

REPORT ON
GEOLOGICAL & GEOCHEMICAL SURVEYS
by
J.M. Newell, P.Eng.
on the
AL GROUP
owned by Silver Standard Mines Ltd.
and the
QUASH CREEK CLAIMS
owned by Texasgulf Canada Ltd.
situated northwest of Kinaskan
Lake in the Liard Mining Division

57°45'N 130°20'W
NTS 104G/9W
104G/16W

May 1978

Vancouver, B.C.

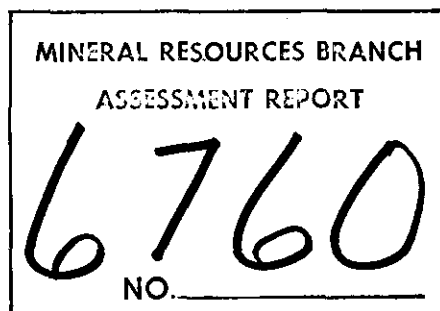


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INTRODUCTION

PURPOSE OF REPORT:

This report summarizes work completed by Texasgulf Inc. on the A1 Group of mineral claims owned by Silver Standard Mines Ltd. and the nearby Quash Creek mineral claims, once held by Texasgulf Canada Ltd., but allowed to lapse in November 1977. The claims cover areas containing copper mineralization in Triassic volcanic and sedimentary rocks intruded by dikes and small stocks of dioritic composition.

A programme of geological mapping and sampling for geochemical analysis and assay was completed during the period July 7 - August 9, 1977. The expenditures incurred are submitted for assessment work credit on the A1 Claims and, with respect to work on the Quash Creek claims, for credit to Texasgulf Canada Ltd.'s Portable Assessment Credit account.

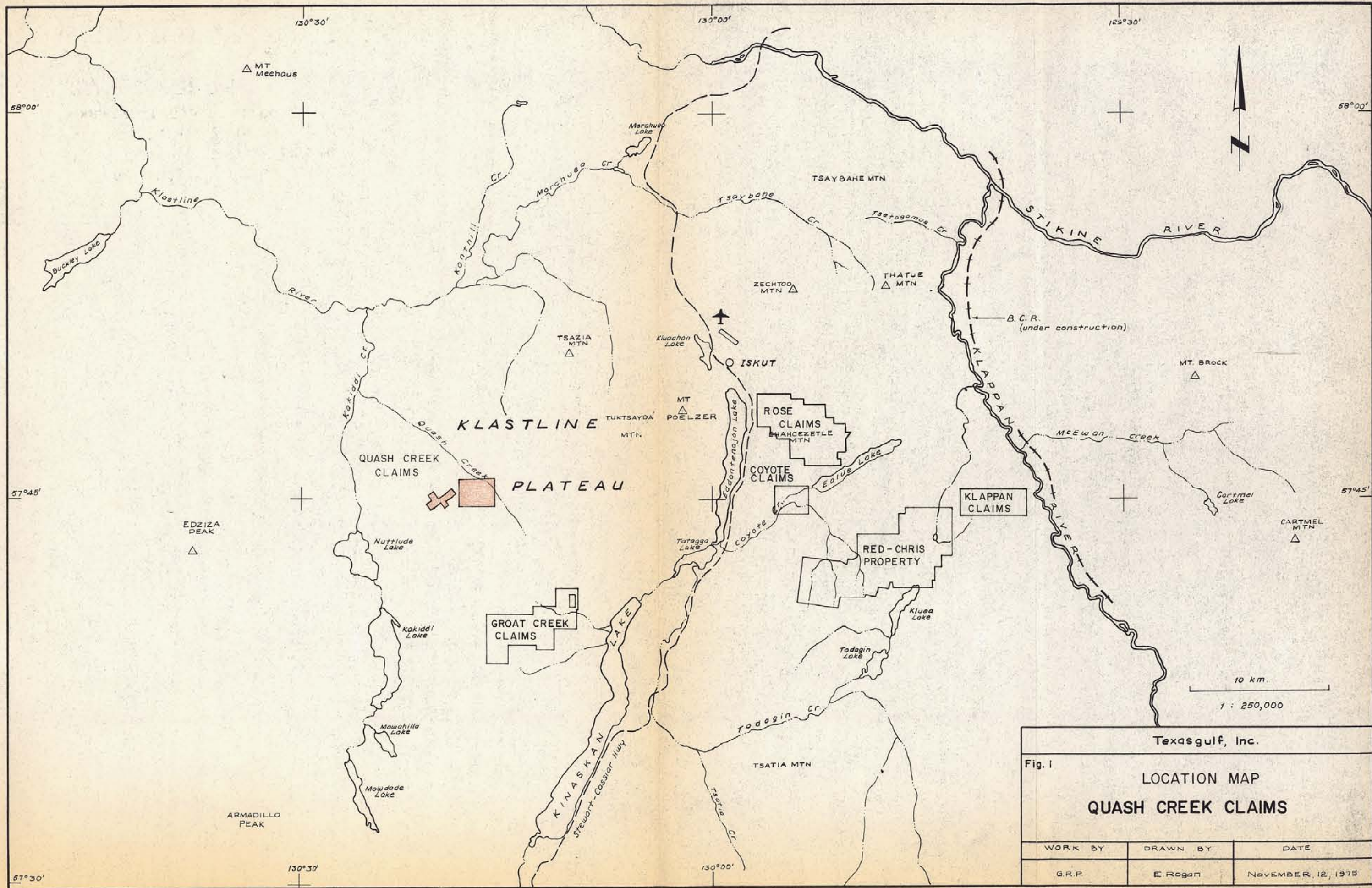
LOCATION & ACCESS:

The properties are located in the Liard Mining Division, British Columbia, some 20 km southwest of the village of Iskut (see Location Map). They lie on the southwest side of Quash Creek which flows northwest in a deeply incised valley. Topography is steep and locally precipitous. Mapping was confined to cliff tops and bottoms, and stream cuts.

Access to the property is by helicopter from the Cassiar-Stewart Highway, which passes 18 km east of the property.

HISTORY:

The Quash Creek copper occurrence was first located by P.O. Hachey, A.H. Groat and A. John, while prospecting for Conwest Exploration Co. Ltd. in 1964. Seventy two claims were subsequently staked and geochemical and geophysical surveys were completed in 1965. (Assessment Work Report #701).



Texasgulf, Inc.		
Fig. 1 LOCATION MAP QUASH CREEK CLAIMS		
WORK BY	DRAWN BY	DATE
G.R.P.	E. Rogan	NOVEMBER, 12, 1975

Little work was undertaken in the period 1966-68 and all but sixteen claims were allowed to lapse. A programme of remapping and further geophysical surveys was completed in 1969 (Assessment Report #2237) and the claims were optioned to Amoco Canada Petroleum Company Ltd. in 1970. A further programme of geological mapping was followed by completion of nine diamond drill holes totalling in excess of 1900 metres. Amoco subsequently relinquished their option and Conwest allowed the remaining claims to come open in 1975. Texasgulf Canada Ltd. staked the King Henry II and Eleanor of Aquitaine mineral claims, covering the Quash Creek showings, in November 1976.

Silver Standard Mines Ltd. staked the A1 property, covering copper occurrences in the headwaters of Henry Creek, during the period 1970-71. This ground had been part of the original Conwest property.

A location line survey completed by McElhanney Associates and data from a programme of geological mapping and sampling completed by Dr. R.H. Seraphim were subsequently filed for assessment work credit (Assessment Work Report #3239).

Texasgulf's work on the A1 Claims was undertaken at the invitation of Silver Standard Mines Ltd.

GEOLOGY

GENERAL STATEMENT:

The following geological data are taken directly from D.A. Donnelly's in-house report on his work on the A1 and Quash Creek claims. In addition, rough summary drill logs, in note form, compiled by C.H.B. Leitch and T.M. Elliott, geologists, from a re-logging of Amoco diamond drill core, are included as Appendix I. No credit is claimed for this latter work.

LITHOLOGY:

The property area, located just southwest of the so-called Quash Creek linear, is underlain by siltstones, and lavas, tuffs and volcanic breccias. These rocks have been intruded by dykes and irregular shaped bodies of porphyritic hornblende diorite or monzonite.

A generalized section from oldest to youngest, and from west to east, includes:

1. A sedimentary suite of black to brown siltstone, chert(?) and wacke.
2. tuffaceous siltstone, tuff, volcanic wacke, volcanic conglomerate and minor andesite,
3. grey-brown wacke, greywacke and siltstone,
4. green andesite, tuff, breccia and minor volcanic wacke, and
5. grey andesite and volcanoclastic rocks.

A total of six geologic units or distinct rock-types have been recognized in mapping (see Figure 2). These are described, in a generalized older to younger order, as follows:

Interbedded siltstone (Unit 1) - brown to black, very fine-grained siltstone and grey cherty beds. These rocks are bedded on a scale of 1-2 cm to 15-20 cm and crop out on the headwall of Henry Creek cirque. Where intruded by dykes of hornblende diorite they are pyritized and somewhat hornfelsed. Weathering in these places produces a bright red gossan.

Volcanic sedimentary rocks (Unit 2) - green tuffaceous siltstone, tuff and wacke with minor amounts of volcanic conglomerate and andesite(?). These rocks are bedded on a scale of metres and locally appear massive.

They crop out on the north and east wall of Henry Creek cirque and may belong in part of unit 3 and/or 4. Weak quartz-chalcopyrite stockwork occurs near the contact of a hornblende diorite dike on the headwall of Henry Creek cirque.

Volcanic wacke (Unit 3) - grey, brown and grey-brown fine to medium-grained wacke or greywacke with minor amounts of siltstone. These rocks crop out in the central portion of the mapped area. Where they are in close proximity to intrusive bodies they are pyritized and slightly hornfelsed. Rocks weather grey except where they are pyritized, in which case they produce a prominent red gossan.

Altered volcanics (Unit 4) - green andesite, tuff, volcanic breccia and minor amounts of volcanic wacke. These rocks are moderately to strongly altered and pyritized. The alteration is pervasive chlorite-epidote-pyrite with minor trace amounts of chalcopyrite. The rocks weather very bright red with small local areas of weak to strong malachite-azurite staining. All the above rocks are cut by dykes and irregular bodies of hornblende diorite.

Grey volcanics (Unit 5) - grey andesite (basalt?), volcanic conglomerate, breccia and minor amounts of maroon andesite. These rocks crop out in the east and southeast of the mapped area and are weakly altered to a chlorite-epidote-carbonate facies. No dykes of the intrusive are seen cutting these rocks and only trace amounts of pyrite were observed within this unit.

Hornblende diorite (Unit A) - porphyritic to equigranular medium-grained hornblende diorite with some phases of hornblende-biotite diorite. The rock consists of 20-25% subhedral to euhedral 1-4 mm crystals (locally 5-10% biotite books) set in a white to pinkish-white anhedral crystalline matrix of plagioclase (70%) and potash (?) feldspar (10%).

This unit occurs as dykes and irregular shaped bodies and appears to be the immediate source of the sulphide mineralization. The rock is weakly but pervasively altered, with chlorite and pyrite after the mafics and slight sericitization of the feldspars.

ALTERATION AND MINERALIZATION:

Alteration near the intrusive bodies is generally moderate to strong, pervasive and propylitic in character. It consists of chlorite-epidote-pyrite (-chalcopyrite) grading outwards to chlorite-carbonate-epidote. The general trend of the alteration zone is east-west, parallel to the trend of the intrusives. The more strongly altered and pyritized rock is well faulted and broken, resulting in large areas of deeply weathered and limonitic rock. This is apparent in the large iron-stained cliffs centered on the Quash Creek Claims. Hornfels zones 1-2 m wide commonly occur around the dykes and intrusive bodies.

Within the intrusive rocks the propylitic alteration is weak but pervasive. Total sulphide content in these rocks is generally low (1-3%) and mainly pyrite. Some local weak quartz-chalcopyrite stockworks were observed, however, the bulk of the mineralization is disseminations of pyrite ± chalcopyrite. Local areas of strong malachite and azurite (?) staining are apparent and are due to the weathering of the copper sulphides. On the surface these showings are impressive. Grab sampling of some of these areas proved disappointing, with results ranging from 0 to 0.19% sulphide copper.

Grading (?) outwards from the mineralized east-west trend, the alteration becomes weaker and is represented by a chlorite-carbonate ± epidote mineral assemblage. The rocks all contain pervasive chlorite and are veined by carbonate and epidote. Pyrite occurs only in trace amounts.

GEOCHEMISTRY

Geochemical sampling in the area was limited and confined mainly to the Quash Creek Claims. A total of 10 talus fines and 5 rock chip samples were taken and analyzed for copper, molybdenum and zinc with results given in parts per million total metal. Twenty-three grab samples from various locations were also taken and these were assayed for total and non-sulphide copper. The location and results for all sampling are shown on the geological map (Figure 2) and the data are recorded in Appendix II.

The observed copper mineralization in the altered volcanic and intrusive rocks probably accounts for the high values in the talus fines. This conclusion is supported by the geochemical values for the rock chips and the assay results for the grab samples, which give copper values of 530 to 2200 ppm and 0 to 0.19% sulphide copper respectively.

The relatively high molybdenum values, 22 to 130 ppm, in the talus fines are broadly similar to values obtained in similar work on other properties in this region, on which little or no molybdenite has been found.

CONCLUSIONS

1. The geological work completed on the Al and Quash Creek properties indicates they are underlain by mainly sedimentary rocks in the west and volcanic rocks in the east. These rocks are cut by east-west trending bodies of hornblende diorite.
2. An alteration and sulphide-bearing system is associated with the diorite. Alteration, generally propylitic in character is pervasive and moderate to strong in intensity. Weak quartz-chalcopyrite stock-work zones are locally developed.

3. Observed copper grades, both in outcrop and in Amoco diamond drill core are sub-economic. Though the mineralized zones exposed in the Quash Creek area may represent the top of a buried porphyry copper system, further exploration is considered unattractive at the present time.

A handwritten signature in black ink, appearing to read 'J.M. Newell', written in a cursive style.

J.M. Newell, P.Eng.

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- Dodds, A.R. and Watson, R.D. 1965 - Report on an Induced Polarization and Magnetometer Survey QC Claim Group, Kinaskan Lake, British Columbia. Assessment Report No. 701.
- Grant, G.W. and Horsely, T. 1969 - Report on Geological, Geochemical and Magnetic Surveys Performed July 30 to September 6, 1969. QC Claims. Assessment Report No. 2237.
- Seraphim, R.H. 1971 - Geological Report on the A1 Claim Group, Quash Creek, Liard M.D. Assessment Report No. 3239.

APPENDIX I

NOTES ON RE-LOGGING AMOCO CORE

by

C.H.B. Leitch

T.M. Elliott

ROUGH DRILL LOGS

DDH 70-2 (535')

Start to 235' = f. gr. (1 1/2 m.m.) hbde-plag. diorite porphyry cut by pyritic fract. and epid. fract.; rare gypsum fract. Mineralized weakly from 200'. 5% dissem. pyrite. Alteration varies from propylitic to phyllic.

235-265' - xeno. of aphanitic volcs. or f. gr. seds (grey)

265-468' - m. gr. hbde-plag. diorite porphyry; mineralized with qtz. and carb. veins. Locally heavy sulphides incl. cpy. Propylitic to phyllic altn. - the latter expressed as bleaching where mafics are destroyed.

468-535' - seds. or aph. volcs; no mineralization.

DDH 70-3 (595')

102-320' = f. gr. propy-phyl. altd. hbde-plag diorite

Some qtz. veining. Local very weak stockwork (Qtz)

Pyrite - 2-3% dissem. and fract. filling. Epid. on fract.

320-340' = aph. volcas. or silic. seds.

340-354' - diorite porphyry as before.

354-385' = light gray and dark volcs. 2-3% dissem. py. Local 3-4 cm long epid. clots.

385-approx. 450'? = altered f. gr. diorite porphyry.

ca. 450-595' = altered vols. Abund. py on fractr. but no copper.

DDH 70-4 (1143')

106 - ca. 200' - unmineralized seds and volcs.

ca. 200-1143' - mineralized (est. 0.1-0.2% Cu) seds., volcs. and minor diorite porphyry dykes. Mineralization includes disseminations, fracture controlled py-cpy and cpy in veins. A common mineral assemblage in this hole is epidote-pyrite-orange feldspar-quartz-chalcopryite. Probably propylitic zone altn. or propylitic-phyllic boundary. From 800-900' mineralization is the strongest. Possibly 0.3% Cu characterized by a quartz-carbonate-pyrite-hematite-chalcopryite assemblage. From 900-1000' mineralization is weaker, but the above assemblage is still present. By the end of the hole there is still dissem. and fract. py and some fract. cpy. Still some qtz. and carb. veins.

DDH 70-5 (1000')

12-58' = mixed hornfels and diorite porphyry. Minor cpy

58-133' = highly fract. mixed rocks. ?fault? No cpy

133-200' = very low grade mixed rocks (est. < 0.1% ?Cu)

200-400' = mixed rocks including abundant diorite porphyry with weak cpy. Est. 0.1-0.2% Cu.
400-500' = weaker mineralization
500-650' = strong chlorite alteration. Chlorite has been evident since 200'.
650-725' = good cpy as dissem. fract-fillings, and in qtz. veins (est. 0.4% Cu). Alteration is qtz-sericite-pyrite. Local MoS_2 in qtz. veins with py-cpy. Appears as if phyllic zone is "poking through" strong propylitic zone.
725-1000' = strong chloritic alteration with an estimated 0.2-0.3% Cu on fract. and in veins. This hole contains more intrusive (diorite porphyry) than the last hole. Could possibly be closer to a stronger mineralized system.

DDH 70-7 (600')

22-75' = aphanitic green volcs. cut by fract. bearing pyrite and cpy (max. est. 0.1% Cu)
75-85'? = dyke of f. gr. diorite porphyry containing 5% dissem. py.
85-245' = green aph. volcs. Occasional fract. with py-cpy. Some qtz. and carb. veins (very weak stwk.) Some f. gr. diorite porphyry dykes.
245-397' = f. gr. diorite porphyry containing 1-2% dissem. py. Occasional qtz., carb. and py veins.
397-600' = gray and green volcs. cut by dykes of f. gr. diorite porphyry. Copper as cpy only very weak along occasional fract. Not a good hole mineralization or alteration wise. Pyrite content of hole only 1-2%.

DDH 70-8 (788')

Start-196' = weakly altered (propylitic) and very weakly mineralized m. gr. biotite-hbde diorite porphyry containing minor dissem. pyrite. Occasional fract. - controlled and dissem. cpy. Biotite approx 2%, hbde = 10%.
196-225' = gray and greenish gray aph. volcs. (acid to intermediate in composition). Local fract. containing weak py-cpy.
225-346' = f. gr. diorite containing 2% dissem. py. Fract.-controlled py and cpy (which is locally "splashy") begins at 300'. Occasional qtz. veins bear cpy.
346-575' = mixed grey to greenish gray volcs. and f. gr. diorite containing 1-2% dissem. py. Some py. on fract. Occas. cpy. Vein of py-sphalerite at 513'.
575-778' = f. gr. diorite porphyry containing 1% dissem. py. Some py. on fract. Occas. qtz-veins. Only minor cpy. Not an impressive hole for alteration and mineralization.

DDH 70-9 (1001')

9-95' = propylitically altd. m.gr. hbde diorite porphyry-no biotite. Rock contains 3% dissem py. Minor cpy. Epid. on occas. fract.
95-105' = contact zone of mixed intr. and volcs.
105-177' = f. gr. diorite cut by abund. pyritic fract.
177-194' = gray to greenish gray volcs.
194-322' = f. gr. diorite cut by abund. (mod. py. stwk) fractures. Epidote also commonly associated with py. fract. Only very weak fract.-controlled and dissem. cpy (est. 0.1% ?Cu). MoS₂ on a fract. at 270'.
322-361' = aph. gray to greenish-gray volcs. Py-epidi. on fract.
361-465' = f. gr. diorite. Abundant py. on fract. Py as dissem=3%. Occasional epid. fract. to 390', then abund. epid.-py on fract.
465-516' = greenish gray aph. volcs. Abund. py on fract.
516-1001' = 60-70% of rock is propylitically alt'd f. gr. diorite with py. on fract. Rock contains only 1% dissem. py. The other 30-40% of the rock is aph. greenish gray volcs. having abund. py and epid. and lesser amounts of carb. on fract. From 940' to the end of the hole cpy increase on fract. and as local dissem. to a possible grade of 0.1-0.2% Cu.

C.H.B. Leitch

T.M. Elliott

APPENDIX II
GEOCHEMICAL AND ASSAY DATA

ASSAYS OF GRAB SAMPLES

<u>SAMPLE NO.</u>	<u>TOTAL CU</u>	<u>NON-SULPHIDE CU</u>	<u>SULPHIDE CU</u>	<u>DESCRIPTION</u>
10651	0.64	0.56	0.08	Cu stained intrusive
10652	0.46	0.27	0.19	Cu stained tuffaceous sedimentary rocks
10653	0.21	0.08	0.13	Weak Cu stain tuffaceous sedimentary rocks
10654	0.08	-.07	0.01	Weakly limonitic, weakly altered Hb-diorite
10655	0.33	0.33	0.00	Cu Stained Hb-diorite
10656	0.04	0.02	0.02	Limonitic altered tuffaceous sedimentary roc
10657	0.01	0.01	0.00	Weak limonite stained Hb-diorite
10658	0.14	0.10	0.04	Limonite stained sedimentary rocks
10659	0.22	0.14	0.08	Weakly altered Hb-Fp diorite
10660	0.36	0.17	0.19	Weakly altered Hb-Bi diorite, rare qtz veins
10661	0.04	0.02	0.02	Weakly altered Hb-Bi diorite
10662	0.03	0.02	0.01	Weakly altered Hb-Fp diorite
10663	0.17	0.02	0.10	Siliceous altered Hb diorite
10664	0.03	0.02	0.01	Limonitic stained Hb porphyry
10665	0.11	0.07	0.04	Green fine-grained siliceous sediments
10666	0.09	0.05	0.04	Green fine-grained siliceous volcaniclastic
10667	0.06	0.02	0.04	Green fine-grained pyritic tuff(?)
10668	0.04	0.01	0.03	Limonitic fine-grained siliceous tuff
10669	0.03	0.01	0.02	Limonitic fine-grained siliceous tuff
10670	0.09	0.02	0.07	Limonitic Hb-Fp diorite
10671	0.09	0.02	0.07	Limonitic Hb-Fp diorite
10672	0.02	0.01	0.01	Fine-grained Hb-Fp porphyry
10673	0.03	0.01	0.02	Fine-grained siliceous andesite(?)

NOTE: Sulphide Cu = Total Cu - Non-sulphide Cu

APPENDIX III
STATEMENT OF EXPENDITURES.

STATEMENT OF EXPENDITURES
AL GROUP (SILVER STANDARD MINES LTD.)

&

QUASH CREEK CLAIMS (TEXASGULF CANADA LTD.)

<u>SALARIES & FRINGE BENEFITS</u>	<u>AL GROUP</u>	<u>QUASH CREEK</u>
D.A. Donnelly: B.Sc. Geologist 13 days in period July 7-Aug 9, 1977 @ \$50/day	250.00	400.00
G. Dix: Field Assistant 13 days in period July 7-Aug 9, 1977 @ \$42.50/day	212.50	340.00
<u>ROOM & BOARD</u>		
26 man-days @ \$25.00	250.00	400.00
<u>ANALYSIS & ASSAY</u>		
5 rock chip samples @ \$3.75	3.75	15.00
10 talus fines samples @ \$2.85		28.50
23 assays @ \$11.50		264.50
<u>HELICOPTER SUPPORT</u>		
Texasgulf Bell 206-B helicopter 3.6 hours @ \$300	415.40	664.60
<u>MISCELLANEOUS</u>		
Travel (pro rated)	45.00	72.00
Report writing, drafting etc.	150.00	250.00
TOTALS	<u>\$1,326.65</u>	<u>\$2,434.60</u>

APPENDIX IV
STATEMENT OF QUALIFICATIONS

STATEMENT OF QUALIFICATIONS

D.A. Donnelly: Geologist

D.A. Donnelly obtained his B.Sc. degree in Geology from the University of British Columbia in 1976. While attending university he was employed in exploration during the summer field seasons by Texasgulf Inc. He was continually employed by Texasgulf from graduation until November 1977 when he joined Shell Oil Ltd. in Calgary.

His geological experience has been largely in porphyry copper exploration in British Columbia, and to a limited extent, in the Republic of Panama.

G. Dix: Field Assistant

G. Dix was employed by Texasgulf Inc. as a senior geological assistant in the summer of 1977. At that time he had completed three years of study towards his B.Sc. degree from Queens University. He has had previous experience with Texasgulf in Quebec and with the Ontario Ministry of Natural Resources.

Mr. Dix is a keen, competent and conscientious employee, well qualified for the work to which he was assigned.



J.M. Newell, P.Eng.



LEGEND

- Upper Triassic
- 5 Grey Volcanics: grey andesite (basalt?), volcanic conglomerate, breccia and minor maroon andesite.
 - 4 Altered Volcanics: green andesite, tuff, volcanic breccia and minor volcanic wacke.
 - 3 Volcanic Wacke: grey to brown, fine to medium grain wacke, greywacke and minor siltstone.
 - 2 Volcanic Sediments: green tuffaceous siltstone, tuff, wacke, minor conglomerate and andesite(?).
 - 1 Interbedded siltstone and cherty sediments.
- Intrusive
- A Porphyritic hornblende-feldspar to hornblende-biotite diorite.

SYMBOLS

- attitude of bedding (upright, overturned)
- attitude of fault
- outcrop area
- geological contact (known, assumed)
- alteration boundary
- mineralized zone, $\geq 0.15\%$ Cu (indicated by AMOCO drilling)
- Rock Chip Sample (ppm Cu/Zn/Mo)
- Talus Fine Sample (ppm Cu/Zn/Mo)
- Grab Sample (1% total Cu, % non-sulphide Cu)
- AMOCO Diamond Drill Hole (dip, total depth)



MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
6760
NO.

To Accompany
REPORT ON GEOLOGICAL & GEOCHEMICAL SURVEYS
AL GROUP
and
QUASH CREEK CLAIMS
by
Kinaskan Lake - Liard Mining Division
J.M. Nowell, P.Eng.

Texasgulf Inc.

**QUASH CREEK CLAIMS
GEOLOGY
a
SAMPLING DATA**

WORK BY	DRAWN BY	DATE	DRWG NO.
D. A. D.	A. T. A.	Jan. 1978	

Scale in Metres
100 50 0 100 200 300 400