TG216-78

Box 10

GEOLOGICAL AND GEOCHEMICAL SURVEYS

and

REPORT ON

TOPOGRAPHIC MAPPING

by

G.R. Peatfield - P.Eng. J.M. Newell - P.Eng. P.J.S. Boyle - B.Sc.

on the

BOYA NO. 1 TO 4 MINERAL CLAIMS Situated west of Graveyard Lake in the Liard Mining Division 59°15'N 127°30'W N.T.S. 94M/3W, 4E, 5E, 6W

> owned by TEXASGULF CANADA LTD. work by TEXASGULF, INC.

June 1978

Vancouver, B.C.



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### INTRODUCTION

### Location, Access, and Terrain.

The BOYA property is located in northeastern British Columbia, approximately ten kilometres northeast of the confluence of the Kechika and Turnagain Rivers (see Figures 1 and 2). The claims cover a small hill, with about 300 metres relief, rising above the broad Kechika River Valley. This area forms the southernmost extension of the Liard Plain. Access is at present by helicopter from various points on the Alaska Highway, to the north and east.

### Property History and Definition

The BOYA claims were located in June, 1977. Work on the property has been completed by Texasgulf, Inc., on behalf of its wholly owned subsidiary, Texasgulf Canada Ltd., the registered owner of the claims. The property consists of four MGS claims totalling 60 units (see Figure 3). The property is at present a raw tungsten prospect on which further work is contemplated.

### Summary of Work Completed

Geological investigations

During the period May 15 to June 4, brief geological evaluations of the claims were undertaken by G.R. Peatfield, P.J.S. Boyle, and H.R. Schmitt. General geological relationships were studied, a crude stratigraphic section was measured, and several rock samples were collected for assay. These samples were mostly grabs intended as character samples, but two were continuous chip samples across portions of a single outcrop, and two others were samples of specific lithologic units within the above continuous sample intervals.







### Geochemical surveys

Concurrent with the above work, a total of 110 soil samples were collected on contour and down-slope traverses, in an attempt to gain some indication of the distribution of mineralization.

- 5 -

#### Topographic mapping

Following the first phase of the above work, it became apparent that further more tightly controlled work would be necessary, and McElhanney Surveying and Engineering Ltd. were commissioned to prepare a topographic map, at a scale of 1:5,000, to cover the entire property. This map was not available for the surveys described in this report, but will be used for further work planned later this season.

Work Distribution

The geological and geochemical surveys were carried out on portions of the BOYA 1 and BOYA 3 mineral claims.

GEOLOGY

**Regional Setting** 

The BOYA property lies within a broad area mapped by Gabrielse (1962) as sedimentary rocks of his Units 1, 4a, 4b, and 4c, as follows:

CAMBRIAN AND ORDOVICIAN (mainly)

4a, thin-bedded, grey and buff, argillaceous and silty limestone and calcareous phyllite; limestone; intruded by greenstone sills and dykes; includes minor (?) dark grey graptolitic siltstone and shale of early Silurian age along Turnagain River; 4b, black and grey slate, siltstone, sandstone, chert, limestone, calcareous phyllite; may locally include 4a; 4c, undivided 4a, 4b, and 1

#### CAMBRIAN AND OLDER

Impure grey and green quartzite, siltstone, sandstone, and argillite; calcareous sandstone; brown and black, laminated siltstone; quartz-pebble conglomerate; red and green slate and shale; limestone-cobble and boulder conglomerate; grit, greywacke; intruded by sills and dykes of gabbro and/or diorite. This area is presently considered by Templeman-Kluit (1977) to form the southern extension of the Selwyn Basin.

- 6 -

Outcrop density is low and access is particularly difficult within this region, and it is likely that the true geologic picture is somewhat more complicated than that shown on published maps. No reports of granitic rocks in the general region of the BOYA claims have been published to date.

### Local Geology

The local geology in the central and southern portions of the property is much more complex than would be suspected from published information. The east side of the hill is underlain by a westward dipping succession of limestone, limey shale, and pelitic and arenaceous sedimentary rocks. On a local scale, in the interbedded shale and limestone strata, these rocks show the effects of small-scale isoclinal folding. On the southern claim (BOYA 3) the succession contains an appreciable amount of coarser arenaceous sedimentary rocks, or 'grits'.

On the BOYA 1 claim, the sedimentary succession has been intruded by a small porphyritic quartz monzonite or granodiorite pluton. The top of this mass is interpreted as being approximately half way up the hill, and numerous dykes extend upward through the sequence, almost to the top of the hill. This rock could, at least in some places, be termed a biotitequartz porphyry. One specimen of fairly fresh rock contains 20-30% of rounded quartz phenocrysts up to 5 mm in diameter, 5% shiny black biotite crystals up to 3 mm, and abundant 1 mm feldspar phenocrysts. The fine groundmass material has abundant potassium feldspar, as evidenced by strong yellow staining with sodium cobaltinitrate. A specimen from a dyke has 5-10% of rounded quartz phenocrysts up to 5 mm, and 15-20% equant, unstained feldspar phenocrysts, set in a fine-grained potassic matrix. In thin section, the biotite-quartz porphyry shows subhedral to rounded, locally embayed quartz grains with complex extinction patterns, and abundant plagioclase grains of medium basicity, showing complex oscillatory zoning. The feldspars are very fresh except near quartz veinlets, where they show sericitic alteration. Biotite is also unaltered except near quartz veinlets. The groundmass is composed of a granular quartz-feldspar aggregate except near quartz veinlets where there is abundant sericite.

- 7 -

A thin section of the quartz porphyry dyke rock shows subhedral to rounded quartz grains and highly altered, serificized feldspar phenocrysts with only very rare polysynthetic twinning. Mafic minerals, probably biotite, have been completely altered to magnetite and chlorite(?). Apatite is common, in tiny stubby prisms.

The pluton has hornfelsed and locally skarnified the sedimentary strata, and the entire rock mass is cut by a parallel set of quartz and quartz-carbonate veins. These veins are most abundant within the pluton, locally representing almost half of the rock volume, but they are also common in the hornfels and skarn units, and extend upward at least as far as the dykes. The trend of the dykes is not necessarily parallel to the veins.

The general geology of the property is shown on Figure 4, and two schematic cross-sections are presented on Figure 5.

### Alteration and Mineralization

Two basic types of alteration and mineralization are presently known on the BOYA property. These are stratigraphically controlled skarnification, and intense quartz veining within and adjacent to granitic rocks.



Skarn

Apparently restricted to a particular stratigraphic position, immediately above a thin unit of interbedded shale and limestone, are several occurrences of disseminated to semi-massive pyrrhotite mineralization. The sulphides, comprising pyrrhotite and lesser chalcopyrite, are contained in very small (maximum 20 cm by 2 m) pods, in a generally skarnified country rock. One thin section of this disseminated sulphide material shows pyrrhotite in a granular skarn composed largely of clinopyroxene (hedenbergite?) and plagioclase with lesser amounts of quartz and calcite. This particular skarn contains small amounts of very fine grained disseminated scheelite, and a representative sample assays 0.11% Cu and 0.15%  $WO_3$ . Similar skarns have some garnet developed, and also contain disseminated pyrrhotite, chalcopyrite and scheelite.

Other, typically very fine grained "porcelainite" type skarns are common on the property; these have very low sulphide content and are apparently not tungsten bearing. One thin section of such a skarn shows a finely banded rock with coarser bands made up of a granular aggregate of quartz, feldspar(?) and probably clinopyroxene (hedenbergite?), and finer bands of quartz, carbonate and probably some carbonaceous material. Very narrow cross-cutting veinlets of carbonate are common.

### Quartz-vein swarms

The granitic intrusive and immediately surrounding rocks are, as described above, cut by swarms of parallel quartz and quartz-carbonate veins varying from 5 mm to locally 20 cm in thickness. The quartz is milky white, and only locally shows megascopic crystal forms. Where these veins cut the mineralized skarns, they contain sparse chalcopyrite, sphalerite and rarely galena mineralization, with some disseminated fine grained scheelite. Small amounts of scheelite also occur in some quartz veins with essentially no sulphide content.

- 9 -

The quartz vein swarms are much stronger within the intrusive rocks. Here, in the more intense portions of the swarms, the veins have sideritic cores, and contain small amounts of very fine grained disseminated scheelite and powellite, and sparse extremely fine grained molybdenite. Locally, there are instances of cross-cutting relationships where narrow quartz veinlets with scheelite have been cut by later quartz veins which are apparently barren. A thin section of intensely veined intrusive rock shows that the country rock is similar to the biotite-quartz porphyry described above, but the groundmass is coarser, probably recrystallized, the feldspar phenocrysts are very strongly altered, and sericite is coarser grained and more abundant. Biotite has been completely destroyed.

### Assay Results

The assay results for several character and continuous chip samples are shown on Figure 6 and 7, and sample descriptions are included together with results in Appendix A.

### Assessment of Potential

The property covers a previously unknown occurrence of tungsten and molybdenum mineralization, in presumed lower Paleozoic miogeoclinal sedimentary rocks intruded by a quartz-rich pluton. It is much too early to speculate on the economic potential, but further work is obviously necessary.

#### GEOCHEMISTRY

Details of Survey

In the course of this survey, a total of 110 soil samples were collected for analysis; locations are shown on Figure 8a. The material sampled was B horizon soil at depths between 3 and 25 cm, although locally considerable talus fines material was included. The minus 80-mesh fraction



Table of Assays

No.	Cu%	Zn %	MoS2%	w03%
2755	0.11	0.03	<b>n.a</b> ,	0.15
2756	0.04	<b>Ø. 0</b> 1	n.a.	0.01
2757	n.a.	n.a.	0.003	0.01
2758	n.a.	<b>B.O</b>	0.002	0.01
2759	n. a.	n.a.	0.001	0.01
2760	n.a.	n.d.	0.002	<b>(0.0)</b>
2761	<b>n.</b> a.	n.a.	0.002	0.02

n.a. = not analyzed





Table of Assays

No.	Mos2%	total Mo%	wo <sub>3</sub> %	Sn%	
2751	0.003	0.009	0.05	<0.001	
2751 (re-analyze)			0.04		
2752	0.003	0.009	0.44	<b>&lt;</b> 0.001	
2752 (re-analyze)			0.43		
2753	0.005	0.011	0.03	<0.001	
2754	0.003	0.008	0.01	<b>(</b> 0.001	
2762	n. a.	n.a.	0.11	n.a.	

- n.a. = not analyzed
- note: for location of outcrop, see Figure 6

	Texa	sgulf Ind	5.
Fig. 7			
	BOYA	CLAII	NS S
	ASS	AY DETAIL	
WORK BY	DRAWN BY	DATE	DRW,G NO.
G.R. P.	E.R.	21 - 6 - '78	
0.5	0 0.	5 1.0	1.5 2.0
	Scal	e in Metres	- Handreich an Andreich an An Andreich an A

was analyzed, by Bondar-Clegg and Co. Ltd. in North Vancouver, for total W, Mo, Cu and Zn. Details of extractions and analytical techniques are given together with all results on the report sheets included as Appendix B.

### Results

The geochemical results are shown on Figures 8b through 8e. A coherent, coincident and intense anomaly in all four metals occurs in the area of the quartz-veined and mineralized intrusive body, with its surrounding skarns, on the BOYA 1 claim. A much less intense, but still well-defined and coincident anomaly pattern is shown in the area of a single intrusive outcrop on the BOYA 3 claim, and may represent a buried system similar to that exposed to the northeast. Much more weakly anomalous samples from southwest of the second anomaly centre cannot be interpreted at this time.

G. R. Geatle

G.R. Peatfield, P.Eng.

J.M. Newell, P.Eng.

per G.R.P.

P.J.S. Boyle, B.Sc.

### BIBLIOGRAPHY

- GABRIELSE, H. 1962. Rabbit River, British Columbia, Sheet 94M. Geological Survey of Canada, Map 46-1962.
- TEMPELMAN-KLUIT, D.J. 1977. Stratigraphic and structural relations between the Selwyn Basin, Pelly-Cassiar Platform, and Yukon Crystalline Terrane in the Pelly Mountains, Yukon. Report of Activities, Part A; Geological Survey of Canada, Paper 77-1A, pp. 223-227.

# APPENDIX A

# Assay Certificates and Descriptions

of Samples Assayed

To: Texas	gulf,	Inc	6	
PAGE No.			1	

# BONDAR-CLEGG & COMPANY LTD.

A28 = 192 REPORT No 25 DATE:\_ May

701 - 1281 West Georgia Street Vancouver, B.C. V6E 3J7

## CERTIFICATE OF ASSAY

Samples submitted: May 23, 1978 Results completed: May 25, 1978

PROJECT: 53

I hereby certify that the following are the results of assays made by us upon the herein described \_\_\_\_\_\_ ore\_\_\_\_\_\_ samples.

MARKED	GC	DLD	SILVER	Cu	Mo	MoS <sub>2</sub>	Zn	WO3	Sn		TOTAL VALUE
	Ounces per Ton	Value per Ton	Ounces per Ton	Percent	Percent	Percent	Percent	Percent	Percent	Percent	PER TON (2000 LBS.)
2751				-	0.009	0.003	-	0.05	<0.001		
2752					0.009	0.003	-	0.44	<0.001		
2753				-	0.011	0.005		0.03	<0.001		
2754				-	0.008	0.003	-	0.01	<0.001		
2755				0.11	-	•	0.03	0.15			
2756				0.04	-	-	<0.01	0.01	-		
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istered Assayer, Province of British Columbia

Texasgulf ;Inc. To: 1 PAGE No.

BONDAR-CLEGG & COMPANY LTD.

REPORTI	No A	28~~	2
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DATE:	<u>lav 29</u>	1978	

701 - 1281 West Georgia Street Vancouver, B.C. V6E 3J7

## CERTIFICATE OF ASSAY

I hereby certify that the following are the results of assays made by us upon the herein described ore

Samples	submitted:	May 25	, 1978
Results	completed:	May 29	, 1978
			-

PROJECT: 53

samples.

MARKED	G	DLD	SILVER	MoS <sub>2</sub>	WO3						TOTAL VALUE
	Ounces per Ton	Value per Ton	Ounces per Ton	Percent	Percent	Percent	Percent	Percent	Percent	Percent	PER TON (2000 LBS.)
2757				0.003	0.01						
2758				0.002	0.01						
2759				0.002	0.02						
2761				0.002	<0.01						
					er alf ar <sup>1</sup> e an 1e an an Arraig 1e an Arraig 1e an Arraig 1e an						

Registered Assayer, Province of British Columbia

To:	Te?	asgu	ılf	Inc	• •	
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Vancouver, B.C.

701 - 1281 West Georgia Street

V6E 3J7

# BONDAR-CLEGG & COMPANY LTD.

# CERTIFICATE OF ASSAY

		5 1 L P		
Samples	submitted;	May	26,	1978
Results	completed:	May	29,	1978
PROJECT	: 53			

Registered Assayer Province of British Columbia

I hereby certify that the following are the results of assays made by us upon the herein described \_\_\_\_\_\_pulp/ore

samples.

MAINICO	GC GC	DLD	SILVER	WO3							TOTAL VALU
	Ounces per Ton	Value per Ton	Ounces per Ton	Percent	(2000 LBS.)						
2762				0.11							
2751				0.04							
2752				0.42							

Descriptions of assayed samples - refer to Figure 6 for locations.

No.	Description
2751	Continuous chip across 2 m of heavily quartz-veined intrusive outcrop (see Figure 7). Rock has visible scheelite and moly- bdenite in quartz veins.
2752	Continuous chip across second 2 m interval of above outcrop.
2753	Chip sample across entire 4 metres of above outcrop, selective sample of quartz veins.
2754	As 2753, but selective sample of country rock exclusive of quartz veins.
2755	Selective grab of massive pyrrhotite from a 20 cm by 2 m pod in skarn. Material has visible chalcopyrite and very fine grained scheelite.
2756	Hedenbergite(?) skarn with strong disseminated pyrrhotite, traces of chalcopyrite.
2757	Character grab sample of biotite quartz porphyry with narrow quartz veinlets, rare scheelite.
2758	Pale green banded porcelainous skarn at contact with granitic rocks; rare quartz veinlets.
2759	Character grab sample of biotite quartz porphyry with narrow quartz veinlets, very rare scheelite.
2760	Character grab sample of quartz porphyry with extremely weak quartz veining.
2761	Character grab sample of biotite quartz porphyry, from a narrow dyke. Rock has very weak quartz veining.
2762	Grab sample from within interval of sample 2751; intense quartz veining and strong fluoresence, from scheelite and powellite.

# APPENDIX B

# Geochemical Report Sheets

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W; Colourimet: nodCu,Mo,Zn; NXK	ric Atomic	Absorpt	ion		From	Texas	gulf In	<u>C</u>
tion Used					Date			May 31, 1978
SAMPLE NO.	Cu ppm	Mo ppm	Zn ppm	W ppm				REMARKS
3 - 1 - 78	47	5	<b>9</b> 8	2				
2	79	4	133	3				
3	81	5	182	5				
4	188	8	650	10				
5	129	8	620	13				
6	323	90	394	75				
7	490	150	1300	225				
8	590	130	1450	225				
9	450	110	640	360				
10	860	180	392	765				
11	920	120	1250	165				
12	1250	17	998	435				
13	264	14	1350	180		an a		
14	15	2	194	5				
15	48	2	750	8				
16	56	1	238	13				
17	30	2	146	13				
18	655	39	700	675				
19	286	27	610	135				
20	990	110	2250	450				
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BONDAR-CLEGG & COMPANY LTD.

1500 PEMBERTON AVE., NORTH VANCOUVER, B.C. PHONE: 985-0681 TELEX: 04-54554

# Geochemical Lab Report

Extraction Cu, En, Mo; Hot Aqua Regia W; Basic Fusion

Report No. 28 - 277

Date\_

28 - 277 PROJECT; 53

Metho&u,Zn,Mo; Atomic Absorption W;Colourimetric From Texasgulf Inc.

Fraction Used \_\_\_\_

June 9, 19 78

SAMPLE NO.	Cu ppm	Zn ppm	Mo ppm	Wppm	SAMPLE NO.	Cu ppm	Zn ppm	Mo ppm	ppm W
53 - 23 - 78	8	72	< 1	5	53 - 53 - 78	21	56	1	6
24	36	116	3	5	54	42	92	2	8
25	29	72	2	6	55	44	108	4	4
26	72	32	2	5	56	48	88	4	5
27	200	28	17	5	57	18	68	2	5
28	48	88	2	5	58	11	92	5	4
29	37	64	3	5	59	9	62	1	5
30	47	88	2	6	60	14	28	< 1	4
31	51	90	3	4	71	4	22	< 1	4
32	63	90	3	5	72	9	38	< 1	5
33	70	88	3	3	73	2	8	< 1	10
34	60	88	4	6	74	3	10	< 1	5
35	194	1920	58	10	75	9	10	< 1	5
36	152	1140	36	8	76	10	20	1	4
37	60	176	8	8	77	4	14	< 1	5
38	102	300	11	8	78	8	14	< 1	4
39	43	96	3	4	79	10	24	< 1	8
40	46	106	4	5	80	23	64	< 1	5
2 41	13	6 <u>2</u>	1	5	84	24	170	1	5
42	53	126	4	5	82	56	74	2	4
43	64	80	2	13	83	72	88	2	3
44	725	960	4	30	84	47	96	3	5
45	<u>**</u> 70	132	4	6	85	29	74	3	4
46	41	72	4	5	86	46	70	3	4
47	44	92	4	6	87	96	186	17	3
48	30 <b>63</b>	146	4	6	88	58	۵۸ 78	2	3
49	60	282	4	5	89	46	78	3	5
50	14	88	1	5	90	14	18	< 1	5
51	30	56	1	6	91	25	28	< 1	5
52	31	66	2	5	92	15	30	< 1	5

# Geochemical Lab Report

Report	No. 28 - 2	277

DUNUM

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Page No.-SAMPLE NO. Mo ppm W ppm Cu ppm Zn ppm SAMPLE NO. < 1 53 - 93 - 78 < 1 < 1 < 11\_ < 1-< 1 < 1  $\leq 1$ .

104		48	< 1	<u> </u>		 	 	
105	26	46	1	5				
196	68	60	2	3				101
107	41	60	1	5				
108	37	64	< 1	5				
109	32	89	< 1	6				
110	6	38	< 1	10				
111	4	20	< 1	8				
	5	36	< 1	4				
113	5	38	< 1	8				ļ
114	7	10	< 1	5				
<b>7 5</b>	21	38	<u>&lt; 1</u>	5				
116	51	бб	< 1	6				
117	46	106	4	5				
118	28	88	1	4				
119	. 33	100	2	5				
120	ື 23	92	1	5				
121	31	100	2	5				
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# APPENDIX C

# Statements of Qualification

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### STATEMENTS OF QUALIFICATION

P.J.S. Boyle - Geologist

P.J.S. Boyle obtained his B.Sc. degree in Geology from the University of Saskatchewan in 1972. He has been engaged in exploration in British Columbia from 1972 to the present, and has been employed by Texasgulf Inc. since 1974.

H.R. Schmitt - Geologist

H.R. Schmitt obtained his B.Sc. degree in Geology from the University of British Columbia in 1977. He has been employed in a variety of positions by Texasgulf Inc., for summer seasons from 1975 to the present.

G.N. Mannard - Assistant

G.N. Mannard has completed the first year of studies for a B.Sc. at Queen's University at Kingston. He has been employed by Texasgulf for summer seasons since 1976.

## APPENDIX D

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Statements of Expenditure,

BOYA 1978 Group & BOYA #3

## STATEMENT OF EXPENDITURES

## BOYA 1978 GROUP

SALARIES AND FRINGE BENEFITS - TEXASGULF INC.	
G.R. Peatfield, P.Eng field and office Period May 15-June 14 5 days @ \$125.00	\$ 625.00
ROOM AND BOARD	
4 days @ \$30.00	120.00
TRAVEL	
Pro-rated share of costs	110.00
ANALYSES	
Assay charges: $5 @ \$16 = 80.00$ 3 @ 9 = 27.00 2 @ 19 = 38.00 4 @ 31 = 124.00	
Geochemistry 31 $@$ 6.10 = <u>189.10</u>	450.10
HELICOPTER SUPPORT	458.10
Texasgulf Bell 206B - 4 hrs @ \$300.00	1,200.00
	2,513.10
Withdrawal from PAC Account	700.00
	\$3,213.10
Pro-rated share of topographic mapping	1,000.00
TOTAL	\$ <u>4,213.10</u>

# STATEMENT OF EXPENDITURES

# <u>BOYA 3</u>

## SALARIES AND FRINGE BENEFITS - TEXASGULF INC.

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P.J.S. Boyle - Geologist - mapping		
May 31-June 2 incl. 3 days @ \$90.00 =	\$270.00	
H.R. Schmitt - Geologist - mapping & sa	mpling	
June 1 & 2 2 days @ \$50.00 =	100.00	
G.N. Mannard - Assistant - sampling		
May 31-June 2 incl. 3 days @ \$35.00 =	105.00	
	\$475.00	\$ 475.00
ROOM & BOARD		
8 days @ \$30.00		240.00
TRAVEL		
Pro-rated share of costs		125.00
ANALYSES		
Geochemistry 79 @ \$6.10	481.90	
Shipping Charges	30.00	
	\$511.90	511.90
HELICOPTER SUPPORT		
Texasgulf Bell 206B 3.5 hrs @ \$300.00		1,050.00
		\$2,401.90
Withdrawal	from PAC Account	700.00
		\$3,101.90
Pro-rated share of topographic mapping		330.00
	ΤΟΤΑΙ	\$3,431,90

### To Accompany

Report on Geological and Geochemical Surveys

and

### Topographic Mapping

BOYA CLAIMS

Graveyard Lake Area - Liard Mining Division

by

G.R. Peatfield — P.Eng. J.M. Newell — P.Eng. P.J.S. Boyle — B.Sc.

2500.

3500

45° |

6

6

4

BOYA 2

3000'

2

6

11

2

6







NTS 94M/3W, 4E

Scale in Metres







,

2



To Accompany

Report on Geological and Geochemical Surveys

and

Topographic Mapping BOYA CLAIMS

Graveyard Lake Area - Liard Mining Division

by

G.R. Peatfield - P.Eng. J.M. Newell - P.Eng. P.J.S. Boyle - B.Sc.

Figure 8e

NTS 94M/3W, 4E

	_							
Texasgulf Inc.								
BOYA CLAIMS								
1.54	SOIL GEOCHEMISTRY							
	Zn in s	oils (ppn	ו)					
WORK BY	DRAWN BY	DATE	DRW,G NO.					
G.P., P.B., R.S.,	E.R.	20th JUNE, 1978						
200	0 200	400 60	800					
Scale in Metres								