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REPORT ON THE <u>TAN</u> AND GIL CLAIMS STEWART BRITISH COLUMBIA SKEENA MINING DIVISION

NTS 104B/8F & 104A/12W Latitude 56°20' and 56°35' North 56° 27 30' Longitude 130°00' and 129°55' West/29° 57' 80"

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GEOLOGICAL BRANCH ASSESSMENT REPORT

Calgary, Alberta February, 1990

FILE: TANGIL

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SUMMARY

The Gil and Tan claim blocks are located 56 kilometers north and 42 kilometers north respectively of Stewart, British Columbia in the Skeena Mining Division. The claim blocks are located within a belt of rocks referred to as B.C.'s "Golden Triangle" which encompasses the Iskut River Gold Camp to the west, the Unuk River Camp to the east and the Stewart Gold Belt to the south. Besides the recent Eskay Creek discovery, the "Triangle" has two producing gold mines and at least three more in the process as well as a recently discovered porphyry copper-gold discovery.

During February to March 1990, Marlin Developments Ltd. undertook an airborne reconnaissance magnetic and VLF-EM survey over the Gil and Tan claims. The results of the survey are covered in a separate report. In addition, an enlarged orthophoto was prepared for the claim area with a lineament interpretation compiled from the enlargement. This lineament interpretation was used in determining possible sources of the VLF-EM anomalies obtained.

Analysis of possible correlations between lineaments, conductors and geology on the Gil and Tan claims has led to the definition of a number of targets worthy of further work.

INTRODUCTION

During February to March 1990 Marlin Developments Ltd. conducted an airborne reconnaissance magnetic and VLF=EM survey over the project area. Western Geophysical Aero Data Ltd. of Vancouver conducted the work while the orthophoto enlargement was prepared by Optimum Mapping of Vancouver. E.R. Kruchkowski Consulting Ltd. of Calgary provided the orthophoto lineament interpretation.

Location and Access

The Tan & Gil Claim Groups are noncontiguous dispositions and are located approximately 42 and 56 kilometres, respectively, north of Stewart and 230 kilometres north of Prince Rupert in northwestern British Columbia (Figure 1). The properties are centered on latitude 56°20'N, longitude 130°00'W and latitude 56°35'N, longitude 129°55'W, respectively, and within NTS map area 104A/5W, 104B/8E and 104A/5W, 12/W, respectively. Essentially, both properties are accessible only by helicopter and, only during the normal summer field season months, usually June through October.

Physiography and Topography

The area of the claim blocks encompass steep mountain slopes typical of the Coast Range region of British Columbia. The Bowser River, a wide braided river system with lakes up to several kilometers wide, is present along the west and southern portion of the claim block. Topography ranges from 2100 to greater than 9800 ft. ASL. Vegetation is confined to valley floors where abundant alder and spruce growth is found. Above 2200 ft. ASL outcrop exposure is extensive, but a high proportion of both claim groups is covered by glaciers or permanent snowfields. Timber supply is limited to lower elevations.

Supplies and accommodation are available at Stewart and there is good supply of skilled exploration and mining manpower in the area.



Property and Ownership

The Tan and Gil Claim Groups comprise a total of four (4) noncontiguous claim groupings to a total aggregate of 1155 mineral units (approximately 71,300 acres) recorded and in good standing in the Skeena Mining Division (Figures 2 and 3). Marlin Developments has acquired a 60% working interest in the property with Keylock Resources Ltd. having a 40% working interest.

The claim blocks are as follows:

Name		Record No.		Units	Record	Date
Tan 1-	46 incl.	7425-7460	incl.	460	March	31
Gil 1-	36 incl.	7379-7424	incl.	695	March	31

Previous Work

The Tan and Gil Claim Groups have had little or no previously documented exploration activities. Undoubtedly, early prospectors have traversed selected areas at lower elevations and, upland areas have been observed and inspected by helicopter-borne explorationists in more recent times.

There are a few old exploration tunnels and adits along the south side of the Bower River and near the northern boundary of Than claim. Most of the work appears to have been done west of the areas of interest.

To the west, the general area has become a focal point for precious and base metals mineralization with the discovery and/or development of mineral deposits near Brucejack Lake (Newhawk Gold Mines



TAN CLAIMS

CLAIMS MAP

4

SCALE=1:100 000

N.T.S. 1048/8E & 104A/5W

FIG. 2



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Ltd. and Catear Resources Ltd.) and, further north and west on the Iskut River where Delaware Resources and Cominco are developing the Snip gold-silver deposit, Skyline Explorations is actively mining the Johnny Mountain gold-silver deposit and the Calpine-Consolidated Stikine joint venture is exploring the apparently large Eskay Creek base and precious-metal bearing massive sulphide deposit(s).

It is important to note that the Stewart area, at large, is documented as a well-mineralized district and many other base and precious metal-bearing deposits have been either discovered, developed and mined in both the areas to the south AND west of the Tan and Gil Claim Groups.

GEOLOGICAL SURVEYS

Regional Geology

The Gil and Tan claims lie in the Stewart area, east of the Coast Crystalline Complex and within the western boundary of the Bowser Basin. Rocks in the area belong to the Mesozoic, Stuhini and Hazelton Group and have been intruded by plugs of both Cenozoic and Mesozoic age.

The base of the volcanic rocks appears to be Triassic in age and consists of brown, black and grey, mixed sedimentary rocks interbedded with medium to dark green, mafic to intermediate volcanic and volcaniclastic rocks. The Stuhini Group appears to be conformably overlain by the Hazelton Group.

At the base of the Hazelton Group is the lower Jurassic Marine (submergent) and non-marine (emergent) volcaniclastic Unuk River Formation. This is overlain at steep discordant angles by a second, lithologically similar, middle lower Jurassic volcanic cycle (Betty Creek Formation), in turn overlain by an upper lower Jurassic dacitic lapilli tuff horizon (Mt. Dilworth Formation). Middle Jurassic non-marine sediments with minor volcanics of the Salmon River Formation unconformably overlie the above sequence.

The oldest rocks in the area belong to the Lower Jurassic Unuk River Formation which forms a north-northwesterly trending belt extending from Alice Arm to the Iskut River. It consists of green, red and purple volcanic breccia, volcanic congolomerate, sandstone and siltstone with minor crystal and lithic tuff, limestone, chert and coal. Also included in the sequence are pillow lavas and volcanic flows.

In the property area the Unuk River Formation is unconformably overlain by middle Lower Jurassic rocks from the Betty Creek Formation. The Betty Creek Formation is another cycle of troughfilling sub-marine pillow lavas, broken pillow breccias, andesitic and basaltic flows, green red, purple and black volcanic breccia, with self erosional conglomerate, sandstone and siltstone, and minor crystal and lithic tuffs, chert, limestone and lava.

The upper Lower Jurassic Mt. Dilworth Formation consists of a thin sequence varying from black carbonaceous tuffs to siliceous massive airfall lapilli tuffs and felsic ash flows. Minor interbedded sediments and limestone are present in the sequence. Locally pyritic varieties form strong gossans.

The Middle Jurassic Salmon River Formation is a late to post volcanic episode of banded, predominately dark coloured, siltstone, greywacke, sandstone, intercalated calcarenite, minor limestone, argillite, conglomerate, littoral deposits, volcanic sediments and minor flows.

According to E.W. Grove, the majority of the rocks from the Hazelton Group were derived from the erosion of andesitic volcanoes subsequently deposited as overlapping lenticular beds varying laterally in grain size from breccia to siltstone.

Mr. Alldrick's work has shown several volcanic centres in the property area. Lower Jurassic volcanic centres in the Unuk River Formation are located in the Big Missouri Premier area, and in the Brucejack Lake area. Volcanic centres within the Lower Jurassic Betty Creek Formation are in the Mitchell Glacier and Knipple Glacier areas.

There are various intrusives in the area. The granodiorites of the Coast Plutonic Complex largely engulf the Mesozoic volcanic terrain to the west. East of these (in the property area), smaller intrusive plugs range from quartz monzonite to granite to highly felsic; some are, likely, related late phase offshoots of the Coast plutonism, others are synvolcanic and tertiary. Double plunging, northerly-trending synclinal folds (Mitre syncline, Dilworth

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LEGEND after Grove, 1982

RECENT

20 UNCONSOLIDATED DEPOSITS; RIVER FLOODPLAIN, ESTUARINE, RIVER CHANNEL AND TERRACES, ALLUVIAL FANS, DELTAS AND BEACHES, OUTWASH, GLACIAL LAKE SEDIMENTS, TILL, PEAT, LANDSLIDES, VOLCANIC ASH, HOTSPRING DEPOSITS

UPPER JURASSIC

17 SILTSTONE, GREYWACKE, SANDSTONE, SOME CALCARENITE, ARGILLITE, CONGLOMERATE, MINOR LIMESTONE, MINOR COAL (INCLUDING EQUIVALENT SHALE, PHYLLITE, AND SCHIST)

MIDDLE JURASSIC

- 16 SILTSTONE, GREYWACKE, SANDSTONE, SOME CALCARENITE, MINOR LIMESTONE, ARGILLITE, CONGLOMERATE, LITTORAL DEPOSITS
- **13a** GREEN, RED, PURPLE. AND BLACK VOLCANIC BRECCIA, CONGLOMERATE, SANDSTONE, AND SILTSTONE

13c SILTSTONE

13d MINOR CHERT AND LIMESTONE (INCLUDES SOME LAVA (+14))

LOWER JURASSIC

12a GREEN, RED, AND PURPLE VOLCANIC BRECCIA, CONGLOMERATE, SANDSTONE, AND SILTSTONE

12b CRYSTAL AND LITHIC TUFF

12c SANDSTONE

EOCENE

- 8a QUARTZ DIORITE
- 8b GRANODIORITE
- 8f FELDSPAR PORPHYRY

JURASSIC

2b PHYLLITE, SEMI-SCHIST, SCHIST

syncline, Spider anti-cline) of the Unuk River and Mt. Dilworth Formations dominate the structural setting of the area. These folds are locally disrupted by small east-overthrusts on strikes parallel to the major fold axis, cross-axis steep wrench faults which locally turn beds, selective tectonization of tuff units, and major northwest faults which turn beds. Figures 4 and 5 show the regional geology of the claims.

Local Geology

The Tan and Gil Claim Groups are primarily underlain by middle Jurassic volcanic, volcano sedimentary and sedimentary rocks and units within the Bower Basin and termed the Hazelton Group (Grove, op.cit.). These rocks have been folded and faulted by granite intrusions and influences of the late Mesozoic and Cenozoic Coast Crystalline Complex to the west. The geological setting and environment is considered favourable for hosting either "high level", epithermal deposits of gold and silver or base and precious metal-bearing massive sulphide deposits.

Outcrop exposure on the Tan and Gil Claim Groups is dominated by the Betty Creek Formation, a "trough filling cycle" of pyroclastic and sedimentary rocks that includes massive green and grey andesitic to dacitic tuffs, lapilli tuffs, tuff breccias, flows and bedded volcanic breccias, lapilli tuffs, crystal and lithic tuffs, commonly hematitic. This unit is succeeded by exposures of the thinner, but stratigraphically diverse Mt. Dilworth Formation that is composed of intermediate to felsic pyroclastic rocks including crystal and lithic tuffs and, possibly rhyolitic flow rocks. The Mt. Dilworth Formation is locally pyritiferous and may develop quartz-rich stockworks and other silicifications.

The regional geological setting of the area of interest is believed to be the result of successive periods of volcanism followed erosional periods of miogeosyclinal and eugeogyclinal accumulations periodically disturbed and influenced by continuing emergences of

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intrusions of Coast Crystalline rocks and Pacific sea-floor spreading. Alldrick (1989) has postulated the presence of a "volcanic centre" in the area immediately west of the Tan Claim Group. This would account for the presence of proximal volcanoclastic rocks and other related extrusives.

Economic Geology

There are no documented or recorded mineral occurrences on the Tan or Gil Claim Groups. However, it is important to take note of some precious and base metals occurrences immediately west and east of the Tan Claim Group.

Immediately west of the southwest margin of the Tan Group is the "East Gold" occurrence, a small high grade precious metals occurrence that has been described by Kruchkowski and Sinden (1989).

Precious metals are distributed throughout altered, pyrite-bearing rocks with silver most enriched in those areas where galena, sphalerite and tetrahedrite are found. High grade gold and silver occurrences are located in subsidiary, splay or subparallel local structures and shears. Documented production history at East Gold includes 39.25 short tons reduced from 850 mined short tons to recover 1,533 oz. gold and 4,024 oz. silver for an average mined grade of 1.8 oz./ton gold and 4.7 oz./ton silver.

The evidence at East Gold is consistent with the proposed model for British Columbia epithermal gold-silver deposits (Panteleyev, 1986), including Silbak Premier and Newhawk.

Another important nearby occurrence is the Moonlight deposit located on American Creek located just at the southeast corner of the Tan Claim Group. Here, base and precious metals mineralization is located in a wide fracture zone striking northerly along the contact of volcanics on the west and argillites on the east. The

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best mineralization is exposed over a width of 11.4 ft for a strike length of 80 ft and consists of galena, tetrahedrite, sphalerite, pyrite and some chalcopyrite. Other types of mineralization include quartz replacements in a fracture zone up to 75 ft wide hosting disseminated pyrite and some sphalerite and narrower quartz vein occurrences and silicifications that host base and precious metals. In 1937, a shipment of 61 lbs of selected vein material returned an assay of 387.7 ounces of gold per ton and 164.4 ounces of silver per ton (EMR Mineral Inventory Information).

The Tan Claims are also near to the Todd Creek property of Goldnev-Noranda to the east.

Recent results released by Golden Nevada Resources Inc. outline three mineralized zones on their Todd Creek property.

The South Zone is a 900 meter long and 15 meter wide fault controlled quartz-sericite-pyrite alteration zone. Chip sampling averaged 0.119 ounces per ton gold over 270 meters and 0.65% copper across three meters.

The North Zone returned values of 0.153 ounces per ton gold across three meters in a quartz sulphide vein system.

The Mid Zone consists of mineralized shear zones and quartz sulphide veins with values up to 0.96 ounces per ton gold. Boulders from a quartz-carbonate-sericite-pyrite alteration zone graded up to 0.845 ounces per ton gold. Some of the trench results are:

TRENCH	WIDTH <u>FEET</u>	GOLD OZ/T	CU _*
8	19.7	0.174	0.49
10	29.5	0.109	1.20
11	14.7	0.214	0.52
13	9.8	0.138	0.23
15	9.8	0.130	0.66

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Drilling on the South Zone substantiated surface assays. Grades of gold mineralization improved with depth. Some of the drilling results are:

HOLE	INTERSECTION	WIDTH	GOLD	COPPER
NO.	FEET	FEET	<u>OZ/T</u>	0 0
5	181.6 - 187.3	5.7	0.348	1.50
7	200.0 - 204.9	4.9	0.117	0.70
8	190.6 - 210.8	20.2	0.200	0.23
	including			,
	196.5 - 203.1	6.6	0.317	0.40
9	196.5 - 203.1	6.6	0.317	0.40
-	232.8 - 265.4	32.6	0.183	0.32
	including			
· · · ·	234.4 - 237.7	3.3	0.181	0.97
	244.3 - 246.5	2.2	0.160	0.28
	256.8 - 262.1	5.3	0.238	0.57

In general, this land position is along the east edge of the Unuk River Camp and is in close proximity to a number of gold discoveries and occurrences as follows:

- 1. Snip Deposit
 1.57 million tons of 0.64 oz/ton Au
 (Proven and Probable)
- 2. Johnny Mountain Gold Mine 686,000 tons of 0.57 oz/ton Au (Proven, Probable, Possible)
- 3. E & L Deposit 3.2 million tons of 0.8% Ni & 0.6% Cu (Drill Indicated)
- 21 Zone Discovery
 3-5 million ounces of Au (Indicated Potential)
- 5. Sulphurets Gold Zone 20 million tons of 0.08 oz/ton Au (Indicated Potential)
- 6. Snowfield Gold Zone 25 million tons of 0.08 oz/ton Au (Indicated Potential)
- 7. Brucejack Gold Deposit 854,072 tons of 0.354 oz/ton Au & 22.94 oz/ton Ag

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(Drill Indicated and Inferred)

- 8. Gold Wedge Deposit 375,000 tons of 0.75 oz/ton Au & 1.0 oz/ton Ag (Proven and Probable)
- 9. Kerr Deposit 66 million tons of 0.86% Cu & 0.01 oz/ton Au (Drill Indicated)
- 10. Q22/17 Gold Zone 470,000 tons of 0.27 oz/ton Au & 1.31 oz/ton Ag (Probable)
- 11. S B Deposit
 308,000 tons of 0.505 oz/ton Au & 1.07 oz/ton Ag
 (Drill Indicated and Inferred)
- 12. Big Missouri Deposit 1.86 million tons of 0.091 oz/ton Au & 0.67 oz/ton Ag (Drill Indicated and Inferred)
- 13. Silbak Premier Deposit 6.1 million tons of 0.064 oz/ton Au & 2.39 oz/ton Ag (Drill Indicated & Inferred)
- 14. Prosperity Porter Idaho Deposit 911,000 tons of 19.5 oz/ton Ag & 5% Pb, Zn (Probable)
- 15. Georgia River Deposit 321,067 tons of 0.839 oz/ton Au & 0.656 oz/ton Ag (Drill Indicated and Inferred)
- 16. Dolly Warden Deposit
 515,350 tons of 11.04 oz/ton Ag
 (Proven, Probable)

This makes the Gil and Tan excellent exploration targets in a well mineralized belt of volcanic rocks.

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TAN CLAIMS AIRPHOTO INTERPRETATION

General Consideration

An enlarged airphoto (1:20000 scale) of the Tan claim block was studied in order to determine correlations, if any, between lineations and airborne geophysical data, structural-stratigraphic features and geochemical patterns (the latter is forthcoming). Positive correlations would greatly facilitate "target-definition" for future exploration.

In interpreting the airphoto, the following features were kept in mind:

- Mt. Dilworth formation: graphitic hanging wall unit and gossanous rhyolites, which host the 21B deposit at Eskay Creek.
- 2. Sericitized, discordant shear systems which trend NNW to NW and are hosted by "Unuk River", "Betty Creek" and porphyry formations (eg. Goldwedge, Silbak, Snip, Shore deposits).
- 3. Altered fault systems trending NE in Unuk and Betty Creek formations (eg. Golden Rocket, Silbak, Johnny Mt. deposits).
- Concordant fault-shears at stratigraphic contacts in Unuk or Mt. Dilworth formations (eg. Brucejack, Johnny Mt. and Eskay Creek deposits).

In this perspective graphitic VLF-EM conductors not lineaments which parallel the Mt. Dilworth formation held special interest. The same may be said of coincident lineaments, conductors and "alteration zone" which are represented by NW< NNW and NE structures, particularly if these are near the Unuk-Betty Creek contact or proximal to porphyritic intrusions. Lineament Study

Lineaments on the Tan claims may be subdivided into six groups: N, NW, WNW, NE, NNE and NNW. Age relationships cannot be ascribed since each group appears to be offset by the other (multiple reactivation?). The NNE group runs least disrupted.

- 1. Due N: Apparently related to stratigraphy. Occur in south portion of claim block.
- 2. Due NW: Long, prominent continuous structures (regional?) wide and recessive (shear zones?). These pervade the claim block.
- 3. WNW: Same as above. Most glaciers follow this trend. "East Gold Fault" is an example. Most common in the west half of the property.
- 4. NE: Most abundant through centre of claim blocks. Discontinuous, anastomosing narrow and usually recessive (faults, joints?).
- 5. NNE: Seemingly late structures, similar to NE ones. Uncommon though may be braced over great distance. Evident in centre and at NW corner of block. Often found where NE structures abound.
- 6. NNW: Poorly defined, uncommon, similar to NNE structures. Narrow, recessive and somewhat anastomosing in NW structures (related?). Common at E, SW and NE centres of block.

Of most interest are belt of NW, NE and NNW-NNE structures (see following section). Many NW features at the north end of the block and NE structures in the centre of the property run directly downslope and are probably insignificant erosional features.

Airphoto Interpretation

It should first be noted that geological data for the area is sketchy at best and that airborne geophysical information at this early stage of exploration may be of limited use (Forly - six conductors caused by any of the following: topography, geomorphology, lithology and structure; all with or without mineralization). At least 30% of the VLF-EM conductors follow ridges! Most trend NW.

The Tan claim region hosts eight (8) major target zones which contain coincident lineament-conductor and geological features. These exploration targets may be better prioritized once silt and soil geochemical data is applied.

1. Tan 21-24-28-31 Zone

Major NW structural break, with coincident multiple lineaments and conductors (S15, S17, A23 and A20).

SW of break are mixed Unuk, Betty Creek and Salmon River formations cut by numerous NE, NNE and NW structures. Also included are possible zones of alteration and a pyritic gossan at the toe of Brightwell glacier.

NE of break: Betty Creek formation hosting two belts of anastomosing "altered" fractures. The first extends in a NNW direction from Tan 24 to Tan 18. The second trends from Tan 24/25 possibly to Tan 16. Note coincident of conductor S13 with "alteration" in Tan 25.

Area of most interest would be where all fracture belts range, ie Tan 28/31. Excellent potential for all ore types.

2. Tan 36-40 Zone

Unuk-Betty Creek contact zone with complex pattern of NE, NW and NNW lineaments. Some "alteration" and one conductorlineament association (S18) are also present. Great potential for Sulphurets, Silbak ores.

3. Tan 12-13-15 Zone

Betty Creek formation. Intense anastomosing NE fracture belt with possible "alteration". Zone is well represented by two conductors (A18, S6). Ties in possibly with similar structures at east end of Tan 18. (A21, S6 and NE lineaments). "Goldwedge" potential.

4. Tan 1-2-5 Zone

Betty Creek-Mt. Dilworth-Salmon River contact zone with discoloration at the upper contact of the Mt. Dilworth unit. Many Ne, NW and NNW structures in Salmon River unit. S14 correlates with a NNW structure. S5 and A10 may correlate with NW features. Of interest is area north of Tan 6. (concordant shears with Mt. Dilworth). Obvious Eskay Creek potential.

5. Tan 10-4 and north

Betty Creek and Mt. Dilworth contact zone. Strong NNE and NE fracture patterns. A NNW magnetic low is also featured. S21, S16 and A17 may coincide with NW structures. Note possible "alteration" and presence of chalcedony near Tan 4 (O.F. 1988-4). Eskay Creek and Goldwedge potential.

6. Tan 20-23 Zone

Salmon River formation. Conductors A24 and A25 follow indistinct NNW lineaments. Four "placer" deposits known to occur along there (0.F. 1988-4). Note presence of Mt. Dilworth unit in Tan 9, 11, and 14.

7. E limits Tan 30, 33, 38

Unuk-Betty Creek - contact zone with many discordant NE and NW lineaments.

8. 3 km NE Tan 6

Betty Creek formation disrupted by clean NE, NW, NNE and NNW structures. Domed environment?

Conclusions and Recommendations

Analysis of "lineament-conductor-geology" correlations of the Tan claims can produce a number of targets worthy of further investigation. All of these targets have at least some structural and geological features which characterize the well-known Iskut-Eskay-Sulphurets area gold deposits.

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Of most interest are the Tan 18 to 31, Tan 36 to 40, and Tan 12 to 15 zones. The most interesting features of the Tan 1-2, Tan 10-4 and Tan 20-23 zones are outside of the claim block.

Preliminary recommendations include detailed geological and "wholesoil" studies of the main interest areas. Soil (talus) samples should be treated as rock samples. Compilation of silt sample geochemistry (ongoing) will help prioritize the targets. Detailed stereo-photo studies may help straighten-out stratigraphic lineaments and topographic conductors.

GIL CLAIMS AIRPHOTO INTERPRETATION

General Considerations

An enlarged airphoto (1:20000 scale) of the Gil claim block was studied in order to determine correlations, if any, between lineations and airborne geophysical data, structural-stratigraphic features and geochemical patterns (the latter is forthcoming). Positive correlations would greatly facilitate "target-definition" for future exploration. Figures 5 and 6 show the interpretation with geophysical anomalies.

In interpreting the airphoto, the following features were kept in mind:

- Mt. Dilworth formation: graphitic hanging wall unit and gossanous rhyolites, which host the 21B deposit at Eskay Creek.
- Sericitized, discordant shear systems which trend NNW to NW and are hosted by "Unuk River", "Betty Creek" and porphyry formations (eg. Goldwedge, Silbak, Snip, Shore deposits).
- 3. Altered fault systems trending NE in Unuk and Betty Creek formations (eg. Golden Rocket, Silbak, Johnny Mt. deposits).
- Concordant fault-shears at stratigraphic contacts in Unuk or Mt. Dilworth formations (eg. Brucejack, Johnny Mt. and Eskay Creek deposits).

In this perspective graphitic VLF-EM conductors not lineaments which parallel the Mt. Dilworth formation held special interest. The same may be said of coincident lineaments, conductors and "alteration zone" which are represented by NW< NNW and NE structures, particularly if these are near the Unuk-Betty Creek contact or proximal to porphyritic intrusions. Lineament Study

Lineaments in the Gil claims may be subdivided into six groups: NW, W/WNW, NE, NNE and NNW. Age relationships cannot be ascribed since each fault group appears to offset the other. (multiple reactivation?)

- 1. Due N: Very uncommon. May be classes with the NNE or NNW lineament.
- 2. NW: Most dominant and well developed, occurring throughout the property, except in the SW quadrant. Represents large shear systems.
- 3. W/WNW: Sharp features, common in north portion of block. Due W. structures offset others. Many glaciers follow this trend. Forms an arcuate belt in north end of block.
- 4. NE: Abundant, anastomosing in south end of property. Long, continuous, sparse in north end. Uncommon through centre of block. Represents narrow fault systems.
- 5. NNE: Uncommon but well defined. Located in regions rich in NE structures. Typically wide and discoloured (?altered?)
- 6. NNW: Uncommon, but well defined. Most obvious in centre and north portions of property. Very similar to NNE structures.

Of most interest are the NW, NE and NNE-NNW structures. Many of the NW lineaments in the centre of the block and the NE features at the south end, run directly down slope and may represent insignificant erosional features.

Airphoto Interpretation

It should first be mentioned that geological data for the Gil claims is sketchy at best and that airborne geophysical information at this early stage of exploration may be of limited use. (eightysix conductors caused by topography, geomorphology, lithology and structure, all with or without mineralization. More than onethird of the conductors are located along ridge tops. The great majority of the conductors trend in a NE direction.

The Gil claim block hosts ten (10) significant target zones (and numerous minor ones) which enclose coincident "lineament-conductorgeological" features. These exploration targets will be better prioritized once silt-soil geochemical data is applied.

1. Gil 2-4 Zone (and east)

Unuk and Betty Creek formations intruded by a porphyry stock. Coincident conductors (A43 and S26) originate in a coincident magnetic high-alteration, zone. Large number of NE, NNE and NNW structures, extending well beyond east limit of Gil 4. Whole area is altered and has associated magnetic high and lows. Important zone for Sulphurets-Silbak type mineralization.

2. Gill 29-30-31 Zone

Betty Creek and Salmon River formation contact zone with a large array of anastomosing discoloured NW and NNE faults (in Salmon River formation). Of note; coincidence of A2 and S4 (Gil 30); coincidence of S9 with A6 and NNE structures (Gil 29) also with NW structures and "alteration" in Gil 31 (in Betty Creek formation); "altered" NE and NW lineaments in SE Gil 26; A17 and S14 coincide with NW structure and the contact between Salon River/Betty Creek formation. This zone has strong Eskay Creek possibilities.

3. Gil 20 Zone

Betty Creek-Salmon River contact zone extending dominate Gil 19. S22 coincides with this contact in NW corner of Gil 20. Three NNE-NNW conductors merge: S22, S23 and A23 (trace of NE and NNE structures) within Betty Creek formation. conductors A20 and A9 somewhat coincident with NE-NNE lineaments. S15 is associated with "alteration" and a NNW lineament complex, curved, intersecting NE, NNE and NW structures at west end of Gil 23. Possibilities for all oretypes.

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4. Gil 12 Zone

Salmon River formation, with anastomosing NNE and NNW structures. S17 is parallel to some of these.

5. Gil 9-11 Zone

Salmon River formation with a NE "lineament" swarm on trend with A39. Also host to a NW "lineament" swarm enclosing a portion of S30. Some discoloured W lineaments! Unknown potential.

6. Gil 17-18 Zone

Salmon River formation hosting four features of coincidence; S16 adjacent to a NW structure; A24 on a NE lineament; A40 coincident with S21 (no NE surface expression); A39 coinciding with S28 (no surface expression). Questionable potential.

7. Gil 6-10 Zone

Salmon River formation with major NE and NW structures, one of which appears altered (Gil 6-10 boundary). Al6 and Al5 coincide with vague NE structures? A31 somewhat coincident with strong NE lineaments.

8. Gil 36 Zone

Salmon River formation with numerous crosscutting conductors (A35-S37, A32-S36, A30-S35). A few of these are represented by a lineament and possible "alteration" (eg S35, A30).

9. Gil 33-35 Zone

Salmon River formation with strong, discoloured W lineaments. S40, S41 and A37 all coincide and are represented on surface by a weak NNW lineament.

10. 2500 m S of Gil 31

Unuk-Betty Creek contact zone pervaded by numerous NW, NE and NNE lineaments. Includes recessive "alteration".

11 Miscellaneous

Gil	26-28:	Coincident A21-S24 and a NE structure.
Gil	27:	Complex NE-NW structures and coincident S27.
Gil	15:	Anastomosing NW and NNW lineaments; also S8
		coincident with NNE structure. S7 also coincident
		with weak NW-NE structure.

Conclusions and Recommendations

Analysis of possible correlations between lineaments, conductors and geology on the Gil Claims has led to the definition of a number of targets worthy of further work. All of these targets have some of the structural and geological aspects which characterize the Iskut-Eskay-Sulphurets gold deposits.

Of most interest is the Gil 2-4 target which has <u>all</u> of the characteristics of a Silbak-Premier or Brucejack Lake environment. Also important are the Gil 20, Gil 29-31 and Gil 33-35 targets.

Preliminary recommendations are straightforward in that detailed geological mapping and "whole-soil" geochemical sampling should be completed over the major targets. Soil (talus) samples should be treated as rock samples. Further recommendations may be outlined when silt geochemistry data is added to this study.

RECOMMENDATIONS

The airborne and airphoto interpretation have indicated many target areas for further work. It is recommended that helicopter supported stream sediment sampling work be conducted to check the geophysical targets as well as structures on the property area. The cost of the initial phase of stream sampling is estimated to cost \$40,000 to \$45,000.

STATEMENT OF EXPENDITURES

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. . .

1.	Airborne 717 line km. all inclusive, data processing, report	80,000.00
2.	Optimum mapping	5,649.50
3.	Geological report	3,842.61
4.	Drafting	1,500.00
5.	Personnel D. Jackson, P.Eng 5 days @ \$450 G. Steene, P.Geol 5 days @ \$450	2,250.00 2,250.00
6.	E.R. Kruchkowski Consulting includes consulting, interpretation report	25,000.00
тота	L	\$120,492.19

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ALLDRICK, D., 1989 Volcanic Centres in the Stewart Complex, Geological Fieldwork 1988, Ministry of Energy, Mines and Petroleum Resources, p 203.

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MOONLIGHT OCCURRENCE Mineral Inventory Occurrence, Skeena Mining Division, BC, Mineral Resource Branch, Energy, Mines and Resources, Ottawa, 2p.

CERTIFICATE

I, EDWARD R. KRUCHKOWSKI, Geologist, residing at 23 Templeside Bay, N.E., in the City of Calgary, in the Province of Alberta, hereby certify that:

- 1. I received a Bachelor of Science degree in Geology from the University of Alberta in 1972.
- 2. I have been practising my profession continuously since graduation.
- 3. I am a member of the Association of Professional Engineers, Geologists and Geophysicists of Alberta.
- 4. I am a consulting geologist on behalf of Marlin Developments.
- 5. This report is based on a review of reports, documents, maps and other technical data on the property area and on my experience and knowledge of the area obtained during programs in 1974 - 1990.

leve !!

B.Sc. E.R. Kruchkowski

APPENDIX I

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REPORT ON THE TAN AND GIL CLAIM GROUPS BY D.S. EVANS NOV. 1989

REPORT

on the

TAN & GIL CLAIM GROUPS

SKEENA MINING DIVISION

BRITISH COLUMBIA

for

MARLIN DEVELOPMENTS LTD.

by

D. S. Evans, Ph.D., P.Geol.

Consulting Geologist

November 22nd, 1989

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SUMMARY

The Tan and Gil Claim Groups are located some 40 to 60 kilometres, respectively, north of Stewart in northwestern British Columbia. The area of interest has little or no recorded or documented reporting on systematic exploration activities. The area is underlain by Hazelton Volcanics of the Stewart Complex that have been folded, faulted and sheared by intrusions and influences of the Coast Plutonic Complex.

Reconnaissance geophysical and geochemical programs are recommended to map and define lithologies and structures that may host either epithermal vein or stockwork precious (& base) metal mineralizations; or, massive sulphide-containing base (& precious) metals deposits. The estimated cost of this work is \$210,000, of which \$75,000 will be devoted to a helicopter-borne, high resolution magnetic and electromagnetic survey. The remaining funds will be allocated to ground surveys to include prospecting, surface mapping and sampling and helicopter-borne stream sediment and soil samplings on selected areas.

The Tan and Gil properties are located in a geological environment favourable for the localization of base and precious metals occurrences and deposits as have been discovered in similar rock types and structural settings in the areas immediately to the south and west.

1

General -

This report has been prepared at the request of Marlin Developments Ltd. which has acquired, subject to regulatory approvals, an undivided sixty (60)% interest in the Tan and Gil Claim Groups. Conclusions and recommendations reached in this report have been gained primarily from government and company reports, and from personal communications and personal observations by the writer during previous mineral exploration work and programs extending back to 1967.

This report discusses the present status of the Tan and Gil Claim Groups, assesses the potential for base and precious metals deposits and, puts forward recommendations for initial reconnaissance programs and activities.

Location and Access

The Tan & Gil Claim Groups are noncontiguous dispositions and are located approximately 40 and 60 kilometres, respectively, north of Stewart and 230 kilometres north of Prince Rupert in northwestern British Columbia (Figure 1). The properties are centered on latitude 56 20 N, longitude 130 00 W and latitude 56 35 N, longitude 129 55 W, respectively, and within NTS map ares 104A/5W, 104B/8E and 104A/5W, 12/W, respectively. Essentially, both properties are accessible only by helicopter and, only during the normal summer field season months, usually June throught October.

Both properties occupy areas of rugged mountainous terrain and topography ranges from 2100 to greater than 9800 ft. ASL. Vegetation is confined to valley floors where abundant alder and spruce growth is found. Above 2200 ft. ASL outcrop exposure is extensive, but a high proportion of both claim groups is covered by glaciers or permanent snowfields. Timber supply is limited to lower elevations.

Supplies and accommodation are available at Stewart and there is good supply of skilled exploration and mining manpower in the area.

Property and Ownership

The Tan & Gil Claim Groups comprise a total of four (4) noncontiguous claim groupings to a total aggregate of 1155 mineral units (approximately 71,300 acres) recorded and in good standing in the Skeena Mining Division (Figures 2 & 3). Marlin Developments has acquired a 60% working interest in the property by making a cash payment of \$10,000 together with 100,000 common shares of Marlin and 100,000 share purchase warrants exercisable at \$0.20 per share until September 1rst, 1990, all payable to the mineral dispostion holders, Keylock Resources Ltd., an Alberta Stock Exchange listed corporation. The properties are presently in good standing under the Mineral Tenure Act and Regulations of the Province of British Columbia.

2



TABLE 1

	Name	Record No.	Units	Record	Date
Tan	1-46 incl.	7425-7460 incl.	460	March	31
Gil	1-36 incl.	7379-7424 incl.	695	March	31

History

The Tan and Gil Claim Groups have had little or no previously documented exploration activities. Undoubtedly, early prospectors have traversed selected areas at lower elevations and, upland areas have been observed and inspected by helicopter-borne explorationists in more recent times.

According to E. R. Kruchkowski (pers. comm.), there are a number of old exploration tunnels and adits along the south side of the Bowser River and near the northern boundary of the Tan claim. Kruchkowksi believes this work was originally in search of base metals.

Recent Exploration Programs

There is no available documentation to the writer on mineral exploration work on either the Tan or Gil Claim Groups. To the west, the general area has become a focal point for precious and base metals mineralization with the discovery and/or development of mineral deposits near Brucejack Lake (Newhawk Gold Mines Ltd. and Catear Resources Ltd.) and, further north and west on the Iskut River where Delaware Resources and Cominco are developing the Snip gold-silver deposit, Skyline Explorations is actively mining the Johnny Mountain gold-silver deposit and the Calpine-Consolidated Stikine joint venture is exploring the apparently large Eskay Creek base and precious-metal bearing massive sulphide deposit(s).

It is important to note that the Stewart area, at large, is documented as a well-mineralized district and many other base and precious metal-bearing deposits have been either discovered, developed and mined in both the areas to the south AND west of the Tan and Gil Claim Groups.

GEOLOGY

The area of interest has been mapped by Grove (1982, 1986) and (partially) by Alldrick and Bretton (1987). For the purposes of this report, the geological outlines and contacts of Grove have been used (Figures 2 and 3) with the accompanying Legend (Figure 4).





LEGEND after Grove, 1982

RECENT

20 UNCONSOLIDATED DEPOSITS; RIVER FLOODPLAIN, ESTUARINE, RIVER CHANNEL AND TERRACES, ALLUVIAL FANS, DELTAS AND BEACHES, OUTWASH, GLACIAL LAKE SEDIMENTS, TILL, PEAT, LANDSLIDES, VOLCANIC ASH, HOTSPRING DEPOSITS

UPPER JURASSIC

17 SILTSTONE, GREYWACKE, SANDSTONE, SOME CALCARENITE, ARGILLITE, CONGLOMERATE, MINOR LIMESTONE, MINOR COAL (INCLUDING EQUIVALENT SHALE, PHYLLITE, AND SCHIST)

MIDDLE JURASSIC

- 16 SILTSTONE, GREYWACKE, SANDSTONE, SOME CALCARENITE, MINOR LIMESTONE, ARGILLITE, CONGLOMERATE, LITTORAL DEPOSITS
- **13a** GREEN, RED, PURPLE, AND BLACK VOLCANIC BRECCIA, CONGLOMERATE, SANDSTONE, AND SILTSTONE
- **13c** SILTSTONE
- 13d MINOR CHERT AND LIMESTONE (INCLUDES SOME LAVA (+14))

LOWER JURASSIC

- **12a** GREEN, RED, AND PURPLE VOLCANIC BRECCIA, CONGLOMERATE, SANDSTONE, AND SILTSTONE
- 12b CRYSTAL AND LITHIC TUFF
- **12c** SANDSTONE

EOCENE

- 8a QUARTZ DIORITE
- 8b GRANODIORITE
- 8f FELDSPAR PORPHYRY

JURASSIC

2b PHYLLITE, SEMI-SCHIST, SCHIST



Lithological descriptions have been amplified with recent observations from Alldrick and Bretton (op. cit.), particularly in view of the recent findings that infer that some mineral deposits within the Stewart Complex may have tectono-stratigraphic associations and affiliations.

The Tan and Gil Claim Groups are primarily underlain by midde Jurassic volcanic, volcanosedimentary and sedimentary rocks and units within the Bowser Basin and termed the Hazelton Group (Grove, op. cit.). These rocks have been folded and faulted by granite intrusions and influences of the late Mesozoic and Cenozoic Coast Crystalline Complex to the west. The geological setting and environment is considered favourable for hosting either "high level", epithermal deposits of gold and silver or base and precious metal-bearing massive sulphide deposits.

Outcrop exposure on the Tan and Gil Claim Groups is dominated by the Betty Creek Formation, a "trough filling cycle" of pyroclastic and sedimentary rocks that includes massive green and grey andesitic to dacitic tuffs, lapilli tuffs, tuff breccias, flows and bedded volcanic breccias, lapilli tuffs, crystal and lithic tuffs, commonly hematitic. This unit is succeeded by exposures of the thinner, but stratigraphically diverse Mt. Dilworth Formation that is composed of intermediate to felsic pyroclastic rocks including crystal and lithic tuffs and, possibly rhyolitic flow rocks. The Mt. Dilworth Formation is locally pyritiferous and may develop quartz-rich stockworks and other silicifications.

The regional geological setting of the area of interest is believed to be the result of successive periods of volcanism followed erosional periods of miogeosyclinal and eugeosyclinal accumulations periodically disturbed and influenced by continuing emergences of intrusions of Coast Crystalline rocks and Pacific sea-floor spreading. Alldrick (1989) has postulated the presence of a "volcanic centre" in the area immediately west of the Tan Claim Group. This would account for the presence of proximal volcanoclastic rocks and other related extrusives.

MINERALIZATION

There are no documented or recorded mineral occurrences on the Tan or Gil Claim Groups. However, it is important to take note of some precious and base metals occurrences immediately west and east of the Tan Claim Group.

Immediately west of the southwest margin of the Tan Group is the "East Gold" occurrence, a small high grade precious metals occurrence that has been described by Kruchkowski and Sinden (1989).

4

Precious metals are distributed throughout altered, ⁵ pyrite-bearing rocks with silver most enriched in those areas where galena, sphalerite and tetrahedrite are found. High grade gold and silver occurrences are located in subsidiary, splay or subparallel local structures and shears. Documented production history at East Gold includes 39.25 short tons reduced from 850 mined short tons to recover 1,533 oz. gold and 4,024 oz. silver for an average mined grade of 1.8 oz./ton gold and 4.7 oz./ton silver.

The evidence at East Gold is consistent with the proposed model for British Columbia epithermal gold-silver deposits (Panteleyev, 1986), including Silbak Premier and Newhawk.

Another important nearby occurrence is the Moonlight deposit located on American Creek located just at the southeast corner of the Tan Claim Group. Here, base and precious metals mineralization is located in a wide fracture zone striking northerly along the contact of volcanics on the west and argillites on the east. The best mineralization is exposed over a width of 11.4 ft. for a strike length of 80 ft. and consists of galena, tetrahedrite, sphalerite, pyrite and some chalcopyrite. Other types of mineralization include quartz replacements in a fracture zone up to 75 ft. wide hosting disseminated pyrite with some sphalerite and narrower quartz vein occurrences and silicifications that host base and precious metals. In 1937, a shipment of 61 lbs. of selected vein material returned an assay of 387.7 ounces of gold per ton and 164.4 ounces of silver per ton (EMR Mineral Inventory Information).

These deposits and occurrences confirm the local presence for a favourable environment for the location of both "high level", epithermal precious metals deposits and base and precious metal-containing massive sulphide deposits on the Tan and Gil Claim Groups.

CONCLUSIONS

The Tan and Gil Claim Groups are underlain by a variety of sedimentary, volcanosedimentary and volcanic rocks of the Stewart Complex that elsewhere host high-level, epithermal precious metals occurrences and deposits and, base and precious metal-containing base and precious metal massive sulphide deposits. Previous exploration activities have been minimal. Both claim groups have good exploration potential for future discovery of either "high grade" and/or bulk mineable type precious and base metals mineralization.

RECOMMENDATIONS

Reconnaissance exploration on the Tan and Gil Groups must focus on establishing viable ground followup targets quickly and expediently. It is recommended that a high resolution, helicopter-borne electromagnetic and magnetic survey be undertaken to assist in locating favourable lithologies and structures to host base and precious metals deposits. Additional reconnaissance and followup work will be best accomplished by helicopter supported ground surveys to include prospecting, mapping and sampling in areas selected from the geophyscial survey. Further helicopter-borne stream sediment sampling work is recommended to isolate larger geophysically promising areas and geologically favourable zones or horizons into confined targets.

The estimated cost of reconnaissance and initial followup activities is estimated at \$210,000.

Nw. 22, 1989

November 22nd, 1989 Calgary, Alberta



COST ESTIMATE

Phase 1 (Reconnaissance)

High resolution, helicopterborne magnetic and electromagnetic survey:

\$75,000

Phase 2 (Reconnaissance & Followup)

Helicopter-borne and assisted stream sediment sampling, prospecting, geological mapping and other surface sampling:

\$135,000

TOTAL:

\$210,000

nov. 22, 1989

November 22nd, 1989 Calgary, Alberta



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REFERENCES

- Alldrick, D., 1989: Volcanic Centres in the Stewart Complex, Geological Fieldwork 1988, Ministry of Energy, Mines and Petroleum Resources, p 203.
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- Panteleyev, A., 1986: Ore Deposits #10. A Canadian Cordilleran Model for Epithermal Gold-Silver Deposits, Geoscience Canada, Vol. 13, No. 2, pp 101-111.
- Moonlight Occurrence: Mineral Inventory Occurrence, Skeena Mining Division, BC, Mineral Resource Branch, Energy, Mines and Resources, Ottawa, 2p.

CERTIFICATE

I, DAVID S. EVANS, currently residing at 5232 Viceroy Dr., N.W., Calgary, AB, T3A 0V7, Canada, hereby certify that:

1. I am a mining exploration geologist and have practised my profession since 1966.

2. I am a graduate of the University of British Columbia with a B.Sc. (1966) in Chemistry and Geology, and a graduate of the Royal School of Mines, University of London (UK) with a Ph.D. (1971) in Applied Geochemistry.

I am a registered Professional Geologist with 3. the Association of Professional Engineers, Geologists and Geophysicists of Alberta, a Member of the Society of Exploration Geochemists, and a Fellow of the Geological Association of Canada (1973).

4. I am familiar with the geology and the mineral deposits of NW British Columbia; and, in the past, have worked near and around the Tan and Gil claim groups on exploration programs. This report is based on personal knowledge, personal communications and a review of reports, maps and other data as is available on this area.

5. I have no interest, direct or indirect, in the properties or securities of Marlin Developments Ltd., nor do I expect to receive any such interest. I have no interest, direct or indirect, in any mineral properties within 10 km of the Tan and Gil claim groups.

6. I consent to the use of the offering document or information circular issued by Developments Ltd.

accompanying report in an Marlin



nov. 22, 1989

November 22nd, 1989 Calgary, Alberta

D. S. Evans, Ph.D., P.Geol. Consulting Geologist



LEGEND

(From ALLDRICK ETAL & From GROVE)

JURASSIC & YOUNGER

B Feldspar Porphyry

	-JURASSIC (HAZELTON GP.) SALMON RIVER FM.
5	Carbonaceous siltstone & sandstone
4	MOUNT DILWORTH FM. Felsic volcanics ; tuff, breccia
3	BETTY CREEK FM. Andesitic pyroclastics & greywacke
2	UNUK RIVER FM. (upper) Porphyryitic andesitic flows & tuffs

SYMBOLS

/-	GEOLOGICAL CONTACT (INFERRED)
	BEDDING ATTITUDE
+	MINERAL LOCATION
	ZONE OF DISCOLORATION (ALTERATION ?)
$\sim\sim$	FAULT ZONE
Py, Cy	PYRITE, CHALCEDONY
H,L	MAGNETIC HIGH, LOW
00000	MAGNETIC "CONTACT"
*	NW (±NNW) LINEAMENT
	NE (± NNE) LINEAMENT
~~~~~	N, NNE & NNW LINEAMENTS
	ANNAPOLIS CONDUCTORS (VUF)
·	SEATTLE CONDUCTORS (VUF)

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# MARLIN DEVELOPMENTS LTD.

# ORTHO PHOTO

# LINEAMENT INTERPRETATION

TAN CLAIMS



JUNE 8, 1990