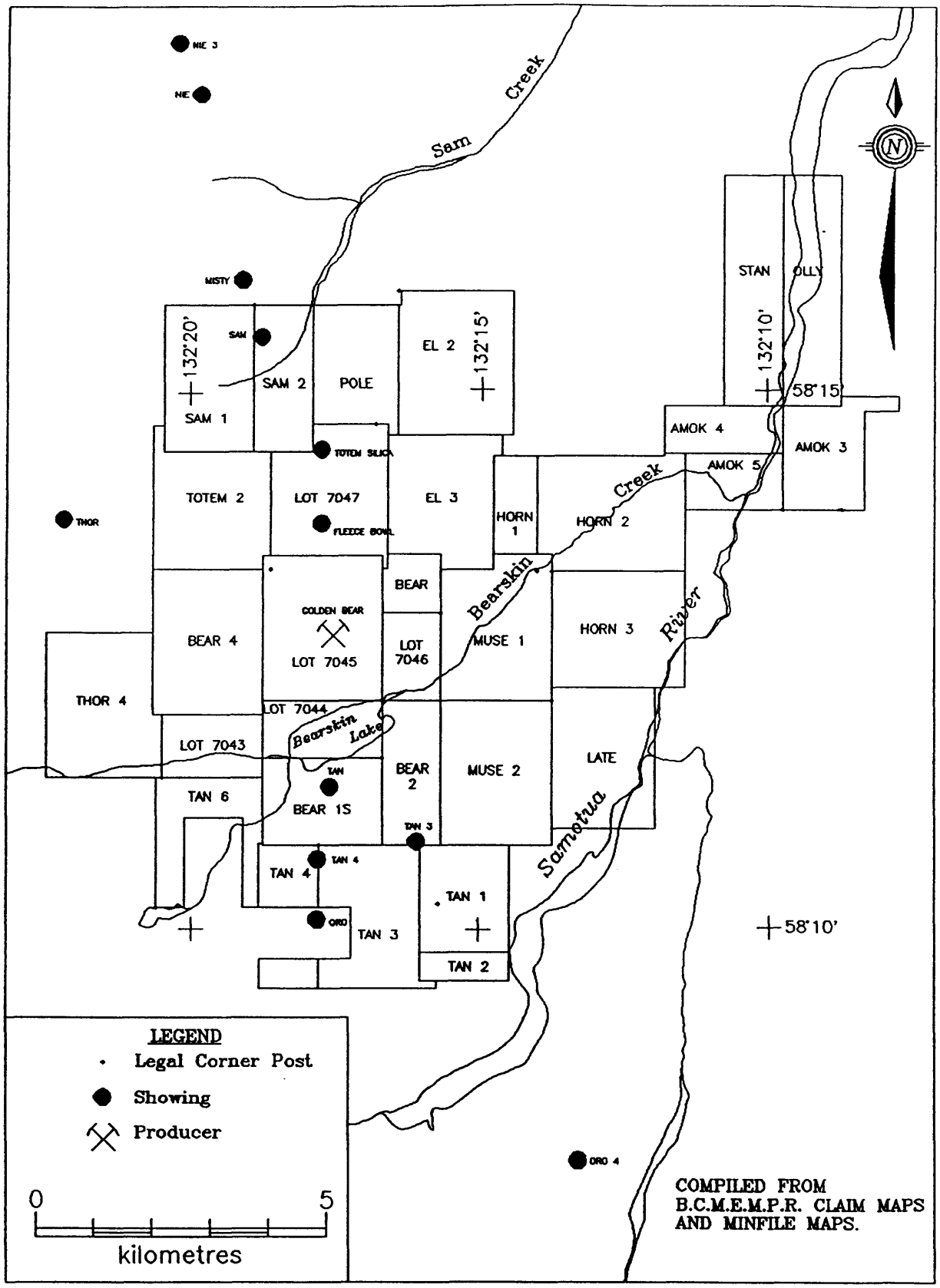


Figure 2.2.1 Claim location map for the Golden Bear property, showing Minfile mineral showings and prospects.

Table 2.2.1 **Claim groups and expiry dates for the Golden Bear property.**

Claim Name	Number	Record date	Expiry Date	Hectares	Units	Min.Div.	NTS
Mineral Lease	ML 40	Oct 30,1989	Oct 30,1991	1462.1		Atlin	104K/1W
(Tan 7*)						Atlin	104K/1W
(Bear 1N*)						Atlin	104K/1W
(Bear*)						Atlin	104K/1W
(Bear 3S*)						Atlin	104K/1W
(Totem*)						Atlin	104K/1W
Amok 3	2061	Oct 26,1983	Oct 26,1999	400	16	Atlin	104K/1E
Amok 4	1947	Jul 04,1983	Jul 04,1999	200	8	Atlin	104K/1E
Amok 5	1948	Jul 04,1983	Jul 04,1999	200	8	Atlin	104K/1E
Bear 1S	3479	Nov 04,1988	Nov 04,1995	300	12	Atlin	104K/1W
Bear 2	1548	Aug 31,1981	Aug 31,1994	250	10	Atlin	104K/1W
Bear 3N	3478	Nov 03,1988	Nov 03,1995	100	4	Atlin	104K/1W
Bear 4	1725	Aug 26,1982	Aug 26,1994	500	20	Atlin	104K/1W
El 2	1730	Sep 15,1982	Sep 15,1994	500	20	Atlin	104K/8W
El 3	1745	Sep 22,1982	Sep 22,1994	500	20	Atlin	104K/1W
Horn 1	1944	Jul 04,1983	Jul 04,1994	200	8	Atlin	104K/1E
Horn 2	1945	Jul 04,1983	Jul 04,1999	500	20	Atlin	104K/1E
Horn 3	1946	Jul 04,1983	Jul 04,1998	500	20	Atlin	104K/1E
Late	1949	Jul 04,1983	Jul 04,1998	500	20	Atlin	104K/1E
Muse 1	1911	Jun 13,1983	Jun 13,1998	500	20	Atlin	104K/1E
Muse 2	1912	Jun 13,1983	Jun 13,1998	500	20	Atlin	104K/1E
Olly	1954	Jul 04,1983	Jul 04,1999	400	16	Atlin	104K/1E
Pole	1490	Aug 21,1981	Aug 21,1994	500	20	Atlin	104K/8W
Sam 1	1290	Mar 05,1981	Mar 05,2000	375	15	Atlin	104K/8W
Sam 2	1291	Mar 05,1981	Mar 05,1994	250	10	Atlin	104K/8W
Stan	1955	Jul 04,1983	Jul 04,1999	400	16	Atlin	104K/1E
Tan 1	1937	Jul 04,1983	Jul 04,1998	300	12	Atlin	104K/1E
Tan 2	1938	Jul 04,1983	Jul 04,1998	75	3	Atlin	104K/1E
Tan 3	1939	Jul 04,1983	Jul 04,1991	500	20	Atlin	104K/1W
Tan 4	1940	Jul 04,1983	Jul 04,1991	250	10	Atlin	104K/1W
Tan 6	1942	Jul 04,1983	Jul 04,1991	500	20	Atlin	104K/1W
Thor 4	1952	Jul 04,1983	Jul 04,1991	500	20	Atlin	104K/1W
Totem 2	1726	Aug 26,1982	Aug 26,1994	500	20	Atlin	104K/1W
27 claims and one mining lease				11662.1 ha	408units		

* These claims constitute mineral lease #40.

2.3 PROPERTY GEOLOGY

The Golden Bear property is underlain by complexly folded and faulted Permo-Triassic rocks of the Stikine Terrane (Fig. 2.3.1). The stratigraphic units are intruded by foliated Triassic to non-foliated Jurassic Coast Plutonic Complex diorite stocks, Cretaceous to Tertiary Sloko Group felsic dykes,and Recent Level Mountain Group basalt dykes.

Episodes of folding, faulting and greenschist facies metamorphism have affected the entire package of stratigraphic rocks exposed in the area. Rocks proximal to major faults have typically been carbonatized or silicified and are locally associated with precious and base metal mineralization.

More recent Quaternary deposits, glaciation and slope movements have created some extreme features such as the Bearskin Creek landslide and the present topographic surface.

Geology

The oldest rock unit that occurs within the map area is a slice of ultramafic rock of tectonic origin (Fig. 2.3.1). Otherwise, the Golden Bear area is dominated by a conformable stratigraphic succession of carbonate rocks and mafic volcanic rocks of the Stikine Terrane.

Rock names used in property-scale geological mapping and core logging have been reduced to four letter codes (McDonald and Reddy, 1990; Appendix C). General lithologies are described from oldest to youngest in the following paragraphs. Property specific four letter rock codes are indicated in bold type in parentheses following general rock names.

Ultramafic rocks (pre-Permian), largely serpentinite, occur along deep-seated, steeply-dipping fault zones just north of the central portion of the property. These rocks have been tectonically emplaced and do not fit conformably into the local stratigraphy. Age is unknown, but is possibly Permian (Souther, 1971). The major fault structures that contain the slices of ultramafic rock cut across the property, but no ultramafic rock is exposed within the claim block.

The **carbonate unit** (Permian) is the oldest stratigraphic unit on the property and is at least 300 m thick. Lithologies comprising this unit include limestone (**LMST**), dolomite (**DOLO**), and chert (**CHRT**) (Figs. 2.3.1 and 2.3.2). The carbonates form a massive, resistant ridge that outcrops on the western edge of the claim block. Permian fusulinids, crinoids and minor coral fossils in the

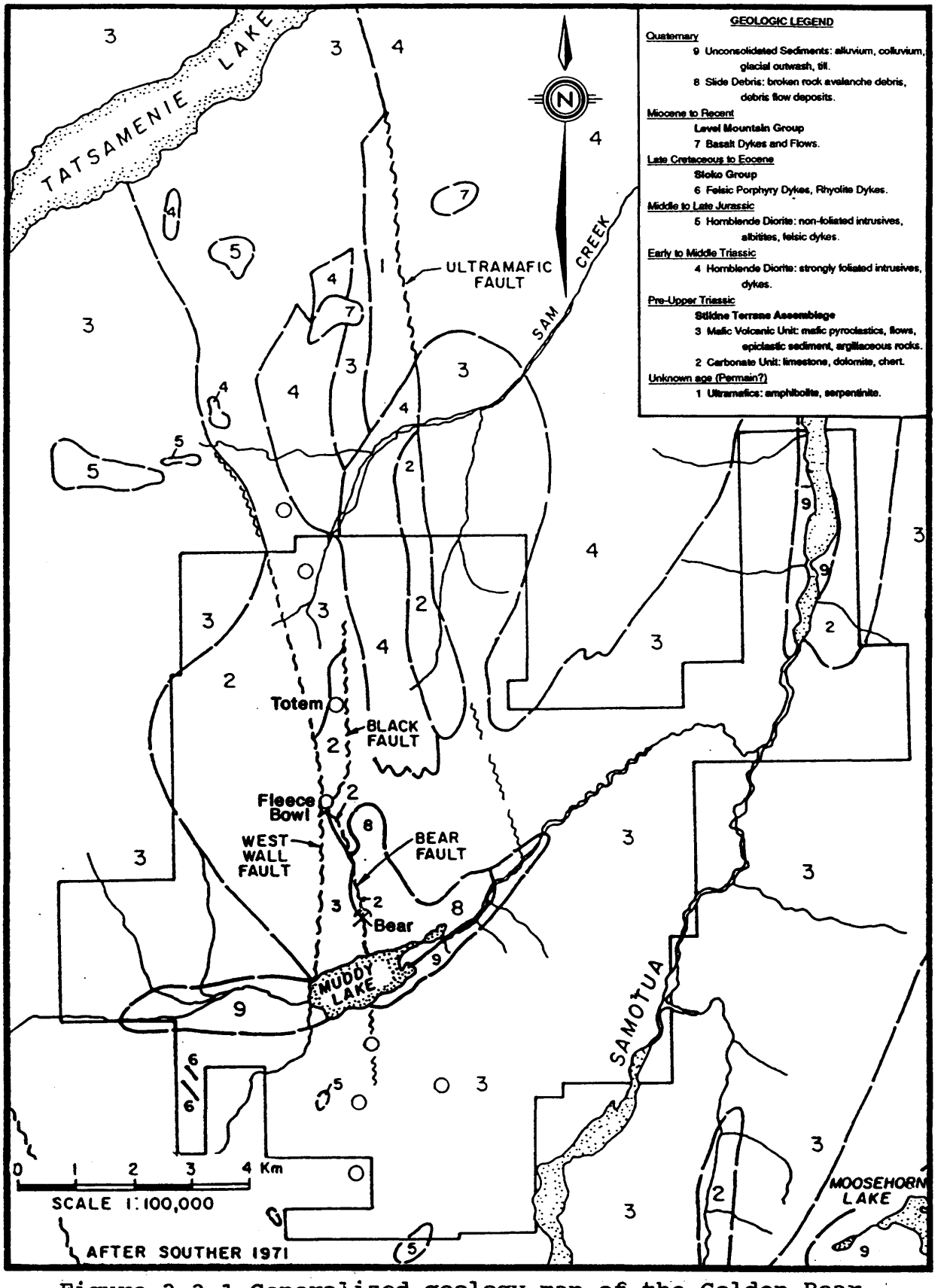


Figure 2.3.1 Generalized geology map of the Golden Bear property.

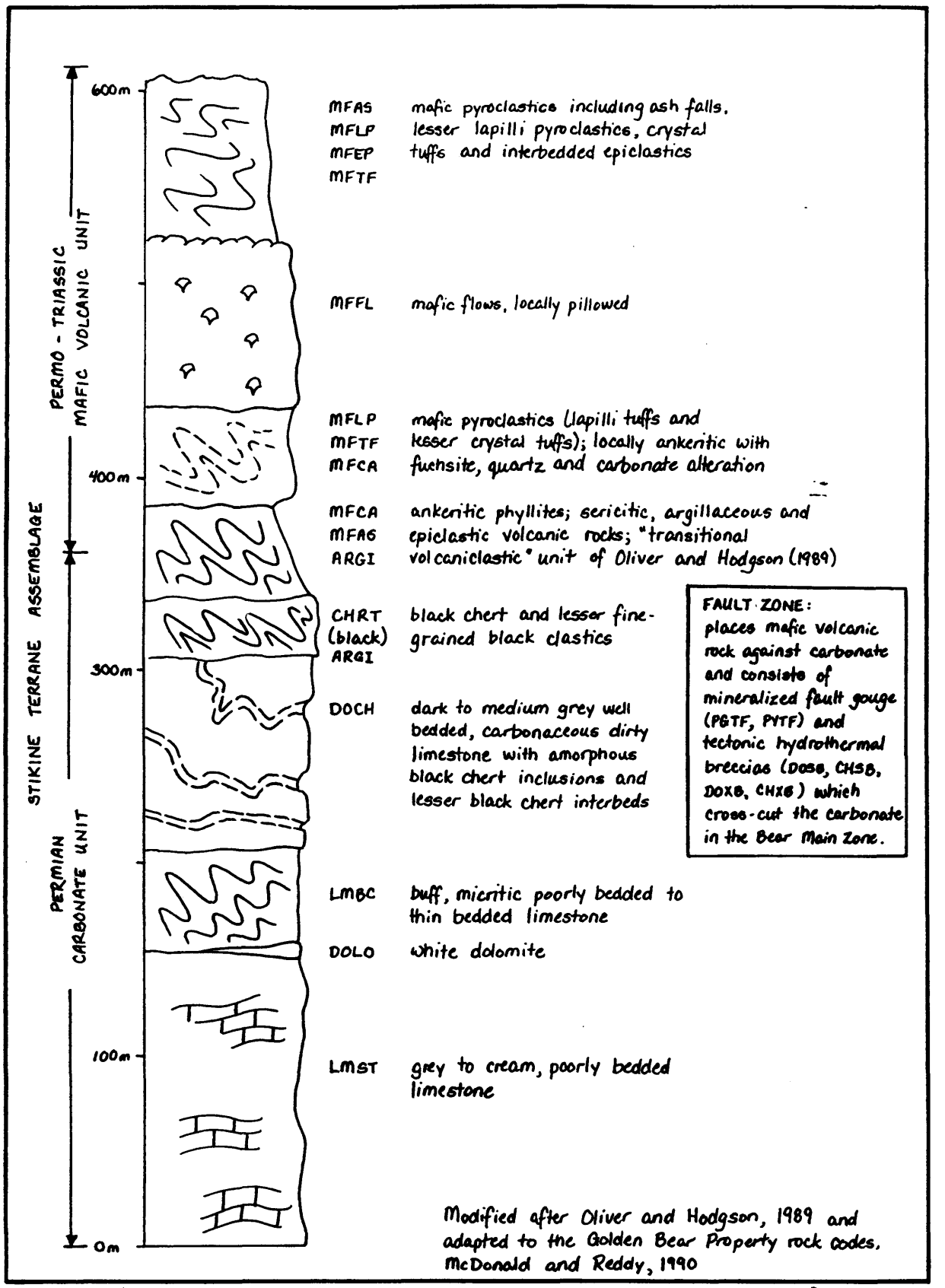


Figure 2.3.2 Generalized stratigraphic section of the main lithologies on the Golden Bear property.

limestone indicate a shallow marine, carbonate bank depositional environment. Fossil ages define a Permian age for this unit (Monger and Ross, 1971).

Within the carbonate unit is a poorly bedded, cream coloured limestone (approximately 150 m thick) that forms the base of the carbonate succession. This is locally overlain by a thin (less than 5 m) white dolomite bed. Thin bedded, buff-weathering crinoidal limestone (**LMBC**) overlies these two units. The crinoidal unit is up to 50 m thick and is a useful marker horizon on the property (Oliver and Hodgson, 1989). Up to 100 m of carbonaceous, "dirty" limestone with local amorphous silica inclusions and black chert interbeds (**DOCH**) overlies the marker unit. The carbonate succession is capped by a distinct black chert unit up to 30 m thick.

A variety of breccias and brecciation textures have been observed in the carbonates including: intraformational beds of monolithic sedimentary breccia (Wober and Shannon, 1985), crackle brecciation where carbonate beds are tightly folded, karst solution collapse breccias (Lowey 1986: Read 1986) and tectonic-hydrothermal breccias related to mineralization (**DOSB, CHSB, DOXB, CHXB**).

The change from deposition of biogenic limestone to chert possibly reflects increasing amounts of silica added to seawater by submarine hotsprings associated with the onset of mafic volcanism (Lehrman and Caddey, 1989). Oliver (Oliver and Hodgson, 1989) mapped a 50 m thick unit that they described as "transitional volcaniclastics" at the contact between the carbonate unit and the overlying mafic volcanic unit. This transitional unit includes ankeritic phyllites **(PHYL)**, epiclastics **(MFEP)**, and argillaceous **(ARGI)** rocks. The transition from limestone to chert to mafic volcanic rock is considered conformable on a regional scale.

The **mafic volcanic rock unit** (Permo-Triassic) is at least 200 m thick. This unit consists of mafic flows with local pillows **(MFFL)**, pyroclastics ranging from ash **(MFAS)** to lapilli-sized fragments **(MFLP)**, and epiclastic sediments **(MFEP)**. Mafic volcanics dominate the central and southern portions of the property (Fig. 2.3.1). The unit is a generally monolithologic succession that was deposited in a back-arc environment. Mafic volcanics are relatively unaltered, except near major fault zones where they can be extensively carbonatized **(MFCA)** and silicified.

Four main units that intrude the stratigraphic rocks within the Golden Bear area are as follows: (1) gabbro sills; (2) granodiorite and diorite stocks; (3) felsic dykes; and (4) basalt dykes. These units are described from the oldest to youngest in the following paragraphs.

Contact relationships between **gabbro sills** (**GBRO**) and the overlying mafic flows and pyroclastic rocks suggest that the gabbro may be, in part, subvolcanic and coeval with the lower Triassic mafic volcanic rocks (Oliver and Hodgson, 1990). These sills intrude the mafic volcanic rocks and form dark, resistant ridges at the top of East Bowl but do not appear on a property scale map. The contacts of the gabbroic intrusives are often marked by chilled margins or by clay gouge zones. Gabbro forms the majority of the slide material that has blocked the Bearskin Creek valley forming Bearskin Lake.

Granodiorite and diorite intrusions of the Coast Plutonic Complex are Triassic (foliated; **GRDF**) and Jurassic (non-foliated; **GRDI**) in age (Souther, 1971). Foliated hornblende diorite intrudes the mafic volcanic rocks in the north central part of the claim block. The strong metamorphic foliation and alteration in these intrusives resulted from middle Triassic tectonic activity (Souther, 1971).

Non-foliated hornblende diorite intrusives are relatively uncommon. A middle to late Jurassic age (156 Ma to 171 Ma) has been assigned to these intrusives based on dates obtained from similar rocks in the surrounding area (Hewgill, 1985; Schroeter, 1987).

Titley (1987) describes felsic dykes, that he equates to the non-foliated diorite, on the TOTEM claim and felsic stocks south of Bearskin Lake where they intrude the pre-Upper Triassic mafic volcanic rocks.

The mineralized felsic dyke in the Fleece Bowl Zone is hydrothermally altered adjacent to the mineralized Fleece Fault. This dyke has not been successfully dated, but seems to predate mineralization. The relationship with the hydrothermal system is not known (Titley, 1987).

Felsic volcanic rocks (**RHDY**; Late Cretaceous to Early Tertiary) of the Sloko Group, cut the Stikine greenstones. These rhyolite dykes also occur as part of a dyke swarm that parallels the contact of a large body of Sloko Group felsic extrusives 2 km west of the property (Titley, 1987).

Basalt dykes (**BSDY**; Miocene to Recent) of the Level Mountain Group are minor in extent but they intrude all units including mineralization. These dykes trend north-south and are steeply inclined, roughly parallel to the main fault structures. Level Mountain Group volcanic rocks form large shield volcanoes east of the property. Basalt flows outcrop 4 km north of the property.

Structure

Three deformational events have affected the rocks in the Golden Bear area. The first two events are the most significant. The first phase of deformation occurred during the Tahltanian orogeny (middle Triassic) and resulted in tightly folded north-trending isoclinal folds with thinned limbs and axial planes that dip steeply to the east. Fold axes plunge shallowly to the south. Greenschist facies metamorphism accompanied the deformational event and a regional axial planar foliation was developed.

As the first phase of folding progressed, early ductile folding gave way to brittle faulting which developed a variety of faults and fractures. Large north-trending structures such as the precursor to the "Ophir Break" were developed at this time. These large scale faults later became host to district mineralization.

A second phase of deformation (early to middle Jurassic) resulted in refolding of the stratigraphy into broad, open northwest-trending, moderately southeast-plunging folds. A complex fold interference pattern resulted (described in detail in Lehrman and Caddey, 1989).

During the second phase of deformation, brittle structures were also developed. Earlier structural features were modified and reactivated during the second event. Renewed movement on major faults probably produced the structural dilations along the Ophir Break. Golden Bear mineralization was coincident with this second event of deformation.

The third phase of deformation has been described as a middle Tertiary extensional event which developed block fault structures that penetrate the youngest Tertiary rocks (Souther, 1971).

Quaternary deposits

Quaternary deposits within the Golden Bear area include landslide debris and unconsolidated sediments.

Souther (1971) described the main rock avalanche that impounds Bearskin Lake in the Bearskin Valley. Slide debris extends over 2 square kilometres in area (volume approximately 100 million cubic metres) on the east side of the BEAR claim (Titley, 1987). This slide is speculated to have occurred as a catastrophic rock avalanche that descended onto a wasting glacier in Bearskin Creek valley about 10,000 years ago, thus as the glacier moved, the avalanche debris was carried farther down the valley than otherwise seems possible (Titley, 1987).

Slope movements directly affect the Bear Main Zone. The uppermost part of the Bear deposit has locally been displaced by mass wasting forming the Slide Base Zone and several other small anomalous horizons within the slide material. Rock avalanche debris has been drilled to 40 m depth in some surface drill holes and in underground workings the slide base has been encountered in cross-cuts in the hanging wall of the Bear Main Zone.

Titley (1987) describes the unconsolidated Quaternary sediments on the claim group as:

> consist(ing) of alluvium, glacial outwash, till, alpine moraine, colluvium and felsenmeer. Some broad alluvial or outwash deposits occur in the Samotua River and Bearskin Creek valleys. These form the only large flat areas on the property and are subject to annual floods. Glacial till occurs as thin, scattered, widespread deposits. Alpine moraine forms low ridges and thick accumulations in local areas such as at the top of East Bowl. Thin deposits of colluvium and felsenmeer cover much of the claim block and often obscure bedrock geology.

2.4 MINERALIZATION

Golden Bear is a shear zone hosted, enigmatic gold-silver telluride deposit with epithermal affinities. The Bear Main Zone is a high grade, structurally controlled ore shoot with a vein-like geometry.

Ore grade material is localized along an intermittently mineralized north-trending structure known as the **Ophir Break**. This structure is at least 20 km in length, about 9 km of which is on the Golden Bear Mine property.

On a property scale, the Ophir Break is made up of several major, steeply east-dipping faults which bifurcate and merge to form an anastomosing shear system. Within this zone of sheared rock distinct structures have been identified (Fig. 2.4.1).

On the deposit scale, the **Bear Main Fault** occurs along the eastern margin of the Ophir Break. This fault juxtaposes carbonatized mafic volcanic rock on the hanging wall, against carbonate rock in the footwall. Further west, the **Footwall Fault** is the western boundary of the carbonate rock package and places carbonate in the hanging wall against mafic volcanic rock in the footwall. The result is a fault-bounded sliver of carbonate rock central to the Ophir Break. The main carbonate lens outcrops over part of

the Bear Main Zone and pinches out at depth and along strike to the north.

This lens of carbonate rock is, itself, cut by the **Internal Sliver Fault** (Fig. 2.4.1). The Internal Sliver Fault is a riedel shear structure which is en echelon and at a low angle to the direction of relative movement on the Bear Main and Footwall Faults. The Internal Sliver Fault connects the Bear Main and Footwall Faults due to a moderate east dip. This fault separates the carbonate into two lenss and displaces them such that the east lens "rides up" onto the west lens in a reverse sense of fault movement.

The Internal Sliver Fault splits into two faults; the **Internal Sliver Footwall Fault** and the **Internal Sliver Hanging Wall Fault**, which follow the volcanic/carbonate contacts. The Internal Sliver Footwall Fault merges up section, with the Footwall Fault, where the west lens of carbonate pinches out. The Internal Sliver Hanging Wall fault merges up section with the Bear Fault, where the east lens of carbonate pinches out.

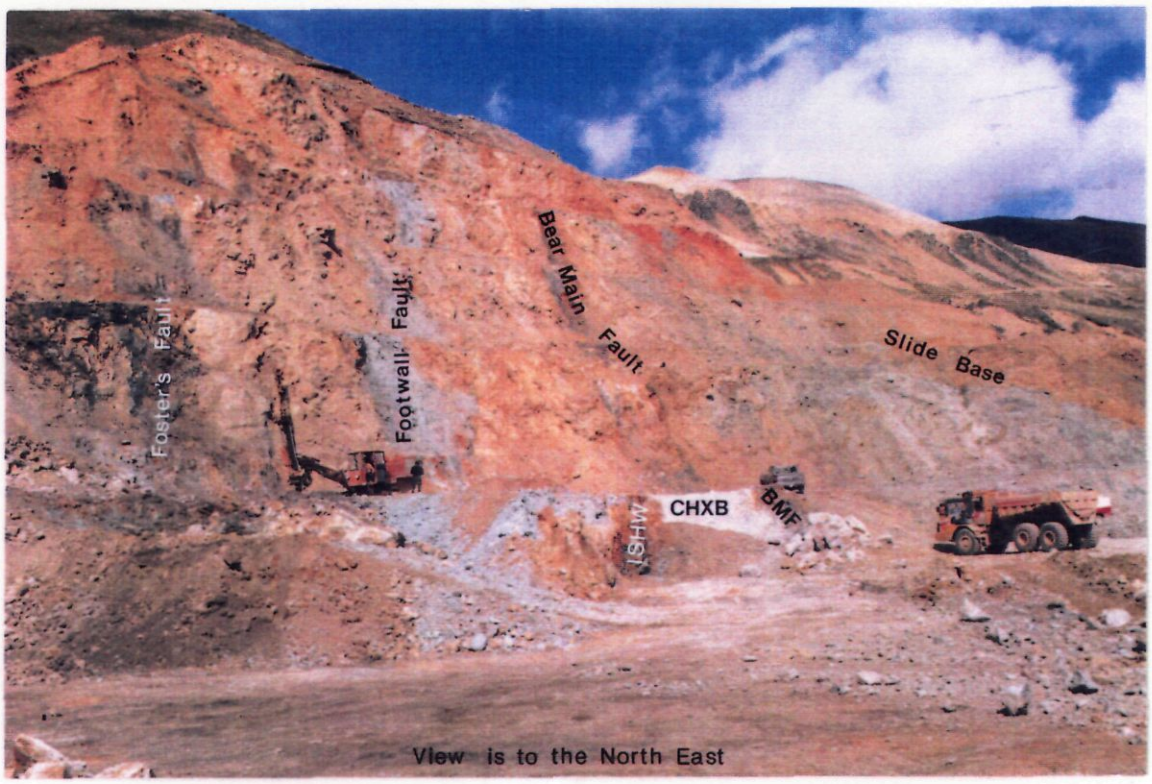
Foster's Fault is a large fault zone in mafic volcanic rock and argillaceous tuffs west of the Footwall Fault, near the western margin of the Ophir Break. The **West Wall Fault** (Fig. 2.3.1) places mafic volcanic rock in the hanging wall against a footwall of limestone. At present, significant mineralization has not been identified in association with these westerly structures.

Mineralization is associated with the fault structures that bound and/or shear the dolomite lozenges. Preferential mineralization, or thickening of a zone, occurs at the confluence of these major fault structures (Fig. 2.4.2). Deposit-scale structural control is also expressed by preferential mineralization along and within right-handed strike deflections and flatter east dipping segments in the Bear Main Fault. Locally, lesser mineralized zones follow splits and splays off the main fault structures.

Ore grade material is commonly, but not invariably, associated with up to 3% pyrite in sheared mafic tuff and is locally accompanied by bleaching and chlorite-sericite-ankerite-fuchsite(?) alteration of the mafic volcanic rocks.

Golden Bear is not typical of epithermal type deposits in that there are no well-defined veins or vein systems. Although the overall geometry is vein-like, the deposit is better described as a mineralized fault zone in contact with hydrothermally cemented chert/carbonate breccia along a structural dilatancy.

Alteration, characteristic of epithermal systems is weak to absent and the prominent alteration minerals;



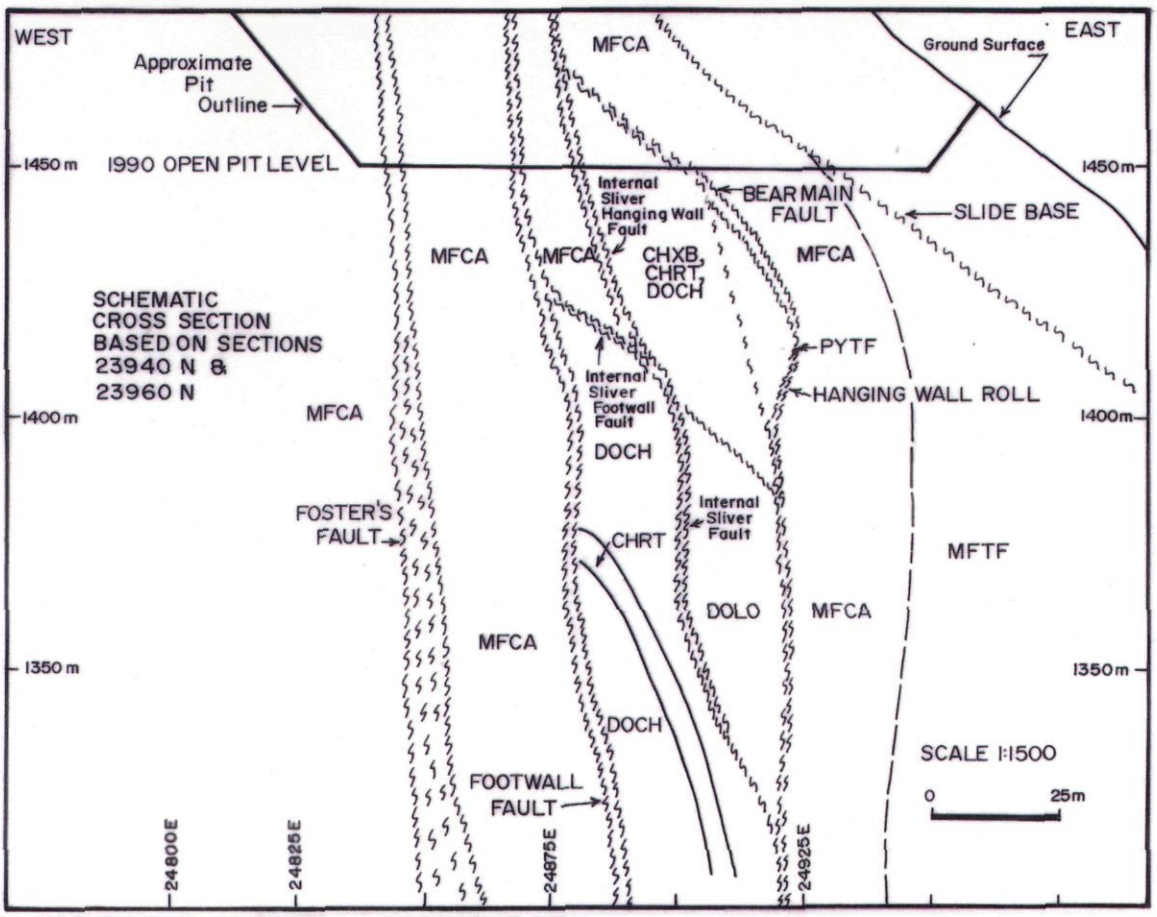


Figure 2.4.1 Photograph and cross-section of the Bear Main Fault and associated structures.

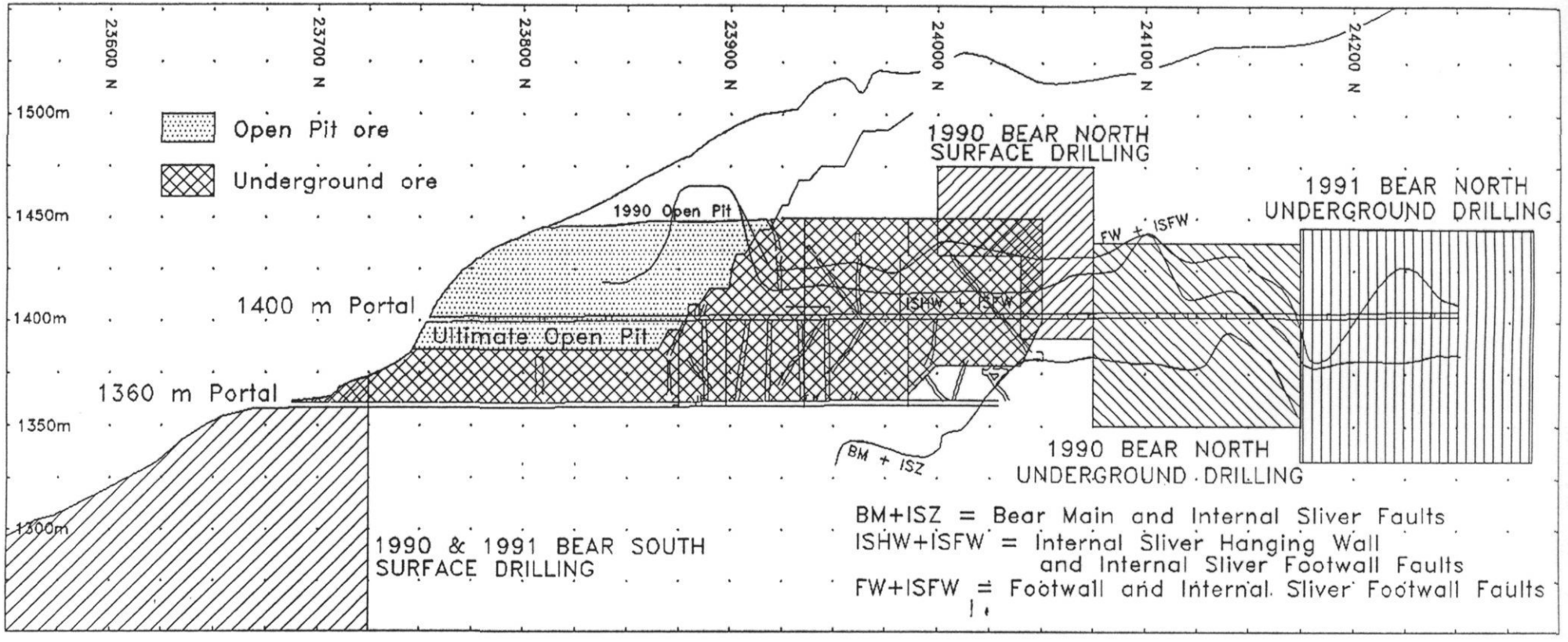


Figure 2.4.2 Longitudinal section of the Bear Main Zone showing areas of 1990 and proposed 1991 drilling, and zones of confluence of the main mineralized structures.

chlorite, fuchsite, sericite and ankerite, are more typical of mesothermal systems (Lehrman and Caddey, 1989). Local kaolinite and illite alteration may be supergene.

Several characteristics of the deposit support an epithermal classification:

(1) mineralization consists largely of open space fillings and is strongly structurally controlled;

(2) gangue mineralogy is dominantly dolomite-quartz-ankerite;

(3) a typical epithermal geochemical signature occurs with elevated Au, As, Te, Ag, Sb, Hg, Bi, S values and low base metals;

(4) Au/Ag ratios are low (generally 1:1 or 1:2); and

(5) limited fluid inclusion data indicates 180^{o}C and 1 to 3 weight percent NaCl equivalent salinities.

Regardless of depth of origin, mineralization is believed to have occurred during a single stage event. Hydrothermal quartz is inconspicuous and, where present, does not show sequential depositional features. Furthermore metallic mineral grains are very small (less than 0.5 to 5 microns) and are typically anhedral.

Lehrman and Caddey (1989) infer that the mineralizing event was a brief, catastrophic, single episode that did not involve significant sustained boiling. Mineralization was associated with hydrofracturing or hydro-tectonic breccia formation. The hydrothermal fluids contained very high metal concentrations (this is required by the high grade system which was not enhanced by multi-episode mineralization) and relatively little silica. Under such conditions a mineralized, non-crustified, gangue-supported dilational breccia, largely devoid of tabular veins or veinlets could be developed.

A conceptual genetic model for the formation of and mineralization in the Bear Main Zone is discussed in detail in Lehrman and Caddey (1989).

2.5 WORK HISTORY

The remote and rugged nature of northwestern British Columbia has restricted mineral exploration to coastal areas until fixed wing aircraft and helicopters made inland access easier. The first claim staked near Bearskin Lake was in 1956 by K.A. Gamey (Nicko No. 30, Record No. 3077, Tag No.

228415; Titley, 1987) on some copper showings. Until 1980, no further exploration work was been recorded.

J.G. Souther (1971) of the Geological Survey of Canada mapped the Tulsequah map sheet (104K) providing the main regional geologic framework for the area.

In 1979-1980, C. Dyson of Chevron Minerals Ltd. was studying the epithermal gold potential of several areas in British Columbia (Wober and Shannon, 1985). A small reconnaissance program on the Tulsequah map sheet was conducted by L. Dick (CML) in 1980. The program was initially focused on alteration zones with associated antimony and arsenic occurrences north of Tatsamenie Lake (Wober and Shannon, 1985).

In 1981, CML staked 43,000 acres in 10 claim groups; one claim group included the Bear Main Zone (Wober and Shannon, 1985). During the summer of 1981, a reconnaissance soil traverse at 300 m sample spacing along the north side of the Bearskin Creek valley returned an assay value of 700 ppb Au. Follow-up contour soil sampling at 100 m spacing produced a high of 9,200 ppb Au from an area directly below what is now the Bear Main Zone. Grab samples taken in this area assayed up to 24.0 g/t Au (0.7 opt Au; Wober and Shannon, 1985).

In 1982, the Bear Main Zone was discovered and trenching, prospecting, chip sampling and mapping were carried out. Samples from the 13 m wide, 175 m long zone produced an average assay of 9.3 g/t Au (0.27 opt Au). Mineralization discovered in the Fleece Bowl area produced 1 to 2 g/t Au assay results (Wober and Shannon, 1985).

In 1983, trenching continued and drill road building and drilling commenced on the BEAR and TOTEM claims. 25 diamond drill holes were completed on the BEAR claim and 5 were drilled on the TOTEM claim.

The project was expanded in 1984 when 4 diamond drills completed 58 holes on the BEAR and TOTEM claims. Drilling was concentrated on the Bear Main Zone, the Fleece Bowl Zone and the Totem Zone. Parts of the BEAR and TOTEM claims were mapped during the 1984 exploration season.

No new mineralization was discovered in the scaled-down 1985 exploration program. 14 diamond drill holes were completed on the BEAR claim and 17 were drilled on the TOTEM claim. Surface trenching and mapping continued. Geological reserves of 1.025 million tonnes of 13 g/t Au, (1.13M tons of 0.38 oz/ton Au) oxidized and refractory ore was indicated in the Bear and Fleece Zones (Wober and Shannon, 1985).

In June 1986, North American Metals Corp. became a 50% joint venture partner with Chevron Minerals Ltd. in the Bear-Totem option agreement. Underground development work commenced with drifting on the 1400 m level at this time.

In 1986 and 1987, 87 underground and 13 surface holes were drilled to further define the ore body. By 1988, 2000 m of underground development had been completed.

A feasibility study presented in July 1987 by Wright Engineers Limited indicated that the Golden Bear Project could be successfully brought into production (Wright Engineers Limited, 1987). In the same month North American Metals Corp. assigned all of its interest in the Bear-Totem agreement to North American Metals (British Columbia). Mining development began in October, 1987 and at that time, Chevron and North American Metals (British Columbia) incorporated the Golden Bear Operating Company (GBOC) as an independent service company to operate the Golden Bear Mine Project. A minable ore reserve in the Bear Main Zone of 625,390 tonnes at 18.6 g/t Au had been identified by Wright Engineers Limited and American Mine Services Inc. (Wright Engineers Limited, 1987). Mill construction took place in 1988 and 1989 and mining commenced in 1989.

In April 1988, Homestake Mining (B.C.) Ltd. acquired a 73.3% interest in North American Metals Corp. and became an active participant in the project. Exploration had experienced a two year hiatus between the end of 1987 until the end of 1989. The exploration effort was revived in 1990 and comprised partial compilation of work from previous years and a limited program of diamond drilling of 2295.12 m in 19 holes immediately north and south of the main deposit area.

Other recent non-exploration studies in the Golden Bear area include government publications by T. G. Schroeter and J.L. Oliver and C.J.Hodgson. Schroeter (1985, 1986, 1987) summarized Golden Bear geology based on Chevron Minerals Ltd. work. Oliver and Hodgson (1989, 1990) have been conducting regional mapping from the Bearskin Creek valley to north of Tatsamenie Lake as part J.L. Oliver's Ph.D. studies.

Table 2.5.1 **GOLDEN BEAR PROJECT DRILL HOLE SUMMARY.**

Bear Drilling 23500N-25300N

Year	# of Holes	Actual #	Total Meterage	
1983	27	25	4,617.45	
1984	24	22	4,487.20	
1985	16	14	2,006.28	/ 11,110.93m
1986	26	25	1,896.91	
1987	78	76	3,569.28	
1988	3	3	309.07	/ 5,775.26m
1989	-	-	-	
1990	20	19	2,295.12	/ 2,295.12m
	194	184	19,181.31	

Totem Drilling 25300N-28100N

Year	# of Holes	Actual #	Total Meterage	
1983	5	5	772.82	
1984	34	34	5,760.00	
1985	17	17	2,327.31	/ 8,860.13m
	56	56	8,860.13	

Total Drilling on the Golden Bear property.			
	250	240	28,041.44 metres

*includes abandoned holes i.e. B83DH27A

3. 1990 EXPLORATION PROGRAM

3.1 SCOPE AND LOGISTICS OF EXPLORATION

Exploration on the Golden Bear Mine property in 1990 was conducted between May 6th and October 3rd by a geologic staff of up to five people and a total budget of $750,000 (Appendix A). Other temporary staff included a geophysicist, geological consultant, diamond drilling crew, and other contractors.

Exploration activity was based out of existing camp and office facilities which service mining and milling operations at Golden Bear Mine. Exploration compilation work and planning before May 6th and after October 3rd was conducted out of the Vancouver offices of Homestake Canada Ltd.

1990 exploration was directed toward:

(1) delineating additional reserves to replace material that was mined this year;

(2) initiating a search for a large tonnage target of the same size as the Bear Main Zone.

Regional exploration was also conducted to identify areas with potential to be ore host structures that require further investigation.

In 1990, exploration work was conducted on four areas; East Bowl, Troy Ridge, Muse Ridge, and Sam Creek (Table 3.1.1, Fig. 3.1.1). The latter three areas received cursory (1:10,000 scale) reconnaissance traverses. In East Bowl, a total of six target areas were examined. Previous data on these areas was compiled and evaluated. Several of these areas were then drilled or mapped depending on the type of target. Three zones were tested by diamond drilling; two were mapped at 1:1,000 scale.

A total of 21 rock and 8 soil samples were collected on the reconnaissance traverses and 481 rock, 22 soil and 1695 core samples were taken in more detailed evaluations in East Bowl.

Diamond drilling was carried out on a contract basis by F. Boisvenu Drilling Ltd. of Delta, British Columbia. One skid mounted Boyles 56A diamond drill was used for surface drilling between July 1st and August 30th. The drill was used to produce HQ, NQ, or BQ size core. A D-5 tractor was also supplied to level out drill pads and move the drill between pads. One connors diamond drill was used for

TABLE 3.1.1 **EXPLORATION AND TARGET AREAS EXAMINED IN 1990.**

Exploration Area	Target Area
East Bowl	Bear North Bear Main Bear South Internal Sliver Zone Slide Base Zone Open Pit Haul Road
Troy Ridge	
Muse Ridge (South side of Lake)	
Sam Creek	

underground drilling between September 1st and October 1st. The drill was capable of producing NQ or BQ core. Whenever possible NQ core was drilled, however, under difficult ground conditions, size reduction to BQ size core was required. Between July 1st and September 30th, 2,295.12 m of core were drilled in 19 holes at an average rate of 15.41 m per shift.

A Trans North Air Bell 206B helicopter was used on a casual basis for fieldwork. The helicopter was based in Telegraph Creek.

Ground geophysical surveys were performed on a contract basis by Delta Geosciences Ltd. of Delta, British Columbia. A technician and equipment were supplied by the contractor with assistants supplied from the exploration crew. Geophysical surveys conducted on the property this year included a VLF-EMR (very low frequency electromagnetic, resistivity, and total field magnetics) and HLEM (horizontal co-planar loop electromagnetics) survey.

A Scintrex IGS system was configured as a VLF-EM/Mag/Resistivity system using a Scintrex MP-3 Base station magnetometer and recording data using the Jim Creek, Washington, NLK, 24.8 khz station. Readings were taken at station intervals of 12.5m and line spacing of 50m. Diurnal variations were recorded using a similar base station magnetometer and were used to correct data (Appendix B: Hendrickson, 1990).

A Max-Min I, eight frequency system was used for the HLEM survey with readings taken at 440 Hz, 1,760 Hz, 7,040 Hz, and 14,080 Hz at station intervals of 25 m and line spacing of 50 m.

Contractors used for significant periods included: Jim Oliver (Consulting Geologist) of Kamloops, British Columbia for 1:1,000 scale grid mapping and section interpretation; and Northern Exploration Services of Whitehorse, Yukon to construct a 50,000 foot (NQ) drill core storage facility. Additional equipment was rented from suppliers for short terms as needed.

3.2 PROPERTY EXPLORATION

Several reconnaissance traverses at 1:10,000 scale were conducted to give a preliminary assessment of areas with potential for an ore host structure. The three main areas visited were: (1) Troy Ridge; (2) Muse Ridge (south side of Bearskin lake); and (3) Sam Creek (Fig. 3.1.1).

Troy Ridge is a prominent ridge of dark gabbroic rock that outcrops along the top of East Bowl (Fig. 3.3.1). (This area has been elaborated on in section 3.3.7 of this report because it is viewed as a good target for 1991 drilling.) The gabbro is a shallow dipping sill that intrudes mafic volcanic rocks . The east end of the ridge is buried by moraines left behind by Helen Glacier. The west end of the ridge is terminated by the Ophir Break and the West Wall Fault. The West Wall Fault separates a massive section of carbonate units from mafic volcanic rocks in the Ophir Break.

On Troy Ridge, the Ophir Break is a zone of intense carbonatization and ankeritic veining in mafic volcanic rock. Large volumes of hydrothermal fluids have passed through this zone. A small wedge of silicified carbonate is within the fault zone on the western edge of Troy Ridge. The faults on either side of this carbonate may have provided a zone of structural dilatancy favourable to deposition of gold mineralization. Previous drill holes were spaced widely and may not have fully tested the Ophir Break in this area, possibly missing a potentially ore-bearing structure.

Muse Ridge is on the south side of Bearskin Lake and separates the Bearskin Creek and Samotua River valleys (Fig. 3.2.1). The main lithologies south of Bearskin Lake are mafic volcanics ,argillite and gabbro. A large (up to 6 m wide), north-striking and steeply east dipping fault zone forms a steep, recessive creek drainage (Figs. 3.2.2) and a large notch on Muse Ridge (Fig. 3.2.3). This fault zone is the southern extension of the Ophir Break and has excellent potential to host a significant zone of mineralization. Locally abundant sulphide minerals include arsenopyrite, pyrite, and chalcopyrite within a black clay fault gouge. The fault zone has been intruded by an altered felsic dyke that carries several percent pyrite.

Previous exploration on this part of Muse Ridge includes some large scale mapping and contour soil/talus sampling, but not in a detailed fashion. Previous chip sampling has returned assays up to 3.0 g/t Au, 9.8 g/t Ag and 1.2 g/t Au, 2.4 g/t Ag as well as high arsenic values (up to 10,000 ppb As) for soil samples along the suspected southward continuation of the Ophir Break structure.

Figure 3.2.1 Photograph of Muse Ridge showing the large east-dipping fault zone that is the southern extension of the Ophir Break. View is to the south.

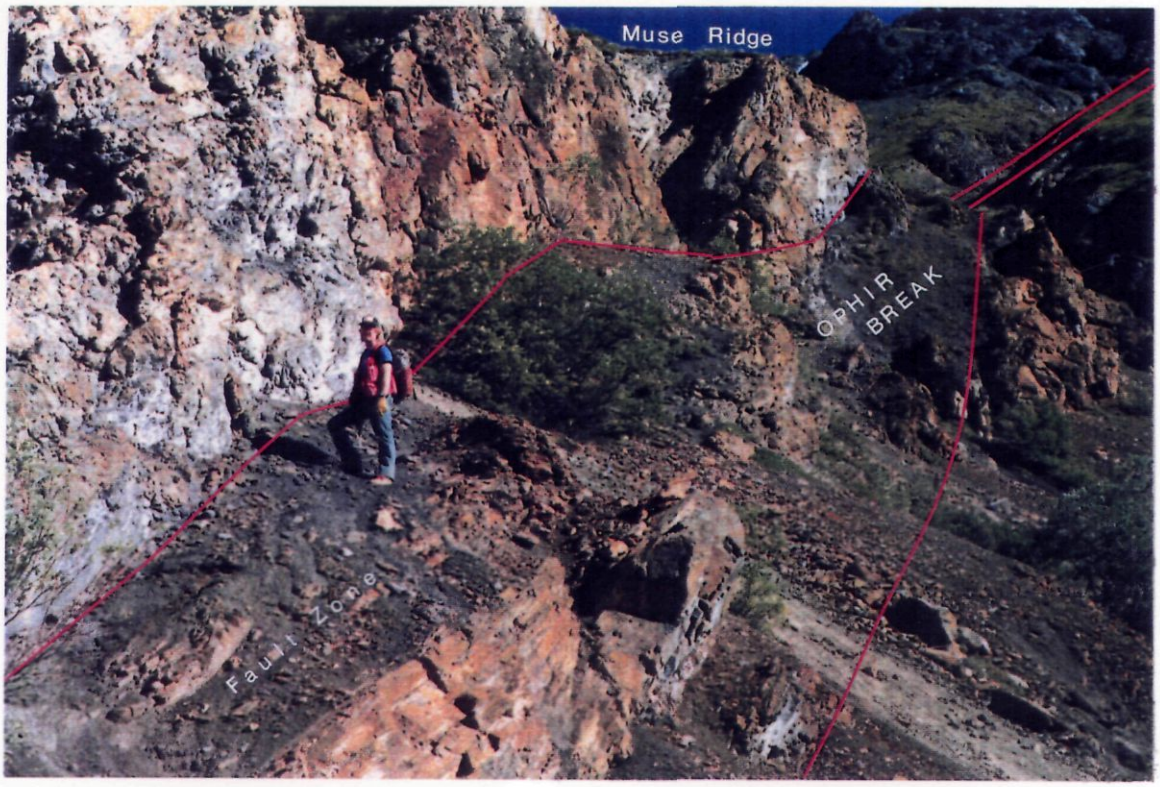


Figure 3.2.2 Photograph of the large east-dipping fault zone on the north side of Muse Ridge. View is to the south.

Figure 3.2.3 Photograph of the notch in Muse Ridge where the fault zone transects the ridge. View is to the west.

Of the ten samples taken this year the highest values were 43 ppb Au, 0.3 ppm Ag /0.10 m for gold and 14 ppb g/t Au, 0.8 ppm Ag /0.20 m for silver. Pathfinder element values were up to 232 ppm As and up to 0.330 ppm Hg indicating some epithermal activity has taken place along this fault. The fact that significant gold assays were received during previous exploration on this large north-striking fault zone, indicates that detailed mapping and lithogeochemical sampling (as proposed in section 1.3.2 of this report) is required to establish the potential for mineralization through the structure.

Sam Creek area (Fig. 3.2.4) is northwest of the Totem Zone on the northern edge of the property. Sam Creek flows northeast and cross-cuts the Ophir Break. The main lithologies in this area are the lower levels of the carbonate succession: limestone is overlain by phyllite and brought into fault contact, along the West Wall Fault, with argillite overlain by mafic volcanics. These units strike northwest and dip moderately northeast, although units on the west side of the map area do display outcrop scale folding especially in the carbonate rocks. The Ophir Break forms a recessive fault zone that cuts across the Sam Creek valley (Fig. 3.2.5) and appears to make strike change from an almost north strike to a northwest strike direction. Mapping by J. Oliver (1988) supports this interpretation.

Previous sampling on the SAM1 and SAM2 claims has returned several anomalous gold assays up to 700 ppb Au (up to 9,000 ppb reported in Walton, 1985 but no location given) as well as high arsenic and silver values in soils. Soil and float samples that are anomalous in gold often do not have an identifiable bedrock source. Rock chip samples from the location where the West Wall Fault cuts into the north side of the Sam Creek valley assayed up to 0.1 g/t Au, 5.4 g/t Ag. Of six samples taken this year, the highest gold assay was 0.4 g/t Au, 1.8 g/t Ag and the highest silver assay was 0.3 g/t Au, 2.2 g/t Ag.

Preliminary investigations and evaluation of compilation data from previous exploration in these and other areas has led to the recommendations for work in 1991 as outlined in section 1.3.2 of this report.

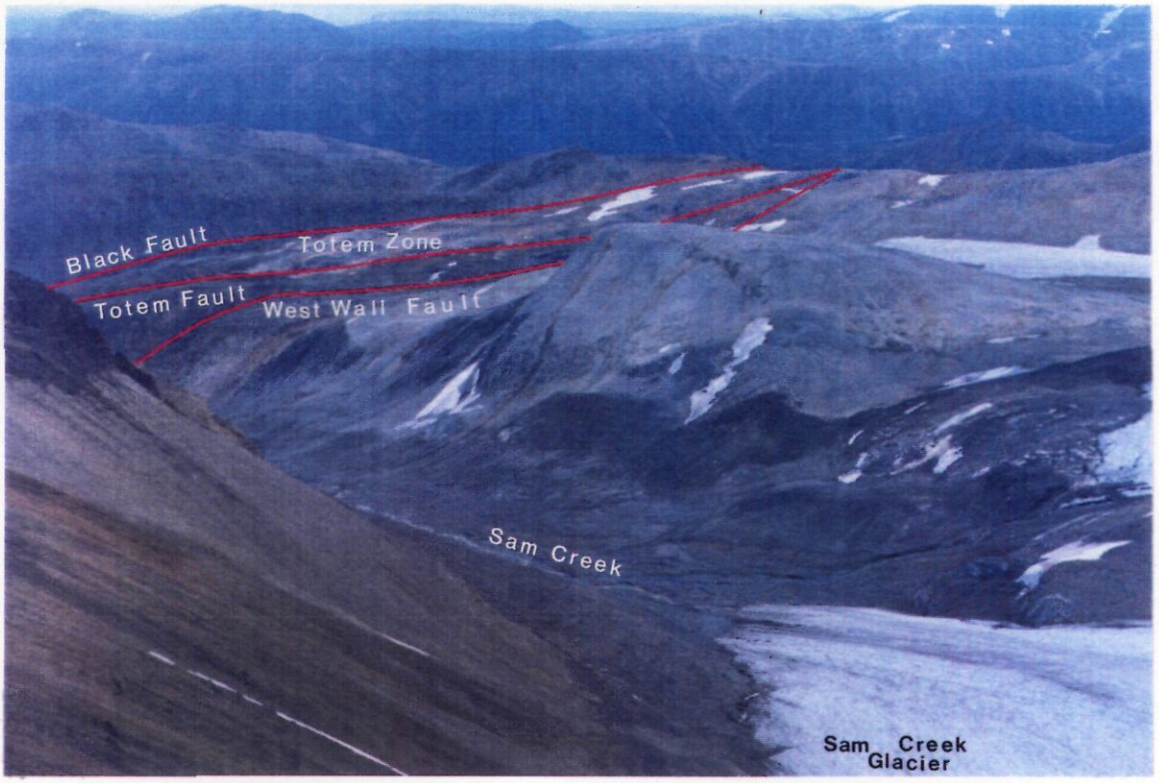


Figure 3.2.4 Photograph of the Sam Creek area between the Sam Creek Glacier and the Totem Zone. View is east-southeast.

Figure 3.2.5 Photograph of the south side of the Sam Creek valley showing the deeply eroded creek where the West Wall Fault strikes across the south side of the valley. View is to the southeast.

3.3 1990 EXPLORATION TARGET AREAS

3.3.1 BEAR NORTH

Introduction

The Bear North area extends from approximately 24025N (near the north end of active stopes) to approximately 24550N (the northern end of existing underground workings; Figs. 3.3.1a,b, 3.3.2 and 3.3.3). Bear North area overlaps onto the northern edge of the presently outlined Bear Main ore body. The highly prospective Troy Ridge area is to the north (section 3.3.7). The Ophir Break strikes north across this zone and has been drifted along the 1400 m level and drill tested from surface and underground. Bear North area was a focus for surface and underground drilling in 1990 in an effort to outline additional tonnages of ore to replace reserves mined during 1990.

Geology

Surface geology of the Bear North area consists of mafic volcanic, carbonate and gabbroic slide material and talus masking outcrops of mafic volcanic rock, carbonatized volcanic rock and gabbro (Fig. 3.3.2). Most of the geological information for this area is derived from 1400 m level geology and drill sections (Figs. 3.3.3 and 3.3.4).

A typical Bear North drill section shows mafic volcanic rock becoming intensely carbonatized and silicified proximal to the Bear Fault (Fig. 3.3.4). The Bear Fault is comprised of pyritic sheared tuff and fault gouge. This fault brings mafic volcanics, in the hanging wall, in contact with a lens of silicified, locally brecciated and sulphide enriched dolomite and chert, in the footwall. A second fault zone, the Internal Sliver Fault, crosscuts the carbonate lens and consists of sheared, pyritic tuff, gouge and brecciated sulphide-enriched carbonate and silicic breccia. The footwall of the carbonate lens is marked by a third fault zone, the Footwall Fault, which consists of sheared, often pyritic tuff, fault gouge, and sometimes argillaceous sediments. The Footwall Fault is a contact between the carbonate lens, in the hanging wall, and variably sheared mafic volcanics, in the footwall, that are typically carbonatized, and may contain lenses of argillaceous sediments. Farther to the west, Foster's Fault zone consists of sheared, usually hematitic and sometimes carbonatized mafic volcanics, epiclastic sediments, and argillaceous sediments.

Relative reverse movement on the Internal Sliver Fault has resulted in a thickening or "doubling-up" of the

Figure 3.3.1a Photograph of the Bear North area showing the 1990 surface drill pad locations and the open pit. View is to the west.

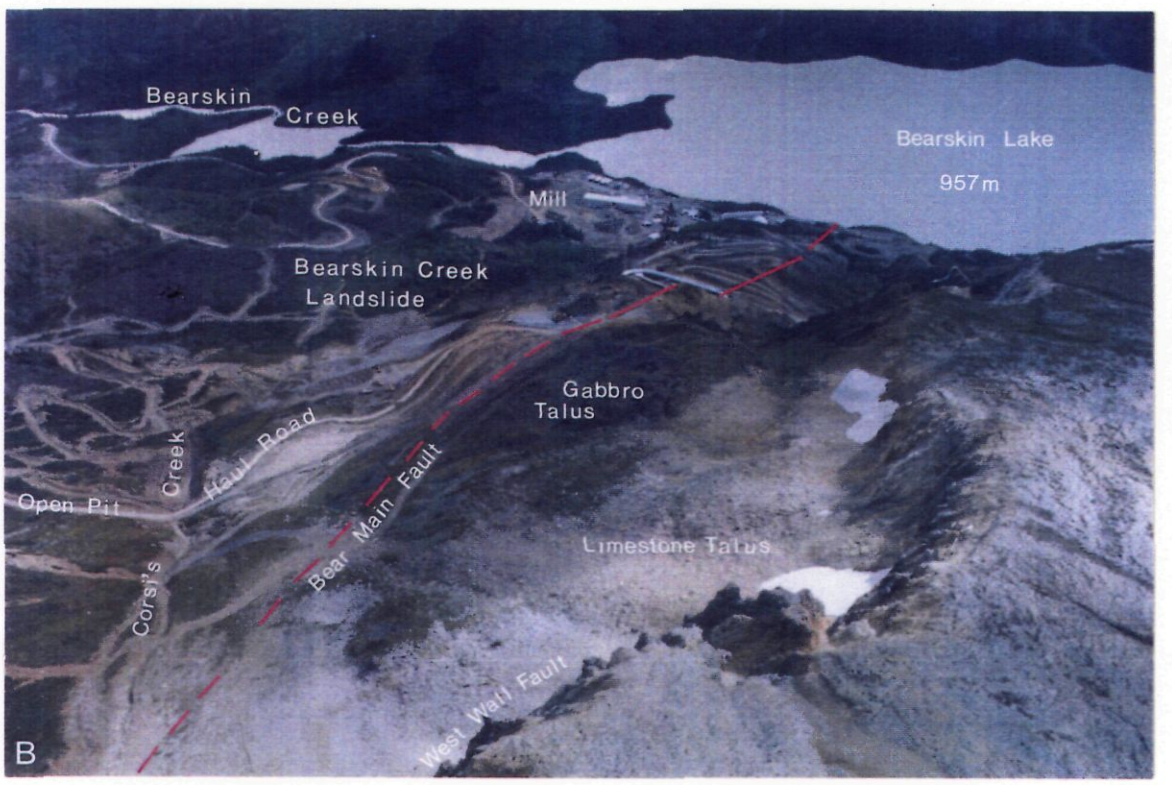


Figure 3.3.1b Photograph of the Bear North area showing the gabbro and limestone talus and slide material masking outcrops within this area. View is to the south.

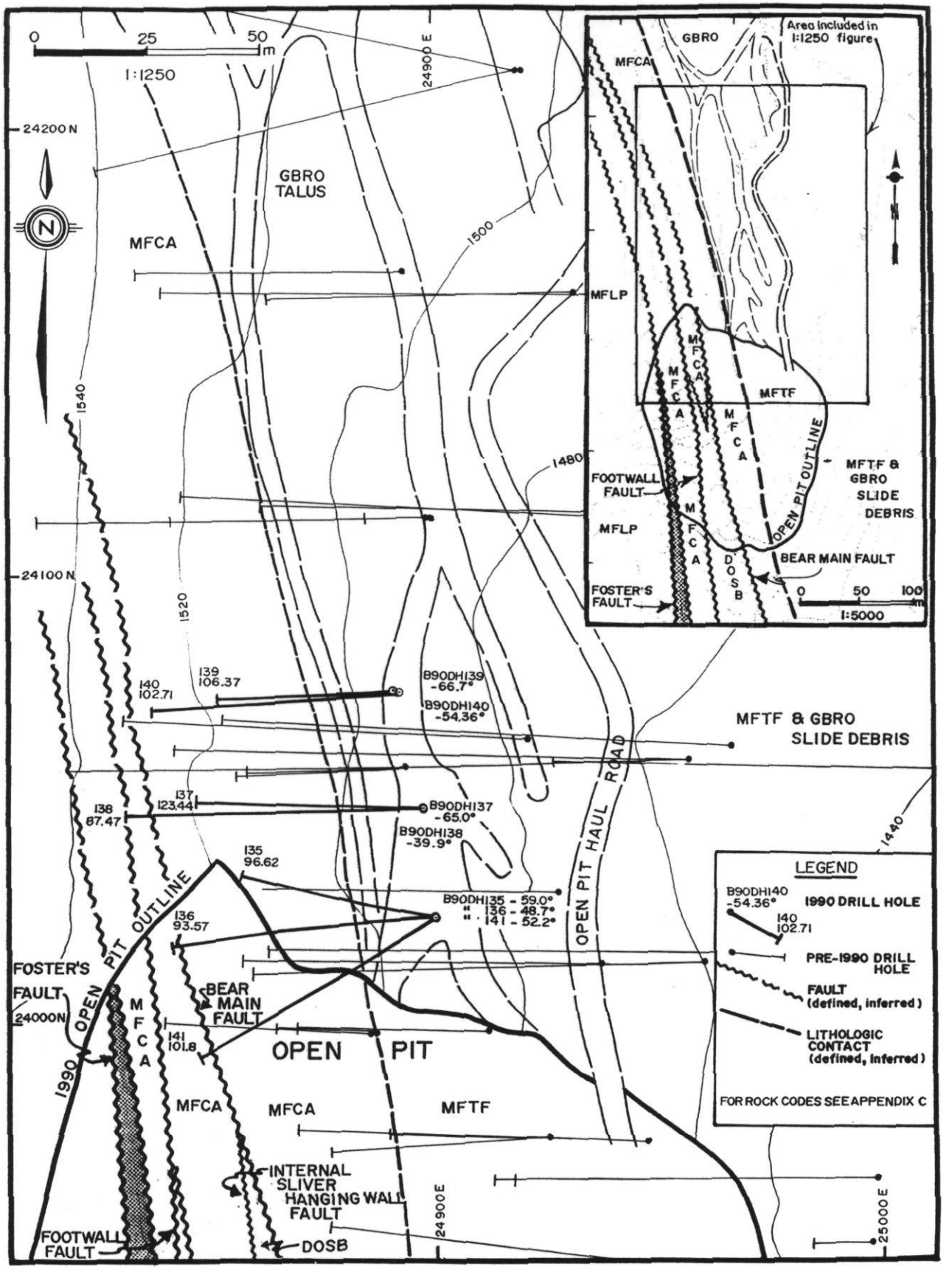


Figure 3.3.2 Bear North surface plan showing 1990 drilling and local geology based mostly on open pit information.

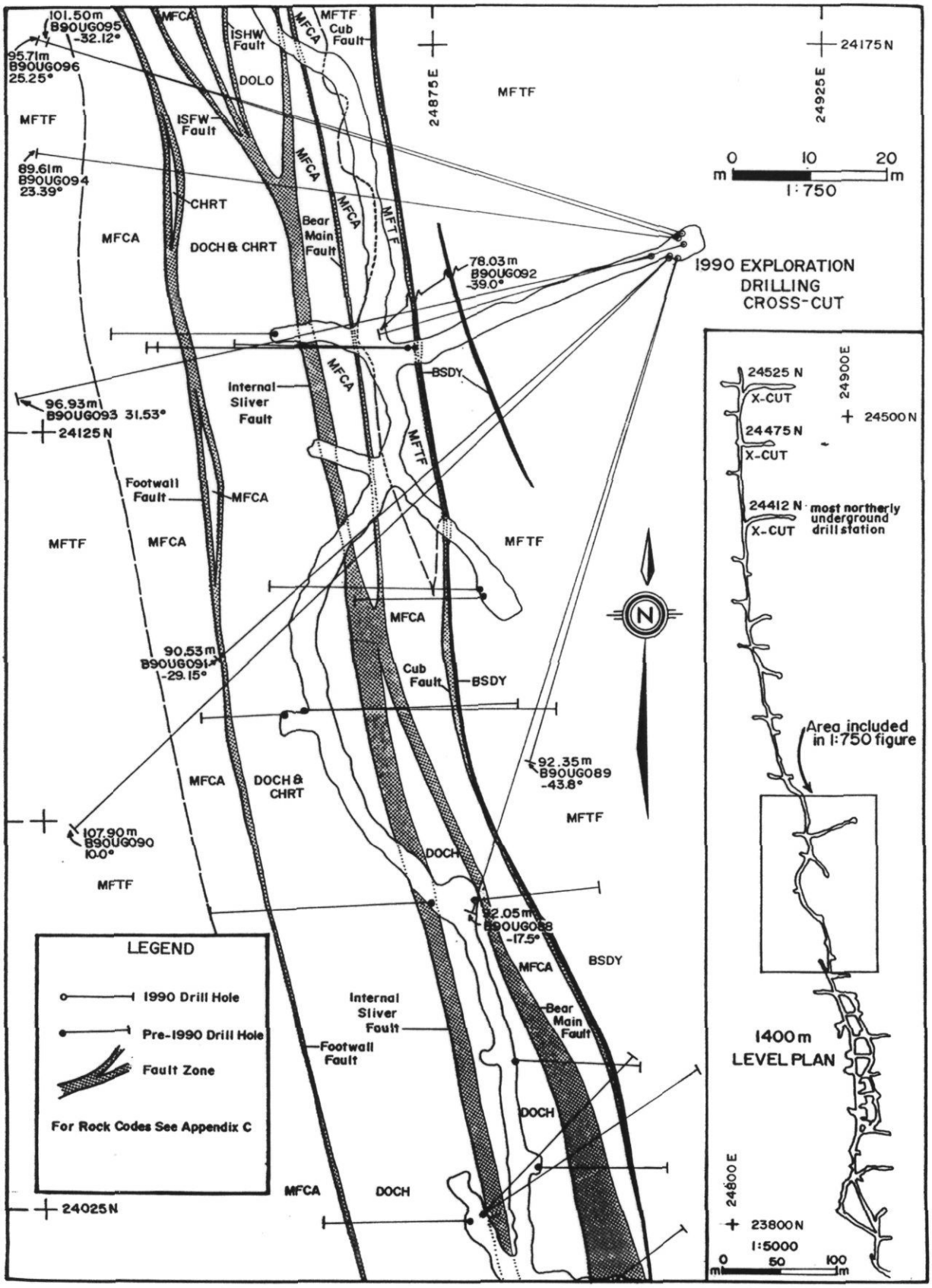


Figure 3.3.3 Bear North underground 1400 m level plan showing 1990 drilling and local geology.

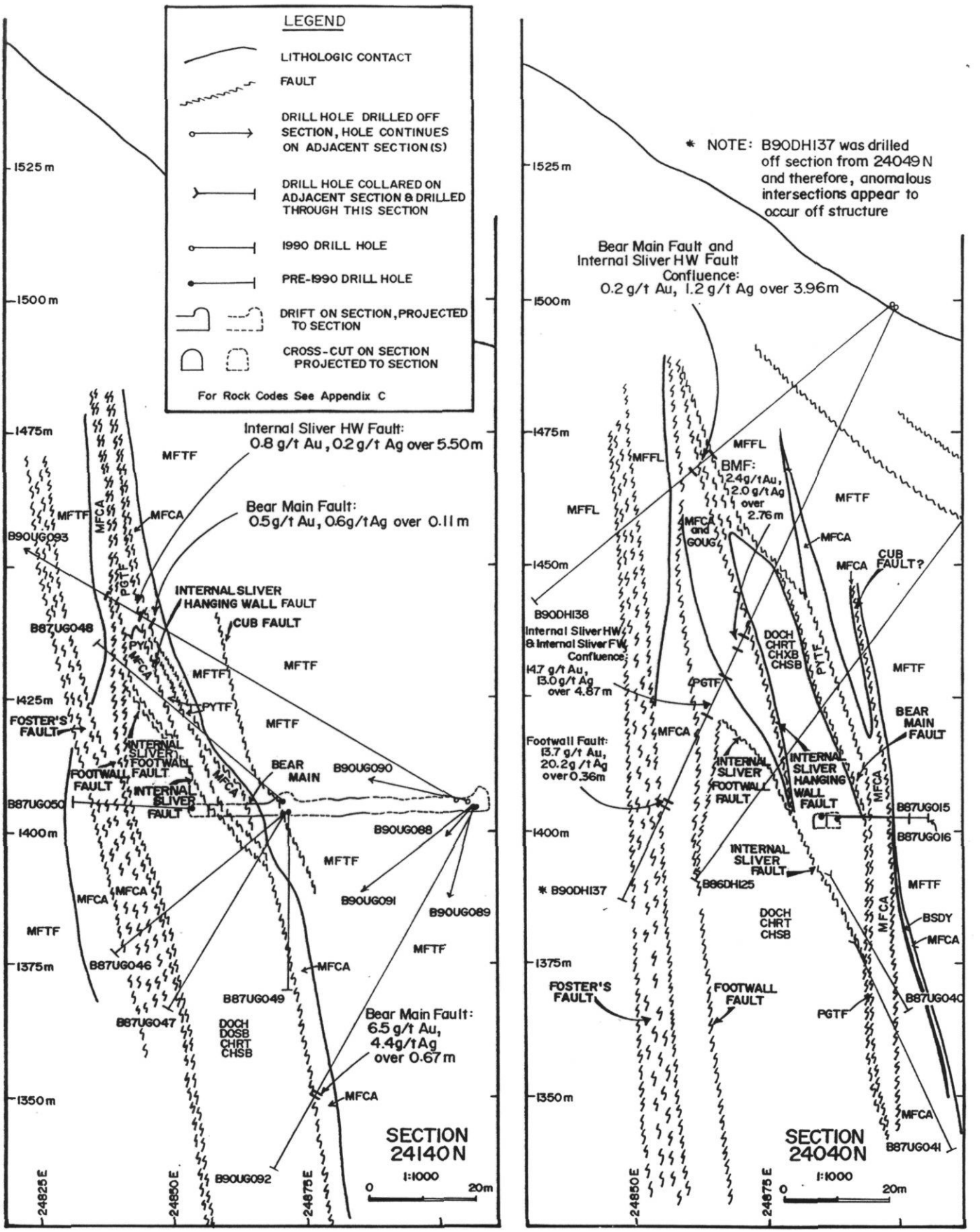


Figure 3.3.4 Bear North generalized cross-sections based on drilling and underground geologic data.

carbonate lens. The Internal Sliver Fault bifurcates through this thickened zone forming two splays One splay follows the west side of the hanging wall lens of carbonate (the Internal Sliver Hanging Wall Fault) and a second splay follows the east side of the footwall lens of carbonate (the Internal Sliver Footwall Fault; Fig. 3.3.4). As the carbonate lenses pinch out with increasing elevation, the Internal Sliver Hanging Wall and Internal Sliver Footwall Faults merge with the Bear Fault and the Footwall Fault respectively. The points of confluence of the faults, and the zone where the Internal Sliver bifurcates, represent areas of greater mineralized widths and often higher grades due to the increased dilatancy of the ore host structures.

A third slice of carbonate-chert may have been imbricated onto the others up to 1350 m elevation on the east side of the Ophir Break at 24320N but further drill testing is required to determine the significance of this structure.

The morphology of the mineralized zones is surprisingly consistent along the length of the Bear North area and when compared to structures in the Bear Main zone (compare Fig. 3.3.4 with Fig. 2.3.3). On the 1400 m level the Bear Main Fault thins out to a weakly mineralized fault zone north of 24100N where the east (or "hanging wall") carbonate lens pinches out leaving the Bear Fault cutting through carbonatized volcanics to 24185N where the carbonate lens thickens again (Fig. 3.3.3). In this area, grade seems to be transferred to the Internal Sliver Zone which is the easternmost carbonate/sheared volcanics contact between 24100 and 24185N.

Another locally anomalous fault zone (up to 42 g/t Au over 0.60 m in a 1990 test hole at 24125N), the Cub Fault, strikes north and lies 7 m east of the Bear Fault. This zone has been intruded by a basalt dyke over most of its length.

Few drill holes have tested for the carbonate lenses or drilled through all of the mineralized zones below 1305 m elevation in the Bear North area. A vertical hole (B87UG070) intersected the Footwall Fault at 1210 m elevation on section 24420N and returned grades of up to 3.1 g/t Au, 6.2 g/t Ag over 1.52 m. Several other anomalous grades up to 7.5 g/t Au, 9.6 g/t Ag over 0.32 m and 15.1 g/t Au, 55.9 g/t Ag over 0.31 m were returned for a pyritic, dolomite breccia just above the Footwall Fault. Numerous other anomalous grades were returned for samples from within the carbonate lens, above the Footwall Fault.

Test holes have not always proved capable of reproducing the grades achieved by chip sampling and diamond

drilling the mineralized structures, although they have indicated relative positions of structures of interest.

Previous Exploration

The Bear North area has received limited detailed surface exploration work due to the veneer of slide and talus material that covers much of the area. Mapping has identified few outcrops amongst the overburden. A geochemical grid over the area shows the general trend of the Ophir Break with gold values up to 550 ppb Au. A VLF-EM geophysical survey over the same area shows an anomaly over the Bear Main zone but it becomes much weaker in areas of thick overburden.

Drilling in this area from 1983 to 1985 consisted of 29 surface diamond drill holes as CML tracked the Bear Main Fault and parallel structures northwards. Four more surface holes were drilled by NAMC in 1986. Underground development work in 1987 on the 1400 m level extended as far north as 24530N although underground drilling of 33 holes in the Bear North area was only as far north as 24415N. Cross-cuts suitable for drill stations exist at 24475N and 24525N (Fig. 3.3.3).

1990 Activities and Results

Compilation work was completed on the Bear North area prior to the 1990 fieldwork. Re-logging old core, compilation of underground data and section interpretation were keys to delineating favourable structural zones with potential for gold mineralization.

A surface and underground drill program was carried out to further define a mineral inventory tonnage on structures between 24000 to 24180N. Figure 3.3.5 is a composite longitudinal section that shows 1990 drilling intersections on all structures. 1990 drilling was most useful in outlining an addition to the mineral inventory in the Internal Sliver Zone. Specific results of compilation and reserve work on the Internal Sliver zone are discussed in section 3.3.4.

The Bear North area is complex with three major target structures, the Bear Main Fault, the Internal Sliver Fault, and the Footwall Fault which merge and splay with one another. Further complexity is introduced where the Internal Sliver Fault splits into two segments; the Internal Sliver Hanging Wall Fault and the Internal Sliver Footwall Fault, which merge with the other structures.

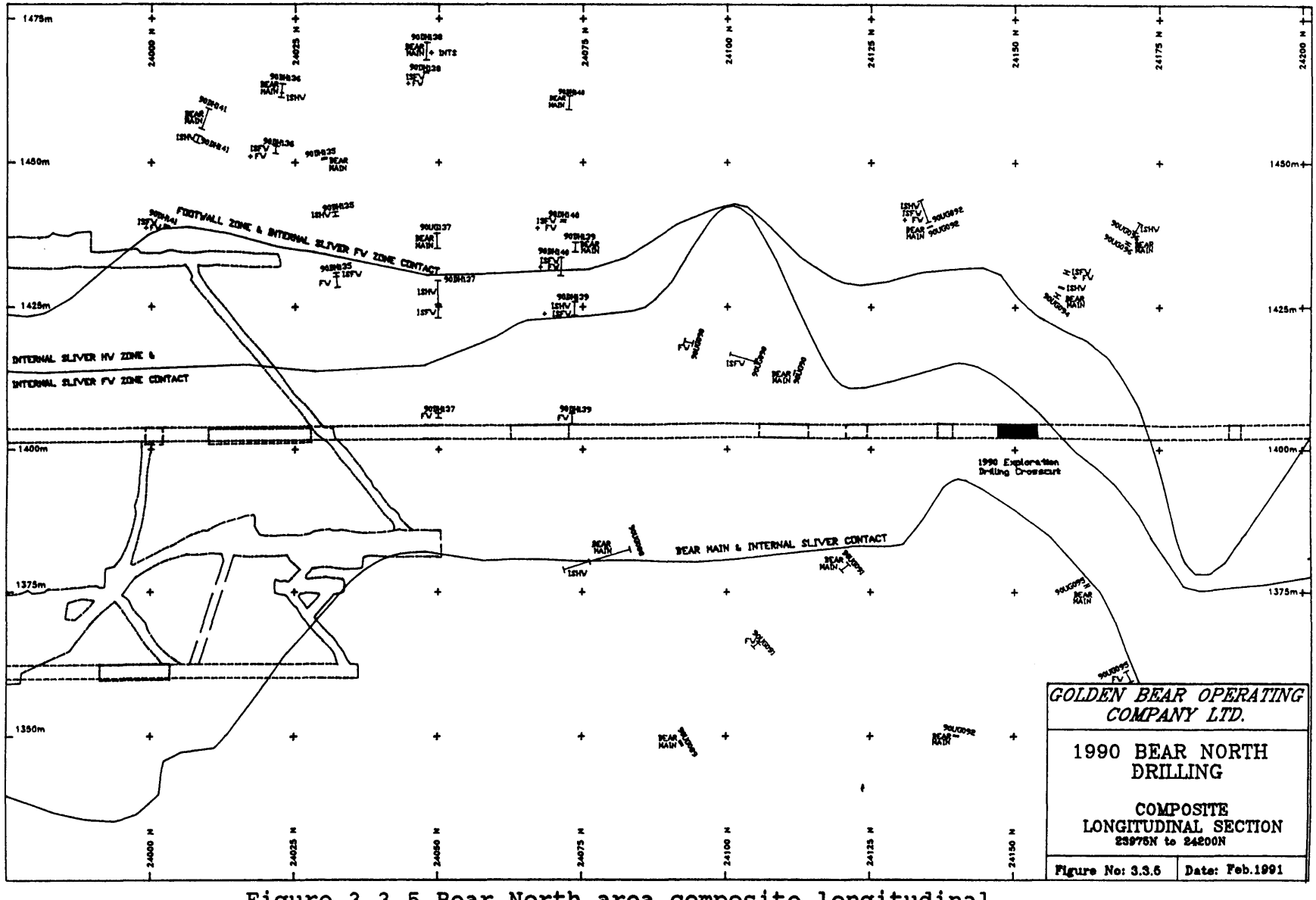


Figure 3.3.5 Bear North area composite longitudinal section showing locations of intersections on all structures by 1990 surface and underground drilling.

The surface drill program consisted of 7 holes drilled from three sites and totalling 711.98 m (Figs. 3.3.1 and 3.3.2). Each of these holes intersected the Bear Main Fault and the Footwall Fault. Some of the holes, dependant on the elevation of intersection, also pierced the Internal Sliver Hanging Wall Fault and/or the Internal Sliver Footwall Fault. Lost core or poor recovery is often associated with the fault zones due to the soft and incompetant nature of the fine grained fault gouge and pyritic tuff that comprises the zones of interest. A summary of the surface drill results is in Table 3.3.1. (All grades specified here and Table 3.3.1 are expressed over true widths unless otherwise noted.)

Drill holes B90DH135, B90DH136 and B90DH141 were drilled from 24025N but were oblique to the section (Figs. 3.3.2 and 3.3.4). All 3 holes encountered slide material to approximately 20 m depth followed by mafic volcanic rocks. As the Bear Main Fault was approached, the level of carbonatization increased and two narrow anomalous zones of sheared, altered volcanics were intersected. The first zone assayed up to 10.8 g/t Au, 10.2 g/t Ag over 0.66 m (B90DH136), the second zone was up to 6.4 g/t Au, 10.0 g/t Ag over 0.21 m (B90DH135).

Each hole intersected the Bear Main Fault and returned good grades over varying widths (Table 3.3.1). B90DH135 and B90DH141 intersected the Bear Fault below the confluence with the Internal Sliver Hanging Wall Fault. Hole B90DH136 intersected the Bear Fault at 1452 m elevation, above the main lense of carbonate at a point where the Bear Fault and the Internal Sliver Hanging Wall Fault merge, resulting in good grade and width of 9.9 g/t Au, 6.7 g/t Ag over 2.38 m.

Holes B90DH135 and B90DH141 intersected a portion of the carbonate lense followed by the Internal Sliver Hanging Wall Fault. The latter fault was followed by sheared carbonatized volcanics and/or gouge in both holes. B90DH136 and B90DH141 intersected the Footwall Fault above the confluence with the Internal Sliver Footwall Fault and had correspondingly poor grades over narrow widths. B90DH135 intersected the Internal Sliver Footwall Fault at the confluence with the Footwall Fault thus giving a composite grade and width of 12.0 g/t Au, 19.7 g/t Ag over 5.38 m.

Carbonatization of the sheared mafic volcanic rocks and epiclastic sediments decreased west of the Footwall Fault. Each hole ended in argillite or argillaceous and tuffaceous sediments.

B90DH135 was drilled at a dip of -59.0^{o} to intersect the Footwall Fault at approximately 1428 m elevation. The east lozenge of carbonate and chert was intersected between 53.75 m and 64.20 m. Three significant structures were

Table 3.3.1 Golden Bear 1990 Bear North surface diamond drill hole summary.

GOLDEN BEAR OPERATING COMPANY LTD.
DIAMOND DRILL HOLE SUMMARY FOR 1990 BEAR NORTH SURFACE DRILLING

CONTRACTOR: F. Boisvenu Drilling RIG: Boyles 56A (surface)

DATE	HOLE #	AREA	LOCATION	ELEVATION (m)	AZIMUTH	DIP	LENGTH (m)	INTERSECTION (m)	WIDTH (m)	GRADE/TRUE WIDTH (gms Au/t, gms Ag/t/m)	REMARKS
July 7	90-135	Bear North	24024.69 N 24900.33 E	1497.58	281.25°	-59.0°	0.00 to 96.62	53.46 to 53.75	0.29	9.3, 12.4 / 0.24	Bear Main Fault - sulphidic chert breccia with 5% pyritic gouge.
								63.94 to 64.80	0.86	3.8, 1.8 / 0.60	Internal Sliver HW Fault - pyritic chert & sheared tuff & 0.35m lost core.
								75.64 to 85.73	10.09	12.0, 19.7 / 5.38	Internal Sliver FW Fault & Footwall Fault confluence - sheared pyritic tuff and gouge.
July 10	90-136	Bear North	24024.71 N 24900.12 E	1497.84	267.58°	-48.7°	0.00 to 93.57	44.80 to 47.85	3.05	9.9, 6.7 / 2.38	Bear Main Fault & Internal Sliver HW Fault confluence - pyritic gouge, pyritic chert breccia & 0.27m lost core (tt).
								58.56 to 60.18	1.62	0.1, 33.3 / 1.34	Footwall Fault & Internal Sliver FW Fault confluence - gouge & 0.9m lost core (tt).
July 12	90-137	Bear North	24048.83 N 24899.03 E	1498.86	272.26°	-65.0°	0.00 to 123.44	67.33 to 70.24	2.91	2.4, 2.0 / 2.76	Bear Main Fault - grey chert with minor pyrite in patches & 0.64m lost core (tt).
								76.40 to 83.47	7.07	14.7, 13.0 / 4.87	Internal Sliver HW Fault & Internal Sliver FW Fault confluence - pyritic chert breccia, carbonatized mafic tuff, pyritic gouge, silicified dolomite & 1.01m lost core (tt).
								101.77 to 102.72	0.95	13.7, 20.2 / 0.36	Footwall Fault - pyritic gouge.
July 16	90-138	Bear North	24048.73 N 24898.07 E	1498.73	268.45°	-39.9°	0.00 to 87.47	43.50 to 48.50	5.00	0.2, 1.2 / 3.95	Bear Main Fault & Internal Sliver HW Fault confluence - limonitic gouge, pyritic tuff, 0.55m lost core and extremely pyritic mafic volcanic rocks.
								51.53 to 51.82	0.29	0.2, tr / 0.19	Internal Sliver FW Fault & Footwall Fault confluence - pyritic gouge.
July 18	90-139	Bear North	24074.67 N 24892.46 E	1500.23	267.80°	-66.7°	0.00 to 106.37	69.73 to 71.56	1.83	1.1, 1.5 / 0.84	Bear Main Fault - pyritic tuff and pyritic brecciated chert.
								72.83 to 73.61	0.78	23.7, 12.2 / 0.36	Chert.
								80.92 to 83.58	2.66	39.8, 41.4 / 1.92	Internal Sliver Fault (HW & FW) - pyritic brecciated chert, pyritic gouge & tuff.
								102.15 to 104.24	2.09	19.1, 16.7 / 0.90	Footwall Fault - pyritic tuff.
July 23	90-140	Bear North	24074.79 N 24892.18 E	1500.75	265.00°	-54.4°	0.00 to 102.71	47.42 to 50.24	2.82	0.4, 0.1 / 1.61	Bear Main Fault - pyritic, brecciated dolomite & 0.25m lost core (tt)
								52.76 to 54.74	1.98	1.0, 0.3 / 1.15	Internal Sliver HW Fault - pyritic fault gouge.
								80.45 to 84.25	3.80	Tr, 0.4 / 2.47	Footwall Fault - pyritic gouge.
July 25	90-141	Bear North	24024.86 N 24900.41 E	1497.67	237.72°	-52.2°	0.00 to 101.80	48.17 to 52.58	4.41	8.7, 0.1 / 4.19	Bear Main Fault - pyritic chert & 0.29m lost core (tt).
								53.08 to 53.68	0.60	6.6, Tr / 0.47	Mineralized brecciated chert associated with the Bear Main Fault Structure.
								54.75 to 55.11	0.36	7.5, 0.5 / 0.31	Internal Sliver HW Fault - brecciated pyritic chert followed by gouge.
								73.42 to 73.83	0.41	0.3, Tr / 0.34	Footwall Fault & Internal Sliver FW Fault confluence - clay gouge.

TOTAL BEAR NORTH SURFACE DRILLING IN 1990 = 711.98 metres

(TOTAL 1990 DRILLING = 2,295.12 metres TOTAL HOLES = 19 holes)

Surface holes drilled in the Bear North area this year = 7

intersected in this hole, the Bear Main Fault, the Internal Sliver Hanging Wall Fault and the Footwall Fault. The Bear Main Fault was a pyritic brecciated chert intersected at 53.46 m and assays 9.3 g/t Au, 12.4 g/t Ag over 0.24 m. The Internal Sliver Hanging Wall Fault was intersected at 63.94 m where it comprises brecciated chert and pyritic fault gouge and assays 3.8 g/t Au, 1.8 g/t Ag over 0.60 m. The Internal Sliver Footwall Fault combined with the Footwall Fault was intersected at 75.64 m and consists of a zone of pyritic gouge that assays 12.0 g/t Au, 19.7 g/t Ag over 5.38 m within a larger gouge zone.

B90DH136 was drilled at a dip of -48.7° to intersect the Footwall Fault at approximately 1452 m elevation. The east lozenge of carbonate and chert was cored from 45.02 m and 47.62 m. Two significant intersections were recovered in this hole. The first intersection is the confluence of the Bear Main Fault and the Internal Sliver Hanging Wall Fault. This zone is pyritic brecciated chert and pyritic gouge and assays 9.9 g/t Au, 6.7 g/t Ag over 2.38 m. The second intersection is the confluence of the Internal Sliver Footwall Fault and the Footwall Fault. This zone consists of gouge and assays 0.1 g/t Au, 33.3 g/t Ag over 1.34 m.

B90DH141 was drilled at a dip of -52.2° to intersect the Footwall Fault at 1443 m elevation. The east carbonate body was encountered between 47.45 m and 55.11 m. Three significant intersections were recovered in this hole. First, the Bear Main Fault comprises brecciated, pyritic chert and assays 8.7 g/t Au, 0.1 g/t Ag over 4.19 m. The second intersection, the Internal Sliver Hanging Wall Fault, consists of brecciated, pyritic chert and fault gouge and assays 7.5 g/t Au, 0.5 g/t Ag over 0.31 m. The third significant intersection represents the confluence between the Internal Sliver Footwall Fault and the Footwall Fault and is a fault gouge assaying 0.3 g/t Au, trace g/t Ag over 0.34 m. Foster's Fault was encountered at 84.43 m to 85.44 m and the hole ended in argillite at 101.80 m.

Drill holes B90DH137 and B90DH138 were drilled on section 24050N. Both holes were triconed through approximately 22 m of slide debris which was followed by mafic volcanics including flows, lapilli tuffs, and epiclastic sediments. In both holes, the intensity of carbonate alteration increases as the Bear Main Fault is approached. Hole B90DH138 pierced the Bear Main Fault at 1470 m elevation, well above the point of confluence with the Internal Sliver Hanging Wall Fault. The intersection consists of a narrow zone of altered volcanics and several lost zones that may represent the fault gouge material anticipated at this point. The Bear Main intersection in hole B90DH137 was not an identifiable fault gouge but the mafic volcanics were in contact with chert and a zone of brecciated and sulphidic chert.

Drill hole B90DH137 pierced the combined width of the Internal Sliver Hanging Wall and Internal Sliver Footwall Faults and returned a good grade and width of 14.7 g/t Au, 13.0 g/t Ag over 4.91 m. The latter zone is followed by a second (western) carbonate lens with the Footwall Fault, grading 13.7 g/t Au, 20.2 g/t Ag over 0.36 m, on the western side.

Hole B90DH138 pierced the Footwall Fault at 1462 m elevation, well above the point where the Internal Sliver Footwall merges with this structure. The combined zones were an unimpressive narrow pyritic tuff zone within carbonatized volcanics that assayed 0.2 g/t Au, trace g/t Ag over 0.19 m. In both holes the Footwall Fault was followed by argillaceous sediments with numerous lost zones ending in relatively unaltered mafic volcanics.

B90DH137 was drilled at a dip of -65.0° to intersect the Internal Sliver Fault Zone at 1438 m elevation. Two lenses of chert and carbonate were encountered, the eastern lens between 67.33 m and 79.36 m and the western lens between 82.80 m and 102.02 m. Three significant intersections were recovered in this hole. The first is the Bear Main Fault which consists of chert that assays 2.4 g/t Au, 2.0 g/t Ag over 2.76 m. The second is the confluence of the Internal Sliver Hanging Wall and Internal Sliver Footwall Faults which comprise brecciated chert, pyritic mafic volcanic rock, pyritic gouge and brecciated dolomite and assays 14.7 g/t Au, 13.0 g/t Ag over 4.91 m. The third significant intersection is the Footwall Fault which comprises pyritic gouge and assays 13.7 g/t Au, 20.2 g/t Ag over 0.36 m. Minor sections of argillite occur towards the end of the hole.

B90DH138 was drilled at a dip of -39.9° to intersect the Footwall Fault at 1454 m elevation. No carbonate-chert lenses were encountered due to the shallow depth penetration of this hole. Two structures were intersected in this hole. The first is the Bear Main Fault, above the confluence with the Internal Sliver Hanging Wall Fault, which comprises altered mafic volcanic rocks and gouge and assays 0.2 g/t Au, 1.2 g/t Ag over 3.95 m. The second is the Footwall Fault, above the confluence with the Internal Sliver Footwall Fault, which consists of pyritic tuff that assays 0.2 g/t Au, trace g/t Ag over 0.19 m.

Drill holes B90DH139 and B90DH140 were drilled from section 24075N. Both holes were drilled through approximately 20 m of slide debris which was followed by mafic volcanic rocks. The Bear Main Fault is preceded by carbonatized volcanics and followed by a narrow chert lens (the east lens). In B90DH139, the chert is followed by the combined Internal Sliver Hanging Wall and Internal Sliver

Footwall Faults which yield good grade and width of 39.8 g/t Au, 41.4 g/t Ag over 1.92 m. B90DH140 also intersects the Internal Sliver Hanging Wall Fault after the eastern chert body but because it is well away from the point of confluence with the Internal Sliver Footwall Fault there was poor grade over a narrow width.

In B90DH139 the second dolomite and chert body (the west lens) was followed by the Footwall Fault which grades 19.1 g/t Au, 16.7 g/t Ag over 0.90 m. Hole B90DH140 did not intersect the second carbonate-chert body at 1435 m elevation. The Internal Sliver Footwall Fault and Footwall Fault have not merged at this elevation so the two faults were intersected as separate structures with no appreciable grades. Both holes ended in locally sheared, carbonatized volcanics.

B90DH139 was drilled at a dip of -66.7° to intersect the Footwall Fault at 1441 m elevation. The two carbonate bodies were encountered between 70.68 to 80.51 m and 83.58 to 102.15 m. Three significant intersections were recovered in this hole. The first is the Bear Main Fault which comprises pyritic tuff and pyritic brecciated chert and assays 1.1 g/t Au, 1.5 g/t Ag over 0.84 m. The second is the Internal Sliver Fault (Footwall and Hanging Wall) which comprises pyritic brecciated chert, pyritic gouge, and pyritic tuff and assays 39.8 g/t Au, 41.4 g/t Ag over 1.92 m. The third significant intersection is the Footwall Fault which comprises pyritic tuff and assays 19.1 g/t Au, 16.7 g/t Ag over 0.90 m. This hole was lost in carbonatized volcanics shortly after the Footwall Fault intersection.

B90DH140 was drilled at a dip angle of -54.4° to intersect the combined Internal Sliver Footwall Fault and Footwall Fault at 1435 m elevation. A narrow slice of chert, that represents the eastern carbonate-chert lens, was intersected from 50.24 to 52.76 m. Three significant intersections were recovered in this hole. The first is the Bear Main Fault which consists of black, crackled, pyritic, silicified dolomite and pyritic fault gouge and assays 0.4 g/t Au, 0.1 g/t Ag over 1.61 m. The second is the Internal Sliver Hanging Wall Fault which consists of pyritic fault gouge containing 30% crackled chert fragments and 10% carbonate altered mafic volcanic fragments and assays 1.0 g/t Au, 0.3 g/t Ag over 1.15 m. The third significant intersection is the combined Internal Sliver Footwall Fault and Footwall Fault that occur as a single structure comprised of a zone of intensely sheared carbonate altered mafic volcanic rock with large zones of fault gouge. This zone assays trace g/t Au, 0.4 g/t Ag over 2.47 m.

The underground drill program consisted of 9 holes totalling 844.61 m. The holes were drilled from a single station at the end of a 40 m cross-cut at 24150N (Fig.

Table 3.3.2 Golden Bear 1990 Bear North underground diamond drill hole summary.

GOLDEN BEAR OPERATING COMPANY LTD.

DIAMOND DRILL HOLE SUMMARY FOR 1990 BEAR NORTH UNDERGROUND DRILLING

CONTRACTOR: F. Boisvenu Drilling RIG: Connors Drill (underground)

DATE	HOLE #	AREA	LOCATION	ELEVATION (m)	AZIMUTH	DIP	LENGTH (m)	INTERSECTION (m)	WIDTH (m)	GRADE/TRUE WIDTH (gms Au/t, gms Ag/t/m)	REMARKS
Aug 30	90-UG-088	Bear North	24146.89 N 24906.89 E	1402.86	198.04°	-17.5°	0.00 to 92.05	70.10 to 71.20	1.10	7.2, 9.1 / 0.74	Cub Zone (occurs in hangingwall of Bear Main Fault) - pyritic tuff in an alteration envelope of carbonatized mafic volcanics & includes 0.49m lost core.
								72.76 to 75.94	3.18	6.7, 37.2 / 2.10	Bear Main Fault (divided into 3 zones of varying gold content) First segment - pyritic gouge & 0.20m lost core (tt) (overall gold grade for 3 zones is 4.4 gms Au/t, 13.4 gms Ag/t/ 6.6m (tt)).
								75.94 to 82.05	6.11	3.0, 1.6 / 4.02	Second segment - pyritic tuff & two lost segments, 0.18m (tt) & 0.12m (tt).
								82.05 to 82.63	0.58	7.2, 7.2 / 0.38	Third segment - pyritic tuff & minor pyritic gouge.
								89.66 to 90.53	0.87	4.6, 11.0 / 0.57	Unknown Zone - brecciated, silicified, pyritic dolomite in footwall of Bear Main Fault.
Sept 2	90-UG-089	Bear North	24147.47 N 24907.11 E	1402.46	196.79°	-43.8°	0.00 to 92.35	73.73 to 74.20	0.47	0.3, 1.8 / 0.25	Cub Zone (in hangingwall of Bear Main/Internal Sliver confluence) - pyritic gouge with fragments of carbonatized volcanics, chert & pyritic tuff & 0.11m lost core (tt).
								78.64 to 79.00	0.36	10.1, 6.7 / 0.19	Bear Main Fault (below confluence with Internal Sliver) - pyritic tuff & pyritic gouge with altered fragments of mafic volcanics, and chert & 0.15m lost core.
								86.60 to 87.52	0.92	1.7, 8.7 / 0.49	Unknown Zone (in footwall of Internal Sliver/Bear Main Fault) - silicified dolomite.
								91.37 to 92.35	0.98	0.5, 17.3 / 0.52	Unknown Zone (in footwall of Internal Sliver/Bear Main Fault) - silicified brecciated dolomite. No sulphides were visible in this zone.
Sept 6	90-UG-090	Bear North	24147.21 N 24905.76 E	1404.06	226.43°	10.0°	0.00 to 107.90	52.51 to 52.64	0.13	0.4, 1.5 / 0.11	Bear Main Fault - narrow zone of fault gouge.
								60.40 to 61.60	1.20	0.2, 7.3 / 1.00	Unknown Zone in footwall of the Bear Fault - intensely carbonatized mafic lapilli tuff.
								62.60 to 66.62	4.02	2.6, 4.2 / 2.62	Internal Sliver Fault (divided into two zones of varying gold content which combined produce a composite assay of 3.6 gms Au/t and 5.5 gms Ag/t / 4.15m (tt)) First portion - (low grade) pyritic tuff, pyritic brecciated dolomite, & chert.
								66.62 to 68.99	2.37	16.1, 21.9 / 1.54	Second portion - (high grade) silicified dolomite & 1.34m lost core (tt).
								78.61 to 80.77	2.16	3.7, 7.1 / 1.94	Footwall Fault - black chert, pyritic brecciated dolomites & 0.6m lost core (tt).
								83.71 to 83.87	0.16	0.2, 1.7 / 0.14	Quartz vein containing up to 5% coarse grained chalcopyrite.
								86.75 to 87.75	1.00	0.1, 7.5 / 0.90	Unknown Zone - carbonatized mafic volcanic rock.
Sept 11	90-UG-091	Bear	24147.63 N	1402.55	228.55°	-29.15°	0.00 to 90.53	46.06 to 48.24	2.18	4.6, 9.5 / 1.96	Bear Main Fault - pyritic gouge & brecciated, pyritic dolomite & 0.14m lost core (tt).
								73.36 to 74.88	1.52	1.3, Tr / 1.26	Footwall Fault - pyritic brecciated dolomite in footwall of the carbonate lozenge.
Sept 14	90-UG-092	Bear North	24149.05 N 24907.61 E	1402.36	253.55°	-59.0°	0.00 to 78.03	61.35 to 62.38	1.03	6.5, 4.4 / 0.67	Bear Main Fault - fault gouge & 0.49m lost core (tt).
Sept 16	90-UG-093	Bear North	24147.51 N 24903.30 E	1404.87	257.54°	31.53°	0.00 to 96.93	66.57 to 66.72	0.15	0.5, 0.6 / 0.11	Bear Main Fault - intensely silicified pyritic tuff with minor fuchsite (green mica).
								68.14 to 75.78	7.64	0.8, 0.2 / 5.50	Internal Sliver HW Fault - pyritic fault gouge with 1.38m lost core (tt) in 4 intervals. Most significant assay in this intersection was 0.9 gms Au/t, Tr gms Ag/t / 0.43m (tt).
								78.74 to 78.86	0.12	0.2, 0.2 / 0.10	Footwall Fault - grey gouge material.
Sept 18	90-UG-094	Bear North	24149.88 N 24906.79 E	1404.65	277.70°	23.39°	0.00 to 89.61	56.88 to 57.78	0.90	3.5, 1.0 / 0.69	Bear Main Fault Splay - highly bleached, fuchsitic mafic volcanic rock with bands of fine grained disseminated pyrite oriented parallel to foliation.
								59.59 to 60.91	1.32	4.2, 3.5 / 1.02	Bear Main Fault - pyritic, carbonatized mafic volcanic rock, pyritic gouge & 0.36m lost core (tt). Intersection includes assay of 12.0 gms Au/t, 11.9 gms Ag/t / 0.19m (tt).
								63.06 to 63.31	0.26	5.5, Tr / 0.20	Unknown Zone - pyritic gouge within bleached tuff with elevated gold grades.
								64.10 to 64.60	0.50	7.8, Tr / 0.39	Internal Sliver HW Fault - pyritic tuff within bleached tuff with elevated gold grades.
								69.00 to 70.24	1.24	4.6, Tr / 0.95	Unknown Zone #3 - highly bleached, fuchsitic mafic volcanic rock.
								71.13 to 72.69	1.56	4.1, 3.9 / 1.45	Footwall Fault (divided into two zones of varying gold content) First portion - pyritic gouge includes a segment which assays 12.0 gms Au/t, 25.5 gms Ag/t / 0.13m (tt).
								72.69 to 77.52	4.83	0.1, 0.6 / 4.49	Footwall Fault Second portion - fault gouge with variable pyrite content & two quartz veins.
Sept 20	90-UG-095	Bear North	24150.25 N 24907.24 E	1402.60	287.17°	-32.12°	0.00 to 101.50	48.85 to 49.47	0.62	2.3, 2.7 / 0.46	Bear Main Fault - pyritic tuff & brecciated, silicified dolomite.
								51.79 to 52.12	0.33	2.0, 10.9 / 0.24	Unknown Zone #1 - pyritic, brecciated, silicified dolomite.
								78.02 to 82.40	4.38	1.9, 3.9 / 3.25	Footwall Fault - pyritic, silicified, brecciated dolomite & 2.15m lost core.
Sept 23	90-UG-096	Bear North	24149.96 N 24906.82 E	1404.60	287.42°	25.25°	0.00 to 95.71	72.10 to 73.00	0.90	7.8, 6.4 / 0.61	Bear Main Fault - intensely sheared, carbonatized mafic volcanic rock.
								77.07 to 80.46	3.39	1.1, 1.8 / 2.41	Internal Sliver HW Fault - gouge & 2.60m lost core.

TOTAL BEAR NORTH UNDERGROUND DRILLING IN 1990 = 844.61 metres
(TOTAL 1990 DRILLING = 2,295.12 metres TOTAL HOLES = 19 holes)

Underground holes drilled in the Bear North area this year = 9

3.3.3). All holes were drilled towards the west at an azimuth of between 196° and 288° thus the structures were intersected on sections 24060N through 24180N. Each of these holes intersected the Bear Main Fault and some holes, dependant on their elevation of intersection and up/down dip angle, also pierced the Internal Sliver Hanging Wall Fault, Internal Sliver Footwall Fault and/or Footwall Fault. A summary of the underground drill results is in Table 3.3.2.

B90UG088 was drilled at a shallow dip angle (-17.5°) and was intended to intersect the Bear Main Fault below its confluence with the Internal Sliver Fault at 1379 m elevation at a northing of 24075N. Mafic lapilli tuff and ash tuff with variable carbonate altered zones was cored to 70.10 m. A narrow zone of pyritic tuff followed by a lost zone in carbonatized volcanics corresponds to the Cub Zone and assays 7.2 g/t Au, 9.2 g/t Ag over 0.74 m. A basalt dyke was intersected from 71.34 m to 72.20 m and was followed by carbonatized mafic volcanics to 72.76 m at which point drilling was reduced to BQ core due to poor ground conditions. The Bear Main Zone was intersected between 72.76 m and 82.63 m and comprises a wide zone of pyritic gouge and pyritic tuff with many zones of lost core. This large intersection represents the combined widths of the Bear Main Fault and the Internal Sliver Hanging Wall Fault and comprises two zones of relatively high grade (7.2 g/t Au, 9.1 g/t Ag over 0.74 m and 6.7 g/t Au, 37.2 g/t Ag over 2.10m) corresponding to the two structures separated by a zone of lower grade. Overall grade of the intersection was 4.4 g/t Au, 13.4 g/t Ag over 6.60 m. Silicified and crackle brecciated dolomite followed this intersection to the end of the hole at 92.05 m.

B90UG089 was drilled at a moderate dip angle (-43.8°) to intersect the Bear Main Fault at 1346 m elevation on section 24100N. Mafic flow rocks as well as ash and lapilli tuffs were intersected from the collar of the hole to 29.43 m. A basalt dyke was intersected from 29.43 m to 29.59 m and was followed by mafic volcanics to 45.11 m. A second basalt dyke was intersected from 45.11 m to 45.45 m and was followed by mafic flow and pyroclastic rocks to 69.59 m with 3.24 m lost in nine zones. Carbonatized mafic volcanic rock was intersected from 69.59 m to 74.07 m with 0.63 m lost in two zones. A zone of light grey gouge with fragments of altered, pyritic volcanic rock was intersected from 73.73 m to 74.20 m. This zone corresponds to the Cub Fault and assays 0.3 g/t Au, 1.8 g/t Ag over 0.25 m. This zone was followed by carbonatized mafic volcanic rock to 78.64 m. The Bear Main Fault was intersected between 78.64 m to 79.00 m and consists of sheared pyritic tuff and pyritic gouge with fragments of altered volcanic rock and dolomite that assays 10.1 g/t Au, 6.7 g/t Ag over 0.19 m. Locally anomalous crackle brecciated dolomite and chert was intersected from 79.00 to the end of the hole at 92.35 m.

B90UG090 was drilled at a shallow angle (+10°) to intersect the Internal Sliver Footwall Fault at 1420 m elevation on section 24100N. Mafic flow rocks as well as ash and lapilli tuff were intersected from the hole collar to 44.05 m. A basalt dyke was intersected from 44.05 m to 44.15 m and was followed by weak to moderately carbonatized mafic volcanics to 46.92 m. This altered zone may correspond to a weak expression of the Cub Fault zone. Relatively fresh mafic volcanic rock was intersected from 46.92 m to 52.51 m. The Bear Main Fault was intersected from 52.51 m to 52.64 m and consists of limonitic fault gouge which assays 0.4 g/t Au, 1.5 g/t Ag over 0.11 m. At this northing and elevation the east lens of carbonate-chert has pinched out leaving the Bear Main Fault within altered volcanics but it has not merged with the Internal Sliver Hanging Wall Fault. Relatively fresh mafic volcanic rock was intersected from 52.64 m to 55.50 m and became carbonatized from 55.50 m to 62.60 m. The Internal Sliver Fault was intersected from 62.60 m to 68.99 m and consists of pyritic tuff, silicified brecciated pyritic dolomite, and chert that includes a low grade portion which assays 2.6 g/t Au, 4.2 g/t Ag over 2.62 m and a high grade portion which assays 16.1 g/t Au, 21.9 g/t Ag over 1.54 m. The overall intersection assays 3.6 g/t Au, 5.5 g/t Ag over 4.15 m. Interbedded dolomite and chert of the west carbonate-chert lens was intersected from 68.99 m to 79.11 m. The Footwall Fault was intersected from 78.61 m to 80.77 m and consists of black chert, brecciated pyritic dolomite and 0.60 m lost core. This zone assays 3.7 g/t Au, 7.1 g/t Ag over 1.94 m. Carbonatized, sheared, folded, clastic-rich volcanic rock follows the Footwall Fault from 80.77 m to 93.04 m where it has an increasing argillaceous component to the end of the hole at 107.90 m.

B90UG091 was drilled at a moderate dip angle (-29.2°) to intersect the Internal Sliver Footwall Fault at 1379 m elevation on section 24120N. Mafic flow rocks as well as ash and lapilli tuff were intersected from the hole collar to 45.07 m. This was followed by carbonate altered mafic volcanics from 45.07 m to 46.06 m. The Bear Main Fault was intersected from 46.06 m to 48.24 m and consists of pyritic gouge as well as brecciated silicified dolomite with local patches of pyrite which assays 4.6 g/t Au, 9.5 g/t Ag over 1.96 m. Silicified, brecciated dolomite and chert of the east carbonate-chert lens follows from 48.24 m to 73.36 m. The Footwall Fault was intersected from 73.36 m to 74.88 m and consists of brecciated, silicified, pyritic dolomite which assays 1.3 g/t Au, trace g/t Ag over 1.26 m. A 1.39 m lost core interval follows the Footwall Fault from 74.88 m to 76.37 m. Fuchsitic, bleached mafic volcanic rock with local gouge zones was intersected from 76.37 m to the end of the hole at 90.53 m. The Internal Sliver Footwall Fault was not intersected as planned because at the target elevation

it has already merged into the Bear Main Fault.

B90UG092 was drilled at a steep dip angle (-59.0°) to intersect the Bear Main Fault at 1352 m elevation on section 24140N. Mafic flow rocks as well as ash and lapilli tuff were intersected from the hole collar to 56.99 m with eight intervals of lost core which totalled 2.88 m. Limonitic gouge was intersected from 60.17 m to 60.40 m and was followed by pyritic, carbonate altered mafic volcanic rock to 61.35 m. The Bear Main Fault was intersected from 61.35 m to 62.38 m and comprised limonitic gouge and dark grey pyritic gouge and included a 0.49 m interval of lost core. The Bear Fault intersection assays 6.5 g/t Au, 4.4 g/t Ag over 0.67 m (including the lost portion). Dolomite and chert with zones of brecciation, variable silicification and pyritization follow to the end of the hole at 78.03 m. Intervals of lost core total 5.42 m within this carbonate body.

B90UG093 was drilled at a moderate angle (+31.5°) to intersect the Footwall Fault at 1448 m on section 24140N. Mafic flow rocks as well as ash tuff and lapilli tuff were intersected from the hole collar to 62.62 m. Carbonate altered mafic volcanic rock was intersected from 62.62 m to 66.57 m. The Bear Main Fault was intersected from 66.57 m to 66.72 m and comprises silicified and brecciated pyritic tuff which assays 0.5 g/t Au, 0.6 g/t Ag over 0.11 m true width. At this northing and elevation, the eastern carbonate body has pinched out leaving the Bear Fault cutting through altered volcanic rock but the Bear Fault has not merged with the Internal Sliver Hanging Wall Fault. Pyritic, carbonate altered mafic volcanic rock follows the Bear Main Fault intersection from 66.72 m to 68.14 m. The Internal Sliver Hanging Wall Fault was intersected from 68.14 m to 75.78 m. This structure comprises pyritic gouge with 1.91 m lost core in four intervals. The intersection assays 0.8 m g/t Au, 0.2 g/t Ag over 5.50 m. A segment of carbonate altered mafic volcanic rock follows from 75.78 m to 78.74 m, after which the Footwall Fault was intersected from 78.74 m to 78.86 m and assays 0.2 g/t Au, 0.2 g/t Ag over 0.10 m. The Footwall Fault comprises a very narrow zone of light grey fault gouge amidst several intervals of lost core. Carbonate altered mafic volcanic rocks and intermittent argillite units with variable hematite content and local graphitic shears and gouge zones were encountered from 78.86 m to the end of the hole at 96.93 m.

B90UG094 was drilled at a moderate angle (+23.4°) to intersect the Footwall Fault at 1432 m elevation on section 24160N. Mafic volcanic flow rock as well as lapilli tuff was intersected from the hole collar to 52.39 m at which point the rock became carbonate altered and increasingly pyritic with depth to 59.59 m where the Bear Main Fault was intersected. The Bear Main Fault consists of highly

pyritic, carbonate altered mafic volcanic rock and pyritic gouge from 59.59 m to 60.91 m and includes 0.47 m of lost core. The intersection assays 4.2 g/t Au, 3.5 g/t Ag over 1.02 m. A zone of highly pyritic, sheared, carbonate altered mafic volcanic rock was intersected from 60.91 m to 64.10 m and contains a narrow pyritic gouge zone that assayed 5.5 g/t Au, trace g/t Ag over 0.20 m. The Internal Sliver Hanging Wall Fault occurs between 64.10 m and 64.60 m, consists of pyritic tuff and assays 7.8 g/t Au, trace g/t Ag over 0.39 m. Between 64.60 m and 71.13 m a zone of intensely pyritic, locally anomalous, carbonate altered and fuchsitic mafic volcanic rock was intersected. The Footwall Fault was intersected from 71.13 m to 77.52 m and can be divided into two zones of varying gold content. The first portion comprises pyritic gouge and assays 4.1 g/t Au, 3.9 g/t Ag over 1.45 m. The second portion assays 0.1 g/t Au, 0.6 g/t Ag over 4.49 m and consists of fault gouge and two quartz veins or fragments of quartz veins up to 0.40 m across. The overall intersection assays 1.1 g/t Au, 1.4 g/t Ag over 5.94 m. The Footwall Fault was followed by intervals of graphitic gouge, silicified crackle brecciated mafic volcanics and zones of chloritic gouge to the end of the hole at 89.61 m.

B90UG095 was drilled at a moderate dip angle (-32.2^{o}) to intersect the Footwall Fault at an elevation of 1360 m elevation on section 24180N. Mafic lapilli tuff with local ash tuff intervals was recovered from the hole collar to 41.38 m. Mafic volcanic rocks became carbonate altered from 41.38 m to 48.85 m and disseminations of pyrite occur towards the end of this interval. The Bear Main Fault was encountered from 48.85 m to 49.47 m and comprises pyritic mafic tuff, pyritic gouge, and brecciated silicified dolomite which grades 2.3 g/t Au, 2.7 g/t Ag over 0.46 m. Brecciated, silicified, locally anomalous and pyritic dolomite was encountered from 49.47 m to 59.97 m where it was followed by dark grey siliceous dolomite to 78.02 m. The Footwall Fault structure was intersected between 78.02 m and 82.40 m and comprises pyritic, silicified, brecciated dolomite and pyritic tuff with 2.15 m of lost core from two zones. The Footwall Fault grades 1.9 g/t Au, 3.9 g/t Ag over 3.25 m and is followed by graphitic to hematitic, carbonatized mafic epiclastic rocks, gouge zones of Foster's Fault, and local zones of argillite to the end of the hole at 101.50 m.

B90UG096 was drilled at a moderate angle ($+25.3^{o}$) to intersect the Footwall Fault at 1446 m elevation on section 24180N. Massive, unaltered mafic lapilli tuff was intersected from the hole collar to 52.43 m, after which, increasing amounts of quartz and carbonate veins and carbonate alteration was encountered along with intensified foliation to 72.10 m. The Bear Main Fault was encountered from 72.10 m to 73.00 m comprising a zones of intensely

sheared and carbonate altered mafic volcanic rock which assayed 7.8 g/t Au, 6.4 g/t Ag over 0.61 m. This structure was followed by an interval of highly sheared, carbonatized mafic volcanic rock including many intervals of lost core to 77.07 m where the Internal Sliver Hanging Wall Fault was intersected from 77.07 m to 80.46 m. This structure consists of gouge material, includes 2.60 m of lost core and assayed 1.1 g/t Au, 1.8 g/t Ag over 2.41 m. The Internal Sliver Fault structure was followed by highly sheared carbonatized mafic volcanic rocks which became less altered towards the end of the hole at 95.71 m. The Footwall Fault was not intersected in this hole.

Other drill-related 1990 exploration work included sampling of limonitic carbonatized mafic volcanics along the road cuts leading to the 1990 drill stations. A total of 34 samples were taken of the bright orange to red, slide debris which is similar to material on the east edge of the Open Pit (Fig. 2.3.3). These samples returned assays up to 2.4 g/t Au, 4.3 g/t Ag over 1.0 m and 0.5 g/t Au, 8.3 g/t Ag over 1.0 m.

Sections between 24250N and 24480N have been re-logged and are currently being re-interpreted in order to delineate targets for further exploration drilling.

Conclusions

Results of the 1990 drilling and compilation work indicate that mineralization on the Internal Sliver Fault and Footwall Fault is highly structurally controlled and attains maximum widths in dilatant zones and in structural confluences of major faults. Only specific faults are mineralized and commonly only the footwall or hanging wall portion of a particular fault is mineralized.

Review and interpretation of drilling in the Bear North area has allowed several promising areas, with potential for new mineral reserves, to be outlined between 23950N and 24200N. Areas drilled this year with the highest potential of containing economic reserves lie within the Internal Sliver Fault. This fault bifurcates above the 1400 m level into two segments, a footwall segment and a hanging wall segment. The locus of maximum widths of ore grade occur where the fault splays. Above the splay, significant grade is found most commonly in the footwall part of the fault. Unfortunately, not all of the gouge material is mineralized and as a result mining may be made difficult due to anticipated poor ground conditions and the lack of distinct visual grade cut-offs.

The Internal Sliver Fault and Footwall Fault continue

north of 24200N as strong structures each locally attaining widths up to 5 m.

3.3.2 BEAR MAIN

Introduction

The Bear Main area extends from 23700N to approximately 24050N and is bounded by Bear South (section 3.3.3) and Bear North areas (section 3.3.1). Bear Main area consists of all structures within the Ophir Break and includes the present outline of the Bear Main Zone ore body and all active and planned stopes and open pittable ore (Fig. 2.4.2). A mineral inventory, calculated from first principles, utilizing all available information including the 1990 data, was presented in an in-house joint venture report by B. McDonald (1991).

1990 exploration work in this area was mainly a compilation of previous information, re-logging and re-interpretation of structures, and sampling of structures which were not previously sampled. The Slide Base Zone (section 3.3.5) and Internal Sliver Zone (section 3.3.4) were investigated by underground development as a result of recommendations generated by the 1990 exploration work. A test hole program was also recommended to provide more structural information on the faults within the Ophir Break (McDonald, 1990). This section of the report is intended as a discussion of the compilation in the Bear Main area as of January, 1991.

Geology

The configuration of structures and general geology around the Bear Fault within the Ophir Break have been described in section 2.4 of this report. Geology specific to the Bear Main area is discussed in the following paragraphs.

The Bear Main Zone outcrops on surface between approximately 23700N and 23925N. The upper portion of the Bear Fault Zone has been removed by mass wasting south of 23840N where the Bear Fault forms part of the actual slip plane through part of this southern area. Layers of ore grade material within the slide debris have been displaced from the Bear Main Zone. North of 23925N, the fault zone is covered by up to 35 m of talus and slide debris.

The Bear Main portion of the Bear Fault is a continuous, north-striking (azimuth 350^{o}), steeply east-dipping, high angle reverse fault, gouge, and tectonic breccia zone that is up to 20 m thick and averages 6 m actual thickness. At 1350 m elevation, between 23740N and 23920N, the fault zone becomes vertical and then "rolls" to

the west with depth (the "hanging wall roll") as the main carbonate lens decreases in width from as much as 40 m down to 20 m. The fault follows the carbonate/volcanic rock contact as the carbonate lens begins to dip west and pinches out with depth.

The keel of the carbonate lens pinches out at 1315 m elevation at 23700N and drops below 1275 m elevation at 24020N. Drilling intersections of the Bear Fault have been completed as deep as 1177 m elevation at 24060N in hole B83DH021. The structure is locally anomalous around 1225 m elevation (i.e. 2.4 g/t Au, 11.8 g/t Ag over 0.41 m true width in hole B83DH024 at 23882N) but the fault does not have significant widths. At this depth the Bear Fault is probably in a zone of relative compressive stress and the width of mineralization is limited, although the proximity to a reactive wallrock encourages mineralization to occur.

The shallow east dip of the Bear Fault at the 1433 m level corresponds to a dramatic thickening (up to 7 m) of ore grade material. This represents the zone of maximum dilation, or a pressure shadow, formed during, or prior to, the mineralizing event. When dealing with a combined reverse and right lateral movement during ore formation, such low pressure areas are associated with right hand offsets along the strike of a structure and kinks in the dip plane.

A basalt dyke that intrudes the Bear Main Fault along most of its strike length and dip extent indicates that this fault has been a zone of low compressive stress subsequent to the original mineralizing event.

The continuity and locally anomalous nature of the Bear Fault suggests there is an excellent potential to develop more mineralization especially proximal to a carbonate lozenge and if there is a kink or "roll" in the structure where a low pressure zone could be developed.

North of 23720N the Internal Sliver Fault becomes an identifiable feature as an east dipping fault zone that is subparallel to the Bear Main Fault and merges with the Bear Fault below the hanging wall roll. The Internal Sliver Fault splits the carbonate lens into two slices separated by sulphide-rich carbonate and quartz breccia fragments set in a fault gouge matrix. At 23920N, a relative reverse movement on the Internal Sliver Fault results in the east lens of carbonate riding up on the west lens. The Internal Sliver fault splits at 1410 m elevation, north of 23920N, into two separate definable structures: the Internal Sliver Hanging Wall and Internal Sliver Footwall Faults.

The east lens of carbonate rock, that forms the footwall to the Bear Main zone, pinches out at approximately

1450 to 1475 m elevation through the Bear zone as far south as 23840N. Where the east carbonate lens pinches out in this area, the Internal Sliver Hanging Wall Fault merges with the Bear Main Fault.

The Footwall Fault is the fault on the footwall side of the carbonate lenses and is a continuous structure that is parallel to the Bear Main Fault. The upper portion of the Footwall Fault, where it has merged with the Internal Sliver Footwall Fault, has been considered as part of the Internal Sliver Zone for mineral inventory purposes (McDonald, 1990). A "cymoid footwall" target was been suggested as an exploration target by Lehrman and Caddey (1989) but has not yet been tested. A pressure shadow could exist on the west side of the keel of the carbonate lens hosted in the Footwall Fault strucutre.

Foster's Fault lies 15 m west of the Footwall Fault and is a 5 to 15 m thick fault gouge and shear zone within altered volcanics and argillaceous tuffs. No anomalous grades have been noted in the few intersections of Foster's Fault within the Bear Main area. West of Foster's Fault are mafic volcanics and argillaceous tuffs. In the Bear South area, stratigraphic carbonate was encountered indicating another possible area of reactive wallrock along which mineralization may have been deposited. A similar carbonate package probably also lies west of the Bear Main area.

Heterolithic breccias, containing tectonized volcanic and sedimentary (carbonate-chert) fragments are developed within strain envelopes of major faults (Oliver, 1990).

A broad 10 to 25 m wide zone of alteration envelopes the main fault zones. Alteration zonation is typically unaltered mafic volcanic rock becoming increasingly carbonatized, ankeritic and quartz veined.

Previous Exploration

The history of the property exploration has been described in section 2.3 of this report and is largely based around the testing and definition of the Bear Main ore body.

Other previous exploration work over the Bear Main Zone included trenching, detailed mapping, a geochemical survey and a geophysical survey. In 1982, channel and chip sampling from the Bear Zone trenching yielded an average grade of 9.3 g/t Au (0.27 opt Au). Detailed mapping defined the location of the Bear Fault and the outcropping portion of the carbonate lens. The geochemistry survey indicated excellent anomalies for gold, arsenic, silver, and antimony over the Bear Main Zone and several downslope dispersion anomalies. The VLF-EM geophysical survey was strongest over

the outcropping Bear Fault zone. The geophysical anomaly becomes weaker to the north and south of the main zone due to the increasing thickness of overburden.

Between 1983 and 1985, a total of 31 surface holes were drilled by CML in the Bear Main area. NAMC, in 1986 to 1988 drilled a further 11 surface holes and 47 underground holes to define the Bear Main ore body. Most holes were designed to intersect the Bear Fault although many pierced several of the Fault zones depending on the dip angle and elevation of the intersections.

1990 Activities and Results

1990 exploration work in the Bear Main area consisted of compilation of all underground and surface data onto a standardized set of 1:250 scale level plans, longitudinal sections, and exploration cross-sections at 20 m spacing. Re-logging of the drill holes and re-interpretation of the cross-sections was completed prior to drilling in the Bear North and Bear South areas. Section and plan information continues to be updated as mining and other development work proceeds. Mining in the open pit this year has revealed a profile of the main fault structures that matches the interpreted cross-sections (Fig. 2.3.3).

Oliver (1990) also interpreted some of the cross-sections within the Bear Main area and concluded that the stratigraphic and structural style appears consistent with the regional tectonic framework developed during his Ph.D. studies. Oliver also conducted detailed mapping at 1:250 scale on the open pit benches as part of an alteration study on the Golden Bear deposit.

The objectives of the alteration study include the following (summarized from Oliver, 1990):

1) To build a site specific, predictive model for the geochemical controls on gold distribution in the Golden Bear geological environment.

2) To use any possible zonation of trace element chemistry to examine the potential for a large scale, gold mineralizing system, deeper in the sulphide rich rock mass, bounded by the hanging and footwall plates of the Footwall Fault.

3) Examine the intimacy of structural and geochemical controls on the development of mineralization.

Oliver (1990) also noted that hydrothermal alteration assemblages, indicative of hydrogen ion metasomatism, are

symmetrically developed around the "Footwall Fault" and actually weaken toward the Bear Fault.

As a result of the compilation work, a test hole and chip sampling program was initiated on the 1400 m and 1360 m levels to fill gaps in the assay and structural information. The additional test hole and chip sample assays were utilized in the calculation of the 1990 mineral inventory.

Conclusions

Compilation of the existing data emphasized the structural control involved in the formation of the Bear Main ore zone and the other fault structures. The complex system of faults required a system of longitudinal sections that would allow intersections on each structure to be considered separately.

Re-interpretation of sections through the mine focused attention on zones of ore grade material in structures parallel to the Bear Main Fault. Such structures include: (1) the Internal Sliver Hanging Wall Fault; (2) the Internal Sliver Footwall Fault; (3) the Footwall Fault; and (4) the Slide Base zone, which is in the hanging wall of the Bear Main Zone at the base of the slide material. These zones carry local areas of good grade and often minable widths but they require careful consideration of their continuity and how well they have been tested thus far. The most significant zones on each of these structures occur where they merge with one another or with the Bear Main Fault.

The dip extent of the Bear Main zone has not been fully tested. The continuous nature of the Bear Fault and several anomalous drill intersections support the possibility of significant mineralization being found below the 1360 m level. The carbonate lens pinches out at depth but there are no indications that a similar lens or suitable structure does not exist at depth or that a carbonate/mafic volcanic contact to the west could not provide conditions favourable to host another deposit.

The need to test the on-strike extent of the Bear Fault and parallel structures is being addressed by the proposed 1991 exploration program with drilling planned in the Bear South, Bear North, and Troy Ridge areas.

The alteration study, currently being conducted by Oliver (1990), may help in guiding exploration in the Troy Ridge area where a large, intensely altered zone has little surface evidence of mineralization.

3.3.3 BEAR SOUTH

Introduction

The Bear South area is a south facing slope that extends from the 1360 m level portal to Bearskin lake (Figs. 1.1.1 and 3.3.6). This area has been targeted for detailed geological work and diamond drilling aimed at tracking the structure southwards to potentially mineralized and structurally favourable zones (Lehrman and Caddey, 1989). The Bear South grid was established from 22800N to 23200N early in the 1990 exploration season in preparation for detailed mapping and geophysical surveys. The 1990 diamond drilling initiated an exploration drilling program designed to track the Bear Main structure southwards and test Bear South target areas.

Geology

Geology of the Bear South area consists of four main lithologies, from oldest to youngest they are: (1) carbonates; (2) chert with interbedded argillite; (3) mafic volcanics; and (4) gabbro (Oliver, 1990) (Fig. 3.3.6).

On the northeastern part of the grid the outcrop is obscured by gabbro debris along the west edge of the Bearskin Creek landslide. The area has been further obscured by construction of the Zed Road that connects the camp to the 1360 meter level portal.

Carbonate rocks outcropping on the west edge of the grid and within the core of a northwest trending anticline, form the base of the stratigraphic section in this area (Oliver, 1990). Oliver (1990) has subdivided the carbonates into 3 units as follows:

> The oldest carbonate rocks are thin bedded buff weathering limestones. These are conformably overlain by dark grey limestones and sometimes by a thin, 5.0 meter thick, white to cream dolomite horizon.

Mafic volcanic rocks are the predominant lithology on the grid area. Oliver (1990) describes these flows and tuffs as follows:

> Mafic volcanic flows, sometimes pillowed, and usually weakly vesicular, conformably overlie limestone. This basaltic flow succession grades upward into a thick sequence of plagioclase porphyritic crystal tuffs and flows. Few internal

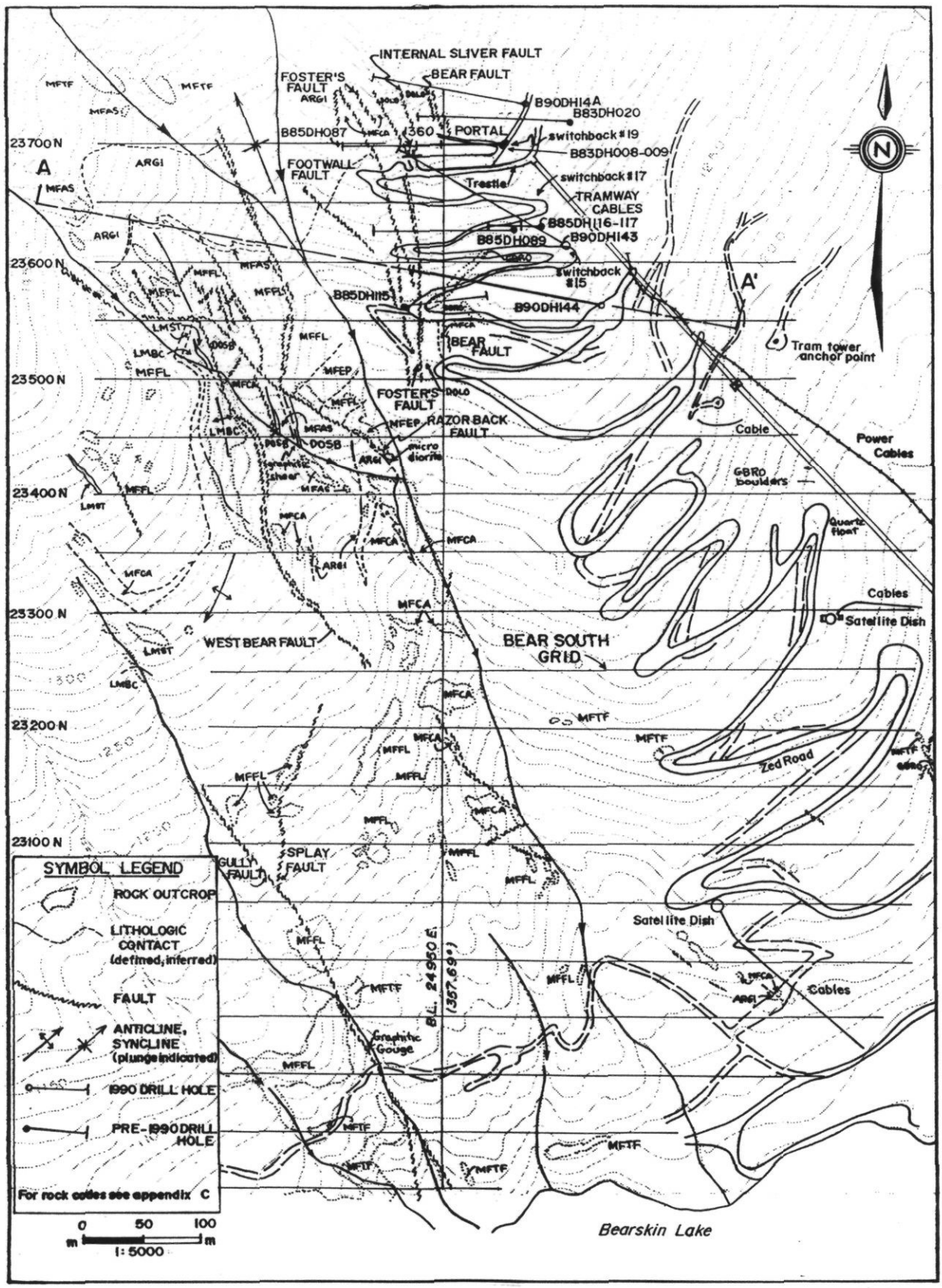


Figure 3.3.6 Summary of Bear South grid detailed mapping and 1990 drill hole locations.

> markers are present in either of these rock units. Stratigraphic and structural relations suggest that over much of the Bear South grid, these units strike 045° and dip modestly, 30 to 50°, southeast.

These mafic volcanic rocks are locally sheared and can be intensely carbonatized where proximal to faults such as the Bear Fault, West Bear Fault, and Foster's Fault. Oliver (1990) states:

> Much of the northwest corner of the Bear South grid area overlies a strong zone of structurally controlled hydrothermal alteration. The zone is cored by iron carbonates (ankerite), green mica development and smaller ledges of silica-carbonate-sulphide alteration. Chlorite-sericite with lesser hematite forms local peripheral alteration selvages to iron carbonate alteration zones.

Other carbonatized zones, such as along Alpha Gully (near 23000N, 25025E), may indicate the most southerly expression of the Bear Main Fault system (Oliver, 1990) or a second, parallel fault that acted as a conduit for mineralized hydrothermal solutions.

The chert and interbedded argillite that outcrop in the northwest corner of the grid conformably overlie the mafic flows. This unit forms part of an antiform 150 m west of the 1360 m portal. The unit becomes embayed in and forms part of a large tectonic melange (Foster's Fault) adjacent to the 1360 m portal (Oliver, 1990).

The geology is most complex in the northwestern part of the grid where doubly plunging antiformal and synformal structures have been identified. The map-scale folds are dominantly chevron style with flat west-dipping limbs and steep east-dipping limbs. Axial planar surfaces are typically steeply (70 to 80°) west-dipping. Fold plunge is to the south at modest angles (15 - 20°) south of line 23450N. North of this location, fold plunges shift to the northwest. These folds were developed during the phase two deformation event (Oliver, 1990).

The curvilinear nature of the antiforms exposed in the extreme northwestern grid area may be due to fault displacement of the northern closure of the fold. It may also be due to rotation of the axial surface of this structure into a northerly alignment with some of the larger strike-slip faults in the area (Oliver, 1990).

Five faults have been mapped in the Bear South grid area. These include the Bear Fault/Foster's.Fault

system,the West Bear Fault, the Razor Back Fault, the Gully Fault and the Splay Fault. The 1990 geophysical survey has also identified the position of these structures.

The Bear Fault/Foster's Fault structure has been traced on the Bear South grid as far south as line 23550N in new roadcuts on the Zed Road. The wedge of dolomite that forms the footwall to the Bear Main Fault also continues this far south although it is only 16 meters thick in outcrop. Previous interpretations indicated a weakening or cessation of the structures and host lithologies south of the 1360 m portal. The recent mapping, geophysics and drilling results extend the trace of the Bear Main structure 120 meters (horizontally) further south and indicate the continued presence, at least on surface, of an important lithologic component (the carbonate) for ore depostion.

South of 23500N landslide debris conceals the trend of the Bear Fault/Foster's Fault system. A colour anomaly, visible on air photographs, coincides with a VLF-EM anomaly over the main structure and suggests a south-southeast trend for these major faults across the southeast portion of the grid.

The West Bear Fault (WBF) is a large north-northwest trending shear located approximately 200 meters west of the Bear Fault. The WBF is continuous over a 100 meter strike length and places hanging wall carbonate altered mafic volcanic rock against footwall limestone.

The northwest-trending Razor Back Fault (RBF) is 50 meters in strike length and merges with the WBF on the western end of line 23550N. Carbonate alteration of mafic volcanic rocks is also associated with this structure.

The WBF and the RBF are both normal faults and are likely conjugate structures to the large reverse faults in the area, i.e. Foster's Fault. Together these faults comprise a sheared and carbonate altered zone up to 50 meters across. Siliceous dolomite breccias are developed in the area bounded by the two structural zones. The style and form of these breccias is similar to those seen in the footwall of the Golden Bear Deposit.

The Bear Fault/Foster's Fault structure, the WBF and RBF define a diamond shaped block of intense, structurally controlled alteration and isolate a downthrown graben (Oliver, 1990)

The northwest trending, 400 m long Gully Fault parallels a creek in the southwest area of the Bear South grid. The north-trending, 160 m long Splay fault splits from the northern end of the Gully Fault at 23055N, 24810E. Both faults cut mafic tuff and mafic volcanic flow rock. No

significant mineralization has been identified along these structures, although graphitic gouge has been noted locally in the Gully Fault. Both structures have a strong geophysical signature.

Previous Exploration

In 1981 and 1982 a soil and silt geochemical survey was conducted over an area that included the Bear South Grid.

Strong gold, arsenic and antimony anomalies were defined over the trend of the known ore bearing structure and as far south as 23350N. The anomaly defined by gold results includes values greater than 10,000 ppb. South of 23350N to Bearskin Lake, gold values are considerably lower (less than or equal to 15 ppb). Silver results were anomalous locally and they form a similar weak trend.

Arsenic and antimony anomalies mimic the gold anomaly pattern. A moderate arsenic anomaly straddles Alpha Gully from 23250N south to the lake shore.

Two bull's eye arsenic highs on the southeastern edge of the Bear South grid (approximately 23145N, 25280E and 23050N, 25410E) are notable as they are the only geochemical anomaly in this area. These anomalies possibly indicate a bend to the southeast in the main structure in this location.

Mapping by Chevron personnel and J. Oliver (1:5000 Ph.D. mapping) noted carbonate rocks, mafic volcanics and argillite units on the west half of the grid. They both indicated a zone of sheared, carbonatized mafic volcanics on strike with the projected trend of the Bear Main Fault.

A VLF-EM geophysical survey conducted by Chevron personnel in 1985 includes the Bear South Grid. Compiled results indicate a series of north-northwest trending linear VLF high and low anomalies. A strong VLF low occurs immediately over the Bear Main Fault structure. The anomaly becomes weaker from 23350N southwards where it becomes discontinuous. Although several southeast trending anomalies continue from 23200N to Bearskin Lake, they cannot be positively attributed to the BMF. Telephone lines that parallel the BMF may have interfered with interpretations of the location of the structure.

A linear north-south trending VLF high of short strike length (less than 100 meters) occurs at approximately 23050N, 25225E. This anomalous trend is coincident with the current position of the satellite dish. Ankeritic mafic volcanic rock noted by Chevron personnel and J. Oliver outcrops in the area.

Previous drilling in the Bear South area includes seven drill holes on three lines.

B83DH008, B83DH009 and B85DH087 were drilled to test the Bear structure on line 23700N. In each hole, three limonitic gouge zones were intersected within slide material. These slide gouge zones carry anomalous precious metal values up to: 15.8 g/t Au, 4.8 g/t Ag over 2.01 m for the uppermost zone (B83DH009); 12.8 g/t Au, 15.7g/t Ag over 0.9 m for the second zone (B83DH009); and 8.5 g/t Au, 4.8 g/t Ag over 0.87 m for the third zone (B83DH008).

B83DH008 confirmed the presence of the carbonate lozenge at 1309 m elevation. A limonitic, silicified pyritic tuff (Bear Main structure) is followed by a very narrow carbonate intersection of silicified dolomite breccia and dolomite stockwork. Anomalous grade (2.2 g/t Au, 15.5 g/t Ag over 0.61 m) was reported over the lower contact of the dolomite with a basaltic dyke. Anomalous grade (3.4 g/t Au, 30.2 g/t Ag over 2.75 meters) was also reported across the lower, faulted contact of the dyke with underlying carbonatized mafic volcanic rock.

B83DH009 intersected the same structures including the basalt dyke at 1220 meter elevation although, at this level, no carbonate was intersected.

B85DH087 intersected the Bear Fault zone at 1312 m elevation and is identical to the zone in B83DH008, including the very narrow intersection of carbonate in contact with basaltic dyke rock followed by altered tuff. Anomalous results (2.5 g/t Au, 0.5 g/t Ag over 0.30 m) were reported for the hanging wall fault contact of the tuff with the dolomite (Bear Main structure) and for the contact between the altered tuff and the basaltic dyke (2.3 g/t Au, 11.5 g/t Ag over 0.87 m).

B85DH089 was drilled to test for the existence of the Bear Main structure on section 23620N. B85DH116 and B85DH117 were short holes that were drilled on section 23620N to test for the shallow mineralized zones in the slide material. B85DH116 was abandoned at 30.78 meters. No anomalous assays were returned.

B85DH089 and B85DH117 intersected the three fault gouge zones in the slide material. Assay results across these zones were generally poor, although assays of up to 6.7 g/t Au, 0.5 g/t Ag over 0.92 m and 2.9 g/t Au, 0.5 g/t Ag over 1.37 m were received for gouge material in the uppermost zone (B85DH117) and 11.2 g/t Au, 2.3 g/t Ag over 1.52 m followed by 4.7 g/t Au, 0.5 g/t Ag over 1.53 m were received for the second gouge zone (B85DH089).

In B85DH089 altered tuffs in the hanging wall to the Bear Main zone were represented by a 7 cm piece of core recovered in a 1.22 m run. Similarly, a very narrow intersection across the Bear Main zone at 1265 m elevation consists of a 4 cm piece of silicified dolomite recovered in a zone of 15% recovery that is surrounded by basalt. The width of the Bear Main structure and the footwall dolomite is difficult to estimate in this drill hole as core recovery was very poor (5% to 20%) across this zone. Slightly elevated precious metal grades (0.3 g/t Au, 2.5 g/t Ag over 0.20 m) were reported for silicified dolomite adjacent to the Bear Main structure.

B85DH115, the southernmost drill hole, was drilled eastwards on line 23580N to test for the presence of the carbonate lozenge at the 1250 m elevation. No carbonate was intersected but assay results for two samples are notable; 5.0 g/t Au, 13.5 g/t Ag over 0.91 m for carbonate altered mafic volcanic rock in the footwall of the Bear structure, and 6.6 g/t Au, 33.0 g/t Ag over 0.30 m within the Bear Main structure. The latter sample occurs at the base of a 4.5 m zone of lost core.

1990 Activities and Results

A 900 m by 700 m (50 m line spacing, 25 m station spacing) slope corrected grid was established over the Bear South area early in the exploration season to facilitate work by geological and geophysical contractors. Diamond drilling followed the interpretation of all compiled and newly acquired data.

J. Oliver completed a 1:1000 scale geology, alteration and structure map of the Bear South grid (results of which have been summarized in the geology section).

A total of 225 chip and channel samples were collected in the Bear South area. Chip samples were taken of the southern extension of the Ophir Break in road cuts up to 180 m south of the 1360 m portal. Prominent structures and areas of intense alteration identified during mapping and prospecting on the Bear South grid were also sampled.

Roadcut samples across the Bear Main Fault taken on switchback number 16 yielded assay values of up to 17.1 g/t Au, 24.7 g/t Ag over 0.40 m for a sample of fault gouge (Fig. 3.3.6).

Foster's Fault gouge sampled on the outside curve of switchback number 14 yielded silver values up to 9.8 g/t Ag over 1.0 m and gold values up to 0.4 g/t Au over the same interval. Anomalous values were also obtained on the inside curve of the same switchback, this time in the Internal

Sliver dolomite and chert. Carbonate assayed up to 0.86 g/t Au, 7.68 g/t Ag over 1.0 m intervals.

Limonitic slide material on switchback number 17 yielded an assay result of 5.6 g/t Au over 1.0 m. In this area silver values tended to be lower, with a high of 2.3 g/t Ag over 1.0 m reported. Gouge landslide material sampled on switchback number 19 produced the highest gold value of 18.1 g/t Au and a high silver value of 9.87 g/t Ag over 0.20 m.

A high gold assay from the Bear South grid was received for a sample from the WBF that assayed 1.4 g/t Au, 0.2 g/t Ag over 0.30 m. The sample is of a black graphitic shear that separates silicified, brecciated dolomite from carbonate altered volcanic rocks.

Anomalous assay results were also received for a number of chip samples taken in ankeritic mafic volcanic rock outcropping just south of the satellite dish in the southeast area of the grid (approximately 23000N, 25175E). Silver assays tend to be higher than the gold assays in this area. Silver values of up to 5.8 g/t Ag over 0.80 m were received, while gold values peaked at 0.2 g/t Au over 0.90 m. The anomalous results are coincident with the colour anomaly and with the VLF-EM anomaly that may indicate the southern extension of the Ophir Break structure.

A single grab sample of float from a graphitic shear cutting carbonatized mafic volcanic rock was collected in Alpha Gully (approximately 23250N, 24975E). This sample yielded 0.4 g/t Au and 4.0 g/t Ag assay results.

The few anomalous gold and high silver values are encouraging due to the association with structures with potential for hosting more significant mineralization. High silver grades have been observed to indicate extensions to significant ore bearing structures within the Bear Main deposit.

Geophysical surveys were conducted on the Bear South grid by Delta Geoscience Limited from June 11 to June 21, 1990. Complete details of the survey procedure and equipment is in the Delta Geoscience report in Appendix B.

VLF-EM, Horizontal Co-planar Loop E.M. (H.L.E.M.), VLF-Resistivity, and Total Field Magnetics surveys were conducted in order to define the exploration target: gold mineralization hosted within hydrothermally altered shear zones. VLF-EM results show the most distinct anomalies and can be correlated to existing features. The H.L.E.M. survey identified similar linear features (anomalies for these two methods are summarized in Fig. 3.3.7).

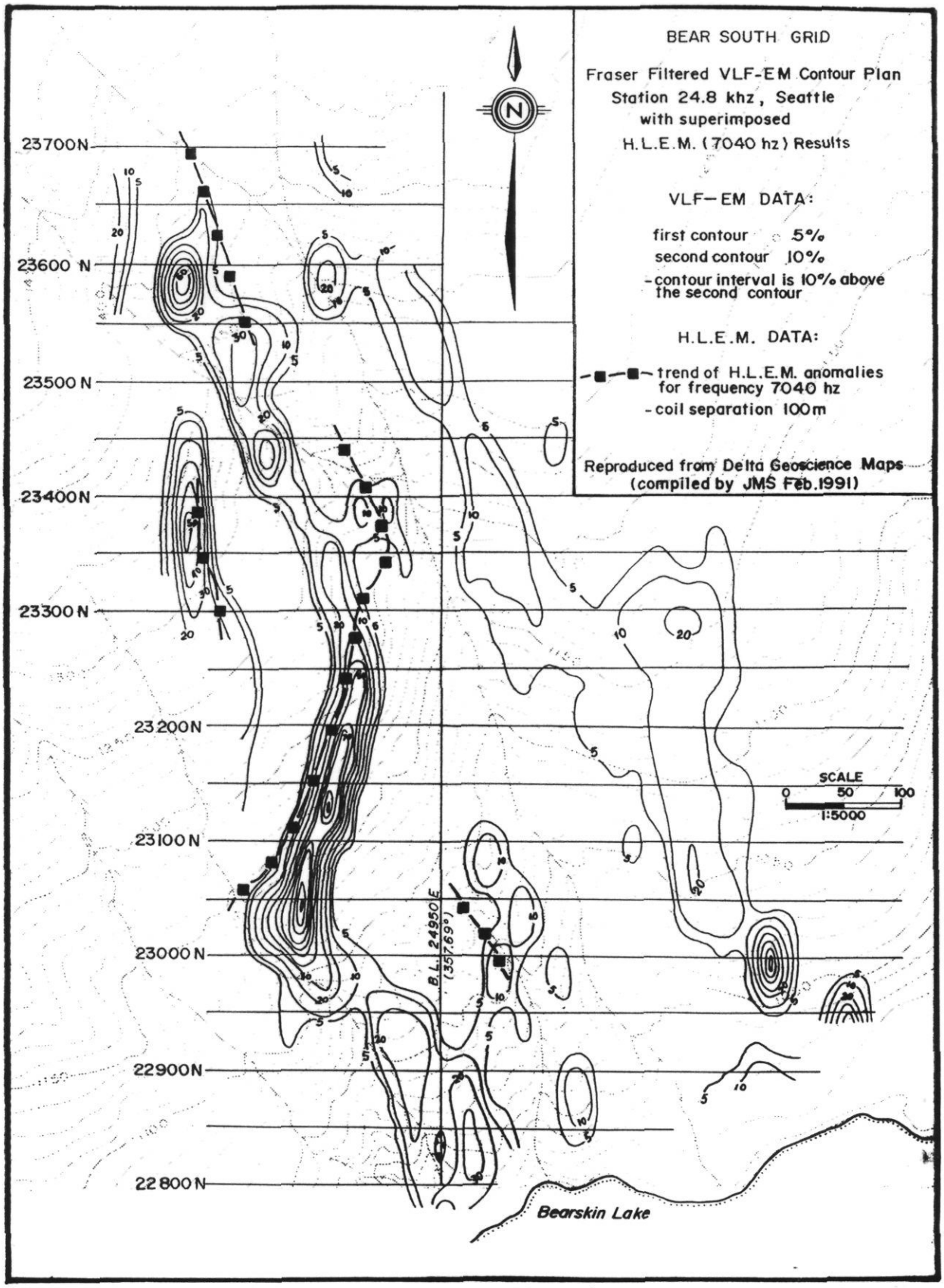


Figure 3.3.7 Summary of Bear South grid ground geophysics (VLF-EM and HLEM).

VLF-EM results have been presented in stacked profiles of vertical in-phase and horizontal field VLF-EM raw data, in a contoured Fraser Filtered plan map, and in profile sections for each line of the filtered vertical in-phase VLF data in Appendix B (Delta Geoscience report).

The VLF-EM survey was expected to respond to hydrothermally altered shear zones with extensive wallrock alteration and minor to moderate sulphide mineralization. This survey also responds to any argillaceous sediments with appreciable strike length.

A broad, weak anomaly on line 23550N just west of the baseline corresponds to the surface exposure of the Ophir Break which includes the Bear Fault and Foster's Fault. The anomaly trends south-southeast to line 23300N were it becomes discontinuous. A subparallel southeast trending anomaly that extends from line 23300N south to 23050N probably outlines the continuation of these fault structures across the area east of the base line. Profile data in this area indicates a weak, deep anomaly coincident with the southern strike extension of the Ophir Break structures and suggests that these anomalies dip moderately to steeply to the east. Little outcrop is exposed in this area but the geophysical anomaly is coincident with a colour anomaly visible on aerial and oblique photographs. The VLF-EM results are influenced by a satellite dish and ground cables in the most southeast corner of the grid.

VLF-EM results also indicate a conductive zone trending north-south along the western side of the grid connecting the West Bear, the Splay and the Gully Faults. Profile data indicates that the Gully Fault dips to the east between lines 22800N and 23000N. In the area where the Gully Fault bifurcates, the dip is more difficult to discern. The Splay Fault dips moderately to steeply to the west.

The northwest trending Gully Fault and the north-trending Splay Fault cut mafic tuff (MFTF) and mafic flow rock (MFFL). Graphitic gouge occurs locally along the Gully Fault and could account for the increased conductivity and resultant geophysical signature of these structural features.

A northwest trending anomaly that extends north from the Splay Fault (from line 23250N to 23600N) is the expression of a conductive portion of the West Bear Fault. Profile data indicates that the southern portion of the West Bear Fault dips moderately to steeply to the west. Profiles for lines 23450N and 23500N, in the area between West Bear Fault and the Razor Back Fault, indicate a dip direction that varies from east to west. The West Bear Fault joins the Razor Back Fault at 23550N, 24750E. At this junction the distinct anomaly is not continuous but it

possibly continues to the northwest off the Bear South grid. On profile 23550N, a vertical to steep east-dipping anomaly is indicated at the West Bear Fault/Razor Back Fault intersection. The Razor Back Fault is graphitic in this area.

Anomalous results between 24850E and 24930E on lines 23300N to 23400N are coincident with outcrop of argillite and argillaceous sediments.

Weak anomalous results occur on the western end of lines 23300N to 23450N. This anomaly reflects a lithologic contrast at the contact between MFFL and limestone (LMST). The anomaly is emphasized by two crossovers on line 23300N which are just south of the antiformal closure of the volcanic unit against the limestone. The crest of the anticline is also evident from the profile data where this anomaly appears as a weak discontinuouis anomaly, east-dipping on line 23350N and west-dipping on line 23400N.

The tram line on the NE side of the grid has a notable effect on the VLF raw data.

The Fraser-filtered VLF-EM contoured plan (Fig. 3.3.7) indicates the location and relative strength of the conductors that lie close to the surface. This plan correlates well with the H.L.E.M. results particularly on the west central side of the grid where both surveys indicate a broad conductive zone of linear north-south trending anomalies.

The contoured plan tends to enhance the continuity of the data as the contouring bias joins anomalous results caused by different conductive structures and lithologies.

The profile sections for each line of the vertical in-phase data are useful for determining dip direction of anomalies. The Hjelt filtered VLF sections should be used when contemplating drill testing any of the anomalies.

The VLF-EM survey responded strongly to several different geologic features, particularly to graphitic sheared rock and argillite outcrops. A weak response over the Ophir Break structures was best defined by the Fraser-filter contour plan and by the profile sections.

H.L.E.M data for the Bear South Grid is presented in four profile plans corresponding to the four frequencies used; 440 Hz, 1760 Hz, 7040 Hz, and 14080 Hz (Appendix B). Four other profile plans show the data collected on the Pit Test Line.

The H.L.E.M. survey has indicated a weak linear conductive zone along the west central part of the grid as

well as in the northwest corner of the grid. As in the other geophysical surveys, the conductive zone is made up of several different conductive structures and lithologies. The main conductors have been outlined on the 440 Hz and 7040 Hz plans. Results from the 7040 Hz survey are summarized in Fig. 3.3.7.

The northwest-trending anomaly just west of the base line on lines 23050N to 23450N is most distinct on the 7040 Hz and 440 Hz frequency plans and is coincident with the Splay Fault and the West Bear Fault. At the southernmost end, the anomaly parallels the west-dipping Splay Fault but lies 10 to 15 meters to the east. The zone continues undisturbed across the West Bear Fault and bulges to the east just north of this fault where argillite outcrops on line 234050N. The anomaly pinches out where the argillite unit is cut off by the Razor Back Fault. The best conductivity along the main conductive trend is between 23050N and 23450N at approximately 24875E. A moderate to steep westerly dip is indicated. The conductive zone appears to subcrop beneath 15 to 30 meters of overburden.

On the profile plan, the western shoulder of the main anomaly is distorted by a narrow, weaker anomaly which occurs on the western end of lines 23300N to 23400N at 24740E. This narrow, north-trending anomaly is coincident with the MFFL/LMST contact exposed in the area. A VLF-EM response has also been noted over this contact.

The anomaly outlined in the northeast corner of the grid is coincident with argillite and continuous across mafic ash tuff and mafic flows to the south, where it pinches out on line 23525N at 24790E, against the Razor Back Fault. The location of the anomaly in the mafic flow rock may be partly controlled by a shear zone of limited strike length, which occurs along the same trend.

A weak anomaly is outlined across lines 23000N and 23050N at 25000E. No outcrop is exposed in this area. The anomaly is coincident with a small creek.

At lower frequencies (i.e. 440 Hz), the induced current migrates into the core of the conductor and produces a narrower anomaly. For this reason, the lower frequency plot (440 Hz) is more significant in terms of a potential drilling target.

A test line through the open pit was surveyed with the H.L.E.M. equipment to test the response of this survey directly over the exposures of the Bear Main Fault, the Footwall Fault and Foster's Fault.

Two significant, but weak conductors were identified. These conductors only show up at high frequency, therefore

their conductivity is poor. Both conductors would likely cause a notable response in a VLF-EM survey.

One broad conductor is centred at 0+00E and the second, thinner conductor occurs at 1+50E on the test line. These anomalies do not correlate to specific known structures and are coincident with an area northeast of the pit and not in the pit itself. The dip of both conductors appears steeply west, although dip estimates are tenuous with weak conductors.

Resistivity data is presented as a stacked profile plan plotted together with the magnetic profiles and as a contour plan map (Appendix B).

This survey was expected to respond to lithology and alteration effects, and primarily to silicified zones. Fault structures generally produce a thin resistivity low. However, in some cases intense silicification of a shear zone may create a local high resistivity zone contiguous to the conductive structure.

The broad low resistivity anomalies outlined by this survey correlate well with the main H.L.E.M. and VLF conductors over the Ophir Break, West Bear Fault, Razor Back Fault, Splay Fault, and Gully Fault. There is a broad northwest trending zone of resistivity lows that support the southeast trend of the Ophir Break.

Generally, resistivity highs occur where mafic rocks outcrop (i.e. MFFL and MFTF from line 23200N south to line 22800N and gabbro in the northeast, on lines 23500N and 23550N between 25000E and 25150E). Areas of limestone also create a well defined high resistivity response (i.e. across lines 23250N to 23450N at 24770E). The area of low resistivity reflecting a sheared, more conductive zone extends from the northwest corner to the southeast corner of the grid but, it is poorly defined.

A Total Field Magnetic Contour plan and the Total Field Magnetic Profiles plotted together with the VLF-EMR profiles for the Bear South grid are included in Appendix B.

The magnetic survey was expected to respond primarily to any near surface magnetite and/or pyrrhotite mineralization associated with hydrothermally altered shear zones. Changes in lithology and corresponding changes in the magnetic susceptibility will moderately affect the magnetic survey results.

There are three areas of anomalous magnetic data outlined on the Total Field Magnetic Plan.

A strong (>58400 nt), north-trending anomaly occurs across lines 23050N to 23150N at 24885E, east of the Gully and the Splay Faults. This is coincident with MFFL, MFTF and MFAS lithologies. This trend continues on line 23200N, where a second strong high (>58400 nt) occurs at 24900E. A sharp bend in the anomaly across lines 23150N - 23200N occurs where mafic flows (MFFL) are sheared and carbonatized (MFCA).

Two magnetic highs on line 23550N define the second magnetic area. These highs coincide with exposed MFFL which outcrops north of the Razor Back Fault.

A series of three magnetic highs occurs across the western end of lines 23400N to 23600N. These anomalies also correspond to the MFFL lithology.

Magnetic lows accompany each high and lie directly east of the high. The magnetics are highly influenced by the spatial position of the MFFL lithology. MFCA and MFAS lithologies produce low to background responses. The magnetic response over the Bear Main, Internal Sliver and Foster's Fault area is a broad background response with no distinct features.

Three diamond drill holes were drilled to test structures within the Ophir Break south of the existing workings. The holes were drilled on 90 meter centers to progressively track the Ophir Break structures southward. This drill program was the initiation of a program to explore the southern extension of the Bear Fault (Fig. 3.3.6, Fig. 3.3.8 and Table 3.3.3).

Results of the drilling indicate that the Bear Fault extends at least 120 meters south of the 1360 portal and persists down dip at least as far as the 1128 meter elevation (Fig. 3.3.6 and 3.3.8).

South and down dip from the 1360 portal, the Bear Fault loses its structural integrity and declines in strength to form a broad zone of carbonate altered volcanic rocks with a very narrow, pyritic shear plane carrying low to poor gold and silver grades. Through this same area the lozenge of carbonate stratigraphy which forms the footwall to the Bear Fault zone pinches out completely, although it may be continuous at depth.

In the 3 drill holes completed on Bear South in 1990, the Footwall Fault and Foster's Fault remain strong continuous structures but do not carry significant precious metal values.

B90DH142A was designed to intersect the Bear Main structure at approximately 1260 m elevation on line 23740N.

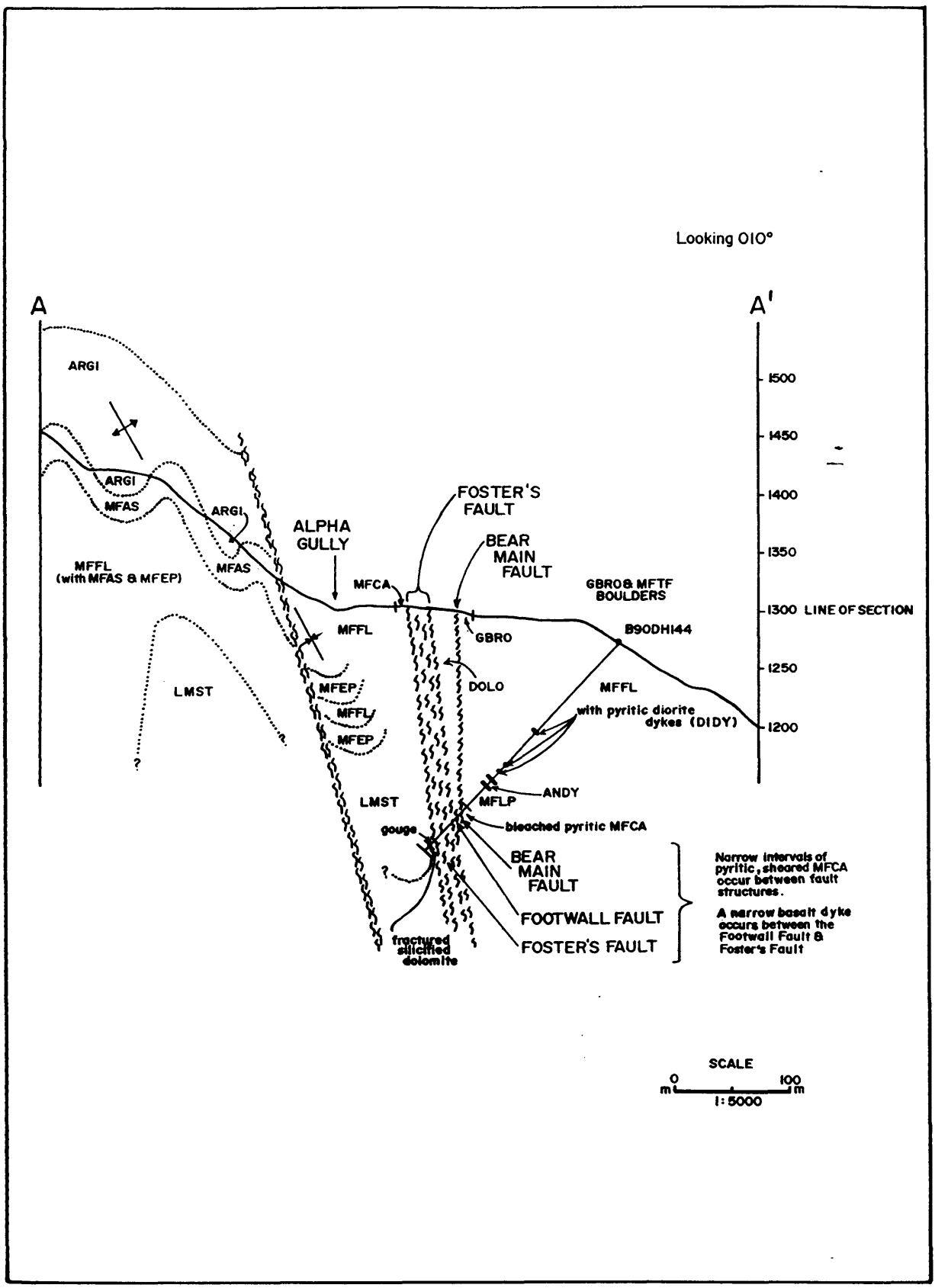


Figure 3.3.8 Bear South generalized cross-section at approximately 23580N based on 1990 drilling and surface work.

Table 3.3.3 Golden Bear 1990 Bear South surface diamond drill hole summary.

GOLDEN BEAR OPERATING COMPANY LTD.
DIAMOND DRILL HOLE SUMMARY FOR 1990 BEAR SOUTH SURFACE DRILLING

CONTRACTOR: F. Boisvenu Drilling RIG: Boyles 56A (surface)

DATE	HOLE #	AREA	LOCATION	ELEVATION (m)	AZIMUTH	DIP	LENGTH (m)	INTERSECTION (m)	WIDTH (m)	GRADE/TRUE WIDTH (gms Au/t, gms Ag/t/m)	REMARKS
July 28	90-142	Bear South	23733.94 N 25023.14 E	1370.25	284.96°	-55.6°	0.00 to 17.37	Abandoned Hole.			
July 30	90-142A	Bear South	23733.64 N 25022.70 E	1370.30	277.44°	-55.4°	0.00 to 233.78	31.09 to 32.23	1.14	7.0, 0.4 / 1.01	Slide material - carbonatized, silicified volcanics with disseminated pyrite, zone follows 0.44m lost core (tt).
								36.27 to 37.25	0.98	5.0, Tr / 0.87	Slide material - carbonatized, silicified volcanics with disseminated pyrite, zone is followed by 0.18m lost core (tt).
								40.48 to 41.56	1.08	12.8, 7.8 / 0.96	Slide material - limonitic gouge. May be contiguous with similar layers in nearby holes.
								140.86 to 141.22	0.36	5.0, 24.4 / 0.21	Bear Main Fault - pyritic tuff in highly carbonate altered, fuchsitic volcanic rocks.
								145.82 to 146.44	0.62	0.2, 13.8 / 0.37	Internal Sliver Hanging Wall Fault - pyritic tuff.
								147.75 to 149.41	0.90	0.9, 3.8 / 0.53	Internal Sliver Footwall Fault - sheared, carbonate altered mafic volcanic rock.
								162.32 to 163.10	0.78	0.9, 9.6 / 0.53	Footwall Fault - pyritic tuff.
August 7	90-143	Bear South	23614.54 N 25058.12 E	1305.80	297.06°	-45.4°	0.00 to 244.45	175.96 to 176.06	0.10	1.4, Tr / 0.05	Bear Main Fault - sheared, pyritic, carbonatized mafic volcanic rock.
								213.10 to 214.10	1.00	Tr, 6.9 / 0.50	Sheared, carbonatized mafic volcanic rock in the hanging wall to the Footwall Fault.
								215.10 to 215.80	0.70	1.1 2.1 / 0.35	As above.
								226.35 to 226.92	0.57	0.4 2.9 / 0.29	Footwall Fault - gouge adjacent to hanging wall rocks.
August 15	90-144	Bear South	23562.33 N 25087.27 E	1273.14	277.80°	-46.7°	0.00 to 242.93	199.84 to 200.11	0.27	0.8, Tr / 0.18	Bear Main Fault - pyritic tuff.
								202.28 to 204.44	2.16	0.2, 0.4 / 1.43	Footwall Fault - pyritic gouge enclosing fragments of altered mafic volcanic rock.
								211.26 to 211.58	0.32	Tr 2.7 / 0.21	Foster's Fault - silicified argillaceous carbonatized mafic volcanic rock.
								217.50 to 218.21	0.71	0.5 1.9 / 1.07	Foster's Fault - sheared carbonatized mafic volcanic rock.

TOTAL BEAR SOUTH SURFACE DRILLING IN 1990 = 738.53 metres

(TOTAL 1990 DRILLING = 2,295.12 metres TOTAL HOLES = 19 holes)

Surface holes drilled in the Bear South area this year = 3

Three zones of limonitic gouge were intersected within the slide material. Anomalous results were returned for samples from each gouge interval as follows: 7.0 g/t Au, 0.4 g/t Ag over 1.14 m; 5.0 g/t Au, Tr g/t Ag over 0.98 m; 12.8 g/t Au, 7.8 g/t Ag over 1.08 m. Fuchsitic and carbonate altered mafic volcanic flow rock was intersected between the slide base and the Bear Main structure which was represented by a narrow zone of pyritic tuff carrying precious metal values of 5.0 g/t Au, 24.4 g/t Ag over 0.36 m. Three zones of pyritic tuff were intersected in the footwall rocks. The first zone has been correlated to the Internal Sliver Hanging Wall Fault and a sample across this zone produced an assay result of 0.2 g/t Au, 13.8 g/t Ag over 0.62 m. The second zone has been correlated to the Internal Sliver Footwall Fault and yielded results of 0.9 g/t Au, 3.8 g/t Ag over 0.9 m. The third zone has been correlated to the Footwall Fault. Assay results for this zone were 0.9 g/t Au, 9.6 g/t Ag over 0.78 m. No carbonate was encountered in this hole before Foster's Fault at 224.92 m, however, a carbonate unit was intersected in the footwall of Foster's Fault. Assays of hematitic, carbonate altered mafic volcanic rock, argillite and gouge across Foster's Fault and of the footwall carbonate rocks were not anomalous in gold and weakly anomalous (up to 6.8 g/t) in silver.

B90DH143 was drilled to intersect the Bear Main Fault at the 1180 m elevation on section 23660N. The hole intersected slide debris to 54.46 m which was followed by variably carbonate altered, locally pyritic mafic volcanic flow rocks, lapilli tuff and epiclastic rocks. No zones of fault gouge carrying anomalous grade were identified in the land slide material. At 107.68 m, a 1.02 m interval of diorite dyke was intersected. Intensely carbonate altered, fuchsitic, sheared mafic volcanic rock marks the position of the Bear Main Fault at 175.96 m. Assay results of 1.4 g/t Au, Tr g/t Ag over 0.10 m were reported for this structure. Carbonatized mafic volcanic rock in the hanging wall to the Footwall Fault yielded anomalous silver values (up to 6.9 g/t Ag over 1.0 m), while anomalous gold values were scarce (one value of 1.1 g/t Au over 0.70 m was received). The Footwall Fault is represented by an 8.73 m interval of intensely sheared carbonatized mafic volcanic rock. A 2.66 m interval of basalt dyke was intersected within this sheared zone. Assays results across this zone indicated one weak anomaly, 0.4 g/t Au, 2.9 g/t Ag over 0.57 m adjacent to hanging wall rocks. No carbonate was intersected in this hole.

B90DH144 (Fig. 3.3.9) was planned to intersect the Ophir Break at 1140 m elevation on section 23580N. Slide material was not observed in this hole due to recovery problems. Carbonate altered and locally pyritic mafic volcanic flow rocks and lapilli tuff were cored below the slide base. Slightly pyritic diorite dykes and one andesite

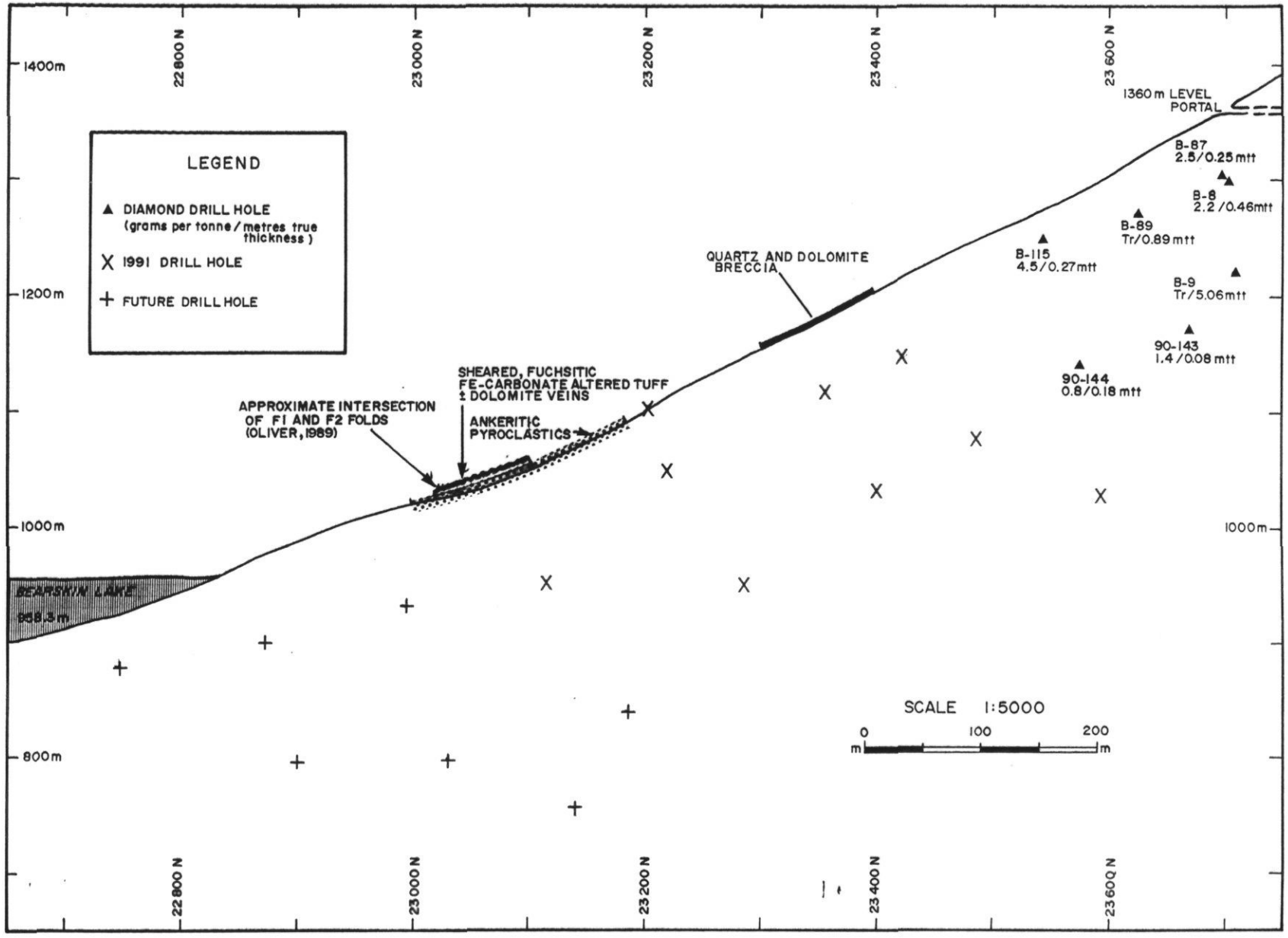


Figure 3.3.9 Bear South area composite longitudinal section showing locations of possible intersections on the Bear Main Fault to date and proposed 1991 drill intersections.

dyke were intersected in the hanging wall to the Bear Main Fault. Pyritic tuff yields anomalous grade in the area of the Bear Main structure with composite assay results of 0.8 g/t Au, Tr g/t Ag over 0.27 m. Pyritic gouge associated with the Footwall Fault produced assay results of up to 0.4 g/t Au over 0.30 m and up to 1.0 g/t Ag over 0.64 m, with a composite assay result across the entire fault zone of 0.2 g/t Au, 0.4 g/t Ag over 2.16 m. A basalt dyke was intersected in the hanging wall of Foster's Fault. Assay results for sample intervals within the Foster's Fault zone yielded low grades of up to 0.5 g/t Au over 0.71 m and 2.7 g/t Ag over 0.32 m. Sheared mafic volcanic rocks in Foster's Fault zone are hematitic, particularly adjacent to the carbonate footwall rocks.

Holes **B90DH142A** and **B90DH144** (Fig. 3.3.7) penetrated Foster's Fault and tested the area west of this structure. Each of these holes intersected a carbonate body in fault contact with highly carbonate altered, fuchsitic (?), mafic volcanic rocks. The fault contact in each case was marked by a locally pyritic gouge zone up to 4.0 m wide with intense silicification extending up to 1.0 m into the carbonate body.

This carbonate body is at least 10 meters thick and was not drilled through in either hole. It may represent another structurally emplaced lozenge of carbonate stratigraphy analogous to the Bear carbonate or it could be part of a continuous carbonate stratigraphic package on the western side of the Ophir Break (Fig. 3.3.7). In either case, the juxtaposition of a potential hydrothermal conduit with a reactive wall rock is encouraging as this new structure has all the parameters conducive to gold deposition.

The Bear Main Fault was marked by very narrow zones of pyritic tuff (less than 0.25 m true thickness) with anomalous grade in all 3 drill holes. Zones of sheared carbonatized mafic volcanic rock with weakly anomalous grade correlated to the expected position of the Footwall Fault in all holes (Table 1). Foster's Fault was intersected in two holes but was not anomalous in gold or silver.

Conclusions

The Bear Main Fault tends to lose its structural integrity and declines in strength south and down dip from the 1360 m portal.

On surface, the stratigraphic and structural host of the Golden Bear deposit may be traced for a minimum of 120 m south of the 1360 m portal. Siliceous dolomite bedrock

exposures, bounded by ankeritic volcanics and Foster's Fault, exist to the 1260 m elevation.

At the southern exposure of the Bear Main system, rocks dip gently to the northeast and plunges are consistently modest (10 - 15°) to 130° (Oliver, 1990). This structural data suggests that the strike direction of the fault system and of the lithology is beginning to rotate to a more southeasterly direction (Oliver, 1990). This is consistent with a colour anomaly visible on oblique and aerial photos that occurs coincident with this area. It is also consistent with the trend of a weak VLF-EM anomaly in the area. East-west drill azimuths are likely to intersect both the structural zone and lithology at oblique angles in this area (Oliver, 1990).

Ankeritic mafic volcanic rock that outcrops just south of the satellite dish (23000N, 25175E) produces anomalous silver values and more weakly anomalous gold values. This location is coincident with the colour anomaly on surface, with the weak VLF-EM anomaly and it is also in the area of the two bull's eye arsenic anomalies defined in the 1981-82 geochemical survey. Further work on this area should establish the relationship of this zone to the main ore-bearing structure and explain anomalous geochemical and geophysical results produced in the area.

The most southern extension of the Bear Zone should be trenched. Oliver (1990) suggests trenching the alteration area on line 23300N, as it is one of very few exposures not covered by rock avalanche debris and it has excellent road access.

The area bounded by the West Bear Fault and the Razor Back Fault correlates directly with the structural, lithologic and alteration scenario seen in the Bear Fault system. The presence of a faulted, north-plunging antiform, strong silicification and brecciation within carbonates, and pervasive carbonate alteration are common to both zones. This area is an attractive exploration target and it is within 250 meters of the 1360 portal (Oliver, 1990).

Oliver's (1990) report concludes the following:

> The surface expression of the Golden Bear deposit warrants a more detailed examination (around and north of the 1360 portal). Information gathered from detailed mapping in this area would be valuable in the interpretation of subsurface data and in the interpretation of other structures mapped on the Bear South Grid.
>
> The plunge of ore shoots is not simply a function of the plunge direction of major fold structure.

Rake of ore shoots follows the line of intersection created by coincidence of the fault plane with the plane of favourable stratigraphy (siliceous dolomite). The former has a generally consistent orientation (steep east dipping). The latter changes, and therefore, the line of intersection (the plunge of the ore shoots), can shift rapidly.

Geophysical surveys tended to be strongly lithologically controlled which resulted in broad, poorly-defined anomalies. The VLF-EM proved to be the most useful geophysical survey with the contoured plan map of Fraser filtered data delineating the Ophir Break structure and the filtered profile sections providing information on dip orientations. The VLF-EM profiles indicated the main conductive trends of the Ophir Break and the Razor Back, West Bear, Splay and the Gully Faults. Similar trends were also noted on the H.L.E.M., Total Field Magnetics and Resistivity surveys, but the trends were not as well defined.

Drilling on the Bear South Grid indicates that the carbonate stratigraphy pinches out above 1250 m elevation south of line 23560N. In section, the Bear Fault extends down dip at least as far as the 1128 m elevation (Fig. 3.3.7). Carbonate stratigraphy exists in the footwall rocks at depth (Fig. 3.3.7).

The area tested by this year's diamond drilling may correspond to a zone of compressive stress, supported by low precious metal values and structural widths, which was not conducive to "trapping" a competent carbonate lozenge or allowing development of dilation zones.

The structural model put forth by Lehrman and Caddey (1989) for the Golden Bear deposit has particular significance for future Bear South drilling programs as it indicates a potential for a blind mineralized zone in the area.

Lehrman and Caddey (1989) proposed that the repetition of cymoid loop structures along the Ophir Break is controlled by the interference of F_1 and F_2 folds as mapped by Oliver (1988). Because of the southward plunge of F_1 fold axes, the crests of resultant interference domes decrease in elevation to the south.

A prominent F_2 anticline (in the younger cover rocks) has been mapped by Oliver (1988) in the Bear South region. As mapped, it would intersect the Ophir Break/F_1 isocline where the old airstrip road crosses the Bear Fault just above camp. Sheared and carbonate altered mafic volcanic rocks have been mapped 200 meters to the northeast, in Alpha

Gully as well as 400 m east of that location. The F_1-F_2 intersection is more likely closer to these areas as they are nearer the projected trend of the Bear Main Fault.

3.3.4 INTERNAL SLIVER

Introduction

The Internal Sliver Zone is a fault that parallels the Bear Main Fault and extends from 23700N to north of 24200N (Fig. 3.3.10). This structure is being discussed as a separate section from the Bear Main and Bear North areas because a significant amount of 1990 exploration work was focused on this zone. A total mineral inventory of 58,075.1 tonnes @ 14.9 g/t Au with a cutoff of 7 g/t Au (dilution of 15% at 2 g/t Au) has been calculated for the Internal Sliver Zone between 23950N and 24225N (Fig. 3.3.11, in pocket). Sections north of 24220N are currently being reviewed and interpreted. This compilation work combined with exploration drilling may outline additional tonnages to add to the mineral inventory.

Geology

The Internal Sliver Zone has a very limited outcrop exposure from 23725N to 23750N as a narrow fault zone within brecciated, silicified and sulphidized carbonate and chert. North of 23750N the zone does not outcrop and is structurally restricted between the Bear Fault and the Footwall Fault. The configuration of the main mineralized structures is described in section 2.4.

The Internal Sliver Zone is the fault within the carbonate sliver. The fault begins at 23720N, as a relatively shallow, east dipping (and therefore cross-cutting) fault, that departs from the Bear Main Fault below the "hanging wall roll" and continues upwards within the carbonate lens, splitting the carbonate lens into two slices. The Internal Sliver Fault bifurcates forming two faults; the Internal Sliver Hanging Wall Fault and the Internal Sliver Footwall Fault. The Internal Sliver Zone is continuous with the Internal Sliver Footwall structure which follows the hanging wall of the west lens of carbonate and merges up section with the Footwall Fault, where the west lens of carbonate pinches out at 1380 m to 1420 m elevation (Fig. 2.4.1).

The Internal Sliver Fault Zone comprises pyritic tuff, fault gouge, dolomite and a chert breccia zone within the carbonate-chert body. Where grade and widths permit, the Internal Sliver Zone is considered to extend above the Internal Sliver Footwall and Footwall Fault confluence point and includes the combined widths of the Internal Sliver Footwall Fault and the Footwall Fault.

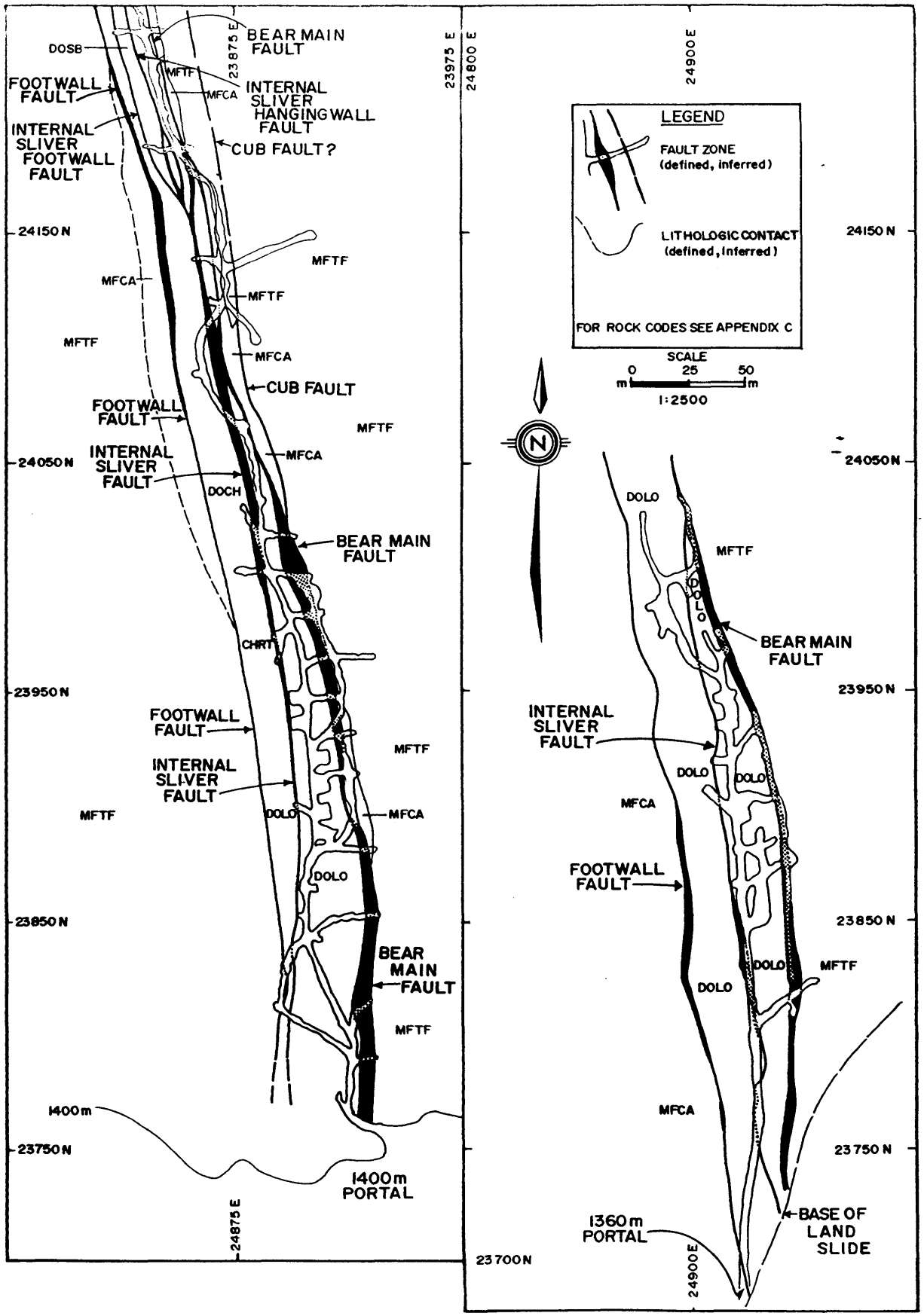


Figure 3.3.10 Level plan showing Internal Sliver 1990 work and interpretations.

The blocks outlined as an addition to the mineral inventory seem to roughly correspond to the mineralized portion of fault zone between the confluence of the Internal Sliver Hanging Wall Fault and Internal Sliver Footwall Fault and the confluence of the Internal Sliver Footwall Fault and Footwall Fault. Because of this restricted structural setting, the zone has a long strike length extent but a limited dip length. Portions of ore grade material locally extend well beyond these junctions.

Test holes assay samples have not proved capable of reproducing the grades achieved by chip sampling and diamond drilling through the Internal Sliver Zone. Chip samples from cross-cuts consistently have higher composite grades than the test hole assays. The disparity is probably due to the fine grained nature of the pyritic tuff and gouge. Test hole drilling washes away the fines, thus biasing the sample and yielding erroneous grades. The apparent lack of grade in areas with only test hole information may artificially restrict the lower limit of the Internal Sliver Zone between 24025N to 24125N. Fortunately, test holes still provide an indication of where the structure is, even if the grades seem lower.

Previous Exploration

The Internal Sliver Zone was mapped and trench sampled by CML in 1983. Surface drilling often intersected this zone depending on the angle and intersection elevation of the hole. Underground development work involved drifting on the 1400 m level within the east carbonate lens, therefore, in the hanging wall to the Internal Sliver Zone. Numerous cross-cuts were driven into the Internal Sliver Zone and at 24075N the main drift veered into this zone. Grades and widths within the cross-cuts indicated a significant structure with composite grades up to 16.8 g/t Au over 4.4 m width. However, only certain areas exhibit consistent zones of good grade and width, such as the area north of 23900N.

On the 1360 m level the main drift follows the Internal Sliver Zone from 23750N to 23850N and then deviates into the east carbonate lens, on the hanging wall side of the Internal Sliver Zone. A few cross-cuts were driven into the Internal Sliver Zone on this level also. At this deeper elevation on the structure, the grades are still good, up to 33.3 g/t Au over 1.8 m, but overall the widths have decreased. The underground workings established the location of the zone as far north as 24000N. Of the 87 underground holes drilled by NAMC in 1986 and 1987, at least 40 were drilled to intersect the Internal Sliver Zone and/or the Footwall Fault.

1990 Activities and Results

Compilation of information on the Internal Sliver was included in the compilation work on the Bear Main and Bear North areas. The Internal Sliver Fault was identified as a structurally controlled zone of mineralization that has potential for a significant tonnage of readily accessible mineralized material.

The 1990 Bear North surface and underground drill program was carried out to further define a mineral inventory tonnage on this and other structures between 24000N to 24180N. Figure 3.3.11 is a longitudinal section that shows 1990 drilling intersections on the Internal Sliver Zone and an outline of the blocks included in the mineral inventory.

Results of the 1990 drilling are listed in Tables 3.3.1 and 3.3.2. All of the 7 surface holes intersected the desired targets. Lost core or poor recovery is often associated with the fault zones due to the soft, incompetant nature of the fine grained fault gouge and pyritic tuff that comprises the zone of interest.

B90DH135 was drilled at -59.0° on section 24040N and intersected the Internal Sliver Footwall Fault at 1428 m elevation, below the confluence with the Footwall Fault thus giving a combined grade width of 12.0 g/t Au, 19.7 g/t Ag over 5.38 m. The zone consists of pyritic gouge within a larger gouge zone. **B90DH136** and **B90DH141** were drilled at shallower angles (-48.7° and -52.2°) also on section 24040N. Both intersected the Footwall Fault well above the confluence with the Internal Sliver Footwall Fault at 1462 m elevation in B90DH136 and 1452 m elevation in B90DH141. The holes had correspondingly poor grades over narrow widths (0.1 g/t Au, 33.3 g/t Ag over 1.34 m in B90DH136 and 0.3 g/t Au, Tr g/t Ag over 0.34 m in B90DH141).

B90DH137 and **B90DH138** were both drilled on section 24060N. B90DH137, drilled at -65.0°, intersected the confluence of the Internal Sliver Hanging Wall and Internal Sliver Footwall Faults at 1426 m elevation. The combined fault comprises brecciated chert, pyritic mafic volcanic rock, pyritic gouge and brecciated dolomite. The zone assays 14.7 g/t Au, 13.0 g/t Ag over 4.91 m. Hole B90DH138 was drilled at -39.9° and pierced the Footwall Fault at 1462 m elevation, well above the point where the Internal Sliver Footwall merges with this structure. The combined zone was an unimpressive narrow pyritic tuff zone within carbonatized volcanics that assayed 0.2 g/t Au, trace g/t Ag over 0.19 m.

B90DH139 and **B90DH140** were drilled on section 24080N. B90DH139 was drilled at -66.7° and intersected the combined Internal Sliver Hanging Wall and Internal Sliver Footwall

Faults at 1425 m elevation yielding a good grade and width of 39.8 g/t Au, 41.4 g/t Ag over 1.92 m. B90DH140 was drilled at -54.4° and intersected the Internal Sliver Footwall Fault and the Footwall Fault as separate structures. Trace g/t Au results were reported for both structures.

All of the 9 underground drill holes intersected the desired targets. All of the 1990 underground drill holes were drilled from one drill station at 24150N. A summary of the underground drill results is in Table 3.3.2.

B90UG088 was drilled at -17.5° and intersected the Bear Fault at 1378 m elevation, just above the Bear Fault and Internal Sliver Fault confluence. Thus this intersection, which grades 6.7 g/t Au, 37.2 g/t Ag over 2.10 m, is considered part of the Bear Main Zone.

B90UG089 was drilled at a moderate dip of -43.8° and intersected the Bear Main Fault at 1348 m elevation, well below the point where the Internal Sliver Zone joins the Bear Main Fault.

B90UG090 was drilled at a shallow angle of +10° and intersected the Internal Sliver Footwall Fault at 1416 m elevation on section 24100N. The Internal Sliver Fault consists of pyritic tuff, silicified brecciated pyritic dolomite, and chert that includes a low grade portion which assays 2.6 g/t Au, 4.2 g/t Ag over 2.62 m and a high grade portion which assays 16.1 g/t Au, 21.9 g/t Ag over 1.54 m. The overall intersection assays 3.6 g/t Au, 5.5 g/t Ag over 4.15 m.

B90UG091 was drilled at a moderate dip angle of -29.2° and intersected the Internal Sliver Footwall Fault where it has already merged with the Bear Fault at 1379 m elevation on section 24120N.

B90UG092 was drilled at a steep dip angle of -59.0° to intersect the Bear Main Fault at 1352 m elevation on section 24140N and therefore did not intersect the Internal Sliver Zone.

B90UG093 was drilled at a moderate angle of +31.5° to intersect the Footwall Fault at 1440 m elevation on section 24140N, well above the confluence with the Internal Sliver Zone. The combined zone assayed 0.2 g/t Au, 0.2 g/t Ag over 0.10 m.

B90UG094 was drilled at a moderate angle of +23.4° and intersected the confluence of the Internal Sliver Footwall Fault and the Footwall Fault at 1432 m elevation on section 24160N. This zone can be divided into two zones of varying gold content. The first portion comprises pyritic gouge and

assays 4.1 g/t Au, 3.9 g/t Ag over 1.45 m. The second portion assays 0.1 g/t Au, 0.6 g/t Ag over 4.49 m and consists of fault gouge and two quartz veins or fragments of quartz veins up to 0.40 m across. The overall intersection assays 1.1 g/t Au, 1.4 g/t Ag over 5.94 m.

B90UG095 was drilled at a moderate dip angle of -32.2° and intersected the Bear Main Fault at 1375 m elevation below the confluence of the Bear Main Fault and the Internal Sliver Zone.

B90UG096 was drilled at a moderate angle of +25.3° to intersect the combined Internal Sliver Footwall Fault and Footwall Fault at 1446 m elevation on section 24180N. This zone was not intersected in this hole.

Other 1990 exploration work included underground chip sampling of the Internal Sliver Zone and wall rock on the 1360 m level. The highest assay from this sampling program was 31.3 g/t Au, 21.6 g/t Ag over 0.50 m taken from the east wall of the southern sand silo.

A cross-cut was driven into the Internal Sliver Zone at 24122N at the end of 1990. Chip samples from across the faces returned assays up to 16.3 g/t Au over 0.7 m and composite assays of 5.1 g/t Au over 6.05 m (south side), and 5.0 g/t Au over 8.2 m (north side). A 10 m raise has since been excavated up from this cross-cut into the Internal Sliver.

Sections north of 24250N to 24480N have been re-logged and are currently being re-interpreted in order to delineate targets for further exploration drilling.

Conclusions

The Internal Sliver Zone is a structurally controlled zone of mineralization with the best grades and widths at the confluence of the Internal Sliver Footwall Fault and the Footwall Fault, and at the confluence of the Internal Sliver Hanging Wall Fault and the Internal Sliver Footwall Fault. Other blocks of possible mineralization have been outlined at the confluence of the Internal Sliver Footwall Fault with the Bear Fault (McDonald, 1990).

North of 24250N, the Internal Sliver Zone is a continuous structure that locally attains widths up to 4 m. The structural boundaries gradually drop in elevation, reflecting a shallow plunge to the north. The exploration strategy for further drilling on the Internal Sliver Zone is to follow the structurally favourable sites of ore deposition northwards as they gradually drop in elevation.

3.3.5 SLIDE BASE ZONE

Introduction

The Slide Base Zone is a mineralized horizon at the base of the unconsolidated landslide material on the west side of East Bowl. Re-interpretation of sections through the mine focused some attention on this zone of ore grade material. A total mineral inventory of 45,163.9 tonnes @ 16.1 g/t Au with a dilution of 40% at 2 g/t Au was added to the Golden Bear mineral inventory from this zone (McDonald, 1990).

It had been rejected as a potentially minable body in the past, due to concerns regarding the unconsolidated nature of the mineralized material. Encouraging information on ground conditions obtained from workings close to and in the slide base material has led to a closer investigation of the potential of this zone.

Geology

The Slide Base Zone forms part of the landslide material that overlies the hanging wall of the Bear Main structure. It is close to, but not quite at, the base of the slide material and is a moderately east-dipping (50^{o}), continuous zone of ore grade limonitic gouge and clay material.

Present interpretation suggests that this zone is actually a portion of the hanging wall of the Bear Main Zone which has been sliced longitudinally off the Bear Fault during the landslide event. The ore grade material has rotated as a slump along slide- related, listric failure planes.

Previous Work

The most promising area occurs below the 1400m level, between 23700N and 23806N. Through this area, three drill holes B83DH010, B85DH113, and B85DH114 intersect the Slide Base Zone on sections 23760N, 23800N and 23720N respectively and each has an ore grade intersection.

The Slide Base Zone material is described as a fault zone with yellow to orange-grey clay gouge (30% to 50%) and angular breccia fragments (up to 70%). Locally, gouge is darker grey in colour and contains up to 5% fine disseminated sulphides. Breccia fragments have been identified as bleached altered gabbro (B83DH010, B85DH114) and also as mafic tuff (B85DH113). Pyrite is concentrated

in the clay sections and occurs in blebs, patches, disseminations, stringers and veins. Fuchsitic (?) and limonitic alteration are prominent, although strong silicification is also noted locally. Alteration minerals reported through this zone include: jarosite, sericite, jasperoid and dolomite. In B85DH113 a 30 cm intersection of basalt dyke was cored in the central area of the Slide Base Zone. The basalt dyke typically intrudes the Bear Main Zone, thus this supports the idea that the Slide Base Zone has been derived from the Bear Main Zone.

Assay results through the Slide Base Zone indicate the following composite values (calculated for down hole thicknesses): 17.2 g/t Au, 29.1 g/t Ag over 4.27 m in B83DH010; 17.9 g/t Au, 26.1 g/t Ag over 4.66 m in B85DH113; and 19.6 g/t Au, 14.1 g/t Ag over 7.75 m in B85DH114.

1990 Activities and Results

Compilation and re-interpretation of sections through the Bear Main Zone has placed the base of the chaotic zone of slide debris higher in elevation than was previously indicated. This has focused attention on the Slide Base Zone and led to a preliminary estimate of the ore potential of this mineralized horizon.

The potential of the zone was based on three drill intercepts of ore grade and ore width. The intersections are spaced between 25 m and 40 m apart and are between 1376 m and 1364 m elevation. The mineralized horizon also extends below the 1360 m level between 23700N and 23806N but the potential below 1360 m was not investigated. Due to the wide spacing of intercepts and the narrow distribution of elevations at which intercepts have been made, grade and width data available may not be representative of the entire zone.

Potential reserves for the Slide Base Zone were calculated using a polygonal method based on longitudinal sections prepared by North American Metals. Dilution is calculated at 40% at 2 g/t Au grade due to the unconsolidated nature of the zone. The total estimated potential mineral inventory is 32,259.9 tonnes @ 21.8 g/t Au (45,163.9 tonnes @ 16.1 g/t Au, when diluted at 40% dilution of 2 g/t Au).

In August 1990, a cross-cut was driven east at 23775N from the 1361 sub-drift on the Bear Main Zone to intersect and test the Slide Base Zone at this location. The cross-cut penetrated the zone in an area where there is no drill information and found the zone to be continuous, with grades up to 48 g/t Au over 0.70 m. The width of the structure at this location is 3.5 m and composite assay results indicate

16.49 g/t Au over 5.1 m on the south side of the cross-cut and 20.5 g/t Au over 2.0 m on the north side. New information is encouraging for development of the Slide Base Zone.

Conclusions

The broken, blocky and unconsolidated nature of the zone, and its 50° average east dip may create mining problems. This zone is estimated to contain over 30,000 tonnes of ore grade material that is currently accessible. The establishment of such a mineral inventory indicates the minability of the Slide Base Zone using underground mining methods is the main limiting factor to further development.

3.3.6 OPEN PIT HAUL ROAD

Introduction

The 7 km long Open Pit Haul Road is used to transport ore from the Golden Bear open pit to the mill stockpile (Figs. 3.3.12 and 3.3.13). The road stretches 2 km northeast of camp and zig-zags up the southeast facing slope of the Bearskin Creek valley. Roadcuts expose several red-brown gossanous areas and a few minor fault zones.

The objective of mapping and prospecting along the road and all nearby outcrops was to find any possible newly exposed mineralized zone. The optimistic goal was to locate another north-striking, gold-bearing fault zone of an appreciable width.

Despite several promising looking altered zones and minor fault zones, no significant assays were reported.

Geology

The main lithologies in this area are: gabbro; mafic volcanic rocks; and argillaceous rocks. These units have been metamorphosed to the greenschist facies. Zones of quartz veining and silicification occur around faults and brecciation occurs locally in carbonatized mafic volcanic and gabbroic rocks.

Gabbro outcrops along the uppermost portion of the haul road between 7 and 5.8 km and appears to be part of an almost flat lying sill that has intruded the mafic volcanic rock. Several of the surface exposures near the haul road could be very large slabs of gabbro that have moved downslope from Troy Ridge.

The gabbro is a dark green to grey-green fine to coarse grained (0.5 mm to 2.2 cm) intrusive that is locally chloritic, epidotized and hematitic. Minor chalcopyrite and malachite can be found on some fractures. Proximal to fault zones, the gabbro has the same carbonatized appearance as the mafic volcanic rocks. Silicified, carbonatized fault zones within the gabbro have no consistent orientation. Locally these zones carry minor pyrite and chalcopyrite and can be chalcedonic or have vuggy quartz veining. A weak foliation with a north strike (354^{o}) and moderate east dip (43^{o}) was observed only locally.

A northwest trending fault zone along the east side of East Bowl juxtaposes gabbro with carbonatized mafic volcanic rocks. This red-brown weathering zone is oriented $320^{o}/82^{o}$NE and is a large silicified, brecciated zone that

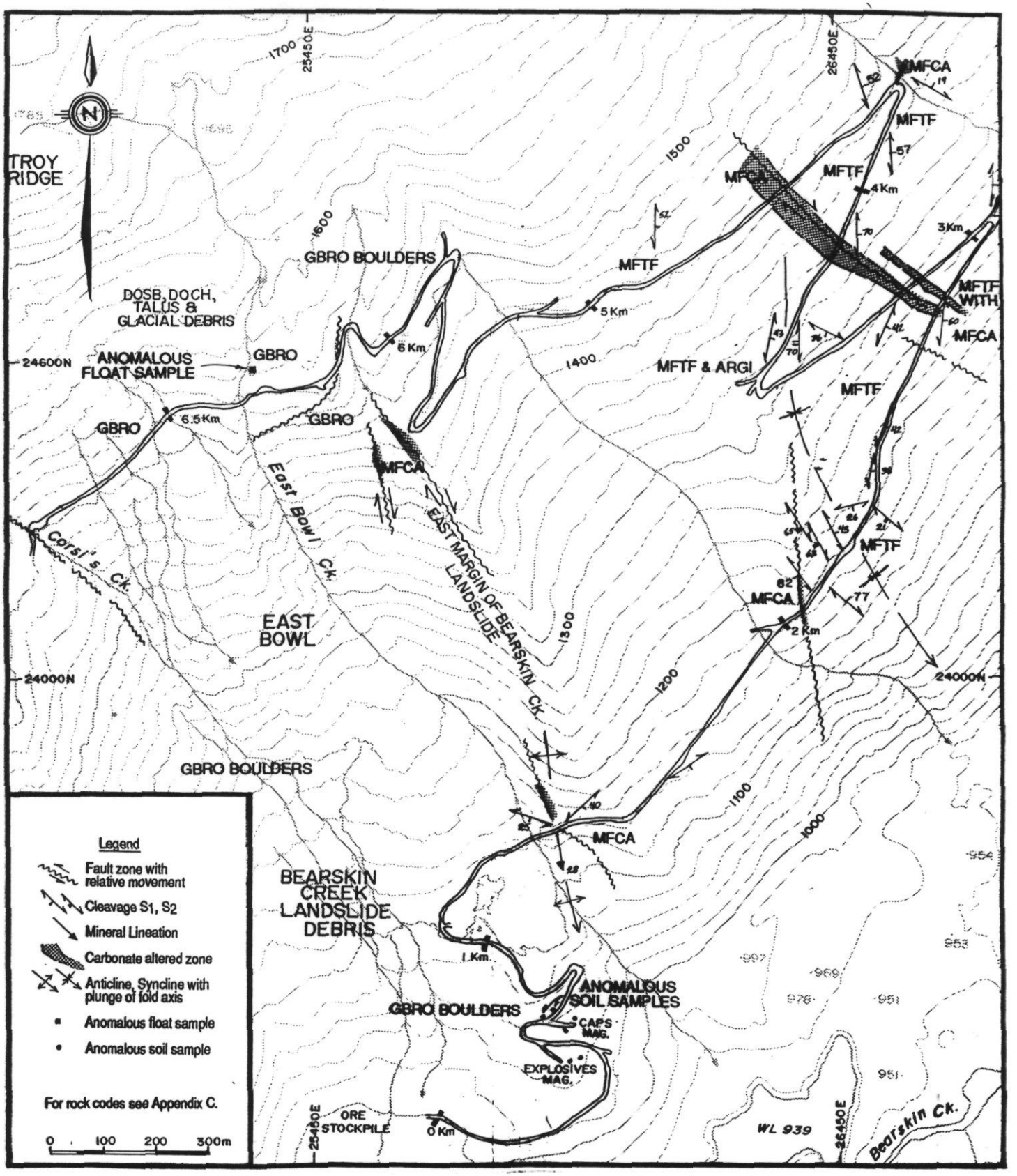


Figure 3.3.12 1:10000 summary diagram of the work on the Open Pit Haul Road carried out in 1990.

Figure 3.3.13 Oblique photograph of the Open Pit haul road showing highlights of the 1990 mapping.

carries 2 to 3 percent pyrite and has locally vuggy and comb quartz veining. Slickensides plunge 22^{o} towards 342^{o} and indicate a right lateral sense of movement.

Mafic volcanic rocks outcrop east of the rim of East Bowl and include mafic tuff, mafic ash tuffs, lapilli tuff-agglomerate, and some mafic flows and epiclastic sediments. These rocks are grey to brown when fresh and dark brown to black when altered. Commonly, the mafic volcanic rock outcrops are rotted, punky, iron stained regolith that have been disturbed by the road construction and are therefore unreliable for measurements. The carbonatized mafic volcanic rock is typically bleached, fuchsitic (?), locally pyritic, and ankerite-veined. Outcrops are orange-red due to a hematitic or limonitic staining.

Argillaceous volcanics tuffs are locally interbedded with the mafic volcanic rocks on the haul road but do not form a significant unit.

The dominant cleavage, S_1 is probably a compaction foliation or a bedding-parallel cleavage (Fig. 3.3.12). The unit is typically phyllitic with a micaceous cleavage producing a north to northwest strike and moderate east to northeast dip. Near to fault zones this S_1 cleavage has been folded (F_2) resulting in a northeast strike with southeast dips. The poles to the S_1 cleavage plane plot on a great circle and represent a northwest striking, southeast plunging open fold. This phase of folding corresponds to the F_2 event described by Oliver (1989, pers. comm 1990) and is probably an artifact of local wrenching proximal to the dextral strike-slip faults.

A second cleavage, S_2, indicated by kink planes within the first cleavage, is probably an axial planar cleavage to the F_2 fold event. The kink fold axes plunge 48^{o} towards 100^{o} and a mineral lineation within the first cleavage plunges 28^{o} towards 188^{o}.

Argillaceous volcanics tuffs are locally interbedded with the mafic volcanic rocks on the haul road but do not form a significant unit.

Previous Exploration

Only minor previous work has been done on the area of the Open Pit Haul Road. The western and uppermost portion of the road was mapped at 1:5,000 scale by CML (McAllister, 1985) and by Oliver (1988). The road was constructed in 1988 to access and haul ore from the Open Pit.

1990 Activities and Results

The Open Pit Haul Road was surveyed and then mapped in conjunction with chip sampling and some soil sampling. Survey control for the mapping was provided by a series of pickets and survey stations along the road.

Mapping was conducted at 1:1,000 scale and covered part or all of 11 map sheets. The scarcity of outcrop, other than immediately along the road, limits the interpretations made here.

A total of 154 rock samples and 22 soil samples were taken during the work around the haul road. The most anomalous rock assay was a float sample of silicified and brecciated dolomite that assayed 4.5 g/t Au, 1.0 g/t Ag (Fig. 3.3.12). This mineralized rock and abundant carbonate talus was transported from Helen Glacier to near the 6.5 km sign on the haul road.

The highest assay from rock chip samples was 0.7 g/t Au, Tr g/t Ag over 1.0 m from gouge and carbonatized mafic volcanics. High values for other rock types were 0.1 g/t Au, 1.2 g/t Ag over 0.3 m from gabbro, 0.3 g/t Au, Tr g/t Ag over 0.45 m from carbonatized mafic volcanics, 0.3 g/t Au, Tr g/t Ag over 0.70 m from argillaceous tuffs, 0.2 g/t Au, 1.7 g/t Ag over 0.35 m from quartz and/or calcite veins and 0.2 g/t Au, 4.8 g/t Ag over 0.3 m from mafic volcanics. Carbonatized mafic volcanic rock associated with fault gouge material generally provides the best assays. Numerous re-assays by an outside lab indicate that several silver anomalies cannot be reproduced and that corresponding gold values for those samples are consistently low.

Soil samples were taken of B-horizon material from undisturbed vegetated areas. Most soil samples returned very low gold and silver results (less than 30 ppb Au, 0.1 ppm Ag) but a few samples from two areas were exceptionally high. The anomalous samples from the uppermost part of the haul road (7 to 6 km) were up to 1,505 ppb Au, 0.1 ppm Ag and represent transported mineralized material that has been moved downslope from the Troy Ridge - Helen Lake area. Anomalous samples from the lower part of the haul road, around the explosives magazine, were up to 2,820 ppb Au, 0.6 ppm Ag. These latter samples also represent transported material that is part of the slide debris.

Conclusions

The fact that carbonatized mafic volcanics occur at least 2 km east of the Ophir Break supports the possibility for another large north-striking fault with an associated alteration zone occurring within the Bearskin Creek valley.

An abundance of mineralized float and slide debris material in East Bowl that has been brought down by Helen Glacier and the Bearskin Creek slide. This suggests that the area around Helen Lake and the west end of Troy Ridge has a significant potential for mineralization.

The carbonatized zones around the dextral strike-slip faults provide some of the most prospective areas on the Open Pit Haul Road. Some of the zones carry a few percent pyrite, are silicified and brecciated yet assay results for gold and silver were negligible.

3.3.7 TROY RIDGE

Introduction

Troy Ridge, a prominent outcropping along the top of East Bowl, is located in the north central part of the BEAR claim (Fig. 3.1.1). Troy Ridge includes the area from Bear North (north of 24540N) to Helen Lake. It is bounded to the west by the West Wall fault and to the east by lateral glacial moraine material from the Helen Glacier.

Geology

Troy Ridge is a prominent, reisitant outcrop of a massive, porphyritic gabbro and microgabbro sill that outcrops along the north side of East Bowl. On the west end of the ridge, carbonate and mafic volcanic rocks of the Stikine Terrane Assemblage are exposed in a series of north-trending anticlinal and synclinal structures (Figs. 3.3.14 and 3.3.15).

Massive, thick bedded limestone forms the base of the stratigraphy in the area. Locally, banded and crinoidal limestone has been mapped between the limestone unit and the overlying dolomite with chert interbeds. The carbonates are capped by mafic pyroclastic and flow rocks that are locally iron carbonate altered, particularly adjacent to large scale fault structures.

Steep east-dipping faults; the Bear Main Fault, the Footwall Fault, and the West Wall Fault, cut the stratigraphy and roughly parallel the fold axes.

The Bear Main structure encloses a lozenge of dolomite and chert (Fig. 3.3.16). Early mapping by CML (1985) indicated that the Bear Main Fault formed the eastern structural boundary to the carbonate lens and that a splay off the Bear Main structure (the Footwall Fault?) formed the western bounding fault.

Oliver (1988) also mapped a fault-bounded carbonate lens, but did not indicate that the bounding faults merge at surface. Furthermore, his mapping indicates that the main structure is continuous with the western fault that forms the footwall structure terminating the carbonate wedge (the Footwall Fault?), and that the easternmost structure is a subordinate fault (the Bear Main structure?).

The easternmost structure (Bear Main Fault) juxtaposes carbonatized mafic volcanic rocks on the hanging wall against dolomite in the footwall. The western structure (Footwall Fault) places carbonate in the hanging wall

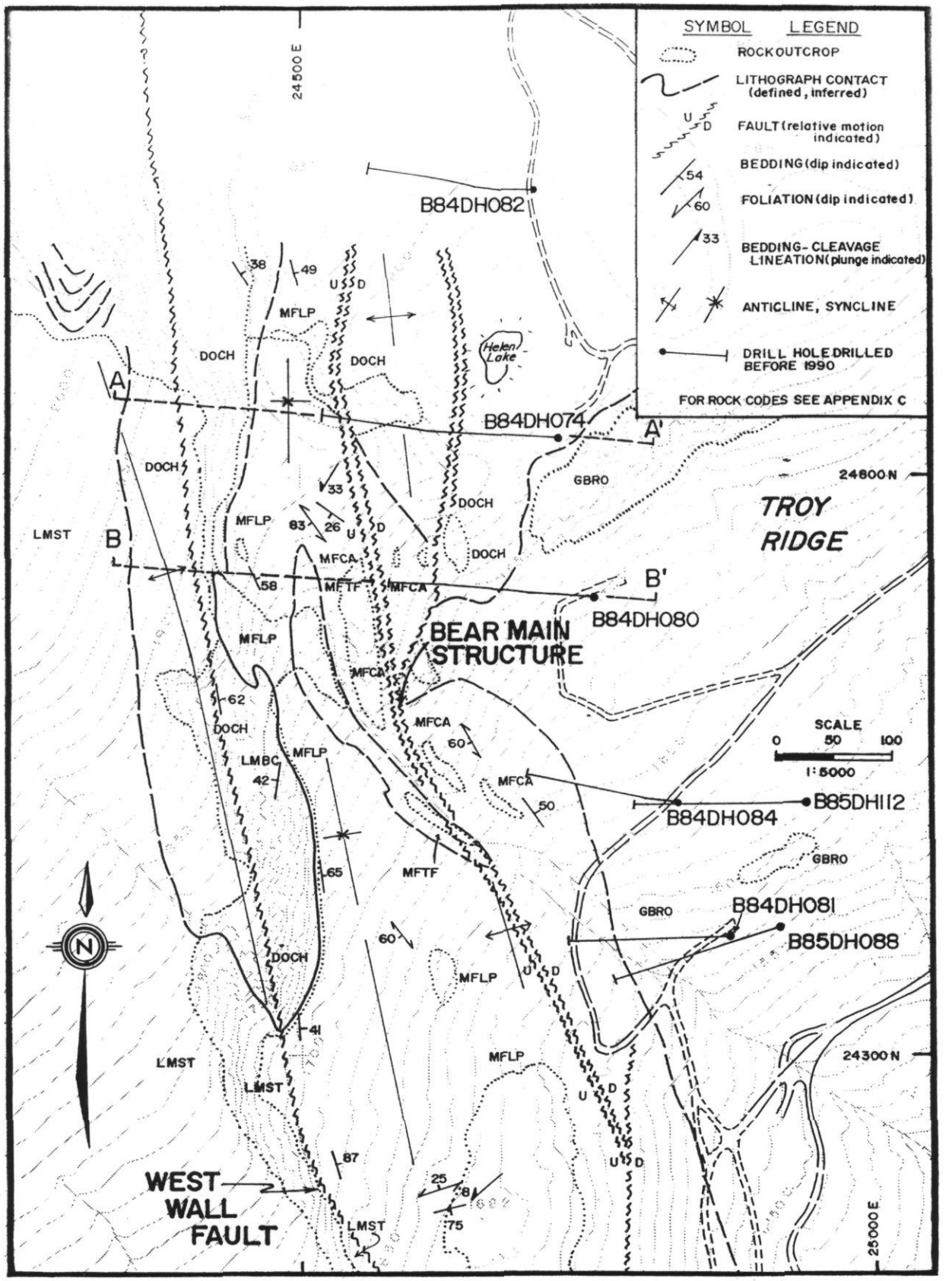


Figure 3.3.14 Location map of the Troy Ridge area summarizing previous work and proposed 1991 work.

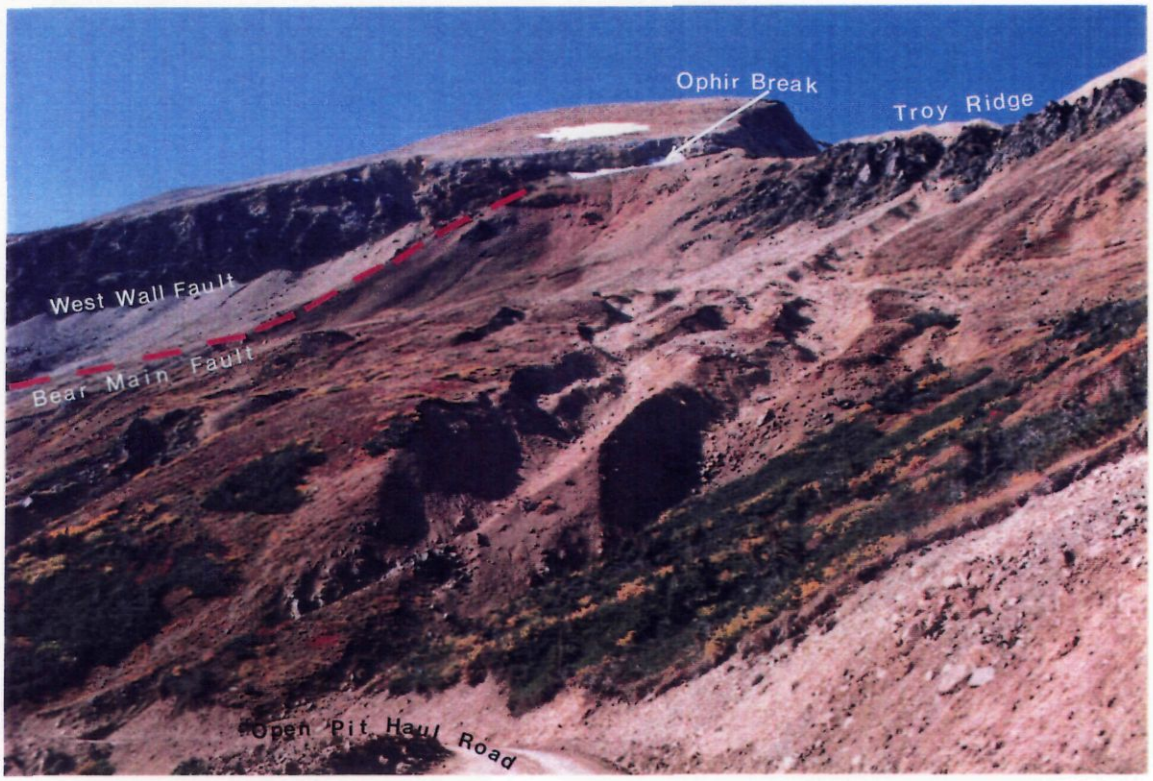


Figure 3.3.15 Photograph of Troy Ridge area showing gabbro bluffs in fault contact with limestone.

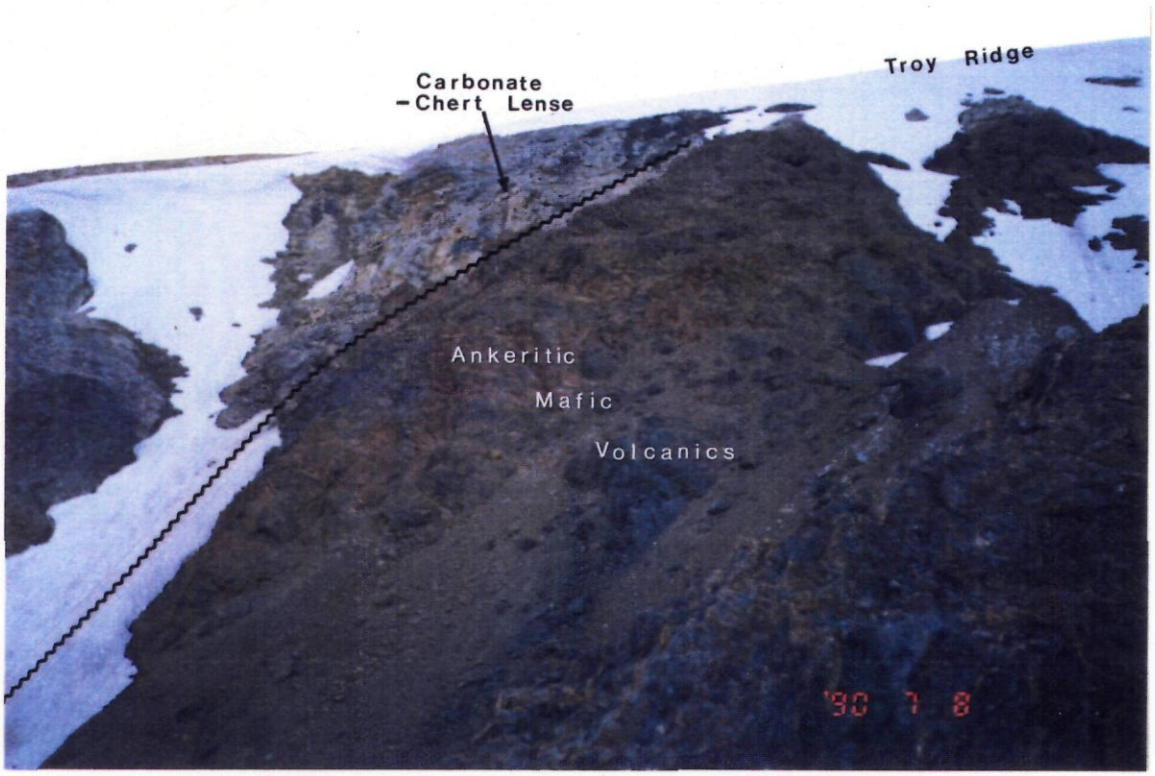


Figure 3.3.16 Photograph of a carbonate wedge on Troy Ridge.

against the volcanic and carbonate rock package in the footwall.

West of these structures, mafic lapilli tuff, mafic tuff and dolomite with interbedded chert are exposed in the trough of a synformal structure. On surface, a zone of extremely carbonate altered mafic volcanic rock cut by sheeted ankerite-dolomite veins has been reported by B. McDonald (pers comm) (Fig.3.3.17). This zone of alteration in the volcanic rocks is strikingly similar to alteration seen in the Bear Main Zone and may indicate an as yet unrecognized focus of hydrothermal activity.

The north-trending West Wall Fault dips at 65^{o} to the east and marks the western extent of the Troy Ridge area. This fault approximately coincides with an antiformal fold axis and cuts dolomite with interbedded chert exposed in the crest of the fold.

The crest of Troy Ridge is capped by lateral moraine material that originated from the Helen Glacier and has spilled over Troy Ridge into East Bowl.

Previous Exploration

Previous work on Troy Ridge includes geochemistry, geophysics, regional mapping, and limited diamond drilling. The area of underground workings continues as far north as 24530N, but no underground work has been done in the Troy Ridge area.

Silt and soil geochemistry carried out in 1981 and 1982 partially covers the Troy Ridge area. Results indicate anomalous values in Au (up to 600 ppb), As (>1000 ppm), and Sb (up to 39 ppm), that form a broad, moderate to strong anomaly east of the Bear Main Fault and west of East Bowl Creek. Geochemical results for silver were not notably anomalous across this area.

A VLF (EM-16) survey was conducted on the property in 1985. Results indicated a weak high across the Troy Ridge area. The north-trending narrow high is coincident with the Bear Main structure and the carbonate lens. Survey results on the top of the ridge are masked by the Helen Glacier moraine material. North of Helen Lake, beyond the moraine material, the anomaly resumes and continues in a linear trend north to Fleece Bowl.

To date, geologic mapping in the area has been on a regional scale. Chevron Minerals Ltd. completed a property scale map at 1 : 5000 during 1984 and 1985. More recent work has been done at the same scale by Oliver (1988) (Fig. 3.3.14).

Figure 3.3.17 Photograph of extremely carbonatized and ankeritic mafic volcanic rock from the Troy Ridge area.

In 1984, Chevron Minerals Ltd. drilled three holes (B84DH074, B84DH080, B84DH084) on Troy Ridge to test for carbonate outliers and fault structures up to and including the West Wall fault. All drill holes intersected the Bear Main structure and two of the holes intersected the West Wall fault.

In 1985, NAMC completed one drill hole (B85DH112) collared east of B84DH084 on section 24525N.

All four drill holes intersected tuff with local siltstone interbeds and lesser gabbro in the hanging wall of the Bear Main Zone.

The Bear Main structure was expressed slightly differently in each of the four drill holes. In hole B84DH074, a 46.36 m intersection of bleached, sheared and brecciated tuff was intersected between 1680 m and 1720 m elevation. This extensive zone contains three short dolomite sections and has been interpreted as the down dip confluence of the two structures (Bear Main Fault and Footwall Fault) that bound the carbonate lens (Fig. 3.3.18a). This interpretation indicates a 60^{o} easterly dip on the western fault, which forms the footwall structure bounding the carbonate wedge, and a steep (80^{o}) east dip on the hanging wall, or east bounding, fault.

In holes B84DH080 (Fig.3.3.18b), B84DH084 and B85DH112, the Bear Main structure is expressed across a narrower interval. The structure is indicated by strongly bleached, brecciated and sheared pyritic tuff with minor gouge and also by silicified polylithic breccia which includes carbonate rock fragments.

Weak anomalous grade was reported across the Bear Main structure in B84DH074. Grades peaked at 0.9 g/t Au over 0.9 m and at 2.4 g/t Ag over 1.0 m, intersected at approximately 1700 m elevation. B84DH080 intersected the Bear Main Zone at 1570 m elevation. Assay results associated with this intersection were low (0.1 g/t Au, 1.4 g/t Ag over 1.7 m for footwall bleached tuffs). Results were somewhat higher (1.4 g/t Au, 3.9 g/t Ag over 2.18 meters for hanging wall altered tuff) in B84DDH084 which intersected the Bear Main structure at 1550 m elevation. B85DH112 intersected the Bear Main structure at 1412 m elevation and produced consecutive results of 1.4 g/t Au, 1.0 g/t Ag over 1.05 m and 1.2 t/t Au, 0.8 g/t Ag over 1.0 m for hanging wall pyritic tuff. Results for samples on the Bear Main structure become slightly more anomalous with depth in the Troy Ridge area.

Below the Bear Main structure weakly bleached, lapilli-poor tuffs with minor black, cherty, carbonaceous, pyritic

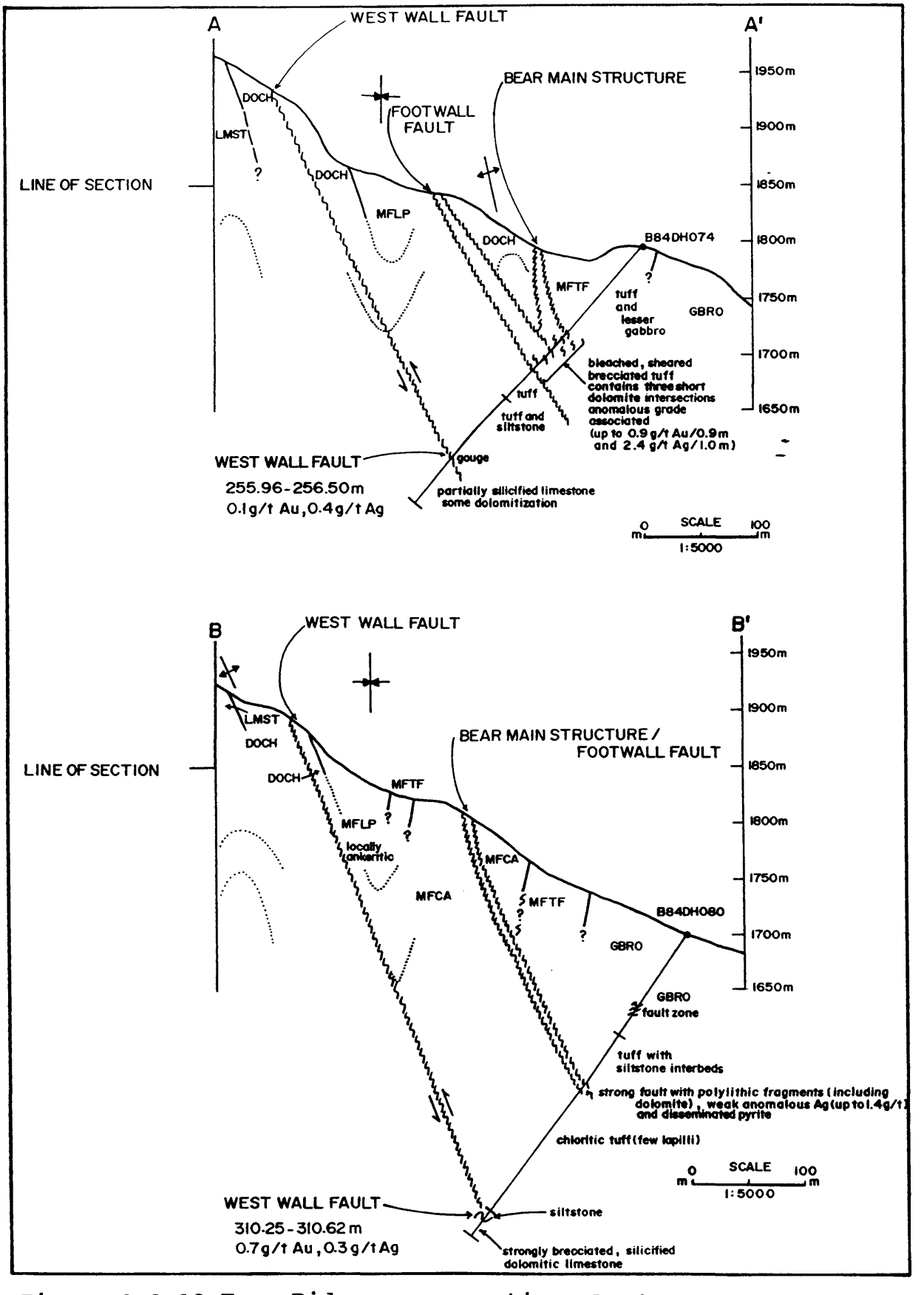


Figure 3.3.18 Troy Ridge cross-sections A-A′ and B-B′ drawn parallel to drill holes B84DH074 and B84DH080.

siltstones were intersected in all three Chevron drill holes.

In B85DH112 a 38.35 m interval of silicified, brecciated dolomite and strongly brecciated jasperoid was intersected below the Bear Main structure between 1412 m and 1372 m elevation. A 2.1 m interval of silicified carbonate breccia marks the lower contact of the carbonate lens and has been interpreted as the Footwall Fault (the west bounding structure).

Consecutive samples in silicified and brecciated jasperoid yielded assays of 6.6 g/t Au, 2.8 g/t Ag over 1.0 m and 8.1 g/t Au, 5.3 g/t Ag over 1.0 m. The silicified carbonate breccia also yielded anomalous results of 2.3 g/t Au, 2.3 g/t Ag over 1.05 m and 2.8 g/t Au, 6.3 g/t Ag over 1.05m for consecutive samples.

This hole ended in altered tuffaceous rocks just below the Footwall Fault. Holes B85DH112 and B84DH084 did not penetrate the West Wall Fault.

The West Wall fault is expressed by a narrow gouge zone in holes B84DH074 and B84DH080. Grades of 0.1 g/t Au, 0.4 g/t Ag over 0.95 m and 0.7 g/t Au, 0.3 g/t Ag over 0.37 m were reported across this zone in B84DH074 and B84DH080 respectively. In both of these holes, partially silicified, brecciated and locally dolomitized limestone was intersected in the footwall below the West Wall fault.

1990 Activities and Results

Very little work was carried out in the Troy Ridge area during the 1990 field season. Five soil samples and two rock chip samples were collected. The samples were taken in an area of extremely carbonate altered mafic volcanic rock cut by sheeted ankerite-dolomite veins. This area is located between two fault zones in the Ophir Break (Figs. 3.3.17).

An assay value of 0.48 g/t Au and Tr g/t Ag over a 0.3 meter width was obtained from a rock chip sample of silicic hydrothermal breccia. No other assay results are available.

Conclusions

The Troy Ridge area requires detailed exploration work in order for a proper assessment of its potential to be made. A grid should be established over the area early in the 1991 season to facilitate this work.

The previous silt and soil sampling program included samples as far west as approximately 25050E and therefore did not completely cover the area between the Bear Main fault and the West Wall fault. A detailed geochemical survey on the newly established grid should focus on this zone and continue far enough west to cover the ground over the West Wall fault if topography permits.

Detailed ground geophysics, specifically a VLF-EM survey, may help to outline general structural trends. It is not likely to produce sharp anomalies, as the VLF-EM survey performed over the Bear South Grid in 1990 did not produce clear cut anomalies over the known ore bearing structures.

Most importantly, detailed geologic mapping is needed to clarify the trends of the main structures and to pinpoint areas where these structures bifurcate and merge. Discrepancies in early mapping should be eradicated.

Detailed rock chip sampling should accompany mapping. To date, no previous rock sample locations or results have been located for the Troy Ridge area. Channel sampling and trenching should follow up the mapping and sampling program.

Four targets in the Troy Ridge area warrant drilling: the Bear Main Fault at 1400 m elevation, the Footwall Fault at 1375 m elevation, the eastern strike deflection of the Footwall Fault, and the West Wall Fault above 1600 m elevation.

The Bear Main structure was intersected at the 1550 m, 1570 m, and the 1700 m elevation in holes B84DH084, B84DH080, and B84DH074 respectively. Fragments, or short intervals of dolomite, were intersected over the Bear Main Fault in each hole and results for samples on this structure become slightly more anomalous with depth.

A "roll" in the Bear Main structure occurs at approximately the 1450 m elevation further to the south. "Rolls", or flatter east-dipping segments, in the main structure dilate during reverse fault movement, becoming structurally favourable zones for ore deposition (Lehrman and Caddey, 1989). Although one drill hole, B85DH112, has intersected the Bear Main Fault at 1412 m elevation, and produced weak anomalous results, the possibility of a roll in the Bear Main structure on Troy Ridge should be investigated further by deeper drilling, targetting the Bear Main structure at 1400 m elevation.

Encouraging results from the Footwall Fault, intersected at 1372 m elevation in B85DH112, suggest that higher grade material is located on this structure in the Troy Ridge area rather than on the Bear Main structure.

This possibility should be further investigated by targeting the Footwall Fault structure at 1375 m elevation.

A grade x thickness contour diagram for the Bear Main and Bear North areas indicates a shallow northerly plunge to the ore shoot. This further emphasizes the need for deeper drilling in the Troy Ridge area targeting the Bear Main and Footwall Fault structures at 1400 m and 1375 m elevation respectively, through the area 24700N to 24900N.

Lehrman and Caddy (1989) have observed that the movement along the Ophir Break is such that strike deflections to the east tend to dilate, becoming favourable zones for ore deposition. On Troy Ridge, the wedge of carbonate is bounded by two faults: the easterly fault maintains a relatively straight, northerly trend, but the western fault (the Footwall Fault?), bends around the wedge of carbonate deflecting first to the west, and then relatively sharply to the east. This structure should be tested along the easterly strike deflection, between Helen Lake and approximately 25050N.

Further drilling should test the West Wall Fault at higher elevation. This structure was tested at the 1450 m and 1600 m elevation in holes B84DH080 and B84DH074 respectively. Weak anomalous results were reported across this structure in both drill holes.

Drilling for this target should incorporate a test of the area of extremely carbonate altered mafic volcanic rock (B. McDonald, pers comm) if possible. This would involve collaring a hole in the area of 24600E, 24800N (approximately).

4. REFERENCES

Hendrickson, G.A. 1990. Geophysical report for horizontal co-planar loop electromagnetics, VLF-EM and magnetic surveys, Golden Bear Mine, British Columbia. Homestake Canada Ltd. internal company report.

Hewgill, W.V. 1985. Geochronology and rare earth element geochemistry of a metasomatic albitite in northwestern British Columbia. B.Sc. thesis. University of British Columbia, Vancouver.

Lehrman, N.J. and Caddey, S.W. 1989. Golden Bear project, northern British Columbia, geologic appraisal and exploration recommedndations. Homestake Mining Company internal company report.

Lowey, G.W. 1986. Observations at Muddy Lake, British Columbia, December 14 - 21 1986. North American Metals Corp. internal company report.

McAllister, S.C. 1984. Bear-Totem Geology 1:5000 Map, Chevron Canada Resources Ltd., map M523-G-119.

McDonald, B.W.R. 1990. Golden Bear Mine property mineral inventory, December 1, 1990. Homestake Canada Ltd. internal company report.

McDonald, B.W.R. and Reddy, D.G. 1990. Golden Bear Mine Project property legend codes, September 10, 1990. Homestake Canada Ltd., Golden Bear exploration group internal company memorandum.

Monger, L.W.H. and Ross, C.A. 1971. Distribution of fusilinareans in the western Canadian Cordillera, Canadian Journal of Earth Sciences, **8**: 259-278.

Oliver, J.L. 1988. Property Geology 1:5000 Map, Golden Bear Deposit. Homestake Canada Ltd. private company map.

Oliver, J.L. 1990. Structural and stratigraphic relations relevant to gold mineralization; Golden Bear Deposit and surround, June 4, 1990 memo. Homestake Canada Ltd. internal company report.

Oliver, J.L. and Hodgson, C.J. 1989. Geology and mineralization, Bearskin (Muddy) and Tatsamenie Lake district (south half), northwestern British Columbia. In British Columbia Ministry of Energy, Mines and Petroleum Resources, Geological Fieldwork 1988, Paper 1989-1, pp. 443-453.

Oliver, J.L. and Hodgson, C.J. 1990. Geology and mineralization, Tatsamenie Lake district, northwestern British Columbia. In British Columbia Ministry of Energy, Mines and Petroleum Resources, Geological Fieldwork 1989, Paper 1990-1, pp. 163-173.

Read, P.B. 1986. Petrography of samples 22501G to 22517G. Geotex Consultatnts Ltd.

Schroeter, T.G. 1985. Muddy Lake prospect (104 K/1W). In British Columbia Ministry of Energy, Mines and Petroleum Resources, Geological Fieldwork 1984, Paper 1985-1, pp. 257-258.

Schroeter, T.G. 1986. Muddy Lake prospect (104 K/1W). In British Columbia Ministry of Energy, Mines and Petroleum Resources, Geological Fieldwork 1985, Paper 1986-1, pp. 175-183.

Schroeter, T.G. 1987. Golden Bear project (104 K/1W). In British Columbia Ministry of Energy, Mines and Petroleum Resources, Geological Fieldwork 1986, Paper 1987-1.

Souther, J.G. 1971. Geology and mineral deposits of Tulsequah map-area, British Columbia. Geological Survey of Canada, Memoir 362.

Thompson, J. 1989. Golden Bear Mine ore reserve as of: January 1, 1989 including methods and procedures of calculation, January 30, 1989. Homestake Canada Ltd. internal company memorandum.

Titley, E.D. 1987. Geological report on the BEAR and BEAR 1 mineral claims. North American Metals B.C. Inc. internal company report.

Walton, G. 1985. Geochemical survey of THOR 4, TAN 7 claims. In British Columbia Ministry of Energy, Mines and Petroleum Resources Assessment Report, M504-G-17.

Wober, H.H. and Shannon, K.R. 1985. Bear-Totem status report. Chevron Canada Resources Limited internal company report.

APPENDIX A: 1990 EXPLORATION BUDGET

Table A.0.1 Golden Bear joint venture deferred exploration subledger December 31, 1990.

GOLDEN BEAR OPERATING COMPANY -- EXPLORATION EXPENDITURES AND PROJECTED BUDGET - 1990
Budget based on exploration drill program of approximately 5,500 ft; surface delineation drilling 1500ft; U/G delineation drilling 1400ft
DATE OF ISSUE: January 24th, 1991 (ALL FIGURES REPRESENTED AS $000's);

	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
LABOUR (015)	6.000	8.000	12.300	14.487	25.190	19.834	20.620	22.785	20.569	9.970	15.425	12.070	187.249
CLERICAL (045)	0.000	0.358	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.160	0.100	0.020	0.638
AIR SUPPORT (480)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.067	0.000	0.000	0.000	1.067
SURFACE DRILLING (415)	0.000	0.000	0.000	0.000	0.000	4.072	0.788	167.071	39.985	0.000	-0.125	0.000	211.792
U/G DRILLING (635)	0.000	0.000	0.000	0.000	0.000	0.321	0.000	0.000	46.808	38.063	0.000	0.000	85.191
ON-SITE ASSAYS (115)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.857	21.280	2.961	0.000	0.000	25.098
OFF-SITE ASSAYS (260)	0.000	0.000	0.000	0.000	0.353	0.000	0.000	0.230	2.090	2.345	0.005	0.000	5.063
CAMP COSTS (425)	0.000	0.150	0.000	0.000	0.000	1.580	0.000	15.754	4.980	2.004	0.354	0.000	24.822
CONSULTANTS (135)	0.230	0.288	0.280	15.400	0.000	6.281	0.000	0.000	0.000	21.641	0.175	8.900	53.195
TRAVEL (215)	0.131	1.436	6.060	0.389	1.597	3.525	1.044	5.276	1.240	2.330	1.376	1.183	25.587
VEHICLE/EQUIP EXPENSE (515)	0.000	0.000	0.000	0.000	0.365	2.206	2.282	2.629	4.564	2.282	1.586	0.000	15.916
FIELD MATERIALS (420)	0.000	0.000	0.000	0.000	3.212	7.591	2.252	0.765	0.419	0.300	0.050	0.000	14.589
GEOPHYSICS (470)	0.000	0.000	0.000	0.000	0.000	0.000	9.900	1.400	0.000	0.000	0.000	0.000	11.300
DRAFTING (925)	0.000	0.360	2.974	2.941	4.990	4.450	0.429	0.660	0.217	0.323	0.765	6.382	24.492
OFFICE SUPPLIES (245)	0.625	1.234	1.071	2.269	2.272	0.000	0.041	0.078	0.000	0.027	1.468	5.253	14.338
ROADS AND TRAILS (445)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TRENCHING (465)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
INSURANCE (285)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
FEES (275)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U/G DEVELOPMENT (615)	0.000	0.000	0.000	0.000	0.000	8.550	8.090	9.764	0.141	0.000	0.000	0.000	26.545
RENTALS AND LEASES (525)	0.000	0.000	0.000	0.000	0.000	0.403	1.193	1.394	0.991	0.901	3.684	0.100	8.666
OFFICE RENTAL (265)	0.000	0.000	2.400	0.800	1.006	1.159	0.785	0.879	0.074	0.076	0.000	4.447	11.625
CLAIM COSTS (325)	0.000	1.510	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	7.315	0.000	9.325
MONTHLY TOTAL(estimated)	10.475	13.500	22.200	39.800	59.500	94.425	206.425	207.225	160.324	107.530	32.178	38.355	
MONTHLY TOTAL(actual)	6.986	13.336	25.085	36.786	39.025	59.971	47.424	229.543	144.425	83.382	32.178	38.355	
CUMMULATIVE TOTAL	6.986	20.322	45.407	82.193	121.218	181.189	228.614	458.157	602.581	685.963	718.141	756.496	

MONTHLY LABOUR REQUIREMENTS
GEOLOGISTS + ASSISTANTS

	REMARKS
JAN	1
FEB	1.5
MARCH	2
APRIL	3
MAY	5
JUNE	5
JULY	5
AUG	5
SEPT	4
OCT	4
NOV	4
DEC	3

TOTAL EXPLORATION EXPENDITURE JAN - APRIL

82.193

TOTAL EXPLORATION EXPENDITURE MAY - SEPT

520.388 (EXPLORATION SEASON)

TOTAL EXPLORATION EXPENDITURE OCT - DEC

153.915

Finalized exploration budget ledger was not available from the Golden Bear Accounting Department at the time of preparation of this statement.

APPENDIX B:

LIST OF 1990 TECHNICAL PAPERS ON THE GOLDEN BEAR MINE PROPERTY

(1) Geophysical report for horizontal co-planar loop electromagnetics, VLF-EM and magnetic surveys, Golden Bear Mine, British Columbia.
Contractor: Delta Geoscience
Author: G.A. Hendrickson

(2) Structural and stratigraphic relations relevant to gold mineralization; Golden Bear Deposit and surround.
Consultant: J.L. Oliver
Author: J.L. Oliver

APPENDIX C: GOLDEN BEAR PROJECT PROPERTY LEGEND CODES MEMO AND UPDATES

Symbol	Description	To replace NAMC symbols
CAVE	CAVE - Material which has been recovered with an interval of core but which has fallen into the recovered position from higher up the hole.	
LOST	LOST CORE - An interval through which no recovery has been sustained.	
OVER	OVERBURDEN - core recovery through unconsolidated soil or transported material overlying bedrock.	
TRIC	TRICONED - Section of a hole drilled with a tricone bit therefore zero recovery obtained.	
BSDY	BASALT DYKE - Fine grained, dark green to black equigranular rock.	By
VNQZ	VEIN QUARTZ - Quartz vein of substantial size (ie. greater than 10cm)	
ANDY	ANDESITE DYKE - Fine grained dark green-grey intermediate volcanic. Contains up to 20% feldspar phenocrysts up to 2 mm across enclosed in an aphanitic ground mass.	
GOUG	FAULT GOUGE - Highly sheared, "punky", extremely soft clay material from an unidentifiable protolith. Assumed to be a sheared variant of wallrock lithology. Marks a fault plane. Not extensively pyritized but may contain minor fine sulphides. May be anomalous in gold and silver.	F, Ft
PGTF	PYRITIC TUFF GOUGE - Same original lithology as PYTF but entirely broken down to soft clay fault gouge by post mineral fault motion in the plane of mineralization. No original texture preserved. The gouge is dark-grey , locally limonitic where affected by supergene water percolation from surface. Invariably	FTp, Fnf, Ft

	anomalous in gold and silver. Commonly extremely high grade ore type, but grade is variable.	
PYTF	PYRITIC TUFF - Pyritic shear zone developed in mafic volcanic rocks. Rock is highly sheared, dark grey to black. It is silicified and competent, to clay-rich and soft. It contains abundant fine to medium grained sulphides, mainly pyrite. Invariably anomalous in gold and silver. Primary ore type.	Tp, Aq, Tp/Td
GBRO	GABBRO - Medium green, massive, porphyritic intrusive rock comprising 1 to 4 mm crystals of plagioclase and pyroxene.	G
DIDY	DIORITE DYKE - Dark grey, medium grained intrusive rock containing euhedral pyroxene and felspar crystals up to 4mm across.	
MFTF	MAFIC VOLCANIC ROCK - Underground use only. Undifferentiated basaltic pyroclastic and flow rocks, generally massive to poorly bedded, minor interflow volcano-sedimentary rocks. Lithologies include mafic ash tuff, mafic lapilli tuff, and turbidites. All are dark grey to dark green in colour.	T
MFAS	MAFIC ASH TUFF - Basaltic pyroclastic rock comprised of at least 50% vitric and lithic less than 2mm across. Variants include crystal tuff where at least some of the clastic components include crystal fragments. Rock may be well bedded to poorly bedded and is typically dark green.	T
MFEP	MAFIC EPICLASTIC VOLCANIC ROCK - Dark grey to green clastic sedimentary rock formed through erosion and re-working of volcanic rocks of mafic composition Typically well bedded with normal grading of moderately sorted clasts.	
MFLP	MAFIC LAPILLI TUFF - Basaltic pyroclastic rock comprised of vitric and lithic clasts 2mm to 64mm across	T

	which occupy greater than 50% of the rock by volume. Rock may be massive or poorly bedded and is typically dark green	
MFFL	MAFIC VOLCANIC FLOW - Basaltic volcanic flow rock. Typically dark green with plagioclase and pyroxene phenocrysts 2mm to 4 mm across of variable abundance. This rock is commonly massive in appearance but locally contains vesicles and may display pillow structures in outcrop.	T
MFCA	MAFIC VOLCANIC ROCK, CARBONATE ALTERED - Basaltic pyroclastic, flow and epiclastic rocks, bleached medium brown to light grey or cream coloured by carbonatization including development of silica, ankerite, dolomite, calcite, sericite, "green mica", and clay enrichment. May be extensively fractured or sheared and may be very soft. May contain up to 10% pyrite developed as patches, veinlets, and envelopes. Most commonly anomalous in gold and silver. Rarely ore grade.	Td, Tpd, Tp/Td
ARGI	ARGILLITE - Fine grained, dark grey to black, massive to finely bedded, pelitic rock which is commonly graphitic. Where tectonized may develop distinct graphitic slip planes.	A, Aq
CHSB	CHERT, SILICIFIED AND BRECCIATED Matrix supported, brecciated chert with angular chert and minor dolomite or silicified dolomite clasts in a light to medium grey matrix of <u>secondary</u> silica. Ankerite or carbonate matrix infilling is minor or absent. Clasts are rotated, and have been transported some distance there is commonly a heterogeneous component including minor tuff fragments. Clast composition is chert>>dolomite>mafic tuff. Trace sulphides may be present. May contain anomalous gold and silver grades. Locally ore grade.	XQ, QX

CHXB	CHERT, SILICIFIED, BRECCIATED, AND SULPHIDIZED - Matrix supported, brecciated chert with angular primary quartz and minor dolomite or silicified dolomite clasts in a dark grey matrix of <u>secondary</u> silica and fine grained sulphides. Ankeritic or carbonate matrix infilling is minor or absent. Clasts are rotated, and have been transported some distance there is commonly a heterogeneous component including up to 30% tuff and pyritic tuff fragments. Clast component is chert>>dolomite>mafic tuff. Commonly ore grade.	QX, Aq
CHRT	CHERT - Massive to finely laminated, White to medium grey, cryptocrystalline primary quartz. May be interbedded with up to 20% limey particulate beds. May be crackled or form jigsaw breccias with a silica or ankeritic matrix where little or no fragment transport has occurred. May contain minor veinlets or replaced limey layers of silica with trace pyrite. May contain anomalous gold and silver. Locally ore grade (open pit).	Q, Aq, QA
DOSB	DOLOMITE, SILICIFIED AND BRECCIATED Matrix supported, brecciated dolomite with angular primary chert and dolomite or silicified dolomite clasts in a light to medium grey matrix of <u>secondary</u> silica. Ankeritic or carbonate matrix is minor or absent. Clasts are rotated, and have been transported some distance there may be a heterogeneous component including minor tuff fragments. Clast component is dolomite>chert>mafic tuff. Trace sulphides may be present. May contain anomalous gold and silver grades.	XDq, XQ, QX
DOXB	DOLOMITE, SILICIFIED, BRECCIATED, AND SULPHIDIZED - Matrix supported, brecciated dolomite with angular primary chert and dolomite or silicified dolomite clasts in a dark grey matrix of <u>secondary</u> silica and fine grained sulphides. Clasts are	QX, Aq

	rotated, and have been transported some distance there is commonly a heterogeneous component including up to 30% tuff and pyritic tuff fragments. Clast component is dolomite>chert>mafic tuff.Commonly anomalous gold and silver grades. May be ore grade.	
DOCH	DOLOMITE WITH CHERT INTERBEDS - Thick bedded to massive tan to light brown fine to medium grained dolomite with increased primary chert component as narrow discontinuous lenses, layers or beds. Primary chert component is greater than 20%. Chert occurs as medium grey to white massive to finely laminated layers or lenses (nodules) in the dolomite. No sulphides are present in this lithology unless silicified. Where tectonized, especially in the mine area, this rock is extensively fragmental with abundant, angular to rounded large fragments of chert (>20%) up to 8 cm across and smaller fragments of dolomite up to 3cm across in an ankeritic carbonate matrix.	Dq, XDq, XQ, QX,
DOLO	DOLOMITE - Massive to thick bedded tan to light brown fine to medium grained dolomite. Contains up to 20% discontinuous primary chert layers which increase in size and extent up-section. Where tectonized, especially near Bear Fault and in mine area this rock appears extensively fragmental with angular to rounded dolomite and chert (<20%) fragments up to 5 cm across in an ankeritic carbonate matrix.	L, Dq, XDq
LMBC	LIMESTONE, BANDED AND CRINOIDAL - Buff to tan coloured, thin bedded limestone locally containing crinoidal bioclastic debris or ankeritic debris.	
LMST	LIMESTONE - Massive or thick to medium bedded carbonate, white to pale grey in colour with local bioclastic debris or argillaceous components	

UPDATES - The following units have been added to the property legend to accommodate rock units mapped by J. Oliver on a regional scale.

GRDI GRANODIORITE - Coarse to medium grained with hornblende as the chief mafic constituent. Biotite is usually present, and locally it is the predominant dark mineral. Plagioclase forms light grey, white or occasionally greenish subhedral crystals and is surrounded by anhedral grains of flesh coloured potassium feldspar. Clear, colourless or smoky quartz occurs as interstitial grains and subhedral crystals lining miarolitic cavities (Souther, 1971).

GRDF FOLIATED GRANODIORITE - Fine to medium grained diorite to quartz monzonite. Chlorite-altered hornblende is the most abundant mafic constituent. Feldspars are opaque, chalky white or tinted pink. Characteristically showing a strong mineral alignment, both foliation and lineation (Souther, 1971).

PHYL PHYLLITE - Fine-grained, dark, clastic sedimentary rocks with secondary fine-grained mica development forming a platy phyllitic texture and lustrous sheen. Typically intercalated with volcanic rocks which have been largely converted to greenstone and chlorite-amphibolite schist. Primary bedding and textural features are preserved (Souther, 1971).

APPENDIX D: 1990 EXECUTIVE SUMMARY MEMO OF JANUARY 15, 1991

GOLDEN BEAR PROJECT

1990 EXECUTIVE SUMMARY

File 104K/1,8
January, 1991
DGR

Commodity/Model:	Au / Shear-zone hosted epithermal gold deposit.
District:	Atlin Mining Division.
Location & Access:	Bearskin Lake, 135 km west of Dease Lake, northwestern B.C. Accessed by the 155 km long Golden Bear Mine road which joins Highway 117 east of Telegraph Creek (Fig. 2.1.1).
Land Position:	28 claims (28817.7 acres / 11662.1 ha), consisting of 408 units and Mining Lease #40 (Fig. 2.2.1).
Exploration Stage:	Detailed evaluation, definition and target drilling.
Agreements/Title:	Golden Bear mine is operated by Golden Bear Operating Company under a 50%-50% joint venture agreement between Chevron Minerals Ltd. and North American Metals Corp. Homestake Mining Company holds 73.3% ownership of NAMC and is operator of exploration on the Golden Bear project. Other joint venture agreements between Chevron and NAMC pertain to exploration along the access road and on claims near the Golden Bear property.
Expenditures:	The exploration expenditure on Golden Bear exploration for 1990 as of Dec. 31, 1990 is $ 756K (estimated final figure; Appendix A).
Competitor Activity:	A & M Exploration (Armeno Resources Inc.), Canamera (Wind River Resources Ltd.), Corona Corp.
1990 Additions to Mineral Inventory:	The additions to mineral inventory were the result of 1990 drilling, compilation work, test holes, and underground sampling. **Internal Sliver Zone** Mineral inventory of 58,075.1 tonnes @ 14.9 g/t Au (64,022.8 short tons @ 0.435 opt Au) cutoff of 7 g/t Au over 1.8 m width threshold + 15% dilution at 2 g/t Au grade (McDonald, 1990). **Slide Base Zone** Mineral inventory of 45,163.9 tonnes @ 16.1 g/t Au (49,789.3 short tons @ 0.470 opt Au) cutoff of 7 g/t Au over 1.8 m width threshold + 40% dilution at 2 g/t Au grade (McDonald, 1990).
Mineral Inventory:	**Bear Main Zone** Proven mineable ore reserves stated as 597,131.2 tonnes @ 18.6 g/t Au (658,286 short tons @ 0.543 opt Au) cutoff of 7 g/t Au over 2 m width threshold + 15% dilution at 0 grade (J.Thompson, 1989). **Fleece Bowl Deposit** Inferred mineral resource of 415,335.7 tonnes @ 7.7 g/t Au (457,871.9 short tons @ 0.225 opt Au) + 15% dilution at 2 g/t Au grade (based on an undiluted mineral resource stated in Wober and Shannon, 1985).

History:

Chevron staked the Golden Bear property in 1981 after contour soil samples returned values up to 9,200 ppb Au and subsequent rock chip samples assayed up to 24 g/t Au. The Bear deposit was discovered and trenched in 1982. Between 1983 and 1985, 19971.06 m was drilled in 117 holes on the property.

North American Metals Corp. became a joint venture partner on the Golden Bear project with Chevron Minerals Ltd. in 1986. Further exploration work, included drilling of 5775.26 m in 104 holes and more than 835 m of drifting. In 1985 a mineral inventory was established as 1.6 million tonnes of 10.8 g/t Au material in the Bear Main Zone, Bear North area, and the Fleece Zone combined. A mine feasibility study was conducted in 1987 and mill construction began in 1989.

HMC purchased a majority shareholding (73.3%) of NAMC in April 1988. Exploration resumed on the property in 1990 with 2295.12 m being drilled in 19 holes.

Geology:

The Golden Bear property is underlain by complexly folded and faulted Permo-Triassic rocks of the Stikine Terrane.

Stratigraphic units (Permo-Triassic)
-The oldest unit on the property is a carbonate unit on the west side of the property that is at least 300 m thick (Fig. 2.3.1). The unit includes limestone, dolomite, chert, and argillaceous siltstone. A shallow marine depositional environment is indicated by fossil debris.
-Mafic volcanic rocks overlie the carbonates. This unit is at least 200 m thick and is a fairly monolithologic succession that formed in a back-arc environment. The unit includes ash to lapilli-sized pyroclastic rocks, mafic flows, and epiclastic sediments.

Alteration near major fault zones is typically carbonatization and silification.

Intrusive units (Jurassic and younger)
-Gabbro intrudes mainly within mafic volcanics and constitutes the majority of landslide material at the northeast end of Bearskin Lake.
-Granodiorite and diorite form a large intrusive body in the north-central portion of the property.
-Porphyritic felsic volcanics (possibly Late Cretaceous to Early Tertiary Sloko Group) occur rarely along the Ophir Break in the Fleece Zone, where a felsic dyke carries ore-grade, and on the south side of Bearskin Lake.
-Miocene to recent basalt dykes of the Level Mountain Group are minor in extent although they intrude all other units including mineralized zones.

Major Structures
Fold structures within the stratigraphic units formed during three phases of deformation. A mid-Triassic Tahltanian Orogeny (probably also concurrent with regional greenschist metamorphism) resulted in isoclinal folding with axial planes dipping steeply east and fold axes plunging shallowly to the south. Second phase folding consists of open folds with northeast dipping axial planes and fold axes plunging moderately

North underground) totalled 2295.12 m (19 holes). Results are in Tables 3.3.1, 3.3.2 and 3.3.3.

1991 Proposed Program:

-**Generative work** consists of compilation and regional work on Bearskin Creek valley, along the Ultramafic Fault, Sam Creek area, and the Ophir Break south of Bearskin Lake (Fig. 2.2.1).
-**Detailed, target definition work** focuses on the Bear North area, Troy Ridge, Fleece Bowl, and the West Bear Fault (Figs. 2 and 4).
-**Drill targets** are the Bear North (underground), the Bear South, and Troy Ridge areas (Fig. 1.1.2).

1991 Proposed Budget: **$700K** (Jan. 15, 1991) Initially proposed as **$1.98M**
Expenditures to be split equally between the joint venture partners.

19000 E 21500 E 24000 E 26500 E 29000 E 31500 E 34000 E

30250 N 27750 N 25250 N 22750 N 20250 N

MISTY MOUNTAIN
MISTY GLACIER
SAM CREEK GLACIER
SAM CREEK (3.2)
SAM CREEK
Golden Bear Mine Claim Area
HIGHWAY CREEK
TOTEM ZONE
SAMOTUA RIVER
FLEECE-BOWL ZONE
SURPRISE RIDGE
BEARSKIN CREEK VALLEY
TROY RIDGE DRILLING
TROY RIDGE (3.2 & 3.3.7)
BEAR NORTH UNDERGROUND DRILLING
BEAR NORTH UNDERGROUND DRILLING (3.3.3)
OPEN PIT HAUL ROAD (3.3.6)
INTERNAL SLIVER UNDERGROUND DRILLING (3.3.4)
BEAR ZONE
BEAR MAIN (3.3.2)
SLIDE BASE (3.3.5)
WEST BEAR FAULT
BEAR SOUTH (3.3.1)
BEAR SOUTH DRILLING
EAST BOWL CREEK
ALPHA CREEK
BEARSKIN CREEK VALLEY
BEARSKIN LAKE
TAILINGS POND
CORE STORAGE AREA
AIRSTRIP
OFFICES
CAMP
BEARSKIN CREEK
MUSE RIDGE (3.2)
MUSE RIDGE
AVALON CREEK
AVALON BOWL
LONESOME LAKE
SAMOTUA RIVER

LEGEND

AREAS OF 1990 EXPLORATION WORK

AREAS OF 1991 PROPOSED EXPLORATION WORK

GENERATIVE

DETAILED

DRILLING

SYMBOLS

ROCK OUTCROP (defined, felsenmeer or talus)

LITHOLOGIC CONTACT (defined, inferred)

FAULT WITH RELATIVE MOVEMENT (defined, inferred)

THRUST FAULT

BEDDING (dip indicated, overturned)

FOLIATION (first, second phase)

BEDDING–CLEAVAGE, CLEAVAGE–CLEAVAGE, MINERAL LINEATION

ANTICLINE, SYNCLINE (deformational phase, plunge indicated)

OVERTURNED ANTICLINE, SYNCLINE (plunge indicated)

CLEAVAGE VERGENCE (oriented, neutral)

MINOR FOLD AXIS (trend, plunge, fold vergence indicated)

VEIN

JOINT

CLAIM POST

SURVEY STATION (permanent)

TRENCH, PORTAL, OPEN PIT

LAKE, MARSH

STREAM or CREEK (perennial, intermittent)

CONTOURS (metres)

CAT–TRAIL, ROAD, MAIN ROAD

inches 0 1 2

centimetres 0 1 2 3 4 5

BRITISH COLUMBIA GEOLOGICAL SURVEY

This reference scale bar has been added to the original image. It will scale at the same rate as the original picture & can be used as a reference for the original size.

Scale 1 : 25,000

0 2500

metres

GOLDEN BEAR OPERATING COMPANY LTD.

LOCATION MAP OF AREAS OF 1990 & 1991 WORK ON THE GOLDEN BEAR PROPERTY

Drawn By:	**Date:**
Figure No: 3.1.1	**Map No:**
Drawing No:	**N.T.S.:** 104 K

MG-1982

Left 1 Upper 1	Upper 1	Right 1 Upper 1
Left 1	Center	Right 1
Left 1 Lower 1	Lower 1	Right 1 Lower 1

HOLE NUMBER
Au(g/t), Ag(g/t)/width (m)
True Thickness (mtt)
Au(g/t), Ag(g/t)/Mining width (m)

DIAMOND DRILL HOLE INTERSECTION

Au(g/t) width (m)

ORE ZONE CHANNEL SAMPLE

Au(g/t) width (m)

FOOTWALL CHANNEL SAMPLE

Au(g/t) width (m)

HANGING WALL CHANNEL SAMPLE

CROSS-CUT, DRIFT (on section)

CROSS-CUT, DRIFT (projected to section)

LITHOLOGIC CONTACT (defined, inferred)

FAULT (defined, inferred)

BRECCIA

SURVEY PLUG NUMBER

SURVEY POINT

FIGURE 3.3.11 a

Internal Sliver longitudinal section showing locations of drill intersections and areas outlined as a mineral inventory in 1990

inches
0 1 2
0 1 2 3 4 5
centimetres

BRITISH COLUMBIA GEOLOGICAL SURVEY

This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.

SCALE 1 : 250

0 25

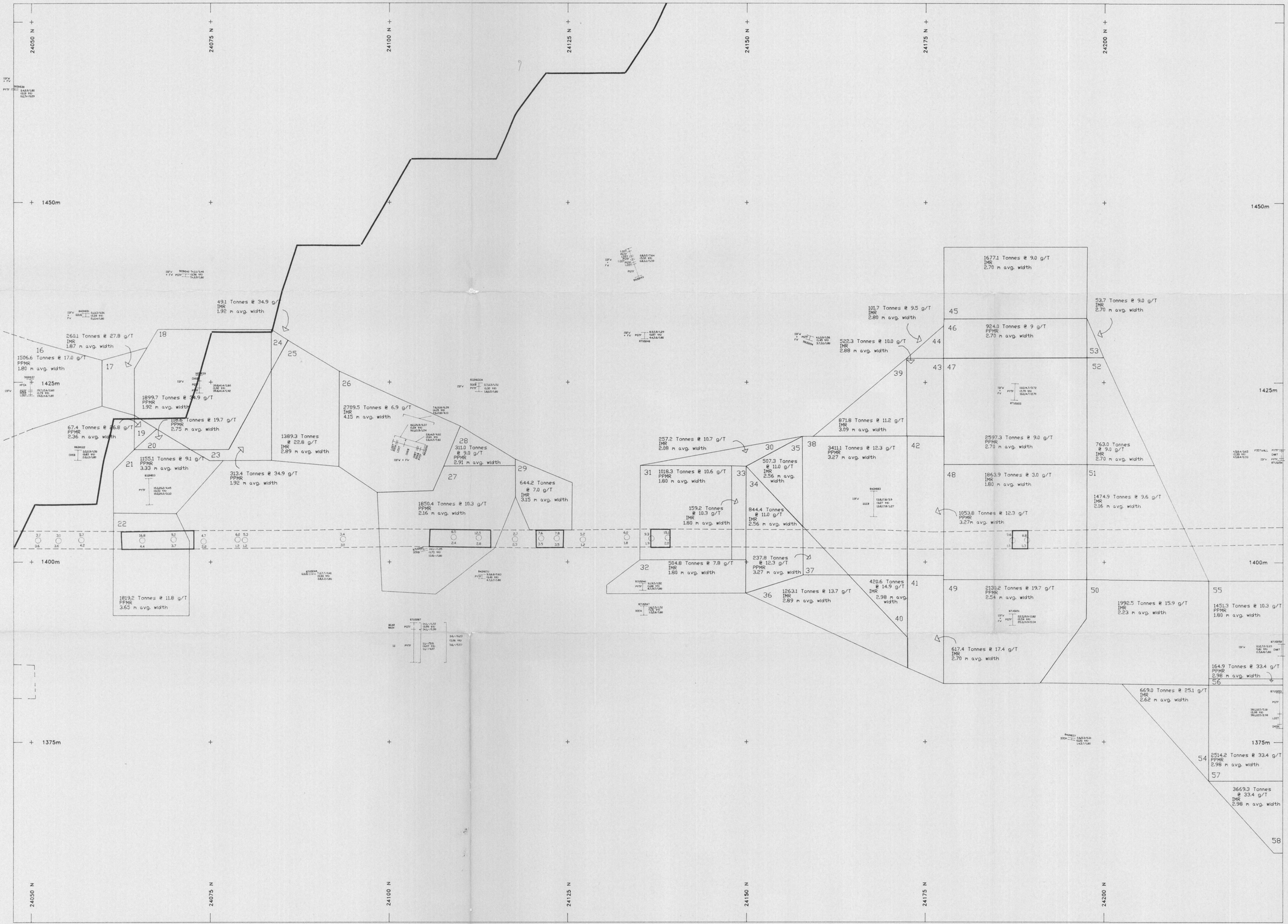
metres

GOLDEN BEAR OPERATING COMPANY LTD.

INTERNAL SLIVER ZONE
Looking West (270°)

Center
LONGITUDINAL SECTION
(Vertical)

Drawn By: DGR	**Date:** Jan. 14,1991
Figure No: 2.9	**Map No:**
Drawing No:	**N.T.S.:** 104K



Left 1 Upper 1	Upper 1	Right 1 Upper 1
Left 1	Center	Right 1
Left 1 Lower 1	Lower 1	Right 1 Lower 1

HOLE NUMBER
Au(g/t), Ag(g/t)/width (m)
True Thickness (mtt)
Au(g/t), Ag(g/t)
/Mining width (m)

DIAMOND DRILL HOLE INTERSECTION

Au(g/t) ○ width (m) — ORE ZONE CHANNEL SAMPLE

Au(g/t) △ width (m) — FOOTWALL CHANNEL SAMPLE

Au(g/t) ▽ width (m) — HANGING WALL CHANNEL SAMPLE

CROSS-CUT, DRIFT (on section)

CROSS-CUT, DRIFT (projected to section)

LITHOLOGIC CONTACT (defined, inferred)

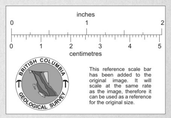
FAULT (defined, inferred)

BRECCIA

SURVEY PLUG NUMBER △ — SURVEY POINT

FIGURE 3.3.11 b

Internal Sliver longitudinal section showing locations of drill intersections and areas outlined as a mineral inventory in 1990



SCALE 1 : 250

0 25

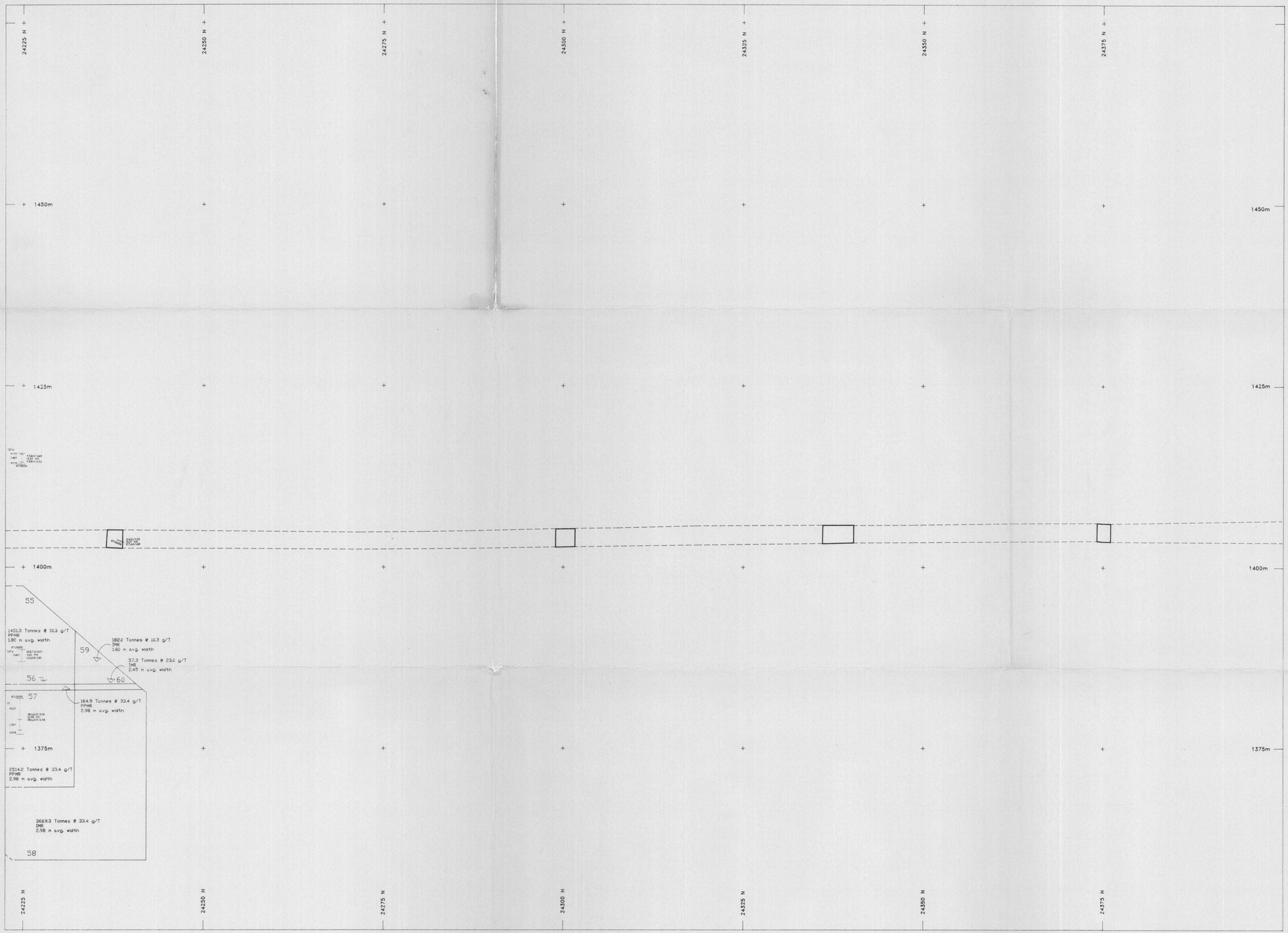
metres

GOLDEN BEAR OPERATING COMPANY LTD.

INTERNAL SLIVER ZONE
Looking West (270°)

Right 1
LONGITUDINAL SECTION
(Vertical)

Drawn By: DGR	Date: Jan. 14,1991
Figure No: 2.11	Map No:
Drawing No:	N.T.S.: 104K



Upper 1	Right 1 Upper 1	Right 2 Upper 2
Center	Right 1	Right 2
Lower 1	Right 1 Lower 1	Right 2 Lower 2

HOLE NUMBER
Au(g/t), Ag(g/t)/width (m)
True Thickness (mtt)
Au(g/t), Ag(g/t)
/Mining width (m)

DIAMOND DRILL HOLE INTERSECTION

Au(g/t) / width (m) — ORE ZONE CHANNEL SAMPLE

Au(g/t) / width (m) — FOOTWALL CHANNEL SAMPLE

Au(g/t) / width (m) — HANGING WALL CHANNEL SAMPLE

CROSS-CUT, DRIFT (on section)

CROSS-CUT, DRIFT (projected to section)

LITHOLOGIC CONTACT (defined, inferred)

FAULT (defined, inferred)

BRECCIA

SURVEY PLUG NUMBER — SURVEY POINT

FIGURE 3.3.11 c

Internal Sliver longitudinal section showing locations of drill intersections and areas outlined as a mineral inventory in 1990

inches
0 1 2
0 1 2 3 4 5
centimetres

BRITISH COLUMBIA GEOLOGICAL SURVEY

This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.

SCALE 1 : 250

0 25
metres

GOLDEN BEAR OPERATING COMPANY LTD.

INTERNAL SLIVER ZONE
Looking West (270°)

RIGHT 2
LONGITUDINAL SECTION
(Vertical)

Drawn By: DGR	Date: Jan. 14,1991
Figure No: 2.13	Map No:
Drawing No:	N.T.S.: 104K