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1990 PHYSICAL AND DIAMOND DRILLING REPORT OF THE BULL 16

Liard Mining Division, B.C. N.T.S. 104-0-16W Lat. 59°56'N; Long. 130°15'W DECEMBER 1990 B.C. 1990 ASSESSMENT



GEOLOGICAL BRANCH ASSESSMENT REPORT



Part 10f2



1990

PHYSICAL AND DIAMOND DRILLING REPORT

ON THE

BULL 16 CLAIM

Liard Mining Division, British Columbia

N.T.S. 104-0-16W

Latitude 59°56'N; Longitude 130°15'W

OWNER/OPERATOR: REGIONAL RESOURCES LTD.

BY

R.A. Sutherland, P.Eng.

Strathcona Mineral Services Limited 12th Floor, 20 Toronto Street Toronto, Ontario M5C 2B8

DECEMBER 1990

WORK PERIOD: OCTOBER 1, 1989 to NOVEMBER 10, 1990



December 19, 1990

Ms G.D. Phillips Deputy Gold Commissioner Ministry of Energy, Mines and Petroleum Resources Robson Square Suite 159, 800 Hornby Street Vancouver, British Columbia V6Z 2C3

Dear Ms Philips:

Re: Midway Project - Liard Mining Division

We are enclosing herewith two copies of our report on the 1989/90 exploration undertaken at the Midway project. The report is in support of the Statement of Work filed by G.G. Clow in October for the Polar 1 through Polar 16 claim groups. Please transfer any excess amount of assessment credit to a PAC account in the name of Regional Resources Ltd.

If you have any questions please contact me at the Strathcona Mineral Services office in Toronto.

Yours tru

Telephone: (416) 869-0772 Telex: 06-23565 Telecopier: (416) 367-3638

R.A. Sutherland

RAS:1b encl.

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Page

TABLE OF CONTENTS

1.0	INTRO	DDUCTION	1
	1.1	Location and Access	1
	1.2	Claim Status	1
	1.3	History and 1990 Exploration	4
	1.4	Geology	7
2.0	PHYS	ICAL WORK	12
	2.1	Underground Excavation	12
	2.2	Results	14
3.0	DIAM	OND DRILLING	17
	3.1	Underground Drill Program	17
	3.2	Results	18
4.0	CONC	LUSIONS AND RECOMMENDATIONS	21
5.0	COST	REPORT	22
	5.1	Project Organization	22
	5.2	Outline of Work	23
	5.3	Cost Statement	25
	5.4	Cost Distribution	26
6.0	BIBL	IOGRAPHY	27
7.0	STAT	EMENT OF QUALIFICATIONS	29

LIST OF APPENDICES

APPENDIX	1	-	ASSAY CERTIFICATES	Separate	Report
APPENDIX	2	_	CORE LOGS	Separate	Report



LIST OF TABLES

Page

1	British	Columbia	Claims	- Midway	Property	••••	3
2	Summary	of Headin	ıgs	•••••	•••••		13
3	Staff	••••					24

LIST OF FIGURES

1	Midway Property Location Map	2
2	Regional Geological Setting	8
3	Discovery Decline Chip Sample	16

LIST OF PLATES (In Pocket)

Scale

1	Surveyed Claims, Midway Property	1:50000
2	Geology Plan, Underground Development	1:1000
3	Diamond Drill Hole Plan, 1990 Exploration	1:1000
4	Mineralization Below the Contact	1:1000
5	Contact Related Mineralization	1:1000
6	Geological Section N43560	1:1000



1.0 INTRODUCTION

1.1 LOCATION AND ACCESS

The B.C. portion of the Midway property consists of the Way, Bull, Climax, Post, Beth, Star, Toots and Renee mineral claims (total 887 units) located 85 km west of Watson Lake, Y.T. (Figure 1). Access to the property is provided by 25 km of gravel road which connects with the Alaska Highway at Kilometre post 1128.

The terrain is moderately mountainous, with broad U-shaped valleys and rounded mountains. Elevations range from 900 m to 2050 m above sea level. Valleys are mostly vegetated by pines, slopes by spruce; local permafrost is found on north facing slopes.

1.2 CLAIM STATUS

The status of the B.C. claims comprising the Midway property, as of October 10, 1990, is given in Table 1. Assuming acceptance of the 1990 assessment, all claims will be in good standing until their date of record in the year 2000. The relative locations of the claims are shown in Plate 1.



MIDWAY PROPERTY - BRITISH COLUMBIA CLAIMS

Registered Owner: Regional Resources Ltd.

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Liard Hining Division; NTS: 104/0-16

887 Units) 89 Claims;

CLAIN		UNIT	RECORD NO.	EXPIRY DATE	CLAIH		UNIT	RECORD NO	BIPIRY DATE	CLAIH		UNIT	RECORD NO.	EXPIRY DATE
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BRITISH COLUMBIA CLAIMS -TABLE 3 MIDWAY PROPERTY



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1.3 HISTORY AND 1990 EXPLORATION

Early exploration efforts on the property date back to 1954. A number of companies explored the Silvertip Hill area of the present property. During the 50's and 60's the following work was completed:

- underground drifting, two adits, 548 m
- surface diamond drilling, 20 holes, 2352 m
- underground drilling, 9 holes, 1120 m
- surface rotary drilling, 4 holes, 684 m

The results were reviewed by Holland, 1968.

In 1980 Cordilleran Engineering personnel, acting on behalf of Regional Resources Ltd., found a shale-hosted massive sulfide showing as the result of a regional stream sampling program. This showing is situated just to the north of the area worked previously and was called the Discovery area. A sizeable property was assembled by staking at that time. Adjoining claims owned by Amax of Canada and Brinco Mining Ltd. were subsequently acquired and are now included in the property.

Intensive exploration for massive sulphide deposits followed in 1981 to 1986. This work is summarized as follows:

- 1981 airborne EM/Mag survey by Dighem
 - line cutting
 - trenching and sampling of the Discovery area
 - 857 m of diamond drilling in 6 holes, Discovery area



- 1982 airborne photography at three different scales
 - soil sampling and geologic mapping of parts of the property
 - ground EM and gravity surveys
 - 5313 m of diamond drilling in 19 holes, mostly in the Discovery area
- 1983 11 743 m of diamond drilling in 32 holes, mainly in the Discovery and Silver Creek areas
 - dowhole pulse EM in some holes
 - pre-feasibility site assessment
 - initial metallurgical test work
- 1984 10 891 m of diamond drilling in 50 holes, mostly in the Silver Creek area
 - improvement of access road and site infrastructure
 - driving of underground access to Silver Creek
 North
 - petrologic and facies studies
 - exploration of the Ewen Barite, Spider Swamp and Bull 7 claim areas
 - reconnaissance soil sampling, Keystone grid
- 1985 underground exploration program of the Silver Creek North area (started in late 1984) comprised 1453 m of adit advance
 - 12 383 m of underground diamond drilling in
 171 holes
 - downhole PEM surveys on part of these holes
 - metallogenetic studies
 - ore reserve calculations
 - computerization of project data
 - additional metallurgical testwork

- 5 -



- 1986 surface exploration in various parts of the property to search for additional deposits to augment the reserves outlined in the Silver Creek area
 - soil geochemistry, line cutting, pulse EM and magnetometer geophysical surveys in 7 target areas (Bull 7, Donegal Mtn., Keystone Mtn., NW Discovery/Silver Creek North, Spider Swamp, Survey Creek, Tricorn/Tour Creek)
 - 2660 m of surface diamond drilling in 14 holes; downhole pulse EM
 - 984 m of reserve circulation drilling in 9 holes, Bull 7 area

The property was on care-and-maintenance during 1987 and 1988.

Exploration resumed in the fall of 1989 with the goals of defining the mineralization and evaluating the mining conditions in the Discovery area. The underground workings were rehabilitated and the surface facilities were upgraded, including a new shop and generator installation, and a mine water treatment plant.

An access decline to the Discovery area was collared off the old sump and taken south and east into the hangingwall shales where drill drifts were turned off north and south. These stopped short of target because of difficult ground conditions and the south drift was lost to a fall of ground. A total of 765 m of ramp and drift were driven at an estimated cost of \$4 541 219.

- 6 -



Diamond drilling totalled 9620 m in 68 holes from the access ramp and the north drift, at an estimated cost of \$1 571 013. NQ core was recovered in the target areas in all completed holes.

<u>1.4 GEOLOGY</u> (From Cordilleran Engineering, 1986)

REGIONAL GEOLOGY

The Midway property area is located within the Cassiar Platform terrain of the Northern Cordillera. Location and relationships with the major geological units of the region are shown in Figure 2.

The Cassiar Platform is an autochthonous miogeosynclinal wedge of relatively shallow-marine carbonate and clastic sediments, Proterozoic to Early Mississippian in age(?). The sedimentary wedge probably plunged to the southwest towards deeper-water depositional environments. During Mid Jurassic to Early Cretaceous times, a complex of oceanic sediments, volcanics and igneous ultramafics (the "Upper Sylvester Allochthon", Gordey et al., 1982a) was thrust, probably from the southwest, and emplaced over the platform, which was later intruded by Mid- to Late-Cretaceous quartz monzonite ("Cassiar Batholith").

The Cassiar platform is bounded to the east by the Rocky Mountain trench, filled with basinal clastic facies. The trench is marked by a major dextral strike-slip fault along which the Cassiar Platform may have moved over a distance of at least 450 km during Mesozoic and Cenozoic times (Templeman-Kluit and Blusson, 1977). The Midway property area is underlain by Lower and Middle Paleozoic sediments intruded on the west by the Cassiar Batholith.

- 7 -





REGIONAL GEOLOGICAL SETTING OF THE Figure 2 MIDWAY PROPERTY (Modified after MacIntyre, 1983)



The sedimentary succession has been assigned to the Kechika, Sandpile, McDame and Sylvester Groups (Gabrielse, 1969).

The Cambrian to Lower Silurian Kechika Group consists of siltstone, phyllite and limestone, altered to hornfels and skarns near the Batholith contact. The Silurian to Middle Devonian Sandpile and McDame Groups consist of quartzite, dolostone and limestone. These Lower Paleozoic sediments were deposited in shallow water and on tidal flats of the Cassiar Platform. The Upper Devonian to Mississippian Lower Sylvester Group consists of a thick section of argillite, sandstone, and local conglomerate beds. These clastic rocks were deposited by turbidity currents in an offshore basin or trough, which probably developed by subsidence of faultbounded blocks, possibly associated with a rifting center. The Mississippian to Permian Upper Sylvester Group consists of phyllite, chert, local calcarenite beds, volcanic flows and tuffs and ultramafics. This unit is part of the allochthon which was thrust over the Cassiar Platform (Gordey et al., 1982a).

PROPERTY AND DEPOSIT GEOLOGY

The geology of the Midway property in general and of the deposits area in particular was presented in Cordilleran Engineering, 1984.

Massive sulphide deposits have been found in two stratigraphic locations: "exhalative", shale-hosted, stratabound deposits near the base of Unit 2A of the Lower Sylvester Group, and replacement and open space filling, carbonatehosted deposits at and below the unconformity between the Lower Sylvester and McDame Groups. The former have not



proven to be of economic interest; exploration activity since 1982 has focused on the latter.

The carbonate-hosted sulphide deposits (Lower Zone or LZ) have been found over a vertical interval of 100 m in McDame carbonate, throughout the upper limestone into the top of the underlying dolostone. The most extensively explored deposits are those immediately below the unconformity in the Silver Creek North zone, where sulphides have been found 20 m to 120 m below the surface. Massive sulphides have been intersected at depths between 175 m and 480 m northeast, east and south of the Silver Creek deposits.

The sulphides are spatially associated with, but not restricted to, altered and brecciated carbonate. In the Silver Creek zone there is a preferred azimuth of veins and tabular shaped bodies of 130 degrees to 150 degrees. The deposits vary in width and thickness from centimetres to tens of metres. The minerals of interest are argentiferous galena, sphalerite, and various silver-bearing sulphosalts, almost invariably accompanied by massive pyrite with lesser pyrrhotite and minor marcasite.

Both pre- and post-Sylvester faults have been found. Pre-Sylvester, post-McDame faults do not appear to have acted as barriers to mineralization. Major post-Sylvester faults are oriented northwest-southeast to north-south, dip to the east and have measured displacements of up to 200 m, east side down.

The source of the mineralizing fluids in the Midway area is unknown. Alteration in the Lower Sylvester clastics, apparent mineral zoning and interpretation of aeromagnetic



data indicate a center could lie 1.5 km to 2.0 km southeast of the known deposits.



2.0 PHYSICAL WORK

2.1 UNDERGROUND EXCAVATION

Drifting and detailed underground diamond drilling in 1984-85 outlined several mineralized bodies in the Silver Creek zone but the reserves defined were insufficient to support a mining operation. Surface drilling at wide spacing indicated that similar mineralized zones could be expected in the Discovery area.

The Discovery mineralization occurs at deeper levels than Silver Creek, so a decline and hangingwall drill drift were planned to provide access for more detailed drilling in the central portion of the area. This project was conceived as the first phase of a 3-stage exploration and development program leading to eventual production.

Site preparation commenced in mid October 1989 and dewatering and rehabilitation of the previous workings started in November.

Actual development started on January 5, 1990 and continued until June 11, 1990. In all, 765 metres of access decline and hangingwall drill drift were completed (Table 2). All mining equipment, personnel and underground service work were supplied by the contractor, Canadian Mine Development. Project management, consumables and support such as camp facilities and power generation were supplied by Regional Resources Ltd. through Strathcona Mineral Services.



An electric-hydraulic 2-boom jumbo drill and 5-cubic-yard scooptrams were used for the drilling and mucking functions. Two 13-tonne trucks were used for hauling the broken muck to surface. Services, including 42-inch ventilation ducting, 6-inch compressed air line, 2-inch fresh water line, 8-inch drain water line, blasting cable and main power cables, and electrical switch panels were hung as required using handheld drills from a portable work platform carried by the scooptram. Crews of 3 or 4 men worked continuously, rotating on three, 8-hour shifts per day.

TABLE 2 SUMMARY OF HEADINGS

	<u>Slope</u>	<u>Nominal Size</u>	<u>Length</u>
Main Decline	-15%	4.5 x 5.0 m	250 m
Drill Access Drift	-15%	3.5 x 3.5 m	230 m
Drill Drift North	+1.5%	3.5 x 3.5 m 3.0 x 3.0 m	35 m 85 m
Drill Drift South	+1.5%	3.5 x 3.5 m 3.0 x 3.0 m	25 m 50 m
4 Remuck Stations	0%	4.5 x 5.0 m	50 m
2 Sumps	-15%	3.5 x 3.5 m	40 m
		Total	765 m

The main decline encountered a limonite filled cavern after advancing 60 metres and had to be relocated about 50 metres to the south to get past it (Plate 2). Thereafter intermittent delays were caused by heavy flows of water from



cavernous fractures, but these drained relatively quickly allowing progress to be resumed.

The drill access drift encountered broken incompetent ground conditions along the limestone/shale contact which required timbering of the back for about 20 metres. When the shale competency improved, the bottom sump and muck bay were driven, and the north and south drill drifts turned off. Ground conditions deteriorated again in the drill drifts and mining was stopped after a severe fall of ground in the south drift. Much of the north drift was then shotcreted to ensure safe working conditions for the ensuing diamond drilling program.

The direct contract cost was estimated at \$2 863 274 or, \$3743 per metre of advance. The relatively high cost performance resulted from delays caused by water inrushes and local difficult ground conditions. This does not include the cost of support services provided by Regional Resources Ltd.

2.2 RESULTS

The main decline and the first 190 m of the drill access drift were in McDame limestone, stratigraphically below the anticipated mineralized horizon (Plate 2). The limestone was generally blocky and competent except in the water and mud-filled cavernous areas. The caverns are locally controlled by steep fractures and do not appear to reflect important faulting.

An irregular pod of sulphide mineralization was exposed by the drill access drift. The adjacent limestone and shale is



highly brecciated and disturbed and the ground overlying the zone required timbering. The brecciated limestone and massive sulphide tends to be rehealed with calcite but the broken shales tend to be soft and friable, possibly because they were less permeable and thus resistant to the introduction of cementing solutions. The mineralization is pyritic and siliceous in nature, low in Pb and Ag, and thus may represent an early zinc-rich phase of mineralization that preceded the main Ag-Pb-Zn stage.

Sampling results are shown in Figure 3.





3.0 DIAMOND DRILLING

3.1 UNDERGROUND DRILL PROGRAM

Advanced Drilling Ltd. of Surrey, B.C. was chosen as drilling contractor and drilling activities on site commenced July 16, 1990. Two electric-hydraulic drills were provided, one tractor mounted, both using a proprietary drill head (the Superdrill) designed by the contractor. Drilling was done on two, 10-hour shifts daily; this schedule was chosen in order to attract a good calibre of personnel for the job. The crew for each drill comprised 1 supervisor, 2 drillers and 2 helpers. One of the supervisors was qualified as an underground shift boss, and each crew was visited twice a shift (or more often) in compliance with B.C. regulations. Operations were continuous for about 17 weeks until November 9 when demobilization was completed.

When the drill drifts were stopped due to bad ground, the drilling plan was modified to include holes fanned from the drill access drift. An area approximately 400 x 400 m adjoining the Silver Creek zone to the east was in fact explored (Plate 3). Fans of holes designed to intersect the limestone/shale contact at approximately 40 m spacing were drilled north-south from the drill access drift at 25080E, 25140E, and 25200E. Similiar fans were drilled at 43560N, 43600N, and 43640N from the drill drift north. Additional holes were fanned northerly and southerly from the drill drift and a number of followup holes were drilled from the access drift. In addition 6 holes from the drill access drift and many of the holes from the drill drift north tested the limestone at depth.



A total of 9620 metres were drilled in 68 holes, at an average advance rate of 27.3 m per shift. All drilling was NQ size except for 2 holes which were collared HQ because of expected poor ground conditions (total HQ drilling 182 m). Core recovery in the mineralization varied from excellent to poor even with the comparatively large size of core recovered. The estimated overall contract cost was \$851,894 or \$88.55 per metre drilled. This does not include the cost of support services provided by Regional Resources Ltd.

All core was stored in existing racks on the Midway site, and the particular location for each hole is noted on the drill log. The racks are numbered from 1 to 10 and the bays in each rack are designated alphabetically.

Core samples were split and sent to Northern Analytical Laboratories Ltd. in Whitehorse for analysis. All samples were assayed by AA for silver, lead and zinc. Samples indicated to run higher than 100 grams per tonne Ag were reassayed for Ag and Au using standard fire assay methods.

Assay certificates are enclosed in Appendix 1.

Collar and downhole survey data along with lithology, storage and assay details are posted on the drill logs.

The drill logs are enclosed in Appendix 2.

3.2 RESULTS

The purpose of the development and diamond drilling was to evaluate the mineralization and potential mining conditions



reserves in the sparsely drilled areas between Zones F and G.

On Plate 5, Zones H, I and J lie west of the YBR fault, and are similar in attitude to and continuous with the mineralized zones outlined by previous detailed exploration in the Silver Creek area (Cordilleran Engineering, 1985). Zone J contains several very thick intersections. Zones K to O are east of the YBR fault in an area complicated by faulting. The faults appear to strike northerly and to step the stratigraphy repeatedly down to the east (Plate 6).

Ground conditions in the shales immediately overlying the limestone and the contact-related mineralization are variable but generally poor. The shales are carbonaceous, broken, and distorted, particularly east of the YBR fault. Ground conditions in the limestone are generally good. During primary development delays can be expected due to inrushes of water but these should not be troublesome once the local water table is drawn down.



4.0 CONCLUSIONS AND RECOMMENDATIONS

- The Discovery area mineralization appears to be repeatedly offset down to the east by northerly striking faults. The YBR fault can be used in future to define the boundary between the Discovery and Silver Creek areas.
- 2. The shales overlying the contact in the Discovery area are deformed and generally incompetent because of the faulting. For this reason the thicker zones of contactrelated mineralization and mineralization in the limestone away from the contact are the best targets for further exploration. Zones C, D and N are the most attractive targets presently indicated, and drifting, cross-cutting and detailed drilled is recommended.
- 3. An exploration drift northerly to Hole 89 and then towards Hole 280 would permit exploration for limestone hosted mineralization in the sparsely drilled area north of Zones C and D. A drift at the 1000 m elevation or deeper is recommended to go at least as far north as Hole 18.



5.0 COST REPORT

5.1 PROJECT ORGANIZATION

Project Manager: Strathcona Mineral Services Limited (SMS)

 project management, administration, support staff and technical.

Owner: Regional Resources Ltd.

- consumables, supplies, surface installation and equipment

Contractor: Canadian Mine Development Ltd. (CMD)

- underground development crews, equipment and supervision

Contractor: Advanced Drilling Ltd.

 underground diamond drill crews, equipment and supervision

SMS staff varied from 3 to 7 persons on site. Approximate dates and days worked are listed in Table 3.

Travel costs are due to leave rotation (6 weeks in, 2 weeks out) and to management visits.

CMD staff varied from 5 to 16 persons on site. A small crew (2 to 7) worked during the rehabilitation/setup phase during October 10 to December 20, 1989. The mining crew (12 to 16) worked during the development phase from January 3 to June 22, 1990.

Advanced Drilling staff varied from 5 to 11 persons on site. The drill crew worked from July 16 to November 10, 1990.



5.2 OUTLINE OF WORK

October 10, 1989 - December 20, 1989

- rehabilitation of camp, shop and generator installation,
 piping, electrical, dewatering of mine, ground support
 (old workings)
- SMS staff and CMD staff on site

January 3, 1990 - June 22, 1990

- development of decline and drill drifts, ground support, muck out old workings
- SMS staff and CMD staff on site

July 18, 1990 - November 9, 1990

- diamond drilling from new development
- SMS staff and Advanced Drilling staff on site
- June 23, 1990 July 18, 1990; and November 10 30, 1990
 SMS support staff on site (cook, electrician, technician, CMD mechanic)



TABLE 3

STAFF

Function	Function Duration									
Engineering/Design	Apr/89 - Aug/89	20								
Project Manager (1 day/week)	Oct 1/89 - Oct 31/90) 60								
Project Superintendent	Oct 1/89 - Dec 20/89 Jan 3/90 - Jun 25/90 Jul 16/90 - Nov 30/90) 71) 122) 112								
Technician	Oct 10/89 - Dec 20/89 Jan 3/90 - Apr 3/90 May 7/90 - Aug 24/90 Sept 14/90 - Dec 6/90) 62) 80) 97) 82								
Geologist	Apr 3/90 - Jun 20/90 Aug 24/90 - Oct 26/90) 31) 69								
Cook	Oct 10/89 - Dec 20/89 Jan 3/90 - Nov 30/90) 71) 334								
Bull Cook	Oct 10/89 - Dec 20/89 Jan 3/90 - Oct 22/90	9 71) 292								
Electrician	Oct 10/89 - Nov 30/90) 410								
HEO/Mechanic	Oct 10/89 - Dec 20/89	€ 71								



5.3 COST STATEMENT

	<u>Amc</u>	unt
Underground Exploration Drilling Contractor (Advanced Drilling Ltd.) Assaying (Northern Analytical Labs) Supplies Geological staff	\$ 776 8 17 48	904 337 691 962
Underground Development Contractor (Canadian Mine Development) Labour Supplies Equipment	1 992 30 806 34	686 321 140 127
Water and Environment Consultant (Hatfield and subcontractors) Labour Supplies Equipment Water analysis (Bondar Clegg)	11 24 31 3 26	930 279 774 800 322
Power and Fuel Equipment Labour Supplies Diesel Gasoline Propane Lubricants	91 38 121 298 14 60 46	769 421 695 540 074 698 374
Mobile Equipment Labour Supplies Rental Equipment	4 43 10 208	560 478 168 943
Site Maintenance Labour Supplies Equipment and buildings	166 24 124	547 755 958
General Services Safety supplies Catering Telephone and TV Equipment	11 243 113 11	912 375 293 353



Transportation Travel Air freight Surface freight		54 14 142	053 816 981
Administration Property, health, life insurance Accrued vacation		6 64	364 011
Project Management General management Engineering and geology Purchasing and accounting Site supervision Travel and expense		100 13 37 185 <u>44</u>	522 972 005 500 822
Total	\$ 6	112	232

5.4 COST DISTRIBUTION

Development direct contract cost Drilling direct contract cost Service and support costs Allocated to development (70%) Allocated to drilling (30%)	\$ 2 2 1	863 851 397 677 719	274 894 064 945 119	
Estimated cost of development Estimated cost of drilling	4 1	541 571	219 013	



6.0 BIBLIOGRAPHY

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STATEMENT OF QUALIFICATIONS

- I, R.A. Sutherland, hereby certify that:
- I am a geologist employed by Strathcona Mineral Services Limited of 12th Floor, 20 Toronto Street, Toronto, Ontario, M5C 2B8.
- 2. I am a Professional Engineer registered in the Province of British Columbia.
- 3. I am the author of this report and supervised the drilling program reported on herein.
- 4. I graduated from the University of British Columbia in 1964 with a degree of B.A. Sc. in Geological Engineering. I have engaged in the practice of mining geology and mineral exploration since 1964.
- 5. I have no beneficial interest in Regional Resources Ltd. or in the claims comprising the Midway Property.

R. Suthercland, P. Eng.

R.A. Sutherland, P.Eng.

STATEMENT OF QUALIFICATIONS

I, Peter C. LeCouteur of the District of North Vancouver, in the Province of British Columbia, do certify that:

- I am a geologist employed by Strathcona Mineral Services Limited with offices located at #701 - 1177 West Hastings Street, Vancouver, B.C. Canada V6E 2K3.
- 2. I have been a practising geologist in mineral exploration continuously since 1973.
- 3. I graduated from the University of Auckland (N.Z.) with the degrees of B.Sc. (1964) and M.Sc. (1967), and from the University of B.C. with a Ph.D. (1972).
- I have been a Fellow of the Geological Association of Canada since 1969, and a Professional Engineer of the Province of B.C. since 1971.
- 5. The information in this report is based on person field supervision of the Midway project, on reports acknowledged in the references, and on the work of others acknowledged in this report.
- 6. I do not personally hold shares in or have agreements of any kind with, companies that own the claims within the property that is the subject of this report.

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