REPORT ON THE 1989 GEOLOGICAL, GEOCHEMICAL AND GEOPHYSICAL FIELDWORK ON THE TAKU ARM PROPERTY

(July 29 - Sept. 14, 1989)
Volume 1 of 2
Text

MINERAL CLAIMS: ICE 1, ICE 2, ICE 3, ICE 4, ICE 5, RICE

REVERTED CROWN GRANTS: ANNEX, SILVER KING 1, SILVER KING 2, SILVER KING 3, TYEE, GOLD BOTTOM, SILVER TIP, ENSIGN, INDEX, BLUE JACKET

Atlin Mining Division, B.C.

Location:
1. 35 km southwest of Atlin B.C.
2. NTS Sheet 104 M/8
3. Latitude 59° 28'
   Longitude 134° 20'

For:
Placer Dome Inc.
P.O. Box 49330
Bentall Postal Station
1600-1055 Dunsmuir St.
Vancouver, B.C., Canada
V7X 1P1

By:
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V6B 1N2

March 16, 1990

SUMMARY

Placer Dome Inc.'s Taku Arm Property consists of five claims totalling 84 units enclosing 10 reverted Crown Grants located on the west side of Taku Arm in northwestern British Columbia. The claims cover the Rupert and portions of the White Moose showings; gold-silver bearing quartz veins discovered in the late 1800's.

Exploration work completed in 1989 consisted of establishing 23.3 km of grid, geological mapping, geochemical sampling, and geophysical surveying.

Regionally, the property lies within the Coast Plutonic Complex, 10 km southwest of the Llewellyn Fault which marks the boundary of the Coast Plutonic Complex and the Intermontane Belt. The property is underlain by Nisling Terrane Proterozoic to Cambrian schists and gneisses, and Triassic or older granodiorite. Cretaceous or younger rhyolite, andesite and basalt dykes intrude the older units.

Mineralization discovered and exposed to date consists of narrow discontinuous mineralized quartz veins at over 10 locations. Previous sampling returned up to 0.45 oz/ton gold and 7.14 oz/ton silver over 1.10 metres from a mineralized quartz vein bounded by siliceous and locally 'rusty' rhyolite.

A piece of partially silicified marble float collected from occurrence L returned 1230 ppb gold. Rare outcrop consists of gneiss intruded by altered, locally gossanous, rhyolite and dacite dykes. Soil samples from an area approximately 150 by 450 metres are all anomalous in gold, and include a high value of 3200 ppb. Coincident magnetic and electromagnetic anomalies indicate a 1400 metre long northwesterly trending bedrock feature, suggestive of new vein-type or stratabound gold mineralization.

Known mineral occurrences closely coincide with northwesterly trending VLF-EM conductors. Numerous east-west trending faults with predominantly dextral movement (< 150 m), spaced 125-175 metres apart, are indicated by the VLF-EM and magnetic data. Many of these interpreted faults coincide with steep topographic gullies.

Based on the 1989 results, additional exploratory work on the Taku Arm Property is warranted and recommended. The main area of interest at this time is occurrence L. Trenching, grid expansion, and further geological, geochemical, and geophysical surveys are recommended.

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INTRODUCTION

This report was prepared at the request of Placer Dome Inc. It summarizes the economic potential of the Taku Arm Property and describes the 1989 geological, geochemical, and geophysical surveys.

The objective of the 1989 program was to locate and examine areas previously found to be anomalous in gold, silver, arsenic, lead, zinc, and copper. Known mineral occurrences consist of mineralized quartz veins hosted by granitoids and Proterozoic to Cambrian schists and gneisses. Intermediate to felsic dykes are spatially related to mineralized quartz veins.

The property is located about 35 km southwest of Atlin, British Columbia on Taku Arm of Tagish Lake and is accessible by helicopter.

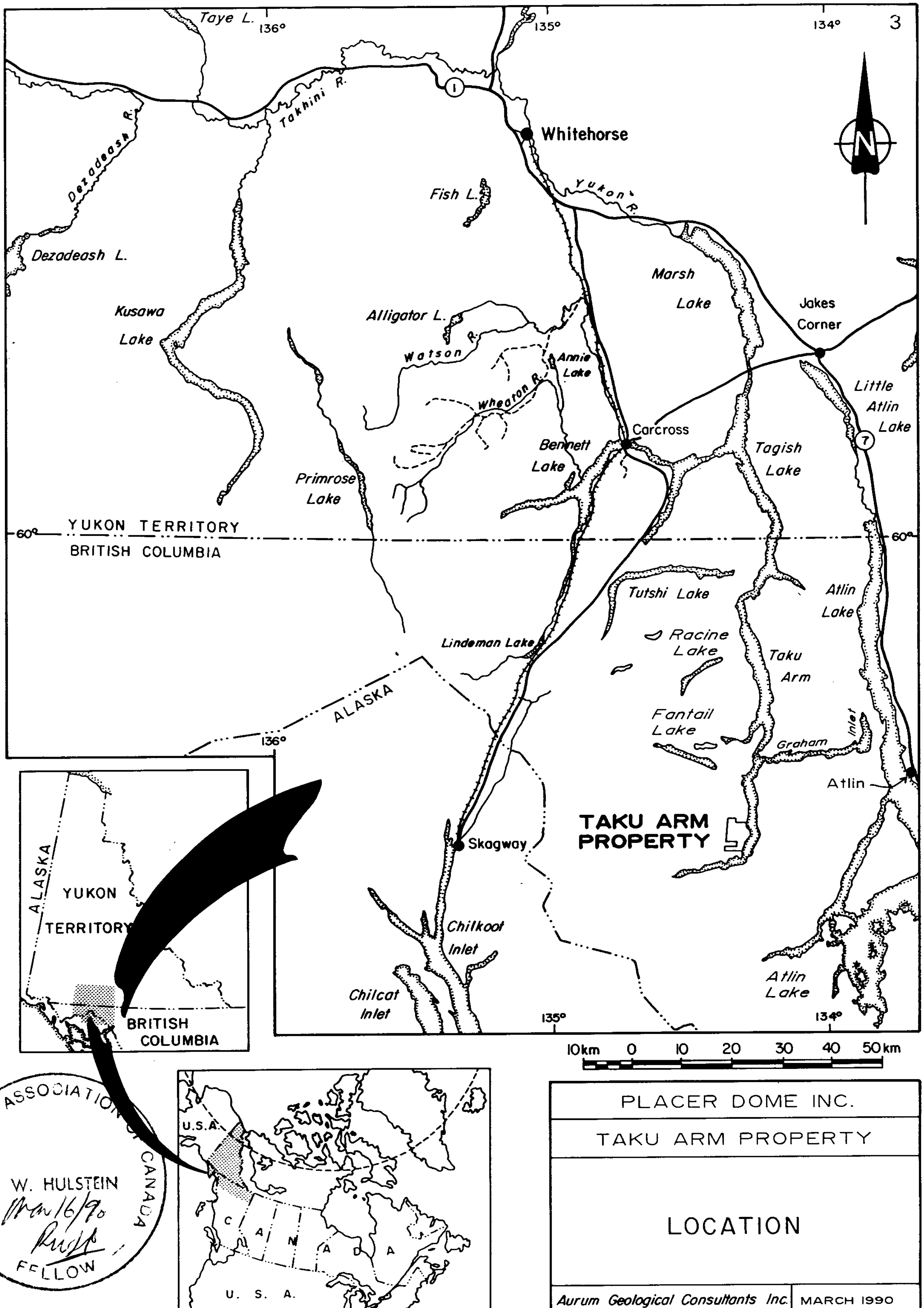
Aurum Geological Consultants Inc. carried out geological, geochemical, and geophysical surveys during the period July 29 to September 14, 1989 on a grid totalling 23.3 line kilometres. The program was supervised by R.A. Doherty and R. Hulstein with the assistance of Greg Smith, Gary Sutton, Stephen Tufford, and David Patterson in the field. Geophysical data were interpreted by Geo-Digit-Ex Inc. of Calgary, Alberta and Placer Dome Inc. staff. Helicopter support was provided by Capital Helicopters Inc. from their base in Atlin, B.C.

LOCATION AND ACCESS

The Taku Arm Property is located in northeastern British Columbia approximately 35 kilometers west-southwest of Atlin, B.C. (Figure 1). The approximate geographic coordinates of the property are latitude 59° 28' north and longitude 134° 20' west.

Access to the property is provided by helicopter based in Atlin, B.C., which in turn is 150 km south-southeast of Whitehorse, Yukon. Atlin is accessible by gravel road (Highway # 7) from Jakes Corner on the paved Alaska Highway - Highway # 1. Whitehorse has twice daily jet service to Vancouver, B.C.

Alternatively, portions of the property bordering Taku Arm on Tagish Lake can be reached by boat. In recent years a boat, based in Carcross, Yukon and capable of carrying a D-4 Cat, has operated on the lake.



GEOLOGICAL ASSOCIATION OF CANADA
R. W. HULSTEIN
Mar 16/90
FELLOW

PLACER DOME INC.
TAKU ARM PROPERTY
LOCATION

Aurum Geological Consultants Inc.		MARCH 1990	
	Drawn by NH	Scale 1:1,000,000	FIGURE : 1

PROPERTY

Placer Dome Inc. optioned the Taku Arm Property from Mr. John Harvey, of Vancouver, B.C. The property consists of six unsurveyed modified grid claims totalling 104 units and 10 reverted Crown Grants staked in accordance with the Mineral Tenure Act of British Columbia. The claims and Crown Grants cover a total of about 2600 hectares (6424 acres) in the Atlin Mining Division (Figure 2). They are shown on B.C. Mineral Titles Reference Map 104 M/8W and are known collectively as the Taku Arm Property. Essential claim data are listed below.

Claims

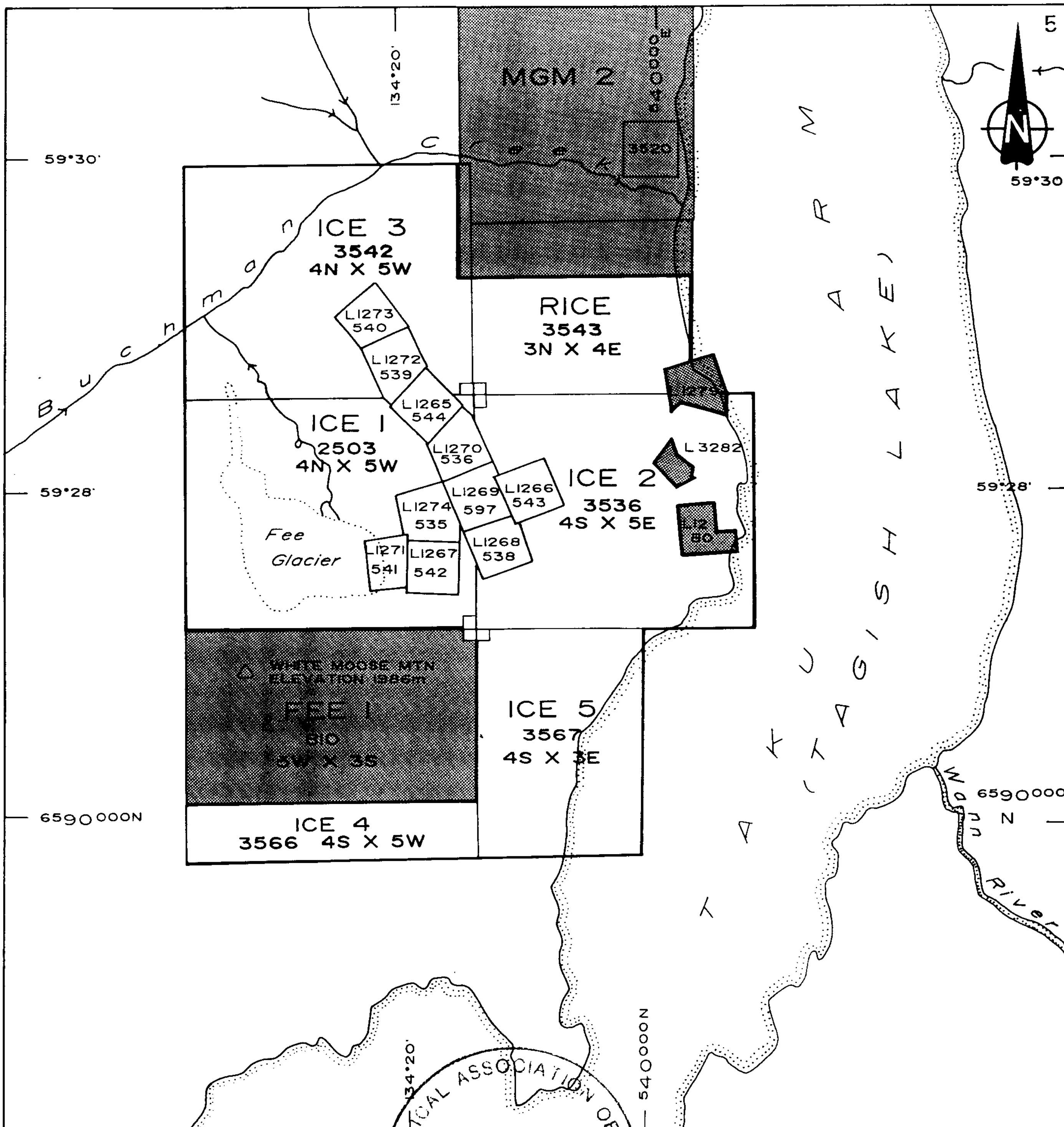
CLAIM NAME	No. of Units	RECORD NUMBER	EXPIRY DATE*
Ice 1	20	2503	August 7, 1990
Ice 2	20	3536	February 27, 1990
Ice 3	20	3542	March 14, 1990
Ice 4	20	3566	May 19, 1990
Ice 5	12	3567	May 19, 1990
Rice	12	3543	February 27, 1990

Reverted Crown Grants

GRANT NAME	LOT NUMBER	RECORD NUMBER	EXPIRY DATE*
Annex	L.1274	535	October 16, 1991
Silver King #3	L.1270	536	October 16, 1991
Silver King #2	L.1269	537	October 16, 1990
Silver King #1	L.1268	538	October 16, 1990
Tyee	L.1272	539	October 16, 1990
Gold Bottom	L.1273	540	October 16, 1990
Silver Tip	L.1271	541	October 16, 1990
Ensign	L.1267	542	October 16, 1990
Index	L.1266	543	October 16, 1990
Blue Jacket	L.1265	544	October 16, 1990

* prior to recording assessment work described herein.

The ten reverted Crown Grants listed above comprise the Rupert Group as described by Cairnes (1913). Three reverted Crown Grants, lot numbers 1279, 1280, and 3282, are located within the Ice 2 and Rice claims and are held by H. Versluce of Whitehorse, Yukon. These three reverted Crown Grants partially cover mineral occurences known collectively as the White Moose Group, and are not currently part of the Taku Arm Property.



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R. W. HULSTEIN
FELLOW

LEGEND

ICE 2	claim boundary
	claim name
3536	record number
4SX5E	staking direction
	legal corner post
L1266	reverted crown grant
	lot number
543	record number
	Creek
	Ground held by others
6703350N	UTM Co-ordinates

1km 0 1 2km
Metres

PLACER DOME INC.

TAKU ARM PROPERTY

CLAIM LOCATION

Aurum Geological Consultants Inc.		MARCH 1990	
NTS 104M8/9	Drawn by: RH LK	Scale 1:50,000	FIGURE 2

CLIMATE, TOPOGRAPHY, AND VEGETATION

The climate in the area of the Taku Arm Property is variable with warm summers and long cold winters. Rainfall is moderate. During June and July daylight is almost continuous. The rivers and streams generally open in May while ice on some of the lakes may remain until June. Freeze-up can occur after mid-October although the large lakes are frequently open until December.

Physiography is characterized by rugged topography of the Boundary Ranges and the Teslin Plateau physiographic provinces. Elevations range from 656 metres at Taku Arm to 1986 metres on White Moose Mountain. Several periods of glaciation produced the wide (1.0 - 3.0 km) U-shaped valleys, cirques, hanging valleys, and roches moutonnees visible today. Taku Arm (Tagish Lake) occupies a depression left by retreating ice. Alpine glaciation, such as the 'Fee Glacier' immediately north of White Moose Mountain, culminated in steep north facing headwalls and deposition of morainal debris. White Moose Mountain and nearby ridges are rounded and often flat-topped.

Above treeline at 1200 metres to 1400 metres elevation, slopes are generally covered with felsenmeer and scree or composed of outcrop. Rock outcrop is scarce below treeline.

Vegetation is sparse above treeline consisting of shrubs, alpine grasses, and moss. In the valleys, up to about 900 metres elevation, slopes are well forested with mature white and black spruce, balsam fir, black pine, poplar, and alder. Dense growths of these species and willows, birch and, alder make traversing difficult in some areas between mature forested regions and treeline. Timber suitable for mining purposes is found in the valley bottoms.

Water sources on the property suitable for exploration or mining are restricted to Taku Arm and the creek draining 'Fee Glacier' during the summer months.

HISTORY

The first recorded mineral exploration in the area was at the time of the Atlin gold rush in 1898. Gold and silver mineralization at the Engineer mine, on the east shore of Taku Arm, was discovered in 1899 (Cairnes, 1913). Both the Rupert and White Moose showings, now covered by reverted Crown Grants, were probably discovered at this time. Cairnes (1913) reported that trenching located 5 mineralized quartz veins on the Rupert group and that trenching, adits and shafts explored two veins on the White Moose group. In 1904 an 840 kg (1860 pound) sorted ore sample, from the White Moose group quartz veins (B.C. Minister of Mines Report for 1904), returned 0.78 oz/ton gold, 50.34 oz/ton silver, 7.36% copper and 4.79% lead. Additional exploration consisting of underground development and trenching was carried out up to the 1920's. No additional exploration data are available until the 1970's.

United Keno Hill Mines Limited staked the 120 unit 'Fee' claim group in 1979 to cover the Rupert and White Moose showings (Watson and Joy, 1980). As they believed that the reverted Crown Grants had lapsed they carried out extensive geological and geochemical surveys over the entire property. This program identified coincident gold, silver, arsenic, copper, and lead in soil anomalies on the *Annex*, *Silver Tip* and *Ensign* reverted Crown Grants (Gonzalez, 1986). Subsequent to learning that Mr. J. Harvey of Vancouver, B.C. owned the Crown Grants, they allowed the claims to lapse with the exception of the *Fee 1* claim.

In 1986 Rise Resources Ltd. optioned the Ice 1 claim and the 10 reverted Crown Grants covering the Rupert showings (Gonzalez, 1986). A two man field party followed up and confirmed the results of United Keno Hill Mines Limited after which the ground reverted back to Mr. J. Harvey.

No further work was carried out until Placer Dome Inc. optioned the property in July 1989. Aurum Geological Consultants Inc. was contracted to carry out the 1989 field program, which consisted of 23.3 km of grid construction, geological mapping (1:5,000), geophysical surveying (VLF-EM and magnetometer; 21.7 and 17.5 line km respectively), rock geochemistry (39 samples), soil geochemistry (596 samples), and prospecting.

Other companies active in the area during 1989 were Cyprus Gold (Canada) Ltd., Frame Mining Corporation, United Keno Hill Mines Limited, Noranda Mining Corporation, and Golden Bee Minerals Inc. Cyprus Gold (Canada) Ltd. diamond drilled (approx. 5000 feet/1350 metres) a gold - cobalt bearing skarn at Teepee Peak. United Keno Hill Mines Limited, Frame Mining Corporation and Noranda Mining Corporation were active in the area of Tutshi Lake - Moon Lake. Golden Bee Minerals Inc. carried out surface exploration near the Engineer mine. A small (<2000 feet/600 metre) diamond drill program was completed on the Happy Sullivan Property by Patrick Gann. United Keno Hill Mines Limited carried out a short geological and geochemical program on their Fee 1 claim.

REGIONAL GEOLOGY

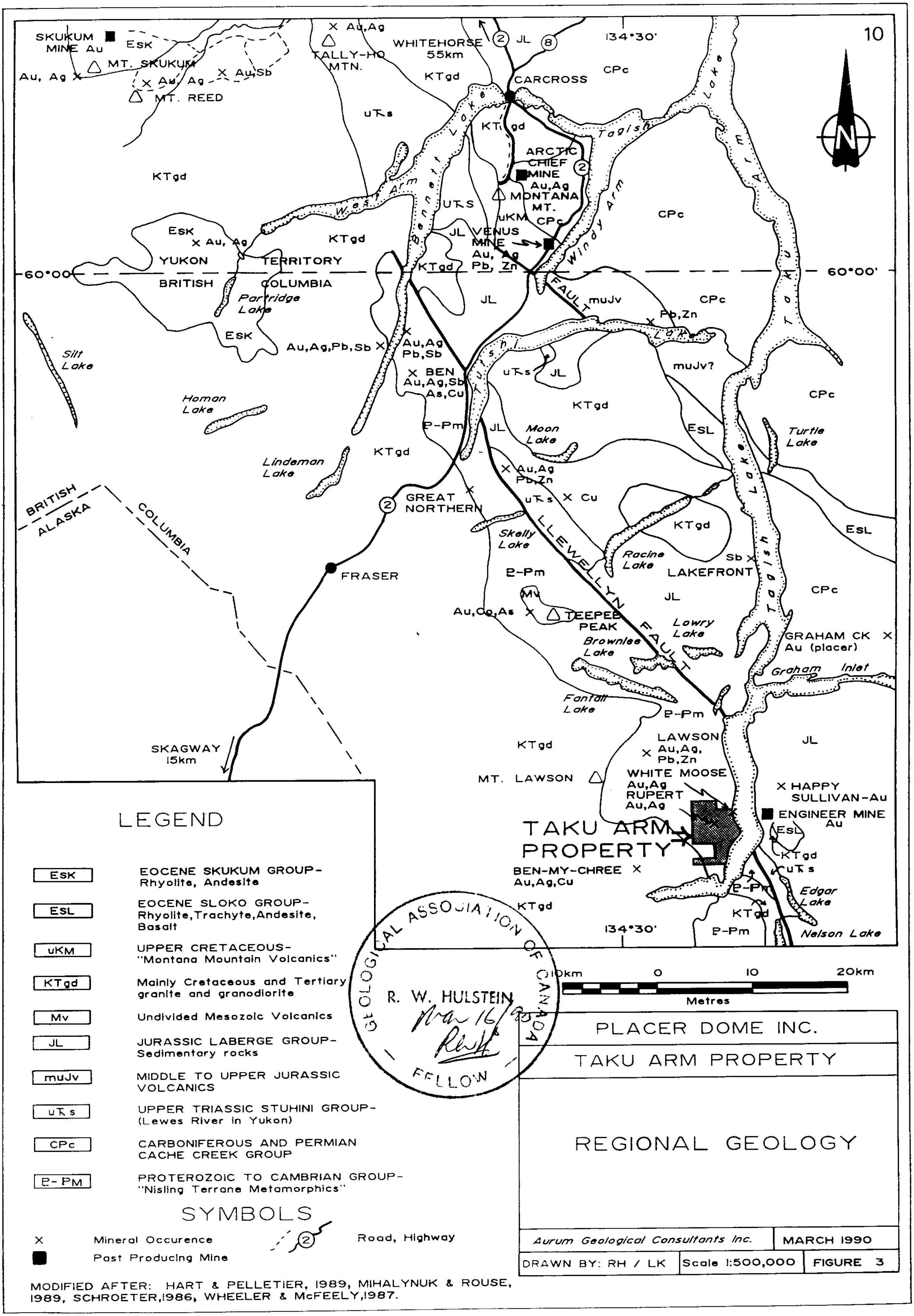
Bultman (1979), Christie (1957), and Mihalynuk (1990) have described the regional geology shown on Figure 3. The White Moose Mountain area lies at the eastern margin of the Coast Plutonic Complex, adjacent to the Intermontane Belt.

Boundary Range metamorphic rocks (Mihalynuk and Rouse, 1988), previously known as Yukon Group (Christie, 1957), have been termed Nisling Terrane (Wheeler and McFeely, 1987). The Intermontane Belt is represented by strata of the Whitehorse Trough (Laberge and Stuhini Groups), also known as the Inklin Overlap Assemblage (Wheeler and McFeely, 1987). These rocks link Proterozoic to Cambrian Nisling Terrane units (displaced continental margin) to the west with oceanic rocks of the Cache Creek Terrane to the east.

Nisling Terrane rocks, composed of Proterozoic (?) to Cambrian metamorphic rocks (map unit PPm), are the oldest exposed in the area (Figure 3). These metamorphic rocks are comprised of four major lithologic subdivisions (Currie, 1990) that include; (1) schists of the Boundary Range metamorphic suite (predominantly chlorite-actinolite), (2) medium grained pre-Triassic Hale Mountain granodiorite (M. Mihalynuk, pers. comm., 1990), (3) Wann River gneiss and (4) pelites and semipelites of the Florance Range metamorphic suite. These rocks underlie most of the Taku Arm Property.

Carboniferous and Permian rocks of the Cache Creek Group consist mainly of mafic volcanic flows and associated volcaniclastic rocks.

Sedimentary and volcanic rocks of the Upper Triassic Stuhini Group are exposed on the margin of the Whitehorse Trough, a synclinorium. The center of the trough is dominated by the Middle Jurassic Laberge Group composed of a thick repetitive succession of greywacke, siltstone, shale and conglomerate (Schroeter, 1986).


SKUKUM MINE Au
Esk
MT. SKUKUM
Au, Ag
Au, Ag
Au, Sb
MT. REED
Au, Ag
TALLY-HO MTN.
WHITEHORSE 55km
JL
134°30'
CARCROSS
CPc
KTgd
uTrs
Bennett Lake
Tagish Lake
ARCTIC CHIEF MINE Au, Ag
MONTANA MT.
uKM
CPc
West Arm
Windy Arm
Taku Arm
KTgd
Esk
Au, Ag
YUKON TERRITORY
BRITISH COLUMBIA
VENUS MINE Au, Ag Pb, Zn
60°00'
60°00'
Partridge Lake
Esk
Au, Ag, Pb, Sb
Au, Ag Pb, Sb
BEN Au, Ag, Sb As, Cu
FAULT
muJv
Pb, Zn
Tutshi Lake
muJv?
Silt Lake
Homan Lake
Lindeman Lake
KTgd
P-Pm
JL
Moon Lake
EsL
CPc
Turtle Lake
Au, Ag Pb, Zn
Cu
BRITISH ALASKA
COLUMBIA
GREAT NORTHERN
Skelly Lake
LLEWELLYN FAULT
KTgd
Racine Lake
Sb
LAKEFRONT
EsL
Tagish Lake
FRASER
P-Pm
Mv
JL
CPc
Au, Co, As
TEEPEE PEAK
Lowry Lake
Brownlee Lake
GRAHAM CK Au (placer)
Graham Inlet
Fantail Lake
P-Pm
SKAGWAY 15km
KTgd
LAWSON Au, Ag, Pb, Zn
JL
MT. LAWSON
WHITE MOOSE Au, Ag
RUPERT Au, Ag
HAPPY SULLIVAN-Au
ENGINEER MINE Au
TAKU ARM PROPERTY
EsL
KTgd
uTrs
BEN-MY-CHREE Au, Ag, Cu
KTgd
P-Pm
Edgar Lake
KTgd
134°30'
P-Pm
Nelson Lake
10km 0 10 20km
Metres
LEGEND
Esk EOCENE SKUKUM GROUP- Rhyolite, Andesite
EsL EOCENE SLOKO GROUP- Rhyolite, Trachyte, Andesite, Basalt
uKM UPPER CRETACEOUS- "Montana Mountain Volcanics"
KTgd Mainly Cretaceous and Tertiary granite and granodiorite
Mv Undivided Mesozoic Volcanics
JL JURASSIC LABERGE GROUP- Sedimentary rocks
muJv MIDDLE TO UPPER JURASSIC VOLCANICS
uTrs UPPER TRIASSIC STUHINI GROUP- (Lewes River in Yukon)
CPc CARBONIFEROUS AND PERMIAN CACHE CREEK GROUP
P-PM PROTEROZOIC TO CAMBRIAN GROUP- "Nisling Terrane Metamorphics"
SYMBOLS
× Mineral Occurence
■ Past Producing Mine
Road, Highway
MODIFIED AFTER: HART & PELLETIER, 1989, MIHALYNUK & ROUSE, 1989, SCHROETER, 1986, WHEELER & McFEELY, 1987.
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PLACER DOME INC.
TAKU ARM PROPERTY
REGIONAL GEOLOGY
Aurum Geological Consultants Inc.
MARCH 1990
DRAWN BY: RH / LK
Scale 1:500,000
FIGURE 3

Cretaceous to Tertiary granodiorite, quartz diorite, granite and hybrid rocks comprise the bulk of the Coast Plutonic Complex exposed immediately west of the Taku Arm Property (Mihalynuk et al., 1989).

Upper Cretaceous Montana Mountain volcanics, Eocene Sloko and Skukum Group volcanics unconformably overlie and intrude all older strata.

Regional Structure

The most significant structure in the area is the Llewellyn Fault which separates the Intermontane Belt from the Coast Plutonic Complex. This fault is a basin bounding, strike-slip fault (M. Mihalynuk and C.J.R. Hart, pers. comm., 1989) traceable from Atlin Lake to Bennett Lake with latest movement in the Upper Cretaceous. Numerous mineral prospects are related to the northwest-trending fault structure and associated splays. Anomalous gold and arsenic values in stream sediments correlate with Nisling Terrane rocks bounded by the Llewellyn fault (Mihalynuk et al., 1989).

Folding has affected all pre-Cretaceous rocks in the area (Mihalynuk and Mountjoy, 1990). Rocks of the Whitehorse trough have been shortened in an east-west direction. Nisling Terrane rocks have undergone several periods of deformation, with well developed cleavages, foliations, and/or lineations resulting from the latest period of Cretaceous deformation.

Regional Mineralization

Mineralization in the area consists of vein-type and skarn-type deposits spatially associated with the Llewellyn Fault, and Cretaceous to Eocene igneous rocks.

The most significant known gold bearing vein system in the immediate area is found at the Engineer mine, five kilometres east of the Taku Arm Property. Approximately 561,659 grams (18,058 oz) of gold and 278,373 grams (8,950 oz) of silver were produced from 15,560 tonnes (17,150 tons) of ore between 1913 and 1952 (Schroeter and Panteleyev, 1986). Narrow quartz and carbonate veins containing native gold, minor pyrite, tellurides and native antimony are hosted by Jurassic Laberge Group shales and greywackes (Cairnes 1913). Veins are developed within splays of the Llewellyn fault adjacent to Eocene Sloko Group rocks (Schroeter, 1986).

Gold-silver-arsenopyrite-quartz mineralization is also known at the Venus mine, about 65 kilometres to the north. The vein-type deposit is structurally controlled within Montana Mountain volcanics. At the Mt. Skukum mine, 80 km to the northwest, Eocene Mount Skukum group volcanics host structurally controlled quartz-carbonate veins containing electrum. Both mines have been developed underground and on surface with the Mt. Skukum mine producing a total of 2,488,000 grams (80,000 oz) gold from 200,000 tonnes (220,000 tons) of ore (Basnett, 1989) prior to shutting down in 1988.

The Teepee Peak prospect consists of skarn-type gold and cobaltite mineralization developed in Nisling Terrane rocks which are adjacent to felsic volcanics, cut by faults and intruded by felsic dykes (Schroeter, 1986; Mihalynuk et al., 1989).

Other significant prospects include the Happy Sullivan, similar to the Engineer mine except that there is locally up to 20% arsenopyrite (Schroeter, 1986). Precious metal (and related metal) bearing quartz veins containing sulfide minerals such as pyrite, chalcopyrite, galena and sphalerite are found at a number of other prospects including the Lawson, Ben-My-Chree, Ben, and Lakefront.

A tabulated geological history of the property and area is given below as Table 1.

TABLE 1: Geologic History of the Taku Arm Area.
Data in table modified from: Mihalynuk and Rouse, 1988; Mihalynuk et al., 1989; Mihalynuk and Mountjoy, 1990; Currie, 1990.

UNIT	AGE	LITHOLOGY
Qs	Quaternary	Unconsolidated surficial debris
- - -	Pleistocene	Glacial erosion; unconformity
ESL	Eocene	Sloko Group: rhyolite, trachyte, andesite, basalt, dike emplacement, quartz veining, and mineralization
- - -	Paleogene	Unconformity
uKm	Upper Cretaceous	Montana Mountain Volcanics: intermediate to felsic pyroclastics and flows
KTgd	Cretaceous to Tertiary	Coast Plutonic Complex: granodiorite, quartz diorite, granite, and hybrid rocks, mineralization
- - -	Upper Cretaceous(?)	Unconformity; Llewellyn Fault, dextral translation
Mv	Mesozoic	Teepee Peak Volcanics: intermediate to felsic pyroclastics and flows
- - -	Upper Jurassic	Open folding, faulting, mineralization (?)
muJv	Middle to Upper Jurassic	Felsic volcanics and minor granitoid intrusions
JL	Lower Jurassic	Laberge Group: Bedded argillite, greywacke, polymictic conglomerate, siliciclastics, and wacke
- - -	Upper Triassic	Erosional unconformity
uTrs	Upper Triassic	Stuhini Group (Lewes River Group in Yukon): argillite, volcanic wacke, arenite, carbonate, tuff, breccias, and conglomerate
Tgd	Triassic or older	Hale Mountain Granodiorite: foliated hornblende biotite granodiorite - orthogneiss
CPc	Carboniferous to Permian	Cache Creek Group: Limestone, chert, andesite, and basalt
- - -	Ordovician to Carboniferous	Several phases of metamorphism, folding, development of penetrative cleavage, faulting
PPm	Proterozoic to Cambrian	Nisling Terrane (Boundary Ranges - metamorphic rocks): argillaceous siltstone, greywacke, minor volcanics and carbonates

GEOLOGY OF THE TAKU ARM PROPERTY

Property geology (Figure 4) is more complex than described under regional geology. Rock outcrops are restricted to ridge crests, steep slopes, and stream cuts. Glacial ice, snowpacks, glacial moraine and debris cover much of the property. Bedrock is covered by uconsolidated alluvial fan deposits and locally thick vegetation below 1,000 metres. Geological mapping in 1989 was restricted to a grid in the central part of the claims or its immediate vicinity. Other geological information was drawn from previous work by United Keno Hill Mines Limited (Watson and Joy, 1980).

The oldest rocks exposed on the property are intercalated schists, gneisses, and local beds of marble/dolomite of the Boundary Range metamorphic suite, part of the Proterozoic to Paleozoic Nisling Terrane (map unit PPm). Watson and Joy (1980) split this suite into mixed pelitic schists, hornblende and/or biotite-feldspar-quartz gneiss. Exposures of these rocks mapped in 1989 found on the western section of the property could not be readily subdivided. These rocks are metamorphosed to the greenschist facies, and often exhibit local lithologic variations.

Metamorphosed lithologies of map unit PPm are best described as interbedded green to brown gneiss/schist composed of fine-grained feldspar, quartz and mafic minerals. Mafic minerals form up to 40% of the rock, and in order of decreasing abundance are; chlorite, biotite, and hornblende-amphibole. Locally the mafic minerals predominate forming chloritic schist, biotite schist, or amphibolite units. In at least one area, the west end of grid line 50N, muscovite predominates forming muscovite-quartz schist. Gneissic units with well developed 0.2 to 2.0 cm quartzofeldspathic bands, without a schist component, are composed of medium grained feldspar, quartz, and subordinate mafic minerals.

Schistose rocks (map unit PPms) are poorly exposed on the southeast side of Fee glacier. Mineralogy is dominated by chloritic minerals and quartz.

Distinctive tan to orange weathering, fine grained, locally skarnified limestone/dolomite (map unit PPmc) outcrops above 1400 metres elevation both on and adjacent to the grid. The unit is exposed in a bed 2 to 4 metres thick, striking northerly and dipping 10^{o} to 40^{o} W within a dark green gneiss/schist unit. The carbonate is irregularly silicified and can contain from 0.5 to 2.0%

disseminated pyrite and/or pyrrhotite. Similar rocks have also been found as float at the southeastern part of the grid; their source can not be attributed to the mapped bed.

Medium to coarse grained foliated hornblende-biotite granodiorite or orthogneiss (map unit Tgd), termed the Hale Mountain granodiorite (Currie, 1990), outcrops below 1400 metres elevation. Mihalynuk (pers. comm., 1990) believes this unit to be Triassic or older. The unit weathers grey to tan and where pyritized, a reddish brown gossan is developed. Judith Radloff of Aurum Geological Consultants Inc. examined two thin sections of unit Tgd and described the following modal mineralogy: plagioclase 35%, hornblende-biotite-chlorite 35%, quartz 20%, epidote and accessories 10%. Mafic content and mineralogy are variable. Feldspar phenocrysts are rare. Foliation ranges from intense to almost nonexistent. Contacts with rocks of the Nisling Terrane were not observed. Pegmatite dykes with the same approximate composition as the Hale Mountain granodiorite are exposed in at least three locations.

Rhyolite, dacite, and andesite dykes presumed to belong to the Eocene Sloko Group (map unit ESL) crosscut all other units. They are nonfoliated, with thicknesses up to 50 metres wide but usually less than 10 metres wide. They strike predominantly northwest with steep to vertical dips. The felsic dykes are spatially related to mineralization at a number of showings. Rhyolite and dacite are most common and range from cryptocrystalline to porphyritic. Phenocrysts of quartz are common; feldspar and mafic (hornblende, chlorite) phenocrysts less common.

Dark green to black, fine grained, mafic dykes of probable basaltic composition were mapped parallel, adjacent to, and within, rhyolite-dacite dykes. A grey porphyritic andesite sill outcrops on the north end of the grid and can be traced for approximately 300 m.

Argillic alteration, often associated with faulting and shearing; was noted at a number of mineral occurrences.

Structure on the Taku Arm Property is dominated by the regional northwest Cordilleran trend. Although structural mapping is incomplete, a complex structural situation is indicated.

MINERALIZATION

Mineralization on the Taku Arm Property was first located in the 1890's, about the same time as the nearby Engineer mine was discovered. The initial discovery of mineralized quartz veins on the White Moose Group, now partially covered by Crown Grants held by others, led to further discoveries of mineralized quartz veins which included the Rupert Group of Crown Grants located near Fee Glacier.

The White Moose and Rupert gold-silver-base metal bearing quartz vein systems appear to range from mesothermal to epithermal in style (Schroeter, 1986). These massive white quartz veins are usually less than one metre in width with rare cockscombs and vugs, contain pyrite, galena, sphalerite, and rare arsenopyrite and chalcopyrite. Weathered portions of the vein are vuggy and contain azurite, malachite and limonite. Host rocks include both the Nisling Terrane schists and gneisses, and foliated Hale Mountain granodiorite. Chloritized alteration haloes and iron staining adjacent to the veins extend one to five metres into wallrock. Rhyolite-dacite dykes often have argillic alteration where adjacent to or cut by quartz veins. Government mineral inventory reports for both the Rupert and White Moose veins are included in Appendix D.

In 1980 United Keno Hill Mines Limited examined the known mineral occurrences and their workings, designated them A to K, and briefly described them. Mineral occurrences A to F forming the White Moose Group are covered by Crown Grants not currently part of the Taku Arm Property. They were not examined in 1989 and are summarized below from data by Watson and Joy (1980).

Occurrence A: An old caved adit located on the shore of Taku Arm driven on a quartz vein containing chalcopyrite, bornite, galena, minor sphalerite and malachite (and possibly tetrahedrite) is probably part of the White Moose North Vein. Assay values from mineralized quartz float found nearby returned 0.08 oz/ton Au, 3.12 oz/ton Ag, 1.78% Pb and 0.01% Cu. This showing is located within a reverted Crown Grant held by H. Versluce of Whitehorse, Yukon Territory.

Occurrence B: Consists of vein quartz in outcrop and blocks of quartz float. The quartz is massive and vuggy, variably hematite stained and mineralized. Mineralized quartz contains up to 5 % galena and pyrite in blebs. Grab samples of this material averaged; trace Au, 2.09 oz/ton Ag, 1.34% Pb, and 0.01% Cu.

Occurrence C: Two shafts 35 metres apart were apparently sunk to intersect mineralized quartz veining along a schist-rhyolite contact. A chip sample of quartz veining with 5-10% fine-grained galena, 4% pyrite and minor chalcopyrite from one shaft assayed 0.06 oz/ton Au, 0.80 oz/ton Ag, 2.45% Pb and 0.01% Cu across an unknown width.

Occurrence D: A collapsed adit and 60 metre long trench are located 300 metres southeast of occurrence C. Veining is not exposed although quartz float with minor malachite, pyrite, and galena were observed by United Keno Hill Mines Limited personnel. This occurrence is located all or partially within a reverted Crown Grant held by H. Versluce of Whitehorse, Yukon Territory.

Occurrence E: This occurrence plots within a reverted Crown Grant held by H. Versluce of Whitehorse, Yukon Territory. It consists of a collapsed adit and a dump containing quartz with a few percent disseminated pyrite. A grab sample from the dump assayed trace Au, 1.55 oz/ton Ag, 0.13% Pb, and 0.01% Cu.

Occurrence F: Several trenches and a caved adit with blocks of barren quartz are found here. Vein in outcrop is not exposed. Sampling in 1980 did not return any significant results.

According to Watson and Joy (1980), several small quartz veins are found along the shoreline between occurrences A to E and in the vicinity of occurrence F. Most of these are narrow (average <0.20 metres wide ?) and barren although some contain up to 8% combined galena, pyrite, chalcopyrite, and sphalerite. Mineral occurrences G to K of the Rupert Group, covered by the Taku Arm Property claims, were examined and along with a new area of interest, occurrence L, are described below.

Occurrence G: This area was briefly examined in 1989. Previous workers (Gonzalez, 1986; Watson and Joy, 1980; Watson, 1981) have adequately mapped and sampled the vein. Trenching in 1981 (Watson, 1981) over a caved adit driven in the early 1900's revealed that the pod-shaped vein is 21 metres long, has a 35^{o} change in strike and pinches out at both ends. The strike and dip of the vein varies from 125^{o}/80^{o} SW on the south end to 160^{o}/80^{o} E on the north end. From the size of the dump, the adit was estimated to be 25 to 30 metres long (Watson, 1981). Two 1.10 metre wide chip samples collected two metres apart along the vein returned an average value of 0.45 oz/ton Au, 7.14 oz/ton Ag, 9.85% Pb, 0.05% Zn and 0.20% Cu (Watson and Joy, 1980). Quartz rubble in the adit dump is mineralized with 1 to 5% disseminated galena, tetrahedrite, chalcopyrite, and pyrite. Weathered mineralized vein material found in the dump contained extensive coatings and fracture fillings of azurite, malachite, and limonite. The vein is hosted almost entirely within a variably altered rhyolite dyke, which in turn is hosted by schist-gneiss.

A strong VLF-EM conductor outlined by Gonzalez (1986) aligns closely with the trend of exposed mineralization. The conductor continues into an overburden covered area to the southeast, where mineralized quartz float found in 1989 (sample # 343977) returned 2,380 ppb gold and 30 ppm silver.

Occurrence H: Previous work (Watson and Joy, 1980) included the excavation of two small pits or trenches located about 100 metres apart over a mineralized shear zone, quartz veins, and altered rhyolite dykes. A 2 to 20 cm wide quartz vein within the 0.50 metre wide shear zone is vuggy, rusty, azurite-malachite stained, and contains less than 1% each of chalcopyrite, pyrite, and galena. Adjacent to the shear zone, host rock contains a stockwork of unmineralized quartz veins. A 0.50 metre rock chip sample (# 343962) across the veined and clay-altered sheared schist/gneiss from the lower (south) pit returned 5,400 ppb gold and 30 ppm silver.

The upper (north) pit exposes a weakly developed stockwork of quartz veins, containing up to 2% pyrite and galena, within a rhyolite dyke. A one metre chip sample (# 343961) of this material returned 5 ppb Au and 4.0 ppm Ag.

Occurrence I: Numerous trenches, pits, and outcrops with mineralized quartz are found here. The Rupert 1 to 4 veins, as described by Cairnes (1913), are possibly located in this area (Watson and Joy, 1980). Samples of white quartz veins with bands and disseminations of galena and pyrite returned up to 510 ppb Au (sample # 343967) and 8.0 ppm Ag (sample # 343970) in 1989. Previous grab and chip sampling reported by Watson and Joy (1980) returned results up to 0.12 oz/ton Au, 6.93 oz/ton Ag, 11.77% Pb, 0.60% Zn.

Quartz veins range up to one metre wide in shear zones up to three metres in width cutting foliated, weakly chloritized, and locally gossanous granodiorite. Sulfide content within the veins is highly variable and usually less than 1%. Veins often pinch out into barren shear zones and several veins are *en echelon*. Distinct recessive weathering gullies trending discordantly with regional structures are presumed to indicate offsetting faults. Attitudes for the veins vary from 020°/50° W to 166°/80° W.

Occurrence J: Vein-type angular quartz float ranging up to 50 cm in diameter has been located in previously trenched overburden in and adjacent to the Fee Glacier lateral moraine. Quartz boulders are found scattered over a wide area with no outcrop. The high variation of total sulfides, ranging from <1% to 20%, is suggestive of multiple bedrock sources. The presence of these boulders allude to undiscovered bedrock mineralization, possibly under the Fee Glacier and/or the "No. 6 Vein" as reported by Cairnes (1913). Mineralized quartz float containing 20% total sulfides including pyrite, galena, and sphalerite sampled in 1989 returned 150 ppb Au, 1,060 ppm Ag, 7.0% Pb and 6.0% Zn (sample # 343901).

Occurrence K: Quartz veins, quartz sweats, and shear zones within gossanous gneiss are located on a nunatak within the Fee Glacier. Minor pyrite (<5%) and unidentified fine-grained black sulfides were noted in a 0.30 metre wide clay bearing shear zone containing approximately 25% quartz clasts. A 0.30 metre wide chip sample (sample # 343903) returned <5 ppb gold and 0.5 ppm silver. The amount and character of quartz veining and mineralization found on the nunatak does not account for all mineralized quartz float, especially the larger pieces, found in the moraine at occurrence J.

Lateral moraines of the Fee Glacier contain alternating bands of rusty and tan colored gneiss boulders. Boulders of irregularly mineralized vein-type quartz are found in the rusty bands. The bedrock source of both the rusty weathering gneiss and quartz float is presumed to lie under the glacier.

Occurrence L: Previously identified gold, silver, arsenic, lead, and zinc soil anomalies east of Fee Glacier (Watson and Joy, 1980: Watson, 1981: Gonzalez, 1986) were resampled and confirmed in 1989. Geological mapping in 1989 located argillic altered and quartz veined rhyolite-dacite dykes within the anomalous area (Figure 5). In addition, geophysics located a north-south trending VLF-EM conductor closely coinciding with a magnetic low. A distinctive east-west trending gully presumably marks a fault.

Samples of altered dyke rocks and rusty schists cut by quartz veinlets in outcrop returned low but anomalous values in gold, silver, and arsenic. A float sample (# 343979) of limonite coated tan dolomitic marble, variably silicified and containing <0.5% disseminated pyrite, returned 1,230 ppb Au, 4.6 ppm Ag, 103 ppm As and 1,960 ppm Pb. Distribution of this geochemically anomalous marble and soil is suggestive of talus-covered bedrock mineralization uphill from the sample sites.

GEOCHEMISTRY

A total of 635 samples (39 rock and 596 soil) were collected during the 1989 exploration program on the Taku Arm Property. Geochemical analyses were made for gold, silver, arsenic, copper, lead, and zinc. The analytical work was performed by Placer Dome Inc.'s Geochemistry Laboratory of Vancouver, B.C. using industry accepted methods described in Appendix B to this report. Results of the rock geochemistry are shown on Figure 4, and soil geochemistry results on Figures 4, and 6 to 11.

Rock Samples

A total of 39 rock outcrop (chip and grab samples) and rock float samples were collected in 1989. Gold and silver are the main elements of interest although some samples of mineralized quartz returned base metal values in the order of several percent. Rock sample descriptions and analytical results are given in Appendices A and B respectively. Significant lithogeochemical results are discussed under *Mineralization.*

Gold values in rocks ranged from less than 5 to 5,400 ppb, with four samples exceeding 1,000 ppb. Three rock samples returned greater than 100 ppm silver, with a range of less than 0.2 to 1,060 ppm. Anomalous gold and silver values closely correspond with high lead (and rarely zinc) values.

Typical Au:Ag ratios (ppb:ppm) range from 0.14 to 270, and average 8.7. Silicified marble at occurrence L returned the highest ratio. Multiple metal sources and/or mineralizing events are indicated.

Soil Samples

The 1989 soil geochemical fieldwork concentrated on a 23.3 line-kilometre grid established in the central part of the Taku Arm Property. The primary objective of the 1989 program was to identify and locate previously known multi-element soil geochemical anomalies. Of the ten previously known mineral occurrences, only two (occurrences I and J) were covered by the grid.

Soil samples were collected with a mattock or shovel at depths of 10 to 25 cm. Samples were collected at 25 metre intervals on picketed grid lines spaced 100 or 50 metres apart. Development of soil horizons is poor to absent.

On scree-covered hillsides, talus fines were collected. The plateau area in the northern part of the grid is covered by talus and reworked glacial moraine material mixed with talus fines, silt and clay. Frost boils were sampled where encountered on the plateau area. The eastern end of the grid was not sampled in detail because the overburden is not suitable for soil geochemistry, and previous results (Watson and Joy, 1981; Gonzalez, 1986) indicate that the area is not geochemically anomalous. Lateral moraines of the Fee Glacier were not sampled as the material is transported and therefore does not reflect local bedrock sources.

Mr. S. Nimmo of Placer Dome Inc. plotted soil geochemical data on histograms and calculated geometric means. These data are shown in Appendix B.

Threshold levels used in contouring the geochemical data are given below:

Element	Geometric Mean	Threshold	Anomalous	Highly Anomalous
Au (ppb)	10	30	60	120
Ag (ppm)	0.3	1.0	2.0	4.0
As (ppm)	15	30	60	120
Cu (ppm)	40	80	160	320
Pb (ppm)	58	100	200	400
Zn (ppm)	121	175	250	500

A correlation matrix (log: 1) for the soil geochemistry data (596 samples) is as follows:

Element	Au	Ag	As	Cu	Pb	Zn
Au	1.0	0.556	0.193	0.402	0.589	0.466
Ag	0.556	1.0	0.397	0.541	0.789	0.708
As	0.193	0.397	1.0	0.332	0.323	0.473
Cu	0.402	0.541	0.332	1.0	0.594	0.669
Pb	0.589	0.789	0.323	0.594	1.0	0.827
Zn	0.466	0.708	0.473	0.669	0.827	1.0

Gold values (Figure 6) range from less than 5 to 3,200 ppb. Contours were drawn at 30, 60, and 120 ppb. Predominantly linear, north-trending, anomalies are located in the relatively steep scree-covered south section of the grid and as isolated samples sites on the plateau. Modest dispersion is present down-slope from the main part of the anomalies.

Silver values (Figure 7) range from less than 0.1 to 11.0 ppm. Contours were drawn at 1.0, 2.0, and 4.0 ppm. Anomalous areas closely coincide with areas containing elevated gold values in the southern part of the grid, and as isolated sample sites associated with known mineralized zones (occurrence I).

Arsenic values (Figure 8) range from less than 1.0 to 12,000 ppm. Contours were drawn at 30, 60, and 120 ppm. Irregularly shaped anomalous areas are associated with elevated precious metal values at the southern part of grid.

Copper values (Figure 9) range from less than 2 to 550 ppm. Contours were drawn at 80, 160, and 320 ppm. Discrete areas of elevated copper values coincide with anomalous gold-silver values.

Lead values (Figure 10) range from 11 to 3,200 ppm. Contours were drawn at 100, 200, and 400 ppm. Broad anomalous areas are centered over areas with elevated precious metal values.

Zinc values (Figure 11) range from 27 to 3,200 ppm. Contours were drawn at 175, 250, and 500 ppm. Anomalous zinc values closely coincide with elevated lead values.

The highest order coincident anomaly for all six analyzed elements is in the area of occurrence L, centered approximately over L48+50N/54+50E. The area covers 150 by 400 metres, exceeds 60 ppb, and ranges up to 3200 ppb gold. The long axis of the anomaly parallels the elevation contour and crosses numerous small gullies, ruling out a point source and downhill dispersion as the cause of the anomaly. Mixed glacial overburden and talus on the plateau area result in a sharp geochemical cutoff on L50N.

Occurrence J adjoins a low-order coincident Au, Ag, As, Pb, and Zn anomaly near the west ends of L55N and L56N. Bedrock is covered by glacial moraine and talus.

On L43N to L45N, at approximately 52+50W, a coincident Au, Ag, As, Cu, Pb and Zn anomaly has been outlined which is distinct from the nearby upslope occurrence L anomaly. Altered rhyolite dykes and associated quartz stringers and veinlets are exposed in the vicinity.

A broad Au (up to 290 ppb), As, Pb, and Zn anomaly, near the baseline on lines 47N to 50N, is coincident with smaller more discrete silver and copper anomalies. Float of quartz containing pyrite, galena, and chalcopyrite was located here. Marble was noted in outcrop and float.

Geochemical sampling over and downslope of visibly mineralized quartz veins, such as occurrence I (east end of L47N), yielded isolated but often highly anomalous values for all six elements analyzed.

An arsenic anomaly ranging up to 310 ppm is located on the west ends of line 48N to 49N is coincident with low-order anomalous values for Au, Ag, Pb, Zn, and Cu. This area is located on a steep talus slope disected with gullies near the western property boundary.

Contour soil sample lines east of the 1989 grid attempted to define a continuation of mineralization between occurrences G and H. Although overburden is presumed to be thick in the area anomalous results were returned, including 310 ppb gold.

GEOPHYSICS

A total of 17.5 line kilometers of total field magnetic survey and 21.7 line kilometers of VLF-EM survey was carried out over the grid in 1989. The data interpretation map (Figure 12) was prepared by R. Tykajlo of Geo-Digit-Ex Inc. in Calgary, Alberta. The complete geophysical report and maps of the magnetic and VLF-EM surveys, and maps produced by Placer Dome Inc. are in Appendix E.

Previous total field magnetic surveying carried out on the eastern portion of the grid (Gonzalez, 1986) indicates the area is not geophysically responsive. This area was not covered by the 1989 magnetometer survey.

Mr. G. Sutton and Mr. S. Tufford of Aurum Geological Consultants Inc. carried out the total field magnetic and VLF-EM surveys from August 8-11 and Sept. 7-13, 1989 respectively. Instrumentation included two EDA OMNI IV magnetometers (a field unit and base station) and a Geonics EM-16. Specific features sought were magnetic lows that may correspond to areas of hydrothermal alteration and electromagnetic conductors that could reflect fault structures and possible related mineralization.

Geophysically defined features include conductors located by the VLF-EM, and areas of low and high magnetic relief. Most of these features are related to known geological structures, lithologies and or geochemical anomalies. Extreme topographic relief and moraine deposits at the northwest corner of the grid result in inconclusive geophysical data. Placer Dome Inc.'s interpretation is similar to that by Geo-Digit-Ex Inc.

Prominent VLF-EM conductors were located over, or trend toward, occurrences G, H, I, J, and L. Occurrence K is outside the grid area. Magnetic lows are associated with occurrence L. A northerly trending VLF-EM conductor is located on the south west end of the grid.

Occurrence L is defined by a distinct northwesterly trending magnetic low on L48N to L49N and a coincident VLF-EM conductor (A-A' on Figure 12) from L47N to L49N. This conductor is probably offset and continues across the plateau area through the occurrence J area to L59N. Immediately west of occurrence J is a lateral moraine which may mask an associated magnetic low or be the source of the A-A' conductor on the plateau area.

A broad northerly trending magnetic low and coincident parallel VLF-EM conductors (B-B' on Figure 12) extends from the west end of L43N to the baseline on L48NL. This area is underlain by rhyolite dykes and soil geochemical anomalies.

The geophysical interpretation postulated ten east trending faults that offset the VLF-EM conductors. A number of these interpreted faults, as at occurrences I and L, correspond with incised gullies. The current 100 metre line spacing is of insufficient detail to allow more definite interpretations.

CONCLUSIONS AND RECOMMENDATIONS

The Taku Arm Property is underlain by Proterozoic to Cambrian Nisling Terrane strata which have undergone at least four separate orogenic events in the Ordovician to Carboniferous, Triassic, Jurassic, and Cretaceous to Tertiary periods. Known gold-silver deposits in the region are spatially associated with the Llewellyn Fault, located within 10 km to the east, and related volcanic-plutonic rocks. The property is situated in a geologic setting that is highly permissive for the development of precious metal deposits.

The property is an epithermal to mesothermal gold-silver prospect. Potential exists for hosting precious metals in skarn, stockwork and vein-type deposits. Twelve mineral occurrences, designated A to L, have been located to date.

Occurrences A to F, found on or near the shore of Taku Arm, are partially covered by claims held by others and were not examined in 1989. Previous work has indentified favorable geology and numerous vein-type mineralized structures.

A quartz vein hosted by altered rhyolite and schist/gneiss at occurrence G has galena, tetrahedrite, chalcopyrite, and pyrite mineralization. Previous trenching by United Keno Hill Mines Limited has shown that the quartz-sulfide vein is restricted to a 21 metre long section at a flexure in the vein/dyke structure. Two chip samples collected in 1980 returned an average grade of 0.45 oz/ton Au and 7.14 oz/ton Ag over 1.10 metre.

A 0.50 metre wide rock chip sample, collected at occurrence H, of mineralized quartz and clay altered schist/gneiss returned 5400 ppb Au and 8.0 ppm Ag, the highest gold value returned in 1989. Geological, geochemical, and geophysical data are suggestive of occurrences G and H being developed on the same structure.

Discontinuous white quartz veins containing bands and disseminations of galena and pyrite cut iron oxide stained foliated granodiorite at occurrence I. Occurrences J and K consist of mineralized quartz float and quartz veining respectively. Sampling in 1989 at these three locations returned low values.

VLF-EM conductors closely coincide with known west to northwest trending mineralization at occurrences G, H, and I. Another conductor located at the southwest part of the grid corresponds with a magnetic low and coincident Au, Ag, As, Cu, and Pb soil geochemistry anomalies. Although outcrops of altered rhyolite dykes with quartz stringers and veinlets are exposed in the vicinity, mineralization has not yet been discovered at this area.

Soil geochemistry surveys do not appear to correlate with VLF-EM conductors found in the plateau area. This may be due to the talus overburden and reworked glacial moraine material. However, the lack of downslope geochemical dispersion on steep slopes suggests that anomalies in these areas have discrete and definite bedrock sources.

Occurrence L is potentially the most significant mineralization located on the property to date. The area is underlain by schist/gneiss with at least one marble/dolomite bed and intruded by variably altered intermediate to felsic dykes. A rock sample of partially silicified dolomite/marble with traces pyrite returned 1,230 ppb gold and 4.6 ppm silver. The soil geochemical survey defined an anomalous area (30 samples) covering approximately 150 X 400 metres exceeding 60 ppb Au with a maximum value of 3200 ppb Au. Vein-type or stratabound gold mineralization is suggested by the current geochemical and geological data.

Total field magnetic surveying located a magnetic low over occurrence L. A VLF-EM survey identified a corresponding northwesterly trending conductor. This conductor, interpreted to be offset in at least three locations, possibly links occurrences J and L, a total distance of 1400 m.

Based on results of surface exploration carried out on the Taku Arm Property in 1989, further work is warranted. The following is recommended:

1. Compile a 1:5000 scale orthophoto map of the Taku Arm Property incorporating all significant available geological, geochemical, geophysical and remote sensing data to better identify potential exploration targets.

2. All claim posts must be located and surveyed to ensure the ground is properly staked.

3. Trenching is required at occurrence L to test for precious metal mineralization. Concurrent geological mapping, geochemical sampling, VLF-EM and magnetometer surveys should be carried out on a tighter grid spacing.

4. The geophysical and geochemical anomaly located on the south west end of the grid requires more mapping, sampling and geophysical surveys (VLF-EM and magnetometer).

5. Additional grid establishment followed by magnetometer and VLF-EM surveys are required to fill in and tie together the various conductors at occurrences G, H and I that lie outside the area covered by the present grid. Additional geological mapping, prospecting, and possibly soil geochemistry and geophysical (VLF-EM and magnetometer) surveys should be carried out over the remainder of the property.

6. Any further work including diamond drilling is contingent on results of the above program.

Respectfully submitted,

GEOLOGICAL ASSOCIATION OF CANADA
R. W. HULSTEIN
FELLOW

March 16, 1990

Roger W. Hulstein, B.Sc., FGAC
Aurum Geological Consultants Inc.

REFERENCES

BASNETT, R., 1989. Epithermal Gold Veins of the Mount Skukum Gold Mine, South - Western Yukon Territory; Alaska Miners Association, Juneau Branch, Abstracts of Professional Papers, 1989.

BULTMAN, T.R., 1979. Geology and Tectonic History of the Whitehorse Trough west of Atlin, British Columbia; Unpublished Ph.D. thesis, Yale University, 284 p.

CAIRNES, D.D., 1913. Portions of Atlin district, B.C.; Geological Survey of Canada, Memoir No. 37.

CHRISTIE, R.L., 1957. Bennett, Cassiar District, B.C., Geological Survey of Canada, Map 19 - 1957, 1:253,440.

CURRIE, L.D., 1990. Metamorphic Rocks in the Florence Range, Coast Mountains, Northwestern British Columbia (104M/8); in Geological Fieldwork 1989, British Columbia Ministry of Energy, Mines and Petroleum Resources, Paper 1990-1.

DOHERTY, R.A. and HART, C.J.R., 1988. Preliminary Geology of Fenwick Creek (105D/3) and Alligator Lake (105D/6) map areas; Indian and Northern Affairs Canada: Yukon Region, Open File 1988-2 by Aurum Geological Consultants Inc., 65 p.

GONZALEZ, R.A., 1986. Report on the Rupert Claim Group, Atlin Mining Division, B.C., NTS 104 M/8W; Private Company Report for Rise Resources Ltd., Vancouver, B.C.

MIHALYNUK, M.G., CURRIE, L.D. and ARKSEY, R.L., 1989. The geology of the Tagish Lake area (Fantail Lake and Warm Creek) (104M/9W and 10E); in Geological Fieldwork 1988, British Columbia Ministry of Energy, Mines and Petroleum Resources, Paper 1989-1, p. 293-310.

MIHALYNUK, M.G. and MOUNTJOY, K., 1990. Geology of the Tagish Lake Area (Edgar Lake 104M/8 and Fantail Lake 104M/9E); in Geological Fieldwork 1989, British Columbia Ministry of Energy, Mines and Petroleum Resources, Paper 1990-1,

MIHALYNUK, M.G. and ROUSE, J.N., 1988. Preliminary geology of the Tutshi Lake area, northwestern British Columbia (104M/15); in Geological Fieldwork 1987, British Columbia Ministry of Energy, Mines and Petroleum Resources, Paper 1988-1, p. 217-231.

SCHROETER, T.G., 1986. Bennett Project (104M); in Geological Fieldwork 1985, British Columbia Ministry of Energy, Mines and Petroleum Resources, Paper 1986-1, p. 185-189.

SCHROETER, T.G. and PANTELEYEV, A., 1986. Lode Gold - Silver Deposits in Northwest British Columbia; in Mineral Deposits of Northern Cordillera, ed., Morin, J. A., The Canadian Institute of Mining and Metallurgy, Special Volume 37.

WATSON, K.W., 1981. 1981 Geological and Geochemical Report on the Fee Claim Group, Atlin Mining District, British Columbia; Private Company Report for United Keno Hill Mines Limited, Whitehorse, Yukon Territory

WATSON, P.W. and JOY, R.J., 1980. 1980 Geological and Geochemical Report on the Fee Claim Group, Atlin Mining Division, British Columbia; B.C. Ministry of Energy, Mines and Petroleum Resources, Assessment Report 8384.

WHEELER, J.O. and McFEELY, P., 1988. Tectonic Assemblage map of the Canadian Cordillera; Geological Survey of Canada, Open File 1565.

STATEMENT OF QUALIFICATIONS

I, ROGER W. HULSTEIN, hereby certify that:

1. I am a geologist with AURUM GEOLOGICAL CONSULTANTS INC., 412-675 West Hastings Street, Vancouver, British Columbia.

2. I am a graduate of Saint Mary's University, Halifax, with a degree in geology (B.Sc., 1981) and have been involved in geology and mineral exploration continuously since 1978.

3. I am a fellow of the Geological Association of Canada (F3572).

4. I have no direct or indirect interest in the properties of Placer Dome Inc.

5. I am the author of this report on the Taku Arm Property, which is based on my personal examination on the ground July 29 - Aug. 5 and Sept 7 - 14, 1989, information supplied to me by Geo-Digit-Ex Inc., Placer Dome Inc., and on referenced sources.

March 16, 1990

Roger W. Hulstein, B.Sc., FGAC

STATEMENT OF COSTS

Geological and Geochemical

A. Fieldwork, Aurum Personnel

R. Hulstein, B.Sc., 17 days @ $320/day:	$5,440.00	
G. Smith, B.Sc. 28.5 days @ $275.00/day:	7,837.50	
G. Sutton, B.Sc., 12 days @ $200/day:	2,400.00	
S. Tufford, 37 days @ 275.00/day:	10,175.00	
D. Patterson, 21 days @ $200/day:	4,200.00	
R.A. Doherty, B.Sc., 4 days @ $350/day:	1,400.00	
Office and support staff:	1,105.00	
Subtotal:		$32,557.50

B. Geochemical Analyses

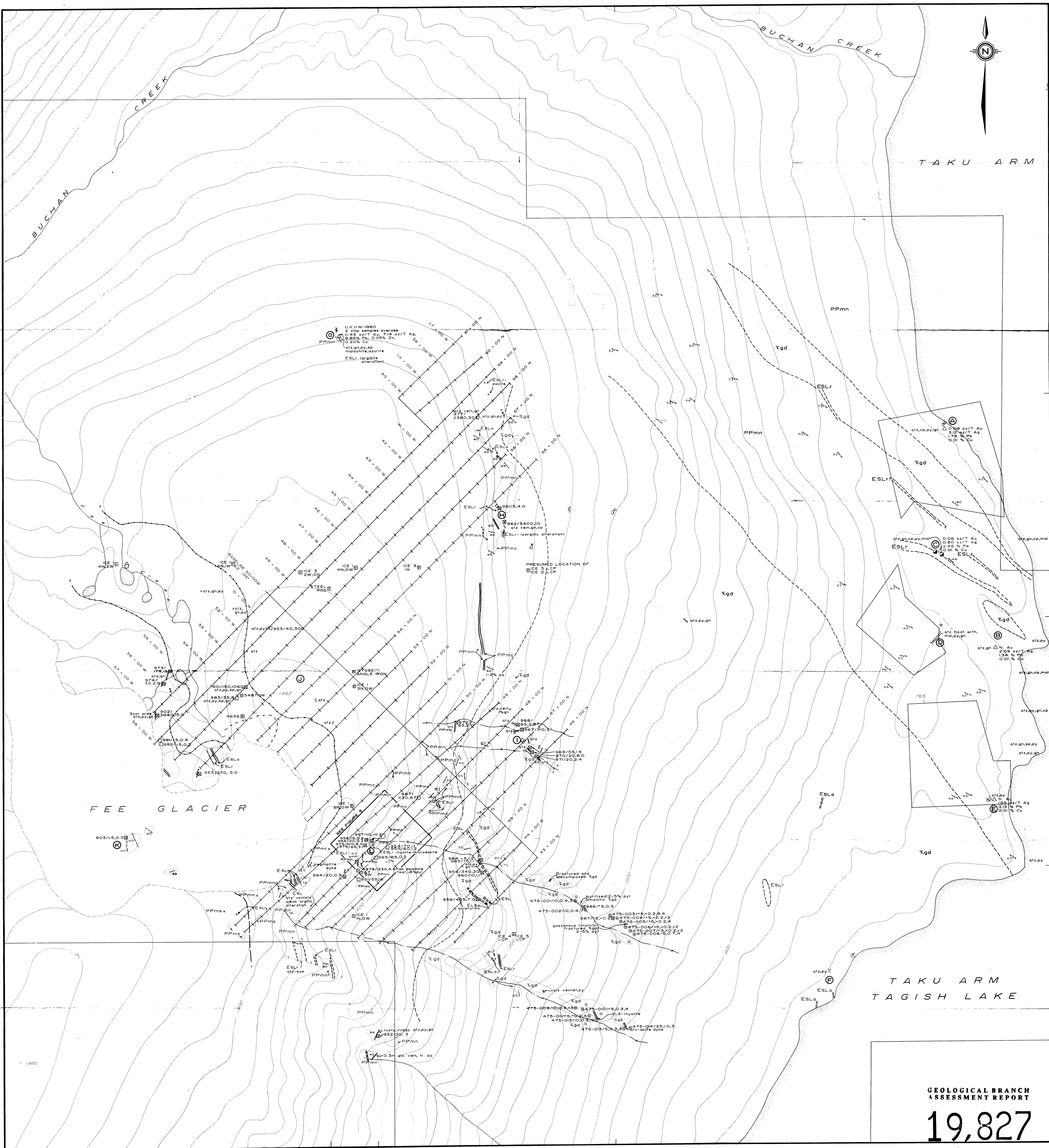
596 soil and 39 rock samples:		$11,500.00

C. Support costs

Helicopter:	$5,797.52	
Freight & Postage:	957.11	
Groceries and meals:	2,684.15	
Sample bags, tape & thread:	299.92	
Gas:	402.81	
Truck Rental:	1,685.41	
Maps:	373.63	
Radio & phone charges:	668.03	
Miscellaneous consumables:	1,214.38	
Magnetometer & VLF-EM rental:	2,405.33	
Camp Rental:	3,200.00	
Travel:	2,056.00	
Administration Fee:	650.00	
Subtotal:		$22,394.29

D. Report Preparation

R. Hulstein, B.Sc.:	$5,500.00	
H. Keyser, B.Sc.:	640.00	
G. Smith, B.Sc.:	962.50	
L. Walton, B.Sc.:	600.00	
Geophysics Report:	1,500.00	
Drafting:	4,500.00	
Reprographics and typing:	1,200.00	
Subtotal:		$14,902.50
TOTAL 1989 ASSESSMENT VALUE:		**$81,354.29**



GEOLOGICAL BRANCH
ASSESSMENT REPORT

19,827

LEGEND

LITHOLOGIES

QUATERNARY
PLEISTOCENE AND RECENT

Qsi	Snowfields and glaciers
Qm	Glacial moraine, glacial deposits
Qd	Till, alluvium, colluvium

TERTIARY
EOCENE

ESL	Sloko Group(?): ESLr, rhyolite, dacite; ESLa, andesite, mafic dykes

TRIASSIC(?) OR OLDER(?)

Ɽgd	Granodiorite

PROTEROZOIC TO PALEOZOIC(?)
NISLING TERRANE

PPms	Schist
PPmn	Gneiss/Schist
PPmc	Marble, Dolomite

Outcrop boundary
Lake/Pond
Creek
Topographical Contour Interval 40m
Approximate property perimeter
Picket grid line
Glacier
Edge of escarpment
Moraine boundary
Rock float location
Previous rock sample site (1980)

SYMBOLS

Rock float sample site (1989)
979/1230, 4.6 — Gold in ppb; Silver in ppm; Sample Number (all numbers should be preceeded by 343)
Rock outcrop sample site
Soil sample site (1989-off grid)
475-012/10,0.3,10 — Sample Number; Gold in ppb; Silver in ppm; Arsenic in ppm
Lithological Contact; assumed, approximate, defined
Fault or Shear; approximate, defined
Vein with dip
Strike & Dip of structure
Strike & Dip of foliation
Strike & Dip of joint
Trench
tr. Trace
G Gossanous

Adit, caved
Claim or Reverted Crown Grant post
Mineral occurence or area of interest
Glacial Striation
shaft
qtz quartz
py pyrite
cp chalcopyrite
gn galena
sp sphalerite
po pyrrohite
mal malachite

NOTE:
- All grid locations based on transit and chain survey
- All off-grid locations based on hip chain, compass and or 1:50,000 topographical map
- Map based in part on United Keno Hill Mines Ltd. assessment report by: Watson and Joy, 1980 (#8384)

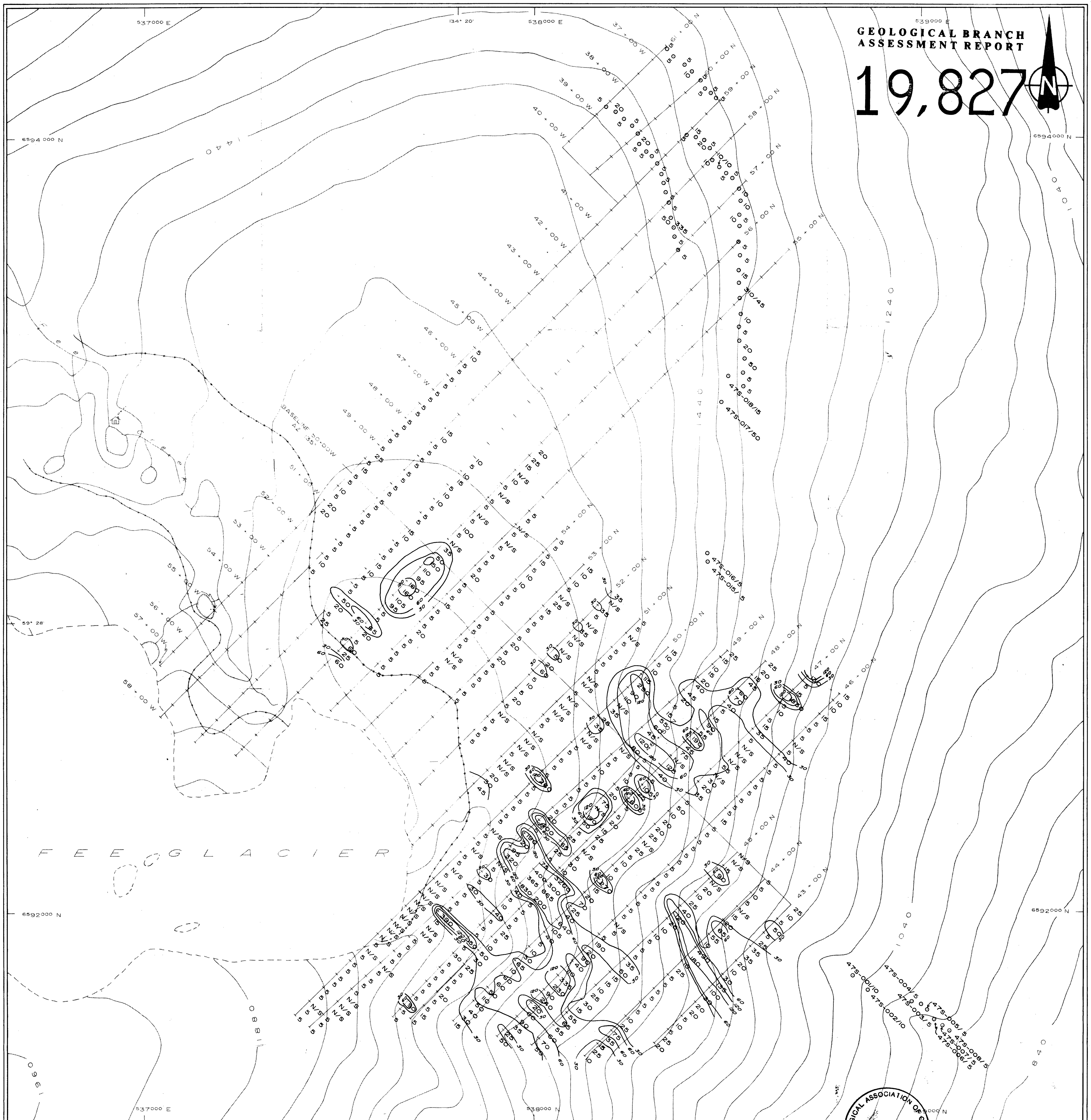
GEOLOGICAL ASSOCIATION OF CANADA
R. W. HULSTEIN
Mar/16/90
FELLOW

50 0 50 100 150 200 250 300 350
Metres

PLACER DOME INC.
TAKU ARM PROPERTY
GEOLOGY AND ROCK GEOCHEMISTRY

Aurum Geological Consultants Inc.	DATE: MARCH 1990
NTS 104M/8	DRAWN BY: RH HS
SCALE: 1:5000	FIGURE: 4


GEOLOGICAL BRANCH
ASSESSMENT REPORT
19,827
LEGEND
LITHOLOGIES
QUATERNARY
Qd Till, alluvium, colluvium
TERTIARY
EOCENE
EsL SLOKO GROUP: EsLr, rhyolite, EsLd, dacite
PROTEROZOIC TO PALEOZOIC ?
PPmn Gneiss/Schist
PPmc Marble, Dolomite
SYMBOLS
strike & dip of structure
trench
vein
lithological contact, defined, approximate
fault, assumed (from geophysics) arrows indicate movement direction
topographic contour, interval 40m
seasonal creek
outcrop boundary
gn galena
py pyrite
G gossan
GEOCHEMISTRY:
sample number
ppb Au
ppm As
ppm Ag
1989 rock sample location -outcrop
N/S no sample
1989 rock sample location-float
rock sample collected prior to 1989
soil sample collected prior to 1989
picket grid line & station, sample site Au ppb, Ag ppm, As ppm
GEOPHYSICS:
interpreted lithological contact from magnetic relief
VLF-EM anomaly trend
NOTE: - grid lines turned by transit, line established by chain and picket
- topography from NTS 1:50,000 topographic map (104M/8)
- geophysical data interpreted by GEO-DIGIT-EX INC.
- rock and soil sample geochemistry prior to 1989 collected by U.K.H.M. (Watson & Joy, 1980) & Rise Resources Ltd. (Gonzalez, 1986).
GEOLOGICAL ASSOCIATION OF CANADA
R. W. HULSTEIN
FELLOW
Metres
PLACER DOME INC.
TAKU ARM PROPERTY
OCCURRENCE L COMPILATION
Aurum Geological Consultants Inc.
DATE: FEB. 1990
NTS: 104M/8
DRAWN BY:
SCALE 1:500
FIGURE: 5
PPmc-Float
PPmn Float
PPmn
L 49 + 00N
L 48 + 50N
L 48 + 00N
L 47 + 00N
1680m
1640m
1600m
1560m
1520m
1480m
ESLr
ESL - micro granodiorite
ESLd
Feldspar porphyry
PPmn (Hornblende)
Tan limonite weathering Limestone/Marble, <0.5% py
PPmn Pegmatite Dykes
Limy Schist, trace py,gn
954/70, 1.1,<2
955/60, 1.2,<2
965/65, 0.5, 22
979/1230, 4.6, 103
966/20, 0.2, 4
976/65, 3.1, 620
975/100, 6.0, 410
957/110,< 0.2, 9
956/15,<0.2,<2
DR18/13, 106.0
DR19/20, 4.4
DR27,27/7.8
790/6.2, 32



GEOLOGICAL ASSOCIATION OF CANADA
R. W. HULSTEIN
FELLOW

50 0 50 100 150 200 250 300 350
Metres

LEGEND

- OFF GRID SOIL SAMPLE LOCATION
- SAMPLE NUMBER/ppb Au
- NO SAMPLE
- GRID SOIL SAMPLE LOCATIONS AT 25m INTERVALS

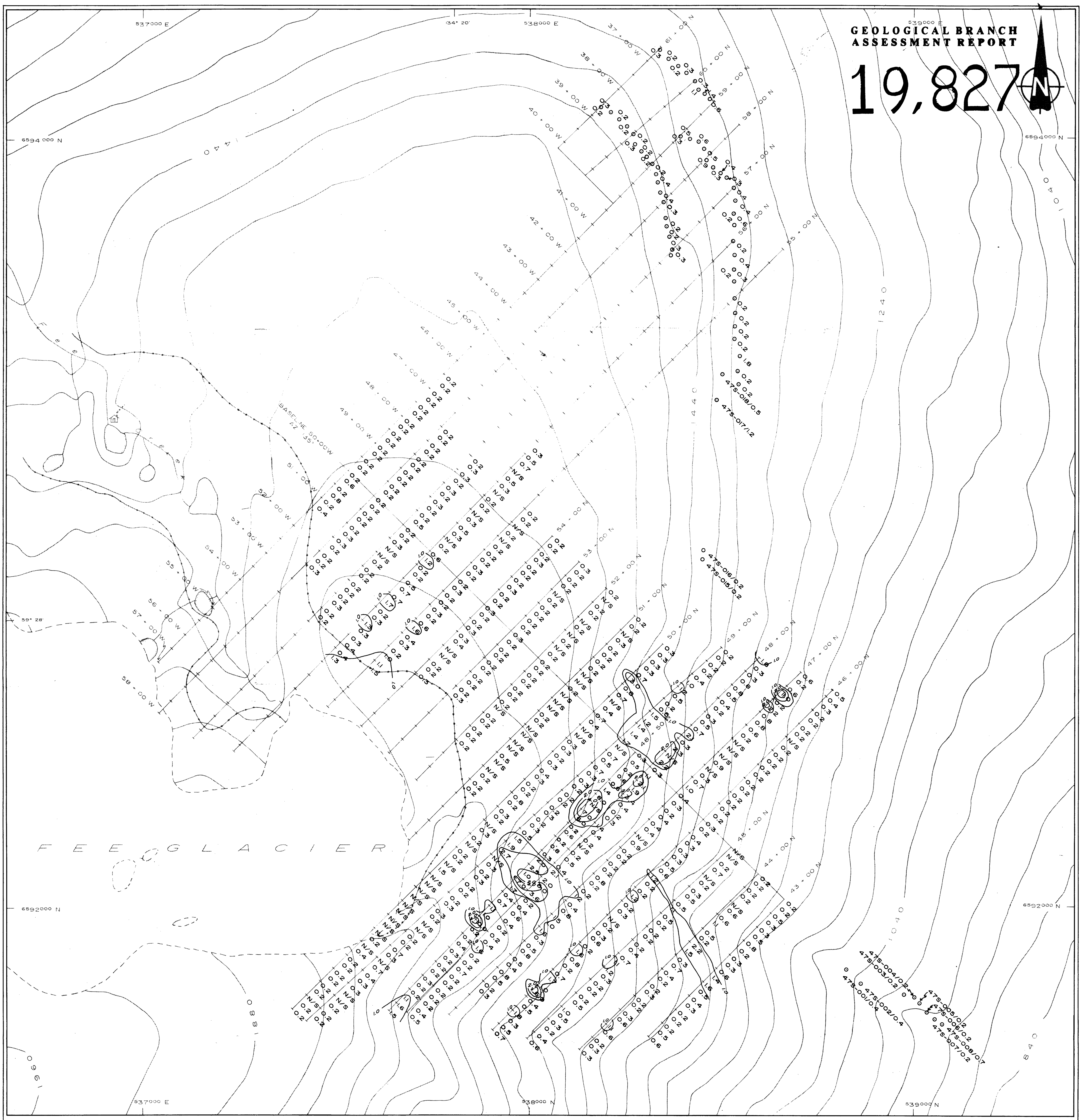
SOIL GEOCHEMISTRY CONTOURS
(<30 ppb Au is background)

- 30-60 ppb Au possibily anomalous
- 60-120 ppb Au anomalous
- >120 ppb Au highly anomalous

SYMBOLS

- POND
- CREEK
- ELEVATION CONTOUR (40m INTERVAL)
- CAMP
- GRID LINE
- GLACIER BOUNDARY
- MORAINE BOUNDARY

PLACER DOME INC.			
TAKU ARM PROPERTY			
GEOCHEMICAL RESULTS GOLD (ppb)			
Aurum Geological Consultants Inc.		DATE: MARCH 1990	
NTS 104M/8	DRAWN BY: RH LK	SCALE: 1:5000	FIGURE: 6



LEGEND

OFF GRID SOIL SAMPLE LOCATIONS

SAMPLE NUMBER/ppm Ag

NO SAMPLE

GRID SOIL SAMPLE LOCATIONS AT 25m INTERVALS

SOIL GEOCHEMISTRY CONTOURS
(<1.0 ppm Ag is background)

1.0-2.0 ppm Ag possibily anomalous

2.0-4.0 ppm Ag anomalous

>4.0 ppm Ag highly anomalous

SYMBOLS

POND

CREEK

ELEVATION CONTOUR (40m INTERVAL)

CAMP

GRID LINE

GLACIER BOUNDARY

MORAINE BOUNDARY

50 0 50 100 150 200 250 300 350
Metres

PLACER DOME INC.

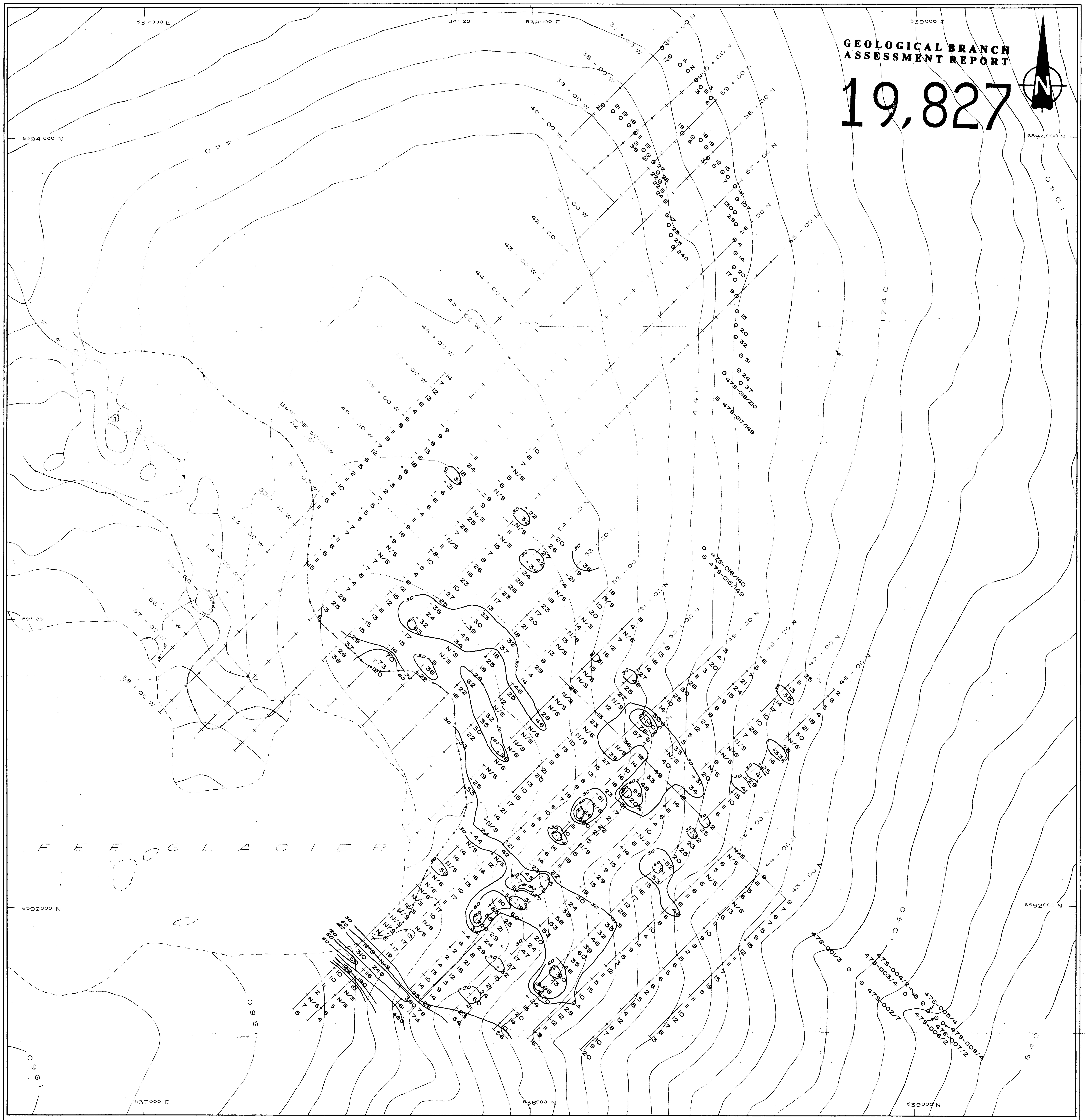
TAKU ARM PROPERTY

GEOCHEMICAL RESULTS

SILVER (ppm)

GEOLOGICAL ASSOCIATION OF CANADA — R. W. HULSTEIN — FELLOW

Aurum Geological Consultants Inc.		DATE: MARCH 1990	
NTS 104M/8	DRAWN BY: RH LK	SCALE 1:5000	FIGURE: 7



LEGEND

OFF GRID SOIL SAMPLE LOCATION

SAMPLE NUMBER/ppm As

NO SAMPLE

GRID SOIL SAMPLE LOCATIONS AT 25m INTERVALS

SOIL GEOCHEMISTRY CONTOURS
(<29 ppm As is background)

30-60 ppm As possibily anomalous

60-120 ppm As anomalous

>120 ppm As highly anomalous

SYMBOLS

POND

CREEK

ELEVATION CONTOUR (40m INTERVAL)

CAMP

GRID LINE

GLACIER BOUNDARY

MORAINE BOUNDARY

50 0 50 100 150 200 250 300 350

METRES

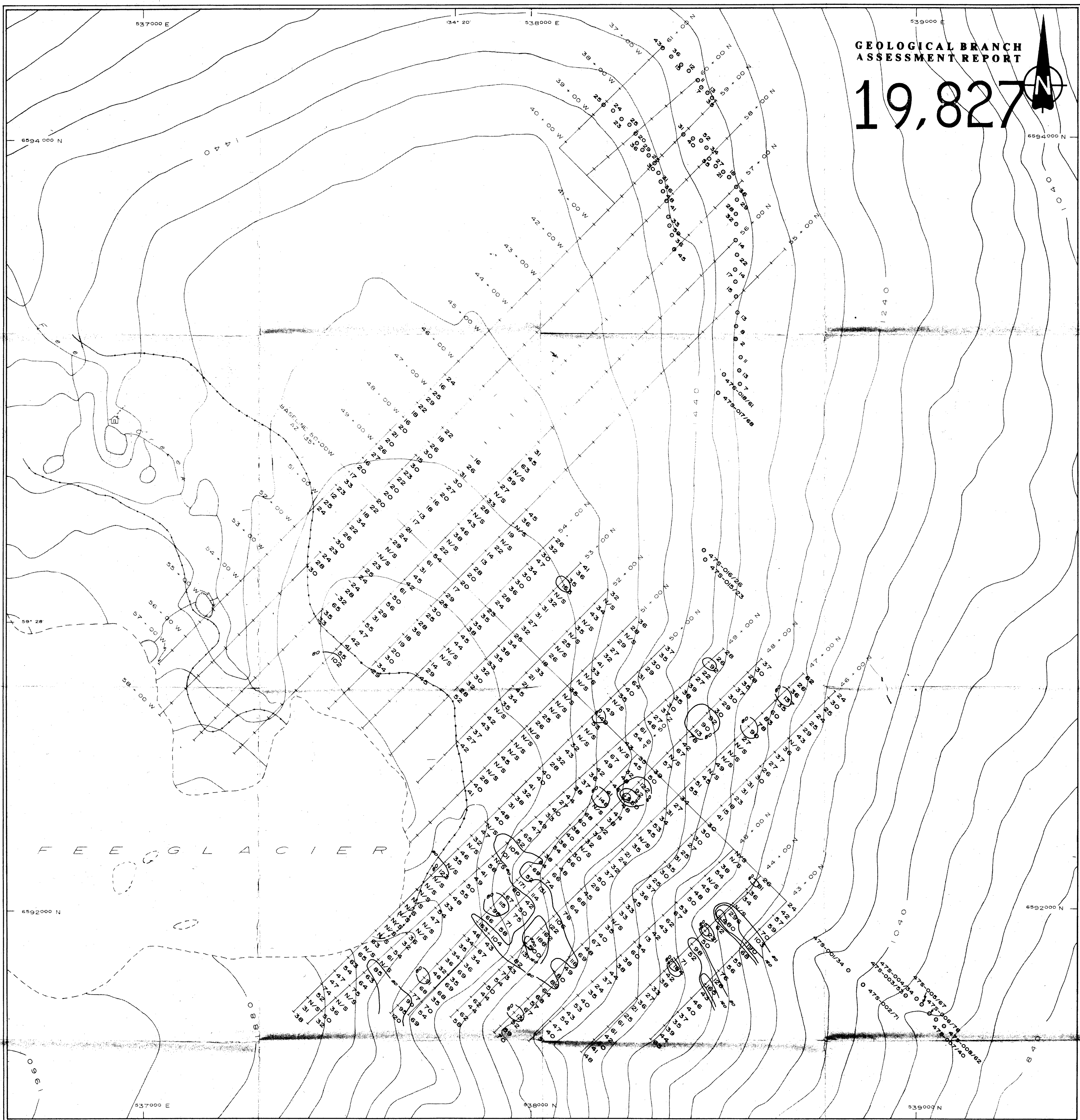
GEOLOGICAL ASSOCIATION OF CANADA
R. W. HULSTEIN
FELLOW

PLACER DOME INC.

TAKU ARM PROPERTY

GEOCHEMISTRY RESULTS
ARSENIC (ppm)

Aurum Geological Consultants Inc.		DATE: MARCH 1990	
NTS 104M/8	DRAWN BY: RH LK	SCALE: 1:5000	FIGURE: 8



LEGEND

OFF GRID SOIL SAMPLE LOCATION
SAMPLE NUMBER/ppm Cu

NO SAMPLE
GRID SOIL SAMPLE LOCATIONS AT 25m INTERVALS

SOIL GEOCHEMISTRY CONTOURS
(<80 ppm Cu is background)

80-160 ppm Cu possibily anomalous
160-320 ppm Cu anomalous
>320 ppm Cu highly anomalous

SYMBOLS

POND
CREEK
ELEVATION CONTOUR (40m INTERVALS)
CAMP
GRID LINE
GLACIER BOUNDARY
MORAINE BOUNDARY

50 0 50 100 150 200 250 300 350
Metres

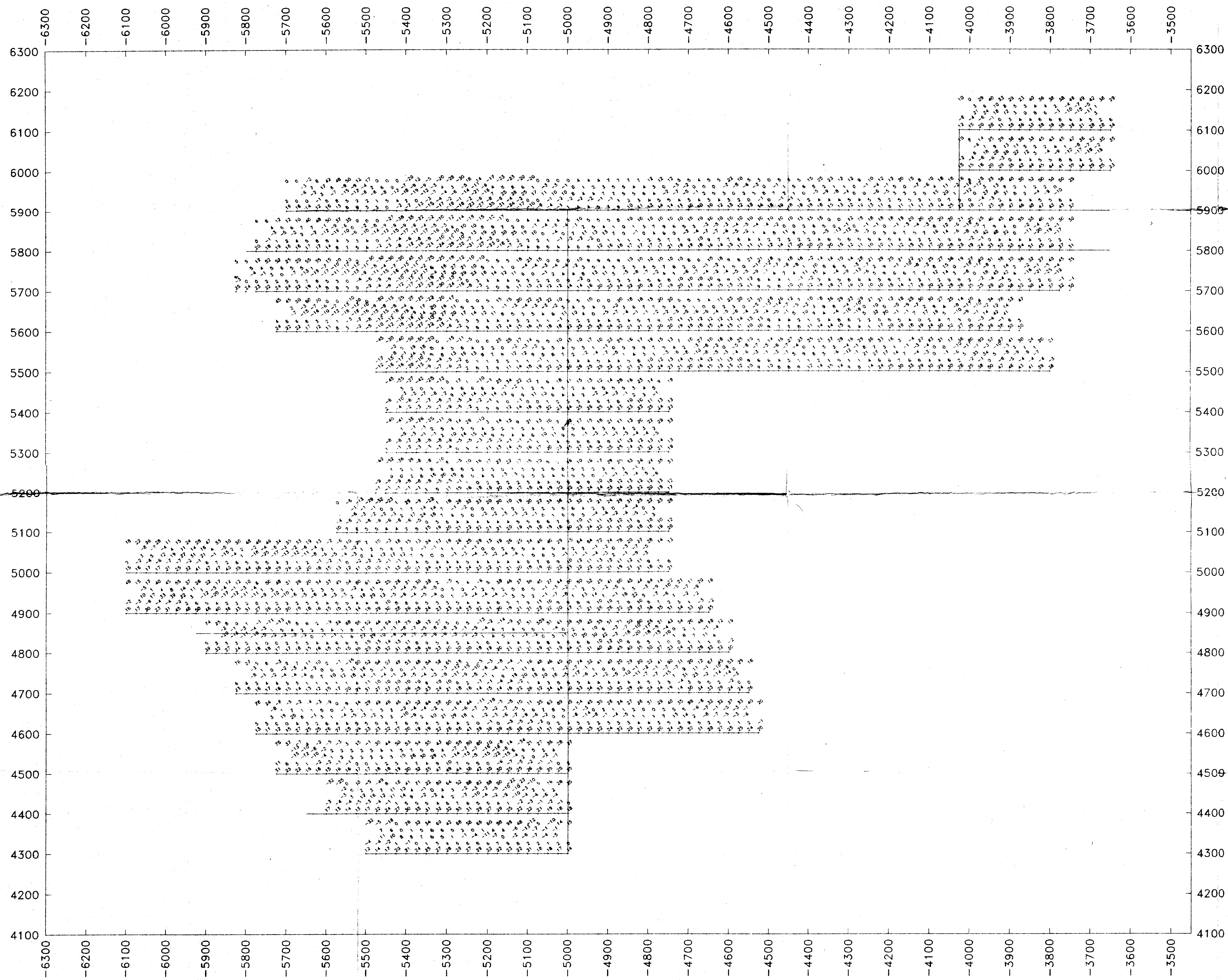
PLACER DOME INC.

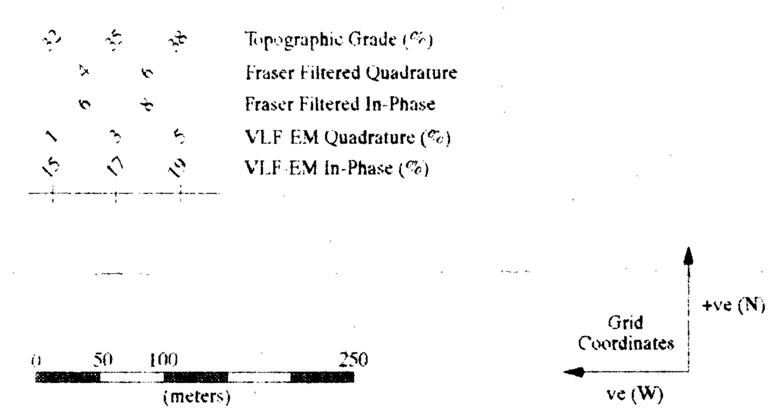
TAKU ARM PROPERTY

GEOCHEMICAL RESULTS
COPPER (ppm)

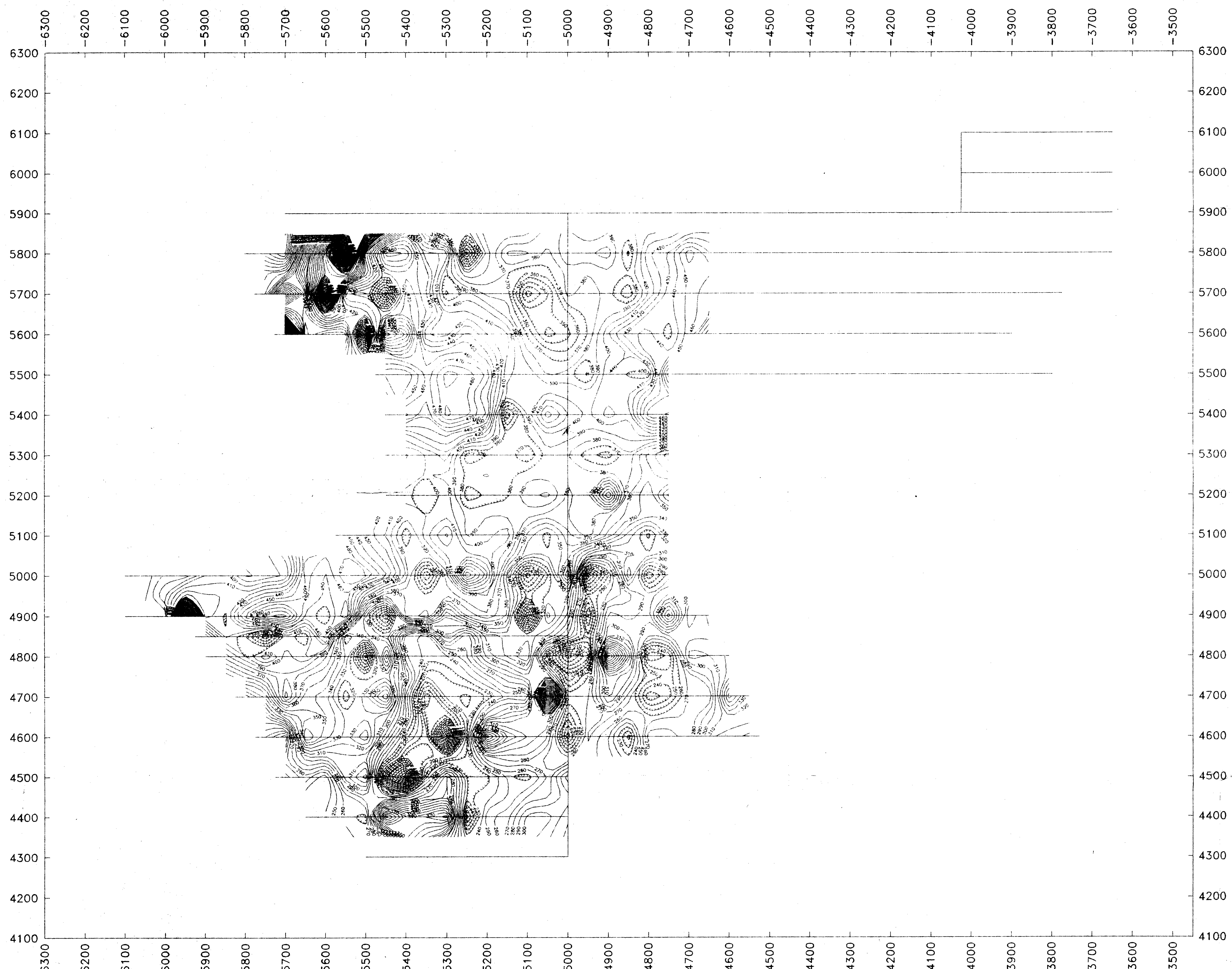
GEOLOGICAL ASSOCIATION OF CANADA
R. W. HULSTEIN
FELLOW

Aurum Geological Consultants Inc.		DATE: MARCH 1990	
NTS 104M/8	DRAWN BY: RH LK	SCALE: 1:5000	FIGURE: 9





Placer Dome Inc.			
Taku Arm Project			
Ice Grid VLF-EM In-Phase, Quadrature, Fraser Filtered Values and Topographic Grade Values			
Aurum Geological Consultants Inc.			Oct. 1989
NTS 104M/8	SCALE 1:5,000	DRAWN BY : GEO-DIGIT-EX Inc.	FIGURE: 1d APPENDIX E



GEOLOGICAL BRANCH
ASSESSMENT REPORT

19,827

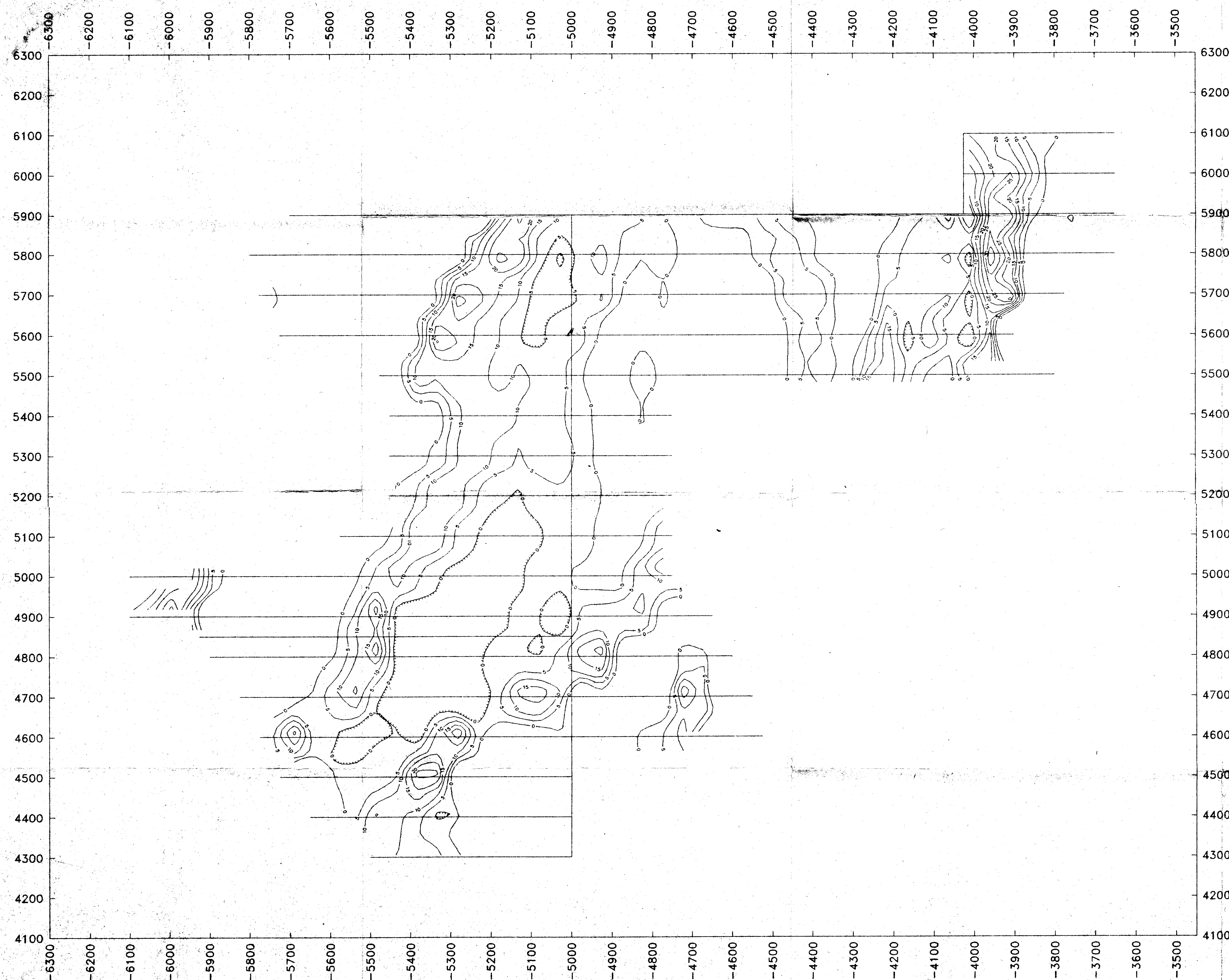
INSTRUMENTATION:
Field: EDA OMNI IV
Base: EDA OMNI IV

DATUM = 56700 nT

0 50 100 250
(meters)

Grid Coordinates
+ve (N)
-ve (W)

Placer Dome Inc.			
Taku Arm Project			
Ice Grid Total Field Magnetic Survey			
Aurum Geological Consultants Inc.			Oct. 1989
NTS 104M/8	SCALE 1:5,000	DRAWN BY : GEO-DIGIT-EX Inc.	FIGURE: 1 a APPENDIX E



GEOLOGICAL BRANCH ASSESSMENT REPORT

19,827

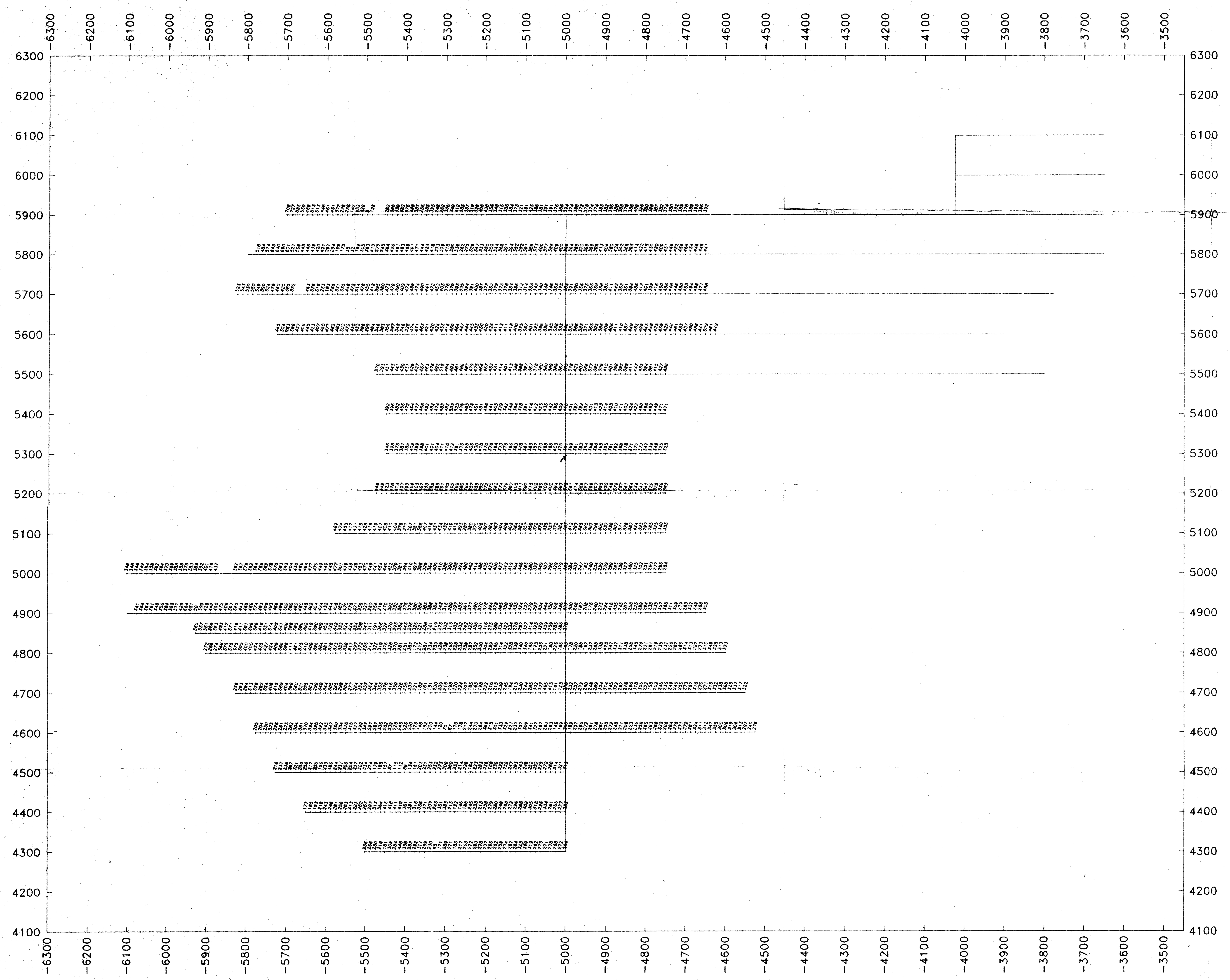
INSTRUMENTATION:
Tx: NLK, Jim Creek, Washington 24.8 KHz
Rx: Geonics EM-16

0 50 100 250
(meters)

Grid Coordinates
+ve (N)
- ve (W)

Placer Dome Inc.	
Taku Arm Project	
Ice Grid Fraser Filtered In-Phase VLF-EM Survey	
Aurum Geological Consultants Inc.	Oct. 1989

NTS 104M/8	SCALE 1:5,000	DRAWN BY: GEO-DIGIT-EX Inc.	FIGURE: 1b APPENDIX E

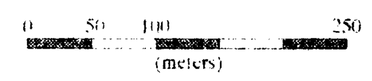


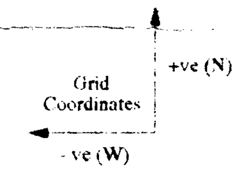
GEOLOGICAL BRANCH
ASSESSMENT REPORT

19,827

INSTRUMENTATION:
Field: EDA OMNI IV
Base: EDA OMNI IV

DATUM= 56700 nT





Placer Dome Inc.			
Taku Arm Project			
Ice Grid Total Field Magnetic Values			
Aurum Geological Consultants Inc.			Oct. 1989
NTS 104M/8	SCALE 1:5,000	DRAWN BY : GEO-DIGIT-EX Inc.	FIGURE: 1c APPENDIX E