MAP NO.: 116 B 14	**ASSESSMENT REPORT** X **PROSPECTUS** **CONFIDENTIAL** X **OPEN FILE**	**DOCUMENT NO:** 093103 **MINING DISTRICT:** Dawson **TYPE OF WORK:** Geological Mapping Geochemical Surveys Prospecting

REPORT FILED UNDER: Placer Dome Exploration Limited

DATE PERFORMED: July 2 - 18 1992. **DATE FILED:** June 9 1993

LOCATION: **LAT.:** 64•54'N **AREA:** Taiga Valley

LONG.: 139•13'W **VALUE $:** 50,400.00

CLAIM NAME & NO.: Olympic 1 - 168, YB40925 - YB41092.

WORK DONE BY: G. Shevchenko

WORK DONE FOR: Major General Resources Ltd.

DATE TO GOOD STANDING:

REMARKS: # 116 B - Taiga Valley
The company carried out an extensive exploration program to see if property held mineralization similar to Olympic Dam Deposit in South Australia. The company carried out prospecting, mapping and geochemical sampling. Wide spread Cu mineralization was found on the property ranging from 0.1 to 7.0 %. The Au mineralization found to date has been very low grade. Geochemical results verified those found by UMEX in 1976 and point to a Olympic Dam style deposit. It was recommended that Placer Dome undertake an aggressive exploration program to substantiate the preliminary results.

OFFICE OF THE REGIONAL MANAGER
MINERAL RIGHTS
JUN 11 1993
WHITEHORSE
YUKON TERRITORY

ASSESSMENT REPORT

GEOLOGICAL and GEOCHEMICAL SURVEYS

on the

OLYMPIC 1-168 CLAIMS

(Record Nos. YB40925-YB41092)

DAWSON MINING DISTRICT, YUKON TERRITORY

NTS: 116B/14

Latitude: 64° 54'N Longitude: 139° 13'W

Field Work Done: July 2nd to 18th, 1992

Owner: Major General Resources Ltd.
10th Floor,
900 West Hastings St.
Vancouver, B.C.
V6C 1E5

Operator: Placer Dome Exploration Limited
103 Platinum Road
Whitehorse, Yukon
Y1A 5M3

Author: G. Shevchenko (Project Geologist)

Date: May 31, 1993

RECEIVED
JUN - 7 1993
MINING RECORDERS OFFICE
DAWSON, Y.T.

093103

VOLUME I OF III

This report has been examined by the Geological Evaluation Unit under Section 53 (4) Yukon Quartz Mining Act and is allowed as representation work in the amount of $ 50,400.00.

Robert Deklerk

for. Regional Manager, Exploration and Geological Services for Commissioner of Yukon Territory.

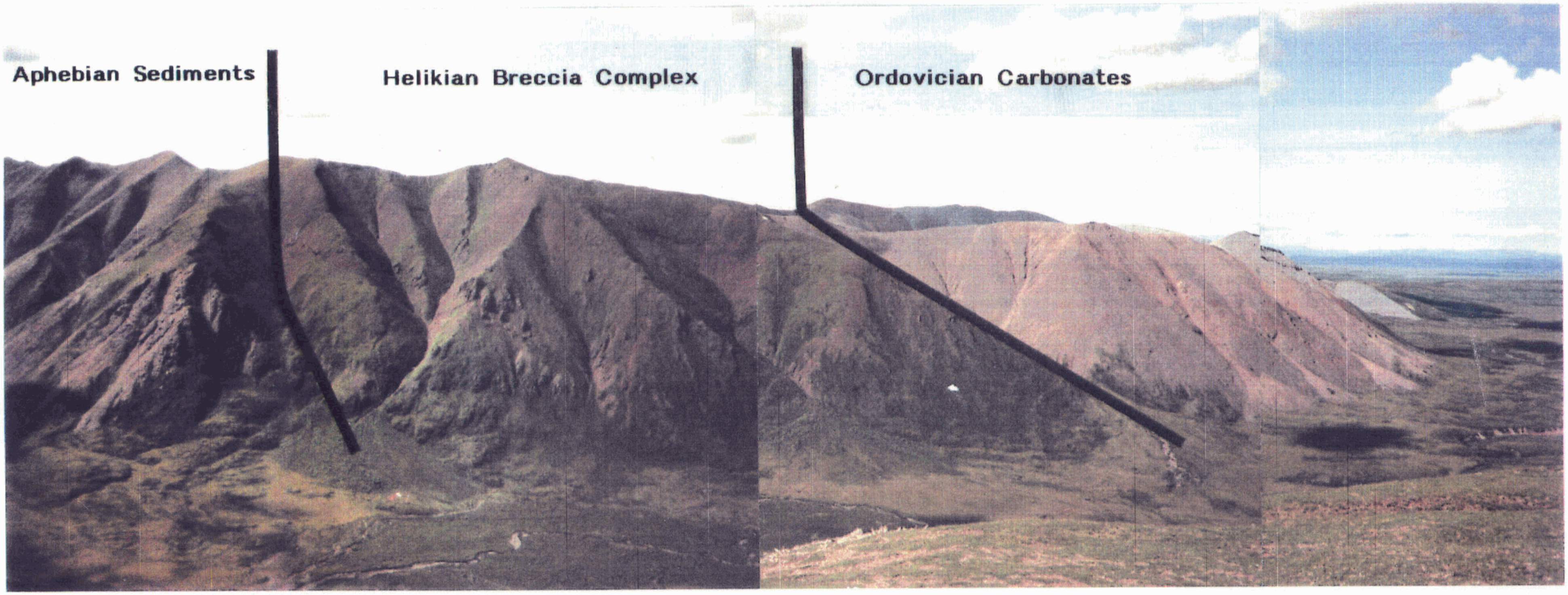

PLATE #1: Looking west across the Pyramid Creek Valley. Aphebian sediments are to the south, the Helikian breccia complex (note the hematite-red colour) is centre, and, the Ordovician carbonates are to the north. The edge of the Taiga Valley can be seen at the very north end of the photograph. Camp is in the valley in the lower left-hand corner of the photograph.

SUMMARY

The Olympic Property, which is located approximately 97 km north of Dawson City, Yukon, lies on the northern fringe of the Ogilvie Mountains overlooking the Taiga Valley.

Access to the property is by helicopter, with the closest base in Dawson City. Due to the relatively flat terrain in the Taiga Valley, the logistics for future road access is considered good.

The claims are owned by Major General Resources Ltd. Placer Dome Inc. may earn a 75% interest in the property by spending $250,000 (two hundred and fifty thousand dollars) over three years.

A limited exploration program, consisting of prospecting, mapping & geochemical sampling, was a conducted on the property. The program was designed to; (i) decide if the mineralized breccia bodies represented an Olympic Dam type setting, (ii) verify the copper-in-soil anomalies that were defined by UMEX in 1976, and, (iii) evaluate the potential for gold mineralization.

The property lies within the Coal Creek Inlier which is an oval-shaped, east-trending erosional window located in the Southern Ogilvie Mountains. The inlier is one of several in the Ogilvie and Wernecke Mountains, which reveals Middle and Late Proterozoic epicontinental clastic and carbonate rocks beneath Lower and Middle Paleozoic carbonate rocks of the Mackenzie Platform.

The Coal Creek Inlier contains three easterly trending Proterozoic successions which are, from oldest to youngest: Wernecke Supergroup, Fifteenmile assemblage (informal) and Harper group (informal).

Two breccia complexes (Northern Breccia Belt & Southern Breccia Belt) occur within the Coal Creek Inlier and are distributed along two distinct northeast trending belts that are about 40 and 15 km long, respectively. The Northern Breccia Belt cuts the Wernecke Supergroup while the Southern Breccia Belt cuts the lower Fifteen Mile group. The Olympic Property is located within the Northern Breccia Belt.

The property is underlain by a 7,000 m long by 1,200 to 2,500 m wide easterly trending breccia complex of Helikian age (1.2 to 1.5 Ga). The complex is comprised of hematitic and chloritic breccias that form dike or pod-like bodies, (ranging from 5 to 20 m wide), that are elongated in an easterly direction. The breccias may be either monolithic or heterolithic and may be cut by associated syn/epigenetic mafic dykes.

Widespread copper mineralization occurs within the breccia complex and locally within mafic dykes. The copper mineralization is mainly associated with the heterolithic variety of the hematitic and chloritic breccias. Chalcopyrite is by far the most important sulphide present and occurs as follows:

i) veins, cutting both the clast and matrix components of the breccia, as well as mafic dykes,
ii) disseminations of chalcopyrite within the breccia matrix,
iii) coarse clots, especially associated with carbonate, chlorite, or quartz patches,
iv) replacement patches.

The anomalous copper values on the property generally range from 0.1% to 7.0% with a high of 23.0%. Some significant chip sample results are: 7.0% over 4 m, 5.0 % over 1.5 m, 1.97% over 4 m, and, 0.54% over 5 m.

Iron is mostly tied up as specularite. It has replaced precursor iron minerals such as magnetite and pyrrhotite. This indicates that the major metasomatizing solutions were more oxidized than is common for porphyry-related hydrothermal systems.

The following criteria suggests that the mineralization found on the Olympic Property is of epigenetic, hydrothermal origin with similarities to that of the Olympic Dam model:

i) the discordant nature of the copper mineralization
ii) association of copper mineralization with heterolithic, hematitic and chloritic breccias
iii) strong hematitic alteration associated with both the breccias and copper mineralization
iv) mafic dikes carrying chalcopyrite
v) breccia bodies are structurally controlled
vi) similar rock geochemical signatures

The soil geochemical surveys verified the copper-in-soil anomalies that were defined by UMEX in 1976.

The gold mineralization encountered thus far is very low grade.

It is highly recommended that Placer undertake an aggressive exploration program to; (i) define the continuity of the copper mineralization, (ii) define the size, type and morphology of the breccia bodies, and, (iii) define geochemical zonations in order to orientate the property with the model.

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1.0 INTRODUCTION

Field work was conducted between July 2nd and July 18th, 1992, and was mainly concentrated in the central portion of the property on the Olympic 105 to 132 claims. The limited exploration program consisted of prospecting, mapping & geochemical sampling, and was designed to fulfil the following objectives:

- i) decide if the mineralized breccia bodies represented an Olympic Dam type setting,
- ii) verify the copper-in-soil anomalies that were defined by UMEX in 1976,
- iii) evaluate the potential for gold mineralization.

The mineralization, breccia bodies and age of the rocks found on the Olympic Property bear a striking similarity to that of the Olympic Dam Deposit in South Australia.

1.1 LOCATION AND ACCESS

The property lies on the northern fringe of the Ogilvie Mountains overlooking the Taiga Valley. It is located approximately 97 km north of Dawson City and 43 km west of Chapman Lake on the Dempster Highway (Figure #1). It may be found on NTS 116B/14, centred at 64° 54'N latitude by 139° 13'W longitude.

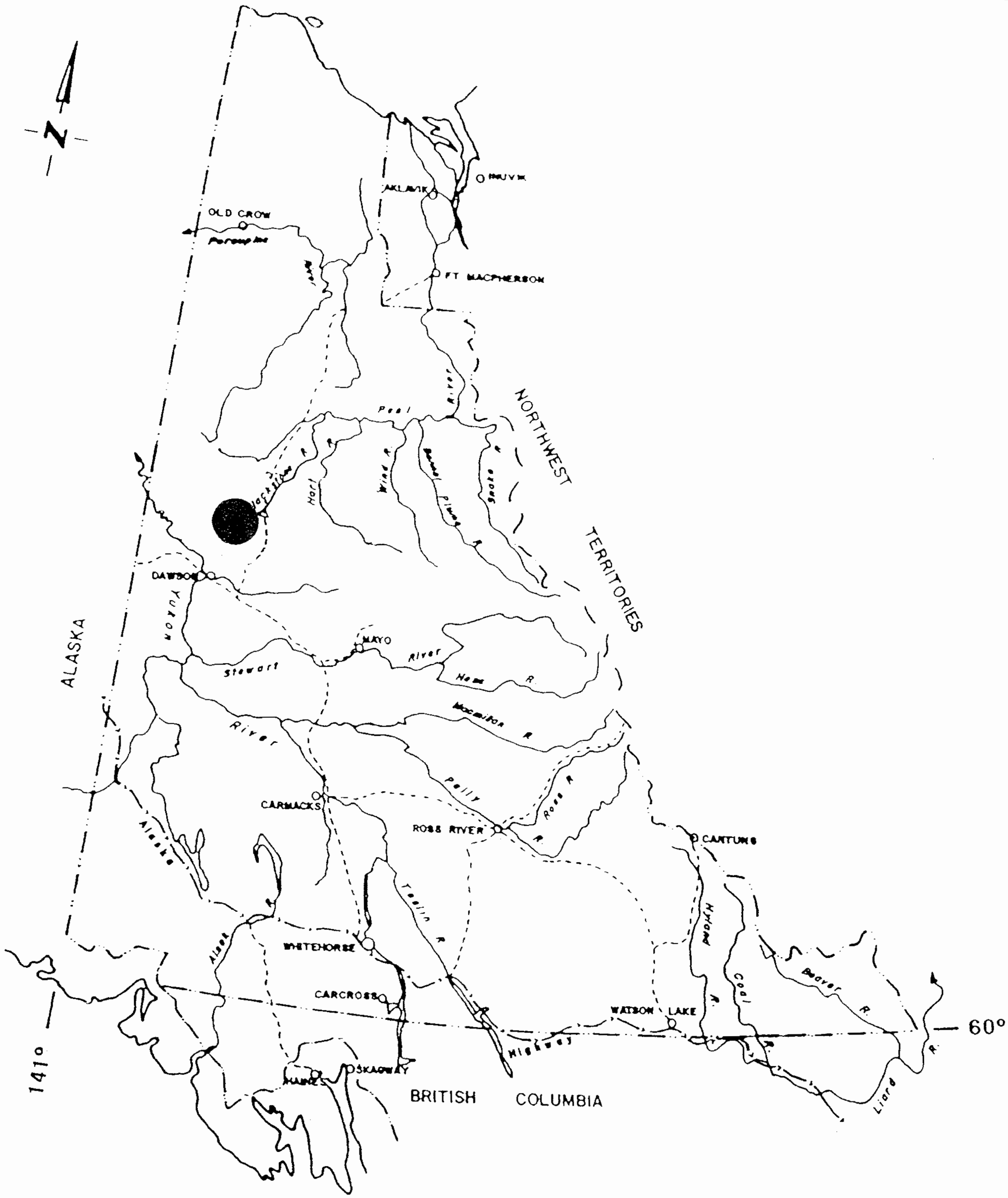
Access to the property is by helicopter, with the closest base in Dawson City. Due to the relatively flat terrain in the Taiga Valley, the logistics for future road access is considered good.

1.2 PHYSICAL ENVIRONMENT

The claims cover two northeasterly trending valleys with adjacent rugged, mountainous terrain. The elevations range from 1160 to 1830 m above sea level.

Vegetation consists of alpine meadows and stunted alder.

The streams on the property drain northward and are part of the headwaters of the Ogilvie River which eventually drains into the Arctic Ocean.



PLACER DOME EXPLORATION LIMITED

OLYMPIC PROPERTY

LOCATION MAP

Scale = 1 : 6,336,000	NTS:

1.3 Claims and Ownership

The claims are owned by Major General Resources Ltd. (10th Floor, 900 West Hastings St. Vancouver, B.C. V6C 1E5). Placer Dome Inc. may earn a 75% interest in the property by spending $250,000 (two hundred and fifty thousand dollars) over three years. The claims are listed on the following pages and may be viewed on Figure #2.

TABLE #1: LIST OF CLAIMS - Olympic Property

Claim Name	Grant No.	Recording Date	Expiry Date
Olympic 1	YB40925	6 July 1992	6 July 1993
Olympic 2	YB40926	6 July 1992	6 July 1993
Olympic 3	YB40927	6 July 1992	6 July 1993
Olympic 4	YB40928	6 July 1992	6 July 1993
Olympic 5	YB40929	6 July 1992	6 July 1993
Olympic 6	YB40930	6 July 1992	6 July 1993
Olympic 7	YB40931	6 July 1992	6 July 1993
Olympic 8	YB40932	6 July 1992	6 July 1993
Olympic 9	YB40933	6 July 1992	6 July 1993
Olympic 10	YB40934	6 July 1992	6 July 1993
Olympic 11	YB40935	6 July 1992	6 July 1993
Olympic 12	YB40936	6 July 1992	6 July 1993
Olympic 13	YB40937	6 July 1992	6 July 1993
Olympic 14	YB40938	6 July 1992	6 July 1993
Olympic 15	YB40939	6 July 1992	6 July 1993
Olympic 16	YB40940	6 July 1992	6 July 1993
Olympic 17	YB40941	6 July 1992	6 July 1993
Olympic 18	YB40942	6 July 1992	6 July 1993
Olympic 19	YB40943	6 July 1992	6 July 1993
Olympic 20	YB40944	6 July 1992	6 July 1993
Olympic 21	YB40945	6 July 1992	6 July 1993
Olympic 22	YB40946	6 July 1992	6 July 1993
Olympic 23	YB40947	6 July 1992	6 July 1993
Olympic 24	YB40948	6 July 1992	6 July 1993
Olympic 25	YB40949	6 July 1992	6 July 1993
Olympic 26	YB40950	6 July 1992	6 July 1993
Olympic 27	YB40951	6 July 1992	6 July 1993
Olympic 28	YB40952	6 July 1992	6 July 1993
Olympic 29	YB40953	6 July 1992	6 July 1993
Olympic 30	YB40954	6 July 1992	6 July 1993
Olympic 31	YB40955	6 July 1992	6 July 1993
Olympic 32	YB40956	6 July 1992	6 July 1993
Olympic 33	YB40957	6 July 1992	6 July 1993
Olympic 34	YB40958	6 July 1992	6 July 1993
Olympic 35	YB40959	6 July 1992	6 July 1993
Olympic 36	YB40960	6 July 1992	6 July 1993
Olympic 37	YB40961	6 July 1992	6 July 1993
Olympic 38	YB40962	6 July 1992	6 July 1993

TABLE #1 (cont'd): LIST OF CLAIMS - Olympic Property

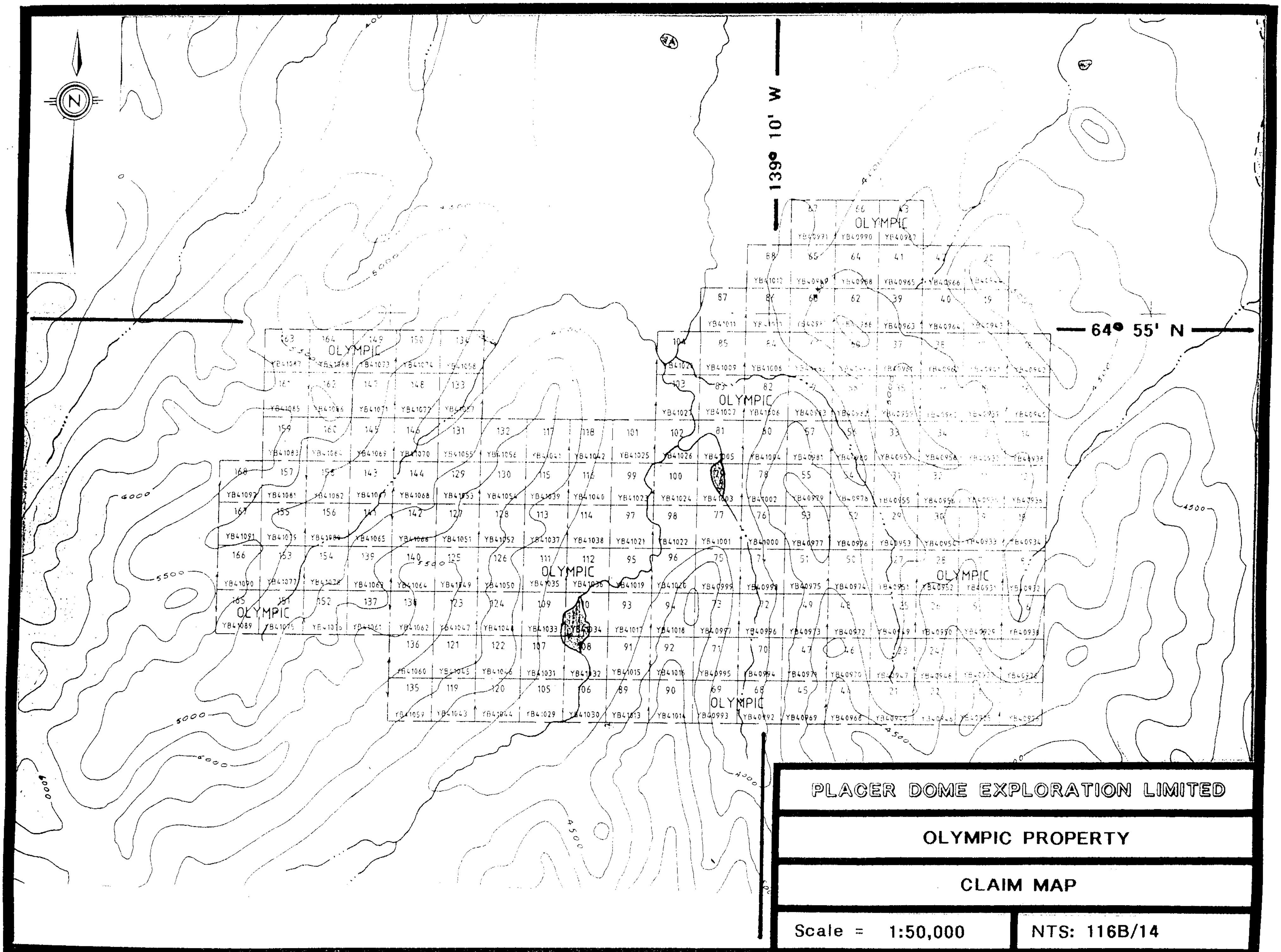
Claim Name	Grant No.	Recording Date	Expiry Date
Olympic 39	YB40963	6 July 1992	6 July 1993
Olympic 40	YB40964	6 July 1992	6 July 1993
Olympic 41	YB40965	6 July 1992	6 July 1993
Olympic 42	YB40966	6 July 1992	6 July 1993
Olympic 43	YB40967	6 July 1992	6 July 1993
Olympic 44	YB40968	6 July 1992	6 July 1993
Olympic 45	YB40969	6 July 1992	6 July 1993
Olympic 46	YB40970	6 July 1992	6 July 1993
Olympic 47	YB40971	6 July 1992	6 July 1993
Olympic 48	YB40972	6 July 1992	6 July 1993
Olympic 49	YB40973	6 July 1992	6 July 1993
Olympic 50	YB40974	6 July 1992	6 July 1993
Olympic 51	YB40975	6 July 1992	6 July 1993
Olympic 52	YB40976	6 July 1992	6 July 1993
Olympic 53	YB40977	6 July 1992	6 July 1993
Olympic 54	YB40978	6 July 1992	6 July 1993
Olympic 55	YB40979	6 July 1992	6 July 1993
Olympic 56	YB40980	6 July 1992	6 July 1993
Olympic 57	YB40981	6 July 1992	6 July 1993
Olympic 58	YB40982	6 July 1992	6 July 1993
Olympic 59	YB40983	6 July 1992	6 July 1993
Olympic 60	YB40984	6 July 1992	6 July 1993
Olympic 61	YB40985	6 July 1992	6 July 1993
Olympic 62	YB40986	6 July 1992	6 July 1993
Olympic 63	YB40987	6 July 1992	6 July 1993
Olympic 64	YB40988	6 July 1992	6 July 1993
Olympic 65	YB40989	6 July 1992	6 July 1993
Olympic 66	YB40990	6 July 1992	6 July 1993
Olympic 67	YB40991	6 July 1992	6 July 1993
Olympic 68	YB40992	6 July 1992	6 July 1993
Olympic 69	YB40993	6 July 1992	6 July 1993
Olympic 70	YB40994	6 July 1992	6 July 1993
Olympic 71	YB40995	6 July 1992	6 July 1993
Olympic 72	YB40996	6 July 1992	6 July 1993
Olympic 73	YB40997	6 July 1992	6 July 1993
Olympic 74	YB40998	6 July 1992	6 July 1993
Olympic 75	YB40999	6 July 1992	6 July 1993
Olympic 76	YB41000	6 July 1992	6 July 1993
Olympic 77	YB41001	6 July 1992	6 July 1993
Olympic 78	YB41002	6 July 1992	6 July 1993
Olympic 79	YB41003	6 July 1992	6 July 1993
Olympic 80	YB41004	6 July 1992	6 July 1993
Olympic 81	YB41005	6 July 1992	6 July 1993
Olympic 82	YB41006	6 July 1992	6 July 1993
Olympic 83	YB41007	6 July 1992	6 July 1993
Olympic 84	YB41008	6 July 1992	6 July 1993
Olympic 85	YB41009	6 July 1992	6 July 1993

TABLE #1 (cont'd): LIST OF CLAIMS - Olympic Property

Claim Name	Grant No.	Recording Date	Expiry Date
Olympic 86	YB41010	6 July 1992	6 July 1993
Olympic 87	YB41011	6 July 1992	6 July 1993
Olympic 88	YB41012	6 July 1992	6 July 1993
Olympic 89	YB41013	6 July 1992	6 July 1993
Olympic 90	YB41014	6 July 1992	6 July 1993
Olympic 91	YB41015	6 July 1992	6 July 1993
Olympic 92	YB41016	6 July 1992	6 July 1993
Olympic 93	YB41017	6 July 1992	6 July 1993
Olympic 94	YB41018	6 July 1992	6 July 1993
Olympic 95	YB41019	6 July 1992	6 July 1993
Olympic 96	YB41020	6 July 1992	6 July 1993
Olympic 97	YB41021	6 July 1992	6 July 1993
Olympic 98	YB41022	6 July 1992	6 July 1993
Olympic 99	YB41023	6 July 1992	6 July 1993
Olympic 100	YB41024	6 July 1992	6 July 1993
Olympic 101	YB41025	6 July 1992	6 July 1993
Olympic 102	YB41026	6 July 1992	6 July 1993
Olympic 103	YB41027	6 July 1992	6 July 1993
Olympic 104	YB41028	6 July 1992	6 July 1993
Olympic 105	YB41029	6 July 1992	6 July 1993
Olympic 106	YB41030	6 July 1992	6 July 1993
Olympic 107	YB41031	6 July 1992	6 July 1993
Olympic 108	YB41032	6 July 1992	6 July 1993
Olympic 109	YB41033	6 July 1992	6 July 1993
Olympic 110	YB41034	6 July 1992	6 July 1993
Olympic 111	YB41035	6 July 1992	6 July 1993
Olympic 112	YB41036	6 July 1992	6 July 1993
Olympic 113	YB41037	6 July 1992	6 July 1993
Olympic 114	YB41038	6 July 1992	6 July 1993
Olympic 115	YB41039	6 July 1992	6 July 1993
Olympic 116	YB41040	6 July 1992	6 July 1993
Olympic 117	YB41041	6 July 1992	6 July 1993
Olympic 118	YB41042	6 July 1992	6 July 1993
Olympic 119	YB41043	6 July 1992	6 July 1993
Olympic 120	YB41044	6 July 1992	6 July 1993
Olympic 121	YB41045	6 July 1992	6 July 1993
Olympic 122	YB41046	6 July 1992	6 July 1993
Olympic 123	YB41047	6 July 1992	6 July 1993
Olympic 124	YB41048	6 July 1992	6 July 1993
Olympic 125	YB41049	6 July 1992	6 July 1993
Olympic 126	YB41050	6 July 1992	6 July 1993
Olympic 127	YB41051	6 July 1992	6 July 1993
Olympic 128	YB41052	6 July 1992	6 July 1993
Olympic 129	YB41053	6 July 1992	6 July 1993
Olympic 130	YB41054	6 July 1992	6 July 1993
Olympic 131	YB41055	6 July 1992	6 July 1993
Olympic 132	YB41056	6 July 1992	6 July 1993

TABLE #1 (cont'd): LIST OF CLAIMS - Olympic Property

Claim Name	Grant No.	Recording Date	Expiry Date
Olympic 133	YB41057	6 July 1992	6 July 1993
Olympic 134	YB41058	6 July 1992	6 July 1993
Olympic 135	YB41059	6 July 1992	6 July 1993
Olympic 136	YB41060	6 July 1992	6 July 1993
Olympic 137	YB41061	6 July 1992	6 July 1993
Olympic 138	YB41062	6 July 1992	6 July 1993
Olympic 139	YB41063	6 July 1992	6 July 1993
Olympic 140	YB41064	6 July 1992	6 July 1993
Olympic 141	YB41065	6 July 1992	6 July 1993
Olympic 142	YB41066	6 July 1992	6 July 1993
Olympic 143	YB41067	6 July 1992	6 July 1993
Olympic 144	YB41068	6 July 1992	6 July 1993
Olympic 145	YB41069	6 July 1992	6 July 1993
Olympic 146	YB41070	6 July 1992	6 July 1993
Olympic 147	YB41071	6 July 1992	6 July 1993
Olympic 148	YB41072	6 July 1992	6 July 1993
Olympic 149	YB41073	6 July 1992	6 July 1993
Olympic 150	YB41074	6 July 1992	6 July 1993
Olympic 151	YB41075	6 July 1992	6 July 1993
Olympic 152	YB41076	6 July 1992	6 July 1993
Olympic 153	YB41077	6 July 1992	6 July 1993
Olympic 154	YB41078	6 July 1992	6 July 1993
Olympic 155	YB41079	6 July 1992	6 July 1993
Olympic 156	YB41080	6 July 1992	6 July 1993
Olympic 157	YB41081	6 July 1992	6 July 1993
Olympic 158	YB41082	6 July 1992	6 July 1993
Olympic 159	YB41083	6 July 1992	6 July 1993
Olympic 160	YB41084	6 July 1992	6 July 1993
Olympic 161	YB41085	6 July 1992	6 July 1993
Olympic 162	YB41086	6 July 1992	6 July 1993
Olympic 163	YB41087	6 July 1992	6 July 1993
Olympic 164	YB41088	6 July 1992	6 July 1993
Olympic 165	YB41089	6 July 1992	6 July 1993
Olympic 166	YB41090	6 July 1992	6 July 1993
Olympic 167	YB41091	6 July 1992	6 July 1993
Olympic 168	YB41092	6 July 1992	6 July 1993



139° 10' W
64° 55' N
OLYMPIC
OLYMPIC
OLYMPIC
OLYMPIC
OLYMPIC
OLYMPIC
4500
5000
5500
6000
PLACER DOME EXPLORATION LIMITED
OLYMPIC PROPERTY
CLAIM MAP
Scale = 1:50,000
NTS: 116B/14

1.4 HISTORY

The Olympic 1 - 168 claims encompass the area which was previously staked as the LALA claims. The LALA 1-60 claims were staked in 1975 to cover widespread copper mineralization in Proterozoic sediments. In that year, a short program of reconnaissance geological mapping and prospecting was completed over selected areas on the claims.

In 1976, a grid was established which consisted of a 7 km baseline with 86 kms of crosslines. The lines were spaced 120 m apart with a station interval of 60 m. The exploration program on the grid included geological mapping (1:12,000), prospecting, soil geochemical sampling (1329 samples) and limited I.P. (14 km) surveys.

In 1977, the exploration program consisted of diamond drilling (2 AQ holes totalling 187 m), a limited ground radiometric survey (22 km) and assaying of selected samples for uranium. The average core recoveries for each hole was 56% and 75%. The core was only analyzed for copper and uranium.

Since 1977, the property has remained dormant and the claims have been allowed to lapse.

In 1992, Placer Dome staked 168 claims on behalf of Major General Resources Ltd.

1.5 SUMMARY OF WORK PERFORMED

The exploration program was extremely limited and consisted of prospecting, geological mapping (1:2,500) and geochemical sampling (149 soil, 17 silt & 152 rock). For the purpose of the soil geochemical survey, a grid was established which consisted of an 800 m flagged baseline (Az = 077°) with 9-four hundred metre long flagged cross lines (station interval = 25m). Most of the work was concentrated in the central portion of the property where UMEX had established their grid.

Soil and silt samples were analyzed for Au by A.A. (Atomic Absorption) and 27-element ICP (Inductively Coupled Plasma). Rock samples were analyzed for Au, F & W by A.A., 27-element ICP, whole rock oxides, Ba, Sr, Zr & Y by ICP, and rare earth elements by neutron activation.

The program was conducted from a helicopter supported 5-man fly camp that was established in the south-central portion of the property near Pyramid Creek. Actual field work was conducted from July 2^{nd} to 18^{th}, 1992, for a total of 17 field days, or 73 mandays.

The field crew consisted of the following personnel with their respective field days spent on the property:

G. Shevchenko	Project Geologist	5 days
G. Couture	Field Geologist	17 days
M. Lamb	Jr. Geologist	17 days
C. Green	Field Assistant	17 days
J. Ali	Field Assistant	17 days

In early 1993, 27 rock samples were sent to Mr. L.A. Clark of Clark Geological for petrographic studies. The petrographic report may be found in Appendix I.

* * * * * * * * * * * * * * * * * * * *

2.0 REGIONAL GEOLOGY (Figures #3 & 4)

The property lies within the Coal Creek Inlier which is an oval-shaped, east-trending erosional window located in the Southern Ogilvie Mountains. The Coal Creek Inlier is one of several in the Ogilvie and Wernecke Mountains, which reveals Middle and Late Proterozoic epicontinental clastic and carbonate rocks beneath Lower and Middle Paleozoic carbonate rocks of the Mackenzie Platform.

The Coal Creek Inlier (Figure #5) contains three easterly trending Proterozoic successions which are, from oldest to youngest: Wernecke Supergroup, Fifteenmile assemblage (informal) and Harper group (informal) as shown in the Stratigraphic Correlation Chart in Figure #6.

The Wernecke Supergroup has been subdivided into three groups; the oldest is the Fairchild Lake Group which is disconformably overlain by the younger Quartet Group which is in turn conformably overlain by the Gillespie Lake Group. These groups are described as follows:

i) *Fairchild Lake Group:* 1.5 km thick, upward-shallowing sequence of meta-mudstone, meta-siltstone and quartzite with minor carbonate beds, reflecting a deep-water facies.

ii) *Quartet Group:* 3 km thick, upward-shallowing succession reflecting a transition from a starved basinal facies to an open shallow marine environment. Consists of dark grey to brown weathering sandstone, siltstone and mudstone with very minor silty dolostone.

iii) *Gillespie Lake Group:* 1 km thick sequence of stromatolitic dolostone, oolitic dolostone and parallel-laminated to wavy-bedded dolostone indicative of supratidal depositional conditions.

Although the base of the mid-Proterozoic succession is not exposed, the thin-skinned style of fold and thrust belt deformation suggests that the Wernecke Supergroup overlies an Early Proterozoic basement.

The only evidence of contemporaneous igneous activity are undated, volumetrically minor intermediate to mafic volcanic rocks, minor gabbro and diorite dikes and sills that cut the Wernecke Supergroup.

The Fifteenmile assemblage unconformably overlies the Wernecke Supergroup and consists of two lithologically distinct successions: the lower Fifteenmile group, composed primarily of clastic rocks with minor dolostone; and the upper Fifteenmile group, consisting of shallow water platformal dolostone.

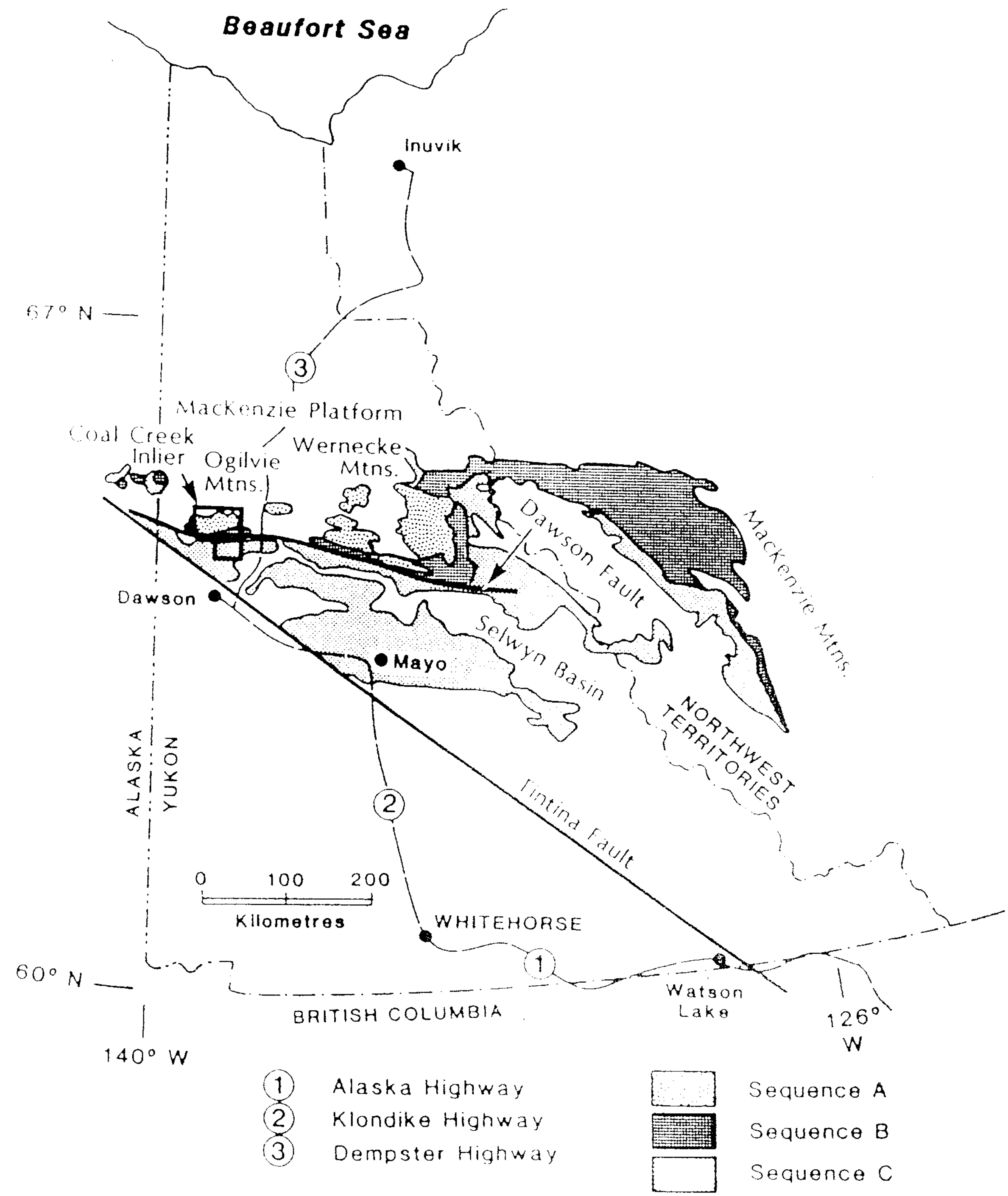
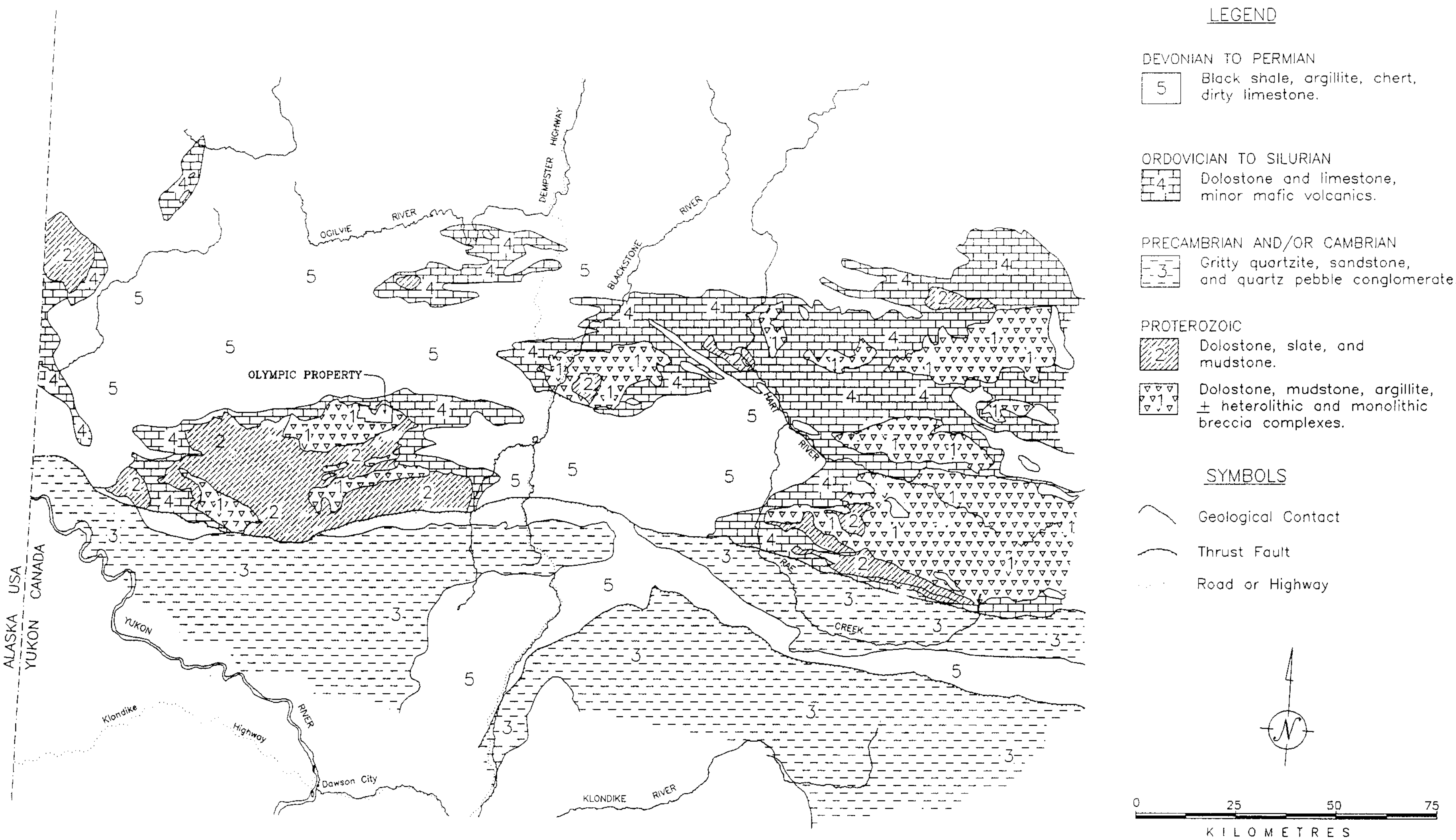


Figure #3: Map of the Yukon Territory and western Northwest Territories showing the distribution of Proterozoic rocks. Sequence A includes the Wernecke Supergroup; sequence B consists of the Fifteenmile assemblage; and sequence C is made up of the Windermere Supergroup & it's equivalents. *(Lane - 1990)*



PLACER DOME EXPLORATION LIMITED	
COMPILED BY GGS	BLACKSTONE RIVER AREA REGIONAL GEOLOGY MAP
DATE: 93:05:27	
SCALE 1:1,500,000	
FIGURE 4	

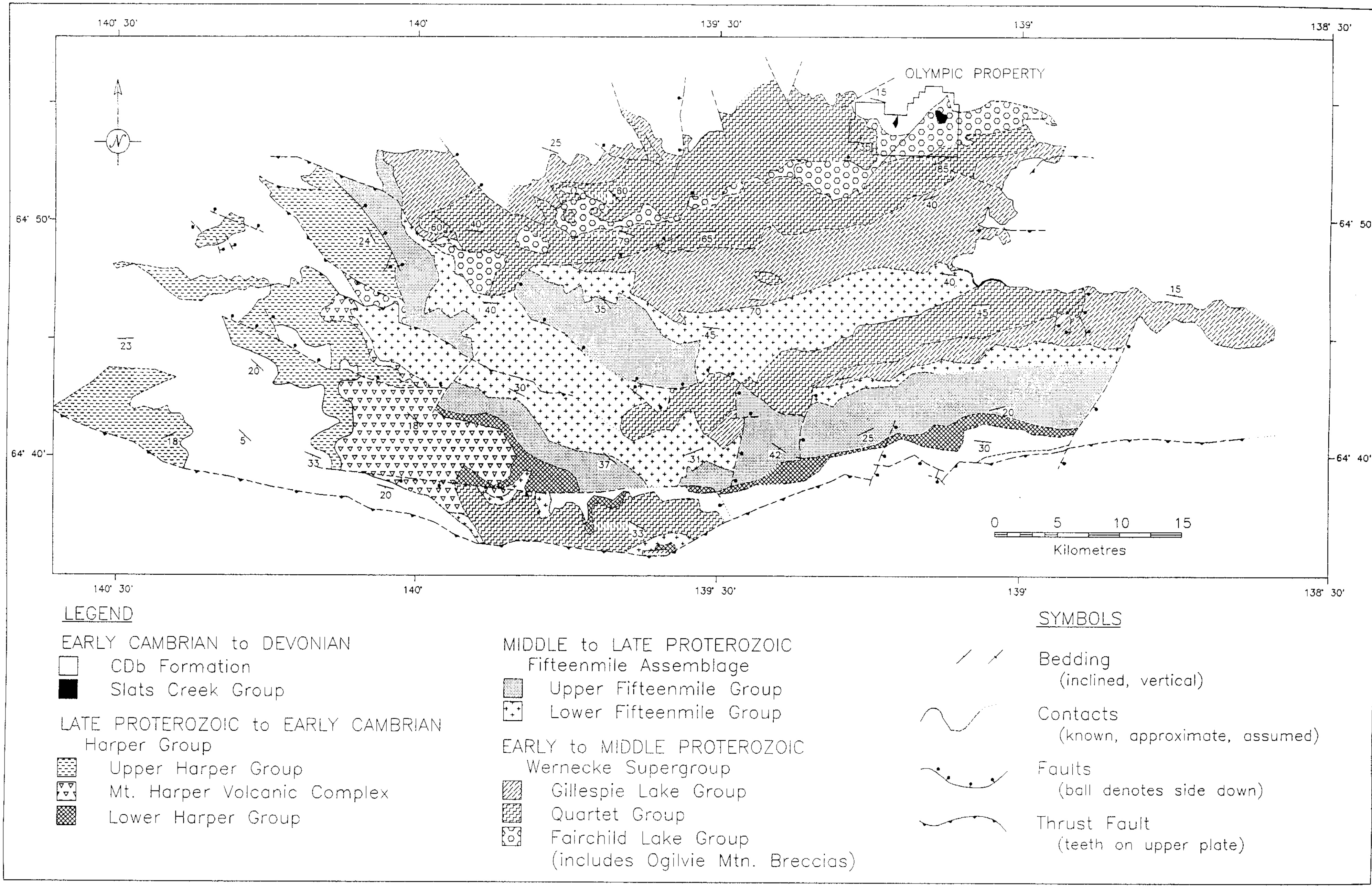


Figure 5: Geology of the Coal Creek Inlear, southern Ogilvie Mountains, west-central Yukon Territory.

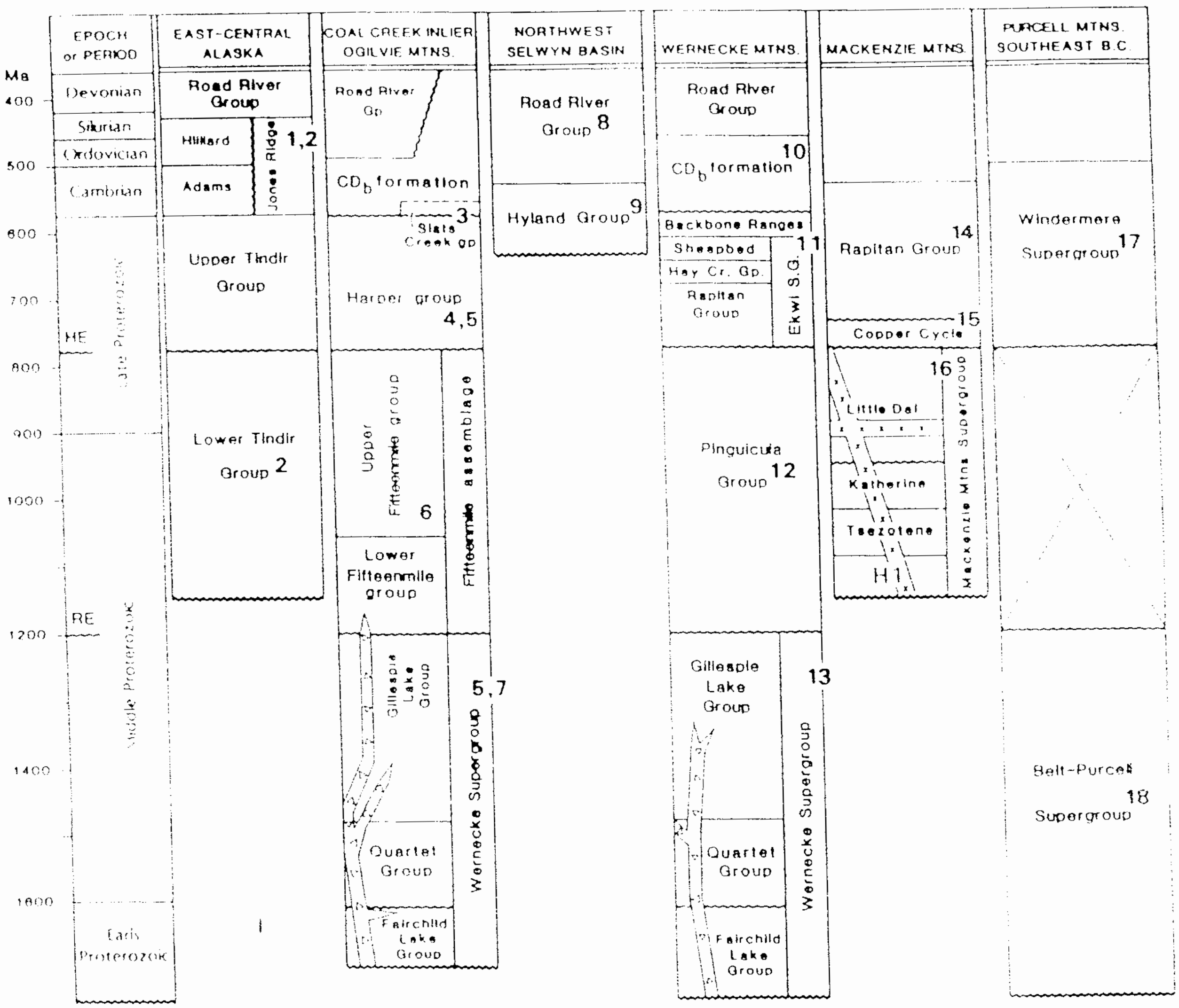


Figure #6: Regional stratigraphic correlation chart for Proterozoic and overlying Paleozoic rocks of the Northern Cordillera and the Purcell Mountains, south eastern B.C. Adapted from Eisbacher (1981) and Roots (1987). Additional references (superscripted numbers) are in Appendix C. HE = Hayhook tectonic event; RE = Rackla tectonic event. Dykes and sills in the Mackenzie Mountains were emplaced at approximately 770 Ma (Armstrong et al., 1982).

The Harper group consists of clastic and volcanic rocks that disconformably overly the upper Fifteenmile group and rest unconformably on older units in the southern part of the inlier.

Two breccia complexes (Northern Breccia Belt & Southern Breccia Belt) occur within the Coal Creek Inlier and are distributed along two distinct northeast trending belts that are about 40 and 15 km long, respectively. The Northern Breccia Belt cuts the Wernecke Supergroup while the Southern Breccia Belt cuts the lower Fifteen Mile group.

The morphology of these discordant breccia occurrences are complex, however, they are typically steep, pipe-like, sill-like or dike-like bodies that commonly occur along structures or contacts. The dyke or sill-like complexes range from a few metres to more than 100 m wide, while the pipe-like zones range from 100 m to over 3 kms in diameter. The vast majority of breccia bodies appear to have formed along faults oriented either north-northwest, colinear with the major faults, or east-northeast, in a conjugate orientation to the major structures.

The breccia bodies vary from hematite-rich to chlorite-rich, and may be monolithic or heterolithic in nature. The copper mineralization is mainly associated with the heterolithic, hematitic and chloritic breccias. It occurs as chalcopyrite veinlets cutting both the clast and matrix components of the breccia and/or disseminations of chalcopyrite within the breccia matrix. Minor chalcopyrite may also occur in veinlets hosted by mafic dykes.

A minimum age of 1.2 to 1.5 Ga years is given to the breccia bodies that cut the lower portion of the sequence, and a Pb-Pb date of 1.28 Ga from galena in stratiform bodies within the Gillespie Lake Group.

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3.0 PROPERTY GEOLOGY

The property is underlain by a thick sequence of westerly trending Proterozoic sediments unconformably overlain by Lower Paleozoic sediments (Figure #7). The Proterozoic rocks consists of a basal Aphebian clastic sedimentary sequence that is unconformably overlain by a varied Helikian package consisting of shales, dolomites, quartzites and siltstones, cut by (diatreme) hematitic breccias and associated mafic dykes.

The breccia complex is part of the 37 km long Northern Breccia Belt which coincides with the Monster Fault (Lane 1992), a steep to moderate, south-dipping reverse fault.

Widespread occurrences of cross-cutting copper mineralization are identified on the claims, mainly within the Helikian sequence, and spatially associated with areas of alteration and brecciation. The favourable Helikian package extends for some 7 kms, varies in width from 1200 m to 2500 m, and is open to both the east and west.

Geological mapping, at a scale of 1:2,500 (Figure #8), was concentrated in the central portion of the claims, as defined by the detailed area outline in Figure #7. Although vegetation is sparse, there is only 10 to 15% exposure, as large areas are covered by talus.

The detailed area primarily covers a Helikian package of rocks that is bounded to the north and south by easterly trending unconformities. The package unconformably overlies Aphebian shales and phyllites to the south, and is unconformably overlain by Ordovician dolostone and limestone to the north.

The Helikian package measures some 1200 m thick and mainly consists of a mixed breccia sequence. The package is subdivided into five field units based on lithology and hematite/chlorite content (see Section 3.1 for lithological descriptions). The units trend from northwest to northeast, dip from 50° north to 70° south, and have been cut by northeasterly striking faults.

The map area mainly consists of hematitic breccia with lesser and approximately equal proportions of chloritic breccia, dolostone breccia and siliceous dolostone. Within the hematitic and chloritic breccia units, the breccia bodies form dike or pod-like zones, less than 10 to greater than 10 m wide, which are elongated in an easterly direction (parallel to the regional structure. The area between the unconformities may be divided into four discrete fault blocks that are described as follows:

i) *Northern Block:* The area is bounded to the north by the Ordovician unconformity and to the south by the east-northeasterly trending fault extending from UTM 583900E by 7197350N to UTM 584800E by 7197700N. The area is underlain by three northwesterly trending units that dip steeply to the northeast. Siliceous dolostone occurs at the western end, it is structurally overlain by chloritic breccia which in turn is overlain by hematitic breccia. Two easterly to southeasterly trending mafic dykes (8 to 30 m wide) occur.

ii) *Western Block:* The area is bounded to the north by the "northern block", to the south by the Aphebian unconformity, and to the east by the northeasterly trending fault that extends from UTM 584000E by 7196700N to UTM 584600E by 7197600N. The southern half of the block is underlain by an easterly trending package of mixed chloritic breccia and sedimentary rocks, while the northern half is underlain by hematitic breccia and minor siliceous siltstone. Three easterly to northeasterly trending mafic dikes, measuring from 10 to 50 m wide, cut the breccia units.

iii) *Central Block:* The area is described as a north-northeasterly trending panel that extends from the south edge of the map to the "northern block". It is bounded to the west by the "western block" and to the east by the north-northeasterly trending Pyramid Creek Fault. The area is underlain by two east-northeasterly trending units consisting of hematitic breccia that is overlying dolostone breccia. A northeasterly trending mafic dyke (40 m wide) cuts the dolostone breccia and is truncated by the northeast fault separating the "western block" from the central block. The Pyramid Creek Fault appears to have experienced left lateral slip.

iv) *Eastern Block:* The block is a triangular shaped area that is bounded by the Pyramid Creek Fault and the east and south edges of the map sheet. Very little outcrop occurs in this block and consequently the lithologies are undifferentiated.

3.1 LITHOLOGICAL DESCRIPTIONS

The following lithological units and descriptions coincide with Figure #8 - Geology of Detailed Area:

ORDOVICIAN

Unit 8 *Dolostone & Limestone:* Grey and buff weathering, mostly medium to thick bedded; minor platy black argillaceous limestone and dolomite.

HELIKIAN

Unit 7 *Mafic Dyke:* Greenish-black to dark grey-green, porphyritic, fine grained hornblende and chlorite phenocrysts set in a fine grained matrix; occasional epidote veinlets; may host very fine grained pyrite (up to 1%) and chalcopyrite (up to 1%) along fractures.

Unit 6 *Hematitic Breccia:* Deep red to red-green; Heterolithic or monolithic, poorly sorted, matrix supported, angular to subangular clasts set in a very fine to fine grained hematitic matrix; Clasts: generally range from 3 to 10 cm but may be up to 1 m in size, pervasive mild to intense hematization, consist of siliceous dolostone ± mudstone ± dolomitic siltstone ± jasper; Matrix: grey to black to red, may be calcareous and locally siliceous, dolomite ± specular hematite; May host siderite ± dolomite ± specular hematite veinlets (<1 to 3 cm wide); Chalcopyrite may occur in quartz-calcite veinlets and rare disseminations; May be interbedded with siltstone and maroon shales.

Unit 5 *Chloritic Breccia:* Red green to green-grey; Monolithic to heterolithic, generally poorly sorted but may locally be moderately well sorted, matrix supported, angular to subangular clasts set in a fine grained chloritic matrix; Clasts: generally range from 3 to 10 cm but may range up to 50 cm in size, consist of siliceous dolomite ± mudstone ± dolomitic siltstone ± siltstone ± chert ± jasper ± cherty dolomite, pervasive mild to intense chloritization ± hornblende; Matrix: green, green-grey, greenish-red, chloritic, usually soft and calcareous but may be locally siliceous; May host quartz-carbonate veinlets ± chalcopyrite; may be interbedded with siltstone and maroon shales.

Unit 4 *Chloritic Breccia and Mixed Sediments:* Intercalated package of chloritic breccia (unit 5) and clastic sedimentary rocks.

Unit 3 *Dolomite Breccia:* Grey to reddish grey, matrix supported, angular dolomitic clasts (up to 5 cm) set in a fine grained matrix, minor pyrite cubes and specular hematite (up to 10%) disseminated in matrix; may host dolomite veinlets measuring up to 30 cm wide; may be intercalated with siltstone.

Unit 2 *Siliceous Dolostone:* Light grey to buff, massive and siliceous, up to 5% silica crackles.

APHEBIAN

Unit 1 *Clastic Sedimentary Rocks:* Mainly dark grey, grey-green and black, thin-bedded argillite, slate and phyllite.

3.2 MINERALIZATION

The copper mineralization is mainly associated with the heterolithic variety of the hematitic and chloritic breccias, however it also occurs as veinlets hosted by mafic dykes. Chalcopyrite is by far the most important sulphide present and is found occurring as follows:

i) veins, cutting both the clast and matrix components of the breccia,
ii) disseminations of chalcopyrite within the breccia matrix,
iii) coarse clots, especially associated with carbonate, chlorite, or quartz patches that were at least partly cavity fillings,
iv) replacement patches.

Pyrite is much less common and may occur as separate disseminations or included in chalcopyrite. Both of these minerals are found to be in equilibrium with specularite.

In thin section, limited supergene mineralization was observed occurring as follows:

i) pyrite is preferentially replaced by chalcocite,
ii) chalcopyrite is replaced by chalcocite and/or cuprite
iii) minor covellite and malachite generally accompanies the supergene enrichment.

In the samples studied thus far, the supergene mineralization is entirely in-situ and not vigorous enough to remobilize copper to an enriched blanket.

3.3 ALTERATION

According to thin section studies, all samples have been subjected to various degrees of metasomatism. Silicification has often destroyed the original clastic sedimentary textures, however it is difficult to know the amount that was introduced as most of the rocks were initially siliceous. Adularia is often found in altered sedimentary rocks where it has replaced the fine grained matrix between silt-sized quartz grains. Except for three specimens, potassium in the form of sericite is minor, sometimes occurring as clay-sized grains intergrown with chlorite. Chlorite is another major replacement of the fine grained matrix in sedimentary rocks. In igneous rocks, all of the mafic minerals are replaced by chlorite. In all rocks, chlorite is uniformly pale green indicating high magnesium, low iron compositions. The other significant alteration is carbonate. There are some late hairline veinlets of calcite, and the more pervasive carbonate in some rocks is also calcite, but in most samples it is interpreted to be siderite, ankerite or ferruginous dolomite. The main vein minerals are quartz and carbonate, believed to be siderite in many cases.

Iron is mostly tied up as specularite. It has replaced precursor iron minerals such as magnetite and pyrrhotite. This indicates that the major metasomatizing solutions were more oxidized than is common for porphyry-related hydrothermal systems. For example, adularia and chlorite were accompanying alterations, so the iron was pulled out of the chlorite, and into specularite. Similarly the iron removal from sphene resulted in rutile being a common constituent of the altered rocks.

3.4 DISCUSSION

The following criteria suggests that the mineralization found on the Olympic Property is of epigenetic, hydrothermal origin with similarities to that of the Olympic Dam model:

i) the discordant nature of the copper mineralization
ii) association of copper mineralization with heterolithic, hematitic and chloritic breccias
iii) strong hematitic alteration associated with both the breccias and copper mineralization
iv) mafic dikes carrying chalcopyrite
v) breccia bodies are structurally controlled

* *

4.0 GEOCHEMICAL SURVEY

Soil, silt and rock geochemical surveys were conducted on selected portions of the Olympic Property.

A total of 149 soil samples was taken on a grid in an area where UMEX defined a copper soil geochemical anomaly measuring 1.7 by 1.3 km. The grid only covered a small part of the anomaly where anomalous copper values ranged from 315 to 2700 ppm. The objective of the 1992 soil survey was to confirm the previous anomaly and test the potential for gold mineralization.

A total of 17 silt samples was taken along two creeks that are located in the eastern half of the claim group with the objective of defining areas of favourable Cu-Au bearing breccia bodies.

A total of 152 rock samples was taken during the geochemical survey, most of which were in the "detailed area". The objective was to define geochemical zonation and areas of economic grade mineralization.

4.1 GEOCHEMICAL PROCEDURES

The rock samples were taken by using a hammer, and placed in "Hubco" bags that were marked with a sample number. The samples were then shipped to the Placer Dome Research Centre in Vancouver where they were analyzed for gold by GFAAS, F & W by atomic absorption and 27-element ICP-AGS. They were then shipped to Activation Laboratories Ltd. in Ancaster, Ontario for whole rock oxide, Ba, Sr, Zr, & Y analyses by ICP, and, rare earth element analyses by neutron activation.

The silt samples were generally taken at a 200 to 500 m interval, and/or where at the mouth of tributaries. The samples, which were collected from the low energy parts of the stream, were placed in "Kraft" envelopes and marked with a sample number. The samples were then shipped to the Placer Dome Research Centre in Vancouver where they were analyzed for gold by GFAAS and 27-element ICP-AGS.

Soil samples were taken on the grid at a 25 m interval along lines spaced 100 metres apart. The samples were collected using a shovel or hand scoop. Wherever possible, holes were dug to depths of 20 cm, however sampling mainly took place on talus slopes, thus for the most part, only talus fines were retrieved at shallow levels. The samples were placed in "Kraft" envelopes and marked with a sample number. The samples were then shipped to the Placer Dome Research Centre in Vancouver where they were analyzed for gold by GFAAS and 27-element ICP-AGS.

The sample preparation and analysis procedures for all sample types are included in Appendix VI.

4.2 Rock Geochemical Survey Results

The lab analysis sheets, along with their histogram plots, may be found in Appendix II, the rock sample descriptions are in Appendix V, and, the summary statistics may be found in Tables 2, 3 & 4 on the following pages. The sample locations along with the results for Ag, Au, Cu, Ba, Ce, F, La, Th, U, CaO, Fe_2O_3, K_2O, Na_2O and SiO_2 may be viewed on Figures #9 to #23, respectively, for the property area and Figures #24 through #38, respectively, for the detailed area.

Ag (Silver): The silver results for the property and detailed areas may be viewed on Figures #10 and #25, respectively. The silver values average 1.0 ppm and range from <0.1 to 2.3 ppm with two samples at 10.0 and 104.0 ppm. Based on the statistical analysis, values greater than 1 ppm are considered to be anomalous. Apart from the two very anomalous values, the silver results are considered low, however, there is a positive correlation with the chloritic and hematitic breccias in the detailed area.

With respect to the Olympic Dam Deposit, background levels of up to 1 ppm silver are common throughout much of the breccia complex, with local zones ranging to >12.5 ppm. Silver accompanies all copper mineralization, with the highest values generally within areas of bornite-chalcocite mineralization. Variable amounts of silver also occur in association with gold mineralization, with gold:silver ratios varying from 2.5:1 to 15:1.

Au (Gold): The gold results for the property and detailed areas may be viewed on Figures #11 and #26, respectively. The gold values are considered to be low and range from <1 to 52 ppb with a mean of 3.8 ppb. Based on the statistical analysis, values greater than 8 ppb are considered to be anomalous. There is a positive correlation with the chloritic and hematitic breccia bodies as well as anomalous copper values.

At Olympic Dam, the average gold grade for copper-uranium zones varies from about 0.3 g/t (300 ppb) to 1.0 g/t (1,000 ppb) for an overall total average of 0.6 g/t (600 ppb). Although gold grades appear to be independent of the grades of

TABLE #2: Rock Geochemical Survey: Statistical Summary for Ag, Au, Ba, Cu, F, Th, Sr, U, W, Y & Zr

Element (units)	Statistical Population	Mean	Std. Dev.	Coeff. of Variance	Maximum	Upper Quartile	Median	Lower Quartile	Minimum
Ag (ppm)	152	1.0	8.4	8.4	104.0	0.3	0.1	0.05	<0.1
Au (ppb)	152	3.8	7.2	1.9	52	4.0	1.0	0.5	<1
Ba (ppm)	152	646	653	1.0	5,668	713	492	311	38
Cu (ppm)	152	4,028	20,449	5.1	230,000	1,239	187	62	<1
F (ppm)	152	507	250	0.5	1,240	660	480	340	69
Sr (ppm)	152	40.5	43.8	1.0	238	40.5	26.0	19.75	4
Th (ppm)	150	8.0	4.1	0.5	16.0	11.0	8.7	4.2	<0.5
U (ppm)	150	3.3	2.5	0.8	26	4.2	3.0	1.9	<0.5
W (ppm)	152	3.4	4.3	1.2	49	5.0	3.0	1.0	<2
Y (ppm)	152	18.3	9.9	0.5	68	24.0	16.0	12.0	<4
Zr (ppm)	152	148	80.7	0.5	502	180.5	154.0	89.0	<2

<u>TABLE #3:</u> Rock Geochemical Survey: Statistical Summary for Rare Earth Elements

Element (units)	Statistical Population	Mean	Std. Dev.	Coeff. of Variance	Maximum	Upper Quartile	Median	Lower Quartile	Minimum
Ce (ppm)	152	53	41	0.8	382	68	47	27	4
Eu (ppm)	152	1.0	0.5	0.5	3.8	1.2	0.9	0.7	0.1
La (ppm)	152	28.5	23.7	0.8	207	37.2	24.8	13.3	1.6
Lu (ppm)	148	0.25	0.12	0.48	0.79	0.28	0.25	0.17	<0.05
Nd (ppm)	144	22.5	16.3	0.7	153	27.2	20.0	13.0	<5
Sm (ppm)	152	3.7	2.3	0.6	22.0	4.6	3.5	2.3	0.3
Tb (ppm)	59	0.7	0.2	0.2	1.5	0.8	0.7	0.6	<0.5
Yb (ppm)	151	1.6	0.8	0.5	5.2	1.9	1.5	1.1	<0.1

TABLE #4: Rock Geochemical Survey: Statistical Summary for Whole Rock Oxides

Element (units)	Statistical Population	Mean	Std. Dev.	Coeff. of Variance	Maximum	Upper Quartile	Median	Lower Quartile	Minimum
Al_2O_3 (%)	152	9.40	4.04	0.43	15.52	12.49	10.66	6.83	0.16
CaO (%)	152	6.15	5.93	0.96	29.64	8.77	4.92	1.25	0.04
Fe_2O_3 (%)	152	9.96	8.92	0.89	88.28	11.14	8.12	5.68	1.92
K_2O (%)	152	4.38	2.60	0.59	10.96	6.29	4.42	2.39	0.08
MgO (%)	152	4.71	2.54	0.54	20.10	5.94	4.26	3.11	0.23
MnO (%)	152	0.39	0.36	0.92	1.98	0.56	0.30	0.12	<0.02
Na_2O (%)	152	0.38	0.83	2.16	4.40	0.12	0.08	0.06	<0.01
P_2O_5 (%)	152	0.45	1.50	3.28	17.52	0.32	0.20	0.13	<0.04
SiO_2 (%)	152	53.09	11.61	0.21	76.39	60.52	54.06	47.53	0.26
TiO_2 (%)	152	0.56	0.47	0.85	2.18	0.56	0.46	0.30	0.02
LOI (%)	152	9.49	7.16	0.75	44.82	13.35	7.43	3.83	0.48

associated copper-uranium, there is a clear tendency for copper-uranium zones nearer the centre of the deposit to have higher gold grades. The highest gold grades (averaging several g/t) occur in a silicified fault zone on the eastern side of the central barren core of the deposit.

Ba (Barium): The barium results for the property and detailed areas may be viewed on Figures #12 and #27, respectively. The barium values average 646 ppm and range from 38 to 5,668 ppm. Based on the statistical analysis, values greater than 629 ppm are considered to be anomalous. The barium results are considered to be significant as anomalous values occur associated with the chloritic and hematitic breccias throughout the property, and in particular, those occurring in the northern half of the "detailed area".

With respect to the Olympic Dam Deposit, barium concentrations range from 0.5 (5,000 ppm) to 5.0% (50,000 ppm) and occur throughout most of the breccia complex. The central hematite-quartz breccia body is particularly enriched with values ranging from 2 to 5% Ba. Barium is generally antipathetic with fluorine.

Ce (Cerium): The cerium results for the property and detailed areas may be viewed on Figures #13 and #28, respectively. The cerium values range from 4 to 386 ppm and average 53 ppm. Based on the statistical analysis, values greater than 84 ppm are considered to be anomalous. There are local occurrences of anomalous cerium associated with the hematitic breccias, as well, there appears to be a spatial relationship with the mafic dykes in the northern part of the "detailed area". Geochemically, there is a strong correlation with anomalous La values.

At Olympic Dam, total REE content appears to be a function of both degree of Fe metasomatism and proximity to the geographic centre of the deposit. Abundances of approximately 3000 ppm Ce are common for mineralized hematite-rich breccias. Although lacking in significant copper-uranium mineralization, the maximum REE values occur in the hematite-quartz microbreccia from the centre of the deposit. High concentrations of Ce are also present in association with some gold mineralization hosted by hematite poor sericitized granitic lithologies.

Cu (Copper): The copper results for the property and detailed areas may be viewed on Figures #14 and #29, respectively. The copper values average 4,028 ppm and range from <1 to 70,000 ppm (7%) with a high of 230,000 ppm (23%). Based on the statistical analysis, values greater than 999 ppm are considered to be anomalous. The copper results are considered to be very significant as extremely anomalous results occur throughout the property. The anomalous values are mainly associated with the chloritic and hematitic breccias as well as the mafic dykes. On the following two pages, Table #5 highlights the more significant copper results that occur on the

TABLE #5: Significant Copper Results (Continued on next Page)

SAMP NO.	LITHOLOGICAL DESCRIPTION	TYPE	WIDTH (M)	Cu (ppm)
B8882	Hematitic-chloritic breccia with disseminated (up to 5%) chalcopyrite in both veins and matrix.	Chip	7	1561
B8883	Same as B8882, but 20 m along apparent strike.	Chip	2	2088
B8886	Medium grained intrusive, as above, contains more sulphides, (up to 5%) and shows malachite staining.	Chip	5	1897
B8931	Calcareous chloritic breccia, with a quartz-carbonate matrix. Malachite staining, 1% pyrite.	Grab		3707
B8965	Hematitic breccia with small quartz stringers, 10-15% hematite.	Grab		2307
B8975	Mafic dyke carbonate veinlets crosscut. chalcopyrite <1%.	Grab		2045
B8985	Weathered massive sulphide with 30% malachite.	Grab		23.0%
B8988	Mafic dyke cut by 5% calcite veinlets carrying 1 to 2% chalcopyrite.	Grab		2249
B8991	Dolomitic breccia, dolomite clasts set in a fine to medium grained calcite matrix. Occasional chalcopyrite occurs with the calcite.	Grab		2109
B8995	Appears to be a monzonite with 3 to 5% chalcopyrite along fractures with calcite.	Grab		0.74%
B8996	Very fine grained feldspathic arenite, 2% chalcopyrite along fractures and as disseminations.	Grab		2982
B8997	Sedimentary breccia with trace to 2% chalcopyrite along fractures in matrix.	Grab		2445
B9153	Hematitic-chloritic breccia with disseminated chalcopyrite blebs 2-3%.	Chip	4	2484
B9154	Hematitic shale with chalcopyrite in quartz veins.	Chip	7	2771
B9159	Chloritic breccia grading into red shale across a sheared zone that hosts a minor chalcopyrite vein.	Chip	5	1835
B9164	Hematitic breccia with disseminated chalcopyrite in veins and matrix up to 5%.	Chip	5	1338
B9165	Sandy dolomite with pervasive quartz veining, chalcopyrite up to 15% in fractures.	Grab		6.10%
B9166	Green mafic dyke with chalcopyrite mineralization in veins.	Grab		0.72%

SAMP NO.	LITHOLOGICAL DESCRIPTION	TYPE	WIDTH (M)	Cu (ppm)
B9167	Chloritic breccia with chalcopyrite mineralization in veins.	Chip	3	1248
B9168	Black green-grey shales and interbedded jasper bands with trace chalcopyrite mineralization in fractures.	Grab		3632
B9202	Hematitic breccia with 5% chalcopyrite mineralization along dolomitic veins and fractures.	Chip	4	7.00%
B9203	Hematitic/Chloritic breccia directly above Cu mineralized zone, no visible copper mineralization.	Chip	5	0.54%
B9205	Red/green dolomitic breccia with disseminated chalcopyrite and malachite coatings.	Grab		0.54%
B9206	Hematitic/chloritic breccia with dolomite stringers and fractures carrying chalcopyrite.	Grab		2.58%
B9212	As per B9211 but with Chalcopyrite dominant mineralization.	Grab		1514
B9213	Hematitic Breccia with abundant dolomitic veining carrying chalcopyrite and malachite staining.	Chip	1.5	5.00%
B9214	Mafic dyke with high copper mineralization along fractures.	Chip	4	1.97%
B9218	Hematitic/chloritic breccia with Cu mineralization.	Chip	2	1237
B9219	Hematitic/chloritic breccia with abundant Cu mineralization.	Chip	5	3101
B9222	Siliceous chloritic breccia with disseminated chalcopyrite (2%) and black octahedral mineral.	Grab		0.92%
B9244	Chloritic breccia with disseminated Cu mineralization.	Grab		1.56%
B9245	Dyke / hematitic-chloritic breccia contact with Cu mineralization present along fractures and veins.	Grab		2654
B11154	Siliceous dolomite with calcite quartz veinlets. chalcopyrite 3%.	Grab		4483
B11155	Siliceous dolomite. Chloritic. Chalcopyrite 1-2% in quartz carbonate veinlets. Showing "D" & "E".	Grab		0.73%
B11156	Chloritic breccia. 1-3% chalcopyrite.	Grab		1.46%
B11157	Chloritic breccia, with 1-3% chalcopyrite, disseminated and veinlet controlled.	Chip	1.7	6954

property. Geochemically, there is a strong positive correlation with F, a moderate correlation with Au, Ba & U, and a weak correlation with Ag, Ce & La.

With respect to Olympic Dam, the central hematitic core of the deposit is largely barren of copper, with only minor amounts of chalcocite and bornite. In a deposit-wide zonation, there is a general increase in copper from the deeper outer parts (0.3 to 2.5% Cu) of the deposit to the upper and more central parts (>2.5% Cu).

F (Fluorine): The fluorine results for the property and detailed areas may be viewed on Figures #15 and #30, respectively. The fluorine values average 507 ppm and range from 69 to 1,240 ppm. Based on the statistical analysis, values greater than 570 ppm are considered to be anomalous. Anomalous fluorine results are mainly hosted by the chloritic and hematitic breccias. Geochemically, it shows a strong association with Au and Cu.

At Olympic Dam, fluorine ranges from 0.3 to 1.0%, and occurs throughout most of the breccia complex, however, there is a preferential association with heterolithic breccias containing black hematite. Fluorine is generally less than 0.2% in the central hematite-quartz breccia body.

La (Lanthanum): The lanthanum results for the property and detailed areas may be viewed on Figures #16 and #31, respectively. The lanthanum values range from 1.6 to 207 ppm and average 28.5 ppm. Based on the statistical analysis, values greater than 37 ppm are considered to be anomalous. There are local occurrences of anomalous lanthanum associated with the hematitic and chloritic breccias, as well, there appears to be a spatial relationship with the mafic dykes in the northern part of the "detailed area". Geochemically, there is a strong correlation with anomalous Ce values.

At Olympic Dam, total REE content appears to be a function of both degree of Fe metasomatism and proximity to the geographic centre of the deposit. Abundances of approximately 2000 ppm La are common for mineralized hematite-rich breccias. Although lacking in significant copper-uranium mineralization, the maximum REE values occur in the hematite-quartz microbreccia from the centre of the deposit. High concentrations of La are also present in association with some gold mineralization hosted by hematite poor sericitized granitic lithologies.

Th (Thorium): The thorium results for the property and detailed areas may be viewed on Figures #17 and #32, respectively. The thorium values range from <0.5 to 16.0 ppm and average 8.0 ppm. Based on the statistical analysis, values greater than 10 ppm are considered to be marginally anomalous. There are widespread occurrences of marginally anomalous thorium associated with most of the Helikian rock types. Due to the low geochemical values, thorium is not considered very significant.

At Olympic Dam, high concentrations of Th occur within the baritic sediments that are associated with anomalous amounts of REEs.

U (Uranium): The uranium results for the property and detailed areas may be viewed on Figures #18 and #33, respectively. The uranium values range from <0.5 to 26.0 ppm with an average of 3.3 ppm. Based on the statistical analysis, values greater than 4.2 ppm are considered to be marginally anomalous, while values greater than 7.9 ppm are anomalous. There are local concentrations of uranium associated with the chloritic and hematitic breccia complexes. Geochemically, there is a positive correlation between higher uranium values and higher copper values.

With respect to Olympic Dam, the uranium concentrations within the deposit vary from 0.3 to >1.1 kg/t U_3O_8. Above background concentrations (>0.3 kg/t U_3O_8) of uranium occur in association with all copper mineralization, and rarely exceeds 100 ppm U in the gold zones. In addition there is a positive, although inconsistent correlation between higher grade uranium and higher grade copper.

CaO (Calcium Oxide): The CaO results for the property and detailed areas may be viewed on Figures #19 and #34, respectively. The values range from 0.4 to 29.64% with an average of 6.15%. Based on the statistical analysis, values greater than 8% are considered to be marginally anomalous, while values greater than 15% are anomalous. In the "detailed area", there is a pocket (300 by 170 m) of CaO enrichment that occurs within the chloritic breccia. Also, there is a northeasterly trending belt, measuring 700 by 150 m, that appears to be spatially associated with the northeasterly striking structure that separates the western and central structural blocks. Geochemically, there appears to be an indirect correlation with copper, in that, areas of CaO depletion have corresponding anomalous copper values.

Fe_2O_3 (Iron Oxide): The Fe_2O_3 results for the property and detailed areas may be viewed on Figures #20 and #35, respectively. The values range from 1.92 to 88.28% with an average of 9.96%. Based on the statistical analysis, values greater than 12% are considered to be marginally anomalous, while values greater than 18% are anomalous. As expected, the anomalous values are associated with the hematitic breccias. In the "detailed area", there are two anomalous clusters measuring 100 by 50 m and 90 by 40 m, as well there is a weak spatial association with the northeasterly trending structure which separates the western and central structural blocks. Geochemically, higher Fe_2O_3 values are associated with higher copper values.

At the Olympic Dam Deposit, iron, in the form of hematite (minor magnetite), occurs throughout most of the breccia complex and ranges up to 35% Fe.

K_2O (Potassium Oxide): The K_2O results for the property and detailed areas may be viewed on Figures #21 and #36, respectively. The values range from 0.08 to 10.96% with an average of 4.38%. Based on the statistical analysis, values greater than 6.9% are considered to be marginally anomalous, while values greater than 9.5% are anomalous. In the "detailed area", there is an area of potassium enrichment (230 by 170 m) that is spatially associated with the mafic dykes. Geochemically, anomalous K_2O values are associated with anomalous copper values.

At Olympic Dam, potassic alteration (K-feldspar - sericite) occurs in the upper parts of the system.

Na_2O (Sodium Oxide): The Na_2O results for the property and detailed areas may be viewed on Figures #22 and #37, respectively. The values range from 0.01 to 4.40% and average 0.38%. Based on the statistical analysis, values of 0.3 to 1.0% are considered to be marginally anomalous, while values greater than 1.0% are anomalous. In the "detailed area", there is an area of sodium enrichment in the southern half of the map area overlying the limestone breccia, the intercalated chloritic breccia/mixed sediments, and the hematitic breccia. In contrast to the northern half of the map sheet, the chloritic and hematitic breccias are depleted with respect to sodium. Geochemically, there is an indirect relationship between Na_2O and copper in that anomalous copper values are associated with areas of sodium depletion.

At Olympic Dam, sodic alteration (albite $\pm$ magnetite $\pm$ actinolite or chlorite) is dominant in the deeper portions of the system.

SiO_2 (Silicon Oxide): The SiO_2 results for the property and detailed areas may be viewed on Figures #23 and #38, respectively. The values range from 0.26 to 76.39% and average 53.09%. Based on the statistical analysis, values of 60.0 to 69.0% are considered to be marginally anomalous, while values greater than 69.0% are anomalous. In the "detailed area", although there is a somewhat even distribution of anomalous material, the more silica-rich rocks are associated with the chloritic breccia.

TiO_2 (Titanium Oxide): Although there were not any maps plotted for TiO_2, it is important draw the comparison with the Olympic Dam Deposit. On the Olympic Property, the rocks host TiO_2 values that range from 0.02 to 2.18% and average 0.56%, this is similar to the rocks at Olympic Dam where the values are generally below 0.5% TiO_2 and rarely above 2% TiO_2. The low levels of titanium help to differentiate these deposits from otherwise somewhat similar occurrences associated with anorthosites, gabbros and layered mafic intrusions.

4.3 SILT GEOCHEMICAL SURVEY RESULTS

The lab analysis sheets, along with their histogram plots, may be found in Appendix III, while the summary statistics may be found in Tables 6 on the following page. The sample locations, along with the results for Ag, Au and Cu, are denoted as triangles on Figures #9, 10, 11 & 14, respectively.

It should be noted that the sample population is only 17 for Ag & Cu, and 16 for Au, which is inadequate for a proper statistical analysis.

Ag (Silver): The silver results are considered to be insignificant as they only range from 0.1 to 0.7 ppm.

Au (Gold): The gold results are considered to be insignificant as they only range up to 5 ppb.

Cu (Copper): The copper values range from 37 to 227 ppm and average 111 ppm. For the purpose of analyzing the results, values greater than 140 ppm are considered to be anomalous. Two samples on the eastern creek returned values of 170 and 227 ppm. There is a hematitic breccia body in the vicinity, and these anomalous values may be indicating associated copper mineralization. The two anomalous values (181 & 201 ppm) on the western creek are unexplained.

4.4 SOIL GEOCHEMICAL SURVEY RESULTS

The lab analysis sheets, along with their histogram plots, may be found in Appendix IV, while the summary statistics may be found in Tables 7 on the following page. The sample location numbers along with the results for Ag, Au and Cu, are plotted on Figures #39, 40, 41 & 42, respectively.

TABLE #6: Statistical Summary for Silt Geochemical Survey

Element (units)	Statistical Population	Mean	Std. Dev.	Coeff. of Variance	Maximum	Upper Quartile	Median	Lower Quartile	Minimum
Ag (ppm)	17	0.2	0.2	0.9	0.7	0.3	0.1	0.1	0.1
Au (ppb)	16	1.3	1.5	1.2	5	2.0	1.0	0.0	0
Cu (ppm)	17	111.7	53.4	0.5	227	139.0	90.0	76.0	37

TABLE #7: Statistical Summary for Soil Geochemical Survey

Element (units)	Statistical Population	Mean	Std. Dev.	Coeff. of Variance	Maximum	Upper Quartile	Median	Lower Quartile	Minimum
Ag (ppm)	143	0.2	0.2	0.9	1.4	0.3	0.2	0.1	0.05
Au (ppb)	143	4.5	5.7	1.3	37	5.0	3.0	1.0	0.5
Cu (ppm)	143	389	516	1.3	4,828	432	225	125	53

Ag (Silver): The silver values range from <0.1 to 1.4 ppm and average 0.2 ppm. On Figure #40, the anomalous values have been contoured at 0.5 ppm and greater. The anomalous values mainly occur on the western most line (L19200E), thus creating an anomaly that is open to the west. The anomaly extends eastward to two spot anomalies on L19300E. The silver anomaly is underlain by the siliceous dolomite unit.

Au (Gold): The gold values range from <1 to 37 ppb and average 4.5 ppb. On Figure #41, the marginally anomalous values have been contoured at values ranging from 8 to 20 ppb, while the anomalous values are greater than 20 ppb. Although the gold values are considered low, two distinct anomalies occur:

i) Located in the central portion of the grid, extending in a southeasterly direction between lines 19400E and 19700E, is a 400 m long by 40 to 100 m wide anomaly that has values ranging from 9 to 37 ppb. The anomaly is coincident with the chloritic breccia unit.

ii) Located in the northeastern corner of the grid, extending between lines 19800E and 19900E, is a southeasterly trending 160 by 80 m anomaly that has values ranging from 8 to 19 ppb. The anomaly is underlain by hematitic breccias.

Cu (Copper): The copper values range from 53 to 4,828 ppm and average 389 ppm. On Figure #42, the marginally anomalous values have been contoured at values ranging from 430 to 749 ppm, while the anomalous values range from 750 to 1200 ppm, and the very anomalous values are greater than 1200 ppm. Two distinct anomalies occur on the grid:

i) Located in the western half of the grid, extending between lines 19200E and 19700E, is an arcuate-shaped anomaly, measuring 650 m long by 40 to 140 m wide, that has values ranging from 430 to 1,438 ppm. The anomaly is coincident with the underlying chloritic breccia unit, as well as a gold-in-soil anomaly.

ii) Located in the northeastern corner of the grid, extending between lines 19900E and 20000E, is a northeasterly trending, 160 by 140 m anomaly that is open to the northeast. The anomaly has values ranging from 553 to 4,828 ppm. The anomaly is underlain by hematitic breccias and is partially coincident with a gold-in-soil anomaly.

4.5 Discussion of Geochemical Results

Rock Geochemical Survey: Although a greater sample population is needed, a crude geochemical zonation/association for several elements may be resolved.

i) Anomalous concentrations of barium (646 to 5,668 ppm) occur in the northern half of the "detailed area". It has a preferential association with the chloritic breccia unit, and is antipathetic with fluorine. At Olympic Dam, barium concentrations range from 0.5 to 5.0% (5000 to 50,000 ppm) and occur throughout most of the breccia complex. The central hematite-quartz breccia body is particularly enriched with values ranging from 2 to 5% Ba. Barium is generally antipathetic with fluorine.

ii) The light rare earth elements, Ce & La occur in the northern half of the detailed area associated with the chloritic and hematitic breccias, as well as the mafic dykes. The association with the dykes suggests a magmatic source for the mineralization. At Olympic Dam, the maximum REE values are hosted in the hematite-quartz microbreccia that is located in the centre of the deposit. The absolute REE values on the Olympic Property are approximately ten times lower than those at Olympic Dam, thus the areas sampled may be peripheral to the centre of the hydrothermal system.

iii) Anomalous to economic grade copper mineralization occurs throughout the property. It is mainly hosted by the chloritic/hematitic breccias and mafic dykes. Within the breccias, copper mineralization is hosted by the matrix and/or as fracture fillings. Within the dykes, the mineralization occurs as disseminations and/or as fracture fillings. The fact that mineralization occurs in the mafic dykes indicates a magmatic association.

iv) Fluorine is widespread, but is preferentially associated with the hematitic and chloritic breccia units.

v) Uranium concentrations are considered low, however anomalous values are preferentially associated with the chloritic/hematitic breccias, and there is a positive correlation with copper.

vi) A zone of potassium enrichment is spatially associated with the mafic dykes, thus indicating a magmatic source for the hydrothermal solutions. Also, anomalous K_2O values are associated with anomalous copper values. At Olympic Dam, potassic alteration (K-feldspar -

sericite) occurs in the upper parts of the system. Thus on the Olympic Property, it would appear that, due to faulting, various levels of the system are currently exposed.

vii) In the "detailed area", there is an area of sodium enrichment in the southern half of the map area, in contrast, the breccias in the northern half of the map sheet are depleted with respect to sodium. Also, there is an indirect relationship between Na_2O and copper in that anomalous copper values are associated with areas of sodium depletion. At Olympic Dam, sodic alteration (albite $\pm$ magnetite $\pm$ actinolite or chlorite) is dominant in the deeper portions of the system. Thus on the Olympic Property, it would appear that, due to faulting, various levels of the system are currently exposed.

viii) The rocks on the property host TiO_2 values that range from 0.02 to 2.18%, which is similar to those occurring at Olympic Dam, where the values are generally below 0.5% TiO_2 and rarely above 2% TiO_2. The low levels of titanium help to differentiate these deposits from otherwise somewhat similar occurrences associated with anorthosites, gabbros and layered mafic intrusions.

ix) The anomalous silver values generally range from 1 to 2.3 ppm with highs of 10 and 104 ppm. As well, the anomalous silver values are associated with anomalous copper. At Olympic Dam, background levels of up to 1 ppm silver are common throughout much of the breccia complex, with local zones ranging to >12.5 ppm. Silver accompanies all copper mineralization, with the highest values generally within areas of bornite-chalcocite mineralization.

x) Although the gold values are considered to be low (<1 to 52 ppb), there is a positive correlation with the chloritic and hematitic breccia bodies. Also, there is a partial coincidence with anomalous copper values. At Olympic Dam, the average gold grade for copper-uranium zones varies from about 300 to 1000 ppb for an overall total average of 600 ppb. Although gold grades appear to be independent of the grades of associated copper-uranium, there is a clear tendency for copper-uranium zones nearer the centre of the deposit to have higher gold grades. The highest gold grades (averaging several g/t) occur in a silicified fault zone on the eastern side of the central barren core of the deposit.

The rock geochemical signatures at the Olympic Property are similar to those that are found at the Olympic Dam Deposit in South Australia. The similarities are listed in Table #8 on the following page:

TABLE #8: Geochemical Comparison between the Olympic Property and the Olympic Dam Deposit

Element	Olympic Property	Olympic Dam Deposit
Ag	- average = 1 ppm - highs of 10 & 104 ppm.	- background = 1 ppm - locally up to 12.5 ppm
Ba	- average = 629 ppm - ranges up to 0.56% - generally antipathetic with fluorine.	- ranges from 0.5 to 5% - generally antipathetic with fluorine.
Ce	- anomalous - sympathetic with La	- enriched - sympathetic with La.
Cu	- average = 0.4% - ranges from 0.1 to 7.0%	- range = 0.3 to >2.5 %
F	- average = 507 ppm - ranges up to 0.1%	- range = 0.3 to 1.0%
La	- anomalous - sympathetic with Ce	- enriched - sympathetic with Ce
K_2O	- zones of potassium enrichment	- potassic alteration occurs in the upper parts of the system
Na_2O	- local zones of sodium enrichment and depletion	- sodic alteration is dominant in the deeper parts of the system
TiO_2	- average = 0.56% - range = 0.02 to 2.18%	- generally below 0.5% and rarely above 2%

Silt Geochemical Survey: The results suggest that there is potential for copper bearing breccia complexes in the eastern portion of the property.

Soil Geochemical Survey: The soil geochemical survey verified the copper anomalies that were delineated by UMEX and defined the following anomalies:

i) In the central portion of the grid, a copper-gold anomaly, measuring 650 m long by 40 to 140 m wide, is coincident with the chloritic breccia unit.

ii) In the northeastern corner of the grid, a partially coincident copper-gold anomaly (260 by 140 m) overlies the hematitic breccia.

iii) Anomalous silver values are confined to the western end of the grid.

Thus, in summary, the soil geochemical survey verified the anomalies defined by UMEX, and showed that the chloritic breccia unit hosts a zone where both copper and gold mineralization occur, the hematitic breccia unit hosts copper-gold anomalies that are only partially coincident, and, silver mineralization is independent of both copper and gold.

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5.0 CONCLUSIONS AND RECOMMENDATIONS

The property is underlain by 7 km long by 1200 to 2500 m wide easterly trending breccia complex of Helikian age (1.2 to 1.7 Ga). The complex is comprised of hematitic and chloritic breccias that form dike or pod-like bodies (less than 10 to greater than 10 m wide) which are elongated in an easterly direction. The breccias may be either monolithic or heterolithic and may be associated with syn/epigenetic mafic dykes.

Widespread copper mineralization occurs within the breccia complex and locally within mafic dykes. The copper mineralization is mainly associated with the heterolithic variety of the hematitic and chloritic breccias, however it also occurs as veinlets hosted by mafic dykes. Chalcopyrite is by far the most important sulphide present and is found occurring as follows:

- i) veins, cutting both the clast and matrix components of the breccia,
- ii) disseminations of chalcopyrite within the breccia matrix,
- iii) coarse clots, especially associated with carbonate, chlorite, or quartz patches that were at least partly cavity fillings,
- iv) replacement patches.

Pyrite is much less common and may occur as separate disseminations or included in chalcopyrite. Both of these minerals are found to be in equilibrium with specularite.

Iron is mostly tied up as specularite. It has replaced precursor iron minerals such as magnetite and pyrrhotite. This indicates that the major metasomatizing solutions were more oxidized than is common for porphyry-related hydrothermal systems.

The rocks have been subjected to various degrees and types of metasomatism as follows:

- i) silicification has often destroyed the original clastic sedimentary textures.
- ii) adularia is often found in altered sedimentary rocks where it has replaced the fine grained matrix between silt-sized quartz grains.
- iii) potassium in the form of sericite is minor, sometimes occurring as clay-sized grains intergrown with chlorite.
- iv) chlorite may be a major replacement of the fine grained matrix in sedimentary rocks.
- v) chlorite is the main replacement mineral in the mafic dykes.
- vi) in all rocks, chlorite is uniformly pale green indicating high magnesium, low iron compositions.
- vii) carbonate may be a significant alteration product.
- viii) the main vein minerals are quartz and carbonate (siderite).

The following criteria suggests that the mineralization found on the Olympic Property is of epigenetic, hydrothermal origin with similarities to that of the Olympic Dam model:

i) the discordant nature of the copper mineralization
ii) association of copper mineralization with heterolithic, hematitic and chloritic breccias
iii) strong hematitic alteration associated with both the breccias and copper mineralization
iv) mafic dikes carrying chalcopyrite
v) breccia bodies are structurally controlled

The rock geochemical signatures that occur on the Olympic Property are similar to those found at the Olympic Dam Deposit.

The results from the silt geochemical survey suggest that there is potential for copper bearing breccia complexes in the eastern portion of the property.

The soil geochemical survey verified the anomalies defined by UMEX.

The gold mineralization encountered thus far is very low grade, however, there is a spatial association with breccia bodies and copper mineralization.

It is highly recommended that Placer undertake an aggressive exploration program to; (i) define the continuity of the copper mineralization, (ii) define the size, type and morphology of the breccia bodies, and, (iii) define geochemical zonations in order to assist with geological modelling.

The exploration program should include:

i) property-wide geological mapping (1:2,500) with particular focus on defining the breccia types in more detail.
ii) systematic rock geochemical sampling (samples analyzed for Au, Ag, Cu, REE & whole rock oxides)
iii) linecutting (line spacing = 100 m, station interval = 25 m)
iv) conventional soil sampling in areas of thin overburden (ie: mountain slopes) and overburden drilling in areas of thick overburden (ie: valley bottoms).
v) tightly spaced magnetometer surveys (station interval = 10 m)
vi) gravity test surveys.

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APPENDIX I

PETROGRAPHIC REPORT

ON

OLYMPIC PROJECT SPECIMENS

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April 6, 1993

Report for: Glenn Shevchenko, Placer Dome Inc., Whitehorse

Project: **Petrographic Report on Olympic Project Specimens**

Thin Sections: 28 (see Table 1 for sample numbers)

Summary:

Due to variable effects of brecciation and metasomatism, only about half the rocks are identified with some certainty, and with some of the others there is a suggested original rock type. Mineralogy for all the rocks is summarized in Table 1.

Among the six recognizable sedimentary rocks, most are siltstone in combination with claystone or the latter without a silt component. (The grain size-related term "claystone" is used to parallel the term "siltstone" rather than the rock name "shale".) B9035 is a ferruginous clay ironstone with associated chert and siderite beds, while GS-12-92 is entirely chert, these rocks reflecting an exhalative sedimentary origin. Some of the fine grained sediment clasts are occasionally semiopaque to opaque with submicroscopic particles presumed to be carbon. In one of the Blackstone drill holes, about 25 % of the chips were polycrystalline carbonate, and this is the only sample with anything at all resembling carbonate rock in this suite.

The seven igneous rocks are all devoid of primary quartz although no feldspathoids were observed either. They include two plutonic rocks, a gabbro (GC-40-92) that is interpreted to have contained olivine prior to chloritization, and a diorite (B9214) where chlorite and carbonate have entirely replaced probable pyroxenes. Most of the volcanic rocks (GC-39-92, GS-3-92, B8995, and JA-35-92) are trachyte with very abundant distinctive lath-shaped K-feldspars of presumably sanidine. A couple specimens contain sparse K-feldspar phenocrysts. There is some evidence for flow banding and amygdules filled with chlorite and with quartz. Based on relict outlines of chlorite, the rock is interpreted to have originally contained 25-40 % pyroxene. B9244 is somewhat different and may be an andesite.

The breccia (B8918, B8999, GC-38-92, GS-2-92, GS-7-92, JA-35-92 and B8989) rocks are variable and extensively metasomatized. Derivation from silty sediment is indicated for B8918, and both silty sediment and trachyte chips appear to be included in JA-35-92 and B8989. For the other seven classed as highly metasomatized (B8986, GS-14-92, GS-15-92, GS-18-92, B9206, B9213, and B11155), GS-14 shows some evidence of derivation from trachyte and B9206 and B9213 from siltstone and claystone. In some of the breccias, for example JA-35-92, the fragments are well rounded suggesting diatreme activity.

All samples are subjected to metasomatism to greater or less degree. Silica has certainly moved around during silicification and recrystllization which has often destroyed the original clastic sedimentary texture, but it is more difficult to know the amount introduced as most of the rocks were siliceous initially. Similarly, some of the highest amounts of K-feldspar shown in Table 1 are for the trachyte samples that are rich in primary K-feldspar. However, 30 % or more of adularia is often found in the altered sediment samples where it is all metasomatic and has replaced the fine grained

matrix between silt-sized quartz grains. Except for three specimens, potassium in the form of sericite is minor, sometimes occurring as illite-sized grains intergrown with chlorite. Chlorite is another major replacement of the fine grained matrix in sediment samples. In igneous specimens all the mafic minerals are replaced by chlorite. In all the rocks, chlorite is uniformly pale green indicating high magnesium, low iron compositions. The other significant alteration is carbonate in many of the rocks. There are some late hairline veinlets of calcite, and the more pervasive carbonate in some rocks is also calcite, but in most samples it is interpreted to be siderite, ankerite or ferruginous dolomite. The main vein minerals are quartz and carbonate believed to be siderite in many cases. These minerals are common as crystal chips in the drill chip samples.

Iron is mostly tied up as specularite in these rocks. It has replaced precurssor iron minerals such as magnetite in one or two cases and pyrrhotite in some other sediment samples. This shows that the major metasomatizing solutions were more oxidized than is common for porphyry-related hydrothermal systems. Adularia, chlorite and probably carbonate were accompanying alterations, so that iron was pulled out of the chlorite, for example, and into specularite. Similarly iron removal from sphene resulted in rutile being a common constituent of the altered rocks. There is minor, usually less than one percent, of plagioclase or albitization accompanying the metasomatism. It is worth noting that in porphyry-skarn related alterations in the Quebec Gaspé region, Wares and Williams-Jones (see Issue 41 of the GAC-MDD Newsletter, Jan. 1993) show that copper mineralization is associated with high pH potassium metasomism but the related, higher temperature albite metasomatism is barren. Minor boron, introduced at the time of the major specularite metasomatism, shows up in at least eight of the samples and is most pronounced in GS-18-92. There is no barite nor was gold observed in any specimen.

Chalcopyrite is by far the most important sulphide present. It is common as monomineralic chips in the drill cuttings indicating implying derivation from a coarse, probably vein-type occurrence. In the rock specimens, it often occurs as coarse clots, especially associated with carbonate, chlorite, or quartz patches that were at least partly cavity fillings. However, chalcopyrite also forms patches replacing the rocks or may occur as finer disseminations in the rocks. Pyrite is much less common and may occur as separate disseminations or included in chalcopyrite. These minerals are in equilibrium with specularite. Although the oxygen fugacity was high during the major metasomatism, the sulphure fugacity was also high enough to stabilize a small part of the iron as sulphide. As noted above both magnetite and pyrrhotite were unstable and were replaced. The assemblage specularite-pyrite-rutile could be employed to define oxygen and sulphur fugacities at any given temperature.

Limited supergene alteration has affected almost all samples. Pyrite is preferentially replaced by chalcocite, but in chalcopyrite either chalcocite or cuprite may dominate with the other usually accompanying as a minor constituent. Covellite may accompany always as a minor constituent, as is generally the case for malachite as well, although occasionally it is a bit more abundant. Supergene alteration is entirely insitu and not vigorous enough to remobilize copper to an eriched blanket.

While these rocks do not contain uraninite, bornite, fluorite and other minerals abundant at the Olympic Dam deposit in South Australia, they do demonstrate other common features such as diatreme brecciation, alkalic volcanics and intrusives, hematization and intense potassium metasomatism. This is an unusual alteration system where high oxidation state has accompanied metasomatism. The high ratio of chalcopyrite to pyrite is another feature that should bear positively on economics of any deposit discovered.

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Table 1 **Mineralogy of Olympic Project Samples[1]**

Sample No.	Plag	K-spar	Qtz	Sercit	Chlor	Tourm	Carb[3]	Rutil	Pyrit	Cpy	Spec	Chalcit	Cuprit	Mlchit	Limnt[2]
B8918	0.5	29	25		35		0.2		<0.1	6	4				
B8986	0.5	29	51	tr	15		0.2				4[4]				
B8999		55	10		tr		31		tr	1		0.1			
B9035[5]			12				4.2				9				
GC-38-92		17	52	0.8	12				0.1		15				3
GC-39-92		75	≤1		14			4			5				
GC-40-92	30	2		18	14		<0.1		1	<0.1	1[6]				
GS-2-92	0.2		42	13	18	0.2	25			0.5	1	0.1			<0.1
GS-3-92		42	6		42		2	5		<0.1	0.6				0.1
GS-7-92	4		75	10	5		1	0.8			3				
GS-10-92		55	30		3		8	tr	0.2[7]	0.1	4	tr			
GS-12-92			90		2	1	5	0.1	0.3	0.2	0.1	0.1	0.3	0.1	0.6
GS-14-92	tr	45	25		14		12	1		3					0.1
GS-15-92	0.5	11	36	1	0.5	0.2	48	0.1	<0.1	1	2				0.2
GS-18-92	0.5	16	38	1	1	0.6	2	0.5	1.5	0.7					0.1
GS-19-92			36	4	50	0.1	2	1		1.5		0.2	2	0.8	0.3
JA-35-92A&B	1	35	57	tr	3	0.3		≤0.1	0.2	0.4	2.5	0.1	0.1	≤0.1	
Drill Chip Samples															
B8989	0.1	45	37			≤0.5	15		0.4	0.1	2	0.1			
B8995		44	5		39		6	2	0.1	3	0.5	0.4	0.2		
B9166		15	50	2	25		0.5	2	0.1	3	0.5	0.2	0.4		0.2
B9202		25	35	2	5		15		tr	15	1	1	0.1		
B9203		6	40		12		40	0.3	0.1	1		0.1	<<0.1	0.1	<0.3
B9206	<1	30	45	1	15		2		0.1	1.5		0.5	1.5	0.1	0.2
B9213		31	50	1.5	1		2		0.5	7	2.5	1.5	1.5	0.8	
B9214	45	1	5	1	25		13	1.5	0.6	6	1	0.2	0.3	<0.1	
B9244	15		40		30		2	0.1		3	2	tr	0.2		
B11155	<0.5	40	40		5	0.2	10	<0.1	0.4	3		0.4	<0.1		

Table 1 (continued)

Footnotes:

1. A few minor constituents omitted

2. Includes goethite and limonite

3. Includes calcite, dolomite, and siderite

4. Some specularite grains have unreplaced magnetite cores

5. 75 % of the slide material is too fine grained to be resolved microscopically

6. Also includes augite 28, biotite 1.5, magnetite 4, and spinel/hercynite 0.3 %

7. In this specimen is pyrrhotite rather than pyrite; and in GS-15-92 is <0.1 pyrrhotite

PTS: **B 8918** **Breccia of Mineralized and Altered Siltstone**

Specimen Description:

Dark grey breccia with a variety of rounded fragments up to 2 cm, many of which are bright orange to red aphanitic rock in 1-8 mm fragments. Rounded masses of specular hematite are up to 4 mm size and locally comprise >5 % of the rock but may average 2-3 % and by chance none of these larger hematite grains is included in the PTS. It does have 6-7 % of chalcopyrite (2-3 % is more typical of the rock), mostly as irregular 1-5 mm patches, which probably are also breccia fragments but from which there has been minor local remobilization. There is several percent quartz as irregular patches and anhedral to euhedral quartz crystals up to 2 mm which are distributed as breccia fragments. K-feldspar has variably replaced different fragments from 2 to about 90 % with average for the rock about 30 %. Clearly, the K-spar alteration pre-dates the brecciation.

Mineralogy: Amounts are approximations, since each fragment could be described as a separate rock.

Quartz	25. %	Chlorite	35. %	Chalcopyrite	6. %
K- feldspar	29	Ankerite/siderite	0.2	Hematite	4
Plagioclase	0.5	Chalcocite	0.2	Pyrite	<0.1

One fragment type is an impure sandstone comprised of 40-75 % of 20-130 µm grains with the matrix now entirely altered to chlorite 25-60 %. According to the Wentworth Particle Size Classification, these clastic grains range from medium silt to very fine sand, so it is a coarse siltstone. The grains are about 30 % quartz, 30 % probably K-feldspar and 2-3 % plagioclase. About 7 % hematite occurs as irregular 20-60 µm grains and as delicate partial replacements as rims and concentric zones in relict crystals. These were euhedral triangular, diamond and square shapes which may have been iron carbonate such as siderite, but are now 20-35 % hematite with the rest very fine grained quartz (see photo). This fragment type comprises about 15 % of the thin section.

A little less common are fragments up to 5 mm that are 60-75 % chlorite with the relict clastic grains only 20-50 µm. So the fragments are medium to coarse silt but there is no evidence of what the matrix was - maybe clay originally? More common are fragments up to 3 x 6 mm that are between the two above extremes, where there is a gradational change in clorite content from 15 to about 65 % along crude layers that may reflect bedding. These contain 2-5 % disseminated hematite.

Perhaps the most common are rounded fragments up to 6 mm which bear about 40 % clasts in the coarse silt size range of quartz, K-feldspar and minor plagioclase, similar to the fragments described first above, but with almost no chlorite. Instead the matrix is indistinct, mottled, colorless material interpreted to be very fine K-feldspar alteration. There is 2-3 % very finely disseminated hematite and 3-4 % of ankerite or siderite crystals still remaining or partially limonitized.

There are also ≥10 % of rounded and occasionally euhedral quartz crystal fragments up to 2 mm, sparse plagioclase fragments of similar size, and ≤5 % of irregular agglomerations of coarse, Carlsbad twinned orthocalse in patches up to 2.5 mm. Short segments of vein quartz are included in some frags. Crystal fragment areas comprise ≤15 % of the slide.

There are also a number of fragments of very fine grained feldspar. It could be untwinned albite, but without evidence it is assumed to be K-feldspar as it is abundant on the stained off-cut. These fragments contain 5-10 % chlorite with relict outlines suggesting replacement of an acicular mineral

Chlorite is distributed throughout as irregular, matrix-like replacements sometimes with up to

15-20 % of irreular to euhedral, relict iron carbonate grains up to 0.4 mm. These are now replaced by 10-25 % hematite and the rest quartz. Rarely, fresh or partly limonitized carbonate grains are preserved.

Chalcopyrite occurs as irregular masses up to 3 x 5 mm that are interpreted to have been fragments also. Some have sharp boundaries while others show some remobilization that has moved bits out into the surrounding rock. There are 3-15 % inclusions of mostly quartz but also some fine grained K-feldspar fragments. There are also 1-3 % each of pyrite and hematite inclusions, mostly <40 µm. Several of the smaller chalcopyrite grains have rims and worm-like inclusions <10 µm wide of chalcocite.

As noted above, the specimen contains sizeable grains of hematite, but in section, only three 0.1-0.6 mm grains were noted. Two are rectangular and one has most of a hexagonal outline preserved so it is interpreted as original specularite rather than a replacment of magnetite.

Conclusions

This rock is a breccia with a wide variety of fragments. The variety plus general rounding reflects considerable movement or diatreme activity as the breccia was formed. The fragments are variably altered and mineralized. Many show evidence of derivation from weakly metamorphosed or unmetamorphosed siltstones, some with a very fine sand component. The clastic grains are predominantly quartz and feldspar, however what was probably a very fine grained clay-rich matrix is now entirely chlorite which may vary from 5 to >75 %.

A second class of fragments are crystal fragments of, in decreasing order of abundance, quartz, orthoclase, and plagioclase. There are also fragments of hematite that may be euhedral crystals but more commonly are rounded, and irregular fragments of chalcopyrite.

Many fragments are partly to almost completely altered to K-feldspar. Some show relicts of clastic sedimentary grains and some show nothing. Clearly this intense period of metasomatism pre-dated brecciation, or at least the last becciation event.

The quartz, orthoclase, minor plagioclase, specular hematite and chalcopyrite fragments also reflect a stage of mineralization in the rocks before brecciation. Minor pyrite and hematite occur in the chalcopyrite, which minerals must be coeval. There is limited supergene replacement of chalcopyrite by chalcocite.

By contrast, chlorite is disseminated through all the fragments and occurs as semimassive masses in the matrix, indicating chloritization during and/or after brecciation. Euhedral crystals of an iron-bearing carbonate such as ankerite or siderite also grew in the chlorite at this second stage of alteration. The second stage of chlorite + ferrous carbonate appears to have been more reducing than the first. During a third stage of alteration, almost all the carbonate was replaced by hematite and quartz. This was the final red alteration that produced finely disseminated hematite. Minor chalcocite replacement of chalcopyrite was a late supergene event.

There is no evidence of an igneous source in this specimen, but there would have to have been a heat source at least to set cells of oxidized formation waters in circulation.

PTS: **B 8986** **Weakly Mineralized Metasomatic Rock (Quartzite?)**

Specimen Description:

Light to medium grey, siliceous rock mottled with about 15 % of 1-3 mm cream colored spots. These vaguely resemble altered feldspar phenocrysts, but are too irregular in outline. Almost half the remaining matrix is irregularly colored with a pink to orange mottling. About 1 % or less of 0.5-1 mm disseminated chalcopyrite inclusions which are partially supergene altered (unfortunately none of these chalcopyrite grains appear in the PTS.) About 15 % K-feldspar is disseminated throughout as irregular patches probably corresponding to the pink mottling but not the cream colored patches.

Mineralogy:

Quartz	51. %	Chlorite	15. %	Hematite	4. %
K- feldspar	29	Dolomite	0.2	Magnetite	0.1
Plagioclase (An 3 or 37)	0.5	Sericite	tr	Zircon	0.1

Quartz in 0.03-0.2 mm grains occurs as a recrstallized, weakly sutured mosaic forming a matrix for most of the slide. It is a product of widespread silicification leaving no relict original textures.

K-feldspar, presumably orthoclase that is occasionally Carlsbad twinned, occupies indistinct 0.5-2 mm patches or "islands" in the quartz. The indistinct, very irregular grains are 15-80 µm size. 15-20 % quartz grains also occur in these patches together with 5-10 % chlorite and sparse plagioclase grains, reflect minor albitization with the K-spar metasomatism.

Carbonate occurs as irregular patches up to 1.5 x 2 mm, corresponding to the cream colored patches in the specimen as described above. It is seldom twinned. The response to HCl is slow reflecting dolomite. Very minor limonite alteration suggests ferroan dolomite or even ankerite.

Pale green, almost nonpleochroic chlorite forms irregular replacement patches up 1.3 mm, but it usually occurs as <80 µm patches intergranular with quartz and K-spar. It is interpreted as a high magnesium low iron variety. Less commonly it occurs as radiating fibrous aggregates and may show blue anomalous extinction. Rarely, a trace of sericite is intergrown with chlorite.

Hematite is disseminated relatively evenly as equant, irregular, pseudocubic pseudododecahedral 10-100 µm grains. A small percentage of grains have tiny remnant inclusions, and rarely complete cores, of magnetite, showing that magnetite was the original Fe-oxide that has since been replaced by specularite.

Wheat-shaped, 10-40 µm grains of probable zircon are sparsely disseminated.

Conclusions

There is no evidence of origin of this rock. Perhaps some quartz derived from a quartz-rich sediment, but all minerals other than zircon are metasomatic. The major alterations are silicification, K-feldspar metasomatism, chloritization, carbonatization and hematization. The latter is a late alteration of earlier magnetite.

Although not present in the slide, widely scatter chalcopyrite grains occur in the specimen. They are partially altered to a dark colored secondary mineral (base on other specimens, this would be either chalcocite, cuprite, or both).

PTS: **B 8999** Breccia Totally Replaced by Adularia and Dolomite

Specimen Description:

Light to medium red to buff colored rock with indistinct patterns of probably partially resorbed fragments 2-15 mm size. The variable salmon to red color relates to K-feldspar which comprises up to 70 % of the rock. The light grey part of the mottling is carbonate, apparently dolomite reflected by a slow HCl reaction. Also a few percent of 1-2 mm rounded quartz grains with fuzzy edges, also reflecting alteration, and about 1 % of finely disseminated chalcopyrite and 2-3 % specularite.

Mineralogy:

Quartz	10. %	Chlorite	tr. %	Chalcopyrite	1. %
K- feldspar	55	Dolomite	31	Digenite	0.1
		Hematite	3	Pyrite	tr

Desilicification is shown by deep embayments and up to 50 % replacement of a number of 0.5-3 mm quartz grains by very fine grained K-feldspar and carbonate to a smaller degree.

K-feldspar, which is probably adularia, occurs as dense, very fine grained, 5-50 µm replacements of irregular areas and some subangular areas recognizable as former fragments. There is no evidence as to what has been replaced. These areas are all heavily dusted with opaque grains ranging in size from about 10 µm to below the limit of detection at about 0.1 µm. These are now specularite but occasionally show cubic outlines possibly indicating origin as pyrite in the precurssor rock. In addition to the few areas that vaguely resemble fragments, this fine grained K-feldspar together with irregular carbonate patches forms large parts of the rock.

Dolomite occurs as diffuse, irregular areas up to 5 mm that sort of envelope all other minerals that happen to be there when they were growing. Rarely it forms small massive areas in angular contact with some euhedral faces that may remain on large quartz grains. Perhaps this part of the dolomite formed earlier when the quartz crystals grew? Chlorite is rare in patches up to 0.1 mm.

Specular hematite occurs as acicular needles throughout from the finest size resolvable up to grains 0.03 x 0.3 mm. Amounts vary from 1 to 5 % being most abundant in areas of variable mineralogy and less where it is all K-spar. Hematite crystals also occur within some large quartz crystals. Rarely a bunch of hematite crystals are stacked together as if a 0.2 mm magnetite was replaced?

Chalcopyrite occurs in cuspate, irregular grains from 5 µm up to 0.15 mm. It is generally free of inclusions with only rare 5-10 µm pyrite included. At least half the grains have reaction rims 2-8 µm wide of digenite.

Conclusions

Some relict fragmental texture is preserved in spite of massive metasomatism. This is interpreted as a breccia of very fine grained rock and coarse quartz crystal fragments which has undergone major replacement by adularia and dolomite. There is a remote chance that in stead they are fragments of a very alkalic rock composed only of quartz phenocrysts and an aphanitic K-feldspar matrix, later subjected to dolomitization. Perhaps field relations can show if this is at all plausible? This would have the advantage that the phenocrysts would be partially resorbed in the melt, a known process, rather than partial replacement by metasomatic solutions.

A trace of pyrite included in chalcopyrite suggests that it may have been more common but is now all hematitized. Chalcopyrite is partly altered to secondary digenite.

PTS: **B 9035** **Clay Ironstone with minor Chert and Siderite beds**

Specimen Description:

Aphanitic, bright red jasperoid with well preserved shaley bedding. A few beds that are still dark grey may contain minor graphite and thus resisted oxidation. The rock is very hard so it must be silicified, and is cut by 2-3 % of quartz veinlets and minor late calcite along fractures. Some 0.5-2 mm quartz layers parallel the bedding and may be chert layers, but they occasionally branch across the bedding more like quartz veins that have follow the bedding as planes of weakness. Minor specularite is developed along some bedding planes. There is no other mineralization.

Mineralogy:

Quartz	12. %	Siderite	4. %	Hematite	9. %
		Calcite	0.2	Unresolved	75

Specularite is finely disseminated in the rock averaging 2-3 % as grains occasionally up to 10 µm but mostly less than 1-2 µm down to the limit of resolution. There must be a lot more that is too fine to see at 400X magnification that gives rise to the bright red colour of the rock. At opposite ends of the slide there are two 1-2 mm beds with about 70 % specularite in one case and 80-90 % in the other. In one case the bed is slightly faulted and beyond the fault the very fine specularite is all recrystallized to 0.02-0.2 mm grains, a few of which show polysynthetic twinning. The bed with 80-90 % specularite parallels a 2 mm quartz layer from which a hook-shaped spur shoots out across the specularite bed at one point (see photo). This is interpreted as a chert bed from which minor amounts were remobilized by minor deformation into cross-cutting veinlets while the chert was still a gel.

The stratiform quartz veins, interpreted as possible chert beds, are mostly 1-4 mm wide and the thicker ones often have a layer or discontinuous series of coarse grains of carbonate at the centre. This carbonate is pink in specimen and does not react with HCl, in contrast to the minor calcite along fractures, and is interpreted as siderite. It also occurs as a separate 2 mm bed (or vein?) across one end of the slide with only a few percent contained quartz. The adjacent red rock has 15-30 % each of disseminated siderite and quartz.

There are common late hairline veinlets of quartz and of calcite throughout rock. In addition, a couple 3 mm beds contain 5-10 % quartz as angular, cuniform patches that are apparently dehydration cracks formed during lithification of the gel-like sediments, or less likely dessication cracks. At a couple places quartz forms a series of parallel, curved bands 1-5 µm wide like a partial finger print. One wonders if this represents a Precambrian organic such as a stromatoporoid form?

Several 0.5-1 mm euhedral siderite crystals occur along one bed. They have concentric zoning and envelop large cores of unreplaced original sediment.

Conclusions:

This rock should be termed clay ironstone with minor chert and carbonate beds. (It probably does not contain the arbitrary 30-35 % iron required to be defined as iron formation.) There has been crystallization and some remobilization of the presumed chert and siderite beds since deposition. The original form of iron deposition is unclear but was probably as hydrous iron oxide gel. Large amounts of entrained water would have been expelled during lithification. Perhaps reflecting weak metamorphism, the iron oxide has recrstallized to specularite, although a large amount probably remains amorphous giving the rock the bright red color. Other than this partial recrystallization due to minor heating, there is no evidence of metasomatism from an outside source. I cannot speculate on the nature of the exhalative source that precipitated the iron-silica-carbonate gels in the first place.

PTS: **GC-38-92** **Ferruginous K-Metasomatized Siltstone-Claystone Breccia**

Specimen Description:

Breccia (or conglomerate ?) of rounded to angular fragments that are tan, pink, dark red and minor light green, very fine grained and hard, presumably siliceous. The matrix is dark reddish grey containing abundant fine specularite. There are sparse 1-2 mm crystals of quartz and almost black carbonate. Along one side of the specimen are three 1-3 mm bands of almost pure specularite that display open folds. Parallel to this are some cream coloured K-spar rich bands and lines of vugs where a presumed carbonate bed has been leached. Elsewhere apparent siderite is partially limonitized. K-feldspar metasomatism is concentrated in the breccia fragments from 25 to 80 %. Some fragments show a very faint compositional banding of the K-spar suggesting replaced sediment.

Mineralogy:

Quartz	52. %	Chlorite	12. %	Hematite	15. %
K-feldsapar (adularia)	17	Sericite	0.5	Limonite	3
Microcline	0.2	Pyrite	0.1	Clay (illite?)	0.3

Some of the fragments consist of a mosaic of equant 15-50 µm quartz grains, 25-35 % of K-spar grains, ≤1 % of possible plagioclase grains, 8-10 % wispy grains of light yellowish green chlorite, and ≤1 % specularite. There is a spectrum of fragments with decreasing amounts of quartz and grain size becoming <5 µm, specularite increasing to 2 % and K-feldspar and chlorite increasing to 40-50 percent each. Sometimes there is a slight grain size and/or compositional variation suggestive of relict sedimentary bedding.

The specularite-rich matrix contains some rock fragments down to 0.2 mm, 20-30 % of angular quartz fragments, 10-15 % chlorite, 0-5 % of zoned limonite, some K-feldspar and rare 0.2 mm microcline angular fragments. Other products of the carbonate breakdown are a supergene clay such as illite and minor quartz. In some of the matrix areas, colloform limonite comprises up to 15-20 %.

Sericite occurs disseminated up to 5 % as 5 x 60 µm platelets in one fragment and at a much finer grain size in about half the other fragments.

The limonite noted above in relict, probably dodecahedral crystals up to 0.5 mm, is mostly a product of pyrite weathering, as sparse grains retain a core of unreplaced pyrite. Some may also be a replacement of ferruginous carbonate, but no evidence of that remains.

Where semimassive, hematite occurs as fine platelets and irregular grains mostly less than 50 µm. Uncommonly if occurs as rectangular grains up to 0.2 x 0.35 mm. These may be replaced magnetite or pyrite but no evidence remains. Where less abundant, hematite is also very fine grained and usually more euhedral with exceptional grains up to 0.05 x 0.5 mm size. Hematite is more concentrated along three or four bands presumed to be beds. The widest and most concentrated is 3-4 mm wide with indistinct edges and has 50-60 % hematite, some quartz grains and 5-8 % limonite after pyrite.

Conclusions:

This is interpreted as a heterolithic breccia, rather than a conglomerate, even though it has crude bedding which is best demonstrated by the hematite beds. Original grains would have been in the silt and clay size ranges. K-metasomatism, presumably as adularia, has replaced the finer grained fragments to a greater extent than the silts, and the chlorite may just replace original clay with or without Mg addition. This was undoubtedly an Fe-rich sediment where pyrite has been limonitized but there is no evidence of the precurssor mineral for the ubiquitous specularite.

PTS: **GC-39-92** **Titanium-rich Trachyte Flow with Cherty Claystone and Quartz-Calcite-Chlorite Veins**

Specimen Description:

Dark reddish grey, very fine grained, massive rock in contact with medium grey cherty claystone with faint colloform-like banding. There is a concentration of relatively massive dark red hematite/specularite along the contact. The chert appears to have pushed into place and caused some fragmentation of the hematite layer. In the dark rock, there are irregular veins and round patches of quartz plus pink calcite. According to staining, the massive dark rock is 60-75 % K-feldspar but none in the chert claystone that occupies about 25 % of the nonvein portion of the slide.

Mineralogy: A - Dark reddish grey rock (about 60 % of the slide):

K-feldspar (sanidine)	75. %	Chlorite	14. %	Hematite	5. %
Quartz	≤1			Rutile	4

B - Cherty claystone portion of the slide (about 25 % of the slide):

Quartz	25	Chlorite	75

C - Veins (about 15 % of the slide):

Quartz	80	Chlorite	4	Limonite	1.5
Calcite	15	Pyrite	0.2	Chalcopyrite	<0.1

The cherty claystone area of the slide is very fine grained with any resolvable grains <5 µm. It consists of 35-100 % chlorite, which is usually in the 60-85 % range, with the rest mostly quartz. There is faint banding and some patchiness where it appears to have been pushed into contact with the other rock prior to consolidation, at least of the material tentatively interpreted as cherty claystone.

The rest of the rock is a uniform, very unusual jumble of ragged lath-shaped crystals with triangular and irregular 0.03-0.2 mm patches of chlorite and hematite in between. The irregular to lath-shaped grains are mostly about 0.2 mm long but occasionally are 0.6 x 0.1 mm and one phenocryst like grain is 0.4 x 0.8 mm. This is interpreted as high temperature sanidine, rather than metasomatic adularia. The relative amounts are about 75 % sanidine, 14 % chlorite, 5 % hematite, 4 % rutile after ilmenite and ≤1 % quartz. The quartz is often associated with the hematite and is probably introduced. Hematite occurs mostly as irregular shreds and subcircular patches with chlorite at the centre, suggesting that these may have been mafic crystals such as pyroxenes that have entirely been replaced. If correct then the original pyroxene content would have been of the order of 25 %. In addition, there are oxide grains mostly about 0.3 mm that are partly hematized around the edges and sometimes along cubic or octahedral cleavages. The original grains are interpreted to have been ilmenite, but it is now oxidized to rutile showing weak anisotropism and strong internal reflection.

Veins 0.05-4 mm wide comprise 10-15 % of the slide cutting both kinds of rock and consist of about 80 % highly strained quartz, 15 % calcite, 4 % chlorite and 1-2 % limonite which is formed as a partial weathering product of the carbonate in some places. The carbonate gives a strong HCl reaction indicating calcite but there may be some ankerite or some iron in the calcite? A compound sulphide grain 0.3 x 0.6 mm occurs as segment of a quartz-carbonate vein of the same width. It has a large pyrite core with a narrow chalcopyrite rim. The rim is surrounded by another rim of supergene hematite. The 0.05-0.3 mm layer of specularite that separates the two rock types is about 75-90 % hematite with some quartz. This band is cut off by the later quartz-carbonate veins.

Conclusions

The main part of this specimen is interpreted as igneous, either a fine grained dyke or a volcanic flow, of unusual composition. It appears to be mostly K-feldspar, presumably the high temperature polymorph sanidine. It is unlikely that this is entirely metasomatic K-feldspar as the texture would probably be somewhat masked by such a massive alteration, so this is interpreted as primary feldspar. An original content of about 25 % probably pyroxene is now entirely chlorite and specularite. Some probably magmatic oxide grains, interpreted to have been ilmenite, are entirely altered to rutile and lesser specularite. This rock, which probably had no original quartz, classifies as a syenite dyke or trachyte flow but of somewhat unusual composition. Field relations should clarify whether it is a dyke or a flow.

The above rock is separated from a light to medium grey cherty claystone by a thin layer of specularite. Minor brecciation of this layer along the claystone side gives the impression of the latter rock being emplaced against the syenite. If this is the case, perhaps it was indeed a trachyte flow with a soft sediment slumped down on top of it?

Both rock types are cut by quartz-calcite veins bearing a few percent chlorite and one compound grain of pyrite plus chalcopyrite.

PTS: **GC-40-92** **Gabbro**

Specimen Description:

Dark grey, fine to medium grained, mafic igneous rock with fine diabasic texture and color index = 50. It is highly magnetic. K-staining shows replacement mostly of the cores of the lath-shaped feldspars comprising about 15 % of the rock.

Mineralogy:

Plagioclase (An 13 or 27)	30. %	Illite	18. %	Magnetite	4. %
Orthoclase	2	Chlorite	14	Hematite	1
Augite	28	Carbonate	<0.1	Spinel/hercynite	0.3
Biotite	1.5	Pyrite	1	Chalcopyrite	<0.1

Plagioclase has an unusual habit occuring in elongate crstals mostly 0.2-1.5 mm long with width about one tenth the length. Preservation of albite twinning is rare as alternate lamellae are usually replaced by metasomatic illite. Although only partial, the alteration has made determinations difficult. There is no identifiable nepheline although it was expected and searched out. A few stubby 1-2 mm crystals with advance illitic alteration resemble nepheline but are biaxial negative and are interpreted as orthoclase. Illite commonly occurs as monomineralic patches about 0.1 mm, occasionally with radiating extinction, that replace part or all of all plagioclase grains.

Augite occurs as approximately equidimensional 1-2 mm grains that are sometimes squashed between a "fence" of plagioclase laths or a lath may protrude patially or entirely through a pyroxene grain. Maximum extinction angle >42° is well in the augite range. Some grains are >60 % altered to intergrown biotite and chlorite while some grains show ≤5 % of such alteration along cleavages. Biotite is restricted to alteration sites in augite, whereas chlorite occurs as intergranular patches throughout the slide which may be irregular but many have relict outlines suggestive of olivine crystals. I would interpret that the original rock contained 5-8 % olivine. Very occasionally such a chlorite patch has a small carbonate, probably dolomite or ankerite, at the center.

Magnetite occurs as irregular to euhedral 0.1-2.5 mm grains with about 30 % hematite exsolution lamellae throughout indicating a high temperature of original crystallization. The remaining magnetite is weakly anisotropic in irregular <5 µm domains which may reflect some elements remaining in solid solution such as Al, Ti, etc. A very small percentage of the magnetite area is occupied by spinel or hercynite which occur both as exsolution lamellae and as 5-10 µm irregular domains. In addition, most of the hematite lamellae contain 1-2 µm patches of spinel/hercynite that are especially concentrated towards the edges of the hematite lamellae. This mixture also forms as somewhat fluffy-looking replacements along exsolution planes. These are gradational to true lamellae. The many complexities of these oxides would have to be sorted out with a scanning electron microscope, if important.

Pyrite is disseminated as irregular 20-150 µm grains. Chalcopyrite is sparsely disseminated mostly as <5 µm grains but occasional irregular patches up to 50 µm. Over large areas, there is no chalcopyrite and then in a 0.5 mm area there may be a concentration of 50 tiny grains included in what appears to be a primary orthoclase grain.

Conclusions:

This is a mafic intrusive with a high color index indicating gabbroic composition. Neither quartz nor feldspathoid minerals are recognized. Magmatic magnetite shows complex exsolutions of hematite and spinel or hercynite. There are minor pyrite and chalcopyrite. Interpreted olivines are completely altered to chlorite, augite is partially altered to chlorite and biotite, while plagioclase and minor orthoclase are extensively altered to illite.

PTS: **GS-2-92** **Breccia of Siltstone and Claystone Fragments in Metasomatic Calcite-Quartz**

Specimen Description:

Dark grey, very fine grained, subrounded breccia fragments comprise >40 % of rock, in a light to medium pink or reddish matrix. There is also about 5 % of pale green fragments up to 3 mm that may be cherty claystone. There is calcite in the matrix and <1 % finely disseminated chalcopyrite.

Mineralogy:

Quartz	42.%	Sericite	13. %	Specularite	1. %
Plagioclase	0.2	Chlorite	18	Chalcopyrite	0.5
Calcite	25	Tourmaline	0.2	Chalcocite	0.1
				Limonite	<0.1

One of the fine grained rock fragments consists of about 75 % of 15-60 µm clastic grains, usually rounded but sometimes sliver-like, of quartz. Some grains may be untwinned feldspar but rarely see a twinned grain and staining indicates no K-feldspar. There is 0.5-1 % tourmaline as similar sized grains, about 2 % of ≤10 µm hematite grains, rare relict sphene grains, and <0.5 % of very fine chalcopyrite grains. The remainder is fine grained matrix chlorite, about 14 % and 11 % sericite. Another similar fragment shows faint bedding, but the matrix chlorite and sericite are up to about 40 and 20 %, respectively. The clastic grains are medium to coarse silt size in what was probably a clay sized matrix before alteration/recrystallization.

The pale green fragments referred to in the description, consist entirely of chlorite and sericite in a 2:1 or 3:2 ratio at a grain size entirely <5 µm. One such fragment contains a portion of a coarser bed similar to the second fragment described above. It would be in the "coarse clay" size range, i.e. a claystone. There is <1 % disseminated specularite. In addition to occurring as larger fragments, these very fine sediments are recognizable as distinct fragments down to 0.15 mm size.

The matrix consists mostly of coarse grained calcite and rounded to angular quartz grains, mostly 0.02-0.3 mm and occasionally up to 0.7 mm. Calcite and quartz are in about a 2:1 ratio. There is no clearly fragmental quartz, so the mosaic of quartz and calcite is interpreted as entirely metasomatic. It is a replacement of the pre-existing breccia matrix rather than vein-type quartz and calcite. There are sparse ribbon-like chlorite grains 25 µm x 0.5 mm long. Matrix comprises almost 50 % of the slide so the fragments are matrix supported.

Chalcopyrite occurs as scattered irregular grains generally less than 0.1 mm but the largest patch is 0.9 mm, and it appears to be part of the late metasomatism associated with the calcite and quartz. About one third of the grains are surrounded by and partially replaced by a harder, dark grey, isotropic mineral, tentatively identified as chalcocite and minor cuprite. Occasionally some supergene red limonite surrounds the combined grain.

Conclusions:

This breccia of siltstone and claystone fragments is supported by a matrix of calcite and quartz that has replaced the original matrix. Chalcopyrite is interpreted to have been introduced at the same time. A portion of the chalcopyrite grains are partially replaced by probable chalcocite and minor cuprite. Minor tourmaline occurs in at least one of the siltstone fragments. It is difficult to tell if it is metasomatic, but more likely it is detrital in this sample. Unlike most rocks in this suite, there is no potassium metasomatism.

PTS: **0S-3-92** Trachyte Flow

Specimen Description:

Very fine grained, dark reddish grey rock with 5-10 % or irregualar quartz knots, a few of which also contain calcite. This is clearly introduced or remobilized quartz but is not in vein form. In the remaining rock, K-staining affects 60-75 % of the rock.

Mineralogy:

Sanidine	42.%	Chlorite	42. %	Rutile	5. %
Quartz	6	Sphene	0.2	Specular hematite	0.6
Carbonate	2	Clay	2	Sphene	0.1
Arsenopyrite	<0.1	Chalcopyrite	<0.1	Limonite	0.1

Ubiquitous lath-shaped sanidine crystals at mostly 0.03 x 0.2 to 0.08 x 0.5 mm with rare phenocrysts up to 0.4 x 1.3 mm. They show Carlsbad twinning and variable cloudiness due to incipient clay alteration that is too fine to identify.

Besides occupying intergranular areas throughout the rock, chlorite forms homogeneous masses about 0.25 x 5 mm interpreted as relict pyroxenes. These may contain a few small inclusions of sphene or some breakdown product thereof, reflecting some titanium content of the original mineral. There is only 10-15 % recognizable as probably relict pyroxene but most of the intergranular chlorite probably was originally fine grained pyroxene. Relict pyroxenes are usually ringed by a 1 µm rim of oxide, presumably specularite. In most of the slide, sanidine crystals are relatively packed together with 30-40 % intergranular chlorite. However, in areas occupying about 15 % of the slide, sanidine crstals become widely spaced with chlorite increasing to 75->90 %. The cause is unclear; one may speculate that these were areas of increased volcanic glass for whatever reason. These areas coincide with the occurrences of included siltstone lenses plus possibly amygdaloidal lenses of chlorite and increased quartz "fragments" or amygdules as described below.

There is no primary quartz. Some discontinuous lines of quartz grains follow fractures or weak shears along which carbonate occurs as veins. This may be vein quartz, but most of the quartz occurs in subangular to rounded clots about 1.5-2 mm in size that sometimes resemble amygdules and in other cases look like fragments dragged in along zones of very weak shearing or flow. One such zone also contains two elliptical patches of pure chlorite up to 0.8 x 3 mm size that resemble stretched amygdules. Along a similar zone are two lenticular patches of bedded, chloritic siltstone 0.7 x 2.5 mm that also appear dragged in perhaps by a volcanic flowing action?

Carbonate in the quartz masses and some late hairline veinlets is clearly calcite. Carbonate following ill-defined veins is limonitized suggesting that it may be ankerite or ferruginous dolomite.

The majority of oxide that is relatively uniformly disseminated throughout the slide in 1-50 µm very irregular grains is the shade of grey of magnetite, but it shows strong white to amber internal reflection. This is tentatively identified as rutile, however anatase and pseudobrookite are similar. Small grains of speculár hematite are intergrown with 5-10 % of the grains. In one large chlorite-quartz area, there are two 1 x 4 mm masses of specularite. In one, rather wormy to fibrous hematite constitutes 30-50 % with chlorite. The other is solid twinned specularite with ≲5 % inclusions of chalcopyrite at 1-20 µm size. This is the only chalcopyrite in the entire slide.

Uncommon irregular to wedge-shaped, 0.03-0.1 mm grains of arsenopyrite occur included in or near a couple of the quartz-calcite clots.

Conclusions:

This is a weakly porphyritic trachyte flow very similar to GC-39-92. The sanidine is cloudy due to weak clay alteration, while relict pyroxenes interpreted from textural outlines are entirely altered to chlorite and minor sphene. Two small lenses of siltstone are interpreted to have been dragged in by volcanic flow action. Two chlorite elliptical areas are interpreted as stretched amygdules, while various rounded to subangular 2 mm patches of quartz, with or without calcite and chlorite, are tentatively identified as amygdules with minor vein-like tendency for some.

Irregular oxide grains throughout are interpreted as mostly rutile with minor specularite, formed by oxidation of probably original sphene or ilmenite in the rock, none of which remains. A 1 x 4 mm mass of solid specularite in a chlorite area contains a few percent chalcopyrite inclusions. This is the only chalcopyrite in the entire section. It indicates that copper was moving in the same metasomatic solution that caused specularite precipation and apparently also chloritization. This may account for chlorite in all these rocks being very pale green, indicating high magnesium content, as most of the iron is pulled out as specularite.

PTS: GS-7-92 **Siltstone & Claystone Breccia Silicified, Illitized and Hematized**

Specimen Description:

Dark reddish grey breccia with rounded to angular fragments up to 1.5 mm. The largest fragments are very fine, dark grey to black probable claystone with no K-staining. A variety of, smaller, lighter grey, more silty fragments are variably K-stained as is some of the matrix, probably indicating potassium introduction both before and after brecciation. There are also light pink, probably siliceous fragments along one side. Fine specularite in the matrix is occasionally coalesed in pockets.

Mineralogy:

Quartz	75. %	Illite/sericite	10. %	Specularite	3. %
Plagioclase (An 6 or 34)	4	Chlorite	5	Rutile	0.8
		Calcite	1	Carbon(?)	1

Angular and rounded fragments of siltstone and claystone occupy 85-90 % of the slide. Some show some bedding as expressed by grain size variation. Amounts of transmitted light vary down to almost none. Such fragments only contain about 1 % visible specularite. At a thin edge of such a fragment one can see almost submicroscopic opaque particles which are probably amorphous carbon. All the fragments contain some chlorite, but it is not major. Illite/sericite alteration varies from fragment to fragment from zero to 15-20 % and locally up to 40-50 % in parts of the matrix. The grain size of the illite/sericite also varies widely between fragments. In most it is <4 µm (illite) but in some it is in flakes up to 5 x 60 µm.

Quartz is a major matrix constituent with highly variable grain size from 15 µm to 0.7 mm. Albite also occurs sporadicly as 0.05-0.2 mm grains. Plagioclase probably also occurs among the clastic silt grains but twinning is rarely seen. Pale green, high magnesium chlorite occurs as irregular matrix patches up to 1 x 3.5 mm of rather fibrous-looking texture. Calcite occurs as occasional 0.2 mm patches. Both quartz and chlorite also occur as occasional veinlets cutting the rock fragments. In a few cases, a slightly earlier generation of quartz veins was emplaced in the fragments before brecciation, showing a more extended period of silicification.

Only 0-2 % very fine specularite is disseminated in the fragments, but it is more abundant in the matrix, often as curved, very thin platlets 10-100 µm long. A few much larger crystals up to 0.08 x 1-2 mm occur in the matrix and also show folding interpreted as slight continued deformation during metasomatism (see photo). Rows of 5-50 µm, irregular rutile grains occur as a rim around some claystone fragments, but not others, and as discontinuous lines veining some fragments. It is clearly a product of metasomatic oxidation of some contained titanium, but there is no evidence of the precursor titanium mineral.

Conclusions:

This is a hematized breccia of claystone and siltstone fragments set in a matrix occupying ≤15 % of the rock. Some quartz veining occurred before brecciation but most is silicification of the matrix. This metasomatic matrix also includes chlorite and lessor calcite as well as 3-6 % specularite. The latter is mostly very fine grained but may occur in platelets or blades up to 1-2 mm long. Both the coarse and fine ones are often curved indicating some continued movement during metasomatism, as they are not fractured by later movements. There is no copper or other mineralization.

PTS: GS-10-92 **Siltstone & Claystone Metsomatised with K-Feldspar & Specularite**

Specimen Description:

Very fine grained or aphanitic, bright orangish red rock with minor cream coloured mottling of calcite that may be aligned along a crude fracture pattern. Much of the slide may have been a faintly bedded siltstone, now 25-60 % affect by potassium metasomatism. The rest appears to be quartz and specularite. The latter probably averages about 5 % in the specimen but is up to 30-40 % in local ill defined bands or zones. There is 0.5-1 % disseminated chalcopyrite.

Minerology:

Quartz	30. %	Pyrite	0.2 %	Specularite	4. %
K-feldspar (adularia)	55	Chalcopyrite	0.1	Pyrrhotite	0.2
Chlorite	3	Chalcocite	tr	Rutile	tr
Calcite	8				

Quartz and K-feldspar, presumably adularia, comprise an equigranular mosaic of 10-100 µm grains. K-feldspar comprises 40-50 % of these areas. This alteration and recrystallization has masked any evidence of pre-existing clastic texture. In the irregular calcite-rich areas, K-spar and to a lesser extent quartz, are reduced. The above area occupies about 25-30 % of the slide and is in fairly sharp to gradational contact with the finer grained remainder. The contact is usually masked by a zone up to 2-3 mm wide of advanced carbonate replacement. Occasionally carbonate has filled a cavity lined with euhedrally terminated quartz crystals.

The rest of the slide has a clearly defined clastic texture preserved. In part, grains are 5-80 µm and in other parts they are all less than 5 or 10 µm, suggesting interbedded siltstone and claystone. This material is largely K-feldspar in which sparse clastic grains have twinning a bit like microcline. There is 10-15 % quartz in the silt-sized area and none in the finer grained area. The latter area has occasional rather irregular K-feldspars up to 0.4 x 0.8 mm. These may also be metasomatic, but they make the finest area resemble a porphyritic volcanic, although this is probably impossible based on a composition of almost pure K-feldspar. Although there is no apparent quartz in this fine grained rock, there are occasional replacement patches up to 1 mm with some euhedral quartz crystals up to 0.3 mm There are more common euhedral calcite crystals up to 1 mm scattered through this portion of rock.

Only about 1 % specularite is finely in the very fine grained rock and up to 15 % in parts of the quartz-calcite metasomatised rock. It occurs in a wide range of sizes up to 0.3 x 0.8 mm, often has polysynthetic twinning. Many grains contain a few tiny pyrrhotite inclusions suggesting that the rock originally contained pyrrhotite that has been replaced during an oxidising metasomatism. One composite 0.8 mm grain contains about 60 % calcite, and 20 % each of pyrite and chalcopyrite plus a couple percent rutile. There are about five other 0.1-0.3 mm grains of mostly pyrite that may be cut by small chalcopyrite veinlets, plus two 0.05-0.2 mm grains of chalcopyrite rimmed and partially replaced by cuprite.

Conclusions:

There is claystone and siltstone that may be adjacent beds in the specimen. These are composed almost totally of K-feldspar which, if metasomatic, has preserved textures remarkably. A 60:40 mosaic of quartz and K-spar replaces one quarter of the slide. Calcite, quartz and specularite occur as coarser grained replacement areas, with at least one quartz-lined cavity filled with calcite. Specularite grains often contain tiny pyrrhotite inclusions suggesting it was the precurssor mineral later replaced by more oxidizing metasomatic fluids. Minor pyrite and chalcopyrite were probably introduced with the carbonate solutions. A bit of chacopyrite is replaced by supergene cuprite.

PTS: **6S-12-92** **Chert with minor Chlorite and Tourmaline**

Specimen Description:

Light cream and grey colored cherty rock. Almost entirely quartz with minor banding of probable chlorite. The rock appears to have been fragmented by soft rock deformation yielding fragments and 1-2 x 10 mm tabular plates of chert in a more granular quartz matrix. There is 5-10 % of light pink calcite in 1-2 mm clots. One of the freshly broken surfaces of the specimen has a heavy dissemination of chalcopyrite and some cuprite(?) with minor malachite along fractures. However, the rest of the specimen has no chalcopyrite and only ≤0.5 % of scattered pyrite and of cuprite grains.

Mineralogy:

Quartz	90. %	Biotite	0.5 %	Specularite	0.1%
Calcite	5	Tourmaline	1	Chalcopyrite	0.2
Chlorite	2	Pyrite	0.3	Goethite	0.6
Rutile	0.1	Chalcocite	0.1	Cuprite	0.3
				Malachite	0.1

Quartz occurs as an interlocking mosaic of 5-35 µm grains. It becomes much coarser in and near areas of veining and remobilization.

Some 30-50 µm calcite is disseminated in the fine quartz, but most of it occurs as coarse grains together with the veins and irregular clots of quartz. Most of the latter was emplaced in open spaces up to 2 x 4 mm surrounded by inward pointing euhedral quartz crystals.

Tourmaline occurs sparsely along some bands with fine inclusions, in grains up to 40 x 100 µm but usually are <10 x 40 µm size. The largest number of grains along these zones of inclusions are chlorite in blades or tablets less than 7 x 40 µm. Small portion of these are biotite in addition to the tourmaline. Even finer grains of these three minerals occur throughout the rest of the chert as well. Grains are so much less than the thickness of the thin section, identification and estimation of amounts are difficult. One very discontinuous band 0.1 to 1 mm wide contains up to 15 % of these fine tourmaline grains (see photo). Another such band had 10-15 % chlorite. When abundant they are not intermixed.

Very irregular patches of colloform, orangish red, supergene mineral interpreted as goethite occur as occasional open space fillings in areas of coarse quartz + calcite. Usually a 10-15 µm thick layer of malachite parallels the rim at a distance of 10-20 µm in from the edge. In other locations, similar material is much redder in color and partially replaced chalcopyrite remains at the centres (see photo). This is interpreted as cuprite, however colour and the greater abundance of cracks perhaps due to shrinkage are the only differences from goethite. Minor malachite occurs in both. The original chalcopyrite grains would have been up to 0.8 mm.

Pyrite is sparse but occurs as euhedral dodecahedrons 10 µm to 0.1 mm and up to about 3 % very locally. More rare magnetite occurs in euhedral octahedra up to 0.25 mm.

Conclusions:

This is chert with discontinuous laminations along which small percentages of chlorite, tourmaline and biotite may occur. There also minor disseminations of pyrite, specularite and rutile. Chalcopyrite occurs as open space fillings in coarse vein quartz + calcite areas. It is partially or completely replaced by supergene cuprite. Supergene goethite occupies other cavities.

PTS: **GS-14-92** **Adularia-Quartz-Chlorite-Calcite Metasomatic Rock**

Specimen Description:

This very fine grained, medium pink to red coloured rock is mottled with aboout 10 % cream color calcite and 10-15 % dark green chlorite in irregular patches up to 1 cm. Staining indicates a K-mineral content of 50-70 %. There is 1-2 % chalcopyrite disseminated throughout as irregular clots up to 1.5 mm (by chance the PTS has about double this amount of chalcopyrite) and ≤1 % specularite.

Mineralogy:

Quartz	25. %	Calcite	12. %	Chalcopyrite	3. %
K-feldspar (adularia)	45	Chlorite	14	Rutile	1
Plagioclase	tr			Limonite	0.1

Adularian K-feldspar occurs throughout as irregular grains with fuzzy outlines and usually less than 0.1 mm size. Where included in more coarsely crystallized metasomatic calcite + quartz it can form laths up to 0.05 x 0.25 mm. Plagioclase is also introduced as sparse 40 µm grains. Quartz, also in irregular, ill-defined 0.03-0.2 mm grains, occurs throughout. Excluding veins and coarser areas, the adularia : quartz ratio varies from 3 : 1 to 1 : 1.

Chlorite is widespread as flakes 1-25 µm thick by 20-100 µm long. The amount varies from minor to 1-2 mm areas that have 40-50 % chlorite, the remainder being calcite. It is all very pale green, presumably high magnesium chlorite. Rarely chlorite occupies about 75 % of an 0.2 x 0.5 mm area that may have been a replaced mafic crystal in the precurssor rock. In contrast, chlorite may be completely absent from occasional 0.5 x 1.2 mm areas that may have been feldspar crystals, now entirely replaced by an adularia-quartz mixture a bit finer grained than the rest.

The original rock must have contained titanium. With the total metasomatism it is all converted to rutile occurring as 0.05-0.5 mm irregular grains with occasional euhedral terminations. Relict outlines of sphene are occasionally preserved. A few grains occur as acicular crystals up to 0.03 x 0.3 mm.

Chalcopyrite occurs in large irregular patches up to 2 mm. There are also 0.5 mm patches which originally may have contained ≤10 % chalcopyrite that are now mostly supergene limonite.

Conclusions:

This is an entirely metasomatized rock. There are one or two faint outlines of possible relict feldspars and mafic minerals such as pyroxene, plus there is relict rutile after sphene which is common in many alkaline rocks. So there is the possibility the rock was something like a trachyte but this is almost total speculation. There is certainly no evidence of a sedimentary origin.

Chalcopyrite was introduced with the later irregular patches and pseudoveins of coarser quartz and especially associated with calcite. The rock appears to be surprisingly low in iron. The chlorite appears to be high magnesium, low iron, and the oxide is titanium oxide as rutile, not an iron oxide.

PTS: **6S-15-92** **Siderite-Quartz-Adularia Rock from possible sediment**

Specimen Description:

Very fine grained, medium reddish colour, faint suggestion of layering, about 10-15 % K-mineral shown by staining, 0.5-<1 % disseminated chalcopyrite mostly as isolated grains along hairline quartz veinlets. 2-3 mm layer of microbreccia preserved along one surface of the specimen. It is hematized with isolated blade-shaped specularite crystals.

Mineralogy:

Quartz	36. %	Siderite	48. %	Chalcopyrite	1. %
K-feldspar (adularia)	11	Chlorite	0.5	Specularite	2
Plagioclase	0.5	Sericite	1	Pyrrhotite	<0.1
Tourmaline	0.2	Rutile	0.1	Limonite	0.2

Quartz and K-feldspar occur relatively uniformly throughout the slide as 0.05-0.25 mm, irregular grains with ill-defined boundaries. One band or area is slightly finer grained and could be interpreted as having clastic texture, but mostly there is no evidence of the precursor rock.

Very irregular 0.1-0.4 mm carbonate grains are mixed throughout with the quartz and K-feldspar. In spite of its abundance, I can get no carbonate reaction with HCl even with scratching, except for minor calcite along one surface of the specimen. So it is tentatively interpreted as siderite.

Sericite is widely scattered as well crystallized tablets up to 15 µm thick by 150 µm long. Less commonly chlorite has developed especially as inclusions in siderite. Much finer grained sericite increases to 15 to 50 % in the sheared and brecciated strip across the end of the specimen.
Sparse brown and occasionally bluish grey tourmaline grains occur up to 30 x 50 µm.

In addition to a lot of sericite, the strip of microbreccia across the end of the slide contains fragments of euhedral quartz, large carbonate grains that may or may not be fragments, and occasional rounded fragments of very fine grained possible sediment that metasomatized like the rest of this specimen. Most of the fine grained carbonate along this zone is heavily limonite stained but some large grains are not, possibly reflecting two carbonate types?

Specularite occurs in the breccia strip as slightly curved tablets up to 0.3 x 0.8 mm that have grown since the episode of brecciation. Elsewhere in the rock it is disseminated as 5-50 µm irregular and tabular grains. Sparse tiny pyrrhotite inclusions show that it was the iron mineral prior to the massive metasomatism. The specularite amount varies from <1 to at least 8 %. Occasionally it is up to 50 % with a few percent rutile along a short segment of a 50-75 µm wide rehealed veinlet.

Chalcopyrite occurs as scattered irregular grains 0.02-0.4 mm with some limonitic alteration. A couple 5 µm pyrite inclusions were contained in one chalcopyrite grain.

Conclusions:

This totally metasomatised rock differs from the others in that carbonate, probably siderite, is the major alteration product with lesser quartz and adularia. Small amounts of sericite and tourmaline are also different. Abundant disseminated specularite appears to be derived from precursor pyrrhotite. Minor rutile within a rehealed specularite vein is the only titanium evident. Magnesium is either very minor or tied up in the carbonate. Chalcopyrite and specularite appear to be part of the major metasomatism. There is only slight evidence of origin as a fine clastic sediment in which pyrrhotite was an early constituent. There is no evidence of origin as a carbonate rock although anything is possible.

PTS: **GS-18-92 Siderite-Quartz-Adularia Rock after probable Siltstone**

Specimen Description:

Very fine grained, light buff coloured, hard, massive rock with faint 5-8 mm, possibly sedimentary, banding visible on the sawed surface. Chalcopyrite in irregular grains up to 1 mm vary from <1 to 2 % and usually associated with coarser, lighter coloured areas of carbonate, apparently dolomite. Abundant carbonate in the rest of the rock, as seen in thin section, does not react with HCl and is presumed to be siderite. There is 15-25 % K-feldspar throughout.

Mineralogy:

Quartz	38. %	Siderite	38. %	Rutile	0.5%
K-feldspar (adularia)	16	Dolomite	2	Chalcopyrite	0.7
Plagioclase	0.5	Sericite	1.	Pyrite	1.5
Biotite	tr	Chlorite	1	Goethite	0.1
Tourmaline	0.6	Zircon	tr		

This section is very similar to GS-15-92. The rock is almost entirely a fine mosaic of carbonate, quartz and K-feldspar with a only a few coarser, more vein-like segregations. This slide does have some systematic grain size variation from coarser to finer, suggestive of relict bedding. For example, the range of quartz grain sizes is usually 35-150 µm but reduces to 15-80 µm in the finer areas, however there is no suggestion of any clastic grain texture preserved. Minor plagioclase also occurs.

The minor occurrence of sericite is also very similar as well-formed tablets up to 10 x 90 µm. Chlorite occurs as tiny 5 µm thick plates and even finer radiating plates or blades, almost always entirely included within siderite grains. There are very rare ragged biotite grains.

Brown to blue-grey tourmaline occurs throughout in stubby subhedral crystals up to 0.2 mm long.

Pyrite occurs as irregular and tabular grains from 1-50 µm and as occasional 1-3 µm wide hair-line veinlets. There are occasional inclusions and associated grains of rutile up to 25 µm. Surprisingly, this rock has no specularite, so the reddish colour of the specimen is due to siderite. Rutile grains are concentrated up to about 5 % of the rock along a band about 0.2 mm wide. Some grains are sponge-like and others just a frail lattice or lamellae. These are interpreted as relicts after sphene and titaniferous magnetite, respectively, and this is interpreted as a relict bed of heavy minerals.

Chalcopyrite occurs as two very irregular shaped 1.5 mm grains plus a few much smaller one. It commonly has a 2 µm rim of goethite and rare veinlets of similar size. Chalcopyrite always occurs within the irregular patches of coarse dolomite that are interpreted as dolomite based on the acid reaction. By contrast, the pyrite is disseminated throughout and obviously accompanied the major stage of metasomatism while chalcopyrite and dolomite are a bit later.

Conclusions:

This is a totally metasomatized rock, but in this case some moderately good evidence, based on grain size variation and a relict bed of heavy minerals, of clastic sedimentary origin. It is very similar to GS-15-92 with slightly more tourmaline and more clearly visible fine chlorite representing the minor magnesium associated with the carbonate mineral sites. A significant difference is the iron in GS-15 was oxidized to specularite. In GS-18 it is all pyrite, even though relict clastic grains of presumed magnetite and sphene are oxidized to rutile. Adularia shows that the metasomatising solution was high pH but the ratio of oxygen to sulphur fugacities was slightly lower in GS-18 than in GS-15 and most other rocks in this suite of samples.

PTS: **0S-19-92 Chloritized Silty Claystone and an associated Microbreccia**

Specimen Description:

Very fine, medium reddish grey, hard rock with faint lamination of probable sedimentary origin. A few irregular clots of pink dolomite and apparently calcite along late fractures. There is 1-2 % of irregular patches of finer chalcopyrite grains which are partially altered to cuprite(?) near one edge of the specimen. A breccia of 2-3 mm rounded fragments that are dark grey, pink, white plus one 8 mm laminated chert fragment occurs along two surfaces on opposite sides of the specimen. About 8 mm of breccia crosses one end of the slide. There is no potassium mineral stain.

Mineralogy:

Quartz	36. %	Chlorite	50. %	Chalcopyrite	1.5%
Sericite	4	Dolomite & siderite	2	Chalcocite	0.2
Pyrite	2	Limonite	0.3	Cuprite	2
Tourmaline	0.1	Rutile(?)	1	Malachite	0.8

Clastic quartz grains of silt size range from 30 µm down to <4 µm and all the matrix was undoubtedly in the clay size prior to replacement. Sparse 30 µm tourmaline grains may also be clastic? Coarse, often euhedral quartz grains occur in 0.3-1.5 mm rounded clots with or without accompanying coarse dolomite and occasionally chalcopyrite. There are also 0.2 mm veins and discontinuous vein-like occurrences of quartz and a <0.1 mm late calcite veinlet.

Sericite is disseminated throughout in fine grains up to 8 x 50 µm and continuing down into the illite size range. In the breccia portion at one end of the slide, variable amounts of sericite occur in the fragments, usually about 15 % and locally up to >50 %.

Very fine chlorite in the matrix is the major rock constituent.

Pyrite occurs in irregular to rounded grains <5-40 µm in size locallized as disseminations up to 8 percent along ill-defined bands up to 0.8 mm wide abd also throughout the slide. It occasionally has tiny chalcocite rims. Along these same zones are even more abundant semiopaque grains with fuzzy outlines and up to 50 µm in size that might be rutile but reflectivity appears to be too low. Pyrite also occurs along some late shear/veins from 20 µm to 0.25 mm wide that include some brecciated rock grains and variable amounts from mostly pyrite to mostly limonite.

The breccia includes subhedral crystal fragments of quartz and siderite up to 0.5 x 1 mm and various very fine grained clastic sedimentary fragments including one 6 mm rounded fragment of about 95 % very fine serpentine-type chlorite containing scattered quartz clasts.

Conclusions:

This rock is a silty claystone where silt-size quartz grains are embedded in chlorite as the major rock constituent. Some faintly bedded concentrations of heavy minerals now contain pyrite with sparse chalcocite rims, and a dark reddish semi-opaque resembling cassiterite, but it is probably rutile. Quartz and lesser dolomite form irregular replacement clots as does chalcopyrite with or without associated dolomite. Part of the chalcopyrite is altered to supergene, colloform cuprite with associated malachite. Chalcopyrite and cuprite also occur in adjacent microbreccia with clasts of subhedral quartz and siderite, and various sediments some with about 95 % chlorite. There seems to be an earlier replacement pyrite and some very late pyrite in weak shear-hosted veinlets.

(no page 22)

PTS: **JA-35-92 A & B** **Breccia of Siltstone, Trachyte & Sulphide Fragments**

Specimen Description:

Dark reddish grey fine, heterolithic breccia with very irregular 0.5-2 cm pods or intrusions of other very fine grained, light green rock. This corresponds with section B. Section A is cut parallel and 7 cm away in this large specimen. It is predominantly the dark red breccia with minor whisps of the light green material. A 2 mm thick chalcopyrite vein with minor pyrite that occurs along one surface of the specimen is not included in either thin section. A number of 0.5-2 mm fragments appear to be totally K-feldspar with 20-35 % in the rest of the rock, except the light green material that appears to be 40-50 % replaced. Very fine specularite is visible.

Mineralogy:

Quartz	57. %	Chlorite	3. %	Chalcopyrite	0.4%
K-Feldspar (adularia)	35	Sericite	tr	Pyrite	0.2
Plagioclase	1	Rutile & relict sphene	≤0.1	Chalcocite	0.1
Nepheline(?)	0.1	Specularite	2.5	Cuprite	0.1
Tourmaline	0.3			Malachite	≤0.1

Section A:

The heterolithic fragments include siltstone with well preserved quartz clasts 5-30 µm including sparse tourmaline clasts; many similar fragments where the texture is partly masked by alteration; and very fine chloritic claystones rendered dark grey by about 2 % specularite inclusions. There are also round fragments of trachyte porphyry with very fine K-feldspar + chlorite matrix and euhedral tabular K-feldspar phenocrysts up to 0.3 x 1.5 mm. Similar fragments are common that have few or no phenocrysts and are just a very fine grained mass of K-feldspar. There single crystal fragments of K-feldspar 0.25 x 0.4 mm and much smaller crystals of microcline and plagioclase. There are 0.2-0.4 mm euhedral pyroxene pseudomorphs that are now all chlorite with minor included specularite. One 3 mm rounded fragment is mostly very fine K-feldspar, some chlorite, a few percent each of relict sphene and of 0.3 mm phenocrysts tentatively identified as nepheline.

The fragments also include round sulphide fragments 0.2-0.5 mm in size, bearing 50-60 % chalcopyrite, 10-20 % each pyrite and chalcocite, about 10 % cuprite and 5 % malachite. Chalcocite is a partial replacement of pyrite inclusions in the chalcopyrite. Others are mostly chalcopyrite and pyrite with minor rutile inclusions.

The breccia is really clast-supported with most of what appears to be matrix is mostly just finer mineral fragments of quartz and feldspars. What is metasomatically introduced or at least recrystallized is locally up to 25 % specularite as irregular grains and euhedral laths up to 0.1 x 0.7 mm. There is also minor tourmaline that appears to have been introduced with the specularite. Chlorite is uncommon except at one location where it occupies an 0.3 x 1.3 mm area and some smaller patches that are probably fragment remnants rather than metasomatic matrix. However minor amounts are also intergrown with specularite. One 1 mm area contains about 75 % specularite and is fragment-like. It may have been an iron-rich original composition such as pyrrhotite that has recrystallized to specularite.

Section B:

The large light green areas in specimen are siltstone with some graded bedding. The clasts are mostly quartz and major K-feldspar with minor plagioclase and microcline, <1 % specularite, 0.5 % tourmaline and about 0.1 % sericite.

There are some other differences from Section A. Occasional fragments are similar clastic sediments but with about 3 % of specularite all disseminated as <1 µm size particles thus rendering the whole fragment opaque to transmitted light. One unusual 1 x 2.4 mm fragment is almost all dark green chlorite (in contrast to the light green metasomatic chlorite in many of the sections) that is charged with about 10 % of <10 µm semiopaque fuzzy balls that may be some form of relict sphene or carbonaceous material? There is no textural variation to suggest sedimentary or volcanic origin. A couple much smaller, similar fragments are brown reflecting somewhat different oxidation. While the coarse crystal fragments of K-feldspar also occur in this section, they and coarse quartz are much less common.

There are also chalcopyrite-pyrite clots with chalcocite and cuprite alteration, the same as Section A, but these are less abundant. Also there are a few of the 0.15 x 0.5 mm densely packed areas of specularite grains that are interpreted to have been original pyrrhotite(?) fragments. While the portions that are light green in specimen have less disseminated specularite, perhaps ≤1 %, there is no apparent reason for the colour difference.

Conclusions:

This is a breccia with occasional siltstone fragments up to 2-3 cm, however most fragments are a few millimetres or less. Although some are highly angular, most fragments are well rounded due to some sort of milling or diatreme action.

Volcanic fragments comprise only 20-30 % of the total. They show complete variation in texture from well developed phenocrysts of K-feldspar and chlorite relicts after smaller pyroxene phenocrysts, to small irregular phenocrysts to none at all, in these rocks composed of almost pure K-feldspar. Although less abundant, there is considerable variation among the chlorite-rich, presumably mafic volcanic fragments.

These are essentially clast-supported breccias with much less metasomatism than shown by most rocks in this sample suite. However, much of the coarse specularite is concentrated between the fragments reflecting solution movement and either iron introduction or oxidation of some pre-existing iron. There are only rare small clumps of specularite crystals that look like they may have replaced a precurssor iron mineral such as pyrrhotite.

There are a number of round 0.2-0.5 mm fragments of opaques. While amounts vary they typically contain 50-60 % chalcopyrite, 15-20 % pyrite and about 10 % each secondary chalcocite and cuprite, and 5 % malachite. Again, if this is a diatreme as may be suggested by the round fragment shapes, these sulphide fragments may have been transported quite away from their original site of deposition.

PTS: **B8989** **Brecciated, K-metasomatized Argillaceous Siltstone & Trachyte**

Specimen Description:

Drill chips up to 6 mm size mounted in epoxy. There is one red, hematitic chip, about three quartz crystal chips and the rest are fine grained rock with variable K-staining from 20-100 %.

Mineralogy:

Quartz	37. %	Carbonate	15. %	Specularite	2. %
K-Feldspar (adularia)	45	Tourmaline	≤0.5	Pyrite	0.4
Plagioclase	0.1	Montmorillonite(?)	0.1	Chalcopyrite	0.1
				Chalcocite	0.1

Among the crystal chips are various pieces of quartz, sparse K-feldspar and one complete subhedral 0.12 x 0.2 mm crystal of pyroxene. Chips of coarse carbonate crystals are common and one has fine grained laminated carbonate in contact with quartz crystals.

Chips of very fine grained K-feldspar are common. They may contain a few percent disseminated carbonate and up to 4 % disseminated specularite. Feldspar phenocrysts are small and rare. These are interpreted as trachytic volcanic chips, but they could be some other fine grained rock completely metasomatized by K-feldspar. This rock is a breccia as occasionally these trachyte fragments occur in compound chips together with matrix enriched in specularite and quartz, as in JA 34-92 and other breccias.

Chips composed of about equal amounts of quartz and K-feldspar with a few percent carbonate are relatively commone and interpreted as altered sediments. There really is a great variety of chips, but the largest and probably the most common have K-feldspar and quartz in about 2:1 ratio, 15-30 % carbonate, ≤1 % tourmaline, sparse plagioclase and microcline plus 3-6 % specularite that is both well crystllized in plates or blades and as fine dust rendering parts of a chip almost opaque to transmitted light. These are interpreted as altered clastic sediment chips. There is only occasional appearance of a rich brown mineral with radiating fibrous habit, nonpleochroic - it is called montmorillonite(?) for lack of a better name. It forms as an open space filling. One expects some sericite and chlorite in such a rock, but none is readily visible.

Sulphide occurs as chips also in sizes up to an 0.6 mm rounded cube of pyrite with chalcopyrite along one edge. Smaller pyrite euhedral grains included in breccia fragments are veined and replaced by chalcocite. Less commonly, chalcopyrite predominates over pyrite in a fragment. Specularite grains disseminated throughout the chips are generally less than 10 x 50 µm size but rarely attain 0.15 x 0.4 mm size.

Conclusions:

Some chips are compound indicating the original rock was a breccia similar to many others in this suite of specimens. The majority of chips are interpreted as derived from clastic sediments with extensive K-feldspar metasomatism and lesser carbonate, surprisingly with no chlorite or sericite. Almost as abundant are very fine grained chips of almost pure K-feldspar which rarely are weakly porphyritic and are interpreted as trachyte. Other principal chips are quartz and carbonate crystals and a small amount of sulphide both as separate chips and included in larger rock chips. These show pyrite being replaced by supergene chalcocite. They are unaffected by recrstallization and/or metasomatism of all other iron to specularite.

PTS: **B8995** **Chloritized Trachyte Mineralized with Chalcopyrite, etc.**

Specimen Description:

Drill chips up to 6 mm size mounted in epoxy. The chips are fairly uniform, fine grained rock with 30-50 % K-staining. There are a few quartz crystal chips and a few small sulphide chips.

Mineralogy:

Quartz	5. %	Chalcopyrite	3. %	Specularite	0.5%
K-Feldspar (adularia)	44	Rutile/leucoxene	2	Chalcocite	0.4
Chlorite (antigorite?)	39	Pyrrhotite	tr	Cuprite	0.2
Carbonate	6	Pyrite	0.1	Arsenopyrite(?)	≤0.1

The chips are mostly trachyte with the very distinctive fine lath-shaped K-feldspars predominant. However they also contain 30-60 % intergranular chlorite that clearly has altered from an original ferromagnesian mineral, presumably titaniferous pyroxene. This chlorite is pale green, very low birefringence, and is probably a serpentine variety of chlorite such antigorite. The rock must also contain some seggregated patches of this chlorite, as it also forms monomineralic chips up to 1 mm. In addition these trachyte chips contain 1-5 % irregular masses of rutile/leucoxene material derived from sphene and usually a few percent but rarely up to 50 % of disseminate euhedral carbonate rhombs that are interpreted as siderite as they are all altering to limonite around the edges.

One chip is a composite of siltstone in sharp contact with a very fine claystone and one bit of coarse quartz crystal. The chip is considerably metasomatised by both very fine carbonate and by chlorite. A few other chips are similar to the finer grained part of the above chip. Another unusual rounded, 1.8 mm chip consists of a quartz mosaic, not the coarse single crystal type of quartz, as found elsewhere in the slide. It is extensively embayed by chlorite around the edges. In addition to the few quartz crystal chips, coarse crystalline carbonate chips are relatively common. Occasionally they contain quartz and specularite inclusions.

Chalcopyrite occurs in chips and the largest 2 mm grain is enclosed in coarse carbonate within a 2.5 mm vein in trachyte. Chalcopyrite also occurs right in the altered trachyte chips and occasionally is altered to chalcocite and lesser colloform cuprite. Sparse subhedral 10-80 µm pyrite inclusions occur in chalcopyrite and are occasionally replaced by chalcocite. The rutile and related alteration products of sphene show up as irregular 20 µm grains throughout the trachyte chips. One rounded 0.1 mm chip looks like an arsenide mineral such as arsenopyrit, but I can't make a definitive identification. Specularite as clusters of bladed grains form chips up to 1 mm and rarely retain a 5 µm inclusion of unreplaced pyrrhotite.

Conclusions:

The few chips of altered silty claystone probably represent down-the-hole contamination. The main rock type is nonporphyritic trachyte. The characteristic K-feldspar laths are relatively fresh but there is 30-60 % chlorite presumably derived from alteration of pyroxene. It is pale green and appears to be a serpentine chlorite variety such as antigorite. An original sphene content of 1-5 % is altered to rutile and other products. Replacement siderite rhombs are usually 1-2 % but locally are up to 50 %. Coarse carbonate, probably dolomite, and some quartz occur in the rock as veins or irregular clots. Mineralization consists mainly of chalcopyrite that may be entirely enclosed in the coarse carbonate or as replacements in the trachyte. It contains sparse pyrite inclusions that are partly replaced by chalcocite. There is also specularitization of apparently precussor pyrrhotite. Parts of the chalcopyrite are replaced by supergene chalcocite, cuprite and there are traces of limonite and malachite.

PTS: **B9166** **Vein Quartz & Highly Chloritized Possible Trachyte with Chalcopyrite**

Specimen Description:

Drill chips up to 4 mm size mounted in epoxy. White quartz comprises at least 50 % of the chips. On the remainder K-staining affects 0-100 % of various chips, averaging 10-15 %. There is one 2-3 mm pyrite chip (not shown in the PTS) and 2-3 % fine sulphide chips, mostly chalcopyrite.

Mineralogy:

Quartz	50. %	Chalcopyrite	3. %	Specularite	0.5%
K-Feldspar (adularia)	15	Rutile/leucoxene	2	Chalcocite	0.2
Chlorite (antigorite?)	25	Pyrrhotite	tr	Cuprite	0.4
Carbonate	0.5	Pyrite	0.1	Goethite	0.2
Illite/sericite	2	Biotite	0.1		

Most quartz chips are of coarse, unstrained crystal, but several chips up to 4 mm have multiple grains of quartz that may be highly strained, perhaps showing two stages of quartz introduction. Occasionally these chips contain major amounts of vein-like chlorite. Quartz also occurs as rounded 20-50 µm grains that appear to be a siltstone with 40 % chlorite matrix. Other chips contain angular quartz grains up to 0.2 mm and some K-feldspar that may represent a microbreccia now set in a matrix of about 50 % chlorite plus minor vein chlorite, so the original rock texture is a bit masked. The latter chips contain 2-5 % very fine sericite or illite.

Other chips are almost entirely fine K-feldspar with 10-25% chlorite, a trace of biotite and 2-3 % of relict rutile, etc. after sphene. In some cases faint relict texture indicates altered and reconstituted trachyte, but others are just an irregular mosaic of K-feldspar with fringing quartz of undetermined origin.

Rounded and angular chips of the pale green, probably serpentine-type chlorite are common, or it may be attached to K-spar rich chips. These are unlike veins but may be cavity fillings or massive replacements. Occasionally there is minor replacement of chlorite by biotite. Occasionally such chips are more than half replaced by very fine sericite or illite.

Chalcopyrite occurs as chips mostly <0.5 mm. It is usually monomineralic occasionally is laced with ≥30 µm veinlets of colloform cuprite. There are occasional irregular patches up to 0.4 mm consisting of about 30 % cuprite, 45-70 % goethite, 0-20 % chalcocite and ≤5 % malachite with or without remnant cores of chalcopyrite. There are a few pyrite chips up to 0.3 mm that may be pure or are under major replacement by chalcocite.

Conclusions:

One chip had probably relict siltstone texture and others possible microbreccia of quartz and K-feldspar. Most of the chips are highly K-feldspar metasomatized rock with major chlorite alteration, some associated vein or replacement quartz and minor sericite. A serpentinous type of chlorite of vein or replacement origin is the major constituent of many chips. It is estimated that the rock drilled may have been mostly trachyte that is highly metsomatised with chlorite, K-feldspar and vein-type quartz. Most mineralization is chalcopyrite, a small part of which is replaced by supergene cuprite, chalcocite and some limonite + malachite. Rutile and related breakdown products of presumed sphene in trachyte is also common. Pyrite is much less common and is partially replaced by supergene chalcocite.

PTS: **B9202** **Altered Siltstone & Claystone with Chalcopyrite Mineralization**

Specimen Description:

Drill chips up to 4 mm size mounted in epoxy. There are about 20-25 % each of sulphide chips and of white quartz chips. Most other chips are very fine grained ranging in colour from light grey to dark red, and K-stain varying from none on many chips, through 10-15 % on several, and completely K-stained on about 10 % of the chips. The PTS contains about 15 % sulphide, almost all chalcopyrite as discrete chips and occasionally occurring as a vein cutting a rock chip.

Mineralogy:

Quartz	35. %	Chalcopyrite	15. %	Specularite	1. %
K-Feldspar (adularia)	25	Pyrite	tr	Chalcocite & digenite	1
Chlorite	5	Pyrrhotite	tr	Covellite	0.3
Carbonate (siderite?)	15	Montmorillonite(?)	0.5	Cuprite	0.1
Illite/sericite	2				

The majority of chips are siltstone with closely packed 25-80 µm clastic quartz grains with 20-25 % metasomatic K-feldspar occurring as a matrix. There is minor bedding and occasional complete chips of finer silty claystone. This has less quartz, 50-75 % K-feldspar, about 5 % each of illite/sericite and chlorite, and 2-3 % of specularite. Others have ≥15 % each of illite and sericite. There is a spectrum of sedimentary chips to a few that are totally opaque due probably to finely divided carbon. One of the more highly altered siltstone chips has a 0.25 mm vein along one edge of unusual yellowish or golden brown fibrous mineral interpreted as a ferruginous clay such as montmorillonite.

A few fragments are fine grained K-feldspar with 5-15 % each of chlorite and specularite arranged in crude curved bands. This is prob-ably a variety of trachyte without the characteristic K feldspar laths which has flow banding - perhaps originally it was a glassy rock?

Coarse crystalline quartz and carbonate chips are common and occasionally occur with sulphide in the same chip. Some carbonate chips have peripheral limonite alteration suggesting siderite.

As noted above, chalcopyrite chips are abundant and mostly free of inclusions or veining. Some are cut by composite supergene veinlets up to 50 µm wide of chalcocite + digenite with selvages of covellite. Rarely these supergene sulphides occur as patches up to 0.25 mm in chalcopyrite. Also separate small chips of both chalcocite and of cuprite are observed occasionally. Specularite occurs in some chips but not all, and is much less abundant than other rocks. A trace of pyrrhotite persists as cores in some grains.

Conclusions:

The rock chips are mostly siltstone and finer sediments that are occasionally clouded by carbon. Crystal fragments of quartz and carbonate, probably siderite, are also abundant. There are sparse chips interpreted as altered trachyte. They are without the characteristic K-feldspar lath-shaped crystals and have curved banding possibly indicating a glassy flow rock.

Chalcopyrite chips are abundant indicating a lot of mineralization in the drilled rock. There are only traces of pyrite and pyrrhotite, the latter having been mostly replaced by specularite at the metasomatic stage. Potassium metasomatism is variable with adularia and some illite/sericite in amounts varying greatly from chip to chip, plus chlorite alteration. There is some supergene alteration of chalcopyrite to composite colloform veinlets of chalcocite, digenite, covellite and minor cuprite

PTS: **B9203** **Silty Claystone & Carbonate Rock plus Vein Siderite, Quartz & Chalcopyrite**

Specimen Description:

Drill chips up to 4 mm size mounted in epoxy. Very fine grained, light to dark grey, bedded sedimentary rock chips predominate. Most have little or no K-staining but a half dozen are 60-80 % stained. There is about 10 % of white quartz chips and another 15 % of red quartz. There is ≤1 % sulphide chips.

Mineralogy:

Quartz	40. %	Chalcopyrite	1. %	Malachite	0.1%
K-Feldspar (adularia)	6	Pyrite	0.1	Chalcocite	0.1
Chlorite	12	Rutile	0.3	Goethite	<0.1
Carbonate (siderite?)	40	Cuprite	<<0.1	Limonite	0.2

There must be some down-hole mixing, as this sample is quite heterogeneous. The chips are approximately 45 % altered silty claystone, 5 % altered trachyte, 10 % quartz crystal, 15 % carbonate crystal, and 25 % finer grained carbonate rock. The latter chips are composed mostly of irregular 0.02-0.1 mm grains of carbonate with or without up to 10 % quartz and occasionally a little dark dusting of possible carbon. These chips appear to represent crystalline limestone or dolostone, and are the first evidence of any carbonate rocks in the suite.

The fine grained clastic sediment chips are similar to those in many previous samples with variable amounts of silt-sized quartz grains in finer matrix and occasionally darkened with minor presumed carbon. The fine matrix is not well resolved. It appears to contain major chlorite with or without carbonate that almost forms a gradation to the carbonate rock in a few chips.

The crystal chips are interpreted as broken vein or segregation type quartz and carbonate. A few of the carbonate grains have prominent limonite alteration which is usually diagnostic of siderite.

The interpreted trachyte chips are mostly fine grained K-feldspar with some chlorite alteration and bits of rutile/leucoxene after presumed sphene.

Most chalcopyrite chips are small but one is 1 x 3 mm. Many are relatively pure chalcopyrite, while others have irregular 50 µm veinlets of goethite and limonite usually with a selvages and inclusions of malachite. This supergene alteration is bright orange colour as opposed to the red of cuprite which occurs in minor amount elsewhere in the section. It may comprise entire chips as shown in the photo where the limonite is about 20 % goethite and 80 % limonite. Sparse chalcopyrite chips have 25 µm partial rims of chalcocite which in turn has a narrow limonite rim. There are sparse specks of pyrite disseminated in some sediment chips, one rounded 50 µm chip of pyrite, and a 60 µm subhedral grain with a chalcocite rim. In one chip, tiny pyrite grains are included in a highly limonitized siderite grain.

Conclusions:

Altered silty claystone chips are the most common, but for the first time, there are also chips interpreted as carbonate rock. Altered trachyte comprises only about 5 % of the chips. Quartz and siderite crystal chips are also common plus about 1 % of chalcopyrite chips. These plus minor pyrite have undergone limited chalcocite alteration and a trace of cuprite plus more common goethite, limonite and malachite alteration.

PTS: **B9206** **Metasomatized and Mineralized Siltstone & Claystone**

Specimen Description:

Drill chips up to 4 mm size mounted in epoxy. A few of the very fine grained chips are light grey, however most have 25-75 % K-staining. There is about 1 % sulphide chips.

Mineralogy:

Quartz	45. %	Sericite	1. %	Cuprite	1.5%
K-Feldspar (adularia)	30	Biotite	0.3	Covellite	0.1
Plagioclase (albite?)	<1	Chalcopyrite	1.5	Malachite	0.5
Chlorite	15	Pyrite	0.1	Goethite	0.1
Carbonate (siderite?)	2	Chalcocite	0.5	Limonite	0.1

Almost all chips are siltstone or finer claystone with and without variable amounts of silt-sized quartz grains. The finest grained portions are variably replaced by K-feldspar, lesser chlorite, and occasionally patches of limonitized carbonate, probably siderite. Some chips have minor metasomatic plagioclase, probably albite, in addition to K-feldspar and silicification. Some chips are 50 % K-feldspar, while others are 60-75 % chlorite with only the larger quartz clasts remaining. In some the chlorite is partly replaced by biotite that is partly of clay grain size so it may be montmorillonite(?) Chlorite may also form rare radiating bundles, also partially biotitized.

There is ≥1 % quartz crystal chips and ≤1 % carbonate crystal chips. There is also ≤5 % of very small trachyte chips.

Chalcopyrite chips are usually fresh, but some show major replacement by chalcocite and by cuprite and radiating malachite crystals at a distance, suggesting that the latter two supergene alterations supercede the earlier chalcocite replacement. Probably digenite is also associated with the chalcocite as well as very narrow fringes of covellite. As in B9203, sparse subhedral pyrite grains up to 0.1 mm are partially replaced by chalcocite. Large cuprite areas have a 2 µm goethite rim with diffuse limonite in the surrounding rock.

Conclusions:

Aside from a few percent of very small trachyte chips that may represent down-hole contamination altered siltstone and silty claystone chips predominate. Some show major adularia replacement, while others are highly chloritized. There is even some silicification and minor albitization. Minor quartz and carbonate crystal chips may also be contamination or reflect minor veins.

Chalcopyrite and its supergene products chalcocite, cuprite and malachite are much more common than in other samples.

PTS: **B9213** **Metasomatized Siltstone with Vein Quartz, Carbonate & Chalcopyrite**

Specimen Description:

Drill chips up to 3 mm size mounted in epoxy. Most of these rather small grey chips are uniform and fine grained with 10-35 % K-staining. There is ≤10 % light grey, nonstained chips and ≥10 % of dark red, ferruginous chips. There is about 7 % sulphide chips.

Mineralogy:

Quartz	50. %	Sericite	1.5 %	Cuprite	1.5%
K-Feldspar (adularia)	31	Montmorillonite(?)	0.7	Specularite	2.5
Carbonate (siderite?)	2	Chalcopyrite	7	Malachite	0.8
Chlorite	1	Pyrite	0.5	Chalcocite	1.5

Most of the chips are a mosaic of 50-100 µm quartz grains with 20-40 % of metasomatic K-feldspar in between. The quartz grains have grown and reshaped due to silicification so the original presumed clastic texture is lost. A small proportion of these chips still preserve a fine subsilt size of particles. These finer grained chips may have about 5 % sericite and may be almost opaque due to a dusting of possible carbon. They also have a highly variable specularite content from 1 to 7 %. While chlorite is absent in almost all chips, there is one large and a couple tiny altered sediment chips with about 15 % quartz clasts in a foliated matrix of very fine chlorite and about 50 % of brown, possibly montmorillonite.

Coarse quartz crystal chips comprise about 10 % of the slide and carbonate ≤2 %. There is a rare tourmaline crystal up to 0.1 mm long embedded in the altered sediment clasts.

Chalcopyrite occupies chips up to 2 mm and may contain very few rounded pyrite cubes ≤50 µm. The latter are often partially or completely replaced by chalcocite. Chalcocite also forms composite veinlets with cuprite that criss cross chalcopyrite and may have a malchite core. Some chalcopyrite chips are extensively replaced by these three supergene minerals. While most of the sulphides occur as free chips, rarely they occur with coarse quartz as a partial vein in a rock chip.

Conclusions:

Most of the rock chips appear to have been siltstone and related sediments that are variably metasomatized with K-feldspar, silicified and show minor amounts of sericitization and chloritization. Iron in these chips is all recrstallized to specularite in amounts varying from 1 to 7 %.

There are quartz and carbonate chips that occurred in veins along with the chalcopyrite and minor pyrite. Chalcocite has replaced part of the pyrite and chalcopyrite and also occurs in composite veins with cuprite and minor malachite cutting chalcopyrite and forming large irregular replacements. Malachite more often forms a separate patch at the edge of a chip.

PTS: **B9214 Diorite, Chloritized and Carbonatized with Vein-type Chalcopyrite**

Specimen Description:

Drill chips up to 3 mm size mounted in epoxy. Most of these rather small chips are grey or bluish grey, uniform and fine grained with a few percent K-staining in only one chip. There is 5-7 % each of quartz crystal chips and sulphide chips.

Mineralogy:

Quartz	5. %	Sericite/illite	1. %	Specularite	1. %
Plagioclase (An 4 or 36)	45	Chlorite	25	Rutile	1.5
K-Feldspar (adularia)	1	Chalcopyrite	6	Cuprite	0.3
Carbonate (siderite?)	13	Pyrite	0.6	Chalcocite	0.2
				Malachite	<0.1

Most chips contain coarse plagioclase in 0.3-0.8 mm laths of presumed andesine composition. Also these chips contain 20-40 % pale green chlorite, or carbonate - usually not both, but some chips have both. There may also be a few percent of irregular oxides which are probably sphene or rutile and other breakdown products. There appears to be no primary quartz in these chips. While polysynthetic twinning predominates in the feldspar, one chip had a lot of Carlsbad twinning, so this may be a stray chip with some orthoclase.

Also relatively common are rounded chips up to 2.5 mm of mostly pale green chlorite, often with penninite extinction. Some of thes contain 5-15 % of fine sericite or illite and also some relict sphene. These chips are interpreted to derive from large mafic crystals, possibly phenocrysts, of something like titaniferous pyroxene.

Quartz does occur in the sample, often as intergrowths with some of the large chlorite patches, or as separate irregular grains. Carbonate crystal fragments are common. One unusual rock chip has quartz and chlorite distributed in a pattern suggestive of trachyte in which the K-feldspar has all been replaced by quartz. This may reflect some rock type higher in the hole.

Pyrite occurs as a few chips up to 0.5 mm with only some chalcocite alteration. Occasional rounded masses of chalcocite up to 0.25 mm are interpreted as totally replaced pyrite sites. Chalcopyrite chips are usually <0.6 mm but occasionally up to 1 x 4 mm. They are generally fresh but may show up to several percent supergene veinlets of cuprite with minor chalcocite and malachite.

Specularite forms grains up 0.3 mm which are irregular, as are the smaller grains, atypical of specularite in this suite of rocks. It is possible that some of these specularite patches are derived by the breakdown of original magnetite. By contrast, rutile often shows well-formed prisms up to 0.1 mm long. It also occurs as very irregular, sponge-like masses up to 0.3 mm accross in areas of chlorite, where it represents the residual breakdown product of titanium in the precurssor mineral, whether as Ti in pyroxene or sphene?

Conclusions:

This is a plutonic rock of diorite composition probably without primary quartz or feldspathoids. All mafic minerals are altered to chlorite and/or carbonate with minor sericite/illite. Possible magnetite is now all specularite and titanium in pyroxene or sphene is now all rutile. Crystal chips of quartz and carbonate indicate vein mineralization with 6-7 % chalcopyrite and minor pyrite. There is limited supergene alteration to cuprite and chalcocite.

PTS: **B9244 Highly Silicified & Chloritized Possible Andesite with Chalcopyrite**

Specimen Description:

Drill chips up to 3 mm size mounted in epoxy. Most of these rather small chips are grey or bluish grey, uniform and fine grained with no K-staining. There are about 3 % sulphide chips.

Mineralogy:

Quartz	40. %	Carbonate (siderite?)	2. %	Specularite	2. %
Plagioclase (An 5 or 34)	15	Chalcopyrite	3	Rutile	0.1
Chlorite	30	Cuprite	0.2	Chalcocite	tr
		Magnetite(?)	tr	Covellite	<0.1

Many chips are mosaics of 40-100 µm quartz grains, sometimes with a few percent matrix carbonate, and termed quartzite as a descriptive name. Some chips also contain plagioclase as irregular, indistinct grains which may comprise up to 60 % as a sort of matrix for the quartz grains, or more commonly as an irregular 0.3 mm patch of plagioclase grains enclosed in a quartzite chip. The plagioclase is somewhat clouded but not otherwise altered. The distribution and clouded nature are suggestive of an original rock composed essentially of fine grained plagioclase, but some of the occurrences with metasomatic quartz appear to be introduced.

Pale green chlorite, often in radiating bundles, occurs through all chips and associated with all the other minerals. It is clearly metasomatic but is probably at least partly a replacement of some precurssor mafic minerals. Limited carbonate may occur in chlorite areas or as polycrystalline aggregates up to 1 mm with some limonite alteration suggestive of siderite.

Mostly chalcopyrite occurs as discrete chips, but it is also intergrown with the metasomatized rock chips. Some rock chips contain up to 15 % of irregular to rounded 10-100 µm grains of specularite. These also occur as inclusions in some chalcopyrite areas as does quartz and occasional radiating bundles of chlorite. This indicates that the oxidizing metasomatic process was earlier than the introduction of chalcopyrite. A trace of possible magnetite remains as inclusions in a couple grains of specularite. Supergene alteration is usually minor but may be up to 50 % of a chip and consists of cuprite with or without a fringe of covellite but little or no chalcocite or malachite.

Conclusions:

Although there is no K-metasomatism, the rocks have suffered strong silicification, chloritization, and minor carbonatization plus the introduction of a few percent chalcopyrite. The distribution of plagioclase in the chips is partly consistent with a metasomatic origin, but a tendency to occur as clusters of grains is interpreted as remnants of some precurssor rock of possibly andesitic composition.

Because chalcopyrite usually occurs in monomineralic chips, it must occur in the rock as relatively coarse, vein-like masses. Supergene alteration is almost exclusively cuprite with a little covellite and is usually minor but is locally up to 50 % of a chip. There is no pyrite. Textural evidence indicates chalcopyrite introduction was after the main metasomatic conversion of all iron to specularite and the extensive chloritization. There is tentative evidence that the precurssor iron mineral was magnetite.

PTS: **B11155 Quartz-K-Feldspar-Carbonate Metsomatized Rock with Chalcopyrite**

Specimen Description:

Drill chips up to 6 mm size mounted in epoxy. Almost all the chips are uniform, fine grained and with 50-75 % K-staining that masks other features of the chips. There are about 2 % sulphide chips.

Mineralogy:

Quartz	40. %	Carbonate (siderite?)	10. %	Chalcocite	0.4%
K-feldspar (adularia)	40	Chalcopyrite	3	Cuprite	<0.1
Plagioclase	<0.5	Tourmaline	0.2	Rutile	<0.1
Chlorite	5	Pyrite	0.4		

Inspite of apparent uniformity in the off-cut, the chips are quite variable. There is a complete gradation from chips that are almost 100 % very fine grained K-feldspar through increasing amounts of quartz to almost 100 % of quartz grains of 50-80 µm size. There are occasional plagioclase grains and some chips have up to 20 % carbonate in irregular patches. These minerals are all clearly metasomatic as is chlorite. Although most chips have no chlorite, it occasionally occurs as irregular patches up to 0.4 mm often showing a laminar or fibrous texture with curved fibres. Often it interlaminated with a colorless mineral that appears to be another variety of chlorite. Sparse brown tourmaline occurs in grains up to 50 µm.

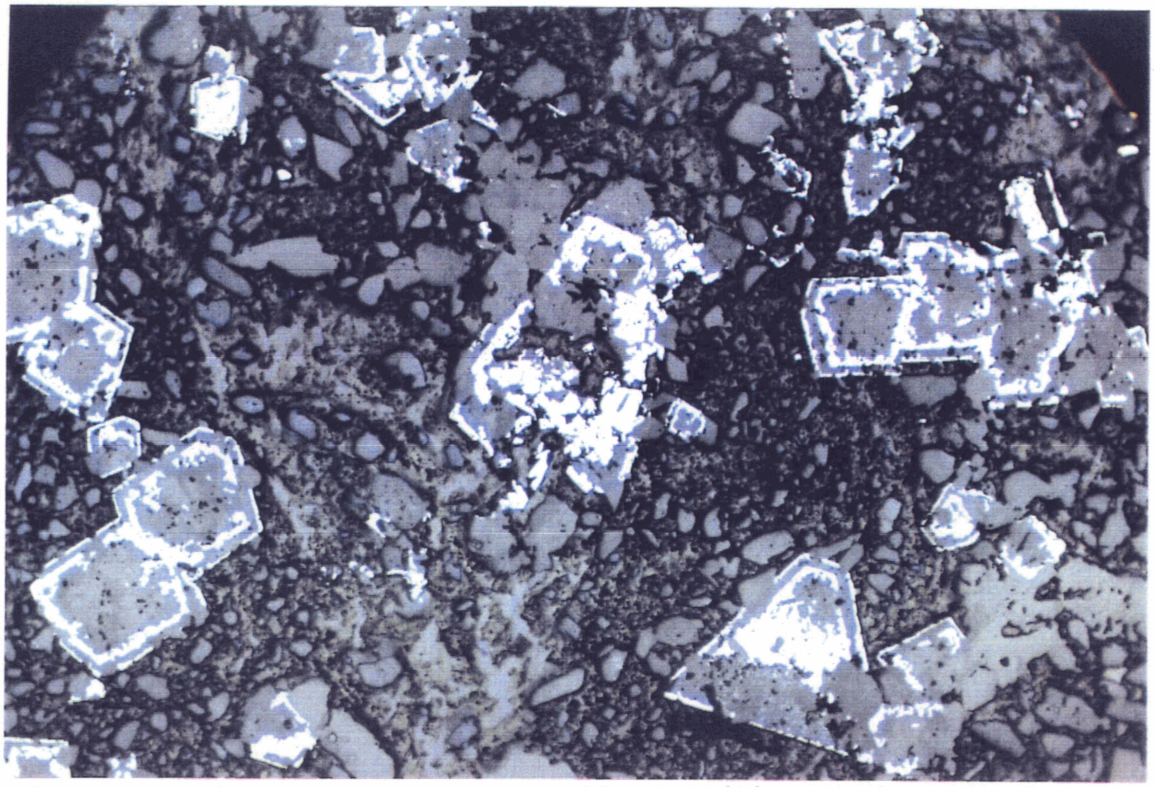
There are a few percent of quartz crystal chips and more of carbonate crystal chips, some of which are considerably altered by limonite indicating probably siderite.

Chalcopyrite chips are either fresh or partially altered with 10 µm veinlets and rims of chalcocite. Cuprite also occurs but only rarely. Pyrite grains occasionally up to 75 µm but mostly less than 30 µm may be fresh but are mostly partially to almost completely replaced by supergene chalcocite. Rutile grains are also very sparse and specularite is absent.

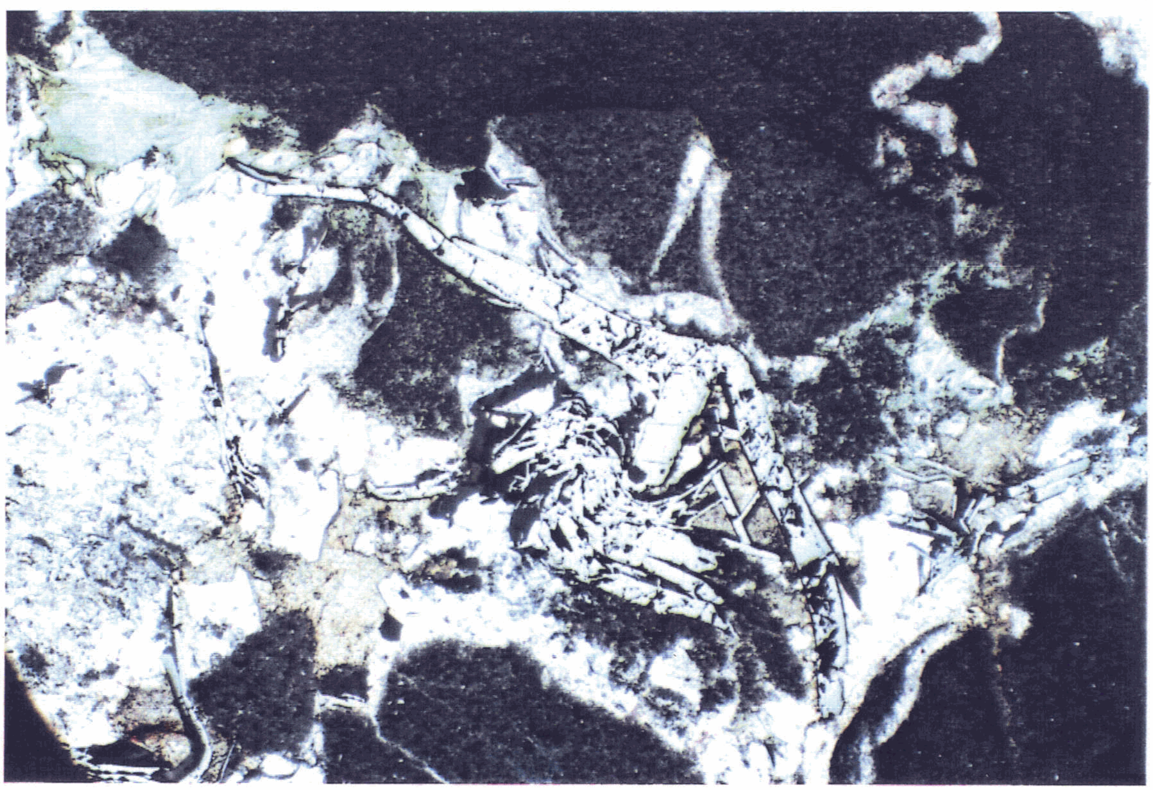
Conclusions:

The rock chips are completely metasomatized by silica, adularia, siderite and chlorite with no evidence as to the nature of the original rock. The rock is also unusual in that it escaped the oxidizing phase of metasomatism, or at least there is no specularite. There is minor rutile reflecting only a small titanium content, so the precurssor rock was probably a sediment rather than trachyte or other igneous rocks. As in many rocks of this suite, minor boron seems to accompany major potassium metasomatism. The iron content is surprisingly low in this rock.

Chalcopyrite usually occurs in monomineralic chips, a number of which are partially replaced by chalcocite and very minor cuprite. The minor content of small pyrite grains show more extensive chalcocite preplacement.

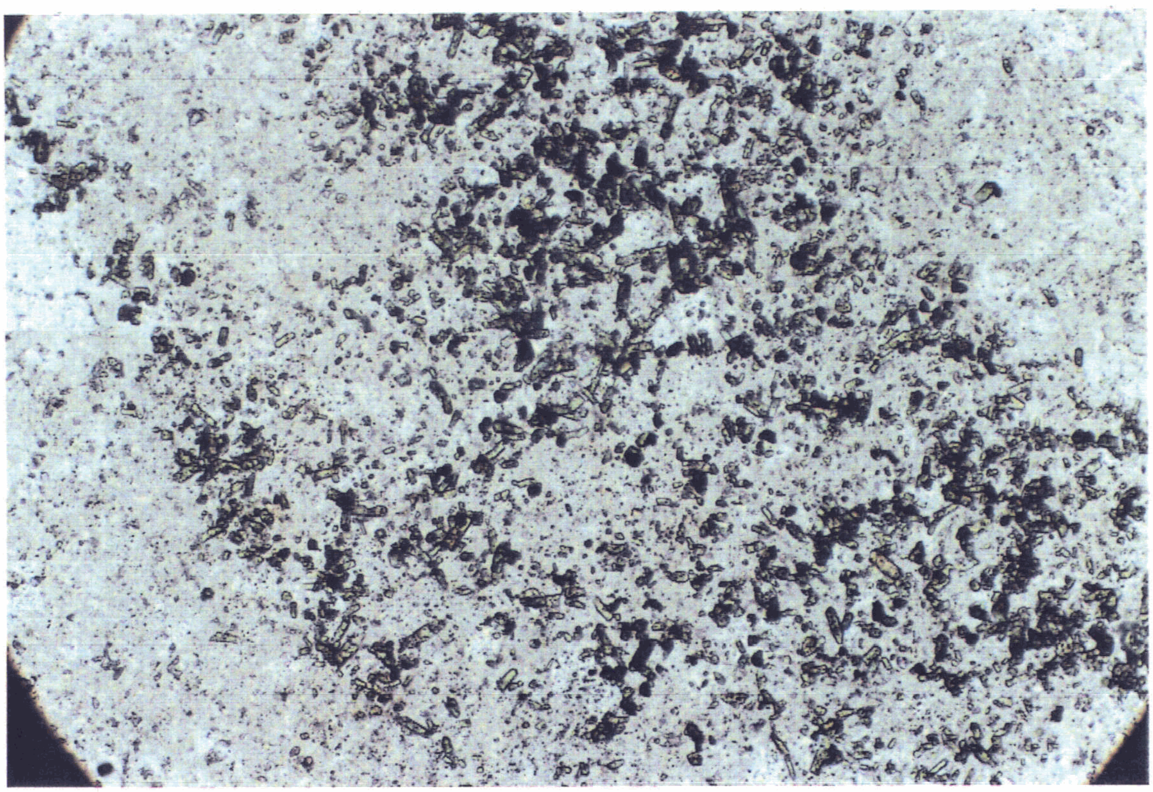


B8918 Specularite-quartz replacements of possible siderite(?) crystals in chloritized, adularia altered siltstone fragment in breccia. Reflected light, width of field 1 mm.

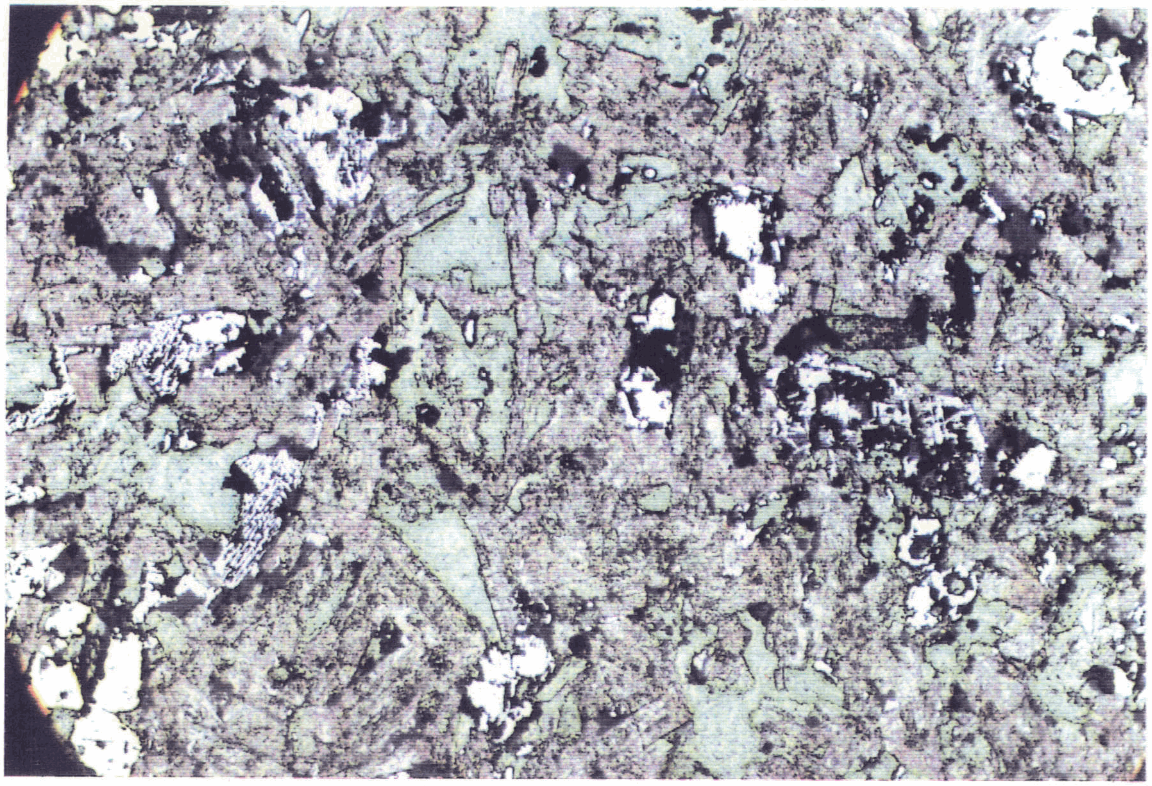


GS-7-92 Hematitic siltstone and claystone breccia fragments with matrix of quartz, chlorite (upper left) and calcite (lower left) with pre-brecciation quartz veins in the fragments. The specularite grains are folded by continued deformation during growth. Transmitted and reflected light, width of field 3 mm.

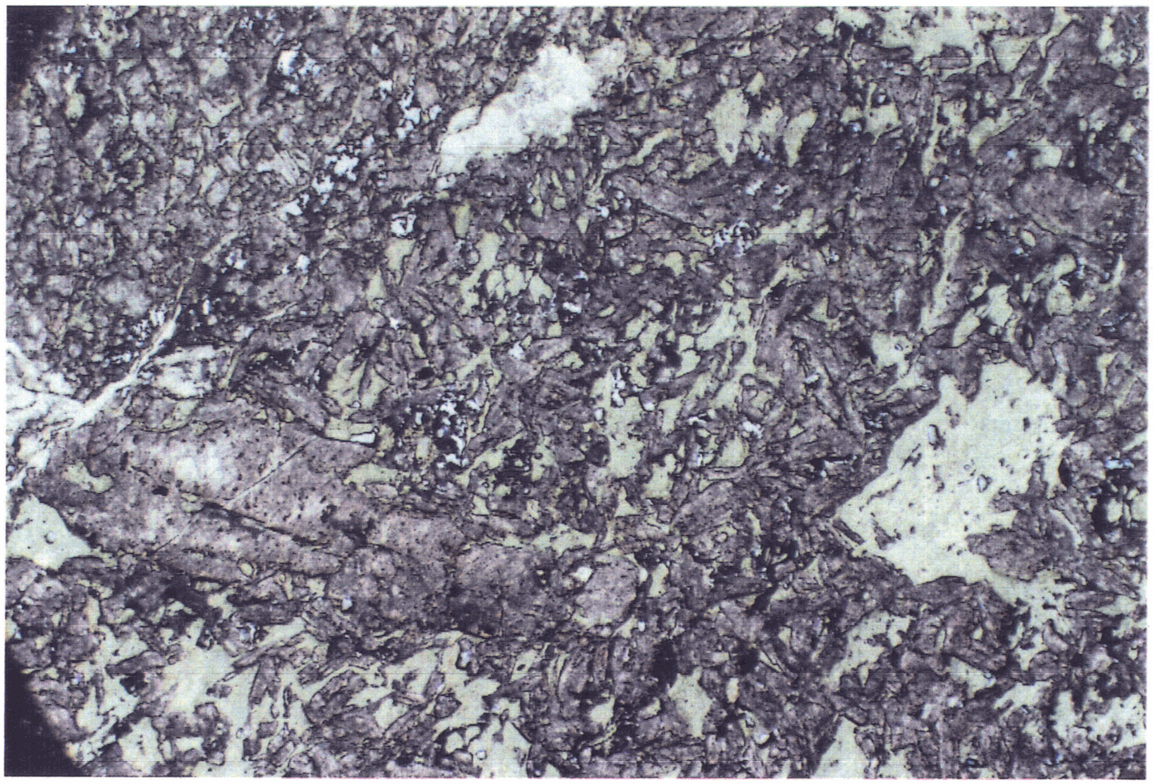
B9035 Specularite-rich 2 mm bed in jasperoid or clay ironstone cut by a quartz vein that may be a remobilized chert? Reflected light, width of field 3 mm.



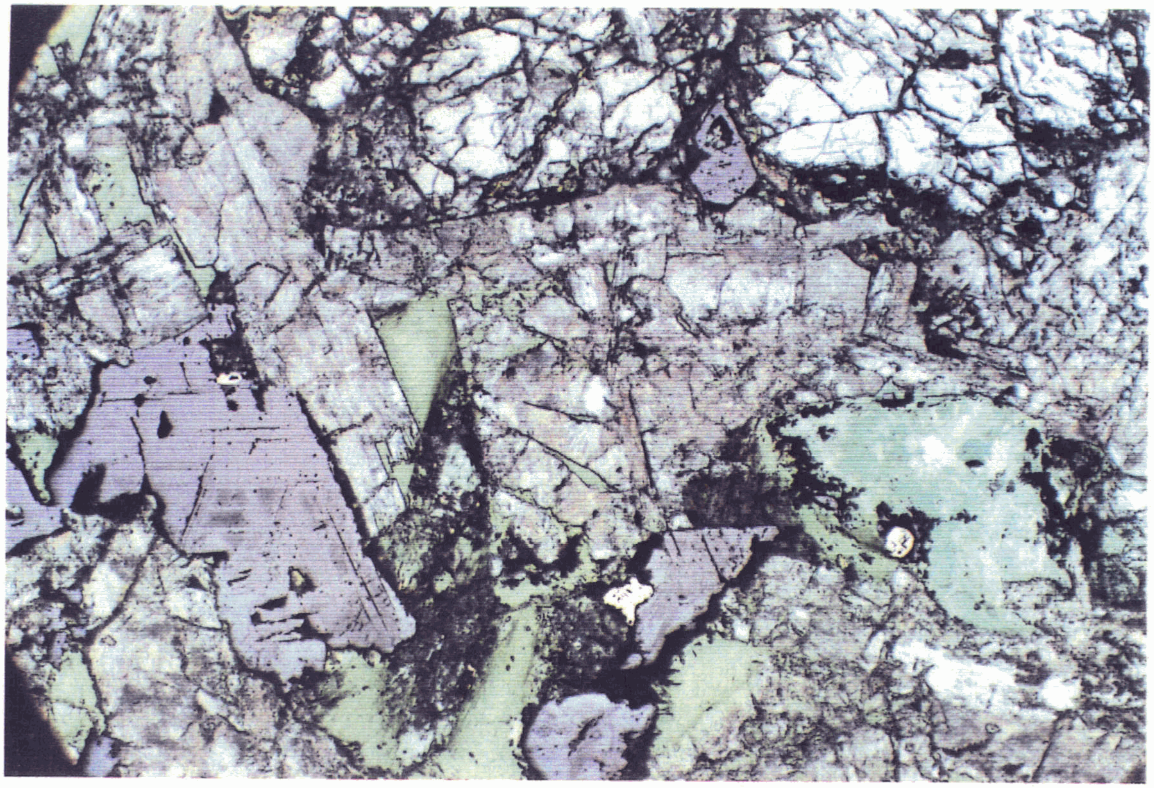
BGS-12-92 A portion of a chert bed that is unusually enriched in tourmaline of probably exhalitive origin. The grains are ≤10 µm diameter. Transmitted light, width of field 1 mm.



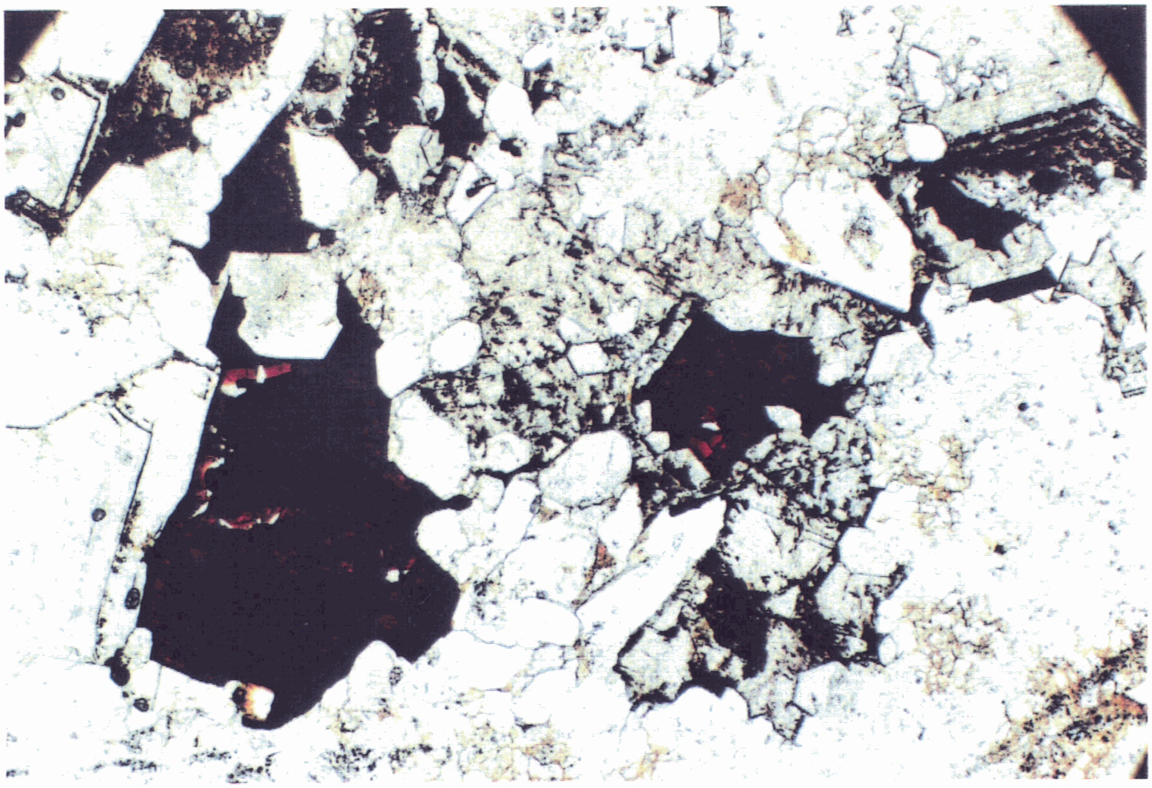
GC-39-92 Lath-shaped K-feldspar (sanidine?) often with chlorite alteration along the axial twin plane; specularite after magmatic magnetite at left, and circles at right are interpreted relict pyroxenes with specularite rims and chlorite cores. Reflected and transmitted light, width of field 1 mm.



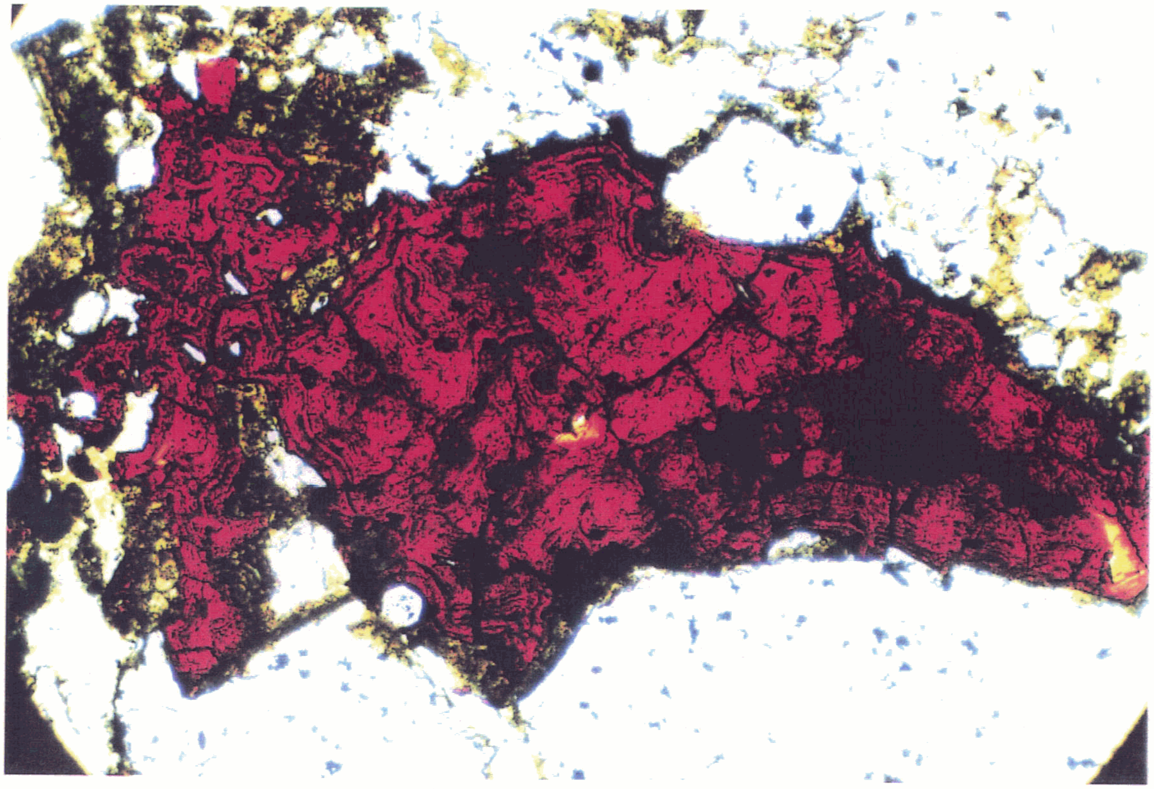
GS-3-92 Trachyte porphyry with sanidine phenocrysts at left, chlorite after pyroxene (right) and introduced quartz (top); feldspar cloudiness due to weak clay alteration; small white grains are specularite. Reflected and transmitted light, width of field 3 mm.



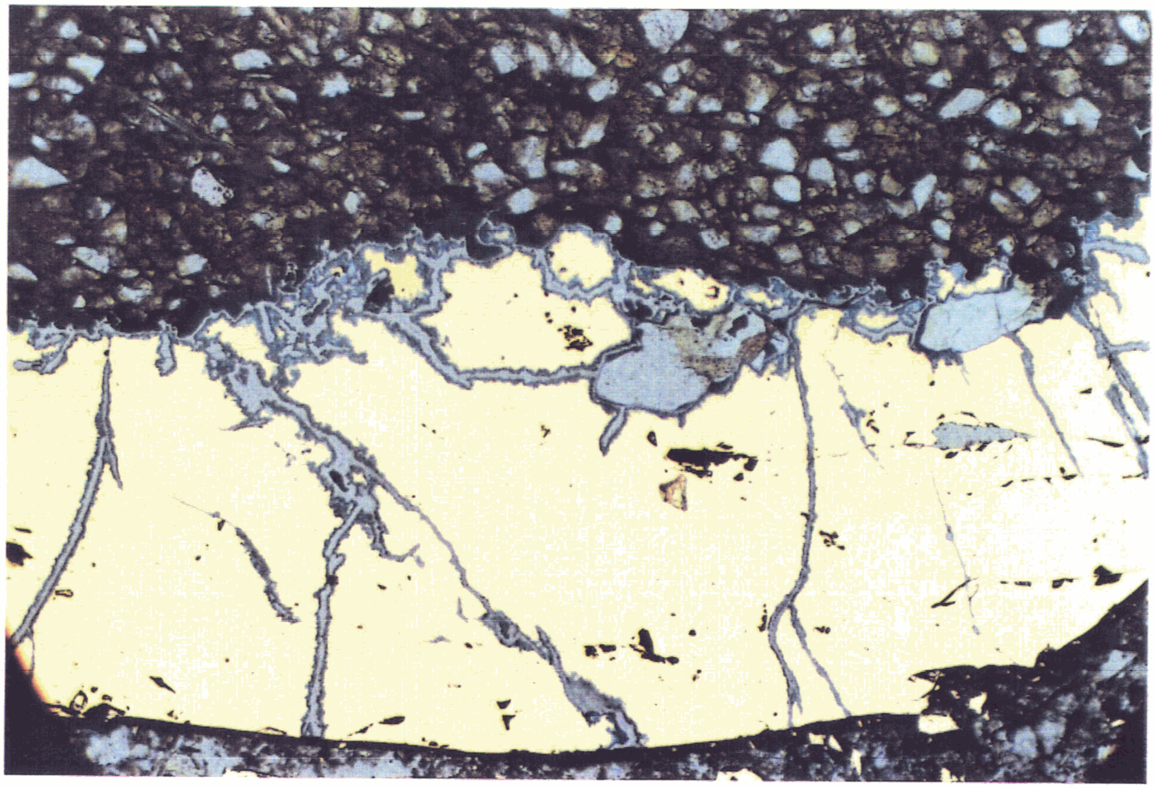
GC-40-92 Gabbro with magmatic magnetite (left) bearing hematite and spinel/hercynite exsolutions, chlorite after olivine (right), augite crystals at top, three small pyrite grains, and the rest of the view is illitized plagioclase laths in chlorite matrix. Reflected and transmitted light, width of field 3 mm.



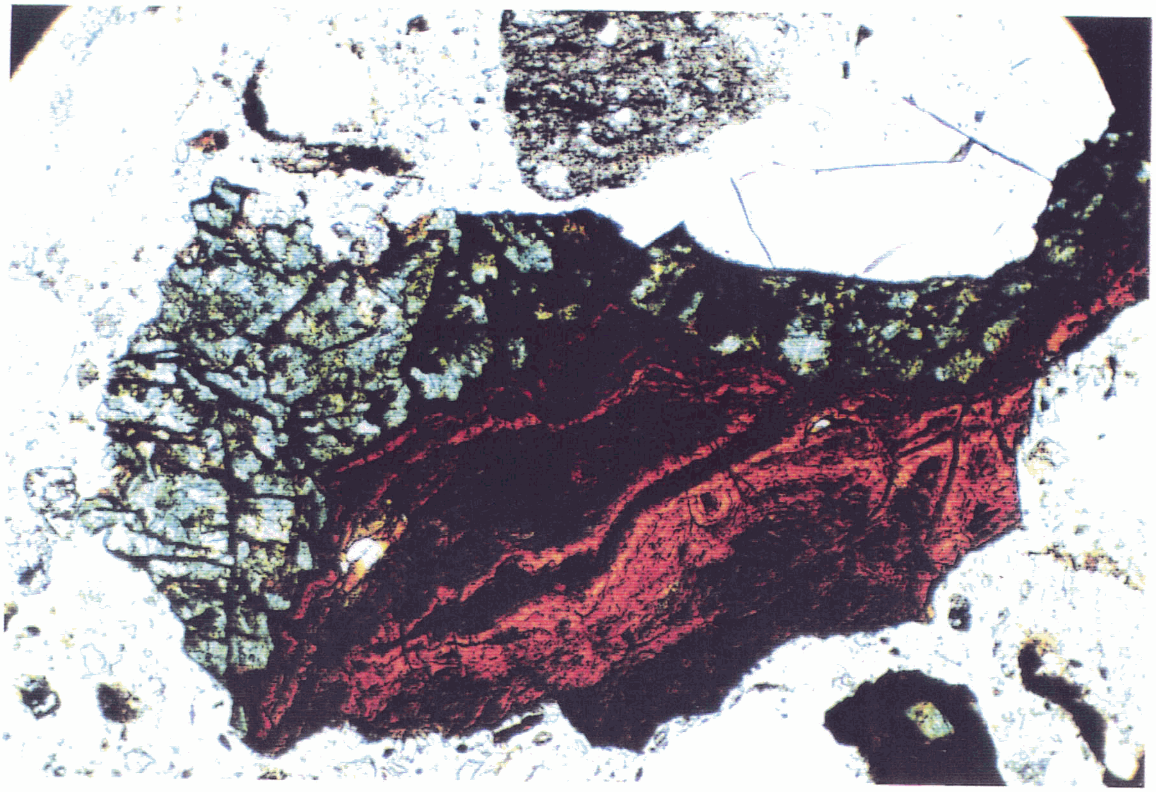
GS-12-92 Cuprite (red) surrounding chalcopyrite (black) in a coarse quartz-siderite(?) vein area of a chert specimen. There is selective replacement of the carbonate by limonite along twin lamellae. Transmitted light, field of view 3 mm.



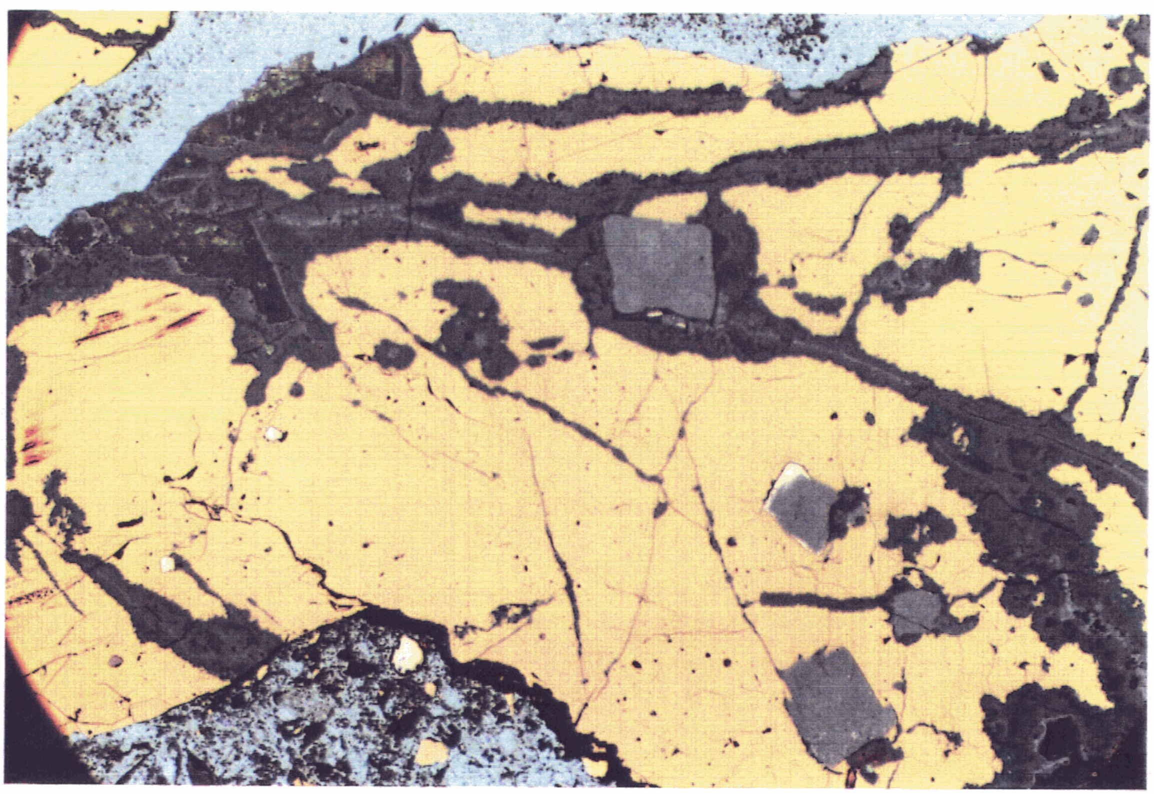
GS-19-92 Colloform cuprite around small core of chalcopyrite (black) with malachite (left) in a breccia of quartz and siderite. Transmitted light, width of field 1 mm.



B9202 Vein-type chalcopyrite cut by supergene veinlets of chalcocite and digenite fringed by covellite in contact with altered, slightly limonitized siltstone. Grey crystals in chalcopyrite are quartz. Transmitted and reflected light, width of field 1 mm.



B9203 A chip of goethite, limonite and malachite is an alteration of chalcopyrite as seen elsewhere in the slide; a chip of altered clastic sediment at top. Transmitted light, width of field 1 mm.



B9213 Chalcopyrite bearing cuprite veinlets with chalcocite cores and malchite at upper left; pyrite cubes are partially or completely replaced by chalcocite (around chip is epoxy). Transmitted and reflected light, width of field 1 mm.

APPENDIX II

LAB ANALYSIS SHEETS

FOR THE

ROCK GEOCHEMICAL SURVEY

OLYMPIC - ROCKS

PLACER DOME RESEARCH CENTRE
Geochemical Analysis

Project/Venture: V810 | Geol: G SHEVCHENKO | Date Received: JULY 27, 1992 | Page 1 of 2

Area: BLACKSTONE 116B14 | Lab Project No.: D2459 | Date Completed: AUGUST 25, 1992 | Attn: G SHEVCHENKO, J KOWALCHUK, E KIMURA

Remarks:

Au – 10.0 g sample digested with Aqua Regia and determined by Graphite Furnace A.A. (D.L. 1 PPB)

ICP – 0.5 g sample digested with 4 ml Aqua Regia at 100 Deg. C for 2 hours.

N.B. The major oxide elements, Ba, Be, Cr, La and W are rarely dissolved completely with this acid dissolution method.

SAMPLE No.	Au ppb	Ag ppm	Mo ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm	Cd ppm	Ni ppm	Co ppm	Mn ppm	Bi ppm	Cr ppm	V ppm	Ba ppm	W ppm	Be ppm	La ppm	Sr ppm	Ti %	Al %	Ca %	Fe %	Mg %	K %	Na %	P %
B8911	5	0.3	2	31	<1	37	<5	<5	<0.1	60	21	711	3	161	39	313	<5	0.1	12	5	0.03	0.97	0.21	5.52	0.82	0.12	<0.01	0.05
B8915	<1	<0.1	2	6	5	33	<5	<5	<0.1	50	8	258	<2	110	31	219	<5	0.4	16	6	<0.01	1.87	0.07	3.94	1.83	0.28	<0.01	0.05
B8938	17	1.6	4	66	3	10	5	<5	<0.1	25	18	3355	<2	90	16	337	<5	0.4	8	17	<0.01	0.65	4.07	3.94	1.86	0.23	<0.01	0.04
B8939	6	0.1	2	62	6	44	<5	<5	<0.1	90	24	1988	<2	139	88	251	<5	0.5	9	10	<0.01	2.65	2.34	5.81	2.92	0.26	<0.01	0.04
B8940	5	0.2	5	22	5	17	<5	<5	<0.1	43	17	436	<2	80	29	99	<5	0.5	34	3	0.02	1.78	0.43	4.59	1.50	0.34	<0.01	0.07
B8941	1	0.1	1	304	4	19	14	<5	<0.1	26	28	6469	<2	49	23	251	<5	0.6	10	28	<0.01	0.79	4.92	3.44	2.59	0.17	<0.01	0.05
B8942	<1	0.1	2	291	4	23	14	<5	<0.1	23	19	7718	<2	47	23	571	<5	0.5	12	38	<0.01	0.65	5.62	3.39	2.88	0.14	0.01	0.06
B8943	<1	0.1	<1	36	3	17	7	<5	<0.1	21	7	7000	<2	46	18	290	<5	0.5	15	36	<0.01	0.58	4.94	3.11	2.35	0.19	0.01	0.07
B8944	<1	<0.1	1	135	2	23	15	<5	<0.1	23	16	9601	<2	45	23	722	<5	0.5	11	58	<0.01	0.66	6.60	3.76	3.26	0.14	0.01	0.07
STD-SPK-P1	41	0.3	64	26	51	146	20	<5	0.3	37	6	608	<2	115	34	181	<5	0.5	8	88	0.11	1.08	0.92	2.30	0.85	0.37	0.07	0.08
B8945	<1	1.9	2	56	26	22	24	<5	<0.1	35	37	1976	7	99	19	27	<5	0.3	5	12	<0.01	0.95	1.09	8.82	0.85	0.13	<0.01	0.05
B8946	<1	0.2	7	95	4	13	16	<5	0.1	20	19	9958	<2	61	20	614	<5	0.3	6	58	<0.01	0.59	6.60	3.77	3.39	0.06	0.01	0.03
B8947	<1	0.1	9	296	2	15	10	<5	0.1	27	28	6531	<2	83	18	80	<5	0.3	4	23	<0.01	0.71	5.27	3.75	2.83	0.05	<0.01	0.02
B8948	<1	0.1	8	42	4	12	6	7	0.2	22	9	5941	<2	132	17	80	<5	0.2	9	17	<0.01	0.49	3.68	3.16	1.79	0.03	<0.01	0.02
B8949	<1	<0.1	5	66	5	27	6	<5	<0.1	30	13	7819	3	72	28	96	<5	0.4	10	18	<0.01	1.10	4.89	4.90	2.74	0.06	0.01	0.03
B8950	<1	0.2	8	138	5	12	8	5	0.1	21	9	4896	4	139	17	75	<5	0.2	8	15	<0.01	0.46	3.35	3.04	1.67	0.04	<0.01	0.02
B8976	<1	0.1	3	591	6	12	<5	<5	0.1	24	12	2173	<2	45	19	51	<5	0.5	11	22	<0.01	1.22	3.98	2.77	2.60	0.29	<0.01	0.08
B8977	1	0.1	3	34	7	14	12	7	<0.1	25	<1	89	16	101	23	83	<5	0.4	15	4	0.08	0.23	0.16	12.96	0.06	0.16	<0.01	0.07
B8978	<1	0.2	3	8	6	33	<5	<5	<0.1	33	11	1942	<2	57	53	126	<5	0.5	20	33	0.01	2.09	4.24	3.97	2.99	0.11	0.01	0.08
B8978*	<1	0.2	3	7	6	33	<5	<5	<0.1	33	11	1900	<2	56	52	124	<5	0.5	19	33	0.01	2.06	4.17	3.87	2.97	0.11	0.01	0.08
B8979	3	0.3	3	630	2	20	14	<5	0.4	18	15	5892	<2	44	25	32	<5	0.5	7	28	<0.01	0.44	11.04	3.04	6.35	0.11	0.02	0.03
B8980	1	0.1	<1	56	5	47	<5	<5	<0.1	48	14	550	<2	69	95	41	<5	0.4	20	5	0.01	2.50	0.94	5.66	2.89	0.05	0.03	0.08
B8981	<1	0.2	<1	615	5	27	<5	<5	<0.1	64	20	485	<2	96	188	37	<5	0.6	7	4	<0.01	2.89	0.57	5.69	3.75	0.08	0.02	0.07
B8982	<1	0.1	<1	11	7	22	<5	<5	<0.1	44	9	507	<2	68	42	35	<5	0.5	30	4	0.03	1.64	0.83	5.17	2.13	0.17	0.03	0.06
B8983	4	0.1	<1	16	9	14	<5	<5	<0.1	20	6	397	<2	82	42	45	<5	0.2	3	5	0.02	1.07	0.90	3.51	1.37	0.12	0.03	0.05
B8984	1	0.1	<1	180	8	112	<5	<5	<0.1	78	33	1501	<2	129	180	99	<5	0.5	4	32	0.05	2.84	2.49	6.27	3.48	0.11	0.03	0.05
B8985	47	104.0	42	23.0%	3	<1	6	<5	1.2	51	30	783	<2	24	42	26	<5	0.3	9	2	<0.01	0.90	0.08	17.11	0.80	0.02	<0.01	0.18
B8986	2	0.3	5	1634	7	18	<5	<5	<0.1	22	9	596	<2	94	37	33	<5	0.2	12	4	<0.01	1.42	1.10	4.05	1.65	0.04	0.03	0.09
B8987	8	0.4	1	1086	6	5	13	<5	<0.1	21	28	1963	<2	66	28	51	<5	0.2	9	10	0.01	0.27	2.93	3.31	1.37	0.18	<0.01	0.05
B8987*	9	0.5	<1	1090	6	6	14	<5	<0.1	23	30	1972	<2	71	29	54	<5	0.2	9	11	0.01	0.27	3.12	3.49	1.45	0.19	0.01	0.05
B8988	2	0.3	2	2249	4	47	<5	<5	<0.1	68	91	2111	<2	86	265	291	<5	0.4	13	7	0.02	3.49	1.44	7.88	4.44	0.06	0.01	0.05
B8989	2	0.1	3	235	5	10	9	<5	<0.1	14	10	2571	<2	70	46	81	<5	0.2	23	17	0.06	0.15	3.74	5.25	1.64	0.18	0.01	0.06
B8990	2	0.1	2	290	7	9	8	<5	<0.1	14	11	2444	<2	65	43	65	<5	0.2	19	18	0.05	0.13	3.63	4.82	1.55	0.14	0.01	0.06
B8991	<1	0.1	7	2109	4	9	16	<5	0.5	10	6	8223	<2	32	18	94	<5	0.3	4	61	<0.01	0.07	11.59	2.72	6.22	0.05	0.02	0.03
B8992	<1	0.1	4	464	8	17	7	<5	0.1	23	11	3985	<2	40	19	179	<5	0.4	9	38	<0.01	0.86	4.64	3.43	2.68	0.18	0.01	0.07
B8993	<1	0.1	3	666	7	6	12	<5	0.3	15	11	2962	<2	23	17	39	<5	0.5	10	212	0.01	0.54	11.29	2.11	1.01	0.23	0.01	0.07
B8994	<1	0.1	3	100	6	9	10	<5	0.3	18	18	2474	<2	22	17	176	<5	0.5	6	115	<0.01	0.66	10.85	1.90	1.63	0.22	0.01	0.08
B8995	3	0.1	2	0.74%	4	88	18	<5	<0.1	67	33	3122	<2	40	184	50	<5	0.4	6	6	<0.01	2.94	2.22	6.99	3.39	0.08	0.01	0.08
B8996	<1	<0.1	4	2982	9	7	14	<5	0.3	10	11	2246	<2	60	13	22	<5	0.3	7	15	<0.01	0.22	4.74	1.85	2.32	0.17	0.02	0.05
B8996*	<1	<0.1	3	2975	8	7	13	<5	0.3	9	11	2210	<2	62	12	22	<5	0.3	6	15	<0.01	0.21	4.67	1.81	2.25	0.18	0.02	0.05

PLACER DOME RESEARCH CENTRE
Geochemical Analysis

Project/Venture: V810 | Geol.: G SHEVCHENKO | Date Received: JULY 27, 1992 | Page 2 of 2

Area: BLACKSTONE 116B14 | Lab Project No.: D2459 | Date Completed: AUGUST 25, 1992 | Attn: G SHEVCHENKO, J KOWALCHUK, E KIMURA

Remarks:
Au – 10.0 g sample digested with Aqua Regia and determined by Graphite Furnace A.A. (D.L. 1 PPB)
ICP – 0.5 g sample digested with 4 ml Aqua Regia at 100 Deg. C for 2 hours.
N.B. The major oxide elements, Ba, Be, Cr, La and W are rarely dissolved completely with this acid dissolution method.

SAMPLE No.	Au ppb	Ag ppm	Mo ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm	Cd ppm	Ni ppm	Co ppm	Mn ppm	Bi ppm	Cr ppm	V ppm	Ba ppm	W ppm	Be ppm	La ppm	Sr ppm	Ti %	Al %	Ca %	Fe %	Mg %	K %	Na %	P %
B8997	2	0.4	3	2445	<1	39	<5	<5	<0.1	61	24	709	<2	52	39	28	<5	1.4	10	5	<0.01	2.93	1.15	4.98	3.27	0.20	<0.01	0.08
B9162	1	<0.1	7	63	5	14	9	11	0.1	23	12	6186	<2	56	24	151	<5	0.3	5	37	<0.01	0.76	7.09	3.90	3.61	0.09	0.01	0.04
B9163	1	0.1	<1	28	3	17	<5	<5	<0.1	35	15	820	2	48	21	230	<5	1.1	21	6	0.03	1.22	0.60	5.07	1.02	0.29	<0.01	0.06
B9164	7	0.1	<1	1338	<1	15	<5	<5	<0.1	36	26	1042	<2	56	92	66	<5	0.4	14	4	0.02	0.97	0.85	4.67	0.91	0.20	<0.01	0.07
B9165	7	10.0	7	6.10%	4	12	22	8	0.3	31	28	4269	11	83	9	20	<5	0.3	8	10	<0.01	0.36	3.35	6.86	1.52	0.08	0.01	0.07
B9166	2	1.9	2	0.72%	<1	46	<5	<5	<0.1	53	28	1176	5	112	96	35	<5	0.3	12	2	<0.01	2.14	0.14	5.99	1.83	0.09	0.01	0.05
B9167	2	0.1	2	1248	2	20	<5	<5	<0.1	30	9	444	<2	108	36	48	<5	0.2	37	2	<0.01	1.32	0.17	3.34	1.08	0.14	<0.01	0.06
B9168	1	0.4	5	3632	4	11	<5	5	<0.1	19	7	4744	<2	122	31	19	<5	0.2	4	17	<0.01	0.48	4.84	4.02	1.81	0.03	<0.01	0.07
B9216	<1	<0.1	<1	53	5	35	<5	<5	<0.1	42	31	325	3	71	29	493	<5	0.5	9	6	0.03	1.90	0.16	6.18	1.75	0.21	<0.01	0.06
B9216*	1	<0.1	1	52	2	36	<5	<5	<0.1	43	32	322	<2	73	30	506	<5	0.5	9	7	0.04	1.94	0.14	6.34	1.78	0.22	<0.01	0.06
B9217	6	0.1	1	65	2	24	6	<5	<0.1	40	16	1047	5	62	30	660	<5	0.7	12	13	0.04	1.28	0.91	6.02	1.47	0.18	<0.01	0.06
B9218	9	0.9	2	1237	3	14	<5	<5	<0.1	28	13	1122	5	58	27	158	<5	1.0	21	5	0.01	1.01	1.21	4.16	1.13	0.32	<0.01	0.07
B9219	4	1.5	2	3101	4	19	<5	11	<0.1	33	11	382	9	66	29	129	<5	0.9	16	4	0.03	1.07	0.30	8.39	0.70	0.33	<0.01	0.07
B9220	6	0.1	<1	136	4	24	<5	<5	<0.1	35	15	865	6	55	37	127	<5	0.8	16	5	0.02	1.33	0.78	5.13	1.33	0.23	<0.01	0.06
B9221	3	0.1	1	153	3	19	6	10	<0.1	29	13	3387	2	43	28	75	<5	0.6	11	16	0.01	1.15	4.39	4.87	2.84	0.20	0.01	0.06
B9222	1	0.3	4	0.92%	4	13	9	12	0.3	13	38	4398	<2	53	12	144	<5	0.2	3	21	<0.01	0.19	5.74	3.19	2.89	0.04	0.01	0.03
B9223	4	0.2	1	144	5	22	34	<5	<0.1	38	14	492	3	57	21	152	<5	0.6	13	4	0.02	1.62	0.33	6.17	1.19	0.23	<0.01	0.06
B9224	2	0.1	3	654	4	27	<5	<5	<0.1	49	32	1313	6	73	128	138	<5	0.5	13	14	0.02	1.87	2.02	6.93	1.91	0.21	<0.01	0.07
B9225	1	<0.1	1	62	3	28	8	11	<0.1	31	20	5423	7	38	26	621	<5	1.3	27	23	0.04	1.25	2.71	6.28	1.36	0.35	<0.01	0.06
B9225*	1	<0.1	1	59	2	29	7	10	<0.1	33	21	5443	6	39	27	630	<5	1.4	30	24	0.04	1.33	2.81	6.50	1.41	0.38	<0.01	0.06
B9244	52	0.3	22	1.56%	4	26	<5	<5	<0.1	43	22	525	5	71	71	75	<5	0.5	14	3	<0.01	2.81	0.50	7.44	2.76	0.03	0.02	0.06
B9245	21	1.2	2	2654	7	24	<5	<5	<0.1	33	17	2259	<2	68	45	129	<5	0.3	24	14	0.02	1.04	3.46	4.80	1.97	0.13	<0.01	0.08
B11126	1	0.1	3	140	6	49	6	5	<0.1	34	16	5181	5	50	25	799	<5	1.2	29	29	0.03	1.38	2.69	6.27	1.57	0.30	<0.01	0.06
B11127	1	0.3	<1	112	8	36	<5	<5	<0.1	35	17	4041	3	53	24	746	<5	1.3	33	25	0.03	1.46	1.98	6.14	1.43	0.30	<0.01	0.06
B11128	<1	<0.1	3	65	<1	29	11	<5	<0.1	27	13	9445	<2	43	22	841	<5	1.0	25	44	0.02	1.04	4.84	5.05	2.40	0.25	0.01	0.06
B11129	<1	<0.1	3	37	3	16	11	<5	0.3	10	6	8549	<2	45	18	962	<5	0.3	14	39	<0.01	0.20	5.23	2.59	2.19	0.12	0.01	0.06
B11151	1	0.1	<1	569	2	47	<5	7	<0.1	118	22	2847	5	179	128	872	<5	0.3	9	16	<0.01	4.13	1.64	8.73	3.88	0.11	<0.01	0.05
B11152	2	<0.1	<1	19	<1	63	27	<5	<0.1	42	18	820	<2	78	55	50	<5	0.3	4	3	<0.01	2.69	0.12	6.82	3.12	0.09	<0.01	0.06
B11153	<1	0.1	3	62	5	38	14	<5	0.4	12	6	5637	<2	75	14	52	<5	0.2	4	14	<0.01	0.12	7.14	2.58	3.26	0.03	0.02	0.02
STD-SPK-P1	40	0.2	59	27	52	147	20	<5	0.5	35	6	619	<2	114	35	175	<5	0.5	8	86	0.11	1.06	0.95	2.26	0.84	0.35	0.07	0.08
B11154	<1	0.7	5	4483	5	19	6	<5	0.2	23	5	3018	<2	109	17	28	<5	0.3	5	10	<0.01	0.63	3.57	3.34	1.95	0.04	<0.01	0.02
B11155	1	1.1	4	0.73%	3	15	<5	<5	<0.1	27	5	1212	<2	117	39	35	<5	0.1	8	4	<0.01	0.90	1.27	3.13	1.17	0.12	<0.01	0.06
B11156	5	2.3	1	1.46%	5	41	<5	<5	<0.1	24	9	866	<2	83	23	42	<5	0.3	10	2	<0.01	1.12	0.36	4.22	0.82	0.20	<0.01	0.07
B11157	2	1.4	1	6954	4	24	<5	<5	<0.1	26	7	812	<2	97	28	45	<5	0.2	14	2	<0.01	1.06	0.38	3.62	0.85	0.17	<0.01	0.07
B11158	1	0.3	2	1545	6	4	9	<5	0.4	9	6	3029	<2	30	13	37	<5	0.4	8	32	<0.01	0.25	6.86	2.25	3.73	0.21	0.01	0.08
B11159	1	0.1	2	616	7	20	7	<5	0.2	29	15	2278	<2	32	16	67	<5	0.6	12	156	<0.01	1.03	8.18	2.36	1.13	0.34	0.01	0.08
B11160	<1	0.2	2	208	7	9	9	9	0.3	19	17	2546	<2	22	16	48	<5	0.5	6	134	<0.01	0.71	12.00	1.77	1.25	0.22	0.01	0.08
B11161	<1	<0.1	1	261	8	9	7	<5	0.3	17	13	2601	<2	27	14	86	<5	0.5	8	112	<0.01	0.68	7.20	2.07	1.44	0.27	0.01	0.07
B11162	1	0.3	3	1469	5	7	15	<5	0.4	9	5	3933	<2	57	12	45	<5	0.3	4	19	<0.01	0.09	7.28	2.12	3.48	0.07	0.01	0.03
B11162*	1	0.4	2	1476	5	8	12	<5	0.4	9	6	3945	<2	56	13	47	<5	0.3	5	19	<0.01	0.09	7.44	2.16	3.57	0.08	0.01	0.03

OLYMPIC - ROCKS

PLACER DOME RESEARCH CENTRE
Geochemical Analysis

Project/Venture: V810 | Geol.: G SHEVCHENKO | Date Received: JULY 20, 1992 |

Area: BLACKSTONE 116B14 | Lab Project No.: D2433 | Date Completed: AUG 4, 1992 | Attn: G SHEVCHENKO, J KOWALCHUK, E KIMURA

Remarks:
Au – 10.0 g sample digested with Aqua Regia and determined by Graphite Furnace A.A. (D.L. 1 PPB)
ICP – 0.5 g sample digested with 4 ml Aqua Regia at 100 Deg. C for 2 hours.
N.B. The major oxide elements, Ba, Be, Cr, La and W are rarely dissolved completely with this acid dissolution method

SAMPLE No.	Au ppb	Ag ppm	Mo ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm	Cd ppm	Ni ppm	Co ppm	Mn ppm	Bi ppm	Cr ppm	V ppm	Ba ppm	W ppm	Be ppm	La ppm	Sr ppm	Ti %	Al %	Ca %	Fe %	Mg %	K %	Na %	P %
B8876	10	0.2	<1	53	6	19	<5	<5	<0.1	36	13	646	6	64	62	36	<5	0.4	12	23	0.02	1.65	3.98	4.93	1.57	0.13	0.02	0.09
B8877	8	0.1	<1	194	5	14	6	<5	<0.1	28	13	956	<2	54	38	39	<5	0.4	14	37	<0.01	1.21	5.18	2.77	1.37	0.09	0.01	0.07
B8878	26	<0.1	4	127	3	17	7	8	<0.1	36	22	808	<2	58	50	74	<5	0.4	16	32	<0.01	1.67	4.56	3.67	1.90	0.12	0.02	0.07
B8879	2	<0.1	<1	23	3	10	7	9	<0.1	24	12	1471	<2	37	25	57	<5	0.4	22	86	<0.01	1.14	8.29	2.19	1.20	0.16	0.01	0.08
B8880	1	<0.1	<1	17	10	8	9	9	<0.1	16	9	2490	<2	23	17	99	<5	0.4	10	164	<0.01	0.53	10.25	1.45	0.69	0.11	0.02	0.07
B8881	1	<0.1	<1	92	9	6	13	7	<0.1	14	12	2924	<2	21	17	63	<5	0.4	6	205	<0.01	0.36	12.15	1.33	0.78	0.11	0.02	0.08
B8882	1	0.2	1	1561	2	15	17	7	<0.1	16	12	2072	<2	39	14	62	<5	0.4	7	22	<0.01	0.63	5.56	1.89	2.84	0.21	0.01	0.08
B8883	2	0.3	2	2088	3	6	13	6	<0.1	9	7	3077	<2	34	12	68	<5	0.4	8	29	<0.01	0.33	7.83	1.38	4.26	0.19	0.02	0.07
B8884	1	<0.1	4	160	1	77	<5	<5	<0.1	30	16	513	<2	60	51	95	<5	0.3	5	5	<0.01	2.12	0.48	3.94	2.14	0.07	0.03	0.12
B8884*	1	<0.1	4	160	1	76	<5	<5	<0.1	32	17	515	<2	62	52	98	<5	0.3	6	5	<0.01	2.19	0.46	4.14	2.21	0.07	0.03	0.12
B8885	3	<0.1	3	125	2	87	<5	11	<0.1	73	42	1562	4	87	176	73	<5	0.7	9	12	<0.01	2.76	2.88	6.81	3.54	0.17	0.02	0.07
B8886	6	<0.1	3	1897	<1	78	<5	7	<0.1	63	67	446	<2	113	108	87	<5	0.4	3	2	<0.01	2.18	0.29	4.80	2.14	0.22	<0.01	0.06
B8887	1	<0.1	3	164	3	50	<5	<5	<0.1	27	14	166	3	77	39	74	<5	0.7	8	3	<0.01	2.11	0.11	4.25	1.71	0.12	0.03	0.06
B8888	1	0.2	4	569	<1	64	<5	<5	<0.1	57	36	925	6	35	264	39	<5	0.4	25	5	0.01	3.50	0.59	10.23	3.05	0.05	<0.01	0.20
B8889	1	0.3	3	808	2	62	<5	<5	<0.1	49	40	730	7	40	186	39	<5	0.3	21	5	<0.01	3.56	0.46	9.90	2.95	0.04	<0.01	0.21
B8890	1	<0.1	2	324	3	58	<5	13	<0.1	54	35	1231	8	29	263	42	<5	0.4	10	3	0.01	3.09	0.87	9.47	2.82	0.06	<0.01	0.09
B8891	9	1.1	1	480	3	60	<5	9	<0.1	46	39	698	9	59	116	37	<5	0.3	17	3	<0.01	3.63	0.25	9.33	2.90	0.05	<0.01	0.14
B8892	<1	<0.1	2	14	3	14	<5	10	<0.1	23	<1	80	15	24	25	15	<5	0.1	6	<1	<0.01	0.21	<0.01	12.43	0.13	0.03	<0.01	0.03
B8926	1	<0.1	2	216	8	24	<5	<5	<0.1	55	103	382	3	47	37	161	<5	0.5	7	2	0.01	2.14	0.13	6.19	2.00	0.19	<0.01	0.07
B8926*	2	<0.1	2	214	6	22	<5	6	<0.1	51	101	382	3	44	34	160	<5	0.4	7	1	<0.01	2.11	0.11	6.11	1.96	0.18	<0.01	0.07
B8927	15	0.1	3	20	5	20	<5	<5	<0.1	63	40	166	2	43	25	114	<5	0.8	10	4	0.01	1.64	0.20	5.47	1.52	0.20	<0.01	0.06
B8928	7	<0.1	6	150	3	17	14	<5	<0.1	34	34	1977	6	42	31	93	<5	0.6	10	8	<0.01	1.35	2.07	4.56	1.71	0.20	<0.01	0.09
B8929	3	<0.1	7	715	2	9	12	<5	0.1	17	14	1948	2	52	17	50	<5	0.6	13	14	<0.01	0.56	3.94	2.44	2.22	0.24	0.01	0.05
B8930	1	<0.1	6	45	2	36	6	6	<0.1	30	11	7066	5	28	30	189	<5	0.4	6	32	<0.01	1.31	4.91	4.70	3.27	0.07	0.01	0.05
B8931	1	0.1	7	3707	4	15	11	6	<0.1	27	20	8994	3	53	24	89	<5	0.5	9	31	<0.01	1.11	6.44	4.78	3.86	0.08	0.01	0.05
B8932	1	<0.1	7	176	5	10	21	15	<0.1	18	15	8835	2	45	16	140	<5	0.4	6	46	<0.01	0.32	6.22	2.86	3.03	0.08	0.01	0.03
B8933	2	<0.1	5	76	3	22	19	9	<0.1	15	17	6768	2	29	23	139	<5	0.5	8	29	<0.01	0.15	7.13	3.11	3.43	0.14	0.01	0.04
B8934	2	0.5	4	137	16	50	20	9	<0.1	53	27	472	6	78	95	64	<5	0.3	4	5	<0.01	2.25	0.21	7.75	1.94	0.08	<0.01	0.06
B8935	1	<0.1	4	57	4	9	25	<5	0.3	8	5	2993	<2	<1	23	32	<5	0.3	2	29	<0.01	<0.01	14.84	1.40	9.73	0.01	0.02	0.01
B8935*	1	<0.1	8	60	5	9	25	<5	0.3	9	5	2981	<2	<1	24	31	<5	0.3	3	31	<0.01	<0.01	15.40	1.39	9.84	0.01	0.02	0.01
B8936	2	<0.1	<1	71	4	79	5	6	<0.1	43	21	1428	2	63	180	81	<5	0.4	8	4	<0.01	1.90	0.92	5.96	1.85	0.10	<0.01	0.06
B8937	2	<0.1	<1	10	6	15	<5	<5	<0.1	41	17	568	<2	43	21	30	<5	0.8	21	4	0.02	1.29	0.76	5.21	1.52	0.23	<0.01	0.06
B8951	1	<0.1	5	220	2	13	16	14	0.1	18	9	4191	<2	9	19	145	<5	0.4	39	117	<0.01	0.45	13.30	2.47	3.80	0.08	0.02	0.06
B8952	38	<0.1	2	389	4	9	16	<5	0.2	10	23	3421	<2	73	16	24	<5	0.3	9	16	<0.01	0.17	7.19	1.61	3.83	0.03	0.02	0.05
B8953	1	<0.1	3	17	2	8	12	7	<0.1	13	7	4531	<2	31	16	43	<5	0.3	9	28	<0.01	0.18	8.52	3.49	3.98	0.11	0.02	0.03
B8954	1	<0.1	<1	8	7	27	7	<5	<0.1	29	13	1258	<2	69	32	46	<5	0.3	7	4	<0.01	1.59	1.07	3.43	2.28	0.12	<0.01	0.06
B8955	<1	<0.1	1	19	6	8	23	6	<0.1	20	56	5020	<2	26	14	226	<5	0.7	16	20	<0.01	0.27	6.52	3.63	2.19	0.24	0.01	0.05
B8956	2	<0.1	1	143	5	9	20	6	<0.1	17	31	4030	<2	33	17	52	<5	0.5	11	13	<0.01	0.30	7.16	3.39	3.30	0.20	0.01	0.05
B8957	4	<0.1	1	284	7	9	12	10	<0.1	23	12	3921	<2	32	21	50	<5	0.6	12	17	<0.01	0.65	6.19	3.60	2.83	0.23	0.01	0.05
STD-NP1-P1	125	0.2	62	24	53	146	23	<5	0.2	34	5	567	<2	98	33	180	<5	0.4	7	79	0.10	0.99	0.90	2.35	0.87	0.35	0.06	0.08

PLACER DOME RESEARCH CENTRE
Geochemical Analysis

Project/Venture: V810 | Geol: G SHEVCHENKO | Date Received: JULY 20, 1992 |
Area: BLACKSTONE 116B14 | Lab Project No.: D2433 | Date Completed: AUG 4, 1992 | Attn: G SHEVCHENKO, J KOWALCHUK, E KIMURA

Remarks:
Au – 10.0 g sample digested with Aqua Regia and determined by Graphite Furnace A.A. (D.L. 1 PPB)
ICP – 0.5 g sample digested with 4 ml Aqua Regia at 100 Deg. C for 2 hours.
N.B. The major oxide elements, Ba, Be, Cr, La and W are rarely dissolved completely with this acid dissolution method.

SAMPLE No.	Au ppb	Ag ppm	Mo ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm	Cd ppm	Ni ppm	Co ppm	Mn ppm	Bi ppm	Cr ppm	V ppm	Ba ppm	W ppm	Be ppm	La ppm	Sr ppm	Ti %	Al %	Ca %	Fe %	Mg %	K %	Na %	P %
B8958	7	<0.1	6	180	15	25	8	14	<0.1	40	13	3248	<2	32	30	46	<5	0.9	13	12	<0.01	1.68	4.29	4.73	2.97	0.28	0.01	0.05
B8959	4	0.1	3	403	3	21	12	12	<0.1	31	18	4964	<2	25	28	38	<5	0.7	8	15	<0.01	1.42	6.85	4.57	4.30	0.15	0.01	0.04
B8960	<1	<0.1	7	123	2	31	18	7	0.2	12	9	5537	<2	11	21	12	<5	0.4	5	20	<0.01	0.09	11.69	2.00	6.65	0.06	0.02	0.05
B8961	2	<0.1	4	13	8	15	6	7	<0.1	38	16	1487	<2	62	45	42	<5	0.3	67	13	0.02	1.04	2.26	4.27	2.10	0.15	<0.01	0.06
B8962	<1	<0.1	5	10	4	7	11	15	<0.1	13	5	4250	<2	31	16	31	<5	0.3	13	16	<0.01	0.10	6.64	3.12	3.27	0.13	0.02	0.04
B8963	10	0.3	2	691	9	14	<5	<5	<0.1	27	16	651	3	61	69	54	<5	0.3	54	4	0.04	0.75	0.56	6.76	0.76	0.19	<0.01	0.10
B8964	10	<0.1	2	740	5	28	<5	<5	<0.1	51	41	1593	<2	37	198	28	<5	0.4	12	7	0.02	2.29	2.01	6.20	3.45	0.10	<0.01	0.07
B8965	5	<0.1	3	2307	3	10	6	9	<0.1	24	9	3356	<2	57	60	55	<5	0.4	11	12	0.04	0.54	4.35	5.87	2.38	0.17	0.01	0.06
B8966	<1	<0.1	7	75	8	8	6	<5	<0.1	12	7	1904	<2	68	38	49	<5	0.3	25	9	0.03	0.22	2.33	3.93	1.12	0.21	0.01	0.05
B8966*	<1	<0.1	2	74	9	7	5	<5	<0.1	12	7	1900	<2	70	37	49	<5	0.2	24	8	0.03	0.21	2.27	3.89	1.11	0.21	0.01	0.05
B8967	6	<0.1	10	55	2	17	<5	8	<0.1	26	2	310	12	57	23	45	<5	0.3	20	4	0.03	0.14	0.31	13.63	0.04	0.16	<0.01	0.12
B8968	<1	<0.1	7	19	1	19	<5	6	<0.1	37	13	1355	<2	62	43	31	<5	0.4	39	6	0.03	1.16	1.74	5.45	2.11	0.17	0.01	0.06
B8969	<1	<0.1	3	15	7	8	7	<5	<0.1	13	6	2799	5	44	23	81	<5	0.4	16	14	0.02	0.23	4.17	3.15	1.91	0.23	0.01	0.05
B8970	<1	<0.1	1	23	3	97	<5	<5	<0.1	54	20	645	4	53	43	141	<5	0.4	36	4	0.03	2.03	0.51	6.12	2.55	0.21	<0.01	0.06
B8971	<1	0.1	1	50	8	45	9	6	<0.1	83	17	3989	<2	94	77	143	<5	0.5	9	10	<0.01	2.10	3.56	5.36	3.68	0.21	0.01	0.04
B8972	<1	<0.1	2	12	6	27	14	5	<0.1	22	10	9207	<2	28	17	138	<5	0.4	7	56	<0.01	0.52	7.60	3.92	3.55	0.11	0.02	0.08
B8973	1	<0.1	1	853	2	42	15	<5	<0.1	50	34	1126	4	42	301	37	<5	0.4	6	5	<0.01	2.21	1.01	9.60	2.21	0.09	<0.01	0.07
B8974	14	<0.1	2	223	2	20	<5	<5	<0.1	43	14	411	7	51	57	250	<5	0.4	12	4	0.03	1.29	0.22	8.94	1.16	0.15	<0.01	0.11
B8975	2	0.8	2	2045	3	42	<5	<5	<0.1	73	46	994	<2	51	259	39	<5	0.3	4	2	<0.01	3.73	0.45	8.57	3.83	0.08	<0.01	0.09
B8975*	1	0.7	<1	2056	2	42	<5	<5	<0.1	70	45	983	2	51	256	37	<5	0.2	3	2	<0.01	3.69	0.44	8.40	3.76	0.08	<0.01	0.09
B9151	<1	<0.1	2	87	7	9	13	5	0.2	17	20	2270	<2	14	14	43	<5	0.5	6	119	<0.01	0.52	9.02	1.60	0.87	0.14	0.01	0.07
B9152	1	0.1	<1	113	6	5	19	8	<0.1	13	47	2628	<2	29	10	119	<5	0.9	13	8	<0.01	0.29	4.25	1.97	1.83	0.24	0.01	0.02
B9153	<1	<0.1	1	2484	5	20	5	<5	<0.1	22	14	1425	<2	44	26	81	<5	0.9	21	6	0.02	0.72	2.63	4.05	1.55	0.26	0.01	0.05
B9154	1	<0.1	3	2771	7	16	6	7	<0.1	36	15	2189	<2	45	27	84	<5	0.8	12	11	0.01	1.02	3.19	4.70	2.27	0.23	0.01	0.06
B9155	1	<0.1	6	68	4	7	12	12	0.1	11	11	2973	<2	17	14	98	<5	0.4	9	159	<0.01	0.20	9.76	1.42	1.54	0.11	0.02	0.09
B9156	<1	0.1	2	214	1	78	<5	<5	<0.1	59	52	2458	6	23	305	322	<5	0.5	9	9	<0.01	3.39	1.16	9.69	2.93	0.07	<0.01	0.09
B9157	<1	<0.1	1	357	2	63	<5	<5	<0.1	52	36	2242	6	29	297	103	<5	0.4	8	7	<0.01	3.11	1.59	8.99	2.81	0.07	<0.01	0.08
B9158	<1	<0.1	1	86	3	56	<5	10	<0.1	50	33	1488	7	26	241	39	<5	0.4	10	5	0.02	3.00	1.28	9.25	2.86	0.07	<0.01	0.08
B9159	11	<0.1	2	1835	<1	23	11	<5	<0.1	34	36	717	6	51	124	119	<5	0.3	9	12	0.04	1.05	0.73	8.52	0.78	0.15	<0.01	0.09
STD-NP1-P1	125	0.2	58	25	53	139	21	8	0.3	34	5	592	2	94	32	176	<5	0.4	7	77	0.09	0.98	0.85	2.33	0.85	0.35	0.06	0.08
B9160	3	<0.1	3	571	6	57	<5	8	<0.1	58	33	1732	8	25	295	48	<5	0.6	7	5	<0.01	3.23	1.37	11.39	3.11	0.06	<0.01	0.08
B9161	1	<0.1	3	541	3	35	<5	<5	<0.1	38	35	723	6	61	79	72	<5	0.2	24	4	0.02	1.91	0.46	5.88	1.91	0.09	<0.01	0.05
B9201	3	<0.1	10	50	7	14	10	7	<0.1	31	25	3432	<2	38	26	106	<5	0.8	12	12	0.02	0.87	5.10	5.32	2.97	0.17	0.01	0.06
B9202	6	0.3	10	7.00%	5	<1	8	<5	<0.1	28	11	1805	<2	38	18	23	<5	0.6	5	7	<0.01	0.63	3.19	8.67	1.68	0.17	<0.01	0.09
B9203	4	0.9	7	0.54%	4	10	21	8	<0.1	21	12	4235	<2	38	24	52	<5	0.5	7	17	<0.01	0.68	7.36	3.89	3.79	0.11	0.01	0.05
B9204	3	<0.1	4	197	19	27	11	6	<0.1	30	10	2447	<2	32	35	220	<5	0.4	4	9	<0.01	1.67	3.88	4.68	2.58	0.11	<0.01	0.05
B9205	9	0.3	10	0.54%	6	11	61	11	<0.1	37	22	2278	<2	44	38	32	<5	0.3	4	12	<0.01	0.88	4.49	3.28	3.18	0.10	<0.01	0.05
B9206	13	1.5	5	2.58%	2	3	<5	<5	<0.1	41	19	351	6	53	23	27	<5	0.3	6	2	<0.01	1.00	0.37	4.88	1.09	0.13	<0.01	0.07
B9207	<1	<0.1	6	65	7	10	14	11	<0.1	13	6	12638	<2	4	16	8	<5	0.5	5	25	<0.01	0.23	11.43	4.13	5.30	0.07	0.02	0.02
B9207*	<1	<0.1	7	64	6	19	16	13	0.2	15	7	12998	<2	5	17	9	<5	0.7	6	29	<0.01	0.28	11.50	4.33	5.35	0.08	0.02	0.03

PLACER DOME RESEARCH CENTRE
Geochemical Analysis

Project/Venture: V810
Area: BLACKSTONE 116B14
Geol: G SHEVCHENKO
Lab Project No.: D2433
Date Received: JULY 20, 1992
Date Completed: AUG 4, 1992
Attn: G SHEVCHENKO, J KOWALCHUK, E KIMURA

Remarks:
Au – 10.0 g sample digested with Aqua Regia and determined by Graphite Furnace A.A. (D.L. 1 PPB)
ICP – 0.5 g sample digested with 4 ml Aqua Regia at 100 Deg. C for 2 hours.
N.B. The major oxide elements, Ba, Be, Cr, La and W are rarely dissolved completely with this acid dissolution method

SAMPLE No.	Au ppb	Ag ppm	Mo ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm	Cd ppm	Ni ppm	Co ppm	Mn ppm	Bi ppm	Cr ppm	V ppm	Ba ppm	W ppm	Be ppm	La ppm	Sr ppm	Ti %	Al %	Ca %	Fe %	Mg %	K %	Na %	P %
B9208	1	<0.1	5	116	11	11	11	<5	0.3	17	8	2864	2	96	23	14	<5	0.3	8	15	<0.01	0.24	5.76	1.73	3.48	0.04	0.01	0.02
B9209	2	1.0	10	83	32	14	30	6	<0.1	34	17	2213	10	117	11	15	<5	0.2	8	10	<0.01	0.03	3.27	7.46	1.81	0.03	0.01	0.02
B9210	<1	<0.1	4	<1	5	9	10	<5	0.4	12	6	4070	<2	52	14	38	<5	0.3	9	17	<0.01	0.04	7.44	1.84	4.46	0.05	0.02	0.02
B9211	2	0.6	6	324	1787	45	17	<5	0.3	23	13	4816	<2	28	25	43	<5	0.7	17	22	<0.01	0.67	8.09	3.06	5.31	0.14	0.02	0.04
B9212	11	0.6	31	1514	52	18	23	<5	<0.1	45	27	1034	7	60	28	41	<5	0.9	21	6	<0.01	1.14	1.38	3.40	1.43	0.21	<0.01	0.05
B9213	6	2.0	5	5.00%	9	<1	11	<5	<0.1	37	9	598	27	108	15	27	<5	0.4	12	3	0.02	0.20	0.65	8.90	0.30	0.17	0.01	0.09
B9214	10	0.6	4	1.97%	9	32	<5	<5	<0.1	77	42	1225	9	26	264	45	<5	0.8	12	7	<0.01	3.59	3.30	8.96	5.60	0.08	0.02	0.10
B9215	1	<0.1	<1	76	11	41	<5	<5	<0.1	63	64	585	4	24	104	72	<5	1.0	14	9	0.01	3.80	1.38	9.04	4.83	0.03	0.03	0.36
B9215*	1	0.1	3	76	9	41	<5	<5	<0.1	60	64	570	2	24	101	76	<5	1.0	14	9	0.01	3.69	1.33	8.90	4.70	0.03	0.03	0.35

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SAMPLE #	SiO2 %	TiO2 %	Al2O3 %	Fe2O3 %	MnO %	MgO %	CaO %	Na2O %	K2O %	P2O5 %	Ba ppm	Sr ppm	Zr ppm	Y ppm	LOI %	TOTAL %
B8876	55.12	0.55	11.51	11.13	0.10	3.30	6.51	1.56	3.68	0.28	396	40	179	18	7.17	100.89
B8877	52.22	0.54	11.34	8.20	0.14	3.86	8.72	0.90	3.88	0.20	402	46	166	20	9.72	99.72
B8878	53.54	0.54	12.54	7.92	0.12	4.04	6.94	1.78	4.00	0.20	562	40	178	12	7.58	99.20
B8879	48.24	0.50	11.16	5.90	0.22	3.40	14.16	0.70	3.44	0.24	508	98	156	12	13.04	100.98
B8880	43.58	0.46	9.24	4.38	0.40	2.14	19.00	1.66	2.44	0.20	434	200	194	24	16.76	100.26
B8881	38.49	0.42	8.50	3.98	0.47	2.38	22.48	1.65	2.20	0.26	315	238	178	24	19.81	100.64
B8882	51.48	0.50	10.30	4.10	0.30	6.06	8.92	0.12	3.96	0.36	448	28	180	24	13.38	99.48
B8883	41.93	0.44	9.02	3.14	0.46	8.60	13.21	0.81	3.10	0.36	473	38	177	28	19.69	100.79
B8884	65.22	1.00	14.42	6.00	0.08	4.04	0.82	4.40	1.04	0.32	278	90	438	32	3.38	100.70
B8885	47.66	1.62	14.70	11.02	0.22	6.56	4.30	2.14	2.16	0.16	436	42	106	28	9.08	99.62
B8886	60.45	1.55	15.44	8.35	0.08	5.54	0.57	0.37	4.06	0.30	484	7	135	14	3.82	100.54
B8887	64.20	0.70	14.60	6.42	0.02	3.30	0.32	3.94	1.52	0.20	248	58	108	8	2.76	98.00
B8888	50.88	1.90	11.88	20.32	0.14	5.08	1.04	0.12	4.24	0.52	424	18	164	32	4.10	100.20
B8889	54.38	1.20	10.68	19.16	0.10	5.02	0.86	0.06	3.00	0.60	266	12	144	36	4.24	99.32
B8890	49.00	1.88	12.62	18.90	0.18	5.00	1.50	0.06	5.52	0.24	556	18	150	28	4.62	99.52
B8891	53.84	0.66	12.10	16.44	0.10	5.20	0.64	0.08	4.20	0.36	336	10	156	24	3.88	97.52
B8892	8.96	0.12	1.66	88.28	<0.02	0.34	0.14	0.12	0.60	0.04	120	4	30	16	0.48	100.76
B8911	70.84	0.34	7.74	10.18	0.10	1.52	0.36	0.08	5.00	0.12	1030	24	242	12	1.54	97.86
B8915	65.52	0.52	13.18	6.06	0.04	3.64	0.04	0.08	6.32	0.12	1164	56	388	16	3.08	98.54
B8926	56.10	0.58	14.34	13.78	0.06	3.70	0.34	0.12	6.48	0.20	756	20	164	12	3.10	98.78
B8927	61.85	0.57	13.90	11.23	0.03	3.16	0.12	0.09	6.66	0.20	742	28	201	20	2.59	100.39
B8928	55.72	0.64	14.00	7.76	0.26	3.56	2.96	0.08	7.08	0.24	706	22	188	16	5.74	98.02
B8929	58.66	0.46	10.34	4.46	0.26	4.22	5.82	0.08	5.84	0.32	450	24	176	12	9.70	100.14
B8930	55.88	0.24	6.84	7.20	0.98	5.60	7.56	0.06	3.08	0.12	664	38	82	8	12.52	100.08
B8931	47.38	0.24	5.92	8.02	1.34	7.22	11.40	0.08	2.40	0.36	442	46	100	8	16.30	100.64
B8932	55.24	0.18	4.44	4.66	1.26	5.34	9.66	0.08	2.68	0.08	672	46	72	16	15.08	98.70
B8933	44.88	0.34	7.52	5.24	1.00	6.12	11.70	0.08	5.64	0.12	1006	36	128	24	17.14	99.76
B8934	59.12	0.70	12.56	12.50	0.08	3.38	0.24	0.12	6.60	0.16	3054	44	172	8	3.30	98.78
B8935	0.26	0.04	0.16	1.92	0.48	20.10	29.64	0.04	0.40	<0.04	136	34	26	8	44.82	97.80
B8936	57.66	1.28	13.04	8.68	0.18	3.22	1.74	0.10	8.52	0.20	1240	18	154	16	3.28	97.90
B8937	62.15	0.48	12.37	12.02	0.10	2.23	1.44	0.13	5.74	0.20	395	23	242	18	3.67	100.52
B8938	62.64	0.22	5.94	7.98	0.46	3.56	6.12	0.08	2.28	0.08	544	22	62	12	9.28	98.64
B8939	53.00	0.56	13.02	10.22	0.32	5.48	3.82	0.06	4.96	0.08	1474	42	86	12	7.28	98.82
B8940	61.82	0.52	13.44	8.32	0.06	2.92	0.76	0.10	6.80	0.16	750	22	152	24	2.70	97.60
B8941	53.62	0.34	8.08	5.90	0.98	4.86	8.06	0.10	4.72	0.12	1014	36	128	16	12.18	98.94
B8942	51.70	0.34	7.16	5.54	1.18	5.46	9.36	0.06	4.52	0.16	1502	48	168	12	13.88	99.38
B8943	55.01	0.43	8.43	5.41	1.08	4.45	8.15	0.12	5.46	0.16	917	57	268	22	12.20	100.91
B8944	48.58	0.32	6.42	6.02	1.46	6.02	10.96	0.08	4.04	0.16	1938	76	180	16	15.92	99.92
B8945	62.66	0.32	6.44	15.14	0.30	1.76	1.74	0.06	3.60	0.16	5668	62	168	16	5.54	97.68
B8946	53.40	0.16	3.38	6.38	1.50	6.22	10.66	0.12	1.48	0.08	1308	60	80	8	16.36	99.72
B8947	60.30	0.10	3.10	6.08	0.92	4.94	8.28	0.20	1.16	0.08	248	36	54	12	13.06	98.20
B8948	74.76	0.06	1.66	4.78	0.84	3.12	5.54	0.04	0.48	<0.04	188	22	42	4	8.90	100.18
B8949	59.98	0.15	3.91	8.32	1.18	5.47	8.02	0.03	0.98	0.02	240	22	73	8	12.51	100.57
B8950	76.39	0.08	1.87	4.87	0.69	3.05	5.13	0.06	0.52	0.04	186	19	39	4	7.79	100.49
B8951	27.46	0.22	5.32	5.94	0.64	7.76	23.04	0.70	1.36	0.20	342	132	90	32	27.24	99.88
B8952	61.40	0.04	0.80	2.38	0.44	6.40	10.12	0.04	0.24	0.12	56	18	30	12	15.52	97.50
B8953	47.14	0.16	3.98	7.24	0.64	7.22	12.76	0.06	1.48	0.08	180	34	74	8	19.38	100.14
B8954	64.40	0.50	11.90	6.00	0.18	4.00	1.64	0.12	7.20	0.16	524	12	214	68	4.10	100.18
B8955	49.44	0.40	8.58	8.50	0.70	4.66	9.86	0.08	5.00	0.12	662	34	142	20	13.56	100.92
B8956	45.74	0.34	7.64	7.26	0.54	6.12	10.36	0.06	4.80	0.16	338	26	140	44	16.26	99.26
B8957	48.38	0.41	10.64	6.91	0.51	5.24	8.50	<0.01	5.86	0.16	528	27	173	16	13.53	100.14
B8958	48.04	0.46	12.10	8.38	0.44	6.38	6.46	0.08	5.56	0.16	446	24	204	12	11.38	99.44
B8959	46.54	0.26	7.24	7.16	0.68	7.80	10.40	0.06	2.64	0.12	246	22	90	20	17.08	99.94
B8960	24.54	0.20	4.10	3.40	0.82	12.72	19.70	0.06	3.28	0.12	240	26	126	8	30.88	99.82
B8961	58.62	0.50	11.76	7.18	0.20	3.64	3.40	0.08	8.72	0.12	510	26	192	20	5.56	99.80

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SAMPLE #	SiO2 %	TiO2 %	Al2O3 %	Fe2O3 %	MnO %	MgO %	CaO %	Na2O %	K2O %	P2O5 %	Ba ppm	Sr ppm	Zr ppm	Y ppm	LOI %	TOTAL %
B8962	47.14	0.32	8.06	5.70	0.58	5.94	10.24	0.08	6.84	0.12	284	26	208	32	15.88	100.92
B8963	58.77	0.53	11.39	16.30	0.10	1.74	1.08	0.14	8.06	0.34	476	23	168	20	2.08	100.55
B8964	49.88	1.74	13.60	11.16	0.22	6.10	3.00	0.18	7.84	0.24	332	20	102	20	6.66	100.60
B8965	41.54	0.58	12.52	11.14	0.48	4.48	6.78	0.12	10.88	0.40	550	26	138	28	10.44	99.34
B8966	58.44	0.54	11.02	9.32	0.26	2.08	3.44	0.12	9.92	0.16	474	26	174	16	5.14	100.42
B8967	41.33	0.19	4.85	47.98	0.05	0.26	0.67	0.19	4.06	0.24	251	19	74	14	0.73	100.55
B8968	57.12	0.54	12.32	9.78	0.18	3.72	2.58	0.12	8.68	0.12	386	24	190	20	5.02	100.18
B8969	54.36	0.46	11.28	5.84	0.36	3.52	6.16	0.10	9.08	0.08	504	32	158	12	9.34	100.58
B8970	57.30	0.60	14.14	9.96	0.08	4.58	0.84	0.12	8.36	0.20	634	28	176	16	3.28	99.50
B8971	53.26	0.50	10.60	9.00	0.56	6.70	5.28	0.06	3.16	0.08	494	34	74	12	10.42	99.62
B8972	44.74	0.28	5.76	6.46	1.28	6.62	11.90	0.04	3.76	0.20	566	64	174	16	18.00	99.00
B8973	53.19	1.73	12.52	15.67	0.16	4.30	1.68	0.09	7.40	0.20	660	24	136	22	3.57	100.52
B8974	57.62	0.46	9.92	20.08	0.04	2.34	0.34	0.10	5.60	0.28	830	18	156	12	2.32	99.08
B8975	49.88	2.06	14.88	13.64	0.14	6.60	0.74	0.06	6.24	0.40	446	12	130	16	4.62	99.26
B8976	54.62	0.80	10.46	5.62	0.32	5.64	6.22	0.08	3.44	0.24	466	30	232	16	10.96	98.40
B8977	53.18	0.40	4.35	38.38	0.03	0.23	0.12	0.15	1.60	0.14	207	69	405	16	1.25	99.84
B8978	51.86	0.54	11.74	7.50	0.28	5.72	6.70	0.12	6.28	0.20	1686	76	140	20	8.28	99.20
B8979	27.80	0.16	3.34	5.02	0.88	12.02	19.14	0.02	1.24	0.08	112	30	66	16	29.12	98.82
B8980	57.22	0.58	13.48	10.62	0.08	5.22	1.46	3.58	2.24	0.20	270	26	186	4	3.88	98.56
B8981	56.90	0.70	15.06	9.08	0.08	6.44	0.94	2.42	5.12	0.16	296	10	132	12	3.82	100.68
B8982	56.22	0.64	15.52	10.04	0.08	4.32	1.24	3.34	4.44	0.12	538	28	142	16	3.74	99.66
B8983	68.40	0.38	10.40	6.78	0.06	2.80	1.62	2.00	4.04	0.12	600	114	150	< 4	2.84	99.42
B8984	45.99	1.26	14.50	13.38	0.28	8.80	5.78	2.62	1.46	0.14	542	161	70	20	6.27	100.48
B8985	12.64	0.24	2.76	38.76	0.12	1.76	0.12	<0.02	0.44	17.52	300	6	76	12	14.90	89.24
B8986	71.90	0.30	6.80	7.48	0.08	3.08	1.76	1.68	1.04	0.56	170	10	196	4	3.42	98.08
B8987	53.77	0.46	13.23	8.05	0.27	2.79	4.39	0.21	10.96	0.24	391	20	180	32	6.30	100.67
B8988	47.34	1.46	13.42	15.62	0.28	8.12	2.18	0.08	5.24	0.32	736	10	110	16	6.42	100.48
B8989	49.50	0.48	11.90	10.28	0.34	3.06	5.56	0.08	10.04	0.20	598	24	152	16	8.36	99.84
B8990	50.82	0.46	11.54	9.88	0.34	2.92	5.52	0.08	9.76	0.20	572	28	160	16	8.08	99.60
B8991	28.14	0.06	1.10	4.50	1.28	12.16	20.42	0.06	0.24	0.28	188	72	64	16	30.68	98.88
B8992	54.68	0.38	8.48	6.50	0.62	5.46	7.56	0.06	4.60	0.20	748	56	292	16	11.90	100.42
B8993	40.46	0.42	9.56	5.74	0.44	2.90	19.30	0.04	3.32	0.32	414	232	26	24	18.18	100.64
B8994	38.22	0.43	9.73	4.46	0.39	4.13	19.58	0.55	2.98	0.26	547	141	19	26	19.69	100.40
B8995	43.58	2.00	15.16	12.40	0.46	6.52	3.64	0.16	7.32	0.72	456	10	154	32	6.68	98.64
B8996	61.76	0.40	7.34	2.92	0.30	4.34	7.12	0.08	4.88	0.36	262	24	216	16	10.56	100.06
B8997	61.70	0.58	13.14	8.42	0.10	6.02	1.60	0.06	2.96	0.44	184	10	168	12	5.68	100.64
B9151	41.84	0.44	9.50	5.04	0.40	3.10	18.68	0.06	3.20	0.24	412	172	138	20	18.14	100.64
B9152	60.46	0.20	8.74	3.54	0.34	4.02	6.12	0.04	4.28	0.08	496	12	146	20	9.92	97.76
B9153	57.04	0.52	12.28	7.24	0.18	3.18	3.76	0.08	7.60	0.40	510	20	224	16	6.92	99.22
B9154	53.80	0.52	11.58	9.54	0.28	4.52	4.70	0.06	6.04	0.44	516	24	208	16	8.18	99.68
B9155	44.18	0.42	9.38	3.46	0.42	3.30	16.06	2.72	2.20	0.24	456	204	168	28	16.84	99.18
B9156	45.96	2.18	13.68	19.70	0.34	5.38	1.76	0.12	5.52	0.20	1250	42	156	36	5.56	100.42
B9157	49.42	2.02	12.98	15.30	0.30	4.84	2.32	0.06	5.96	0.24	830	30	154	36	5.88	99.30
B9158	50.06	1.80	12.62	17.66	0.20	5.02	1.90	0.04	5.80	0.20	544	18	150	28	5.38	100.72
B9159	54.42	0.92	11.38	19.26	0.10	1.48	1.10	0.08	7.80	0.44	962	26	10	24	2.20	99.16
B9160	45.78	1.84	12.96	19.60	0.24	5.70	2.32	0.16	5.52	0.24	426	26	158	40	5.58	99.96
B9161	64.08	0.58	11.78	9.64	0.10	3.30	0.78	0.08	6.80	0.20	768	16	228	20	2.82	100.16
B9162	49.40	0.18	4.74	6.26	0.88	6.84	11.42	0.04	1.96	0.08	490	40	< 2	12	17.64	99.44
B9163	61.04	0.54	13.28	9.36	0.12	2.72	0.92	0.06	6.08	0.16	816	22	226	16	3.28	97.52
B9164	62.44	0.86	10.90	10.84	0.14	2.02	1.20	0.08	6.40	0.32	410	12	222	20	2.78	97.96
B9165	58.12	0.08	2.02	10.92	0.58	2.96	5.28	0.04	0.32	3.44	78	10	30	12	3.84	87.58
B9166	71.06	0.88	7.72	9.08	0.16	3.28	0.12	0.06	2.80	0.76	374	6	178	8	3.02	98.94
B9167	70.50	0.46	11.44	4.74	0.06	1.90	0.28	0.14	7.56	0.24	1364	24	126	8	1.98	99.30
B9168	69.22	0.04	1.10	6.04	0.64	3.36	7.38	0.02	0.20	0.48	38	20	32	8	10.06	98.56
B9201	48.28	0.36	9.20	10.58	0.46	5.82	8.06	0.06	4.92	0.12	464	28	142	56	12.74	100.62

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SAMPLE #	SiO2 %	TiO2 %	Al2O3 %	Fe2O3 %	MnO %	MgO %	CaO %	Na2O %	K2O %	P2O5 %	Ba ppm	Sr ppm	Zr ppm	Y ppm	LOI %	TOTAL %
B9202	42.76	0.30	6.76	15.12	0.24	3.46	4.88	0.06	3.44	4.36	530	18	156	24	4.66	85.98
B9203	45.38	0.24	6.00	6.36	0.60	7.48	12.34	0.02	2.76	0.68	312	24	86	24	17.96	99.80
B9204	60.70	0.28	7.42	7.20	0.32	4.92	6.00	0.04	2.36	0.16	432	14	64	12	9.38	98.78
B9205	48.74	0.46	10.60	5.22	0.32	6.12	7.36	0.10	7.48	0.60	686	24	220	16	10.68	97.66
B9206	63.68	0.48	11.04	7.18	0.04	2.04	0.66	0.10	7.40	2.00	518	16	224	12	2.96	97.58
B9207	24.32	0.08	1.76	7.04	1.98	10.86	21.20	<0.02	0.56	0.04	44	28	82	12	30.68	98.54
B9208	65.70	0.10	1.24	2.46	0.40	5.64	8.70	<0.02	0.56	<0.04	110	18	10	4	12.88	97.72
B9209	68.80	0.02	0.22	10.72	0.30	2.96	4.92	0.04	0.08	<0.04	44	12	12	< 4	4.30	92.32
B9210	53.94	0.08	1.92	2.82	0.58	7.56	12.28	0.02	1.40	<0.04	218	20	< 2	4	18.36	98.96
B9211	42.80	0.24	5.58	4.54	0.64	8.96	12.96	0.04	2.40	0.08	272	28	72	20	20.30	98.56
B9212	71.50	0.30	9.02	5.20	0.12	2.88	1.98	0.18	3.32	0.28	366	26	66	12	4.14	98.90
B9213	58.50	0.26	5.70	15.90	0.08	0.70	0.96	0.04	3.56	3.72	310	16	310	20	3.04	92.42
B9214	41.40	1.86	12.44	15.68	0.16	9.16	4.92	2.70	0.36	1.56	110	18	146	28	7.58	97.82
B9215	51.42	1.74	12.74	14.28	0.08	7.40	2.12	3.16	0.20	0.92	152	26	502	52	4.60	98.62
B9216	62.54	0.50	12.10	10.10	0.04	3.38	0.18	0.12	6.00	0.16	1122	26	268	20	2.70	97.78
B9217	61.68	0.50	12.04	10.60	0.14	3.02	1.26	0.06	6.56	0.16	1594	32	250	24	3.56	99.56
B9218	60.94	0.56	13.26	8.78	0.14	2.74	1.58	0.08	7.00	0.32	550	18	218	16	4.02	99.44
B9219	58.84	0.48	11.48	16.48	0.06	1.94	0.50	0.06	5.60	0.48	618	20	200	16	2.66	98.56
B9220	63.98	0.56	11.88	9.74	0.12	3.06	1.14	0.06	5.52	0.20	560	20	256	24	3.56	99.82
B9221	49.32	0.40	9.70	9.68	0.46	5.86	6.56	0.06	4.40	0.16	342	26	140	20	11.64	98.28
B9222	62.22	0.06	1.14	5.18	0.60	5.88	8.62	0.02	0.44	0.96	356	22	40	8	12.68	97.76
B9223	65.36	0.44	11.30	10.20	0.06	2.56	0.46	0.08	5.40	0.16	766	24	284	12	2.74	98.72
B9224	54.18	0.96	12.52	11.98	0.18	3.72	2.96	0.06	6.84	0.24	686	26	162	36	5.80	99.46
B9225	52.48	0.46	12.64	11.68	0.76	3.50	4.12	0.08	5.56	0.16	1950	36	142	24	7.24	98.68
B9244	60.32	0.44	9.98	14.58	0.08	4.86	0.64	2.12	0.32	1.24	230	8	160	4	3.92	98.48
B9245	55.48	0.54	10.90	8.44	0.30	3.64	5.02	0.10	7.56	0.52	572	24	182	16	7.52	100.02
B11126	53.32	0.42	11.52	11.80	0.70	3.68	4.02	0.08	4.72	0.16	2234	42	130	28	7.34	97.76
B11127	55.34	0.46	12.28	11.48	0.56	3.58	3.00	0.06	5.04	0.16	2246	42	136	24	6.08	98.04
B11128	47.58	0.40	10.32	9.18	1.32	5.08	7.30	0.06	4.76	0.20	1976	58	172	16	12.44	98.60
B11129	53.80	0.34	8.02	4.38	1.24	4.16	8.24	0.08	6.32	0.16	1962	62	220	20	12.60	99.26
B11151	47.12	0.56	14.38	15.10	0.38	7.12	2.64	0.16	4.84	0.16	2604	38	84	20	6.74	99.18
B11152	56.78	0.52	13.30	11.14	0.12	5.56	0.12	0.08	6.76	0.12	1478	30	158	24	4.40	98.94
B11153	58.18	0.04	0.26	3.86	0.78	5.96	11.18	0.04	0.16	<0.04	100	18	26	12	17.10	97.56
B11154	72.56	0.08	2.10	4.78	0.40	3.56	5.36	0.02	0.40	0.44	86	14	30	8	7.80	97.50
B11155	65.66	0.46	11.26	4.36	0.16	2.18	1.88	0.10	8.40	0.64	876	20	160	8	2.56	97.68
B11156	66.40	0.48	11.46	6.48	0.12	1.80	0.54	0.06	6.64	1.32	766	16	192	12	2.52	97.82
B11157	66.80	0.50	11.64	5.38	0.10	1.82	0.54	0.06	7.52	0.88	844	18	194	16	2.42	97.66
B11158	41.56	0.48	9.26	5.78	0.42	7.96	11.24	0.12	3.72	0.40	498	42	154	24	18.22	99.14
B11159	45.22	0.48	12.48	5.40	0.32	3.30	13.04	0.22	4.44	0.24	540	160	102	20	13.34	98.50
B11160	37.22	0.36	9.04	4.26	0.36	3.36	20.68	0.06	3.16	0.24	390	146	116	20	19.64	98.38
B11161	46.32	0.56	11.90	5.58	0.38	3.84	11.86	0.50	4.32	0.24	548	200	120	24	13.72	99.22
B11162	55.46	0.06	1.36	3.32	0.56	6.60	12.12	0.02	0.44	0.24	100	24	42	12	17.84	97.98

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Sample description	SC PPM	SE PPM	SR %	TA PPM	TH PPM	U PPM	LA PPM	CE PPM	ND PPM	SM PPM	EU PPM	TB PPM	YB PPM	LU PPM	Mass g
B8876	9.0	<3	<0.05	<1	9.6	2.9	15.0	30	13	2.7	0.7	<0.5	1.3	0.22	1.630
B8877	9.6	<3	<0.05	<1	9.8	2.9	32.6	64	31	4.5	1.1	0.7	1.5	0.25	1.770
B8878	9.6	<3	<0.05	<1	11	2.2	22.6	42	19	3.1	0.9	<0.5	1.2	0.22	1.720
B8879	8.2	<3	<0.05	<1	12	3.2	31.9	61	26	4.4	1.1	<0.5	1.5	0.24	1.548
B8880	6.6	<3	<0.05	<1	11	3.5	33.6	64	25	4.7	1.0	0.6	1.7	0.29	1.878
B8881	6.1	<3	<0.05	<1	10	3.8	22.6	45	18	3.9	0.9	0.7	1.7	0.29	1.946
B8882	7.7	<3	<0.05	<1	11	3.4	11.9	25	11	2.5	0.7	0.6	2.0	0.27	1.902
B8883	6.3	<3	<0.05	<1	10	5.8	10.5	24	10	2.6	0.9	0.8	2.5	0.35	1.780
B8884	12	<3	<0.05	<1	6.2	2.1	7.0	12	8	2.4	0.7	0.6	3.7	0.65	1.678
B8885	38	<3	<0.05	<1	0.8	<0.5	12.3	25	13	3.3	1.2	0.7	2.4	0.41	1.937
B8886	17	<3	<0.05	<1	0.5	0.7	3.1	8	<5	1.1	0.3	<0.5	1.5	0.24	1.761
B8887	6.0	<3	<0.05	1	11	2.6	9.9	19	8	1.3	0.4	<0.5	1.0	0.17	1.774
B8888	20	<3	<0.05	<1	6.0	2.0	36.1	69	28	5.4	1.4	0.8	3.4	0.54	1.943
B8889	17	<3	<0.05	<1	6.7	1.7	30.8	60	25	4.3	1.2	0.8	2.8	0.45	1.907
B8890	24	<3	<0.05	<1	4.4	1.9	13.9	31	19	3.5	1.0	0.7	3.2	0.52	1.962
B8891	13	<3	<0.05	<1	9.3	1.1	42.6	86	38	6.6	1.6	0.7	2.0	0.30	1.916
B8892	2.1	<3	<0.05	<1	1.5	2.3	9.3	14	5	0.9	0.3	<0.5	0.3	<0.05	3.083
B8911	4.7	<3	<0.05	<1	8.7	3.1	20.9	38	17	3.0	0.8	<0.5	1.4	0.23	1.711
B8915	9.7	<3	<0.05	<1	11	1.9	22.5	50	24	4.0	1.0	<0.5	1.7	0.26	1.747
B8926	9.4	<3	<0.05	<1	12	2.4	13.3	24	10	2.0	0.5	<0.5	1.3	0.22	2.021
B8927	7.4	<3	<0.05	<1	13	4.1	37.0	67	25	4.0	1.0	<0.5	1.4	0.24	1.745
B8928	10	<3	<0.05	1	14	3.6	55.0	100	40	5.9	1.5	<0.5	1.8	0.29	1.878
B8929	7.4	<3	<0.05	<1	11	3.9	48.0	87	34	5.3	1.3	<0.5	1.8	0.26	1.703
B8930	6.5	<3	<0.05	<1	4.0	2.9	6.5	14	6	1.7	0.5	<0.5	0.9	0.12	1.878
B8931	5.2	<3	<0.05	<1	6.2	3.0	28.6	55	21	3.3	0.8	0.5	1.1	0.19	1.941
B8932	3.2	<3	<0.05	<1	3.9	3.4	11.8	23	9	1.8	0.5	<0.5	0.7	0.10	1.855
B8933	6.6	<3	<0.05	<1	8.7	2.7	33.5	76	27	5.0	1.0	0.6	2.0	0.32	1.815
B8934	11	<3	<0.05	<1	11	2.9	10.4	20	7	1.5	0.5	<0.5	1.4	0.25	1.781
B8935	1.8	<3	<0.05	<1	<0.5	0.5	2.2	5	<5	0.8	0.2	<0.5	0.6	0.11	2.103
B8936	7.3	<3	<0.05	<1	7.9	2.4	8.3	19	9	1.8	0.6	<0.5	2.3	0.41	1.785
B8937	9.0	<3	<0.05	<1	12	3.1	49.3	85	33	5.5	1.4	0.7	1.7	0.27	1.798
B8938	4.6	<3	<0.05	<1	5.3	1.9	18.2	33	12	2.1	0.7	<0.5	0.8	0.13	1.657
B8939	24	<3	<0.05	<1	4.0	4.2	17.6	35	16	2.8	0.8	0.5	1.5	0.23	1.770
B8940	11	<3	<0.05	<1	13	2.7	43.4	79	32	4.8	1.1	<0.5	2.0	0.31	1.717
B8941	6.0	<3	<0.05	<1	8.7	4.2	22.2	40	16	2.8	0.7	<0.5	1.5	0.21	1.994
B8942	4.9	<3	<0.05	<1	8.4	4.9	22.0	40	16	2.9	0.7	<0.5	1.3	0.22	1.784
B8943	5.0	<3	<0.05	<1	10	4.2	19.6	40	19	3.3	0.8	<0.5	1.9	0.27	1.894
B8944	4.5	<3	<0.05	<1	7.9	4.9	21.9	43	15	3.2	0.8	<0.5	1.3	0.21	1.729
B8945	3.7	<3	<0.05	<1	8.0	3.2	21.1	42	16	3.0	0.7	<0.5	1.3	0.22	1.603
B8946	2.8	<3	<0.05	<1	3.4	2.0	9.4	19	8	1.6	0.5	<0.5	0.7	0.10	1.839
B8947	2.3	<3	<0.05	<1	2.3	1.2	4.6	10	<5	1.1	0.4	<0.5	0.7	0.08	1.957
B8948	1.3	<3	<0.05	<1	1.5	1.2	11.0	22	8	1.6	0.5	<0.5	0.5	0.08	2.170
B8949	3.0	<3	<0.05	<1	3.0	1.7	13.8	28	12	2.1	0.6	<0.5	0.8	0.12	1.913
B8950	1.3	<3	<0.05	<1	1.3	1.3	9.0	19	8	1.3	0.4	<0.5	0.5	0.07	1.761
B8951	5.6	<3	<0.05	<1	8.7	3.7	207	382	153	22	3.8	1.5	1.6	0.27	1.927

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Sample description	SC PPM	SE PPM	SR %	TA PPM	TH PPM	U PPM	LA PPM	CE PPM	ND PPM	SM PPM	EU PPM	TB PPM	YB PPM	LU PPM	Mass g
B8952	3.8	<3	<0.05	<1	0.9	1.8	26.8	38	13	2.3	0.5	<0.5	0.7	0.09	2.352
B8953	3.6	<3	<0.05	<1	3.6	1.2	25.2	48	20	3.1	0.8	<0.5	0.9	0.14	2.101
B8954	6.8	<3	<0.05	<1	11	1.2	19.1	37	17	2.6	0.6	<0.5	1.3	0.22	1.885
B8955	7.6	<3	<0.05	<1	9.3	2.9	38.3	68	28	5.0	1.3	0.6	1.9	0.29	1.831
B8956	6.0	<3	<0.05	<1	7.7	2.2	39.0	72	32	6.3	1.9	1.2	2.7	0.38	1.899
B8957	9.4	<3	<0.05	<1	9.0	2.1	44.5	79	32	5.4	1.5	0.7	1.8	0.27	1.907
B8958	9.7	<3	<0.05	<1	8.5	2.9	32.5	60	24	4.0	1.0	0.5	1.4	0.22	1.958
B8959	6.8	<3	<0.05	<1	4.3	3.0	22.7	45	19	3.6	0.8	0.6	1.5	0.22	1.856
B8960	3.0	<3	<0.05	<1	4.6	1.6	13.4	27	12	2.0	0.5	<0.5	0.8	0.12	2.211
B8961	7.5	<3	<0.05	1	12	2.4	112	187	70	11	2.6	0.8	1.6	0.27	1.800
B8962	7.5	<3	<0.05	<1	7.5	1.4	26.4	56	22	4.6	1.4	0.9	2.3	0.31	2.015
B8963	14	<3	<0.05	<1	11	4.7	106	176	74	11	2.6	0.9	1.9	0.26	1.966
B8964	28	<3	<0.05	<1	2.4	4.2	29.7	57	25	3.8	1.1	0.6	2.6	0.40	1.538
B8965	13	<3	<0.05	1	13	3.9	36.6	65	25	4.9	1.4	0.8	2.4	0.38	1.952
B8966	6.0	<3	<0.05	<1	11	3.1	42.9	74	27	4.4	1.2	<0.5	1.5	0.25	1.837
B8967	1.8	<3	<0.05	<1	4.2	5.0	47.0	58	17	2.4	1.8	<0.5	0.6	0.09	2.257
B8968	8.5	<3	<0.05	1	13	3.0	67.0	109	40	6.3	1.5	0.8	2.0	0.31	1.920
B8969	8.9	<3	<0.05	<1	10	2.3	31.0	61	26	4.2	1.0	0.6	1.8	0.28	1.821
B8970	8.7	<3	<0.05	<1	14	2.8	89.3	162	65	8.9	1.7	0.7	2.2	0.32	1.762
B8971	18	<3	<0.05	<1	2.3	0.8	17.1	34	14	2.7	0.8	<0.5	1.2	0.18	1.626
B8972	3.9	<3	<0.05	<1	6.2	3.2	13.7	31	13	2.8	0.6	<0.5	1.2	0.20	1.816
B8973	27	<3	<0.05	<1	4.3	1.1	23.6	46	21	4.6	1.1	<0.5	2.7	0.43	2.067
B8974	6.9	<3	<0.05	<1	9.3	4.8	31.2	56	20	3.7	1.0	<0.5	1.5	0.23	1.786
B8975	22	<3	<0.05	<1	3.2	1.8	7.9	16	7	1.4	0.5	<0.5	2.5	0.42	1.739
B8976	8.1	<3	<0.05	<1	14	6.2	31.8	61	25	4.1	0.8	<0.5	1.4	0.22	1.850
B8977	4.6	<3	<0.05	<1	8.7	11	28.2	50	19	3.8	1.5	0.5	1.4	0.22	2.044
B8978	9.9	<3	<0.05	<1	13	3.3	27.6	55	22	4.1	1.0	0.7	1.9	0.28	1.831
B8979	4.4	<3	<0.05	<1	3.1	1.8	17.0	32	14	2.7	0.7	<0.5	0.9	0.14	1.797
B8980	11	<3	<0.05	<1	13	3.3	25.3	47	19	3.3	0.8	<0.5	1.1	0.14	1.960
B8981	13	<3	<0.05	<1	16	2.6	9.9	21	10	2.2	0.8	<0.5	1.4	0.21	1.746
B8982	13	<3	<0.05	<1	14	3.3	43.4	78	38	5.6	1.3	<0.5	1.5	0.27	1.894
B8983	9.8	<3	<0.05	<1	7.8	2.1	3.7	8	<5	0.6	0.3	<0.5	0.6	0.11	1.993
B8984	39	<3	<0.05	<1	0.6	<0.5	4.8	13	8	2.3	0.7	<0.5	1.9	0.30	2.241
B8985	7.0	100	<0.05	<1	2.2	26	12.0	19	9	1.8	0.6	<0.5	0.9	0.14	2.403
B8986	5.3	<3	<0.05	<1	6.4	0.9	12.6	26	11	2.5	0.8	<0.5	1.0	0.17	1.851
B8987	10	<3	<0.05	<1	10	3.0	18.7	35	15	2.8	0.9	0.6	1.7	0.28	1.932
B8988	34	<3	<0.05	<1	2.4	0.9	19.6	36	16	3.4	0.9	<0.5	2.3	0.40	1.983
B8989	8.8	<3	<0.05	<1	11	2.9	45.8	76	29	4.5	1.3	0.6	1.9	0.28	1.984
B8990	8.4	<3	<0.05	1	11	3.4	40.8	70	28	4.2	1.1	<0.5	1.9	0.30	1.790
B8991	1.5	<3	<0.05	<1	1.0	2.2	3.3	8	<5	1.3	0.4	<0.5	0.6	0.09	1.780
B8992	5.7	<3	<0.05	<1	8.2	2.8	17.9	38	16	3.2	1.0	0.6	1.7	0.26	1.762
B8993	7.4	<3	<0.05	<1	12	4.5	73.0	135	60	8.8	1.6	0.7	1.5	0.26	2.063
B8994	7.2	<3	<0.05	<1	11	5.3	30.7	60	23	4.4	0.8	0.6	1.6	0.26	2.044
B8995	14	4	<0.05	<1	2.7	1.2	8.8	21	11	2.6	0.8	<0.5	3.5	0.53	1.823
B8996	4.0	<3	<0.05	<1	7.5	3.0	24.7	47	22	3.6	0.8	<0.5	1.4	0.23	1.800

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Sample description	SC PPM	SE PPM	SR %	TA PPM	TH PPM	U PPM	LA PPM	CE PPM	ND PPM	SM PPM	EU PPM	TB PPM	YB PPM	LU PPM	Mass g
B8997	9.3	<3	<0.05	<1	12	4.5	43.2	78	33	5.1	0.8	<0.5	1.3	0.22	1.785
B9151	6.9	<3	<0.05	<1	10	3.5	30.5	59	22	4.2	0.9	0.6	1.6	0.24	1.744
B9152	5.1	<3	<0.05	<1	14	3.2	31.6	55	19	3.5	1.1	<0.5	1.8	0.27	2.000
B9153	9.0	<3	<0.05	<1	12	3.2	53.6	97	40	6.1	1.4	0.7	1.8	0.26	1.773
B9154	8.9	<3	<0.05	<1	10	3.9	47.4	84	33	5.3	1.5	0.6	1.7	0.27	1.895
B9155	6.6	<3	<0.05	<1	11	4.2	28.7	56	28	4.7	1.1	0.8	1.8	0.26	1.904
B9156	29	<3	<0.05	<1	3.9	1.4	22.4	49	24	5.7	1.5	1.1	3.5	0.53	1.928
B9157	26	<3	<0.05	<1	4.1	2.4	18.7	43	19	4.7	1.2	0.8	3.8	0.57	1.762
B9158	21	<3	<0.05	<1	4.4	2.0	16.9	38	19	4.1	1.0	0.7	3.1	0.47	1.682
B9159	15	<3	<0.05	1	11	4.4	43.8	73	26	4.3	1.2	0.8	2.0	0.31	1.905
B9160	29	<3	<0.05	<1	4.4	1.8	15.2	31	14	3.3	1.0	0.7	3.3	0.51	2.072
B9161	10	<3	<0.05	<1	9.6	2.4	31.2	59	23	4.1	1.1	<0.5	1.7	0.26	1.802
B9162	3.9	<3	<0.05	<1	3.5	1.9	10.9	22	9	2.1	0.6	<0.5	0.9	0.13	2.112
B9163	9.5	<3	<0.05	<1	12	3.6	45.7	81	33	5.2	1.3	0.6	1.9	0.32	2.031
B9164	12	<3	<0.05	<1	8.3	3.7	39.0	68	27	4.6	1.1	<0.5	1.9	0.32	1.860
B9165	2.4	11	<0.05	<1	1.6	1.0	21.9	39	16	2.9	0.7	<0.5	0.5	0.06	2.074
B9166	11	<3	<0.05	<1	2.7	1.1	41.5	75	30	5.6	1.4	<0.5	1.0	0.16	1.802
B9167	6.4	<3	<0.05	<1	10	2.2	76.6	134	56	8.1	2.1	<0.5	1.1	0.17	1.774
B9168	1.2	<3	<0.05	<1	0.8	0.8	5.5	12	7	1.6	0.5	<0.5	0.4	0.06	2.157
B9201	6.9	<3	<0.05	<1	8.4	3.1	36.6	68	28	5.6	1.6	0.9	2.2	0.28	1.967
B9202	6.5	25	<0.05	<1	6.2	3.5	25.4	48	19	3.5	1.1	0.6	1.5	0.23	1.806
B9203	6.3	<3	<0.05	<1	5.0	4.2	25.5	51	20	3.6	1.0	0.7	1.7	0.25	1.918
B9204	7.0	<3	<0.05	<1	6.3	5.3	4.0	10	5	1.4	0.5	<0.5	1.0	0.14	1.987
B9205	7.7	<3	<0.05	<1	11	9.2	21.4	43	16	2.5	0.7	<0.5	1.4	0.20	1.933
B9206	6.0	4	<0.05	<1	12	8.8	39.4	79	31	3.6	1.0	<0.5	1.2	0.20	1.873
B9207	3.1	<3	<0.05	<1	1.5	1.3	8.4	20	9	2.0	1.1	<0.5	0.7	0.10	1.926
B9208	1.2	<3	<0.05	<1	0.5	1.0	1.6	4	<5	0.5	0.2	<0.5	0.3	<0.05	1.796
B9209	0.3	<3	<0.05	<1	<0.5	0.8	1.6	4	<5	0.3	0.1	<0.5	<0.1	<0.05	2.144
B9210	1.0	<3	<0.05	<1	1.6	0.8	5.8	13	<5	0.9	0.3	<0.5	0.4	0.05	1.950
B9211	5.5	<3	<0.05	<1	4.9	3.1	20.4	41	16	2.7	0.7	<0.5	1.1	0.15	1.841
B9212	5.0	<3	<0.05	<1	6.7	5.2	42.3	79	30	3.7	0.7	<0.5	0.7	0.08	1.950
B9213	3.3	8	<0.05	<1	7.2	5.9	20.6	39	13	2.6	0.9	<0.5	1.1	0.16	1.900
B9214	37	8	<0.05	<1	2.5	0.9	27.7	52	24	4.7	1.5	0.8	2.5	0.38	1.768
B9215	21	<3	<0.05	2	9.4	2.6	16.1	36	14	4.2	1.3	1.0	5.2	0.79	1.942
B9216	8.5	<3	<0.05	<1	12	4.2	13.2	30	12	2.1	0.7	<0.5	2.0	0.28	1.668
B9217	8.6	<3	<0.05	<1	12	4.9	23.0	45	16	3.1	1.0	0.6	1.9	0.30	1.953
B9218	10	<3	<0.05	<1	14	4.0	37.8	72	24	4.1	1.1	<0.5	1.7	0.22	1.725
B9219	8.9	<3	<0.05	<1	11	6.2	36.8	68	28	3.7	1.1	<0.5	1.5	0.22	1.785
B9220	9.7	<3	<0.05	<1	11	4.4	30.8	61	26	4.1	1.1	<0.5	1.8	0.26	1.791
B9221	8.4	<3	<0.05	<1	9.1	3.5	27.4	53	22	3.4	1.0	<0.5	1.6	0.23	1.997
B9222	1.1	<3	<0.05	<1	1.5	2.4	6.4	14	5	0.9	0.4	<0.5	0.4	0.05	2.044
B9223	7.4	<3	<0.05	<1	10	4.3	30.4	58	24	3.4	1.1	<0.5	1.5	0.20	1.855
B9224	22	<3	<0.05	<1	7.6	4.3	33.0	61	21	4.2	1.2	0.7	2.4	0.35	1.904
B9225	10	<3	<0.05	<1	13	6.9	54.5	96	35	5.2	1.3	0.8	1.9	0.28	2.112
B9244	5.8	17	<0.05	<1	6.1	1.6	17.9	36	13	2.2	0.6	<0.5	0.7	0.09	2.602

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Sample description	SC PPM	SE PPM	SR %	TA PPM	TH PPM	U PPM	LA PPM	CE PPM	ND PPM	SM PPM	EU PPM	TB PPM	YB PPM	LU PPM	Mass g
B9245	16	<3	<0.05	<1	14	4.2	52.9	95	33	5.2	1.3	<0.5	1.6	0.25	2.060
B11126	9.6	<3	<0.05	<1	13	6.1	55.9	95	30	5.3	1.3	<0.5	1.8	0.25	1.711
B11127	9.9	<3	<0.05	<1	14	6.0	64.6	107	37	5.6	1.5	<0.5	1.9	0.25	1.890
B11128	8.3	<3	<0.05	<1	12	5.1	46.4	80	27	4.7	1.2	<0.5	1.7	0.25	1.918
B11129	4.8	<3	<0.05	<1	8.2	3.7	17.9	38	15	2.6	0.8	<0.5	1.4	0.21	1.898
B11151	25	<3	<0.05	<1	3.0	2.2	10.9	21	8	1.8	0.5	<0.5	1.3	0.21	1.909
B11152	10	<3	<0.05	<1	14	2.2	9.8	22	9	2.0	0.7	0.8	2.1	0.28	1.856
B11153	1.0	<3	<0.05	<1	0.5	0.9	9.3	18	11	1.5	0.5	<0.5	0.5	<0.05	2.100
B11154	2.5	<3	<0.05	<1	1.6	1.3	8.4	17	7	1.4	0.6	<0.5	0.6	0.08	2.118
B11155	6.6	<3	<0.05	<1	10	1.9	25.5	49	20	2.5	0.8	<0.5	0.8	0.12	1.764
B11156	8.2	<3	<0.05	<1	11	3.4	42.3	81	26	4.5	1.2	<0.5	1.1	0.15	1.728
B11157	8.2	<3	<0.05	<1	13	2.7	55.1	101	33	5.4	1.4	<0.5	1.0	0.14	1.884
B11158	8.2	<3	<0.05	<1	12	5.5	25.8	53	23	3.8	0.9	0.5	1.5	0.24	2.200
B11159	12	<3	<0.05	<1	12	5.2	39.7	82	30	5.2	1.0	0.7	1.6	0.25	1.730
B11160	8.0	<3	<0.05	<1	11	5.3	26.0	53	21	3.8	0.9	0.6	1.7	0.27	1.713
B11161	11	<3	<0.05	1	13	4.8	24.9	52	22	3.6	0.8	0.5	2.0	0.25	1.858
B11162	4.5	<3	<0.05	<1	1.3	1.2	6.1	14	7	1.5	0.5	<0.5	0.8	0.12	2.039

GRID	SAMPLE	PROJECT		F PPM	W PPM
116B14		B8876	3002	530	7
116B14		B8877	3002	580	3
116B14		B8878	3002	560	5
116B14		B8879	3002	660	4
116B14		B8880	3002	600	3
116B14		B8881	3002	660	2
116B14		B8882	3002	650	6
116B14		B8883	3002	540	2
116B14		B8884	3002	360	-2
116B14	DUP	B8884	3002	380	2
116B14		B8885	3002	340	-2
116B14		B8886	3002	460	5
116B14		B8887	3002	340	2
116B14		B8888	3002	580	4
116B14		B8889	3002	660	4
116B14		B8890	3002	480	2
116B14		B8891	3002	620	-2
116B14		B8892	3002	106	4
116B14		B8911	3002	210	-2
116B14	DUP	B8911	3002	210	-2
116B14		B8915	3002	600	5
116B14		B8926	3002	700	6
116B14		B8927	3002	880	3
116B14		B8928	3002	980	2
116B14		B8929	3002	740	-2
116B14		B8930	3002	420	-2
116B14		B8931	3002	500	-2
116B14		B8932	3002	350	-2
116B14		B8933	3002	360	-2
116B14	DUP	B8933	3002	340	-2
116B14		B8934	3002	470	2
116B14		B8935	3002	100	-2
116B14		B8936	3002	270	3
116B14		B8937	3002	900	5
116B14		B8938	3002	580	5
116B14		B8939	3002	680	5
116B14		B8940	3002	840	5
116B14		B8941	3002	620	4
116B14		B8942	3002	480	3
test	STD_W_F		3002	760	37
116B14		B8943	3002	460	2
116B14		B8944	3002	460	-2
116B14		B8945	3002	450	-2
116B14		B8946	3002	250	-2
116B14		B8947	3002	164	-2
116B14		B8948	3002	174	-2
116B14		B8949	3002	290	2
116B14		B8950	3002	150	-2
116B14		B8951	3002	176	-2
116B14	DUP	B8951	3002	188	-2
116B14		B8952	3002	146	-2
116B14		B8953	3002	420	-2
116B14		B8954	3002	400	2
116B14		B8955	3002	940	3
116B14		B8956	3002	680	-2

PDI GEOCHEM SYSTEM: Data From: V810 Blackstone

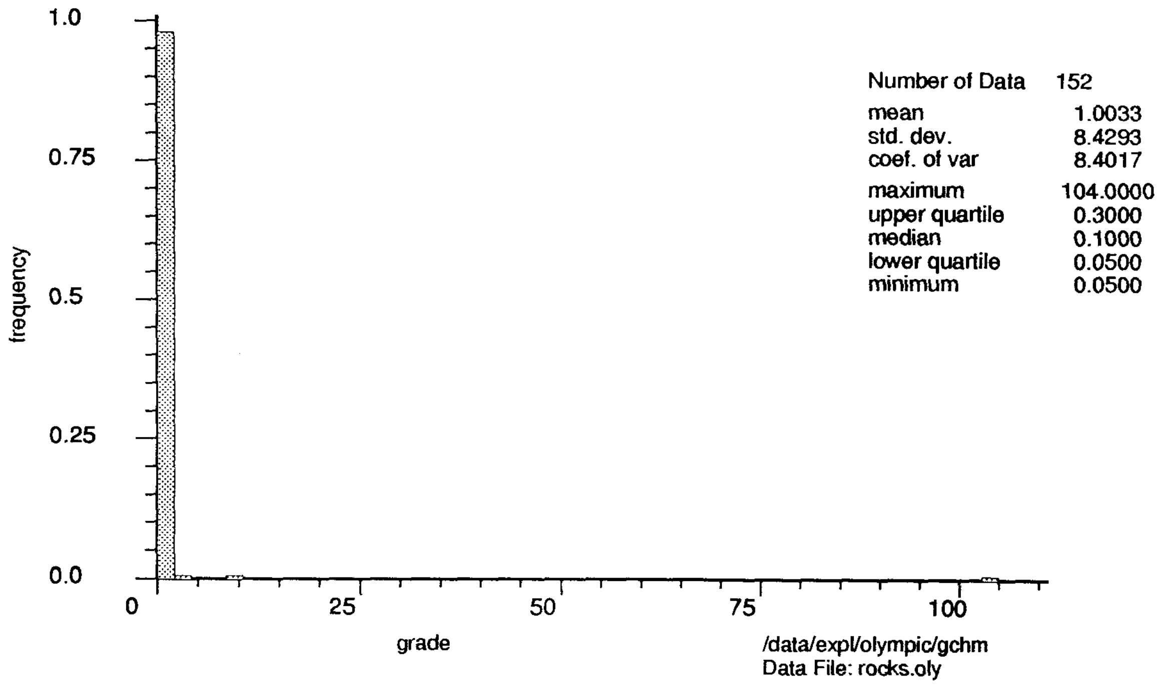
GRID	SAMPLE	PROJECT	F PPM	W PPM
116B14	B8957	3002	800	-2
116B14	B8958	3002	1080	2
116B14	B8959	3002	560	-2
116B14	B8960	3002	220	-2
116B14	DUP B8960	3002	220	-2
116B14	B8961	3002	430	-2
116B14	B8962	3002	196	-2
116B14	B8963	3002	450	6
116B14	B8964	3002	530	3
116B14	B8965	3002	250	-2
116B14	B8966	3002	134	2
116B14	B8967	3002	290	49
116B14	B8968	3002	330	2
116B14	B8969	3002	390	-2
test	STD_W_F	3002	720	33
116B14	B8970	3002	740	5
116B14	B8971	3002	660	6
116B14	B8972	3002	460	-2
116B14	B8973	3002	390	4
116B14	B8974	3002	620	11
116B14	B8975	3002	620	6
116B14	B8976	3002	900	4
116B14	B8977	3002	630	13
116B14	B8978	3002	520	4
116B14	DUP B8978	3002	510	4
116B14	B8979	3002	300	3
116B14	B8980	3002	380	4
116B14	B8981	3002	520	5
116B14	B8982	3002	560	4
116B14	B8983	3002	340	3
116B14	B8984	3002	350	4
116B14	B8985	3002	290	10
116B14	B8986	3002	340	3
116B14	B8987	3002	156	5
116B14	DUP B8987	3002	152	5
116B14	B8988	3002	450	4
116B14	B8989	3002	120	3
116B14	B8990	3002	124	2
116B14	B8991	3002	148	-2
116B14	B8992	3002	460	-2
116B14	B8993	3002	620	2
116B14	B8994	3002	640	2
116B14	B8995	3002	320	4
116B14	B8996	3002	340	-2
test	STD_W_F	3002	700	36
116B14	B8997	3002	880	6
116B14	B9151	3002	740	2
116B14	B9152	3002	1200	4
116B14	B9153	3002	840	5
116B14	B9154	3002	820	4
116B14	B9155	3002	520	-2
116B14	B9156	3002	580	5
116B14	B9157	3002	490	3
116B14	B9158	3002	460	4
116B14	DUP B9158	3002	420	4

GRID	SAMPLE	PROJECT	F PPM	W PPM
116B14	B9159	3002	440	12
116B14	B9160	3002	640	5
116B14	B9161	3002	370	-2
116B14	B9162	3002	410	2
116B14	B9163	3002	880	5
116B14	B9164	3002	650	2
116B14	B9165	3002	350	8
116B14	B9166	3002	540	3
116B14	B9167	3002	420	-2
116B14	DUP B9167	3002	410	-2
116B14	B9168	3002	220	-2
116B14	B9201	3002	490	3
116B14	B9202	3002	440	7
116B14	B9203	3002	350	-2
116B14	B9204	3002	550	-2
116B14	B9205	3002	400	3
116B14	B9206	3002	480	2
116B14	B9207	3002	192	-2
116B14	B9208	3002	130	-2
test	STD_W_F	3002	680	43
116B14	B9209	3002	69	-2
116B14	B9210	3002	114	-2
116B14	B9211	3002	380	2
116B14	B9212	3002	980	2
116B14	B9213	3002	540	7
116B14	B9214	3002	350	7
116B14	B9215	3002	640	3
116B14	B9216	3002	720	6
116B14	B9217	3002	720	6
116B14	DUP B9217	3002	760	5
116B14	B9218	3002	900	2
116B14	B9219	3002	860	7
116B14	B9220	3002	840	5
116B14	B9221	3002	700	3
116B14	B9222	3002	184	-2
116B14	B9223	3002	700	5
116B14	B9224	3002	640	2
116B14	B9225	3002	1240	6
116B14	B9244	3002	410	5
116B14	DUP B9244	3002	390	4
116B14	B9245	3002	420	-2
116B14	B11126	3002	1100	5
116B14	B11127	3002	1200	7
116B14	B11128	3002	760	3
116B14	B11129	3002	300	-2
116B14	B11151	3002	440	3
116B14	B11152	3002	360	4
116B14	B11153	3002	116	-2
116B14	B11154	3002	250	-2
116B14	DUP B11154	3002	260	-2
116B14	B11155	3002	220	-2
116B14	B11156	3002	700	4
116B14	B11157	3002	520	-2
116B14	B11158	3002	660	4
116B14	B11159	3002	780	2

GRID	SAMPLE	PROJECT	F PPM	W PPM
116B14	__________B11160	3002	620	4
116B14	__________B11161	3002	800	-2
116B14	__________B11162	3002	144	-2
116B14	DUP_______B11162	3002	144	-2
test	STD_F___________	3002	580	

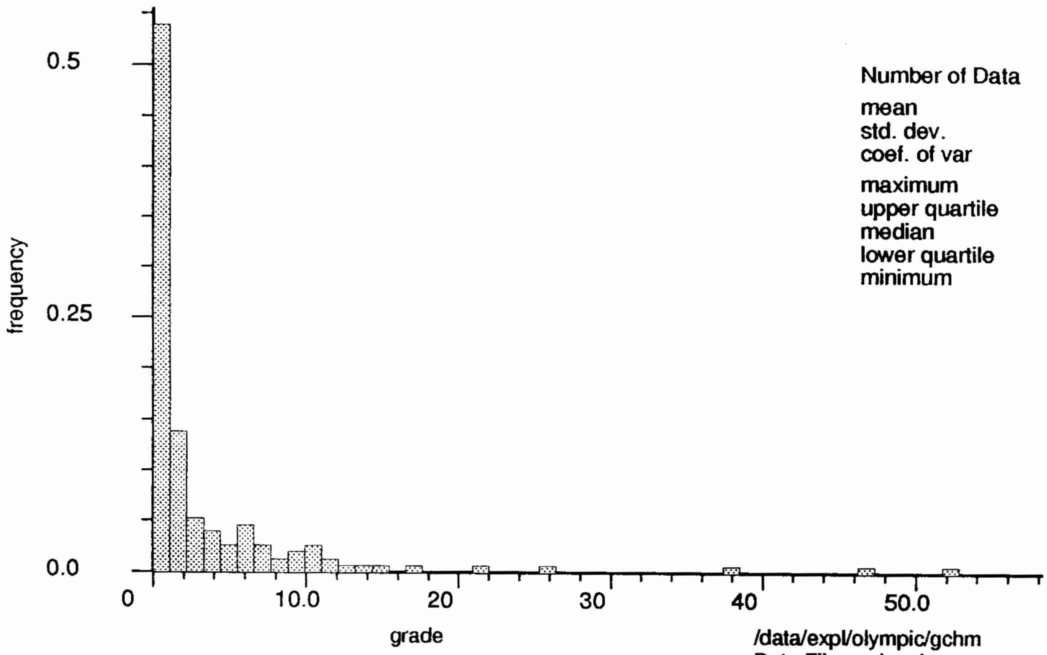
END OF LISTING - 170 RECORDS PRINTED Run on: 93:02:26 at 11:42:34

Histogram: Ag (ppm)



Figure

Histogram: Au (ppb)

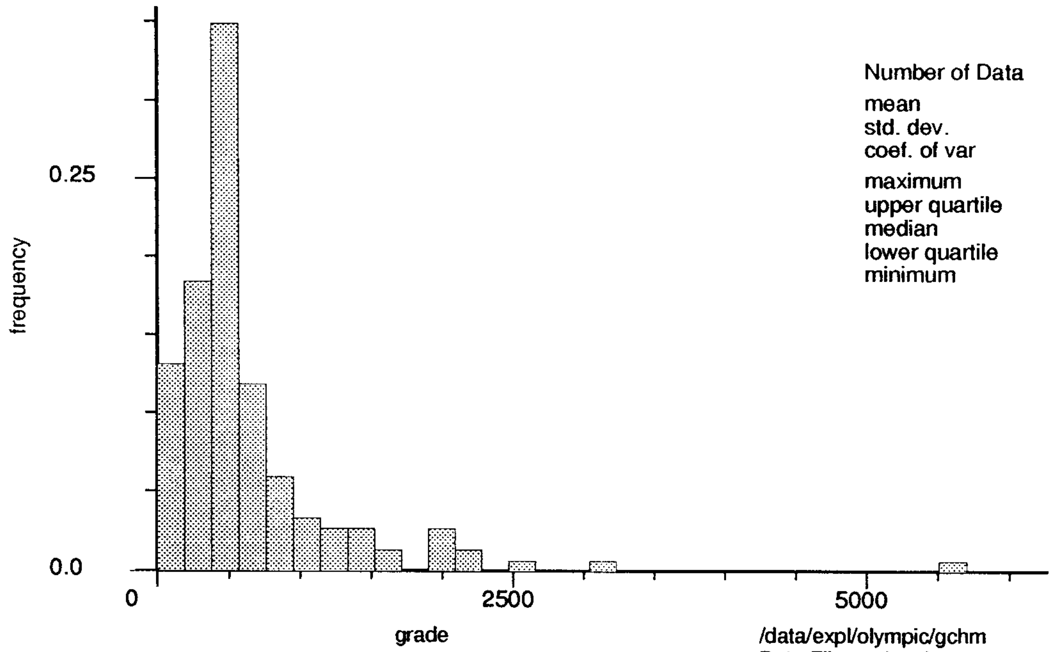


Number of Data	152
mean	3.8717
std. dev.	7.2263
coef. of var	1.8664
maximum	52.0000
upper quartile	4.0000
median	1.0000
lower quartile	0.5000
minimum	0.5000

/data/expl/olympic/gchm
Data File: rocks.oly

Figure

Histogram: Ba (ppm)

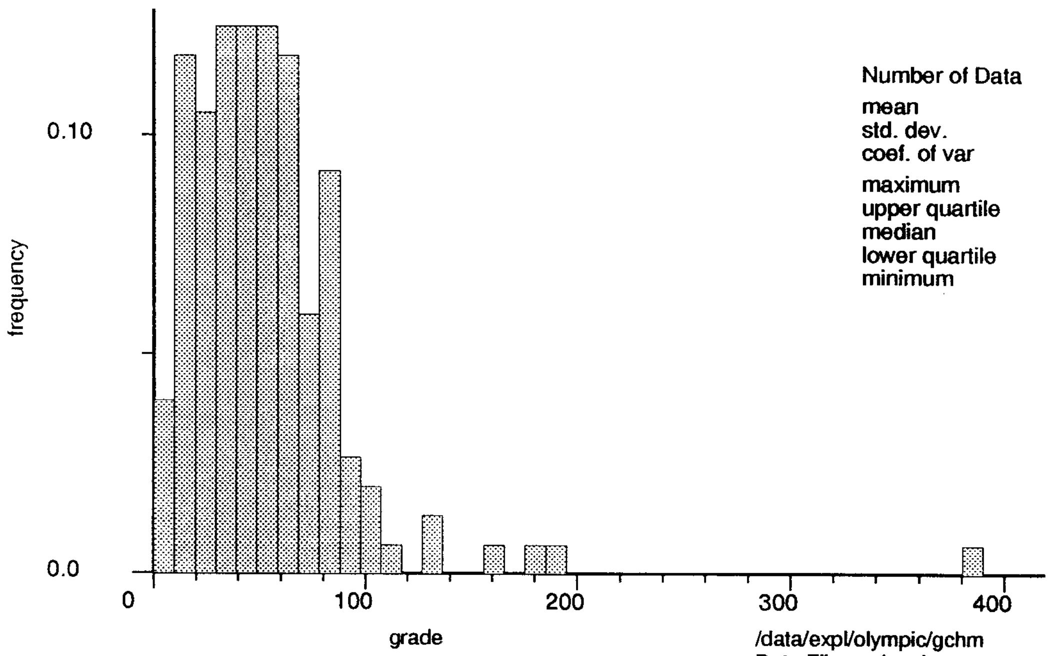


Number of Data	152
mean	646.4737
std. dev.	652.8981
coef. of var	1.0099
maximum	5668.0000
upper quartile	713.5000
median	492.0000
lower quartile	311.5000
minimum	38.0000

/data/expl/olympic/gchm
Data File: rocks.oly

Figure

Histogram: Ce (ppm)

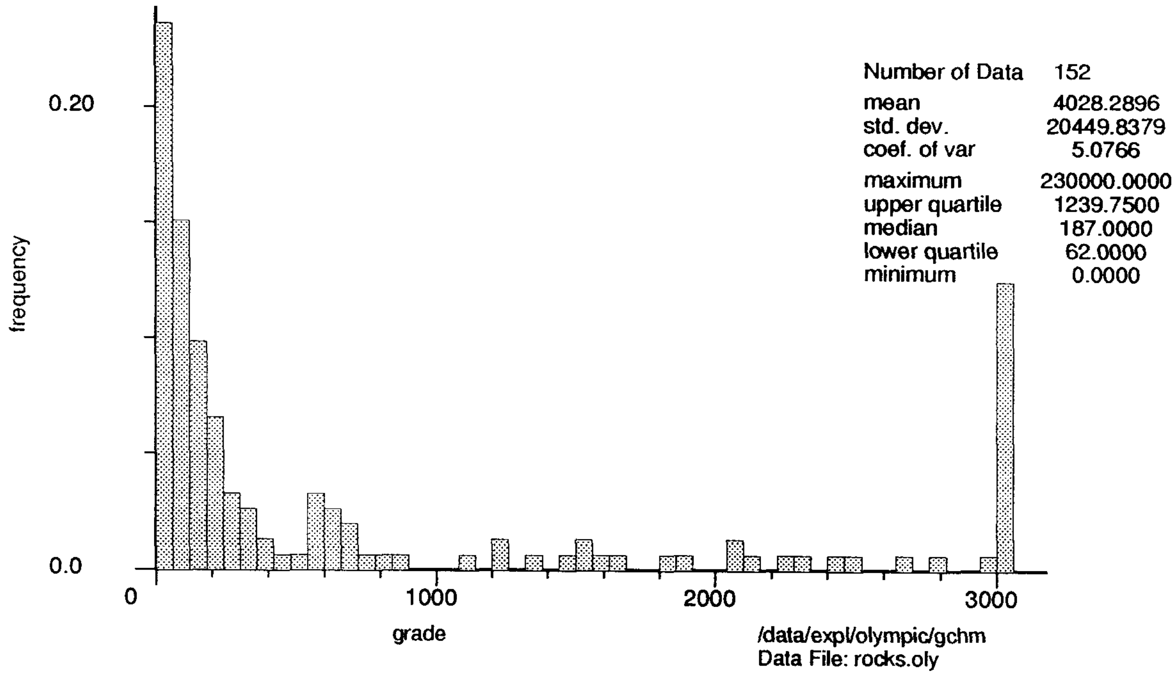


Number of Data	152
mean	53.1842
std. dev.	41.6425
coef. of var	0.7830
maximum	382.0000
upper quartile	68.0000
median	47.5000
lower quartile	26.7500
minimum	4.0000

/data/expl/olympic/gchm
Data File: rocks.oly

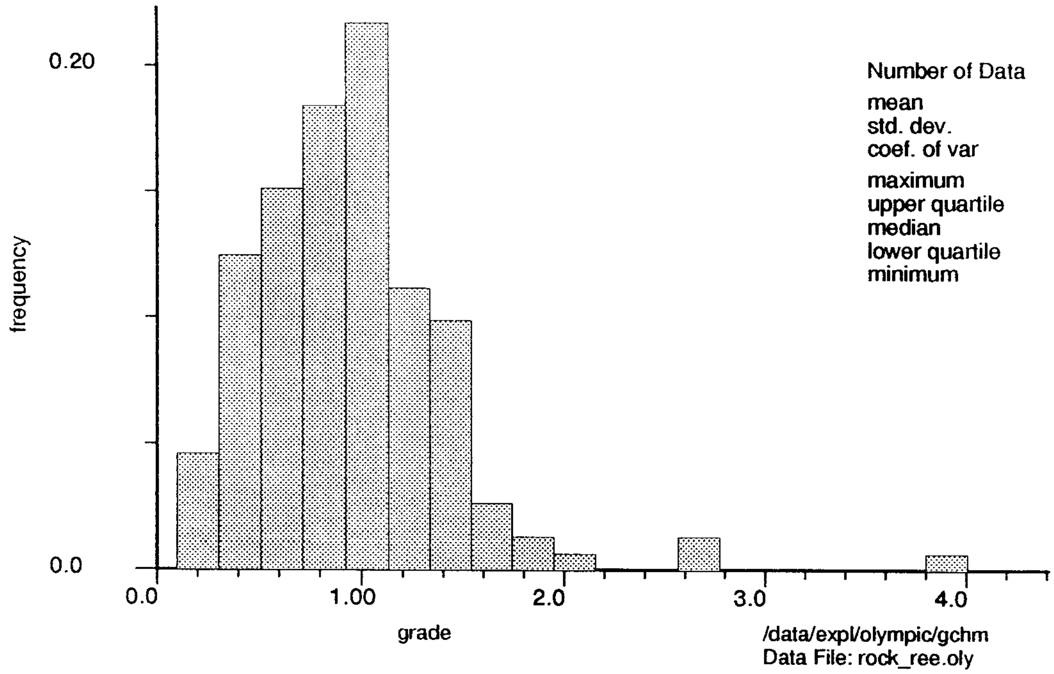
Figure

Histogram: Cu (ppm)



Figure

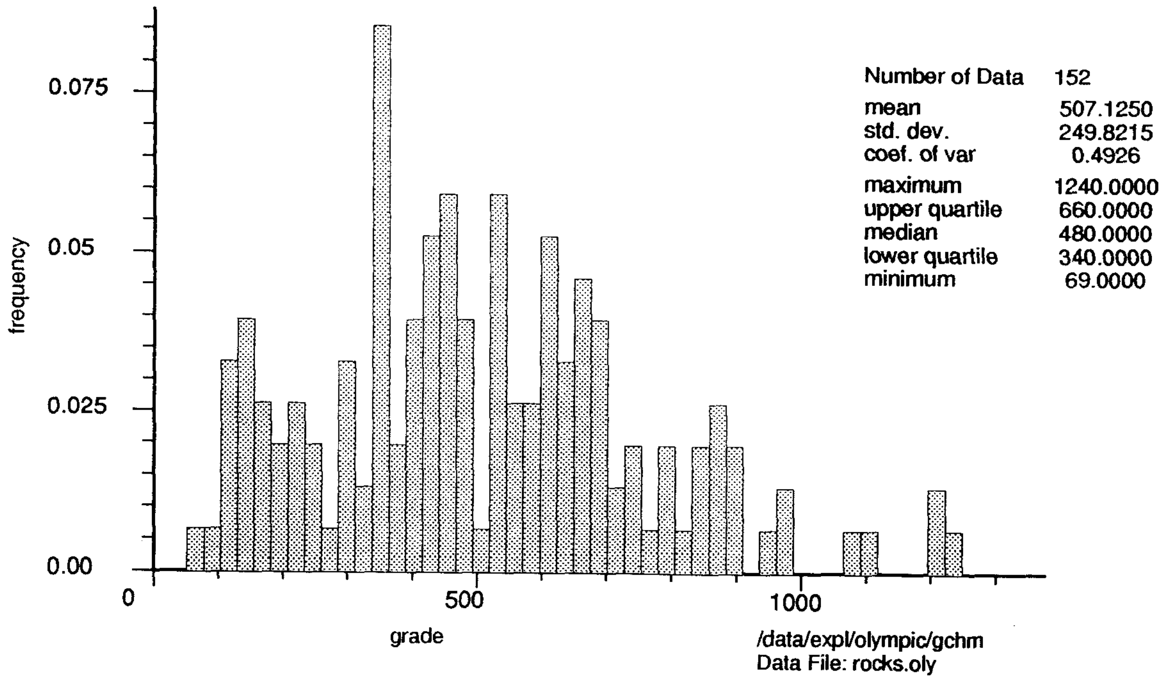
Litho Geochemistry: Eu (ppm)



Number of Data	152
mean	0.9757
std. dev.	0.4753
coef. of var	0.4872
maximum	3.8000
upper quartile	1.2000
median	0.9000
lower quartile	0.7000
minimum	0.1000

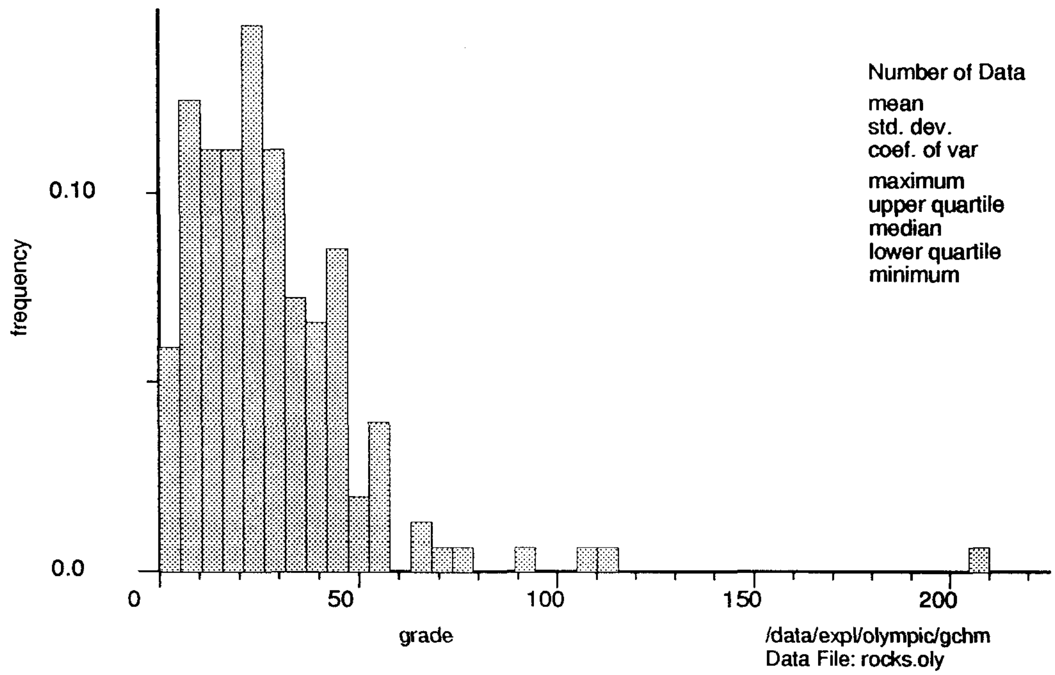
Figure

Histogram: F (ppm)



Figure

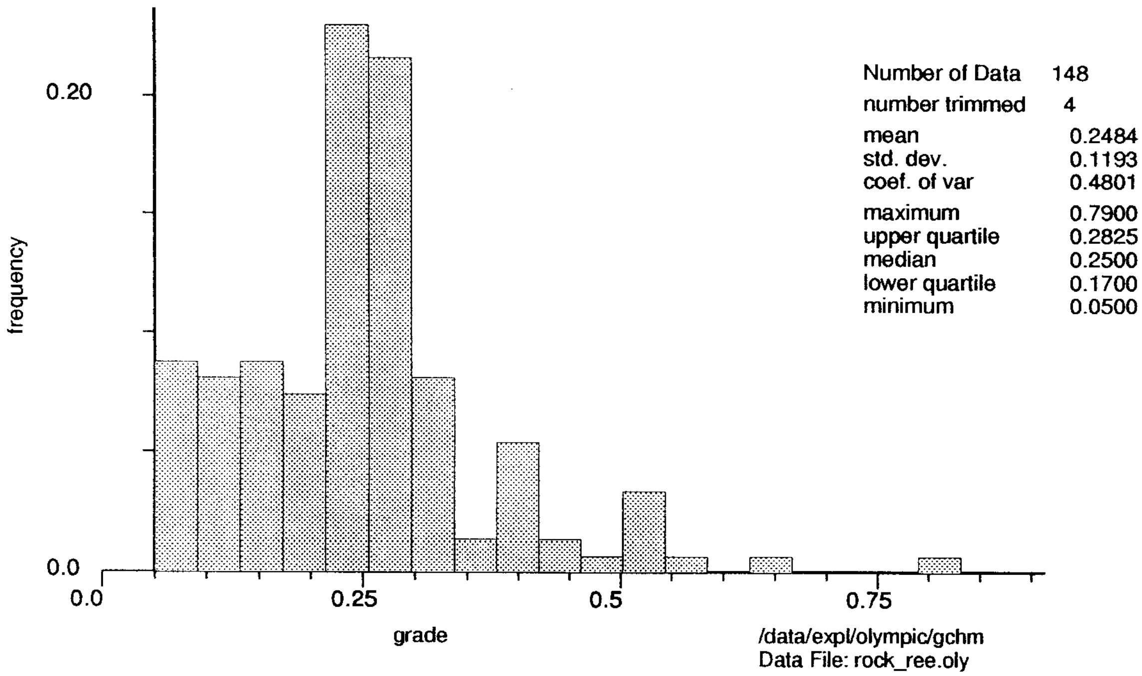
Histogram: La (ppm)



Number of Data	152
mean	28.4875
std. dev.	23.7566
coef. of var	0.8339
maximum	207.0000
upper quartile	37.2000
median	24.8000
lower quartile	13.2750
minimum	1.6000

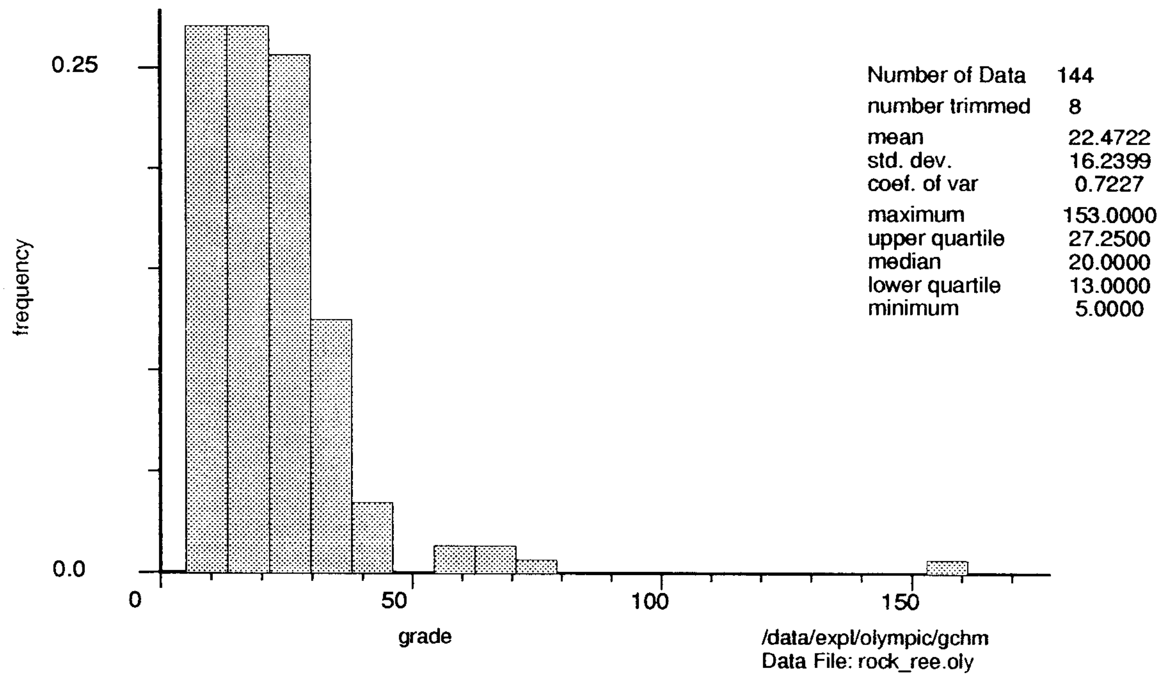
Figure

Litho Geochemistry: Lu (ppm)



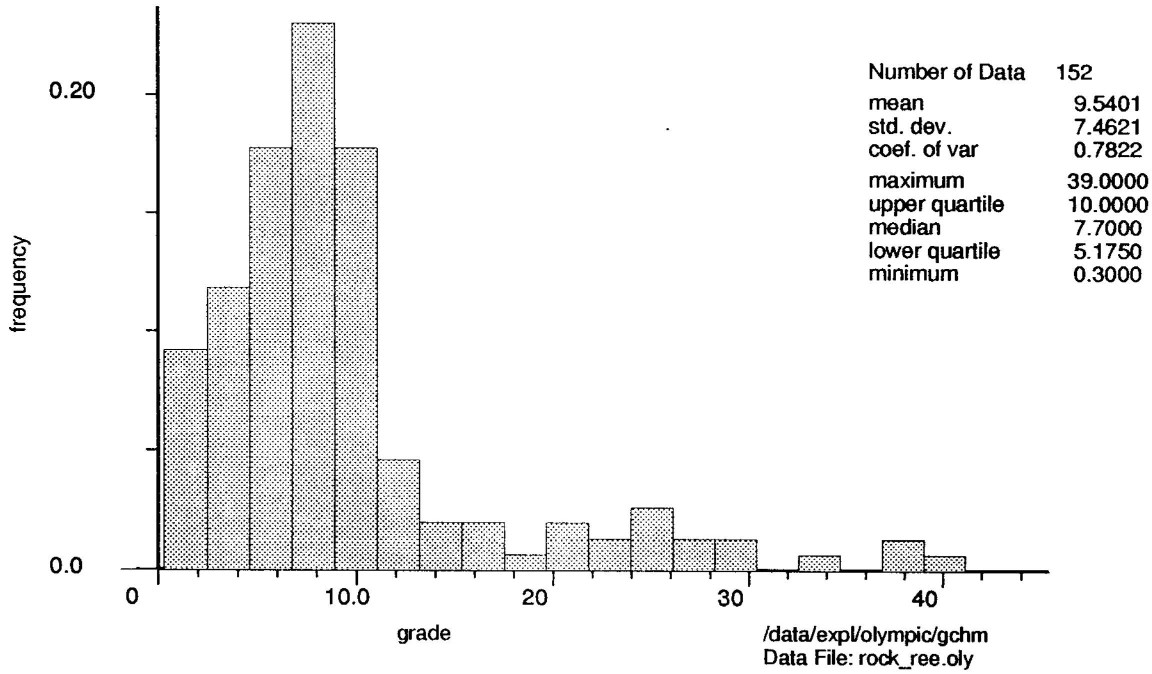
Figure

Litho Geochemistry: Nd (ppm)



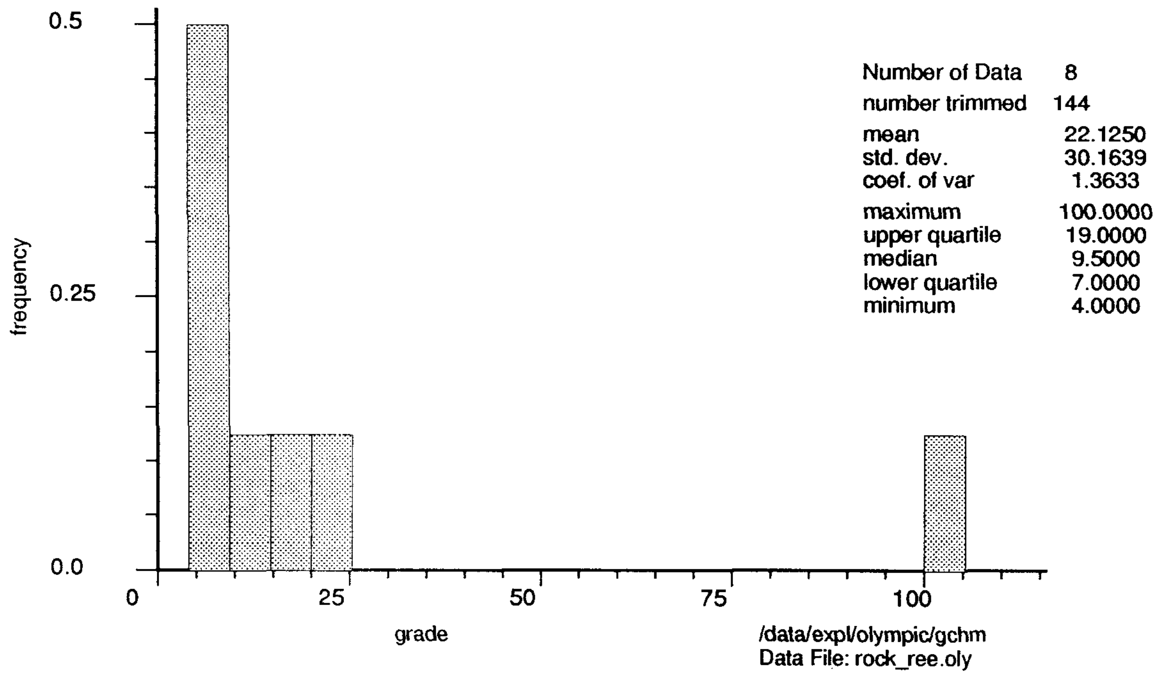
Figure

Litho Geochemistry: Sc (ppm)



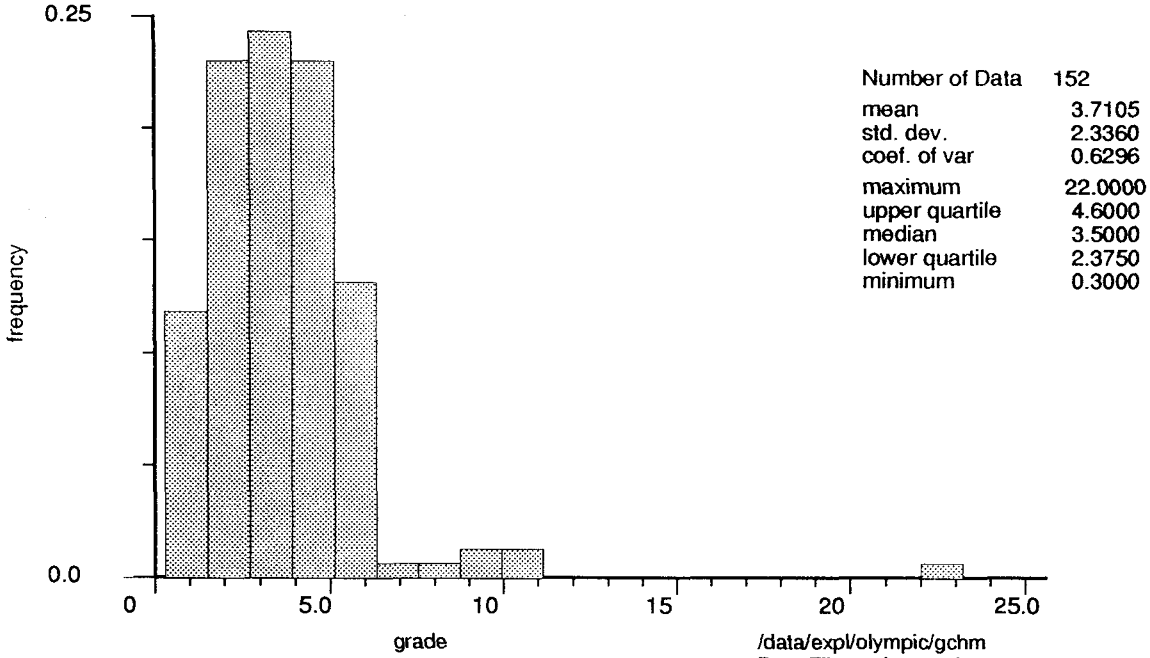
Figure

Litho Geochemistry: Se (ppm)



Figure

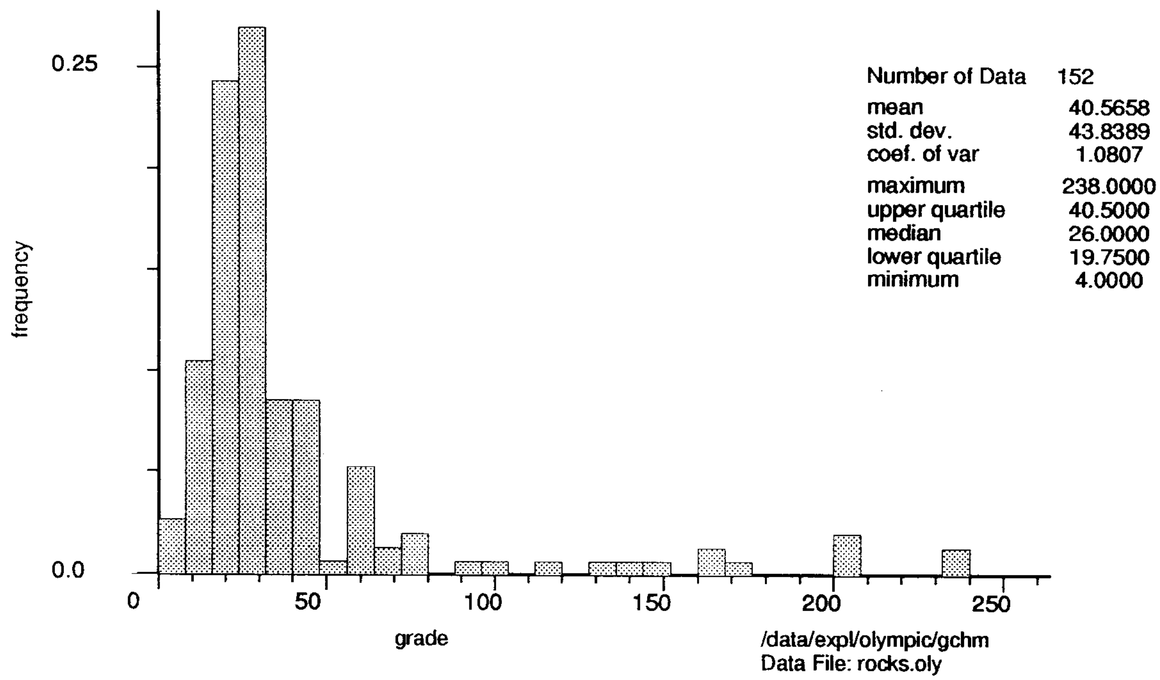
Litho Geochemistry: Sm (ppm)



/data/expl/olympic/gchm
Data File: rock_ree.oly

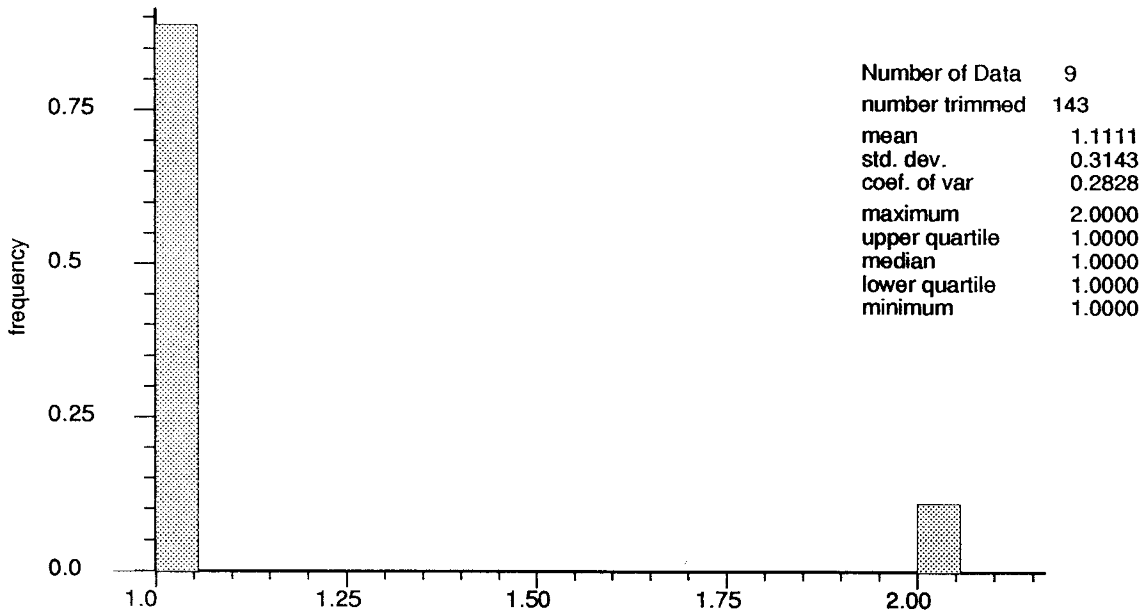
Figure

Histogram: Sr (ppm)



Figure

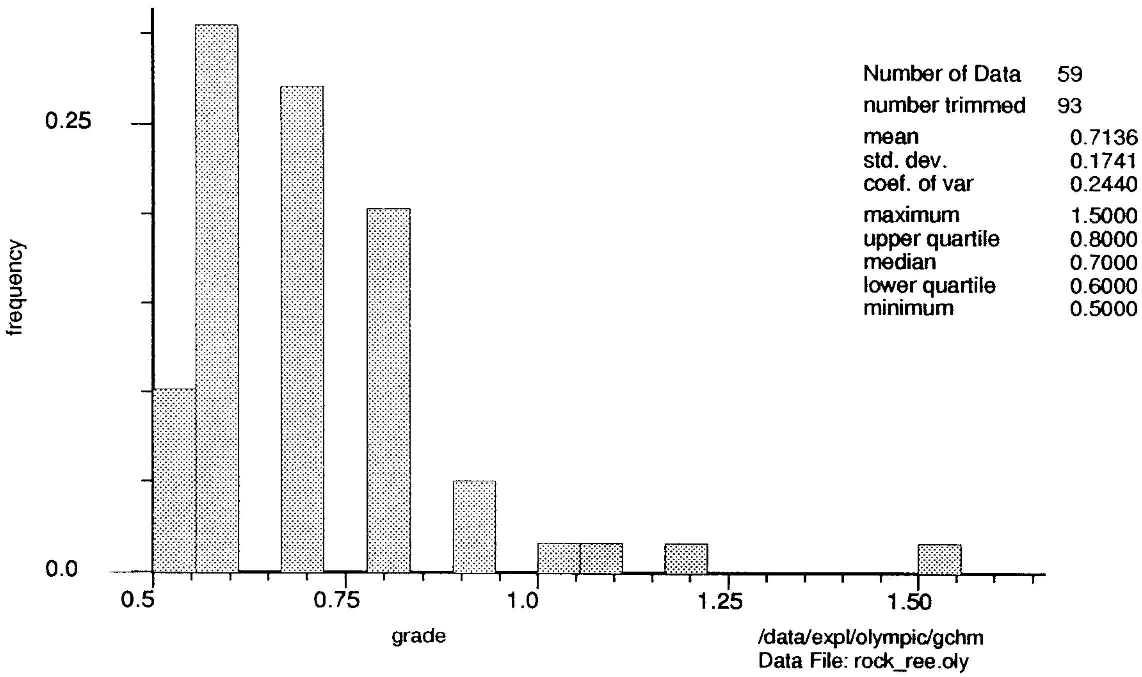
Litho Geochemistry: Ta (ppm)



/data/expl/olympic/gchm
Data File: rock_ree.oly

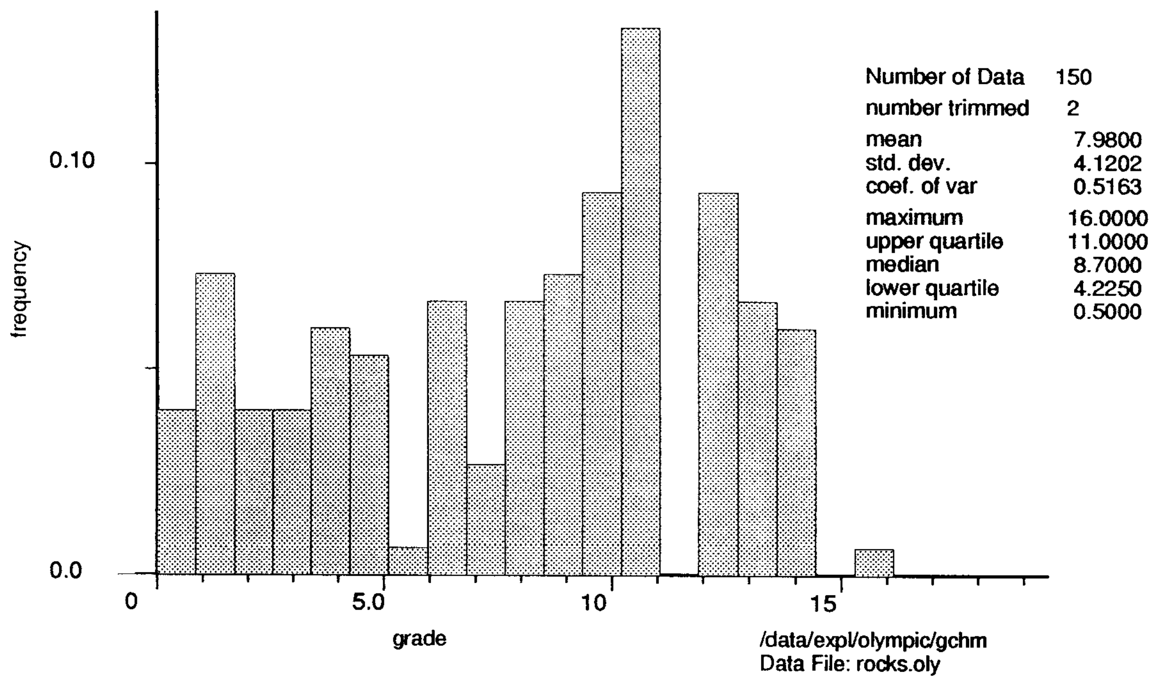
Figure

Litho Geochemistry: Tb (ppm)



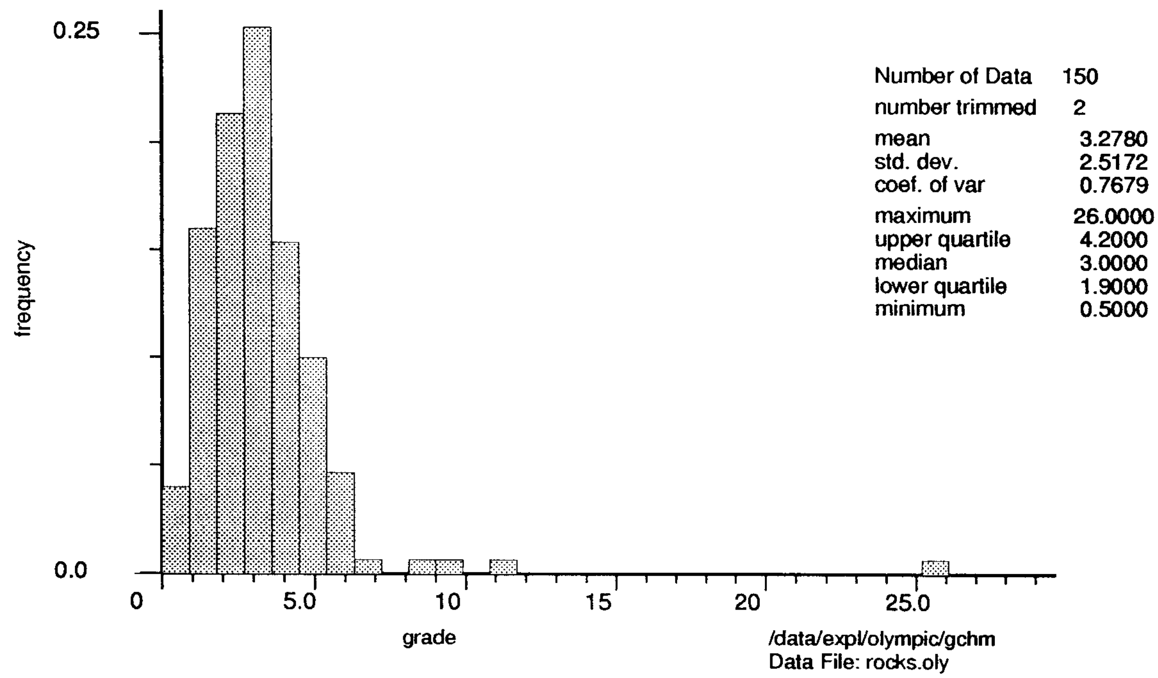
Figure

Histogram: Th (ppm)



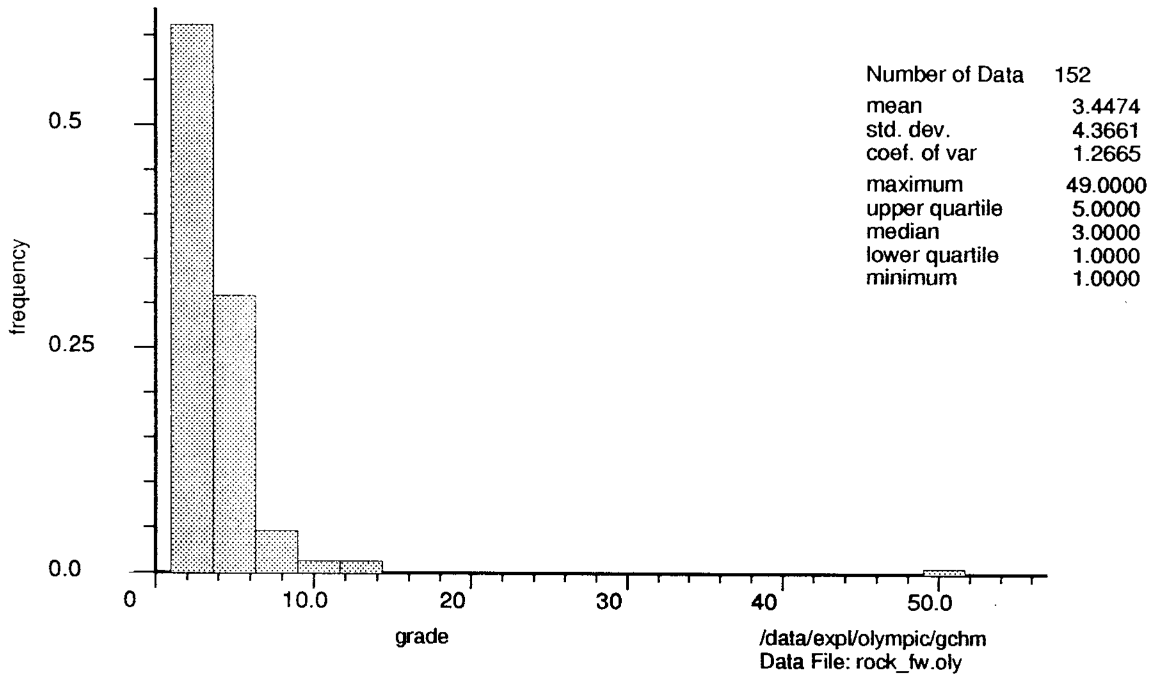
Figure

Histogram: U (ppm)



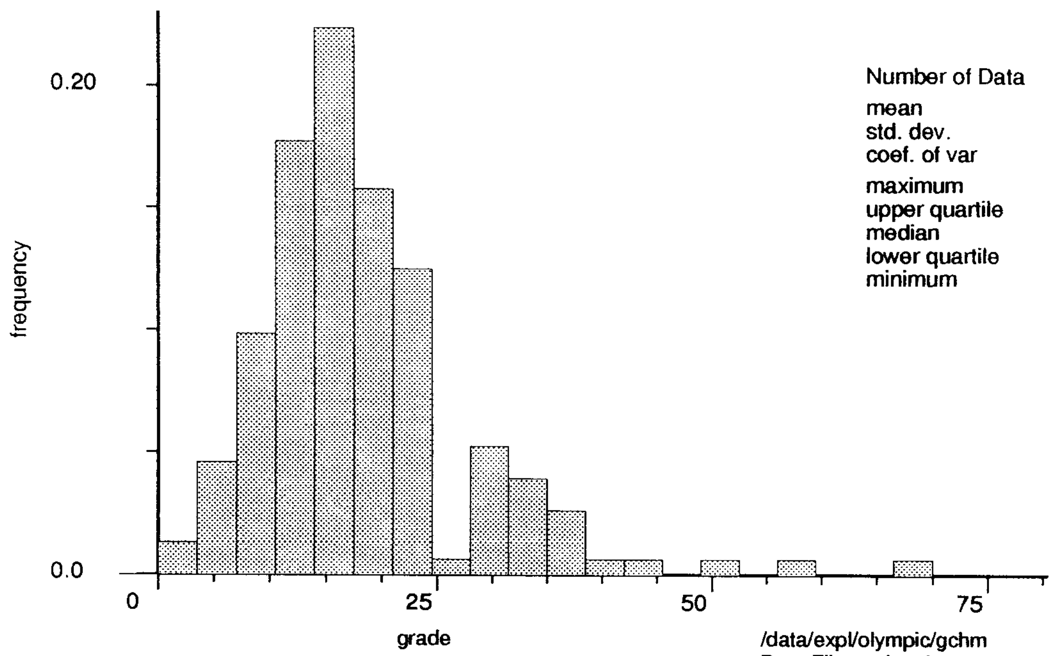
Figure

Litho Geochemistry: W (ppm)



Figure

Histogram: Y (ppm)

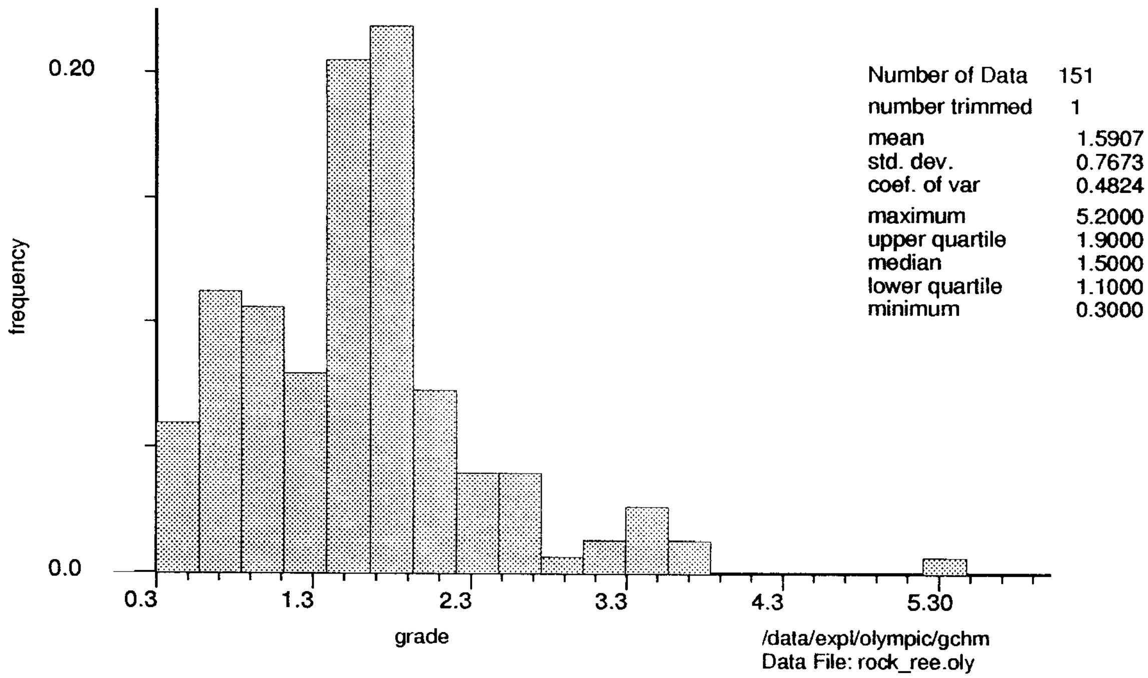


Number of Data	152
mean	18.3421
std. dev.	9.8982
coef. of var	0.5396
maximum	68.0000
upper quartile	24.0000
median	16.0000
lower quartile	12.0000
minimum	1.0000

/data/expl/olympic/gchm
Data File: rocks.oly

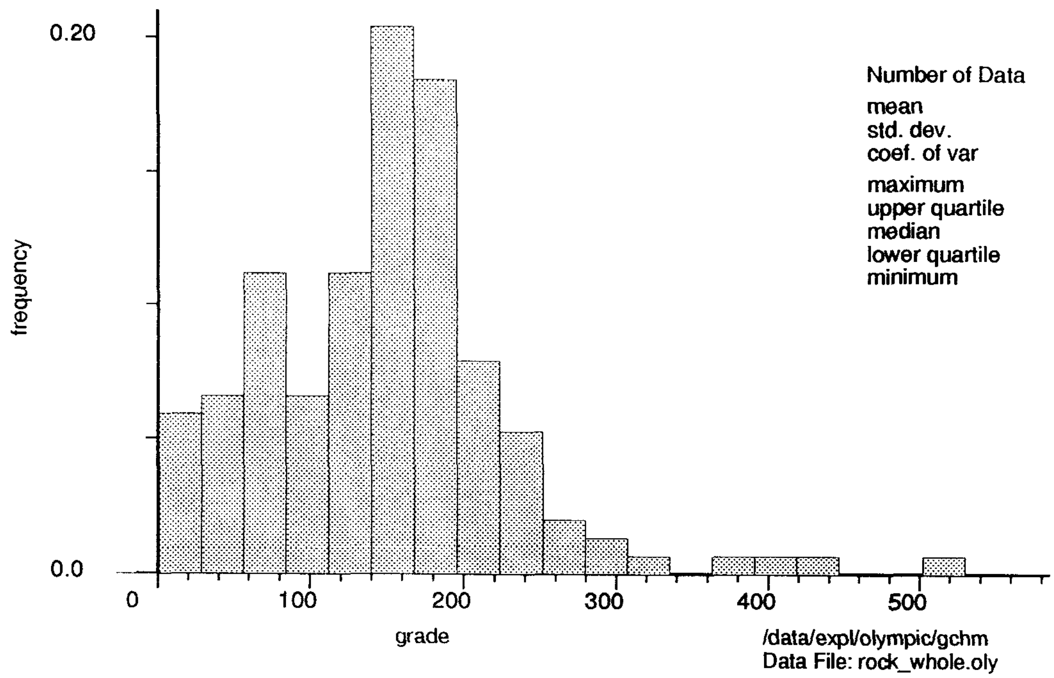
Figure

Litho Geochemistry: Yb (ppm)



Figure

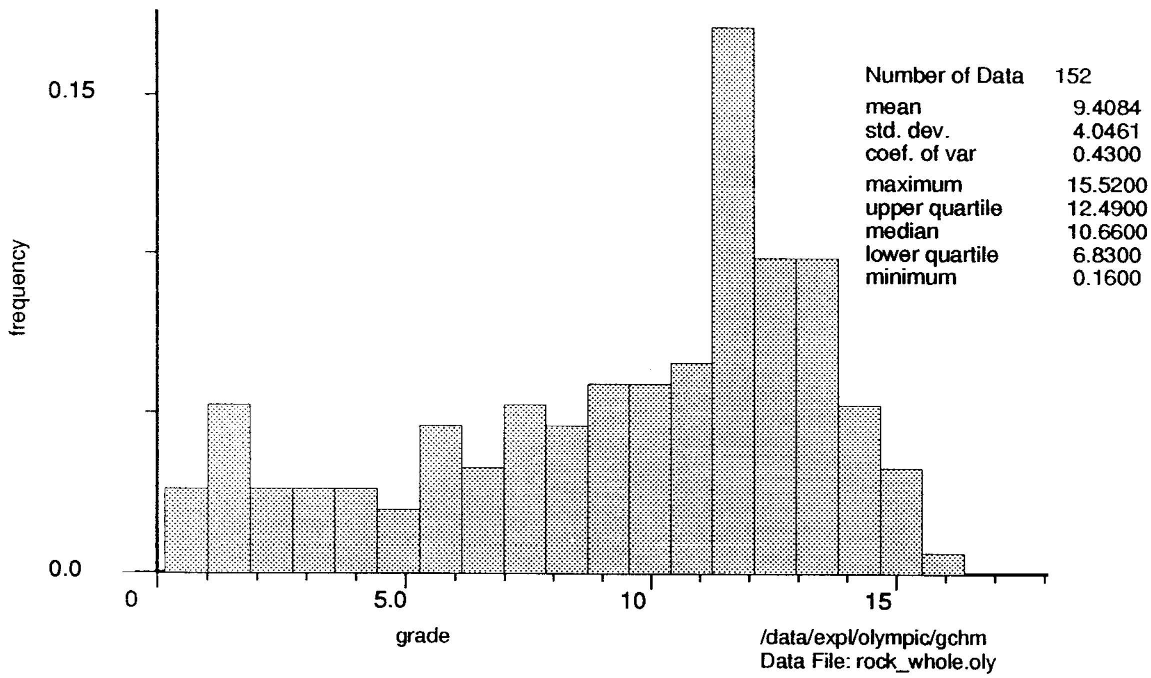
Litho Geochemistry: Zr (ppm)



Number of Data	152
mean	148.2171
std. dev.	80.7152
coef. of var	0.5446
maximum	502.0000
upper quartile	180.5000
median	154.0000
lower quartile	89.0000
minimum	1.0000

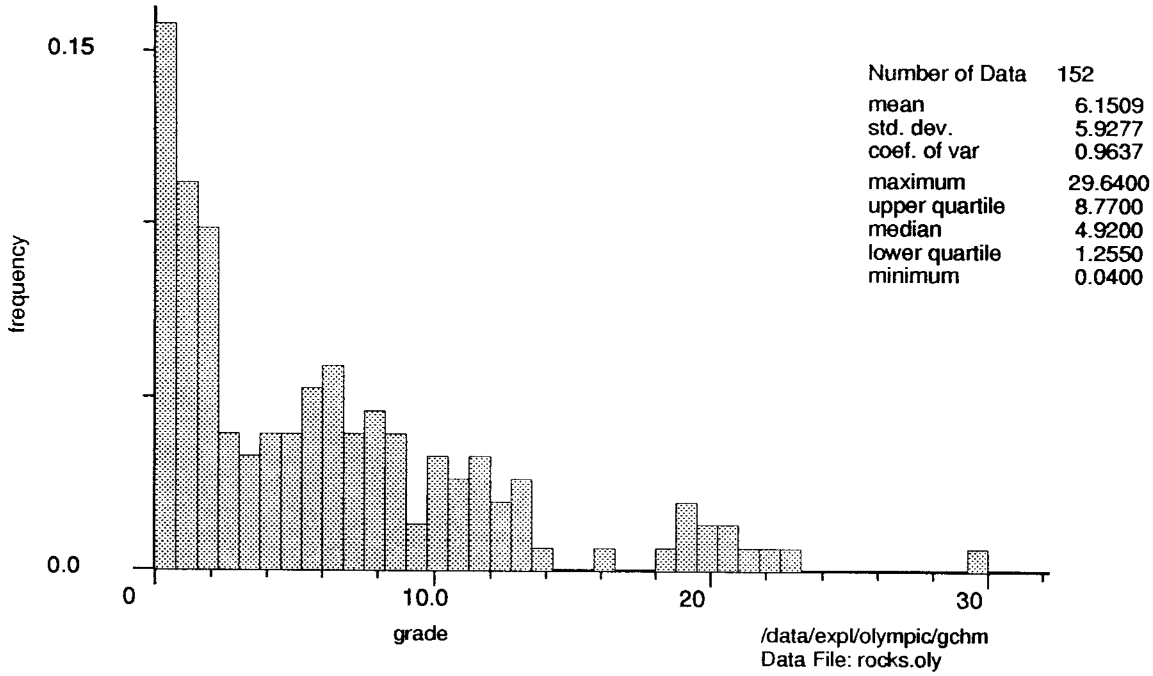
Figure

Litho Geochemistry: Al2O3 (%)



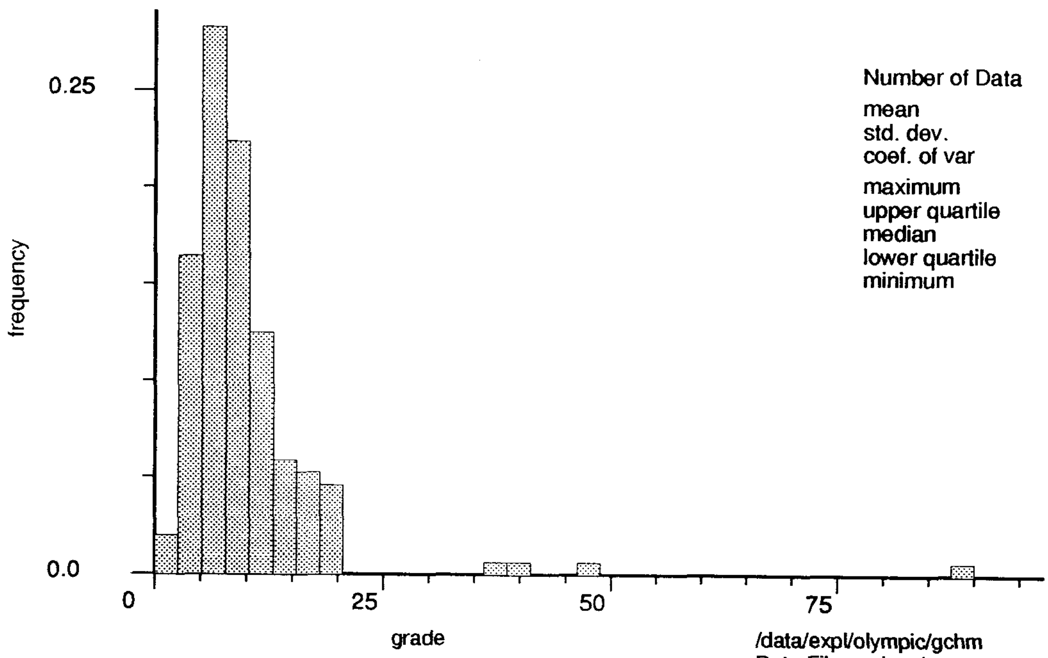
Figure

Histogram: CaO (%)



Figure

Histogram: Fe2O3 (%)

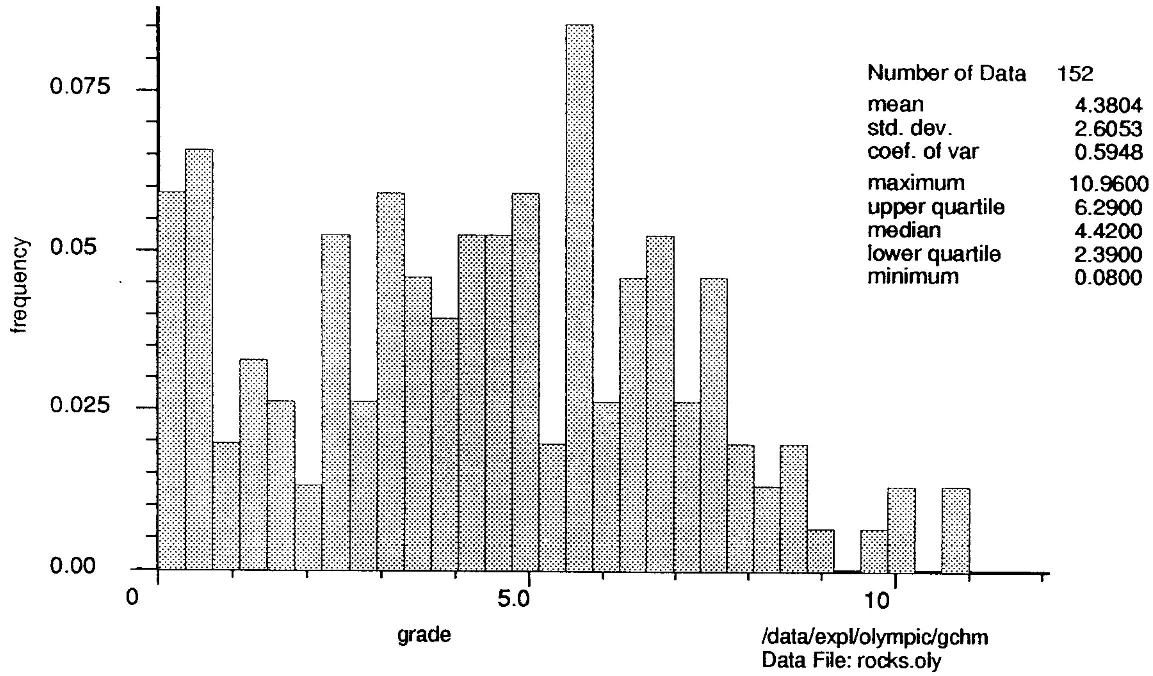


Number of Data	152
mean	9.9563
std. dev.	8.9236
coef. of var	0.8963
maximum	88.2800
upper quartile	11.1400
median	8.1250
lower quartile	5.6800
minimum	1.9200

/data/expl/olympic/gchm
Data File: rocks.oly

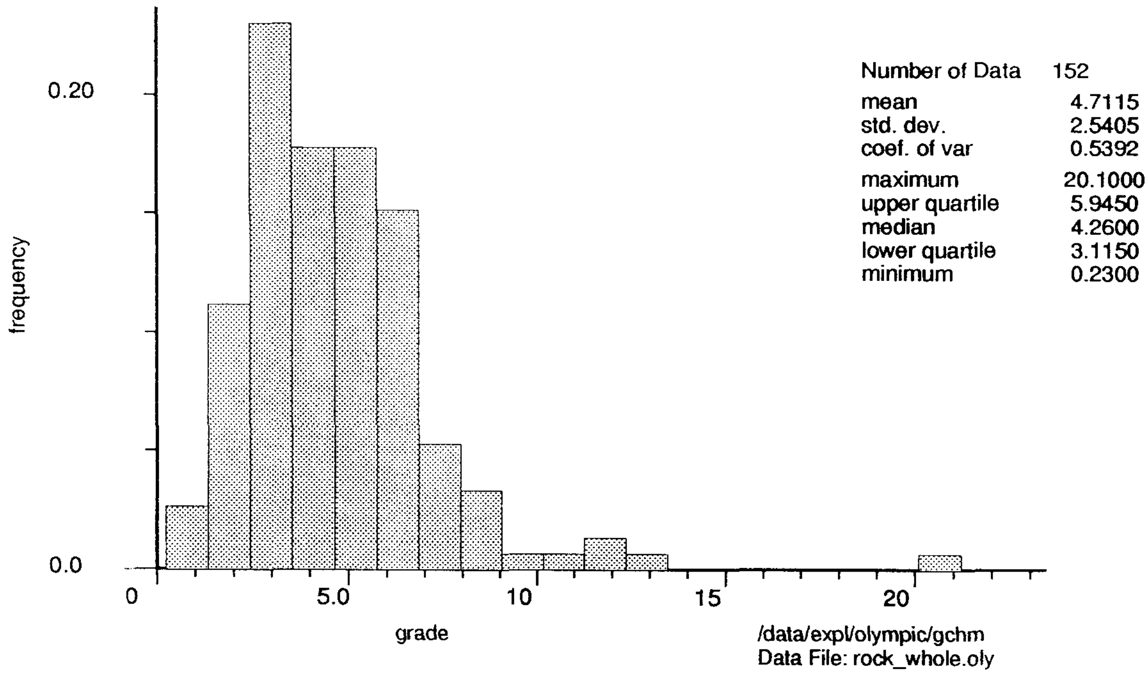
Figure

Histogram: K2O (%)



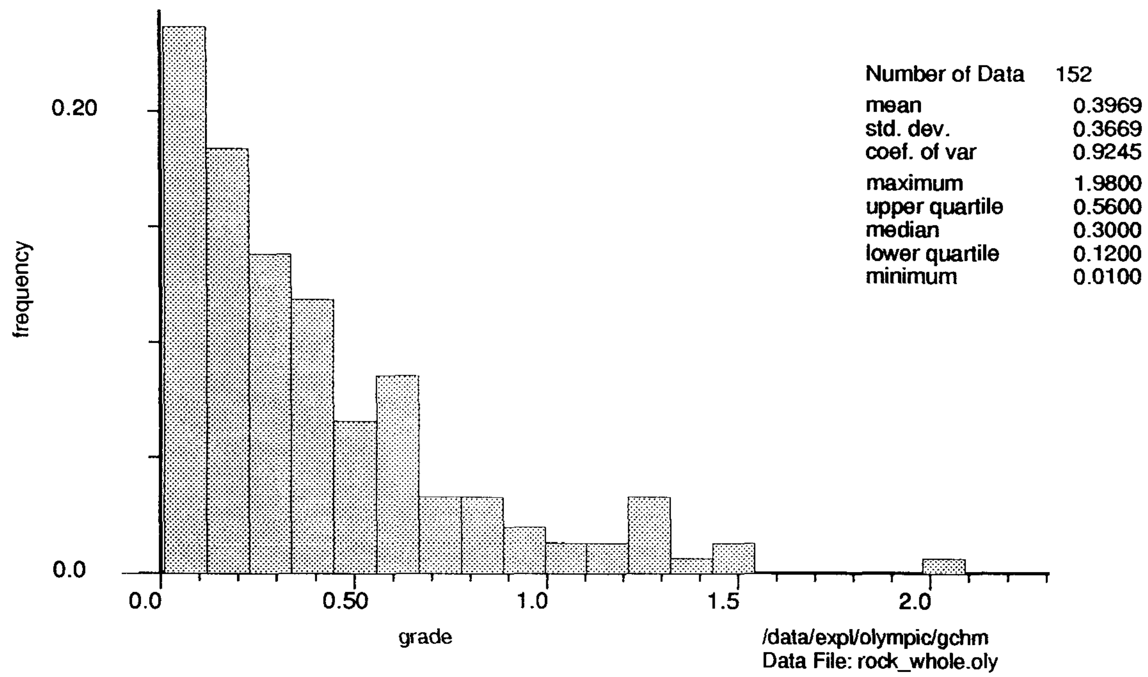
Figure

Litho Geochemistry: MgO (%)



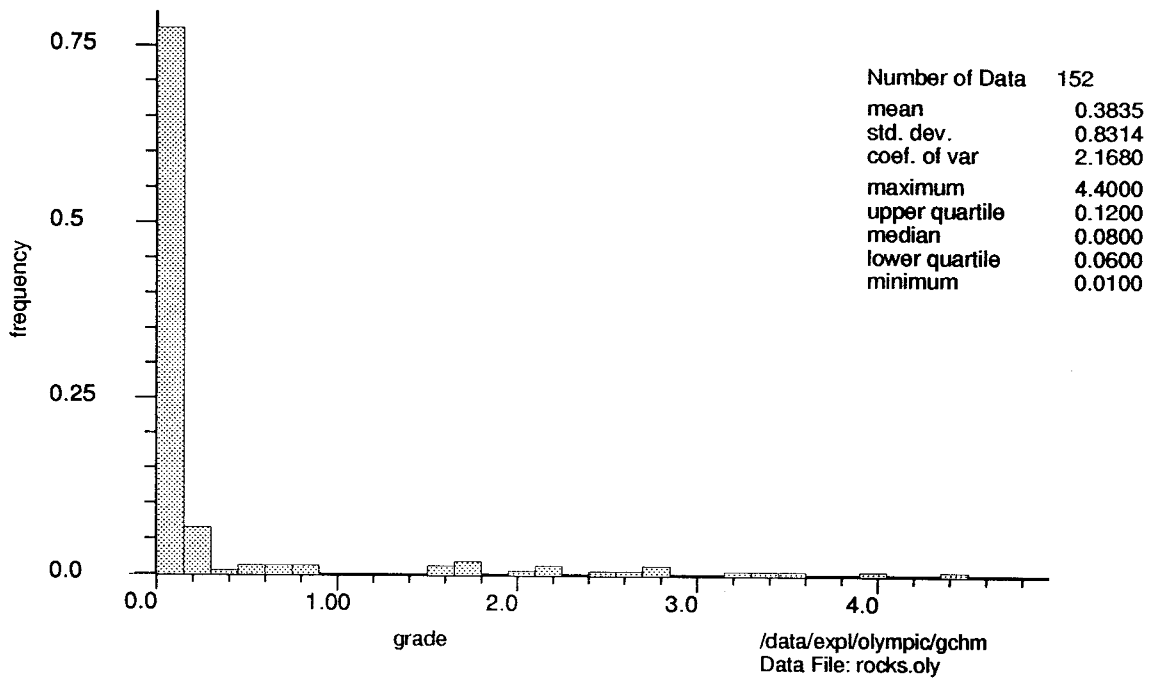
Figure

Litho Geochemistry: MnO (%)



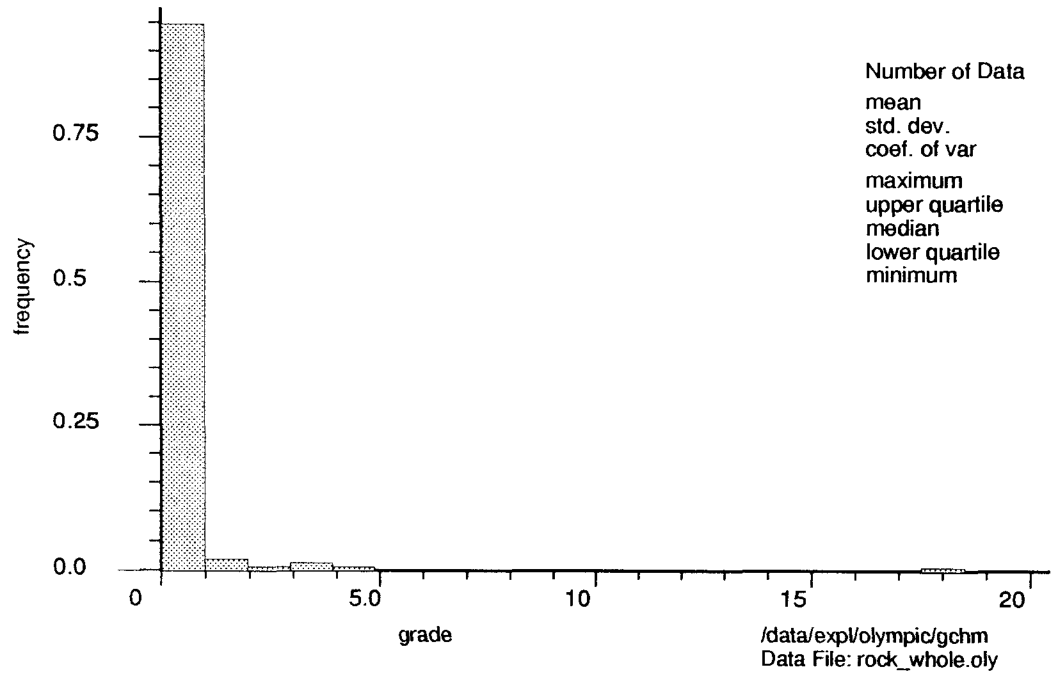
Figure

Histogram: Na2O (%)



Figure

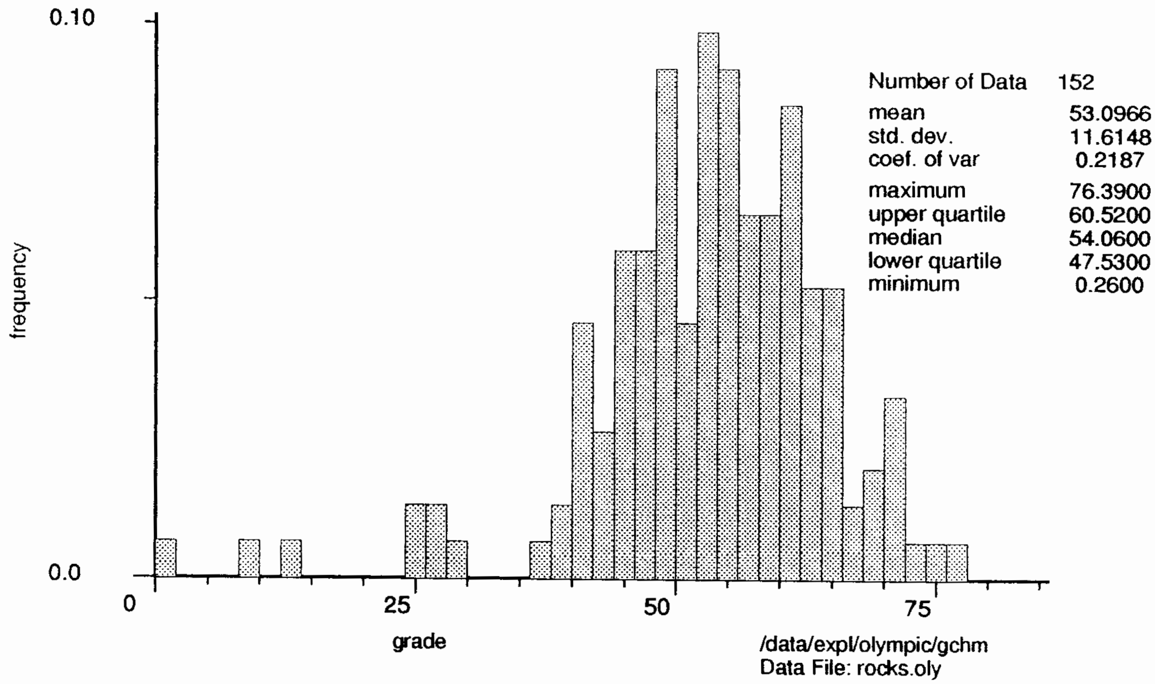
Litho Geochemistry: P2O5 (%)



Number of Data	152
mean	0.4574
std. dev.	1.5006
coef. of var	3.2808
maximum	17.5200
upper quartile	0.3200
median	0.2000
lower quartile	0.1350
minimum	0.0100

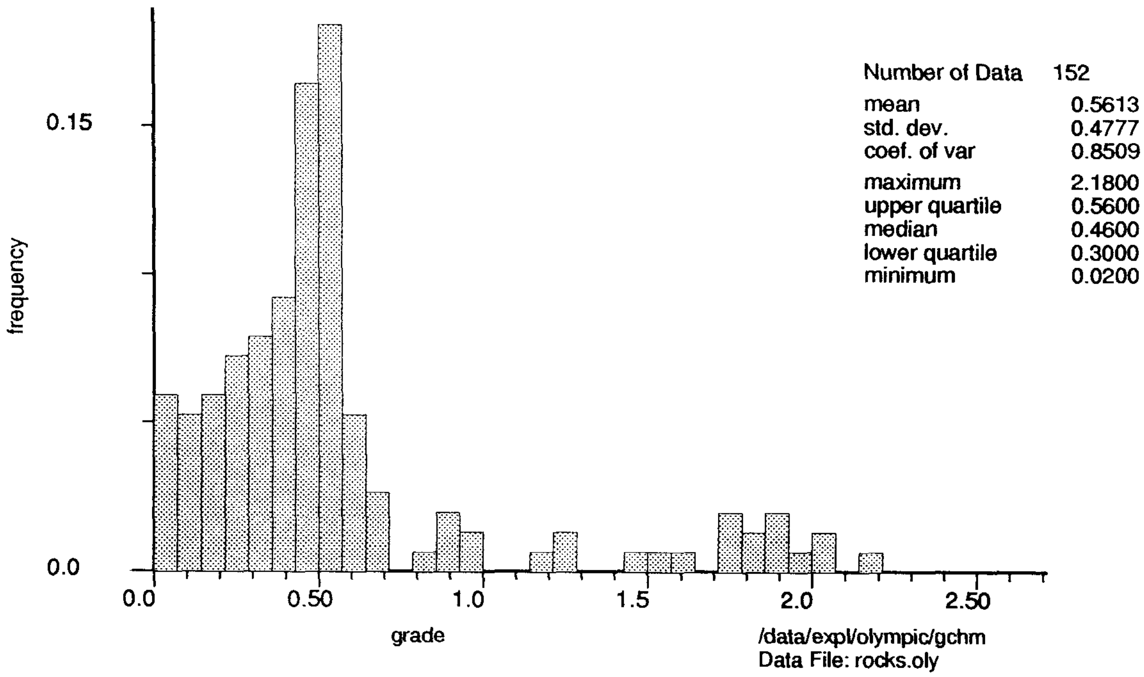
Figure

Histogram: SiO2 (%)



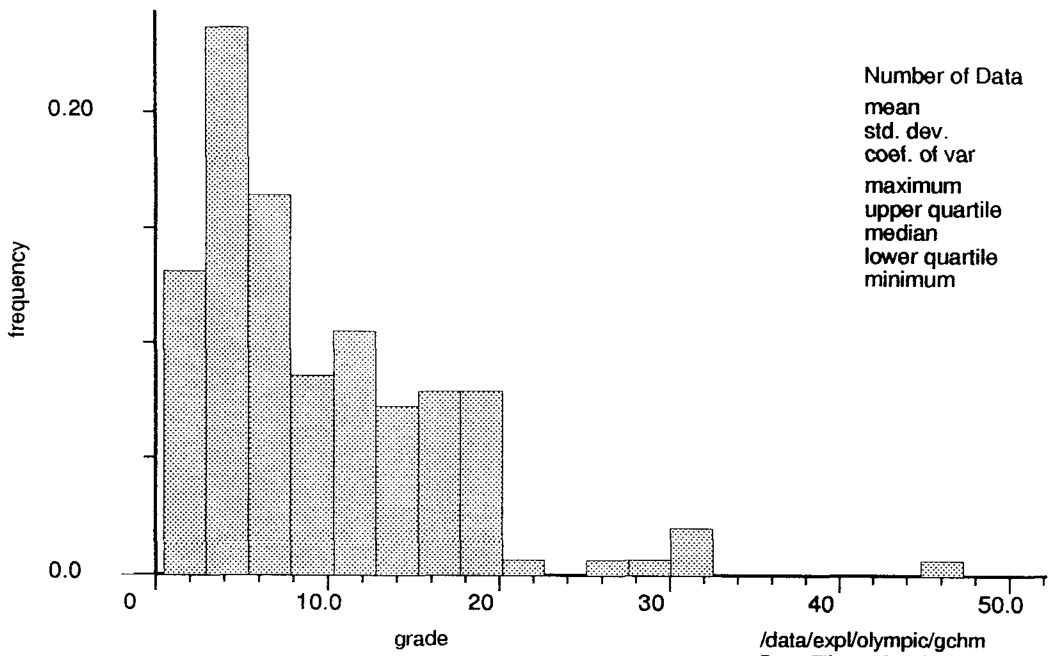
Figure

Histogram: TiO2 (%)



Figure

Litho Geochemistry: LOI (%)



Number of Data	152
mean	9.4938
std. dev.	7.1601
coef. of var	0.7542
maximum	44.8200
upper quartile	13.3500
median	7.4300
lower quartile	3.8350
minimum	0.4800

/data/expl/olympic/gchm
Data File: rock_whole.oly

Figure

APPENDIX III

LAB ANALYSIS SHEETS

FOR THE

SILT GEOCHEMICAL SURVEY

OLYMPIC - SILTS

PLACER DOME RESEARCH CENTRE
Geochemical Analysis

Project/Venture: V810
Area: BLACKSTONE 116B14
Remarks:
Au – 10.0 g sample digested with Aqua Regia and determined by Graphite Furnace A.A. (D.L. 1 PPB)
ICP – 0.5 g sample digested with 4 ml Aqua Regia at 100 Deg. C for 2 hours.
N.B. The major oxide elements, Ba, Be, Cr, La and W are rarely dissolved completely with this acid dissolution method

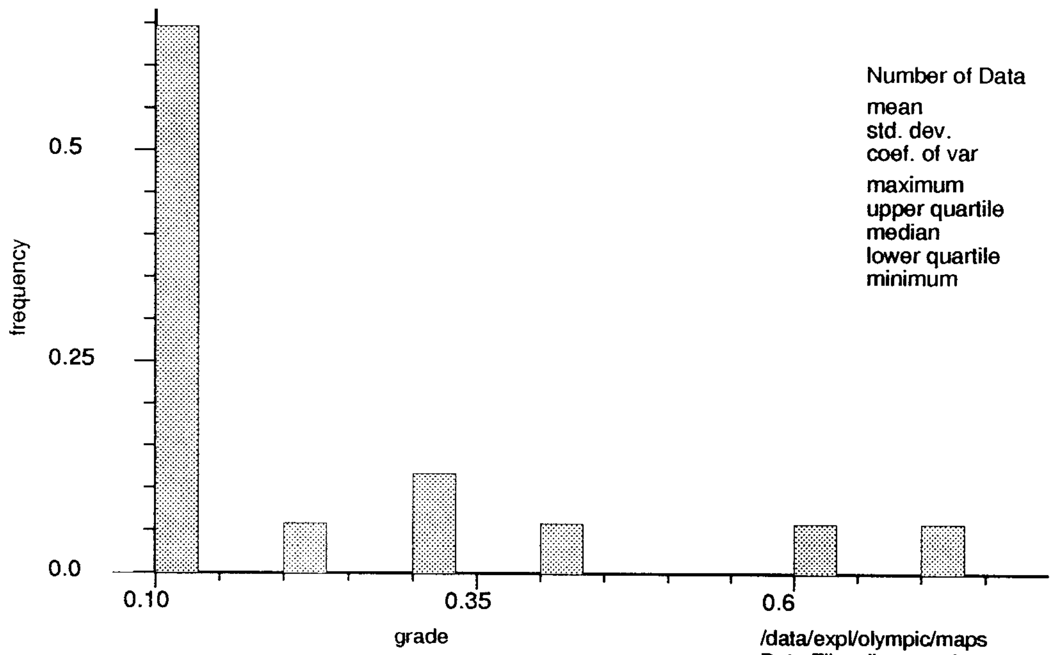
Geol.: G SHEVCHENKO
Lab Project No.: D2460

Date Received: JULY 27, 1992
Date Completed: AUGUST 21, 1992

Page 1 of 1
Attn: G SHEVCHENKO
J KOWALCHUK
E KIMURA

SAMPLE No.	Au ppb	Ag ppm	Mo ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm	Cd ppm	Ni ppm	Co ppm	Mn ppm	Bi ppm	Cr ppm	V ppm	Ba ppm	W ppm	Be ppm	La ppm	Sr ppm	Ti %	Al %	Ca %	Fe %	Mg %	K %	Na %	P %
B8912	5	0.4	2	227	13	113	31	7	<0.1	58	23	5925	8	82	39	1461	<5	1.0	18	16	0.02	1.47	1.18	5.32	0.96	0.09	0.01	0.12
B8913	4	0.1	2	170	25	81	31	18	<0.1	35	26	7634	6	29	34	1172	<5	1.0	16	11	0.01	1.11	1.47	5.09	1.15	0.10	0.01	0.10
B8914	2	0.2	3	126	20	74	9	<5	<0.1	30	12	2328	<2	35	43	725	<5	0.8	17	16	0.02	1.35	1.09	3.47	0.71	0.09	0.01	0.12
B8916	2	<0.1	2	119	17	64	11	<5	<0.1	34	22	5630	2	29	38	722	<5	1.0	22	11	0.01	1.13	0.73	4.76	0.57	0.10	<0.01	0.11
B8917	1	<0.1	<1	37	15	41	6	<5	<0.1	20	10	1042	<2	26	21	163	<5	1.1	22	8	<0.01	1.08	0.37	2.76	0.50	0.08	<0.01	0.07
B9232	2	0.1	2	90	32	71	12	<5	<0.1	33	18	2262	<2	26	28	276	<5	0.8	18	20	<0.01	0.96	1.63	3.86	1.21	0.08	<0.01	0.11
B9233	<1	<0.1	4	201	11	92	22	5	<0.1	58	23	5744	4	74	37	487	<5	0.7	13	18	0.01	1.25	2.40	4.47	1.83	0.09	0.01	0.11
B9234	<1	<0.1	2	76	22	69	11	10	0.2	31	18	2497	2	28	26	280	<5	0.8	18	17	<0.01	1.02	1.69	3.64	1.33	0.08	<0.01	0.09
B9235	<1	0.1	3	60	17	39	16	13	0.2	30	18	2740	<2	17	22	209	<5	0.5	12	47	<0.01	0.40	5.71	3.33	2.80	0.05	0.01	0.11
B9235*	<1	0.2	5	61	16	39	18	12	0.2	30	18	2737	<2	16	21	197	<5	0.5	12	47	<0.01	0.38	5.61	3.32	2.77	0.05	0.01	0.11
B9236	<1	<0.1	<1	70	39	92	<5	<5	0.1	31	16	1529	<2	35	23	274	<5	1.2	21	11	0.01	1.34	0.38	3.37	0.61	0.09	<0.01	0.07
B9237	3	<0.1	<1	181	9	66	<5	<5	<0.1	37	14	834	3	43	64	333	<5	0.7	16	16	0.02	2.05	0.66	4.37	1.17	0.08	0.01	0.09
B9238	NSS	<0.1	<1	58	25	148	<5	<5	0.1	29	15	1831	<2	32	19	275	<5	0.9	20	7	<0.01	1.22	0.24	3.39	0.58	0.07	<0.01	0.05
B9239	1	0.7	2	139	95	83	12	<5	<0.1	33	27	4386	6	34	33	603	<5	2.2	21	15	0.01	1.45	0.83	4.61	0.86	0.13	0.01	0.11
B9240	1	0.3	<1	76	45	104	7	<5	<0.1	30	15	1748	<2	30	25	276	<5	1.3	20	13	0.01	1.34	0.47	3.61	0.61	0.09	<0.01	0.08
B9241	<1	0.3	<1	77	71	143	<5	<5	<0.1	34	19	1250	<2	36	25	367	<5	1.7	20	11	0.01	1.61	0.19	3.78	0.64	0.09	<0.01	0.06
B9242	<1	0.6	2	111	156	321	8	<5	0.5	44	30	2362	3	42	38	385	<5	2.8	22	16	0.02	2.17	0.28	4.62	0.93	0.13	0.01	0.10
B9243	<1	0.1	1	82	34	79	<5	<5	<0.1	28	19	977	3	30	17	502	<5	1.2	15	7	<0.01	1.32	0.10	3.42	0.40	0.06	<0.01	0.04
STD-SPK-P1	55	0.2	62	26	49	146	19	5	0.4	35	6	584	2	112	33	167	<5	0.4	7	85	0.11	1.03	0.91	2.26	0.81	0.34	0.06	0.08

Silt Samples - Ag (ppm)

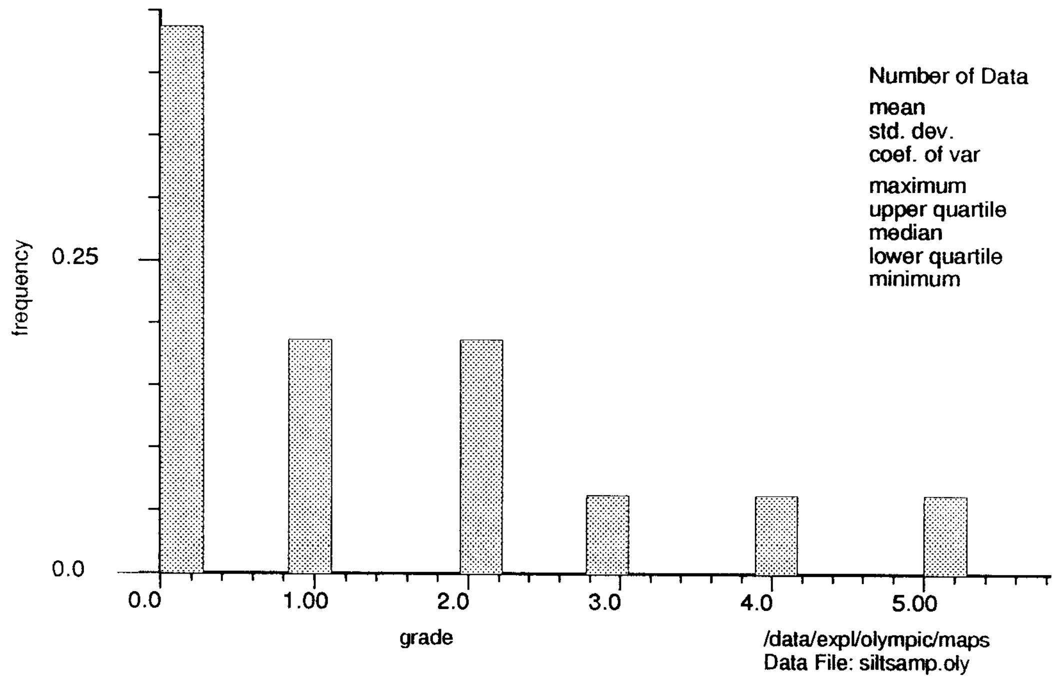


Number of Data	17
mean	0.2118
std. dev.	0.1843
coef. of var	0.8705
maximum	0.7000
upper quartile	0.3000
median	0.1000
lower quartile	0.1000
minimum	0.1000

/data/expl/olympic/maps
Data File: siltsamp.oly

Figure

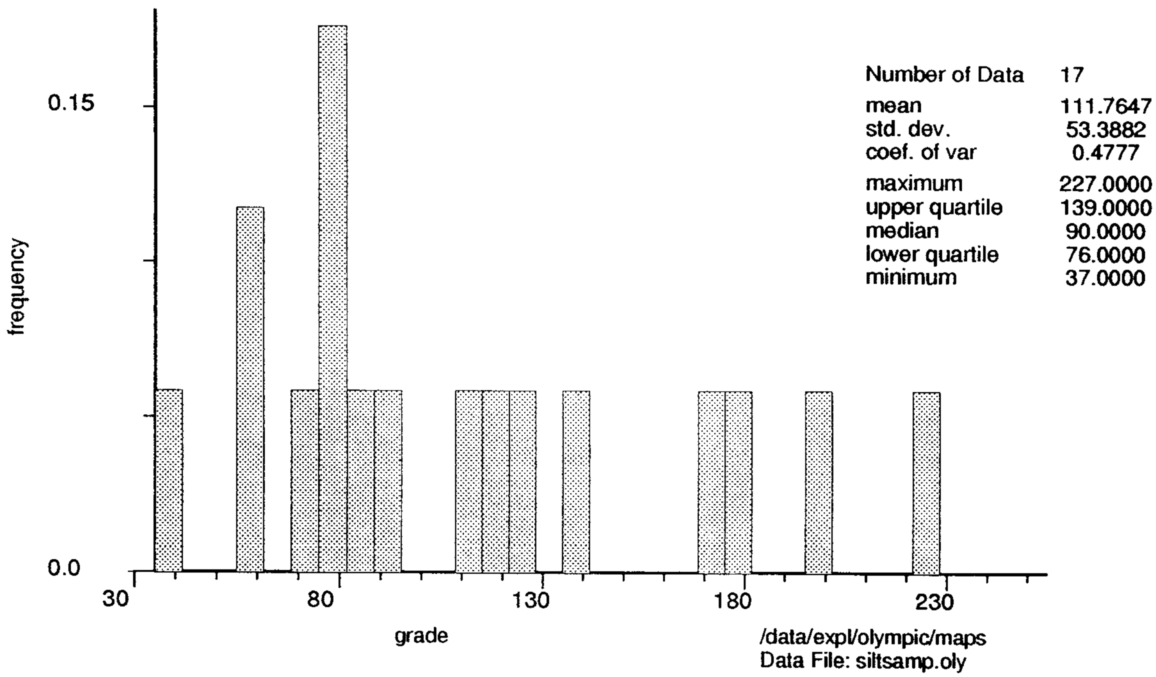
Silt Samples - Au (ppb)



Number of Data	16
mean	1.3125
std. dev.	1.5297
coef. of var	1.1655
maximum	5.0000
upper quartile	2.0000
median	1.0000
lower quartile	0.0000
minimum	0.0000

Figure

Silt Samples - Cu (ppm)



Figure

APPENDIX IV

LAB ANALYSIS SHEETS

FOR THE

SOIL GEOCHEMICAL SURVEY

PLACER DOME RESEARCH CENTRE
Geochemical Analysis

Project/Venture:	V810	Geol:	G SHEVCHENKO	Date Received:	JULY 27, 1992
Area:	BLACKSTONE 116B14	Lab Project No.:	D2454	Date Completed:	AUG 20, 1992

Attn: G SHEVCHENKO, J KOWALCHUK, E KIMURA

Remarks:
Au – 10.0 g sample digested with Aqua Regia and determined by Graphite Furnace A.A. (D.L. 1 PPB)
ICP – 0.5 g sample digested with 4 ml Aqua Regia at 100 Deg. C for 2 hours.
N.B. The major oxide elements, Ba, Be, Cr, La and W are rarely dissolved completely with this acid dissolution method.

SAMPLE No.	Au ppb	Ag ppm	Mo ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm	Cd ppm	Ni ppm	Co ppm	Mn ppm	Bi ppm	Cr ppm	V ppm	Ba ppm	W ppm	Be ppm	La ppm	Sr ppm	Ti %	Al %	Ca %	Fe %	Mg %	K %	Na %	P %
B8893	1	0.1	3	288	12	61	9	<5	0.2	20	16	3745	2	26	36	509	<5	0.8	13	22	0.02	1.16	1.63	3.37	0.50	0.06	0.01	0.12
B8894	9	0.3	7	695	11	86	14	<5	0.3	30	27	5653	<2	28	35	1254	<5	0.9	16	32	0.02	1.25	2.19	4.24	0.83	0.07	0.01	0.11
B8895	10	0.1	9	125	7	51	<5	<5	<0.1	40	29	4114	4	33	34	431	<5	1.7	31	12	0.03	1.10	0.67	6.25	0.62	0.10	<0.01	0.06
B8896	<1	0.1	3	288	5	153	15	<5	0.3	25	19	6967	3	25	42	685	<5	1.0	13	24	0.01	1.07	2.02	4.72	0.50	0.06	0.01	0.16
B8897	5	0.4	3	553	6	83	8	<5	0.2	39	24	7585	<2	27	78	657	<5	1.0	15	22	0.01	1.27	1.59	5.37	0.82	0.06	0.01	0.11
B8898	<1	0.2	3	1759	2	86	10	<5	<0.1	31	20	9163	3	19	74	642	<5	0.9	10	19	0.01	0.96	2.25	5.83	0.72	0.06	0.01	0.11
B8899	2	<0.1	4	616	10	112	<5	8	<0.1	46	39	7432	7	28	193	472	<5	0.8	15	17	0.02	2.10	1.52	7.32	1.30	0.07	0.01	0.10
B8900	<1	0.2	1	242	12	72	10	<5	<0.1	28	22	7541	5	27	48	1039	<5	0.7	15	19	0.01	1.30	1.71	5.69	0.62	0.05	<0.01	0.13
B8901	<1	<0.1	1	60	8	70	<5	<5	0.2	13	8	1841	<2	20	26	343	<5	0.5	8	14	0.03	1.06	0.76	2.34	0.37	0.04	0.03	0.05
STD-SPK-P1	56	0.2	60	27	51	146	19	<5	0.6	34	6	589	<2	121	37	178	<5	0.5	9	88	0.12	1.13	0.95	2.23	0.82	0.34	0.07	0.08
B8902	<1	<0.1	1	158	11	67	9	<5	0.3	16	16	4476	<2	22	39	443	<5	0.5	10	16	0.01	0.92	0.77	2.96	0.27	0.06	0.01	0.13
B8903	5	<0.1	3	379	13	71	<5	<5	<0.1	27	19	3358	2	31	63	422	<5	0.9	20	12	0.02	1.59	0.20	5.47	0.53	0.09	0.01	0.08
B8904	<1	0.1	5	329	9	95	12	<5	<0.1	39	42	8578	10	37	77	910	<5	1.1	15	17	0.01	2.26	0.91	7.61	0.76	0.07	<0.01	0.22
B8905	1	0.3	4	1670	<1	71	20	5	<0.1	44	57	12361	10	23	152	1872	<5	0.9	14	20	0.01	1.59	2.58	8.78	1.42	0.06	0.02	0.10
B8906	<1	0.3	3	1003	7	66	11	<5	<0.1	25	16	5318	<2	26	29	689	<5	1.3	18	15	0.01	0.93	1.14	4.56	0.49	0.09	<0.01	0.11
B8907	<1	0.1	4	224	5	45	7	7	<0.1	33	20	6451	4	28	29	915	<5	1.4	27	13	0.02	1.12	0.93	5.25	0.73	0.13	<0.01	0.09
B8908	7	0.2	9	381	8	60	9	10	0.1	34	27	7202	2	31	36	604	<5	0.9	17	17	0.02	1.22	1.13	4.94	0.80	0.08	0.01	0.08
B8909	<1	0.2	4	305	5	84	14	10	0.3	25	19	7487	<2	23	30	502	<5	0.7	11	30	0.01	0.91	4.13	4.49	1.27	0.07	0.01	0.10
B8910	<1	<0.1	3	88	9	74	6	<5	0.3	23	14	3328	3	28	36	396	<5	0.8	13	25	0.02	1.26	1.11	3.72	0.57	0.11	0.01	0.11
B8910*	<1	<0.1	4	87	8	73	6	<5	0.3	21	13	3104	<2	27	33	389	<5	0.8	12	23	0.02	1.18	1.04	3.45	0.53	0.10	0.01	0.11
B9174	15	<0.1	5	1336	13	73	6	<5	0.1	32	23	3771	4	33	52	361	<5	1.5	19	14	0.02	1.53	0.40	5.12	0.63	0.07	0.01	0.09
B9175	<1	<0.1	3	196	11	88	7	<5	0.3	29	22	5079	<2	33	43	789	<5	1.0	15	19	0.01	1.33	1.31	4.76	0.55	0.08	0.01	0.16
B9176	<1	<0.1	3	203	12	69	9	<5	0.2	31	18	4579	6	30	35	1432	<5	1.2	16	18	0.02	1.33	1.09	4.01	0.62	0.10	0.01	0.13
B9177	<1	<0.1	2	252	6	60	10	<5	0.2	23	12	4748	3	25	23	1368	<5	1.1	13	21	0.01	0.97	1.81	3.74	0.53	0.07	0.01	0.13
B9178	1	<0.1	2	115	13	63	<5	<5	<0.1	24	14	4096	4	32	47	1815	<5	1.1	23	13	0.01	1.51	0.51	4.78	0.45	0.11	<0.01	0.12
B9179	27	<0.1	4	1421	6	40	7	<5	<0.1	33	31	6012	5	26	36	1034	<5	1.5	25	13	0.01	1.41	1.66	6.23	1.25	0.13	<0.01	0.09
B9180	12	<0.1	5	911	10	58	19	<5	0.1	32	28	5054	4	36	47	854	<5	1.1	24	11	0.02	1.29	0.76	5.51	0.75	0.09	<0.01	0.08
B9181	28	<0.1	4	1408	13	65	8	<5	<0.1	35	37	6874	11	31	55	1227	<5	1.2	28	11	0.02	1.18	0.62	7.07	0.55	0.11	<0.01	0.11
B9182	2	<0.1	3	551	11	82	8	<5	<0.1	35	28	7342	9	37	54	559	<5	1.2	23	16	0.02	1.40	0.84	6.73	0.55	0.09	0.01	0.13
B9182*	2	<0.1	2	549	11	79	7	<5	<0.1	34	26	7288	7	36	52	550	<5	1.2	22	15	0.02	1.35	0.81	6.54	0.53	0.09	0.01	0.12
B9183	<1	0.1	2	61	14	80	9	<5	0.4	16	12	3465	<2	23	28	256	<5	0.8	11	15	0.02	0.96	0.82	2.90	0.26	0.05	0.01	0.11
B9184	<1	0.4	5	214	20	94	18	<5	0.2	31	23	7557	4	26	32	609	<5	1.1	16	12	0.01	1.08	1.14	5.26	0.53	0.06	<0.01	0.11
B9185	2	0.2	4	131	15	77	9	<5	0.3	25	18	6054	<2	27	42	625	<5	0.8	14	14	0.01	1.18	1.11	4.58	0.38	0.06	<0.01	0.15
B9186	6	0.3	5	283	19	91	12	<5	<0.1	32	32	7038	<2	29	49	806	<5	1.1	24	15	0.02	1.46	0.75	5.74	0.56	0.10	0.01	0.13
B9187	9	0.2	4	430	12	39	8	<5	<0.1	35	25	7528	4	26	32	1363	<5	1.6	35	16	0.01	1.23	2.46	6.23	1.33	0.15	<0.01	0.08
B9188	3	0.3	3	162	24	115	23	<5	0.2	34	22	13231	4	21	34	538	<5	1.0	18	13	0.01	0.96	0.98	6.86	0.42	0.07	<0.01	0.10
B9189	<1	0.5	5	157	56	103	26	<5	0.3	30	23	11754	5	21	23	427	<5	1.2	13	13	<0.01	0.79	1.82	4.77	0.48	0.07	0.01	0.13
B9190	<1	0.1	2	116	25	133	16	<5	0.3	28	20	7962	4	23	31	333	<5	0.9	13	13	0.01	0.99	1.30	4.87	0.49	0.07	0.01	0.09
B9191	1	0.3	2	101	30	68	23	<5	0.3	34	25	9333	2	24	33	618	<5	1.6	17	14	0.01	1.16	1.10	4.97	0.40	0.08	0.01	0.15
B9191*	6	0.3	2	99	33	67	25	<5	0.3	33	24	9256	<2	24	33	611	<5	1.6	16	14	0.01	1.15	1.09	4.94	0.40	0.08	0.01	0.15

PLACER DOME RESEARCH CENTRE

Geochemical Analysis

Project/Venture: V810 Geol: G SHEVCHENKO Date Received: JULY 27, 1992

Area: BLACKSTONE 116B14 Lab Project No.: D2454 Date Completed: AUG 20, 1992 Attn: G SHEVCHENKO, J KOWALCHUK, E KIMURA

Remarks:

Au - 10.0 g sample digested with Aqua Regia and determined by Graphite Furnace A.A. (D.L. 1 PPB)

ICP - 0.5 g sample digested with 4 ml Aqua Regia at 100 Deg. C for 2 hours.

N.B. The major oxide elements, Ba, Be, Cr, La and W are rarely dissolved completely with this acid dissolution method.

SAMPLE No.	Au ppb	Ag ppm	Mo ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm	Cd ppm	Ni ppm	Co ppm	Mn ppm	Bi ppm	Cr ppm	V ppm	Ba ppm	W ppm	Be ppm	La ppm	Sr ppm	Ti %	Al %	Ca %	Fe %	Mg %	K %	Na %	P %
B9192	5	0.4	9	434	64	78	52	<5	<0.1	41	42	10360	7	29	40	1489	<5	1.3	29	15	0.01	1.35	0.77	6.33	0.79	0.11	0.01	0.09
B9193	1	0.4	5	156	61	99	56	<5	0.3	34	30	7635	6	26	29	659	<5	1.2	16	11	0.01	1.01	1.30	5.15	0.43	0.09	0.01	0.12
B9194	6	0.8	9	133	52	74	123	<5	0.1	45	42	9922	12	21	29	483	<5	1.2	22	11	0.01	0.74	1.06	6.39	0.48	0.10	<0.01	0.08
B9195	3	0.5	3	131	29	112	31	8	0.2	35	24	11317	8	24	36	594	<5	1.2	17	12	0.02	1.07	1.04	6.24	0.52	0.07	0.01	0.10
B9196	2	0.4	3	101	14	60	27	<5	0.4	27	22	7956	3	18	26	378	<5	1.0	13	13	<0.01	0.59	3.82	4.09	2.12	0.08	0.01	0.08
B9197	7	0.5	8	236	74	82	93	9	0.1	42	47	12748	6	20	30	1542	<5	1.1	18	11	<0.01	0.80	2.93	5.87	1.78	0.09	0.01	0.08
B9198	10	0.7	6	262	62	85	53	7	<0.1	48	41	9595	10	20	28	478	<5	1.0	15	11	<0.01	0.69	2.12	7.09	1.28	0.11	0.01	0.07
B9199	3	0.6	5	96	47	71	37	7	<0.1	36	26	10274	7	20	25	502	<5	1.7	16	12	<0.01	0.76	1.22	7.67	0.47	0.20	<0.01	0.11
B9200	6	0.6	11	297	45	68	15	<5	<0.1	43	32	10612	7	27	34	678	<5	2.2	30	12	0.01	1.22	0.65	7.18	0.70	0.11	0.01	0.09
B9200*	12	0.5	10	303	45	68	14	<5	<0.1	43	31	10745	9	27	34	685	<5	2.2	30	12	0.01	1.23	0.65	7.23	0.70	0.11	0.01	0.09
B9226	<1	<0.1	2	105	20	115	8	5	<0.1	34	30	4956	2	35	64	1229	<5	1.4	20	22	0.03	1.76	0.54	5.43	0.59	0.14	0.01	0.13
B9227	<1	0.1	<1	98	16	90	11	<5	<0.1	19	11	1948	<2	28	40	245	<5	0.7	15	12	0.02	0.74	0.42	3.33	0.22	0.08	0.01	0.12
B9228	1	<0.1	1	81	18	85	<5	<5	<0.1	28	15	1652	2	38	85	368	<5	0.7	18	11	0.03	1.49	0.15	5.40	0.38	0.10	<0.01	0.09
B9229	<1	0.2	3	53	10	37	<5	<5	<0.1	13	5	284	<2	31	64	478	<5	0.3	25	7	0.01	0.89	0.09	3.11	0.13	0.07	<0.01	0.06
B9230	2	0.2	2	120	16	75	8	<5	<0.1	29	18	4385	<2	34	50	1221	<5	1.3	20	15	0.02	1.47	0.51	5.08	0.46	0.13	<0.01	0.13
B9231	<1	0.3	3	108	10	81	8	<5	0.2	25	14	5235	<2	29	28	1625	<5	1.2	17	20	0.02	1.14	1.32	4.07	0.50	0.11	0.01	0.15
STD-SPK-P1	41	0.2	64	27	57	147	19	<5	0.5	37	6	599	<2	125	37	190	<5	0.5	9	89	0.12	1.14	0.98	2.38	0.85	0.37	0.07	0.09
B9246	2	0.4	4	161	34	120	27	7	<0.1	38	26	9481	12	27	39	506	<5	1.5	21	15	0.02	1.13	1.09	6.55	0.49	0.09	0.01	0.12
B9247	4	0.3	2	137	35	101	26	<5	<0.1	40	24	10704	10	27	37	539	<5	1.3	19	11	0.01	1.05	0.91	6.40	0.43	0.09	<0.01	0.10
B9248	1	0.4	4	235	38	152	29	<5	<0.1	38	22	13167	11	25	35	551	<5	1.0	18	12	0.01	0.90	1.83	7.14	0.71	0.08	0.01	0.10
B9249	3	0.4	5	185	40	134	61	<5	<0.1	42	32	13321	15	25	37	692	<5	1.4	21	13	0.01	1.14	1.31	6.95	0.57	0.10	0.01	0.12
B9250	4	0.1	5	707	21	50	42	<5	<0.1	41	66	11287	16	27	25	2616	<5	1.7	38	14	0.02	1.12	0.77	6.51	0.80	0.20	<0.01	0.09
B9251	7	0.1	5	408	17	60	13	<5	<0.1	40	28	8185	9	29	29	1423	<5	2.1	39	16	0.02	1.25	1.51	6.61	1.24	0.20	0.01	0.10
B9252	9	0.1	5	1020	8	52	30	7	0.2	33	42	6830	<2	22	36	1457	<5	1.0	17	25	<0.01	0.84	7.26	4.90	4.22	0.13	0.02	0.07
B9253	4	0.2	3	380	15	72	20	<5	<0.1	42	25	5180	5	30	33	1165	<5	2.2	34	14	0.02	1.40	1.56	6.24	0.97	0.23	0.01	0.12
B9254	<1	0.1	4	169	60	89	17	<5	0.4	37	32	7721	2	32	33	1104	<5	2.0	26	18	0.01	1.78	0.90	4.74	0.82	0.14	0.01	0.18
B9254*	NSS	0.1	2	166	57	88	15	<5	0.3	39	30	7698	3	32	31	1096	<5	1.9	25	17	0.01	1.67	0.84	4.56	0.78	0.13	0.01	0.17
B9255	8	0.4	4	710	27	68	15	<5	<0.1	39	29	8098	8	37	39	2440	<5	1.4	30	20	0.02	1.53	0.81	6.03	0.66	0.16	0.01	0.13
B9256	5	0.3	5	1088	21	83	20	<5	<0.1	41	48	13347	12	30	38	1433	<5	1.4	32	17	0.02	1.27	0.90	7.08	0.65	0.13	0.01	0.10
B9257	3	0.2	6	482	46	90	31	<5	<0.1	35	35	9608	9	26	32	1427	<5	1.2	26	25	0.02	1.17	1.73	5.49	0.91	0.16	0.01	0.14
B9258	3	0.3	6	191	78	94	60	<5	<0.1	42	33	8142	7	28	32	673	<5	1.4	22	14	0.01	1.15	1.13	6.07	0.52	0.11	0.02	0.12
B9259	4	0.4	9	120	46	94	69	9	<0.1	52	38	10200	10	23	27	524	<5	1.5	24	12	0.01	0.82	1.09	6.88	0.49	0.14	0.01	0.10
B9260	2	0.2	7	84	25	75	28	<5	0.3	19	19	10630	<2	13	16	238	<5	0.5	6	20	<0.01	0.25	6.80	3.41	3.80	0.02	0.02	0.05
B9261	3	0.1	4	78	16	63	27	<5	0.4	25	19	9981	<2	16	24	350	<5	0.9	11	15	<0.01	0.54	6.50	4.23	3.73	0.05	0.02	0.06
B9262	1	0.2	5	125	49	109	30	7	<0.1	34	25	9325	5	21	28	632	<5	1.5	16	11	<0.01	0.76	1.58	6.39	0.54	0.08	0.01	0.12
B9263	3	0.5	4	85	48	112	47	6	<0.1	30	24	13705	3	15	29	468	<5	0.7	8	13	<0.01	0.40	5.05	6.65	2.51	0.04	0.02	0.09
B9263*	3	0.4	4	81	46	109	45	5	0.1	27	22	13385	4	14	28	458	<5	0.7	8	13	<0.01	0.38	5.08	6.57	2.56	0.03	0.02	0.08
B9264	3	0.1	5	181	66	116	44	10	0.1	41	32	14681	<2	21	32	1031	<5	1.2	22	10	0.01	0.86	2.00	6.76	1.20	0.09	0.01	0.10
B9265	2	0.5	9	373	234	97	148	<5	<0.1	47	55	8941	<2	28	35	1285	<5	1.3	25	13	0.01	1.19	0.80	6.54	0.66	0.12	0.02	0.12
B9266	4	0.7	8	273	135	89	83	5	0.2	56	58	11667	<2	33	43	676	<5	1.1	25	14	0.02	1.31	0.62	6.19	0.60	0.12	0.01	0.11

PLACER DOME RESEARCH CENTRE
Geochemical Analysis

Project/Venture: V810 Geol: G SHEVCHENKO Date Received: JULY 27, 1992
Area: BLACKSTONE 116B14 Lab Project No.: D2454 Date Completed: AUG 20, 1992 Attn: G SHEVCHENKO, J KOWALCHUK, E KIMURA
Remarks:
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ICP – 0.5 g sample digested with 4 ml Aqua Regia at 100 Deg. C for 2 hours.
N.B. The major oxide elements, Ba, Be, Cr, La and W are rarely dissolved completely with this acid dissolution method.

SAMPLE No.	Au ppb	Ag ppm	Mo ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm	Cd ppm	Ni ppm	Co ppm	Mn ppm	Bi ppm	Cr ppm	V ppm	Ba ppm	W ppm	Be ppm	La ppm	Sr ppm	Ti %	Al %	Ca %	Fe %	Mg %	K %	Na %	P %
B9267	8	1.4	10	469	838	160	59	5	0.3	53	54	12674	<2	29	41	875	<5	1.6	30	14	0.02	1.16	0.68	6.89	0.62	0.11	0.01	0.08
B9268	1	<0.1	3	616	24	73	20	5	<0.1	37	34	10444	3	31	41	1448	<5	1.4	23	18	0.01	1.42	0.66	6.47	0.43	0.14	0.01	0.17
B9269	5	<0.1	3	123	13	73	14	6	<0.1	36	24	3954	<2	36	38	1086	<5	1.0	33	13	0.02	1.47	0.18	6.29	0.61	0.14	0.01	0.12
B9801	2	<0.1	5	400	14	138	17	8	0.6	49	25	9008	3	38	52	707	<5	1.1	21	19	0.02	1.83	1.09	5.70	0.98	0.10	0.02	0.14
B9802	<1	<0.1	4	132	8	84	21	5	0.3	29	17	6299	<2	24	27	514	<5	1.5	15	30	0.01	1.11	1.95	4.66	0.51	0.08	0.02	0.14
B9803	<1	<0.1	4	293	8	74	17	7	0.4	25	18	5682	<2	23	26	418	<5	1.0	12	22	0.01	1.02	1.91	4.03	0.43	0.08	0.01	0.14
B9803*	<1	<0.1	4	285	9	73	18	8	0.4	24	18	5663	<2	23	25	407	<5	1.0	12	21	0.01	0.98	1.88	3.92	0.42	0.08	0.01	0.14
B9804	<1	<0.1	3	240	<1	58	18	<5	0.6	13	10	2655	<2	15	23	324	<5	0.5	5	26	<0.01	0.35	3.63	1.41	0.61	0.07	0.01	0.13
B9805	3	0.1	5	976	3	84	10	5	<0.1	46	36	8863	6	26	154	707	<5	0.9	18	21	0.02	1.88	1.50	7.47	1.11	0.09	0.02	0.14
B9806	4	0.2	4	1348	4	99	9	<5	<0.1	52	36	10105	8	32	193	760	<5	0.7	21	17	0.03	2.18	0.90	8.35	1.14	0.09	0.01	0.11
B9807	<1	<0.1	3	233	11	80	8	<5	<0.1	24	9	1588	4	27	134	205	<5	0.4	12	9	0.03	1.24	0.15	6.97	0.22	0.06	<0.01	0.13
B9808	<1	<0.1	2	101	9	143	9	<5	0.4	22	18	6418	<2	23	38	631	<5	0.7	12	18	0.02	1.03	1.39	3.67	0.39	0.07	0.01	0.14
B9809	3	0.2	3	1388	<1	80	14	5	<0.1	46	81	17997	13	23	164	903	<5	0.9	20	29	0.02	1.77	2.12	10.31	1.29	0.07	0.02	0.09
B9810	8	0.2	3	4828	<1	99	9	7	<0.1	49	37	17117	8	26	180	971	<5	0.8	20	21	0.02	1.73	1.19	10.64	1.03	0.09	0.02	0.10
B9811	2	0.1	2	331	<1	73	12	<5	<0.1	24	12	4468	<2	26	32	1032	<5	1.1	16	20	0.01	1.05	1.71	4.63	0.65	0.08	0.01	0.11
B9812	4	0.2	3	210	5	66	8	11	<0.1	31	15	3866	<2	30	33	605	<5	1.2	21	17	0.02	1.22	0.82	4.29	0.66	0.11	0.01	0.11
B9812*	4	0.2	3	210	4	68	7	9	<0.1	31	15	3907	<2	31	33	615	<5	1.3	21	17	0.02	1.23	0.82	4.35	0.67	0.11	0.01	0.11
B9813	5	0.2	2	164	7	58	<5	<5	<0.1	34	16	3532	3	32	38	482	<5	1.2	27	16	0.03	1.23	0.44	4.42	0.69	0.11	0.01	0.06
B9814	<1	0.1	4	100	6	71	7	<5	<0.1	32	20	4994	7	29	40	1449	<5	1.4	26	19	0.02	1.45	0.92	5.29	0.58	0.16	<0.01	0.16
B9815	8	0.3	2	116	6	78	<5	<5	<0.1	38	20	4736	9	31	36	1036	<5	1.6	37	17	0.03	1.48	0.78	5.59	1.03	0.15	0.01	0.09
B9816	14	0.4	3	187	6	65	<5	<5	<0.1	37	22	5060	6	30	44	1281	<5	1.2	25	20	0.03	1.40	1.30	5.64	1.17	0.12	0.02	0.10
B9817	16	0.2	2	184	13	90	<5	<5	<0.1	40	32	5901	14	32	95	893	<5	1.3	27	15	0.02	2.06	0.59	7.61	0.82	0.13	0.01	0.16
B9818	2	0.1	3	59	11	84	<5	<5	<0.1	31	15	2713	6	33	54	467	<5	1.3	18	14	0.03	1.61	0.29	4.87	0.48	0.12	<0.01	0.09
B9819	19	<0.1	4	93	2	89	5	<5	<0.1	32	18	2173	7	32	62	563	<5	0.9	26	10	0.02	1.37	0.34	6.94	0.62	0.08	<0.01	0.11
B9820	<1	0.2	4	513	6	52	<5	<5	<0.1	25	13	2976	6	27	46	292	<5	2.0	23	12	0.01	1.23	0.65	5.31	0.46	0.13	<0.01	0.15
B9821	1	<0.1	3	60	20	77	11	<5	<0.1	29	13	1361	5	31	51	387	<5	0.9	19	10	0.02	1.46	0.15	5.57	0.42	0.16	<0.01	0.10
STD-SPK-P1	60	0.3	66	25	48	144	19	<5	0.4	36	6	576	<2	112	36	182	<5	0.5	9	84	0.11	1.09	0.87	2.27	0.85	0.35	0.07	0.08
B9822	2	0.1	3	106	10	66	7	<5	<0.1	32	17	2527	<2	36	55	483	<5	1.3	22	11	0.02	1.55	0.19	5.14	0.57	0.11	<0.01	0.09
B9823	3	0.3	3	114	6	85	6	<5	<0.1	34	17	4312	2	35	43	1422	<5	1.4	22	17	0.02	1.50	0.73	4.81	0.60	0.12	0.01	0.11
B9824	2	0.2	1	109	4	93	5	<5	<0.1	32	16	2871	<2	34	42	815	<5	1.3	25	16	0.03	1.51	0.56	4.75	0.68	0.11	0.01	0.10
B9825	1	0.2	2	197	<1	56	6	<5	<0.1	29	17	5371	<2	24	26	1668	<5	1.6	23	21	0.01	1.20	1.52	4.39	0.70	0.11	0.01	0.13
B9826	4	0.2	2	90	<1	51	<5	<5	<0.1	31	14	2789	3	33	35	2238	<5	1.8	33	14	0.02	1.48	0.40	5.34	0.68	0.13	<0.01	0.10
B9827	2	0.3	2	103	5	116	<5	<5	<0.1	25	13	4342	<2	30	49	826	<5	1.2	20	13	0.02	1.58	0.41	5.33	0.39	0.10	0.01	0.13
B9828	2	0.3	4	80	14	125	6	<5	<0.1	38	29	4174	3	38	71	1202	<5	1.7	17	18	0.02	2.21	0.47	5.49	0.70	0.11	0.01	0.15
B9829	2	0.1	4	355	11	102	13	<5	<0.1	38	43	5295	7	33	97	886	<5	1.3	21	14	0.02	1.65	0.88	6.07	0.71	0.13	0.01	0.15
B9830	37	0.4	5	443	11	62	17	5	<0.1	40	32	8038	6	26	47	1192	<5	1.4	30	17	0.02	1.03	0.78	7.07	0.71	0.15	0.01	0.10
B9830*	39	0.5	6	446	10	62	14	<5	<0.1	41	32	8174	7	26	47	1218	<5	1.4	29	17	0.02	1.04	0.80	7.15	0.73	0.15	0.01	0.10
B9831	16	0.7	1	446	13	67	14	7	<0.1	38	30	12849	6	22	37	1921	<5	1.5	25	18	0.01	0.99	1.53	7.30	0.80	0.15	0.01	0.14
B9832	11	0.3	5	386	7	42	10	<5	<0.1	33	23	6972	<2	26	31	1263	<5	1.4	35	15	0.02	1.11	1.90	5.81	1.17	0.14	<0.01	0.08
B9833	6	0.1	5	274	27	75	15	<5	<0.1	34	23	8594	2	28	38	718	<5	1.1	23	10	0.02	1.10	0.63	5.75	0.53	0.08	<0.01	0.08

PLACER DOME RESEARCH CENTRE
Geochemical Analysis

Project/Venture: V810
Area: BLACKSTONE 116B14
Geol: G SHEVCHENKO
Lab Project No.: D2454
Date Received: JULY 27, 1992
Date Completed: AUG 20, 1992
Attn: G SHEVCHENKO, J KOWALCHUK, E KIMURA

Remarks:
Au – 10.0 g sample digested with Aqua Regia and determined by Graphite Furnace A.A. (D.L. 1 PPB)
ICP – 0.5 g sample digested with 4 ml Aqua Regia at 100 Deg. C for 2 hours.
N.B. The major oxide elements, Ba, Be, Cr, La and W are rarely dissolved completely with this acid dissolution method

SAMPLE No.	Au ppb	Ag ppm	Mo ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm	Cd ppm	Ni ppm	Co ppm	Mn ppm	Bi ppm	Cr ppm	V ppm	Ba ppm	W ppm	Be ppm	La ppm	Sr ppm	Ti %	Al %	Ca %	Fe %	Mg %	K %	Na %	P %
B9834	4	0.4	2	255	21	107	22	<5	<0.1	35	24	10517	3	30	43	689	<5	1.1	19	12	0.02	1.18	1.13	6.00	0.52	0.07	0.01	0.10
B9835	1	0.3	3	110	23	112	18	<5	0.2	29	19	9849	<2	23	26	449	<5	0.8	12	11	<0.01	0.71	1.82	5.01	0.66	0.06	0.01	0.12
B9836	1	0.4	2	112	15	98	12	<5	0.2	29	20	5913	<2	26	30	320	<5	0.8	16	15	0.02	1.07	0.85	4.04	0.41	0.07	0.01	0.09
B9837	<1	0.3	<1	194	7	117	15	<5	0.2	24	14	3931	<2	28	29	360	<5	0.8	13	13	0.01	0.86	1.57	3.99	0.45	0.07	0.01	0.10
B9838	<1	0.3	2	979	8	82	8	<5	0.1	22	18	4989	<2	26	25	531	<5	0.8	14	11	0.01	0.87	1.01	3.54	0.40	0.07	<0.01	0.10
B9839	9	0.1	2	1091	3	48	9	<5	<0.1	32	23	7194	<2	25	27	1437	<5	2.2	18	12	0.01	1.09	1.07	5.95	0.66	0.11	<0.01	0.10
B9839*	10	0.1	3	1103	3	46	7	<5	<0.1	33	23	7248	<2	25	27	1451	<5	2.2	18	12	0.01	1.10	1.09	6.00	0.67	0.11	<0.01	0.10
B9840	10	<0.1	2	1438	<1	38	7	<5	<0.1	34	31	5185	5	29	34	853	<5	1.2	22	17	0.01	1.30	3.08	5.02	1.76	0.12	<0.01	0.07
B9841	3	0.1	<1	172	5	65	7	<5	<0.1	36	18	4772	5	35	39	1798	<5	1.8	29	14	0.02	1.58	0.55	5.67	0.66	0.13	<0.01	0.11
B9842	4	0.1	<1	312	3	60	6	<5	<0.1	34	15	4184	3	32	34	1130	<5	1.0	18	16	0.02	1.24	0.89	4.39	0.64	0.09	0.01	0.10
B9843	5	0.1	<1	218	8	60	6	<5	<0.1	30	17	3260	<2	32	37	648	<5	1.0	18	14	0.02	1.33	0.49	4.01	0.62	0.08	<0.01	0.08
B9844	9	<0.1	<1	615	5	59	8	<5	<0.1	25	23	2596	<2	30	50	460	<5	0.8	17	11	0.02	1.18	0.32	4.58	0.44	0.08	<0.01	0.10
B9845	1	<0.1	<1	96	<1	53	11	<5	0.2	11	9	1550	<2	17	13	257	<5	0.4	3	35	0.01	0.49	2.09	1.40	0.40	0.06	0.01	0.11
B9846	1	<0.1	2	290	2	67	11	<5	0.1	23	21	6445	<2	21	22	508	<5	0.8	8	26	<0.01	0.84	2.60	3.20	0.55	0.06	0.01	0.15
B9847	3	0.1	3	140	5	53	24	<5	<0.1	30	29	4045	2	28	31	275	<5	0.6	12	16	0.03	1.10	0.64	3.91	0.66	0.05	0.01	0.04
B9848	3	0.2	7	835	<1	46	6	<5	<0.1	36	20	5427	<2	24	29	309	<5	1.6	22	15	0.01	1.32	1.25	5.29	0.99	0.14	<0.01	0.08
B9848*	5	0.2	7	840	<1	47	6	<5	<0.1	37	21	5484	<2	24	29	318	<5	1.6	21	15	0.01	1.34	1.29	5.42	1.02	0.15	<0.01	0.08
B9849	1	<0.1	2	127	11	56	8	<5	0.3	27	15	4061	<2	30	35	779	<5	1.1	18	22	0.02	1.29	0.85	3.73	0.55	0.09	0.01	0.11
B9850	5	<0.1	4	296	29	68	14	<5	<0.1	39	29	4599	<2	50	45	562	<5	0.9	16	16	0.02	1.50	0.70	4.50	1.01	0.08	<0.01	0.09
B9851	<1	0.2	2	162	25	101	13	<5	0.2	27	18	5167	<2	35	36	679	<5	1.0	13	22	0.01	1.22	1.34	3.87	0.63	0.06	<0.01	0.15
B9852	<1	<0.1	3	186	33	160	12	<5	0.7	30	19	4127	<2	34	36	568	<5	0.9	13	27	0.02	1.20	1.44	3.65	0.65	0.08	0.01	0.14
B9853	1	0.3	3	229	18	76	9	<5	0.3	24	17	5075	<2	28	32	800	<5	0.9	13	24	0.01	1.19	1.60	3.49	0.60	0.08	0.01	0.16
B11130	4	1.1	9	237	124	54	60	<5	0.1	33	39	7814	6	22	23	589	<5	1.4	25	11	<0.01	0.78	1.52	3.86	0.68	0.12	<0.01	0.09
B11131	3	0.4	7	625	65	110	77	<5	0.1	35	34	9585	3	26	33	696	<5	0.8	14	13	0.01	1.09	1.04	5.29	0.50	0.06	<0.01	0.11
B11132	<1	0.7	3	181	31	78	24	<5	0.1	25	22	6498	<2	31	32	2067	<5	1.0	13	13	<0.01	1.14	0.70	3.61	0.32	0.09	<0.01	0.15
B11133	1	0.2	2	146	12	63	11	<5	0.2	25	15	3427	<2	33	35	541	<5	0.9	18	11	0.02	0.93	0.19	3.93	0.24	0.09	<0.01	0.13
B11133*	1	0.2	1	142	13	62	10	<5	0.2	23	15	3415	<2	32	34	537	<5	0.9	18	10	0.02	0.91	0.19	3.82	0.24	0.09	<0.01	0.12
B11134	2	<0.1	<1	180	10	104	18	<5	0.2	49	31	10509	6	35	30	2709	<5	1.7	25	18	0.02	1.30	0.59	5.45	0.42	0.11	0.01	0.12
B11135	2	0.1	2	114	31	243	21	<5	0.1	41	38	4718	<2	30	32	453	<5	3.5	20	10	0.01	1.37	0.14	4.55	0.53	0.14	<0.01	0.11
B11136	3	0.1	2	225	14	51	15	8	<0.1	34	20	5528	2	32	27	1663	<5	1.7	45	13	0.02	1.45	0.48	5.01	0.91	0.20	<0.01	0.08
B11137	5	0.1	1	844	9	74	19	6	<0.1	35	29	11204	5	30	32	1971	<5	1.4	25	19	0.02	1.17	1.09	5.93	0.74	0.16	0.01	0.12
B11138	4	0.4	6	650	35	59	83	7	<0.1	37	34	11611	5	31	35	1139	<5	1.0	27	14	0.02	1.15	0.82	5.98	0.79	0.13	<0.01	0.09
B11139	3	0.1	3	290	37	74	37	<5	<0.1	34	27	5888	5	25	28	648	<5	1.3	19	12	0.01	0.96	0.97	5.10	0.56	0.10	0.01	0.09
B11140	5	0.1	2	327	11	49	20	7	<0.1	34	23	8741	5	28	26	1710	<5	1.5	34	13	0.02	1.03	0.95	6.09	0.93	0.14	0.01	0.07
B11141	6	0.2	2	931	16	52	19	5	<0.1	31	23	6696	<2	22	30	829	<5	1.1	17	15	<0.01	0.78	5.30	4.76	3.53	0.08	0.02	0.06
B11142	7	0.4	2	418	12	40	71	<5	0.2	34	32	3355	<2	21	26	390	<5	0.9	17	16	<0.01	0.63	5.85	3.83	3.86	0.10	0.02	0.06
STD-SPK-P1	56	0.2	67	27	48	143	19	<5	0.4	35	6	610	<2	117	35	177	<5	0.5	8	87	0.11	1.08	0.94	2.27	0.84	0.36	0.06	0.08
B11143	7	0.2	2	495	17	61	19	<5	<0.1	41	26	5822	3	32	31	570	<5	2.1	34	12	0.02	1.28	0.59	5.51	0.59	0.14	<0.01	0.11
B11144	2	0.1	3	151	23	115	8	<5	<0.1	43	45	3405	4	43	102	419	<5	0.8	18	11	0.02	1.80	0.20	5.53	0.81	0.10	<0.01	0.11
B11145	28	0.1	1	284	18	68	12	<5	<0.1	39	30	2999	4	33	65	1244	<5	1.2	26	14	0.02	1.33	0.27	6.06	0.57	0.11	<0.01	0.07

PLACER DOME RESEARCH CENTRE
Geochemical Analysis

Project/Venture: V810 | Geol: G SHEVCHENKO | Date Received: JULY 27, 1992 |

Area: BLACKSTONE 116B14 | Lab Project No.: D2454 | Date Completed: AUG 20, 1992 | Attn: G SHEVCHENKO, J KOWALCHUK, E KIMURA

Remarks:

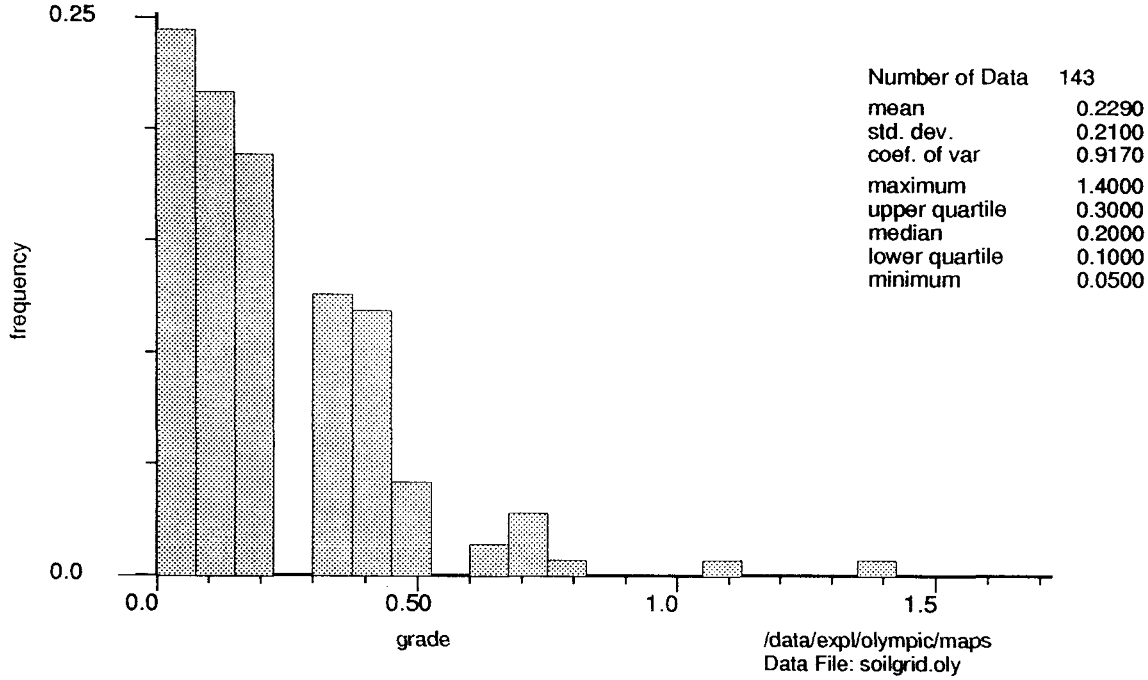
Au – 10.0 g sample digested with Aqua Regia and determined by Graphite Furnace A.A. (D.L. 1 PPB)

ICP – 0.5 g sample digested with 4 ml Aqua Regia at 100 Deg. C for 2 hours.

N.B. The major oxide elements, Ba, Be, Cr, La and W are rarely dissolved completely with this acid dissolution method.

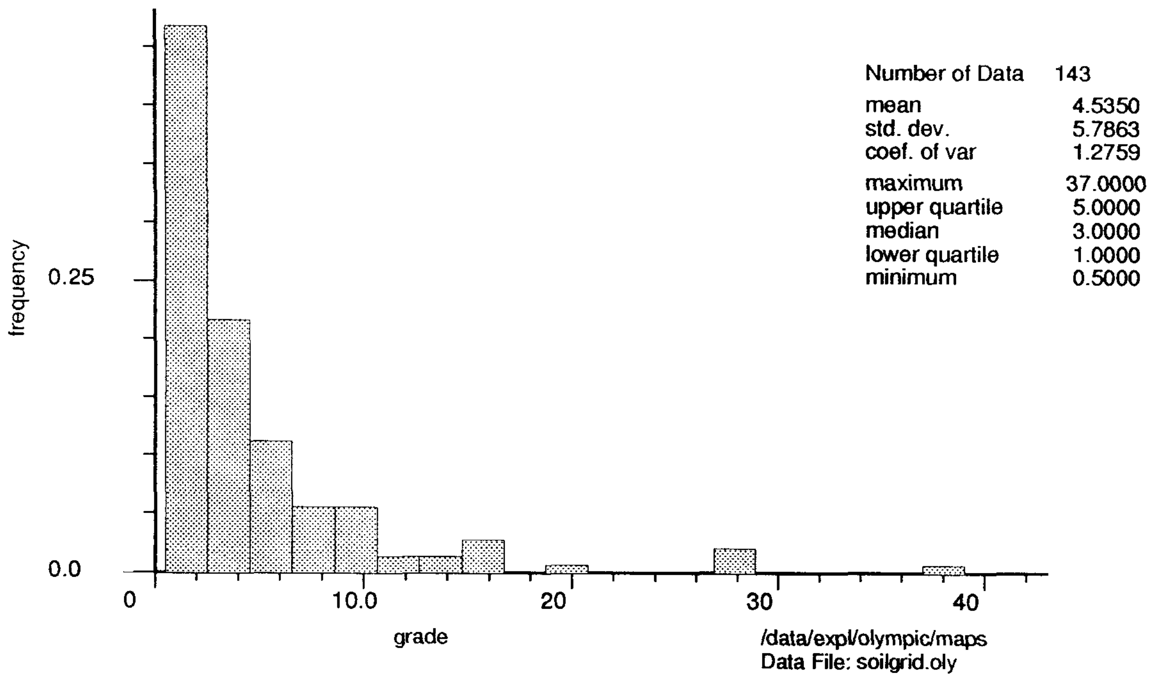
SAMPLE No.	Au ppb	Ag ppm	Mo ppm	Cu ppm	Pb ppm	Zn ppm	As ppm	Sb ppm	Cd ppm	Ni ppm	Co ppm	Mn ppm	Bi ppm	Cr ppm	V ppm	Ba ppm	W ppm	Be ppm	La ppm	Sr ppm	Ti %	Al %	Ca %	Fe %	Mg %	K %	Na %	P %
B11146	15	0.2	3	434	11	62	14	<5	<0.1	37	26	9674	7	25	38	1578	<5	1.7	26	13	0.01	0.98	1.13	6.95	0.65	0.15	<0.01	0.14
B11147	14	0.5	2	380	12	66	15	8	<0.1	40	28	10607	10	30	37	1650	<5	1.3	24	16	0.01	0.99	2.30	6.91	1.21	0.14	0.01	0.11
B11148	5	<0.1	3	169	<1	38	<5	<5	<0.1	29	30	6932	8	23	24	1147	<5	1.1	22	26	0.02	0.75	3.91	5.17	0.93	0.10	0.01	0.07
B11149	4	<0.1	2	116	5	52	5	<5	<0.1	32	15	4390	7	32	30	1457	<5	1.6	26	16	0.02	1.34	0.73	4.94	0.67	0.10	<0.01	0.10
B11150	1	0.1	1	87	12	61	7	<5	<0.1	21	14	3212	3	31	39	1774	<5	1.0	18	14	0.01	1.09	0.41	4.13	0.28	0.10	<0.01	0.16
B11150*	1	0.1	1	85	12	60	9	<5	<0.1	20	13	3196	<2	31	39	1751	<5	1.0	18	14	0.01	1.08	0.40	4.02	0.28	0.10	<0.01	0.16

Soil Geochemistry - Ag (ppm)



Figure

Soil Geochemistry - Au (ppb)



Figure

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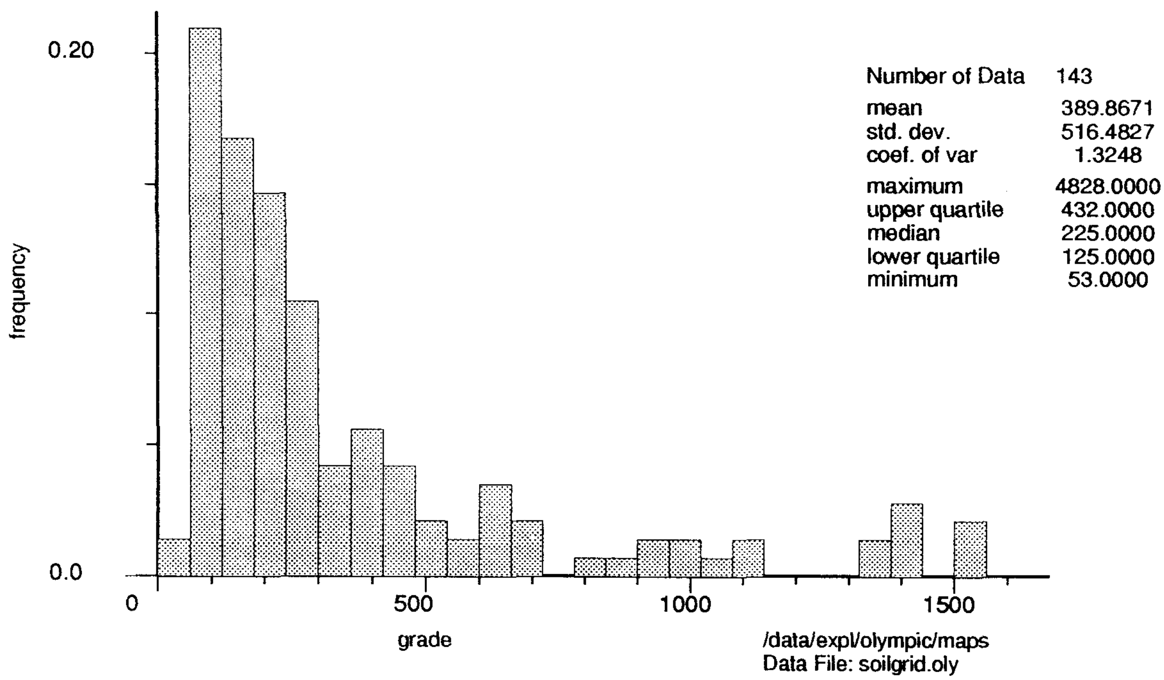
Soil Geochemistry - Cu (ppm)



Figure

APPENDIX V

ROCK SAMPLE DESCRIPTION SHEETS

SAMP NO.	LOCATION & DESCRIPTION	TYPE	WIDTH (M)	Au (ppb)	Cu (ppm)	Ag (ppm)
B8876	(JA,CG) Light colored grey breccia with malachite/chalcopyrite mineralization.	Chip	5	10	53	0.2
B8877	(JA,CG) Same as B8876.	Chip	5	8	194	0.1
B8878	(JA,CG) Red green breccia, with dolomitic veining. No mineralization visible.	Chip	5	26	127	<0.1
B8879	(JA,CG) Same as B8878.	Chip	3	2	23	<0.1
B8880	(JA,CG) Red green hematitic breccia with 3-5% disseminated sulphides (pyrite).	Chip	3	1	17	<0.1
B8881	(JA,CG) Same as B8880.	Chip	2	1	92	<0.1
B8882	(CG) Red green breccia with disseminated (up to 5%) chalcopyrite in both veins and matrix.	Chip	7	1	1561	0.2
B8883	(CG) Same as B8882, but 20 m along apparent strike.	Chip	2	2	2088	0.3
B8884	(CG) Medium grained, dark, greyish green intrusive. Quartz veining, with disseminated (1-3%) sulphides.	Chip	4	1	160	<0.1
B8885	(CG) As above, but containing reddish (hematite stained feldspar?) irregular crystals. Beside linear recessive structure.	Grab		3	125	<0.1
B8886	(CG) Medium grained intrusive, as above, contains more sulphides, (up to 5%) and shows malachite staining.	Chip	5	6	1897	<0.1
B8887	(CG) As above, 20 m up slope, across apparent strike.	Grab		1	164	<0.1

SAMP NO.	LOCATION & DESCRIPTION	TYPE	WIDTH (M)	Au (ppb)	Cu (ppm)	Ag (ppm)
B8888	(CG) Red-green breccia, taken across jointing, beside linear recessive feature. High hematite matrix and quartz veining. Contiguous to B9157.	Chip	5	1	569	0.2
B8889	(CG) As above, with minor malachite staining. Contiguous to B8888.	Chip	5	1	808	0.3
B8890	(CG) As above. Contiguous to B8889.	Chip	5	1	324	<0.1
B8891	(CG) Red breccia, across jointing. Some large siltstone/shale clasts.	Chip	5	9	480	1.1
B8892	(CG) Very hematite rich zone in red breccia.	Grab		<1	14	<0.1
B8911	(CG) Siliceous siltstone, some sulphides, from float in northern creek valley.	Grab		5	31	0.3
B8915	(CG) Cherty siltstone, from talus, northern creek.	Grab		<1	6	<0.1
B8926	(GC) Red green breccia, trace chalcopyrite in veinlets. 5% hematite, some biotite flakes.	Grab		1	216	<0.1
B8927	(GC) Green breccia, <1% chalcopyrite. 5% hematite. chloritic. minor quartz and carbonate stringers with copper mineralization.	Grab		15	20	0.1
B8928	(GC) Calcareous green breccia, chalcopyrite in quartz-carbonate stringers. Weak crackle texture. pyrite <1%, hematite 1-3%, chalcopyrite <1%	Chip	1.1	7	150	<0.1
B8929	(GC) Calcareous green breccia, <1% chalcopyrite along fractures. Pyrite <1%, very siliceous.	Grab		3	715	<0.1
B8930	(GC) Calcareous green breccia, <1% chalcopyrite along fractures. Pyrite <1%. very siliceous.	Grab		1	45	<0.1

SAMP NO.	LOCATION & DESCRIPTION	TYPE	WIDTH (M)	Au (ppb)	Cu (ppm)	Ag (ppm)
B8931	(GC) Calcareous green breccia, with a quartz-carbonate matrix. Malachite staining, 1% pyrite.	Grab		1	3707	0.1
B8932	(GC) Green to grey calcareous breccia. Minor hematite in matrix, trace chalcopyrite in veinlets.	Grab		1	176	<0.1
B8933	(GC) Red siltstone, with chalcopyrite 1-2% in quartz-carbonate veinlets.	Grab		2	76	<0.1
B8934	(GC) Monzonitic dyke - green breccia contact. 1% chalcopyrite, minor quartz veinlets.	Grab		2	137	0.5
B8935	(GC) Brecciated siliceous dolomite, with calcareous matrix. Bleached area.	Grab		1	57	<0.1
B8936	(GC) Green breccia, with trace chalcopyrite. Quartz veinlets.	Grab		2	71	<0.1
B8937	(GC) Red breccia, with quartz-carbonate veinlets. Trace chalcopyrite blebs, and minor specular hematite. Some jasperoid fragments.	Grab		2	10	<0.1
B8938	(GC) Chloritic calcareous green breccia, with quartz carbonate veinlets, cherty dolomite and siltstone fragments, and moderate quartz crackle texture. Hematite <1%, 1% chalcopyrite. .	Grab		17	66	1.6
B8939	(GC) Jasperoid cherty dolomite with quartz carbonate veinlets + chalcopyrite(1%). Mild crackle texture.	Grab		6	62	0.1
B8940	(GC) Red-green breccia, with siltstone fragments, and a chloritic, calcareous matrix. some specular hematite.	Grab		5	22	0.2

SAMP NO.	LOCATION & DESCRIPTION	TYPE	WIDTH (M)	Au (ppb)	Cu (ppm)	Ag (ppm)
B8941	(GC) Highly fractured green breccia. 1% chalcopyrite in quartz carbonate veinlets.	Chip	5	1	304	0.1
B8942	(GC) same as above	Chip	4	<1	291	0.1
B8943	(GC) same as above	Chip	3.3	<1	36	0.1
B8944	(GC) same as above	Chip	2.5	<1	135	<0.1
B8945	(GC) Green breccia, highly fractured. 5-8% chalcopyrite. 1-2% pyrite.	Grab		<1	56	1.9
B8946	(GC) Green breccia and cherty dolomite contact.	Chip	5.5	<1	95	0.2
B8947	(GC) Cherty dolomite breccia with a calcareous matrix. 1-2% chalcopyrite.	Grab		<1	296	0.1
B8948	(GC) Cherty dolomite. Calcite + chalcopyrite (<1%).	Chip	3.3	<1	42	0.1
B8949	(GC) Cherty dolomite, with calcite quartz veinlets. <1% chalcopyrite + trace pyrite.	Chip	5	<1	66	<0.1
B8950	(GC) same as above	Chip	5	<1	138	0.2
B8951	(GC) Siliceous dolomite, minor hematite, minor calcite veining. Chalcopyrite 1%.	Grab		1	220	<0.1
B8952	(GC) Siliceous dolomite with red dolomitic veinlets. Crosscutting veinlets of quartz and dolomite. Mineralization is disseminated and vein controlled. Chalcopyrite 1%, pyrite <1%, hematite 1%.	Grab		38	389	<0.1
B8953	(GC) Green/Grey breccia	Chip	3	1	17	<0.1
B8954	(GC) Green breccia. 10-15% hematite. <1% chalcopyrite. trace calcocite.	Chip	5	1	8	<0.1

SAMP NO.	LOCATION & DESCRIPTION	TYPE	WIDTH (M)	Au (ppb)	Cu (ppm)	Ag (ppm)
B8955	(GC) Contact between breccia and interbedded argillite and siltstone. Calcite veinlets along fractures control mineralization. Chalcopyrite <1%, hematite 1-3%, pyrite <1%. Pervasive hematization.	Chip	2.7	<1	19	<0.1
B8956	(GC) Red breccia crosscut by quartz-carbonate veinlets.	Chip	5.5	2	143	<0.1
B8957	(GC) Green and red breccias. Quartz and carbonate veinlets control mineralization. chalcopyrite <1%.	Chip	5	4	284	<0.1
B8958	(GC) same as above, and contiguous with B8957.	Chip	5	7	180	<0.1
B8959	(GC) same as above, and contiguous with B8958.	Chip	5	4	403	0.1
B8960	(GC) Cherty dolomite. <1% pyrite, trace chalcopyrite.	Grab		<1	123	<0.1
B8961	(GC) Red breccia with small calcite veinlets. 5% hematite, malachite staining with trace chalcopyrite.	Grab		2	13	<0.1
B8962	(GC) Red breccia with quartz-carbonate veinlets, and veinlets of hematite.	Grab		<1	10	<0.1
B8963	(GC) Red breccia with quartz veinlets. Specular hematite 5-10%.	Grab		10	691	0.3
B8964	(GC) Mafic dyke, with trace chalcopyrite.	Grab		10	740	<0.1
B8965	(GC) Red breccia with small quartz stringers. 10-15% hematite.	Grab		5	2307	<0.1
B8966	(GC) Red breccia with quartz veinlets. Specular hematite in matrix.	Grab		<1	75	<0.1
B8967	(GC) Red breccia, massive hematite.	Grab		6	55	<0.1

SAMP NO.	LOCATION & DESCRIPTION	TYPE	WIDTH (M)	Au (ppb)	Cu (ppm)	Ag (ppm)
B8968	(GC) Red breccia, shows intense hematization and minor quartz-carbonate veinlets. Trace malachite staining.	Grab		<1	19	<0.1
B8969	(GC) Red breccia, intense hematization, minor pyrite.	Grab		<1	15	<0.1
B8970	(GC) Red breccia, intense hematization.	Grab		<1	23	<0.1
B8971	(GC) Green breccia, with quartz-carbonate veinlets, and minor chalcopyrite.	Grab		<1	50	0.1
B8972	(GC) Red breccia.	Grab		<1	12	<0.1
B8973	(GC) Dark green breccia, chloritic, with quartz veinlets. chalcopyrite <1%.	Grab		1	853	<0.1
B8974	(GC) Red breccia, minor malachite staining.	Grab		14	223	<0.1
B8975	(GC) Mafic dyke carbonate veinlets crosscut. chalcopyrite <1%.	Grab		2	2045	0.8
B8976	GS-2-92: Outcrop on north side of creek at 4450 asl. Grey siltstone breccia with subangular to subrounded clasts ranging from 0.1 to 1.0 cm. 1% disseminated very fine grained chalcopyrite in matrix.	Grab		<1	591	0.1
B8977	GS-4-92: Red breccia with 5% specularite and 1% pyrite disseminated in a hematitic matrix.	Grab		1	34	0.1
B8978	GS-5-92: Hematitic siltstone clasts set in a grey very fine grained matrix. 3% specularite and weak carbonate along fractures.	Grab		<1	8	0.2
B8979	Float, fractured grey dolomite with 5% hematite veins and 3 to 5% quartz veins carrying 1% pyrite.	Grab		3	630	0.3

SAMP NO.	LOCATION & DESCRIPTION	TYPE	WIDTH (M)	Au (ppb)	Cu (ppm)	Ag (ppm)
B8980	Grey breccia float - hematitic siltstone clasts set in a grey fine grained matrix - 5 to 15% fine grained specularite disseminated in matrix.	Grab		1	56	0.1
B8981	GS-6-92: Float, syenite or monzonite with a weak breccia texture - 3% pyrite, 3% limonite and trace malachite along fractures.	Grab		<1	615	0.2
B8982	Float, siltstone clasts set in a syenitic fine grained matrix - disseminated and fracture controlled specularite (5%) and limonite (1%) in matrix.	Grab		<1	11	0.1
B8983	GS-8-92: Intrusive breccia, pink felsic clasts set in a very fine grained granitic matrix with 3 to 5% specularite and 2% limonite.	Grab		4	16	0.1
B8984	GS-9-92: Outcrop located along ridge, gabbroic dyke with occassional epidote and 1% pyrite along fractures.	Grab		1	180	0.1
B8985	Float located along ridge - weathered massive sulphide with 30% malachite.	Grab		47	23.0%	104.0
B8986	Float located along ridge - Syenite/granite with 3% malachite and 1 to 2% pyrite along fractures	Grab		2	1634	0.3
B8987	Float located in gully - Monzonitic breccia with 5% specularite/calcite veinlets and 2% pyrite along fractures.	Grab		8	1086	0.4
B8988	Outcrop located in the north bank of creek - Mafic dyke cut by 5% calcite veinlets carrying 1 to 2% chalcopyrite.	Grab		2	2249	0.3

SAMP NO.	LOCATION & DESCRIPTION	TYPE	WIDTH (M)	Au (ppb)	Cu (ppm)	Ag (ppm)
B8989	GS-11-92: Intrusive breccia outcrop, monzonitic clasts set in a hematitic matrix - occasional calcite veins, occasional pyrite and malachite along fractures.	Chip	5	2	235	0.1
B8990	Contiguous with sample B8989. Same as above.	Chip	5	2	290	0.1
B8991	GS-13-92: Area of float, dolomitic breccia, dolomite clasts set in a fine to medium grained calcite matrix. Occasional chalcopyrite occurs with the calcite.	Grab		<1	2109	0.1
B8992	GS-15-92: Float, recrystallized siltstone with 1 to 2% chalcopyrite along fractures and as disseminations.	Grab		<1	464	0.1
B8993	Outcrop - Siliceous dolomite with local very fine grained chalcopyrite and calcite along fractures.	Chip	3	<1	666	0.1
B8994	As above and contiguous	Chip	3	<1	100	0.1
B8995	GS-17-92: Float in creek bed. Appears to be a monzonite with 3 to 5% chalcopyrite along fractures with calcite.	Grab		3	0.74%	0.1
B8996	GS-18-92: Angular float - Very fine grained feldspathic arenite, 2% chalcopyrite along fractures and as disseminations.	Grab		<1	2982	<0.1
B8997	GS-19-92: Angular float - Sedimentary breccia with trace to 2% chalcopyrite along fractures in matrix.	Grab		2	2445	0.4
B9151	(JA) Grey green breccia, (chalco?)pyrite blebs through out matrix 3-4%.	Chip	7	<1	87	<0.1

SAMP NO.	LOCATION & DESCRIPTION	TYPE	WIDTH (M)	Au (ppb)	Cu (ppm)	Ag (ppm)
B9152	(JA) Light colored quartzitic breccia with disseminated sulphides, (pyrite, minor chalcopyrite) 2-3%	Chip	6	1	113	0.1
B9153	(JA) Red green breccia with disseminated chalcopyrite blebs 2-3%.	Chip	4	<1	2484	<0.1
B9154	(JA) Red hematitic shale with chalcopyrite in quartz veins.	Chip	7	1	2771	<0.1
B9155	(JA) Green/grey breccia (possibly siltstone) with fine grained disseminated chalcopyrite and surface malachite staining.	Grab		1	68	<0.1
B9156	(JA) Red hematitic breccia, no mineralization visible. Contiguous sample series B9156, 57, B8888, 89, 90, B9158.	Chip	5	<1	214	0.1
B9157	(JA) Same as above, contiguous to B9156.	Chip	5	<1	357	<0.1
B9158	(JA) Same as above, contiguous to B8890.	Chip	5	<1	86	<0.1
B9159	(JA) Green breccia grading into red shale across a sheared zone, (fault?) with a minor chalcopyrite vein in the fault.	Chip	5	11	1835	<0.1
B9160	(JA) Green breccia with trace chalcopyrite and malachite.	Chip	5	3	571	<0.1
B9161	(JA) Red breccia with trace malachite staining present.	Chip	5	1	541	<0.1
B9162	(JA) Grey green breccia with trace chalcopyrite mineralization.	Chip	4	1	63	<0.1
B9163	(JA) Red breccia with specular hematite, no visible copper mineralization.	Chip	5	1	28	0.1

SAMP NO.	LOCATION & DESCRIPTION	TYPE	WIDTH (M)	Au (ppb)	Cu (ppm)	Ag (ppm)
B9164	(JA) Red breccia with disseminated chalcopyrite in veins and matrix up to 5%.	Chip	5	7	1338	0.1
B9165	(JA) Sandy dolomite with pervasive quartz veining, chalcopyrite up to 15% in fractures.	Grab		7	6.10%	10.0
B9166	(JA) Green mafic dyke with chalcopyrite mineralization in veins.	Grab		2	0.72%	1.9
B9167	(JA) Green breccia with chalcopyrite mineralization in veins.	Chip	3	2	1248	0.1
B9168	(JA) Black green-grey shales and interbedded jasper bands with trace chalcopyrite mineralization in fractures.	Grab		1	3632	0.4
B9201	(ML) Red breccia with abundant specular and massive hematite (directly below Cu mineralized area sampled by B9202).	Chip	4	3	50	<0.1
B9202	(ML) Red breccia with Cu mineralization along pervasive dolomitic veins, also along fractures (later estimate 5% chalcopyrite in sample).	Chip	4	6	7.00%	0.3
B9203	(ML) Red/Green breccia directly above Cu mineralized zone, visibly dead (no copper mineralization).	Chip	5	4	0.54%	0.9
B9204	(ML) Green/grey dolomitic siltstone with calcareous veins carrying chalcopyrite (veins are 2% of rock).	Grab		3	197	<0.1
B9205	(ML) Red/green dolomitic breccia with disseminated chalcopyrite and malachite coatings.	Grab		9	0.54%	0.3
B9206	(ML) Red/green breccia with dolomite stringers and fractures carrying chalcopyrite.	Grab		13	2.58%	1.5

SAMP NO.	LOCATION & DESCRIPTION	TYPE	WIDTH (M)	Au (ppb)	Cu (ppm)	Ag (ppm)
B9207	(ML) Green/grey dolomitic siltstone with dark rust surface weathering.	Grab		<1	65	<0.1
B9208	(ML) Highly silicified red breccia with minor sparse mineralization.	Grab		1	116	<0.1
B9209	(ML) Red/green highly siliceous breccia with massive pyrite veins.	Grab		2	83	1.0
B9210	(ML) Red Breccia with siliceous veining and rusty surface weathering.	Grab		<1	<1	<0.1
B9211	(ML) Contact between red breccia and green/buff shales with galena visible along fractures.	Grab		2	324	0.6
B9212	(ML) As per B9211 but with Chalcopyrite dominant mineralization.	Grab		11	1514	0.6
B9213	(ML) Red Breccia with abundant dolomitic veining carrying chalcopyrite and malachite staining.	Chip	1.5	6	5.00%	2.0
B9214	(ML) Mafic dyke with high copper mineralization along fractures.	Chip	4	10	1.97%	0.6
B9215	(ML) Intrusive looking breccia with disseminated blebs of chalcopyrite (subcrop).	Grab		1	76	<0.1
B9216	(ML) Green Breccia.	Chip	4	<1	53	<0.1
B9217	(ML) Red hematitic breccia, high cleavage, with no visible mineralization.	Chip	4	6	65	0.1
B9218	(ML) Red/green breccia with Cu mineralization.	Chip	2	9	1237	0.9
B9219	(ML) Red/green breccia with abundant Cu mineralization.	Chip	5	4	3101	1.5

SAMP NO.	LOCATION & DESCRIPTION	TYPE	WIDTH (M)	Au (ppb)	Cu (ppm)	Ag (ppm)
B9220	(ML) Grey/green breccia, no visible Cu mineralization.	Chip	5	6	136	0.1
B9221	(ML) Very coarse red/green breccia, no apparent Cu mineralization.	Chip	4	3	153	0.1
B9222	(ML) Siliceous green breccia with disseminated chalcopyrite (2%) and black octahedral mineral.	Grab		1	0.92%	0.3
B9223	(ML) Red/green breccia with minor disseminated sulfides. Across fault zone.	Chip	4	4	144	0.2
B9224	(ML) across faulted (?) red breccia.	Chip	5	2	654	0.1
B9225	(ML) Red breccia (20m continuous chip with 9225, 11126, '27, '28).	Chip	5	1	62	<0.1
B9244	(ML) Green breccia with disseminated Cu mineralization.	Grab		52	1.56%	0.3
B9245	(ML) Contact of red/green breccia and dyke with Cu mineralization present along fractures and veins.	Grab		21	2654	1.2
B11126	(ML) Red breccia, contiguous with B92225.	Chip	5	1	140	0.1
B11127	(ML) As above, contiguous with B11126.	Chip	5	1	112	0.3
B11128	(ML) As above, contiguous with B11127.	Chip	5	<1	65	<0.1
B11129	(ML) Red breccia (intrusive looking).	Chip	5.0	<1	37	<0.1
B11151	(GC) Fine grained green intrusive. Chloritic, with quartz lenses and quartz carbonate veinlets. chalcopyrite <1%.	Grab		1	569	0.1
B11152	(GC) Green breccia with red siltstone fragments, crosscut by pyrite = chalcopyrite veinlets. Moderate crackle texture.	Grab		2	19	<0.1

SAMP NO.	LOCATION & DESCRIPTION	TYPE	WIDTH (M)	Au (ppb)	Cu (ppm)	Ag (ppm)
B11153	(GC) Siliceous dolomite, with crosscutting quartz carbonate veinlets. Minor chalcopyrite along fractures. Showing "F".	Chip	2.1	<1	62	0.1
B11154	(GC) Siliceous dolomite with calcite quartz veinlets. chalcopyrite 3%.	Grab		<1	4483	0.7
B11155	(GC) Siliceous dolomite. Chloritic. Chalcopyrite 1-2% in quartz carbonate veinlets. Showing "D" & "E".	Grab		1	0.73%	1.1
B11156	(GC) Green breccia. 1-3% chalcopyrite. Showing "D" & "E".	Grab		5	1.46%	2.3
B11157	(GC) Green breccia, with 1-3% chalcopyrite, diseminated and veinlet controlled.	Chip	1.7	2	6954	1.4
B11158	(GC) Dolomitic siltstone, with disseminated and veinlet controlled chalcopyrite & pyrite (<1%).	Grab		1	1545	0.3
B11159	(GC) Siliceous dolomite to muddy limestone. Dolomite and quartz veinlets crosscut bedding. Trace chalcopyrite along veinlets and disseminated.	Grab		1	616	0.1
B11160	(GC) same as above	Chip	2.0	<1	208	0.2
B11161	(GC) same as above	Chip	2.1	<1	261	<0.1

APPENDIX VI

ANALYTICAL PROCEDURES

27 Element I.C.P.:

A 0.5 gm portion of the -80 mesh soil, sediment or -100 mesh pulverized rock is placed in numbered test tubes. Approximately every tenth sample is a duplicate or internal reference standard. Four millilitres of aqua regia is added to the sample 12 hours before digestion. It is then digested for 2 hours at 95° C. The sample is cooled and brought up to the 10 ml mark with H_2O and then centrifuged. A 3 ml aliquot of the sample solution is taken and placed in an autosampler tube and 4.5 ml of H_2O is added. The sample is analyzed on a Leeman Labs Inductively Coupled Plasma model PS 3000 using matrix matched calibration standards. Only silver is determined by Atomic Absorption using a Perkin Elmer model 3100 AA, analyzing the original sample solution. Background correction is used for this determination.

Gold by Atomic Absorption:

A 10 gm sample is put into a Coors 07 crucible and heated in a muffle furnace for 4 hours at 600° C. The sample is cooled and transferred to a glass beaker and 30 ml of Aqua Regia is added. The sample is digested at just off the boil for 2 hours and then cooled and bulked up to 110 ml and left to settle overnight. Fifty millilitres of the sample is decanted into a screw cap test tube, 7.0 ml MIBK is added and then the tube is turned upside down at least 25 times. The gold is determined by reading the organic layer on atomic absorption.

Rare Earth Analysis:

All elements were determined by INAA. Sample weight as noted on the report was weighed into polyethylene vials and irradiated together with MRG-1 (CANMET certified standard reference material) and flux wires at a thermal neutron flux of $7x10^{12}n.cm^2.s^{-1}$ at the McMASTER nuclear reactor. After a 7 day decay, samples were counted on a high purity Ge detector with resolution of 1.67 KeV for Co-60 (1332 KeV) [12.4% efficient]. All elements were corrected for decay and compared to a standard calibration developed from approximately 100 standard reference materials. The standard present was used solely as a check on the procedure.

Whole Rock Analysis:

Major and trace elements were determined by fusion (lithium metaborate-lithium tetraborate mixture) and by using a combination Jarrell Ash simultaneous-sequential ICP on dissolved fusion bead. Loss on ignition was determined at 950°C.

APPENDIX VII

STATEMENT OF COSTS

STATEMENT OF COST - OLYMPIC PROPERTY 1992/93

GEOLOGICAL & PROSPECTING SURVEY					
G. Shevchenko	4	mandays	@ $400/day	1,600	
G. Couture	15	mandays	@ $340/day	5,100	
M. Lamb	7	mandays	@ $225/day	1,575	
C. Green	7	mandays	@ $225/day	1,575	
Field Supplies				425	
		Sub-Total		$10,275	**$10,275**
GEOCHEMICAL SURVEY					
M. Lamb	8	mandays	@ $225/day	1,800	
C. Green	8	mandays	@ $225/day	1,800	
J. Ali	15	mandays	@ $225/day	3,375	
Analyses (soil & silt)	166	samples	@ $10.90/sample	1,810	
Analyses (rock)	152	samples	@ $67.25/sample	10,222	
Field Supplies				500	
		Sub-Total		$19,507	**$19,507**
LOGISTICS					
Room & Board				5,340	
Helicopter	8.6	hours	@ $550/hr	4,760	
Communication				350	
		Sub-Total		$10,450	**$10,450**
MOB/DEMOB					
G. Shevchenko	1	manday	@ $400/day	400	
G. Couture	2	mandays	@ $340/day	680	
M. Lamb	2	mandays	@ $225/day	450	
C. Green	2	mandays	@ $225/day	450	
J. Ali	2	mandays	@ $225/day	450	
Helicopter	10	hours	@ $550/hr	5,500	
Vehicle Costs				3,810	
Travel & Accommodation				1,370	
		Sub-Total		$13,110	**$13,110**
OTHER					
Petrographic Studies				3,190	
Sample Preparation (Thin Sections)				690	
Report and Compilation				7,500	
		Sub-Total		$11,380	**$11,380**
		GRAND TOTAL			**$64,722**

DETAILED ANALYTICAL COSTS

SOIL & SILT SAMPLES

Sample preparation	$0.90
Au by A.A.	$5.00
27-element ICP	$5.00
Total Cost per Sample	**$10.90**

ROCK SAMPLES

Sample Preparation	3.25
Au by A.A.	5.00
27-element ICP	5.00
W	4.50
F	4.50
Rare Earth & Actinide Elements	20.00
Major Oxides, Ba, Sc, Sr, Y & Zr	25.00
Total Cost per Sample	**$67.25**

APPENDIX VIII

STATEMENT OF QUALIFICATIONS

STATEMENT OF QUALIFICATIONS

I, Glenn Shevchenko, residing at 44 Ketza Road, Whitehorse, Yukon, do hereby certify that:

1. I am a graduate of Concordia University where I received a B.Sc. in Geology in May 1982.

2. I have practised my profession part-time since 1977, and full-time since 1984.

3. I am a member in good standing with the Geological Association of Canada.

4. I am currently employed by Placer Dome Exploration Limited and was responsible for the field exploration conducted on the Olympic Property.

May 31, 1993
Date

Glenn Shevchenko

ASSESSMENT REPORT

GEOLOGICAL and GEOCHEMICAL SURVEYS

on the

OLYMPIC 1-168 CLAIMS

(Record Nos. YB40925-YB41092)

DAWSON MINING DISTRICT, YUKON TERRITORY

NTS: 116B/14

Latitude: 64° 54'N Longitude: 139° 13'W

Owner: Major General Resources Ltd.
10th Floor,
900 West Hastings St.
Vancouver, B.C.
V6C 1E5

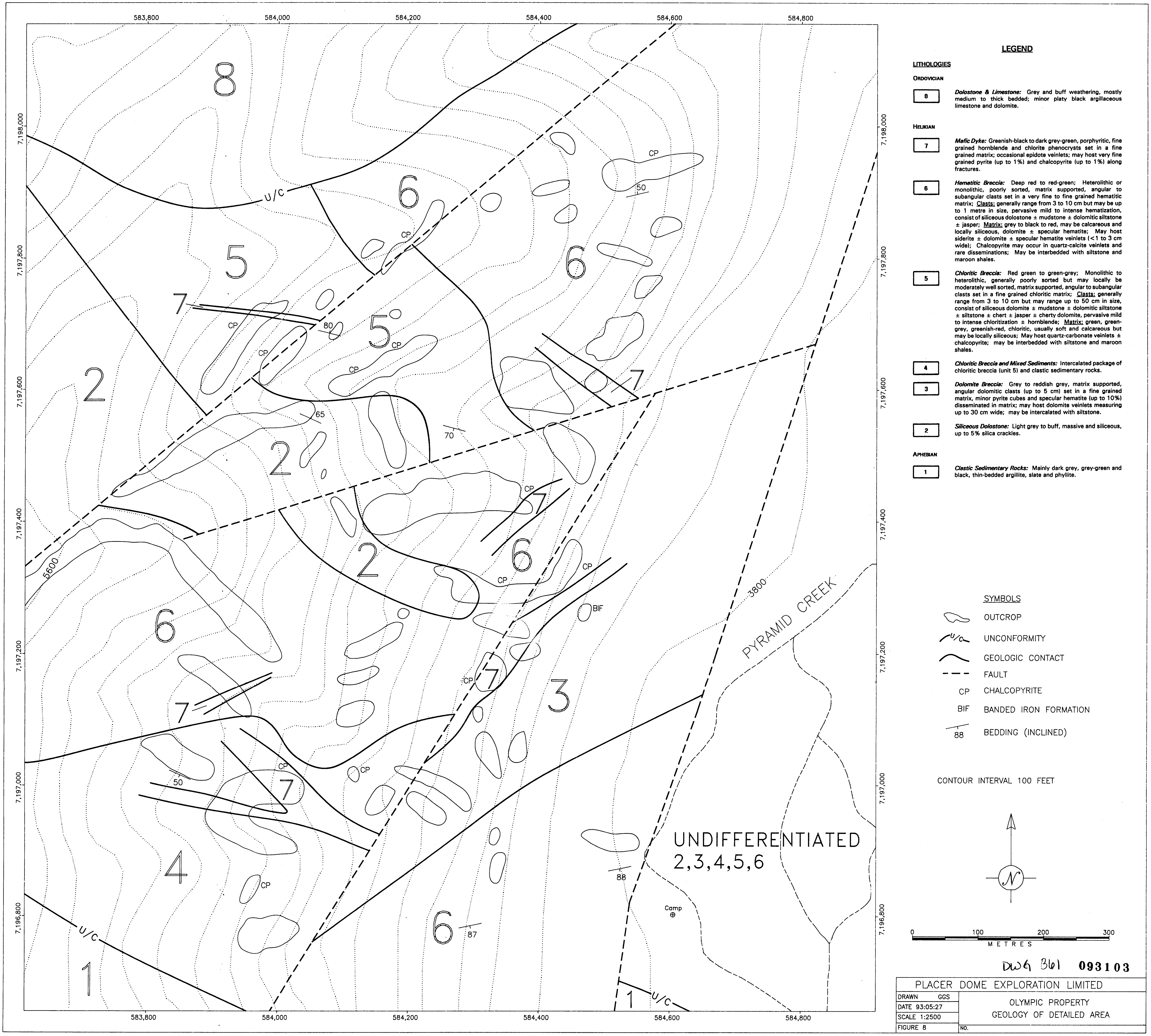
Operator: Placer Dome Exploration Limited
103 Platinum Road
Whitehorse, Yukon
Y1A 5M3

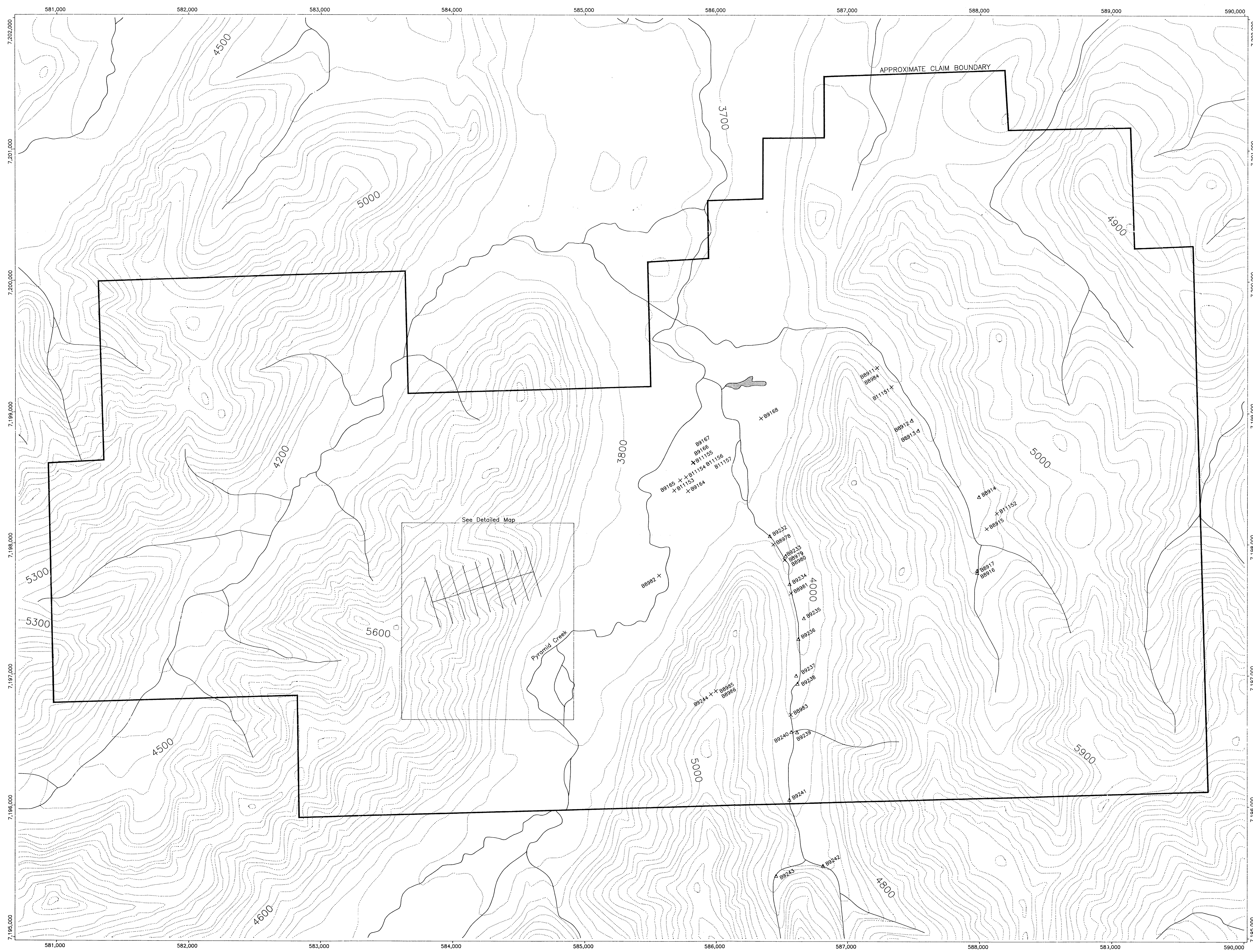
Author: G. Shevchenko (Project Geologist)

Date: May 31, 1993

VOLUME II OF III (Figures #7 to #23)


LEGEND
HEMATITIC and/or CHLORITIC BRECCIA COMPLEX
SYMBOLS
UNCONFORMITY
FAULT
CONTOUR INTERVAL 100 FEET
APPROXIMATE CLAIM BOUNDARY
CAMBRO-ORDOVICIAN CARBONATES
HELIKIAN BRECCIA COMPLEX, DOLOMITE AND CLASTIC ROCKS
APHEBIAN SILTSTONES AND SHALES
See Detailed Map
Pyramid Creek
Camp
U C
METRES
0
400
800
1200
Dwg 36D
093103
PLACER DOME EXPLORATION LIMITED
DRAWN GGS
DATE 93:05:27
SCALE 1:10000
FIGURE 7
OLYMPIC PROPERTY
PROPERTY GEOLOGY MAP


LEGEND
LITHOLOGIES
ORDOVICIAN
8 Dolostone & Limestone: Grey and buff weathering, mostly medium to thick bedded; minor platy black argillaceous limestone and dolomite.
HELIKIAN
7 Mafic Dyke: Greenish-black to dark grey-green, porphyritic, fine grained hornblende and chlorite phenocrysts set in a fine grained matrix; occasional epidote veinlets; may host very fine grained pyrite (up to 1%) and chalcopyrite (up to 1%) along fractures.
6 Hematitic Breccia: Deep red to red-green; Heterolithic or monolithic, poorly sorted, matrix supported, angular to subangular clasts set in a very fine to fine grained hematitic matrix; Clasts: generally range from 3 to 10 cm but may be up to 1 metre in size, pervasive mild to intense hematization, consist of siliceous dolostone ± mudstone ± dolomitic siltstone ± jasper; Matrix: grey to black to red, may be calcareous and locally siliceous, dolomite ± specular hematite; May host siderite ± dolomite ± specular hematite veinlets (<1 to 3 cm wide); Chalcopyrite may occur in quartz-calcite veinlets and rare disseminations; May be interbedded with siltstone and maroon shales.
5 Chloritic Breccia: Red green to green-grey; Monolithic to heterolithic, generally poorly sorted but may locally be moderately well sorted, matrix supported, angular to subangular clasts set in a fine grained chloritic matrix; Clasts: generally range from 3 to 10 cm but may range up to 50 cm in size, consist of siliceous dolomite ± mudstone ± dolomitic siltstone ± siltstone ± chert ± jasper ± cherty dolomite, pervasive mild to intense chloritization ± hornblende; Matrix: green, green-grey, greenish-red, chloritic, usually soft and calcareous but may be locally siliceous; May host quartz-carbonate veinlets ± chalcopyrite; may be interbedded with siltstone and maroon shales.
4 Chloritic Breccia and Mixed Sediments: Intercalated package of chloritic breccia (unit 5) and clastic sedimentary rocks.
3 Dolomite Breccia: Grey to reddish grey, matrix supported, angular dolomitic clasts (up to 5 cm) set in a fine grained matrix, minor pyrite cubes and specular hematite (up to 10%) disseminated in matrix; may host dolomite veinlets measuring up to 30 cm wide; may be intercalated with siltstone.
2 Siliceous Dolostone: Light grey to buff, massive and siliceous, up to 5% silica crackles.
APHEBIAN
1 Clastic Sedimentary Rocks: Mainly dark grey, grey-green and black, thin-bedded argillite, slate and phyllite.
SYMBOLS
OUTCROP
U/C UNCONFORMITY
GEOLOGIC CONTACT
FAULT
CP CHALCOPYRITE
BIF BANDED IRON FORMATION
88 BEDDING (INCLINED)
CONTOUR INTERVAL 100 FEET
N
0 100 200 300
METRES
583,800
584,000
584,200
584,400
584,600
584,800
7,198,000
7,197,800
7,197,600
7,197,400
7,197,200
7,197,000
7,196,800
PYRAMID CREEK
UNDIFFERENTIATED
2,3,4,5,6
Camp
5600
3800
DWG 361 093103
PLACER DOME EXPLORATION LIMITED
DRAWN GGS
DATE 93:05:27
SCALE 1:2500
FIGURE 8
NO.
OLYMPIC PROPERTY
GEOLOGY OF DETAILED AREA



LEGEND

× ROCK SAMPLE LOCATION
Δ SILT SAMPLE LOCATION

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:
DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: REG_SAMP.RUN (EG_SAMP.RUN)

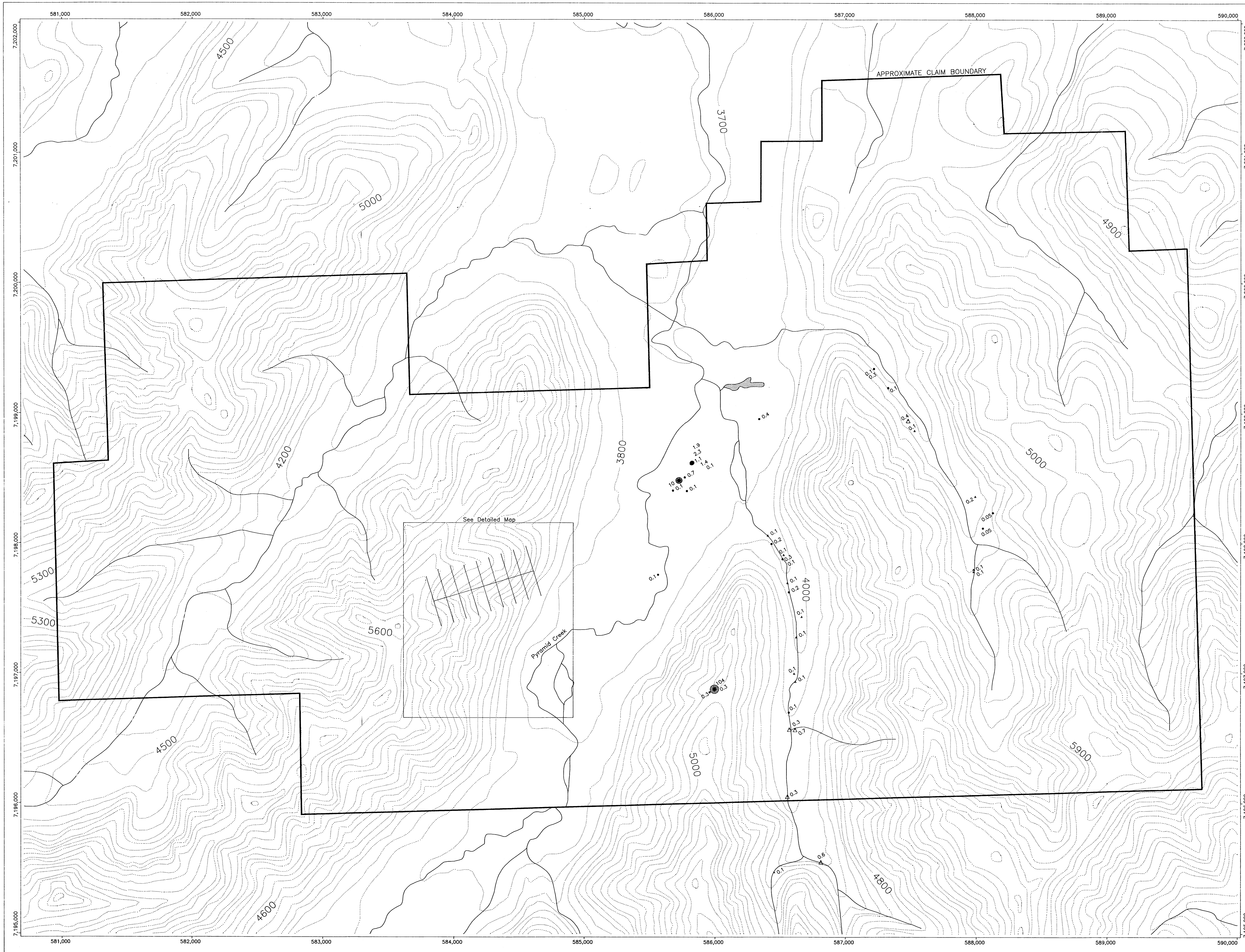
		FIELD	FILE
×	POINTS:	SAMP	ROCKSAMP_REG.OLY
Δ	POINTS:	SAMP	SILTSAMP.OLY

0 400 800 1200
METRES

DWG 362

093103

PLACER DOME EXPLORATION LIMITED	
DRAWN GGS	OLYMPIC PROPERTY ROCK & SILT GEOCHEMISTRY SAMPLE LOCATIONS
DATE 93:05:12	
SCALE 1:10000	
FIGURE 9	NO.



LEGEND

- ROCK SAMPLE LESS THAN 1 PPM SILVER
- ROCK SAMPLE 1 TO 4.9 PPM SILVER
- ROCK SAMPLE 5 TO 20 PPM SILVER
- ROCK SAMPLE GREATER PPM SILVER
- SILT SAMPLE LESS THAN 0.3 PPM SILVER
- SILT SAMPLE EQUAL TO OR GREATER THAN 0.3 PPM SILVER

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:

DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: REG_AG.RUN (EG_AG.RUN)

	FIELD	FILE
POINTS:	AG	ROCKSAMP_REG.OLY
POINTS:	AG	ROCKSAMP_REG.OLY
POINTS:	AG	SILTSAMP.OLY
POINTS:	AG	SILTSAMP.OLY

N

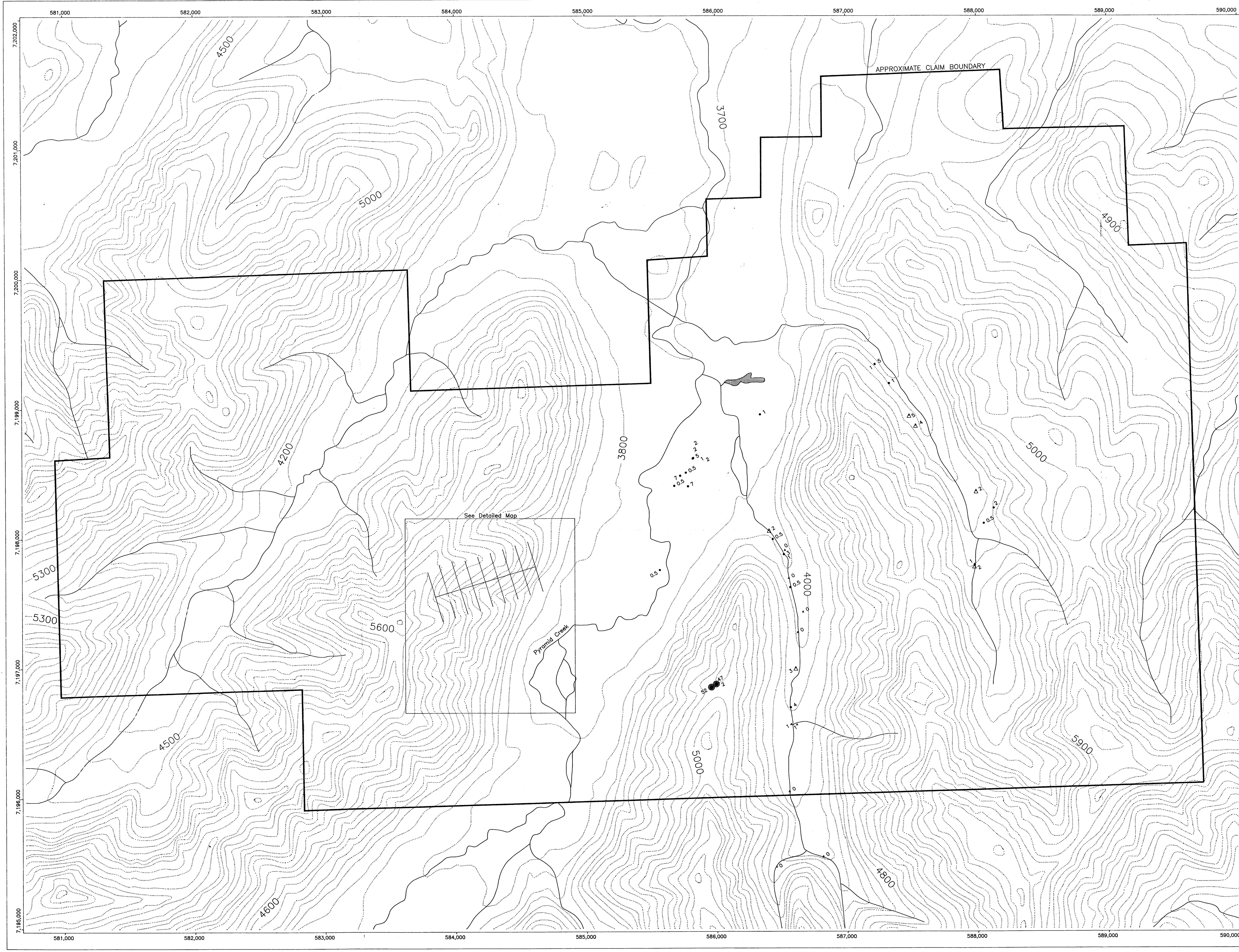
0 400 800 1200
METRES

DWG. 363

093103

PLACER DOME EXPLORATION LIMITED

DRAWN GGS	OLYMPIC PROPERTY
DATE 93:05:17	ROCK & SILT GEOCHEMISTRY
SCALE 1:10000	AG (PPM)
FIGURE **10**	NO.



LEGEND

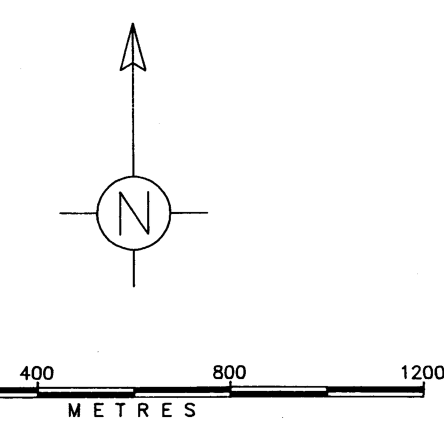
- ROCK SAMPLE LESS THAN 9 PPB GOLD
- ROCK SAMPLE 9 TO 30 PPB GOLD
- ROCK SAMPLE GREATER THAN 30 PPB GOLD
- SILT SAMPLE LESS THAN 2 PPB GOLD
- SILT SAMPLE EQUAL TO OR GREATER THAN 2 PPB GOLD

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:

DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: REG_AU.RUN (EG_AU.RUN)

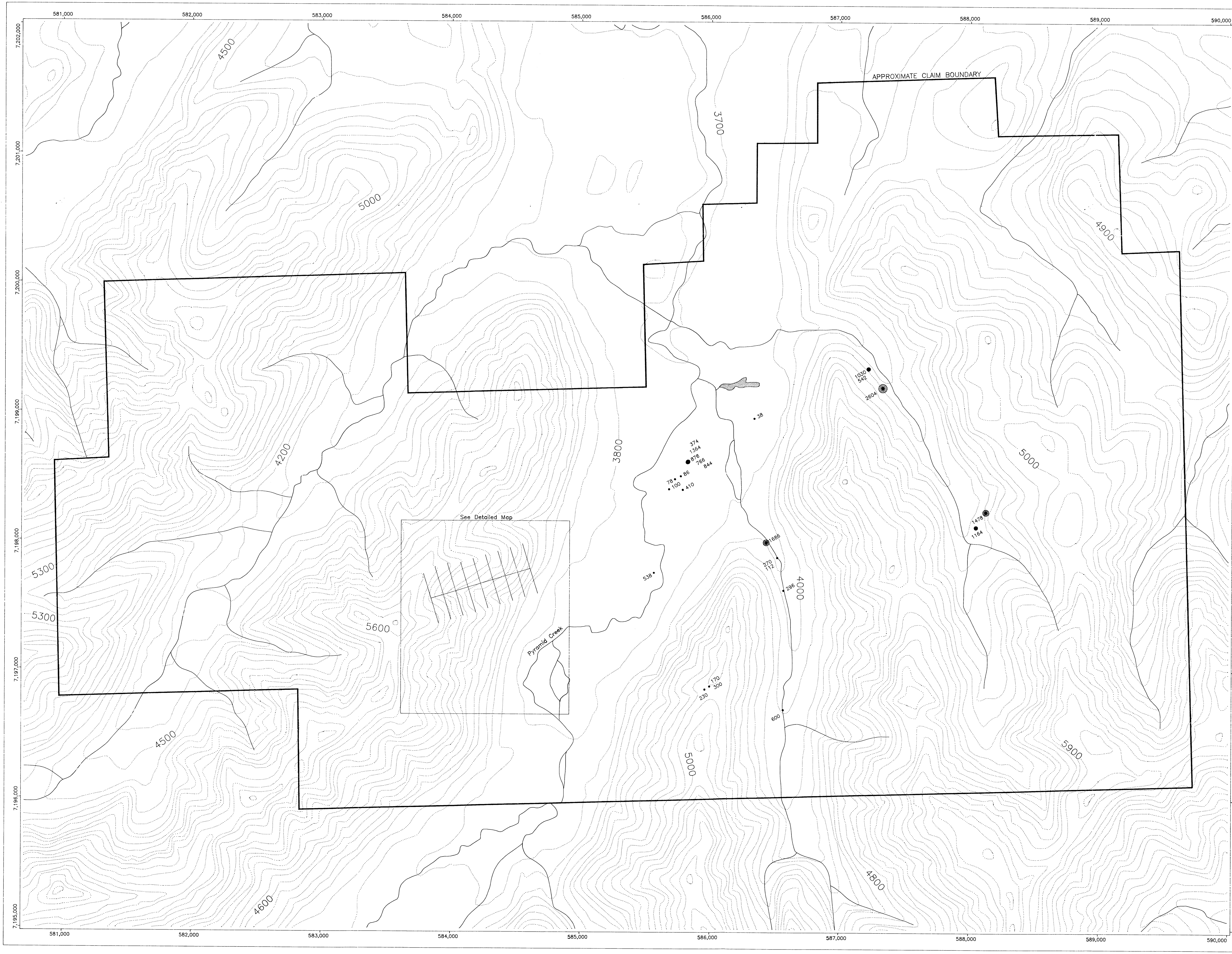
	FIELD	FILE
POINTS:	AU	ROCKSAMP_REG.OLY
POINTS:	AU	ROCKSAMP_REG.OLY
POINTS:	AU	SILTSAMP.OLY
POINTS:	AU	SILTSAMP.OLY



DWG 364 093103

PLACER DOME EXPLORATION LIMITED

DRAWN GGS	OLYMPIC PROPERTY ROCK & SILT GEOCHEMISTRY AU (PPB)
DATE 93:05:17	
SCALE 1:10000	
FIGURE 11	NO.



LEGEND

- LESS THAN 630 PPM BARIUM
- 630 TO 1399 PPM BARIUM
- 1400 TO 2000 PPM BARIUM
- GREATER THAN 2000 PPM BARIUM

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:

DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: REG_BA.RUN (EG_BA.RUN)

	FIELD	FILE
POINTS:	BA	ROCKSAMP_REG.OLY
POINTS:	BA	ROCKSAMP_REG.OLY

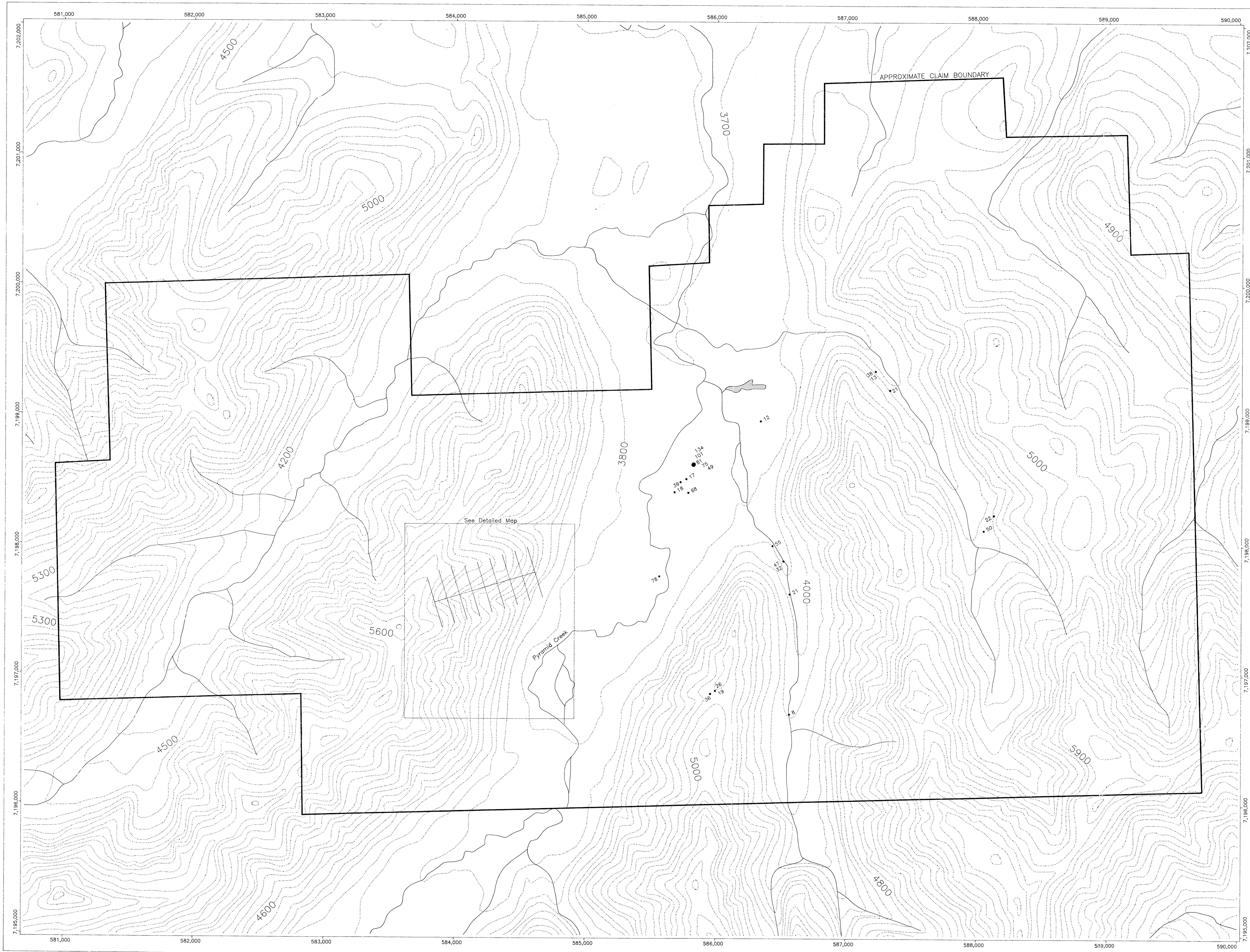
N

0 400 800 1200
METRES

DWG 365

093103

PLACER DOME EXPLORATION LIMITED	
DRAWN GGS	OLYMPIC PROPERTY ROCK GEOCHEMISTRY BA (PPM)
DATE 93:05:13	
SCALE 1:10000	
FIGURE 12	NO.



LEGEND

- LESS THAN 85 PPM CESIUM
- 85 TO 150 PPM CESIUM
- GREATER THAN 150 PPM CESIUM

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:

DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: REG_CE.RUN (EG_CE.RUN)

	FIELD	FILE
POINTS:	CE	ROCKSAMP_REG.OLY
POINTS:	CE	ROCKSAMP_REG.OLY

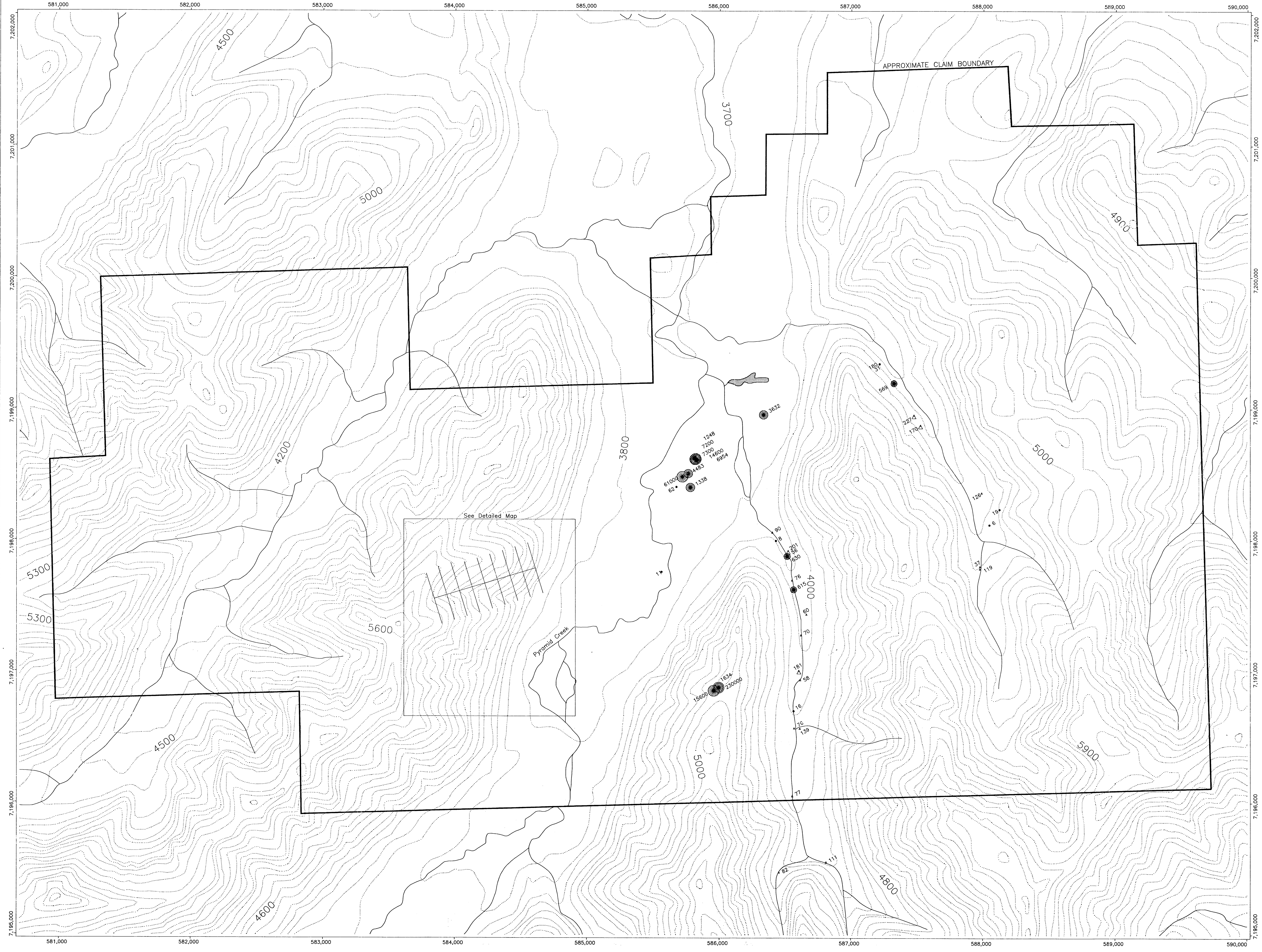
N

0 400 800 1200
METRES

DWG ?

093103

PLACER DOME EXPLORATION LIMITED	
DRAWN GGS	OLYMPIC PROPERTY
DATE 93:05:13	ROCK GEOCHEMISTRY
SCALE 1:10000	CE (PPM)
FIGURE 13	NO.



LEGEND

- ROCK SAMPLE LESS THAN 200 PPM COPPER
- ROCK SAMPLE 200 TO 499 PPM COPPER
- ROCK SAMPLE 500 TO 999 PPM COPPER
- ROCK SAMPLE 1000 TO 5000 PPM COPPER
- ROCK SAMPLE GREATER THAN 5000 PPM COPPER
- SILT SAMPLE LESS THAN 140 PPM COPPER
- SILT SAMPLE EQUAL TO OR GREATER THAN 140 PPM COPPER

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:
DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: REG_CU.RUN (EG_CU.RUN)

	FIELD	FILE
POINTS:	CU	ROCKSAMP_REG.OLY
POINTS:	CU	ROCKSAMP_REG.OLY
POINTS:	CU	SILTSAMP.OLY
POINTS:	CU	SILTSAMP.OLY

N

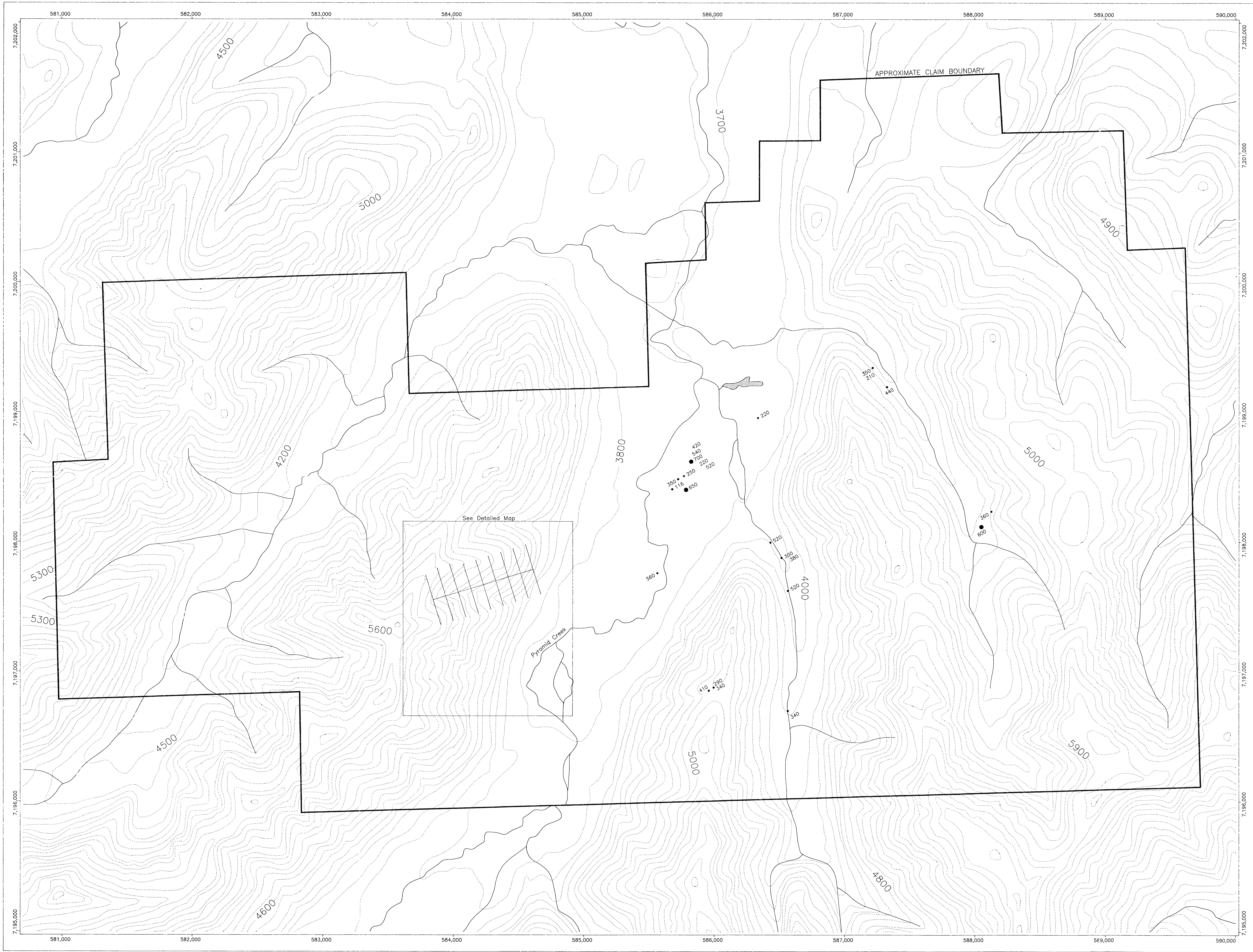
0 400 800 1200
METRES

DWG 367

093103

PLACER DOME EXPLORATION LIMITED

DRAWN GGS	OLYMPIC PROPERTY ROCK & SILT GEOCHEMISTRY CU (PPM)
DATE 93:05:17	
SCALE 1:10000	
FIGURE 14	NO.



LEGEND

- LESS THAN 570 PPM FLUORINE
- 570 TO 800 PPM FLUORINE
- GREATER THAN 800 PPM FLUORINE

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:

DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: REG_F.RUN (EG_F.RUN)

	FIELD	FILE
POINTS:	F	ROCKSAMP_REG.OLY
POINTS:	F	ROCKSAMP_REG.OLY

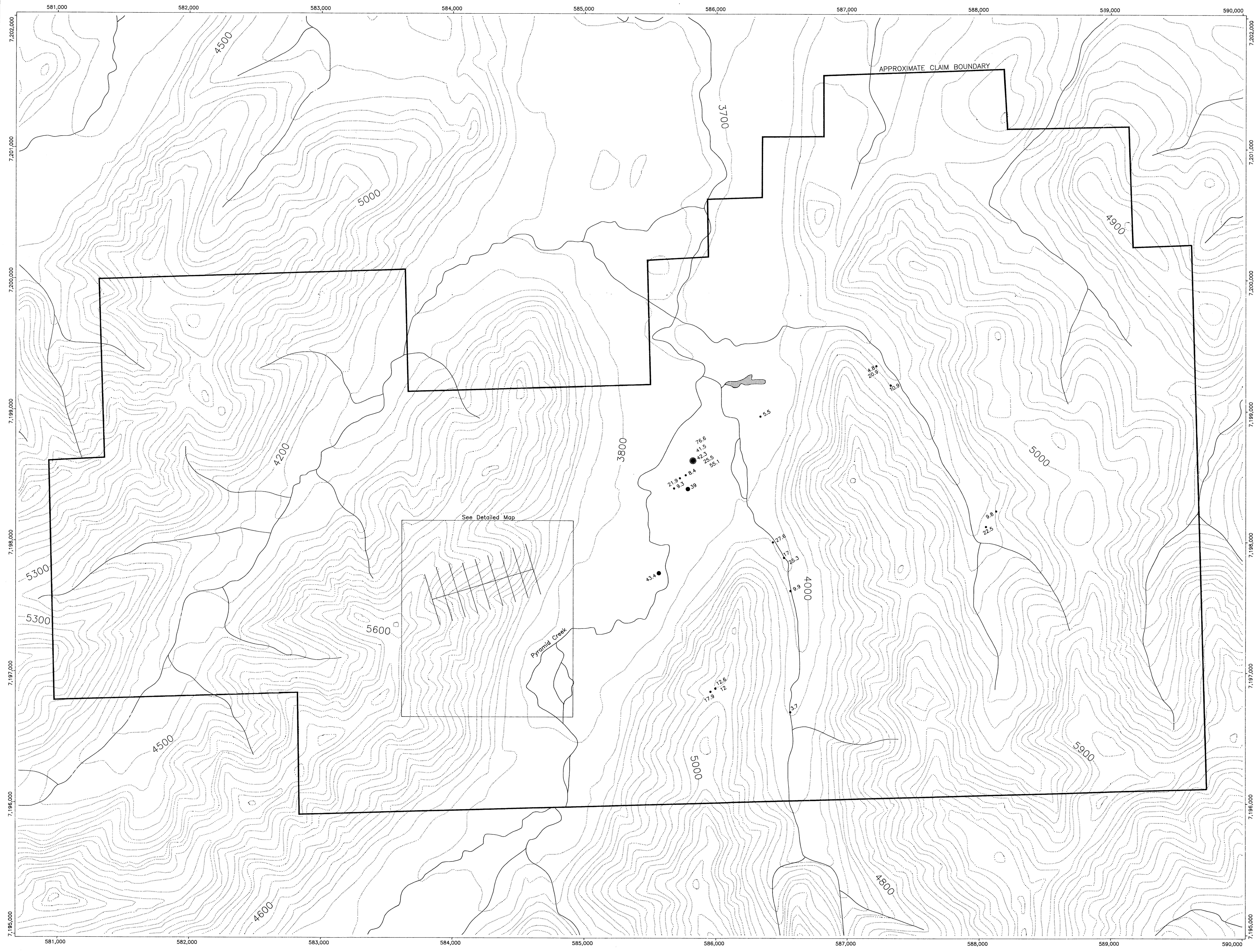
N

0 400 800 1200
METRES

DWG 368

093103

PLACER DOME EXPLORATION LIMITED	
DRAWN GGS	OLYMPIC PROPERTY
DATE 93:05:12	ROCK GEOCHEMISTRY
SCALE 1:10000	F (PPM)
FIGURE **15**	NO.



LEGEND

- LESS THAN 37 PPM LANTHANUM
- 37 TO 70 PPM LANTHANUM
- GREATER THAN 70 PPM LANTHANUM

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:

DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: REG_LA.RUN (EG_LA.RUN)

	FIELD	FILE
POINTS:	LA	ROCKSAMP_REG.OLY
POINTS:	LA	ROCKSAMP_REG.OLY

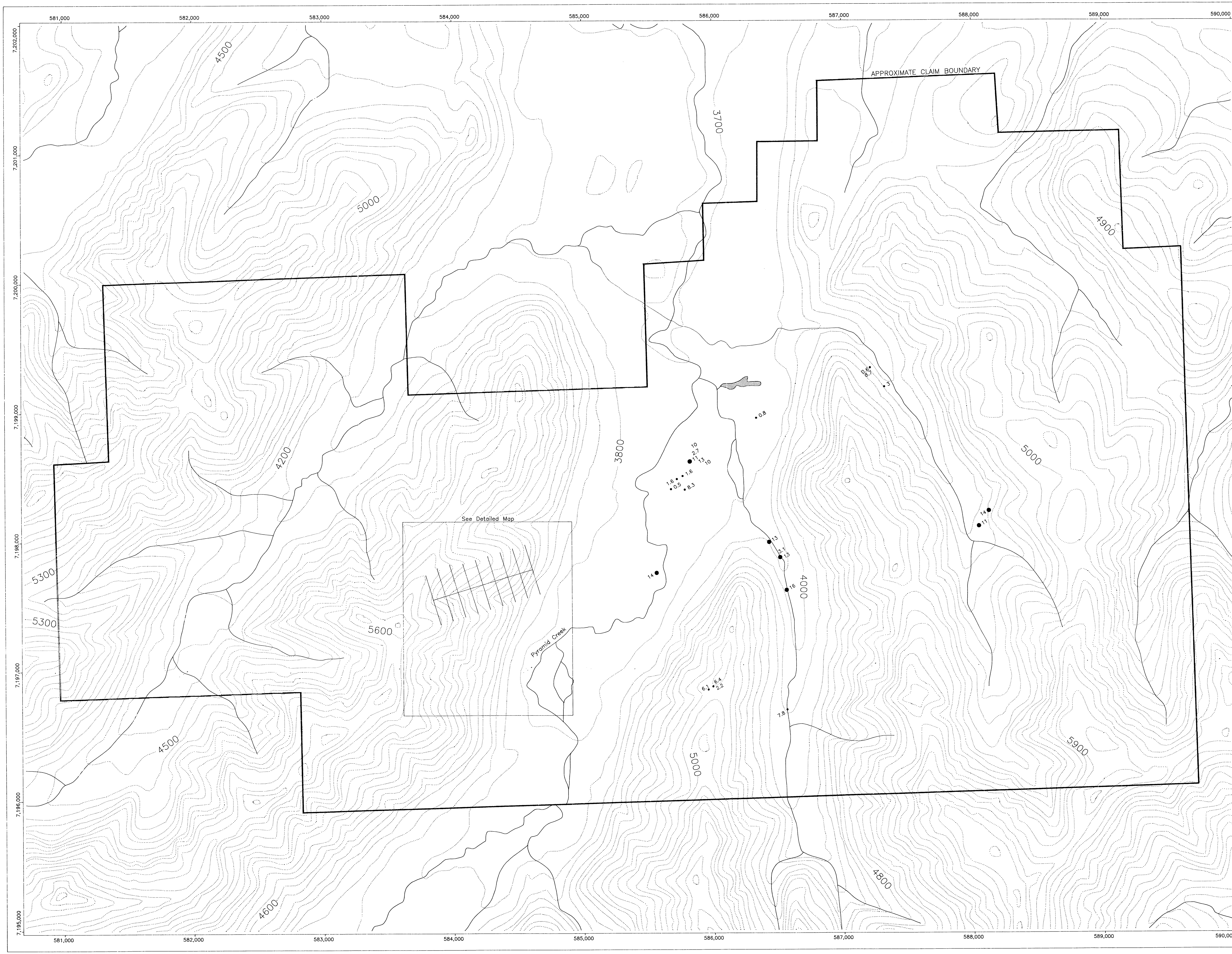
N

0 400 800 1200
METRES

DWG 369

093103

PLACER DOME EXPLORATION LIMITED	
DRAWN GGS	OLYMPIC PROPERTY ROCK GEOCHEMISTRY LA (PPM)
DATE 93:05:13	
SCALE 1:10000	
FIGURE 16	NO.



LEGEND

- • LESS THAN 11 PPM THORIUM
- ● EQUAL TO OR GREATER THAN 11 PPM THORIUM

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:

DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: REG_TH.RUN (EG_TH.RUN)

	FIELD	FILE
POINTS:	TH	ROCKSAMP_REG.OLY
POINTS:	TH	ROCKSAMP_REG.OLY

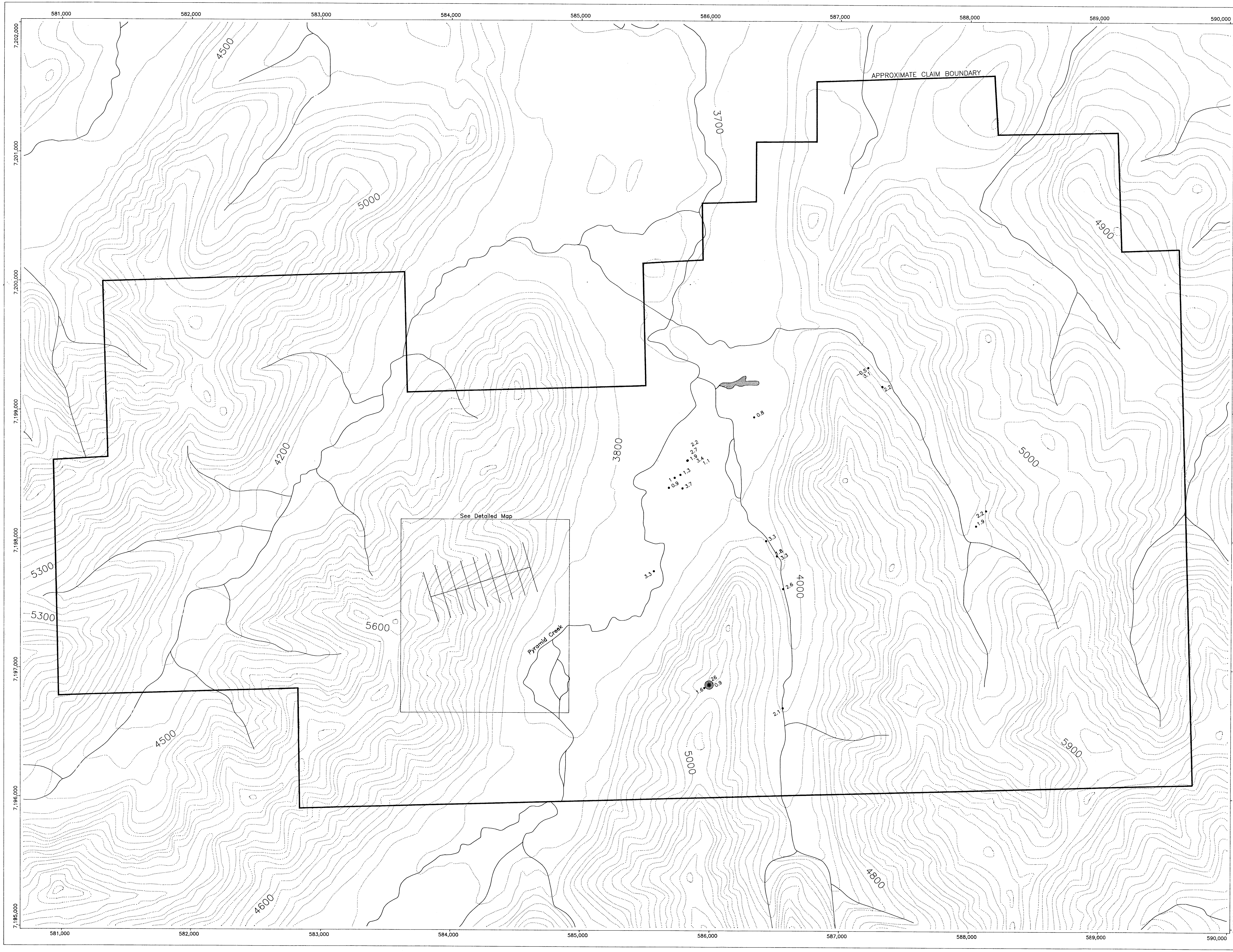
N

0 400 800 1200
METRES

DWG 370

093103

PLACER DOME EXPLORATION LIMITED	
DRAWN GGS	OLYMPIC PROPERTY
DATE 93:05:13	ROCK GEOCHEMISTRY
SCALE 1:10000	TH (PPM)
FIGURE 17	NO.



LEGEND

- LESS THAN 4.2 PPM URANIUM
- 4.2 TO 7.9 PPM URANIUM
- 8 TO 14 PPM URANIUM
- GREATER THAN 14 PPM URANIUM

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:
DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: REG_U.RUN (EG_U.RUN)

	FIELD	FILE
POINTS:	U	ROCKSAMP_REG.OLY
POINTS:	U	ROCKSAMP_REG.OLY

N

0 400 800 1200
METRES

DWG 371

093103

PLACER DOME EXPLORATION LIMITED	
DRAWN GGS	OLYMPIC PROPERTY ROCK GEOCHEMISTRY U (PPM)
DATE 93:05:13	
SCALE 1:10000	
FIGURE 18	NO.

LEGEND

- LESS THAN 9% CAO
- 9 TO 15% CAO
- GREATER THAN 15% CAO

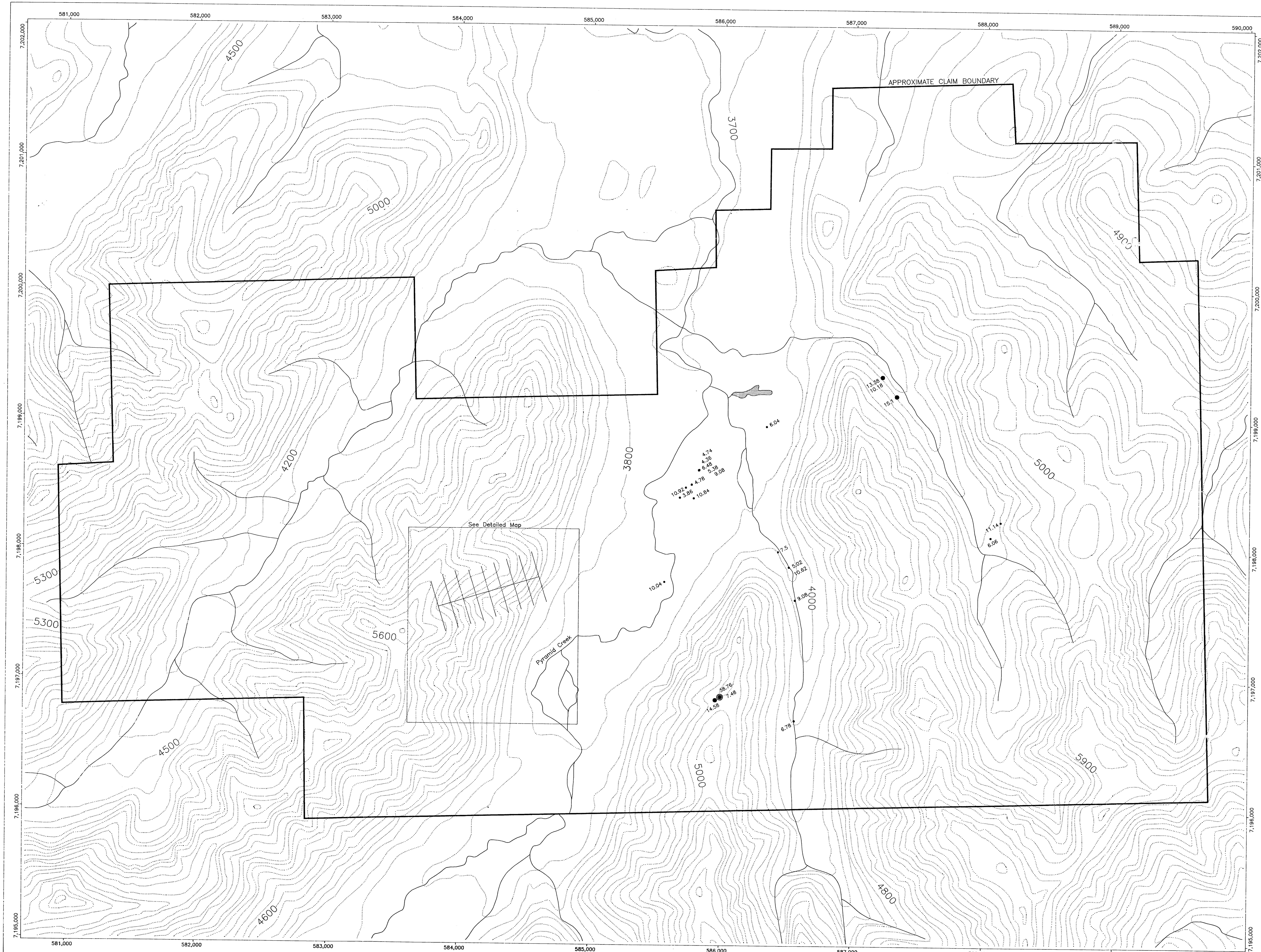
CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:
DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: REG_CA.RUN (EC_CA.RUN)

		FIELD	FILE
POINTS:		CAO	ROCKSAMP_REG.OLY
POINTS:		CAO	ROCKSAMP_REG.OLY

DWG 372 093103

PLACER DOME EXPLORATION LIMITED	
DRAWN GGS	OLYMPIC PROPERTY
DATE 93:05:12	ROCK GEOCHEMISTRY
SCALE 1:10000	CAO (%)
FIGURE 19	NO.



LEGEND

- LESS THAN 13% FE_2O_3
- 13 TO 18% FE_2O_3
- GREATER THAN 18% FE_2O_3

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:

DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: REG_FE.RUN (EG_FE.RUN)

	FIELD	FILE
POINTS:	FEO	ROCKSAMP_REG.OLY
POINTS:	FEO	ROCKSAMP_REG.OLY

N

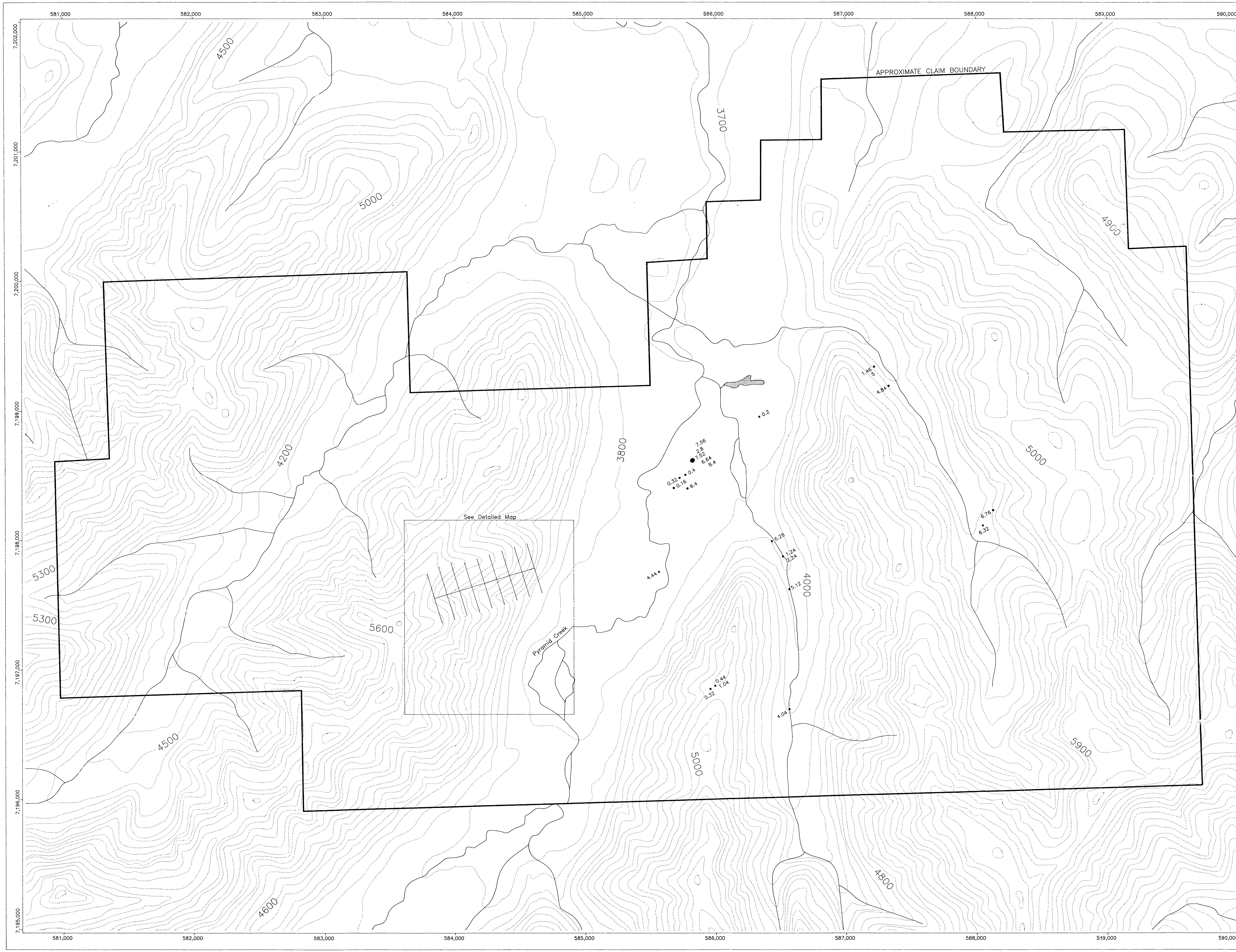
0 400 800 1200
METRES

DWG 373

093103

PLACER DOME EXPLORATION LIMITED

DRAWN GGS	OLYMPIC PROPERTY ROCK GEOCHEMISTRY FE_2O_3 (%)
DATE 93:05:12	
SCALE 1:10000	
FIGURE 20	NO.



LEGEND

- LESS THAN 7% K_2O
- 7 TO 9.5% K_2O
- GREATER THAN 9.5% K_2O

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:

DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: REG_K.RUN (EG_K.RUN)

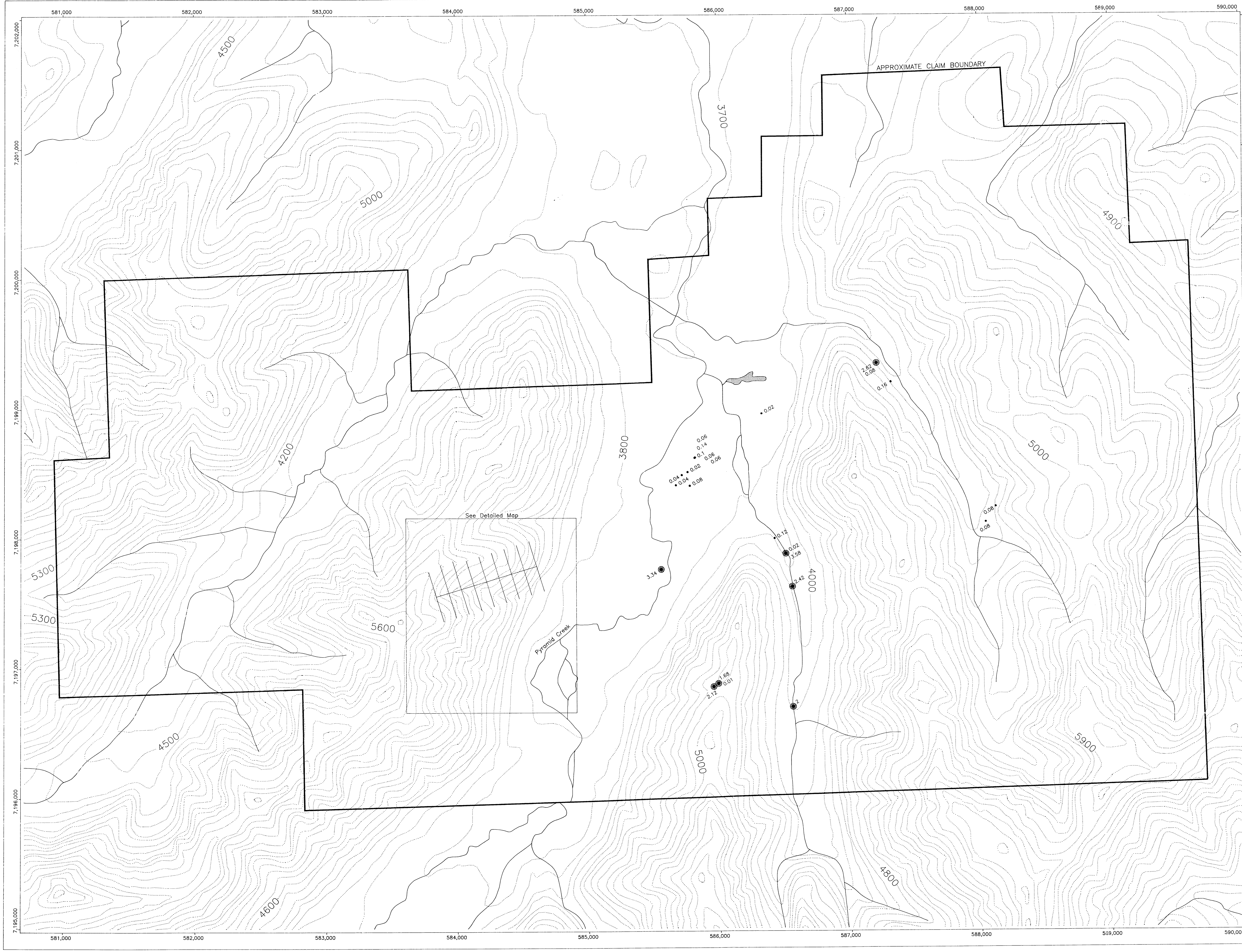
	FIELD	FILE
POINTS:	K20	ROCKSAMP_REG.OLY
POINTS:	K20	ROCKSAMP_REG.OLY

0 400 800 1200
METRES

DWG 374

093103

PLACER DOME EXPLORATION LIMITED	
DRAWN GGS	OLYMPIC PROPERTY
DATE 93:05:13	ROCK GEOCHEMISTRY
SCALE 1:10000	K_2O (%)
FIGURE 21	NO.



LEGEND

- LESS THAN 0.3% NA_2O
- 0.3 TO 1.0% NA_2O
- GREATER THAN 1.0% NA_2O

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:

DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: REG_NA.RUN (EG_NA.RUN)

	FIELD	FILE
POINTS:	NAO	ROCKSAMP_REG.OLY
POINTS:	NAO	ROCKSAMP_REG.OLY

0 400 800 1200
METRES

DWG 375

093103

PLACER DOME EXPLORATION LIMITED	
DRAWN GGS	OLYMPIC PROPERTY
DATE 93:05:13	ROCK GEOCHEMISTRY
SCALE 1:10000	NA_2O (%)
FIGURE 22	NO.


LEGEND
LESS THAN 60% SIO2
60 TO 69% SIO2
GREATER THAN 69% SIO2
CONTOUR INTERVAL 100 FEET
APPROXIMATE CLAIM BOUNDARY
See Detailed Map
Pyramid Creek
DATA PLOTTED ON THIS MAP:
DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: REG_SI.RUN (EG_SI.RUN)
FIELD FILE
POINTS: SIO ROCKSAMP_REG.OLY
POINTS: SIO ROCKSAMP_REG.OLY
N
0 400 800 1200
METRES
DWG 376
093103
PLACER DOME EXPLORATION LIMITED
DRAWN GGS
DATE 93:05:12
SCALE 1:10000
FIGURE 23
OLYMPIC PROPERTY
ROCK GEOCHEMISTRY
SIO2 (%)
NO.

ASSESSMENT REPORT

GEOLOGICAL and GEOCHEMICAL SURVEYS

on the

OLYMPIC 1-168 CLAIMS

(Record Nos. YB40925-YB41092)

DAWSON MINING DISTRICT, YUKON TERRITORY

NTS: 116B/14

Latitude: 64° 54'N Longitude: 139° 1[illegible]

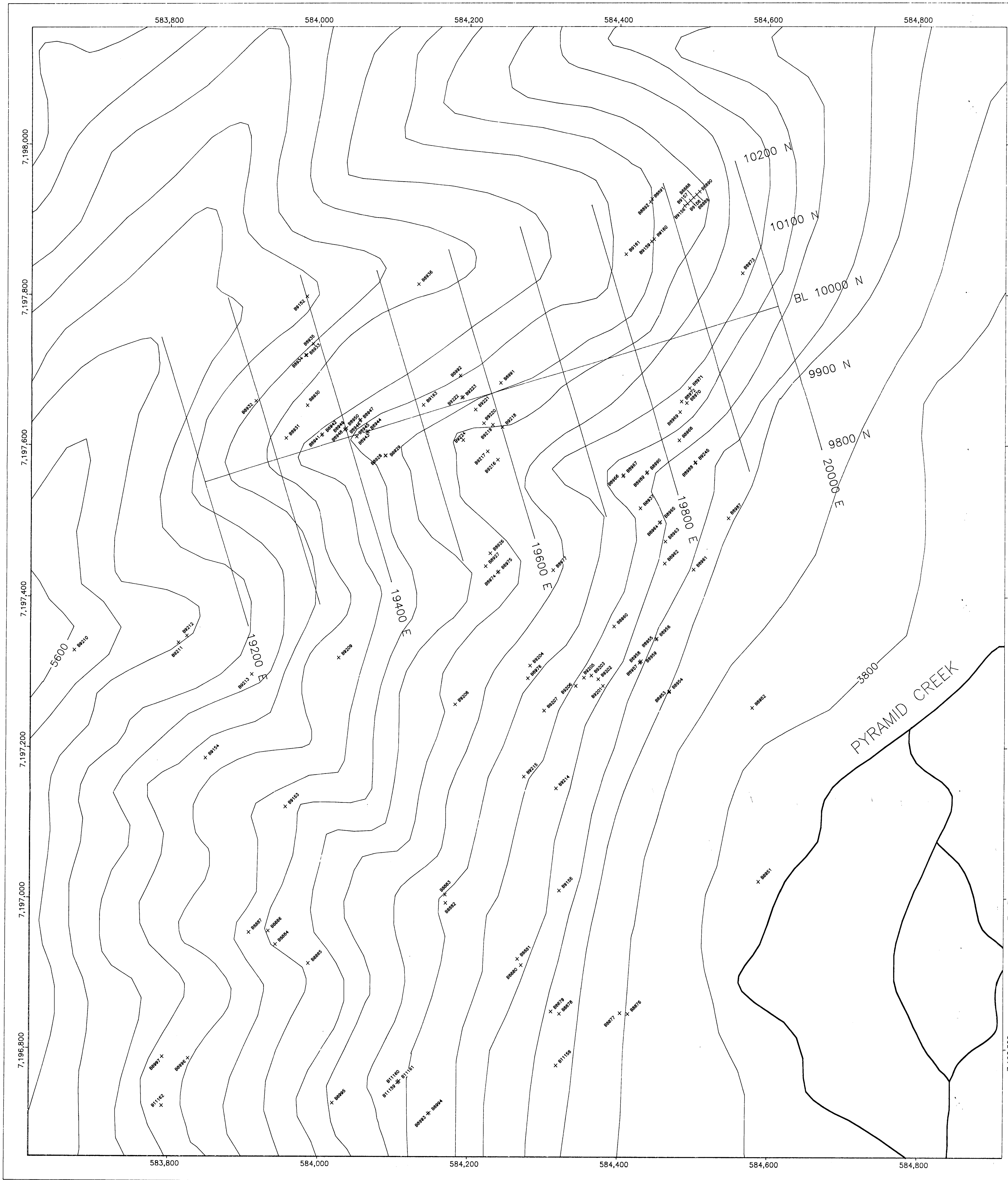
Owner: Major General Resources Ltd.
10th Floor,
900 West Hastings St.
Vancouver, B.C.
V6C 1E5

Operator: Placer Dome Exploration Limited
103 Platinum Road
Whitehorse, Yukon
Y1A 5M3

Author: G. Shevchenko (Project Geologist)

Date: May 31, 1993

VOLUME III OF III (Figures #24 to #42)



LEGEND

× ROCK SAMPLE LOCATION

B8952 SAMPLE NUMBER

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:

DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: SCRA001.RUN

	FIELD	FILE
+ POINTS:	SAMP	ROCKSAMP_DET.OLY
		TOPO.DXF

N

0 100 200 300
METRES

DWG 377 **093103**

PLACER DOME EXPLORATION LIMITED	
DRAWN GGS	OLYMPIC PROPERTY DETAILED AREA ROCK SAMPLE LOCATIONS
DATE 93:05:11	
SCALE 1:2500	
FIGURE 24	NO.

LEGEND

- LESS THAN 1 PPM SILVER
- 1 TO 4.9 PPM SILVER
- 5 TO 20 PPM SILVER
- GREATER THAN 20 PPM SILVER

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:

DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: DET_ROCK_AGSYM.RUN

	FIELD	FILE
POINTS:	AG	ROCKSAMP_DET.OLY
POINTS:	AG	ROCKSAMP_DET.OLY
		TOPO.DXF

N

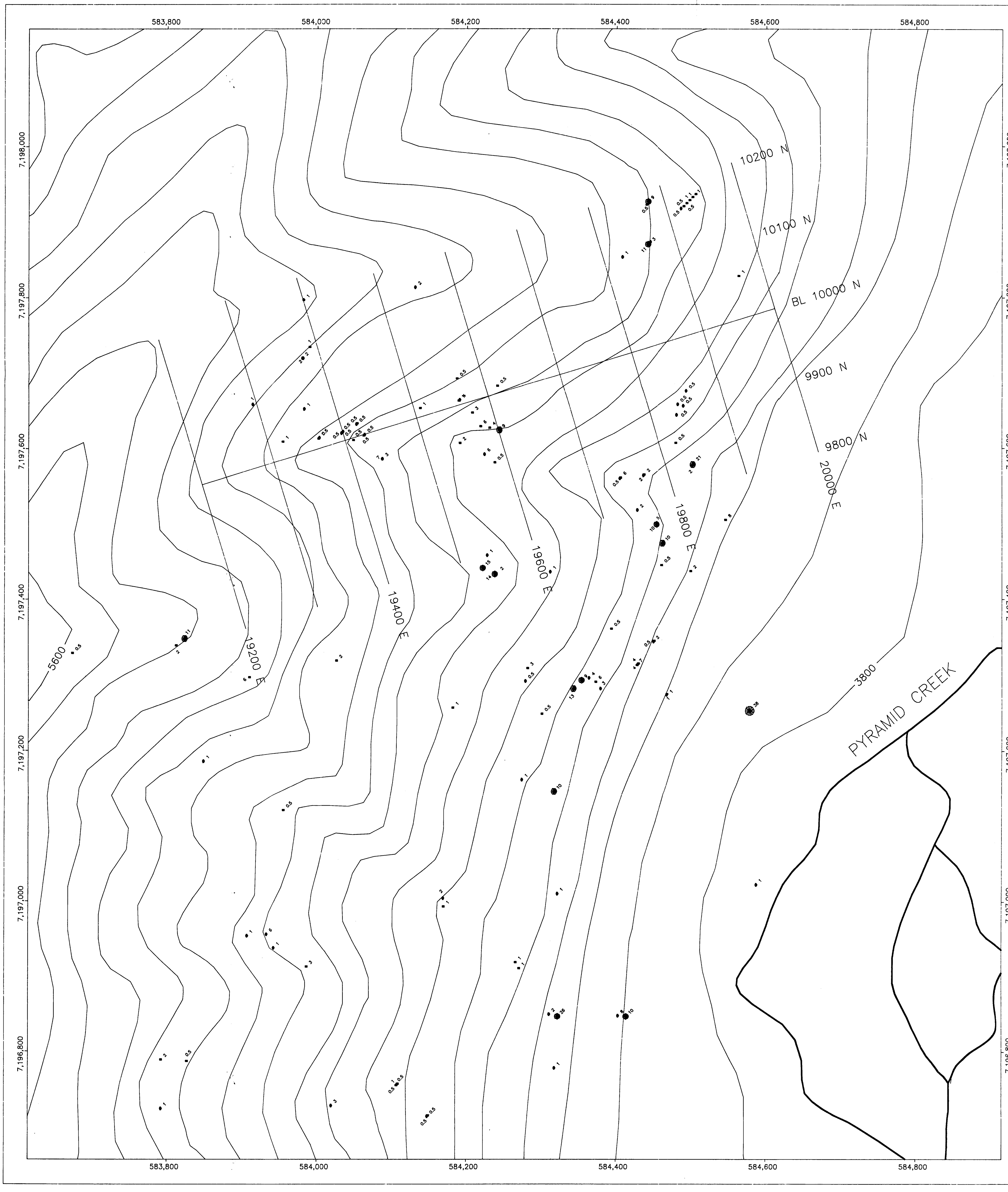
0 100 200 300
METRES

DWG 378

093103

PLACER DOME EXPLORATION LIMITED

DRAWN GGS	OLYMPIC PROPERTY
DATE 93:05:14	DETAILED AREA – LITHOGEOCHEM
SCALE 1:2500	SYMBOL & VALUE PLOT – AG (PPM)
FIGURE 25	NO.



LEGEND

- LESS THAN 9 PPB GOLD
- 9 TO 30 PPB GOLD
- GREATER THAN 30 PPB GOLD

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:

DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: DET_ROCK_AUSYM.RUN

	FIELD	FILE
POINTS:	AU	ROCKSAMP_DET.OLY
POINTS:	AU	ROCKSAMP_DET.OLY
		TOPO.DXF

DWG 379

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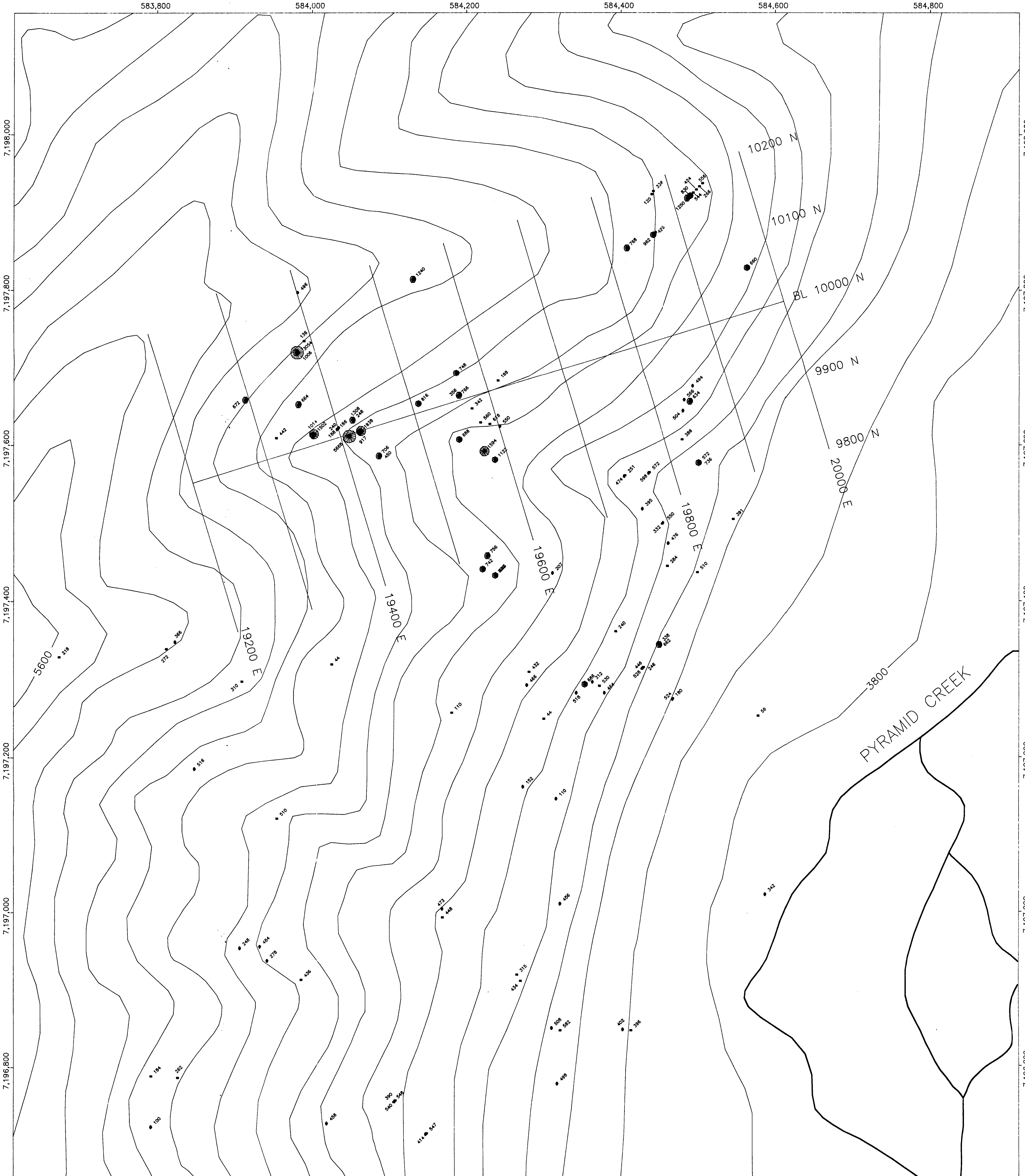
PLACER DOME EXPLORATION LIMITED

DRAWN GGS	OLYMPIC PROPERTY
DATE 93:05:03	DETAILED AREA – LITHOGEOCHEM
SCALE 1:2500	SYMBOL & VALUE PLOT – AU (PPB)
FIGURE 26	NO.



LEGEND

- LESS THAN 630 PPM BARIUM
- 630 TO 1399 PPM BARIUM
- 1400 TO 2000 PPM BARIUM
- GREATER THAN 2000 PPM BARIUM

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:

DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: DET_ROCK_BASYM.RUN

	FIELD	FILE
POINTS:	BA	ROCKSAMP_DET.OLY
POINTS:	BA	ROCKSAMP_DET.OLY
		TOPO.DXF

N

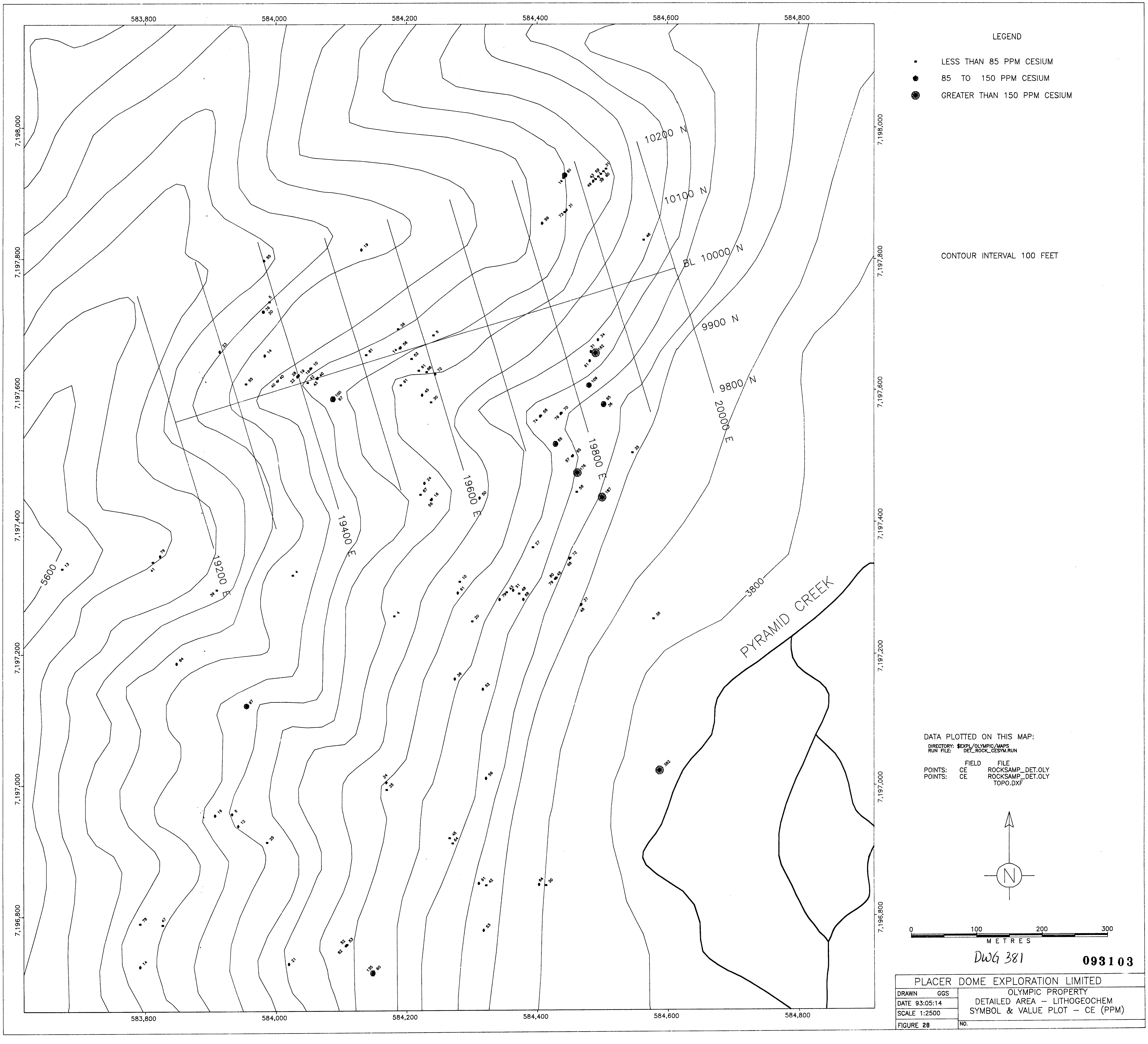
0 100 200 300
METRES

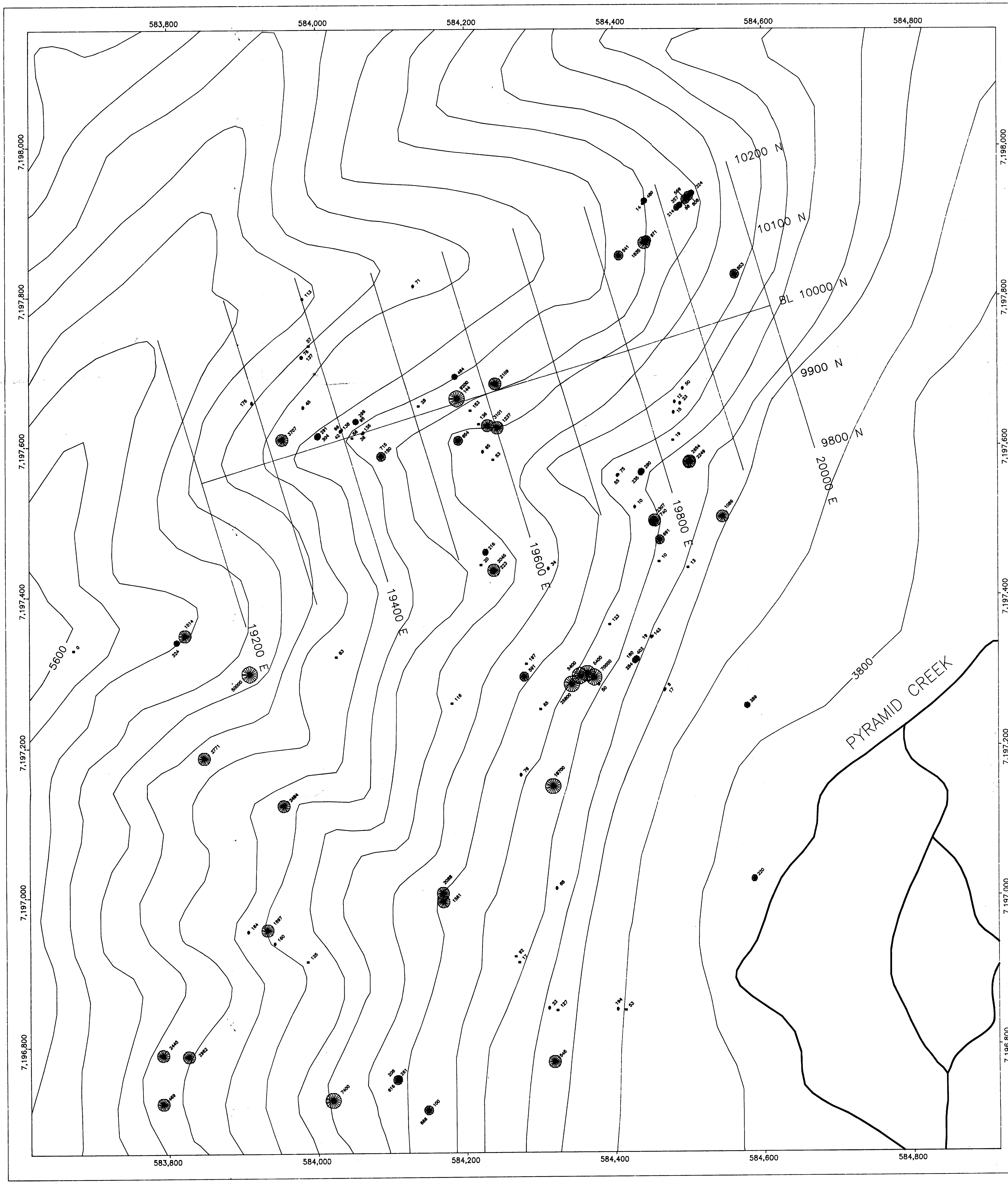
DWG 380

093103

PLACER DOME EXPLORATION LIMITED

DRAWN GGS	OLYMPIC PROPERTY
DATE 93:05:14	DETAILED AREA – LITHOGEOCHEM
SCALE 1:2500	SYMBOL & VALUE PLOT – BA (PPM)
FIGURE 27	NO.


LEGEND
LESS THAN 85 PPM CESIUM
85 TO 150 PPM CESIUM
GREATER THAN 150 PPM CESIUM
CONTOUR INTERVAL 100 FEET
583,800
584,000
584,200
584,400
584,600
584,800
7,198,000
7,197,800
7,197,600
7,197,400
7,197,200
7,197,000
7,196,800
10200 N
10100 N
BL 10000 N
9900 N
9800 N
19200 E
19400 E
19600 E
19800 E
20000 E
5600
3800
PYRAMID CREEK
DATA PLOTTED ON THIS MAP:
DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: DET_ROCK_CESYM.RUN
FIELD FILE
POINTS: CE ROCKSAMP_DET.OLY
POINTS: CE ROCKSAMP_DET.OLY
TOPO.DXF
N
0 100 200 300
METRES
DWG 381
093103
PLACER DOME EXPLORATION LIMITED
DRAWN GGS
DATE 93:05:14
SCALE 1:2500
FIGURE 28
OLYMPIC PROPERTY
DETAILED AREA – LITHOGEOCHEM
SYMBOL & VALUE PLOT – CE (PPM)
NO.



LEGEND

- LESS THAN 200 PPM COPPER
- 200 TO 499 PPM COPPER
- 500 TO 999 PPM COPPER
- 1000 TO 5000 PPM COPPER
- GREATER THAN 5000 PPM COPPER

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:
DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: DET_ROCK_CUSYM.RUN

	FIELD	FILE
POINTS:	CU	ROCKSAMP_DET.OLY
POINTS:	CU	ROCKSAMP_DET.OLY
		TOPO.DXF

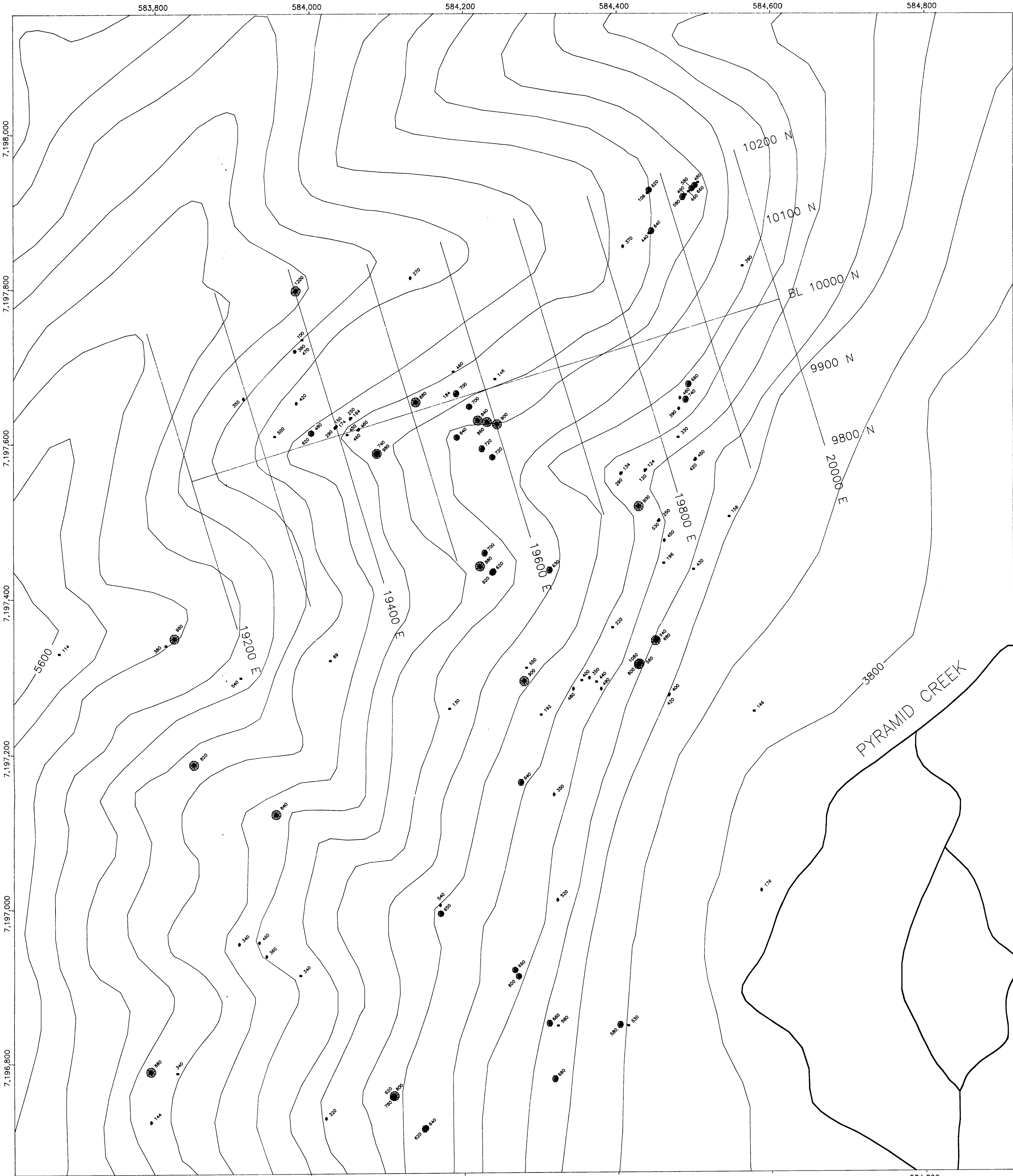
N

0 100 200 300
METRES

DWG 382 093103

PLACER DOME EXPLORATION LIMITED

DRAWN GGS	OLYMPIC PROPERTY
DATE 93:05:13	DETAILED AREA – LITHOGEOCHEM
SCALE 1:2500	SYMBOL & VALUE PLOT – CU (PPM)
FIGURE 29	NO.



LEGEND

- LESS THAN 570 PPM FLUORINE
- 570 TO 800 PPM FLUORINE
- GREATER THAN 800 PPM FLUORINE

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:

DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: DET_ROCK_FSYM.RUN

	FIELD	FILE
POINTS:	F	ROCKSAMP_DET.OLY
POINTS:	F	ROCKSAMP_DET.OLY
		TOPO.DXF

N

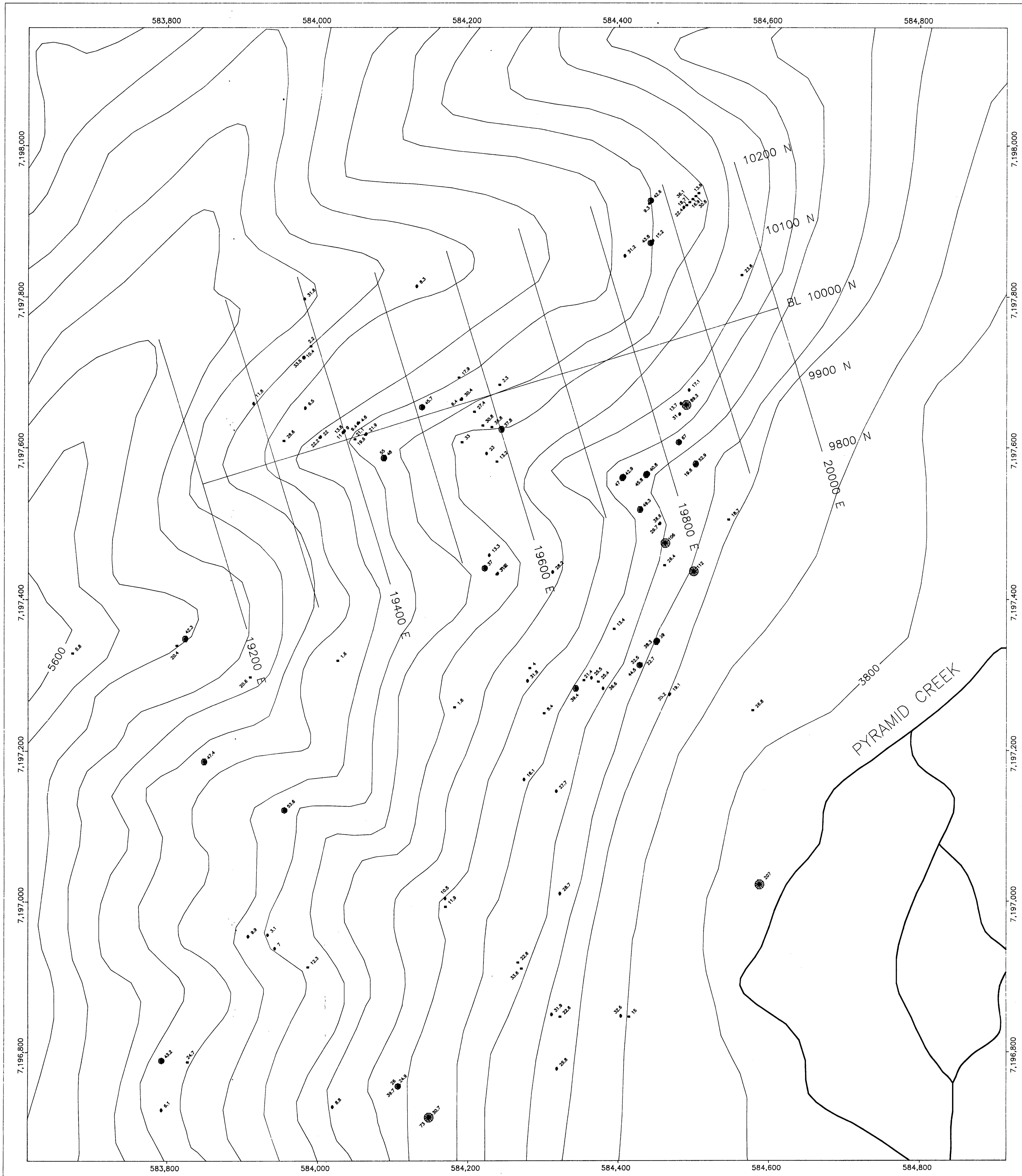
0 100 200 300
METRES

DWG 383

093103

PLACER DOME EXPLORATION LIMITED

DRAWN GGS	OLYMPIC PROPERTY
DATE 93:05:14	DETAILED AREA – LITHOGEOCHEM
SCALE 1:2500	SYMBOL & VALUE PLOT – F (PPM)
FIGURE 30	NO.



LEGEND

- LESS THAN 37 PPM LANTHANUM
- 37 TO 70 PPM LANTHANUM
- GREATER THAN 70 PPM LANTHANUM

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:
DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: DET_ROCK_LASYM.RUN

	FIELD	FILE
POINTS:	LA	ROCKSAMP_DET.OLY
POINTS:	LA	ROCKSAMP_DET.OLY
		TOPO.DXF

0 100 200 300
METRES

DWG 384

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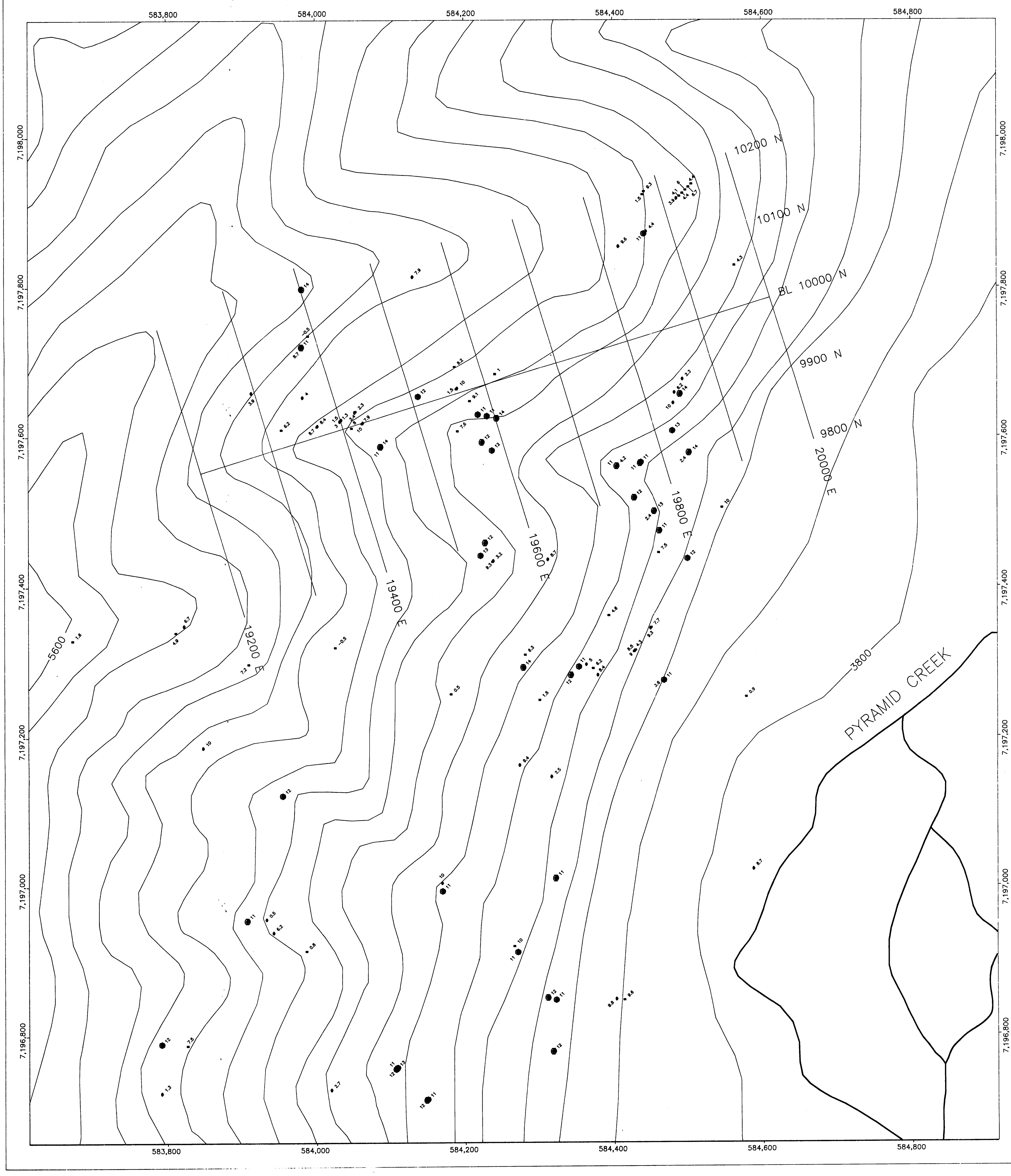
PLACER DOME EXPLORATION LIMITED

DRAWN GGS	OLYMPIC PROPERTY
DATE 93:05:14	DETAILED AREA – LITHOGEOCHEM
SCALE 1:2500	SYMBOL & VALUE PLOT – LA (PPM)
FIGURE 31	NO.



LEGEND

- LESS THAN 11 PPM THORIUM
- EQUAL TO AND GREATER THAN 11 PPM THORIUM

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:
DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: DET_ROCK_THSYM.RUN

	FIELD	FILE
POINTS:	TH	ROCKSAMP_DET.OLY
POINTS:	TH	ROCKSAMP_DET.OLY
		TOPO.DXF

N

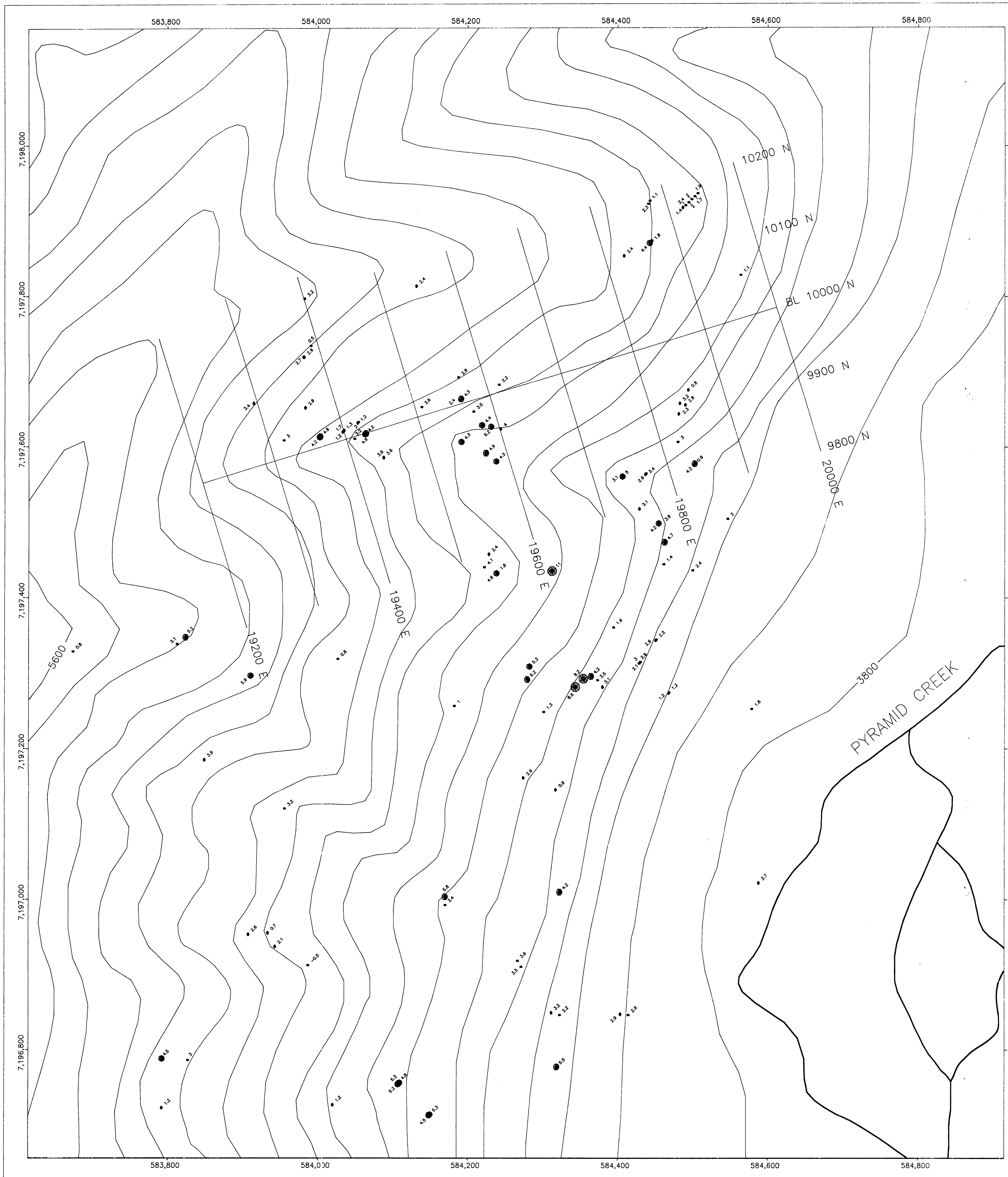
0 100 200 300
METRES

DWG 385

093103

PLACER DOME EXPLORATION LIMITED

DRAWN GGS	OLYMPIC PROPERTY DETAILED AREA – LITHOGEOCHEM SYMBOL & VALUE PLOT – TH (PPM)
DATE 93:05:14	
SCALE 1:2500	
FIGURE 32	NO.



LEGEND

- LESS THAN 4.2 PPM URANIUM
- 4.2 TO 7.9 PPM URANIUM
- 8 TO 14 PPM URANIUM
- GREATER THAN 14 PPM URANIUM

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:

DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: DET_ROCK_USYM.RUN

	FIELD	FILE
POINTS:	U	ROCKSAMP_DET.OLY
POINTS:	U	ROCKSAMP_DET.OLY
		TOPO.DXF

N

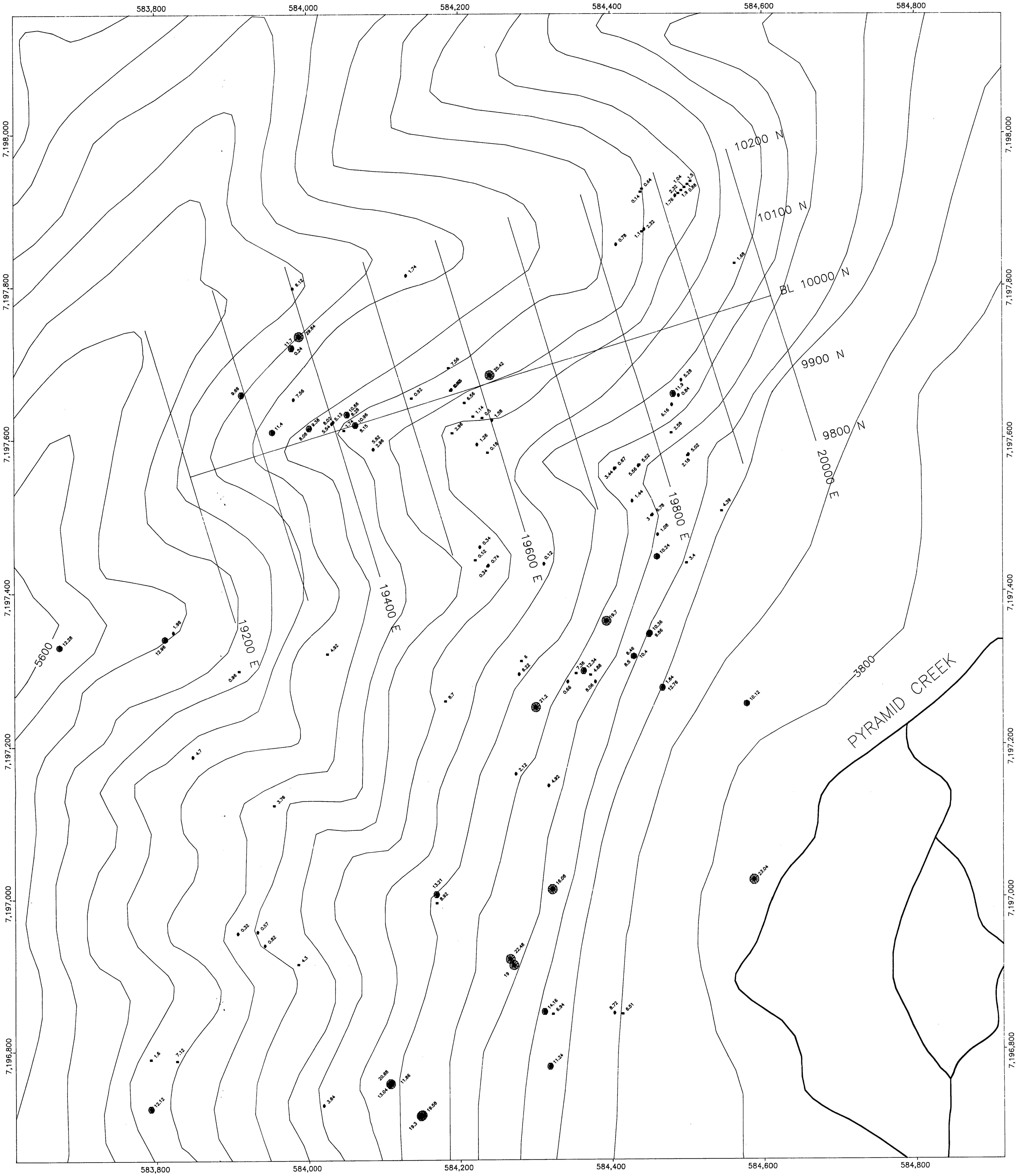
0 100 200 300
METRES

DWG 386

093103

PLACER DOME EXPLORATION LIMITED

DRAWN GGS	OLYMPIC PROPERTY
DATE 93:05:14	DETAILED AREA – LITHOGEOCHEM
SCALE 1:2500	SYMBOL & VALUE PLOT – U (PPM)
FIGURE 33	NO.



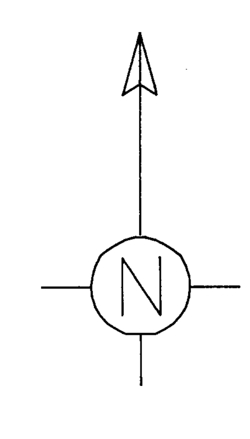
LEGEND

- LESS THAN 9% CaO
- 9 TO 15% CaO
- GREATER THAN 15% CaO

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:
DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: DET_ROCK_CASYM.RUN

	FIELD	FILE
POINTS:	CAO	ROCKSAMP_DET.OLY
POINTS:	CAO	ROCKSAMP_DET.OLY
		TOPO.DXF



0 100 200 300
METRES

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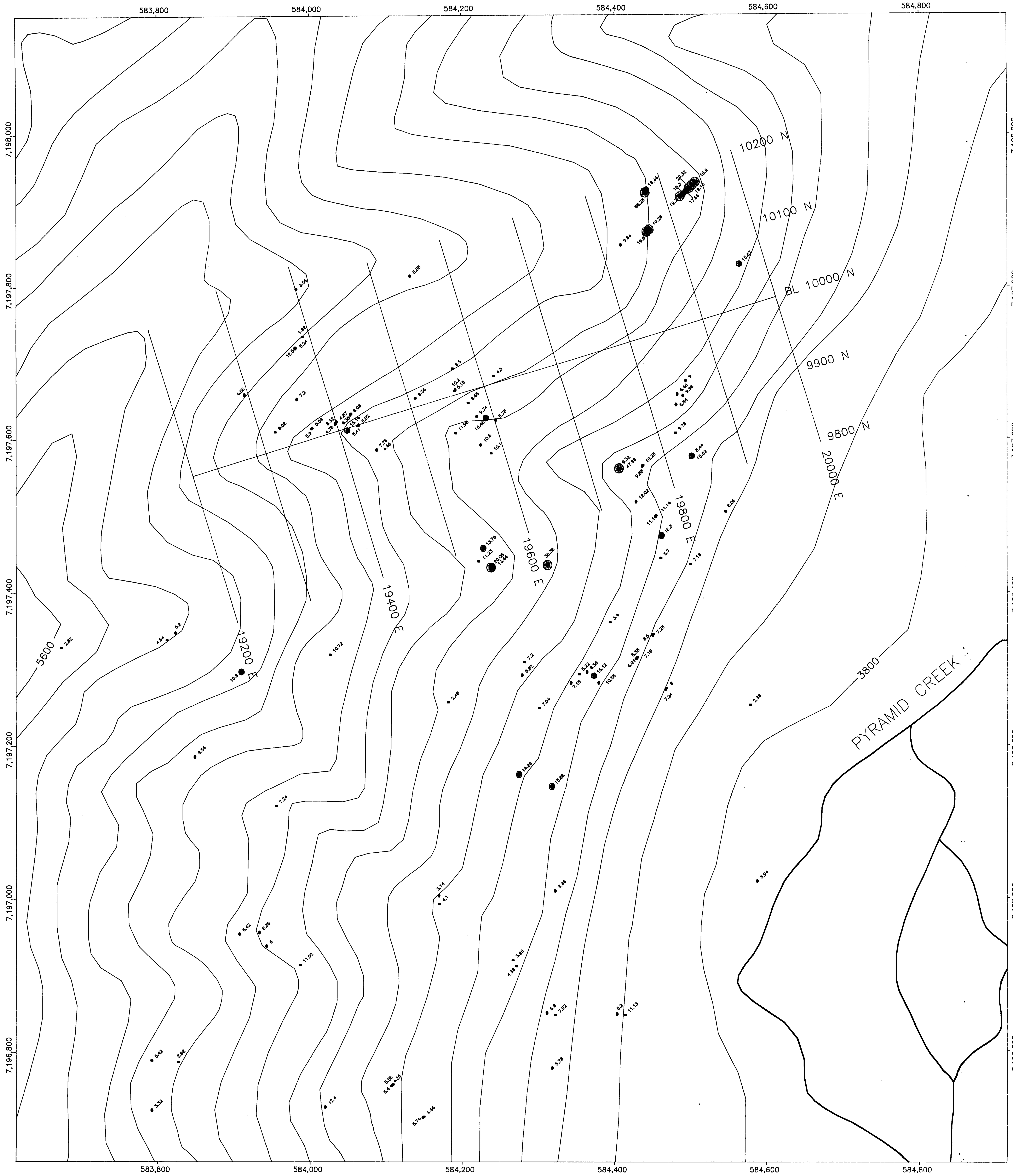
PLACER DOME EXPLORATION LIMITED

DRAWN GGS	OLYMPIC PROPERTY DETAILED AREA – LITHOGEOCHEM SYMBOL & VALUE PLOT – CaO (%)
DATE 93:05:14	
SCALE 1:2500	
FIGURE 34	NO.



LEGEND

- LESS THAN 13% Fe_2O_3
- 13 TO 18% Fe_2O_3
- GREATER THAN 18% Fe_2O_3

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:

DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: DET_ROCK_FESYM.RUN

	FIELD	FILE
POINTS:	FEO	ROCKSAMP_DET.OLY
POINTS:	FEO	ROCKSAMP_DET.OLY
		TOPO.DXF

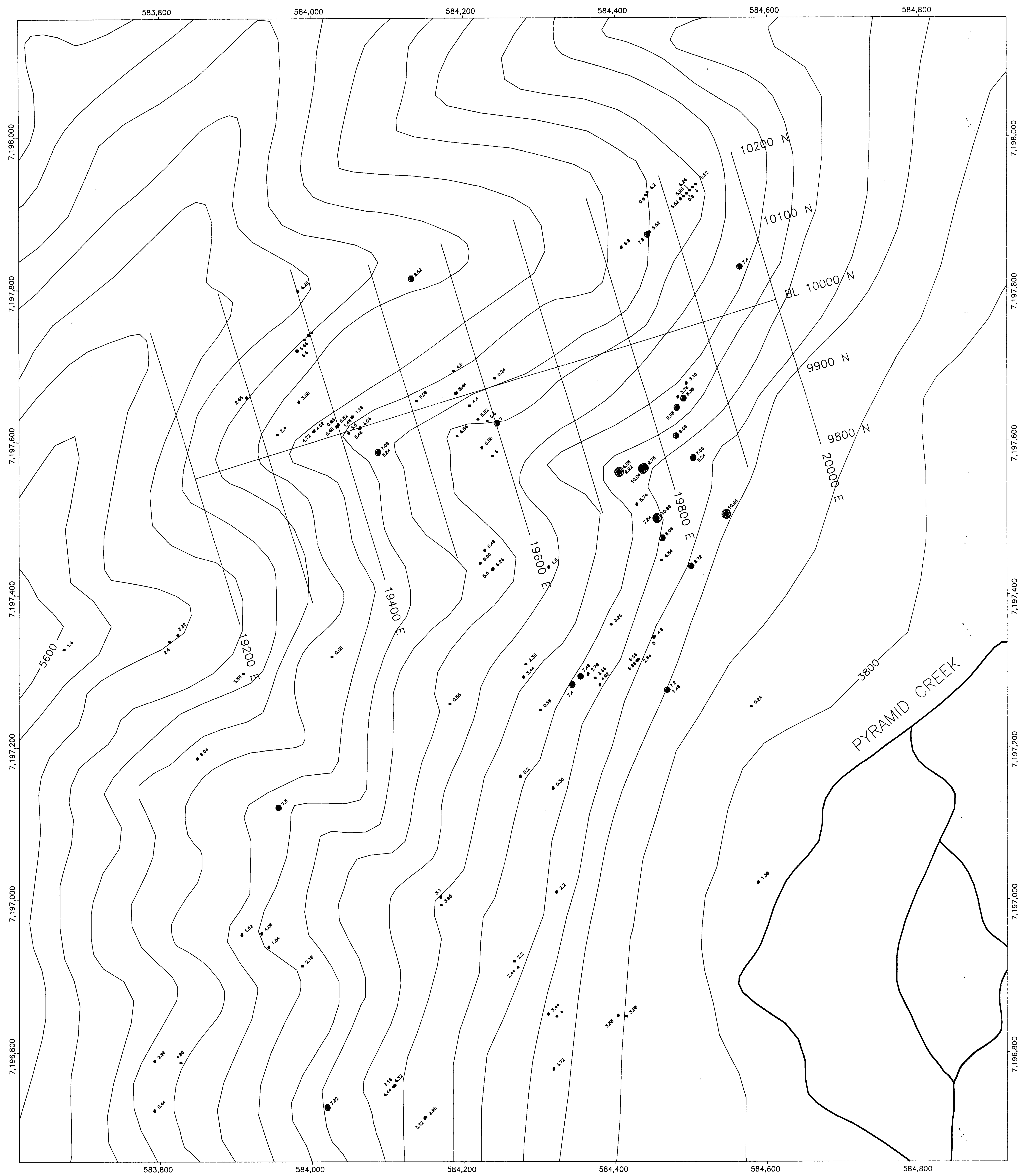
N

0 100 200 300
METRES

DWG 388

093103

PLACER DOME EXPLORATION LIMITED	
DRAWN GGS	OLYMPIC PROPERTY
DATE 93:05:14	DETAILED AREA – LITHOGEOCHEM
SCALE 1:2500	SYMBOL & VALUE PLOT – Fe_2O_3 (%)
FIGURE 35	NO.



LEGEND

- LESS THAN 7% K_2O
- 7 TO 9.5% K_2O
- GREATER THAN 9.5% K_2O

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:

DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: DET_ROCK_KSYM.RUN

	FIELD	FILE
POINTS:	K2O	ROCKSAMP_DET.OLY
POINTS:	K2O	ROCKSAMP_DET.OLY
		TOPO.DXF

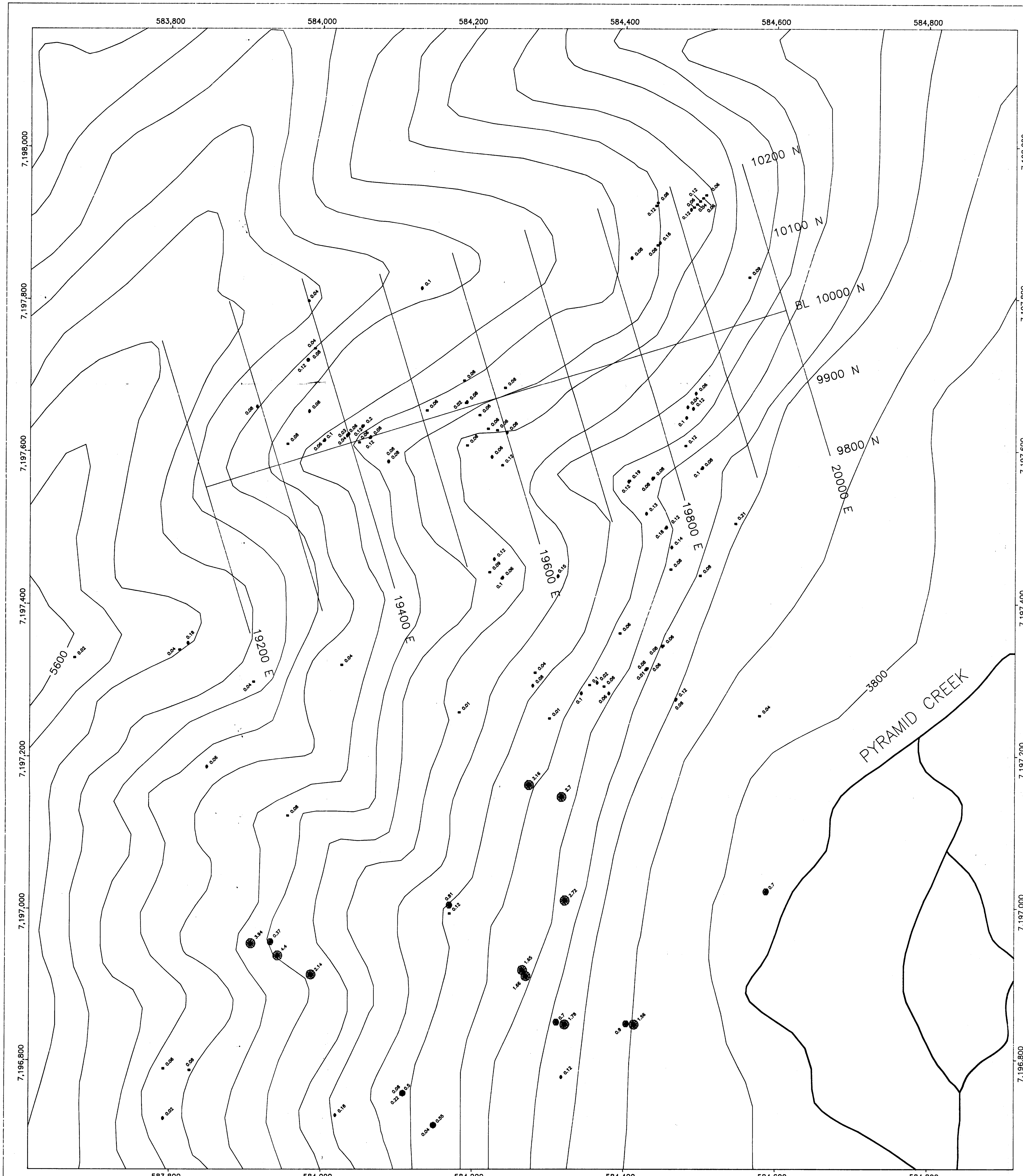
N

0 100 200 300
METRES

DWG 389

093103

PLACER DOME EXPLORATION LIMITED	
DRAWN GGS	OLYMPIC PROPERTY
DATE 93:05:14	DETAILED AREA – LITHOGEOCHEM
SCALE 1:2500	SYMBOL & VALUE PLOT – K_2O (%)
FIGURE 36	NO.



LEGEND

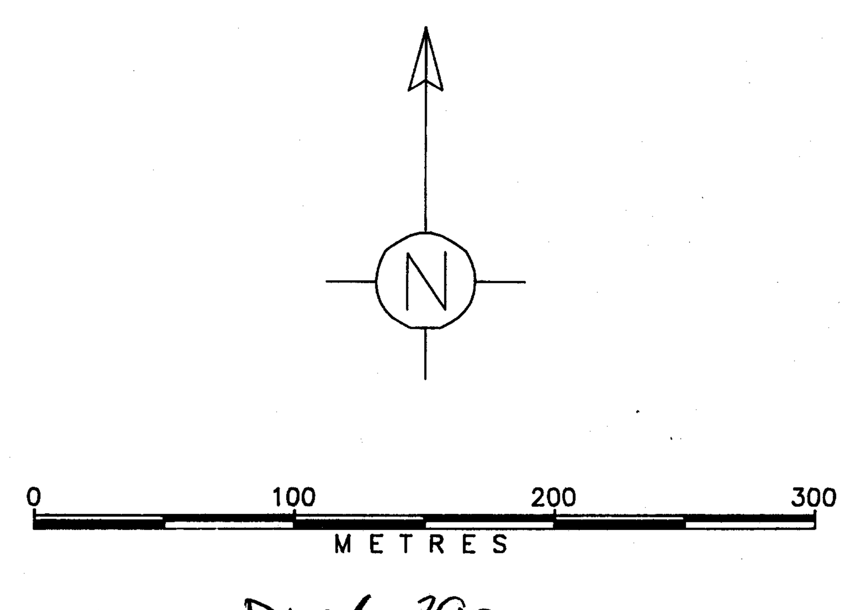
- LESS THAN 0.3% Na_2O
- 0.3 TO 1.0% Na_2O
- GREATER THAN 1.0% Na_2O

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:

DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: DET_ROCK_NASYM.RUN

	FIELD	FILE
POINTS:	NAO	ROCKSAMP_DET.OLY
POINTS:	NAO	ROCKSAMP_DET.OLY
		TOPO.DXF

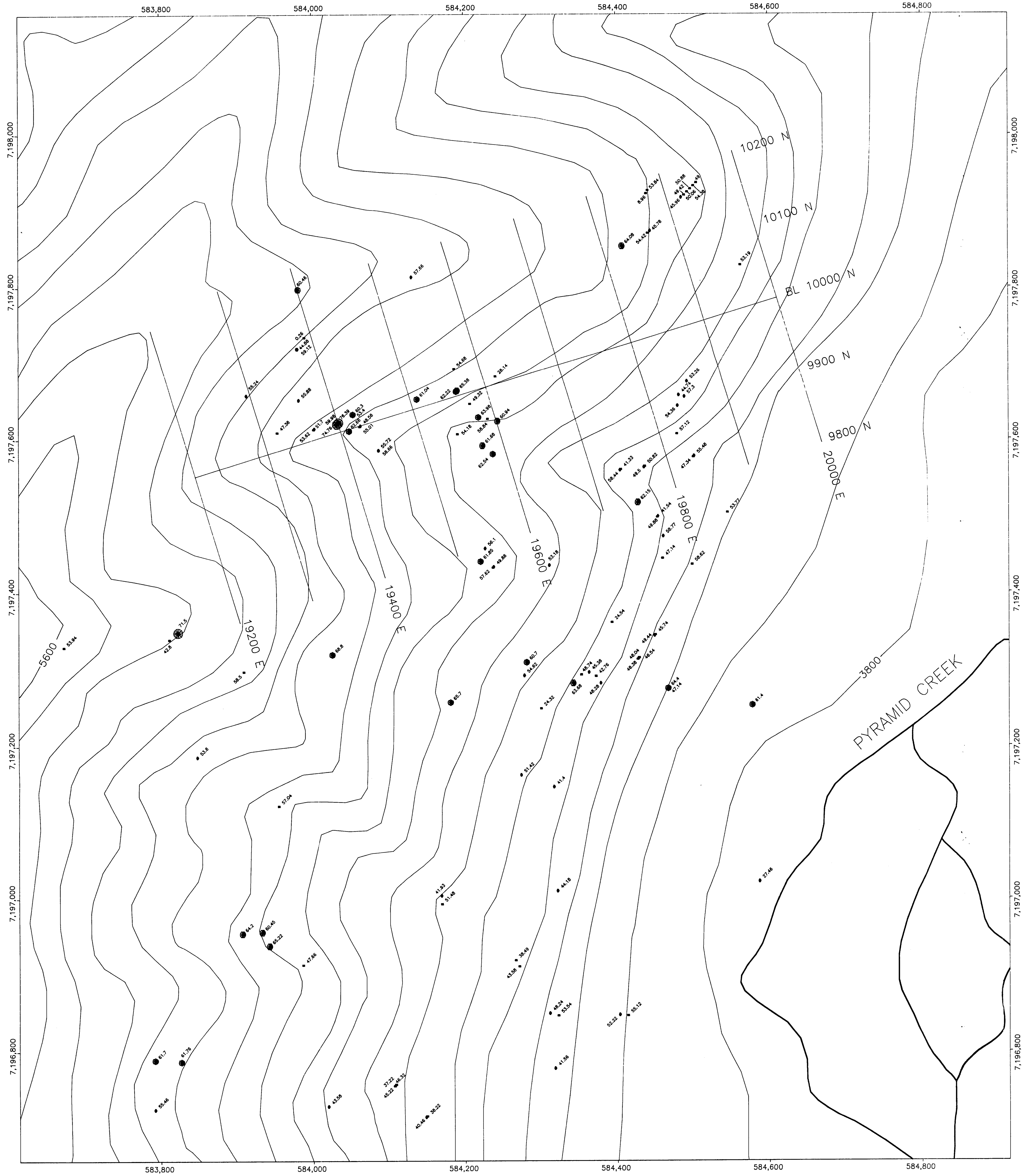


DWG 390

093103

PLACER DOME EXPLORATION LIMITED

DRAWN GGS	OLYMPIC PROPERTY
DATE 93:05:14	DETAILED AREA – LITHOGEOCHEM
SCALE 1:2500	SYMBOL & VALUE PLOT – Na_2O (%)
FIGURE 37	NO.



LEGEND

- LESS THAN 60% SiO_2
- 60 TO 69% SiO_2
- GREATER THAN 69% SiO_2

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:

DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: DET_ROCK_SISYM.RUN

	FIELD	FILE
POINTS:	SIO	ROCKSAMP_DET.OLY
POINTS:	SIO	ROCKSAMP_DET.OLY
		TOPO.DXF

N

0 100 200 300
METRES

DWG 391

093103

PLACER DOME EXPLORATION LIMITED

DRAWN GGS	OLYMPIC PROPERTY
DATE 93:05:14	DETAILED AREA – LITHOGEOCHEM
SCALE 1:2500	SYMBOL & VALUE PLOT – SiO_2 (%)
FIGURE 38	NO.

LEGEND

× SOIL SAMPLE LOCATION

B8901 SAMPLE NUMBER

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:

DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: SOIL_SAMP.RUN

	FIELD	FILE
× POINTS:	SAMP	SOILGRID.OLY

N

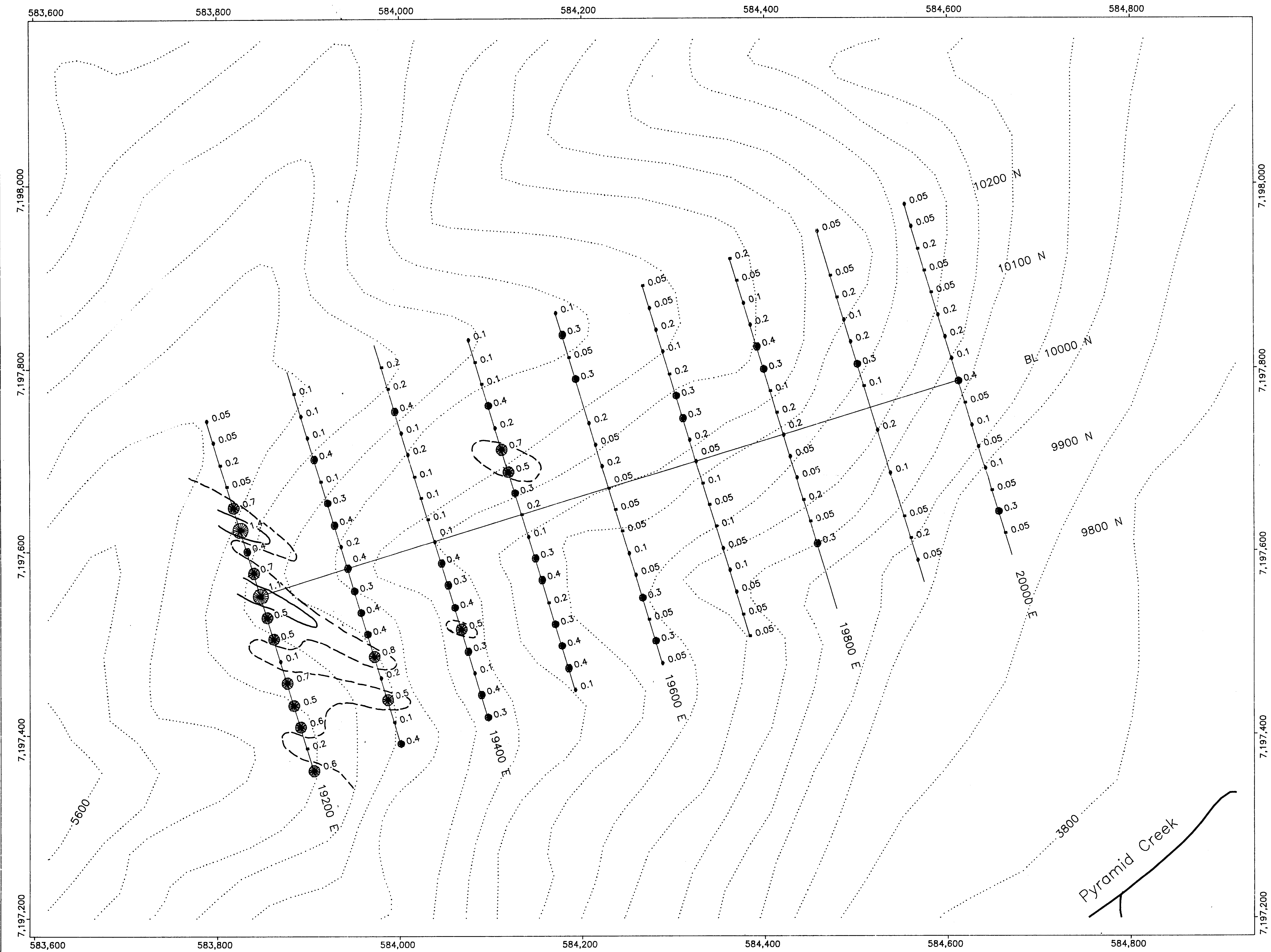
0 100 200 300
METRES

DWG 392

093103

PLACER DOME EXPLORATION LIMITED

DRAWN GGS	OLYMPIC PROPERTY
DATE 93:05:17	SOIL GRID
SCALE 1:2500	SAMPLE LOCATIONS
FIGURE 39	NO.



LEGEND

- LESS THAN 0.3 PPM SILVER
- 0.3 TO 0.49 PPM SILVER
- 0.5 TO 1.0 PPM SILVER
- GREATER THAN 1.0 PPM SILVER

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:

DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: SOIL_AG.RUN

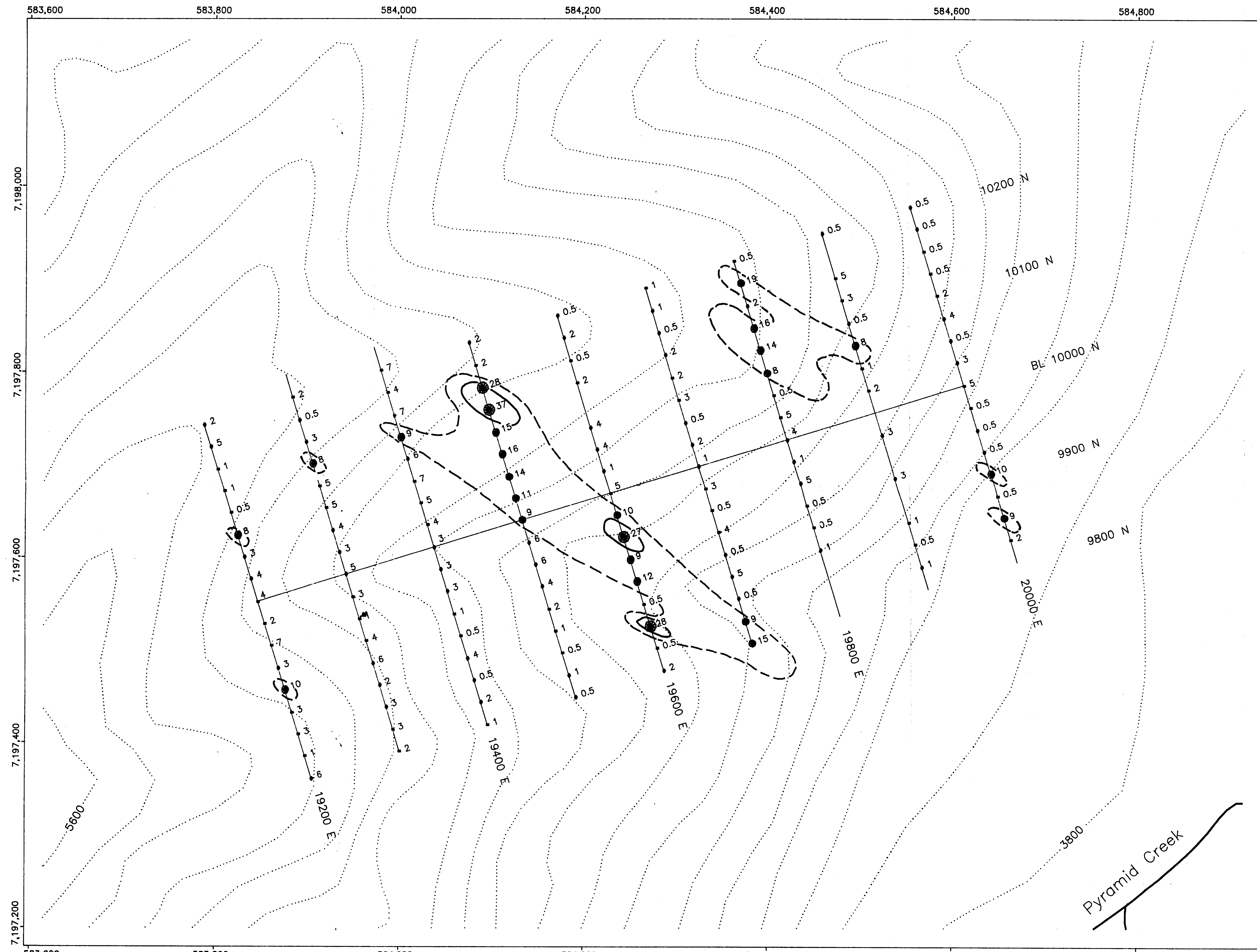
	FIELD	FILE
POINTS:	AG	SOILGRID.OLY
POINTS:	AG	SOILGRID.OLY

0 100 200 300
METRES

DWG 393

093103

PLACER DOME EXPLORATION LIMITED	
DRAWN GGS	OLYMPIC PROPERTY
DATE 93:05:17	SOIL GRID
SCALE 1:2500	SYMBOL & VALUE PLOT – AG (PPM)
FIGURE 40	NO.



LEGEND

- • LESS THAN 8 PPB GOLD
- ● 8 TO 20 PPB GOLD (dashed line)
- ✺ GREATER THAN 20 PPB GOLD (solid line)

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:

DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: SOIL_AU.RUN

	FIELD	FILE
POINTS:	AU	SOILGRID.OLY
POINTS:	AU	SOILGRID.OLY

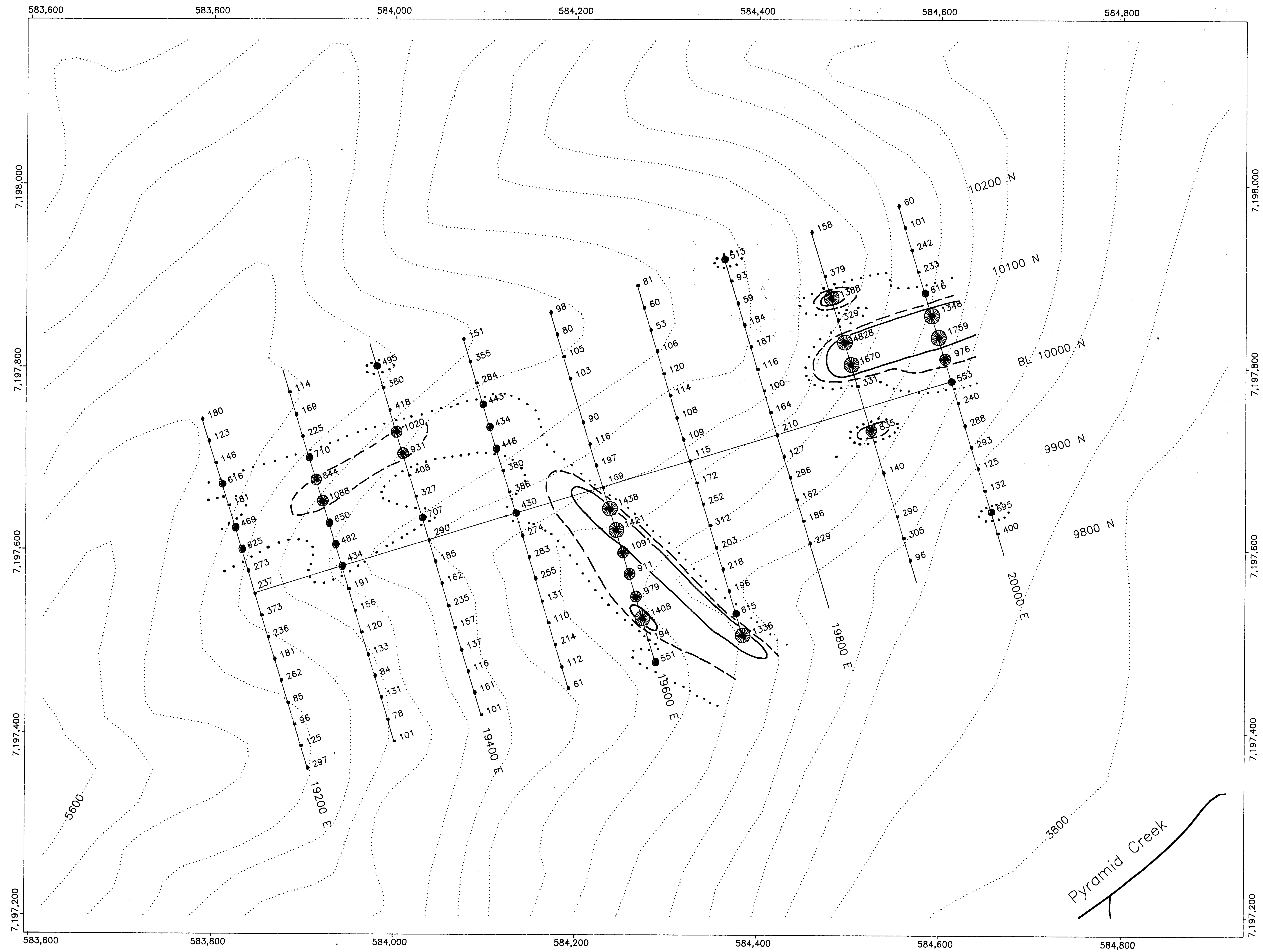
N

0 100 200 300
METRES

DWG 394

093103

PLACER DOME EXPLORATION LIMITED	
DRAWN GGS	OLYMPIC PROPERTY
DATE 93:05:17	SOIL GRID
SCALE 1:2500	SYMBOL & VALUE PLOT – AU (PPB)
FIGURE 41	NO.



LEGEND

- LESS THAN 430 PPM COPPER
- 430 TO 749 PPM COPPER
- 750 TO 1200 PPM COPPER
- GREATER THAN 1200 PPM COPPER

CONTOUR INTERVAL 100 FEET

DATA PLOTTED ON THIS MAP:
DIRECTORY: $EXPL/OLYMPIC/MAPS
RUN FILE: SOIL_CU.RUN

	FIELD	FILE
POINTS:	CU	SOILGRID.OLY
POINTS:	CU	SOILGRID.OLY

N

0 100 200 300
METRES

DWG 395

093103

PLACER DOME EXPLORATION LIMITED

DRAWN GGS	OLYMPIC PROPERTY
DATE 93:05:17	SOIL GRID
SCALE 1:2500	SYMBOL & VALUE PLOT – CU (PPM)
FIGURE 42	NO.