THE NORTHERN GEM

BRIDGE RIVER, B.C.

- - -

Report by

ALFRED R. ALLEN, P. Eng.

November, 1956

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INTRODUCTION

The Northern Gem cobalt-gold-uranium property was examined by the writer first in July 1955, and regularly during 1956 while supervising the works program thereon.

The purpose of this report is to present a compilation of all available data along with results of the 1956 program.

The general aspects of the property are described briefly, and the bulk of the report contains information pertaining to the character and potential of the cobalt-gold-uranium ore deposits.

LOCATION AND ACCESSIBILITY

The property is located about 100 miles north of Vancouver, B.C., in the Bridge River district, Lillooet Mining Division.

From Shalalth on the Pacific Great Eastern Railway, via the Bridge River Highway, it is 37 miles to the branch road which leads to the property. This branch road off the Bridge River Highway is about 2 miles east of Minto, and leads 12 miles up Gun Creek to the Gun Creek bridge near the mouth of Roxey Creek. From the bridge a 3 mile switch-back road leads to the Northern Gem camp on the east bank of Roxey Creek. The tunnels are about 1/2 mile easterly from the camp, 700 feet higher, and are reached part way by road and the remainder by a trail.

From Vancouver to Minto is approximately a 10-hour drive by automobile, a day by P.G.E., and bus, and a 1-hour flight to Gun Lake by Pacific Western Airlines during the summer months only.

CLAIMS AND OWNERSHIP

The following Crown Grant and Located mineral claims comprise the Northern Gem property:

Crown Grant Mineral Claims:

Little Gem 2	Lot 7566	34.90 Acres
" " 4	" 7567	34.49 "
" " 6	" 7568	46.99 "
" " 11	" 7729	51.(approx) Acres
" " 15	" 7727	49.87 Acres
" " 16	" 7728	49.57 Acres
" " 17	" 7730	51.63 "
" " 18	" 7731	49.14 "

Located Mineral Claims:

Palang	1 - 8	Some being fractions
Paul	1 - 8	" " "
O K	1 - 10	

Some of the Palang and Paul claims overlie four claims previously held, these being the Eros 1, 2, 3 by E. Howard of Minto, and the Little Gem 19 held by R.R. Taylor of Vancouver. The exact boundaries of the respective claims will not be known until they are surveyed. The Northern Gem showings are well protected by the Crown Grant claims listed above.

The claims are shown on the map accompanying this report, data for which has been acquired from official surveys of the Crown Grant claims and the B.C. Department of Mines Mineral Reference Map 21T-269 for the located claims.

HISTORY

The mineral deposits were discovered and staked by William Haylmore and W.H. Ball in 1934. Their interests were bought by J. M. and R.R. Taylor in 1937. The United States Vanadium Corporation optioned the property in 1937 and drove the upper tunnel. All work in Canada was terminated in 1939 by the above named company and the exploratory program on the Northern Gem was not completed. During the winter of 1939 the lower tunnel was driven by contractors for J.M. and R.R. Taylor. In 1940 the property was optioned for a short time by Bralorne Mines and the two short raises were driven from the lower tunnel. The lack of a treatment process, and indefinite marketing possibilities at that time, resulted

in the option being dropped by Bralorne Mines. In 1952 Estella Mines optioned the property. A switchback road was completed from Gun Creek bridge to the camp and twelve holes were diamond drilled from the lower tunnel. Estella Mines were forced to drop the option when they were unable to meet the due payment in November 1953 and it was not possible to secure an extension from the owners. Northern Gem Mining Corporation was formed in Dec. 1955 for the purpose of acquiring and developing the property. Work was commenced on the road in June, on the camp in August and on the showings shortly thereafter. Work was terminated for the winter October 23rd because of the unusually early arrival of winter snow at the property.

TOPOGRAPHY

The property is located in the rugged mountainous terrain of the Bridge River region. Camp lies on the east bank of Roxey Creek 5,500 feet above sea level. Mount Dixon towers 3,700 feet above the valley of Roxey Creek. The lower and upper tunnels, about 1/2 mile easterly from camp, are on a steep rocky sidehill at elevation 6,192 and 6,250 feet above sea level respectively. The easterly trending faulted zone in which the showings occur extends up the precipitous sidehill and over the top of the ridge, 6,540 feet elevation, between Roxey and Jewel Creeks. Gun Creek bridge is at 3,440 feet, and Minto is at approximately 2,400 feet above sea level.

The creeks occupy narrow V-shaped valleys with steep gradients.

The Northern Gem camp is about 500 feet below timber line.

Snow slides are numerous during the winter season on both sides of Roxey Creek.

GENERAL GEOLOGY

Permian and Triassic sediments and volcanics of the Fergusson, Noel, Pioneer and Hurley formations have been intruded by Jurassic, Bralorne, Sumner, President and Bendor igneous rocks. Attendant metamorphism and subsequent deposition of mineral bodies containing precious and base metals, now partially exposed by erosion, have resulted in the Bridge River mining camp, the center of which is Bralorne and Pioneer Gold Mines.

LOCAL GEOLOGY

Introduction.

The geology of the area has been mapped by the Geological Survey of Canada on a 1/2 mile per inch scale. This shows the Northern Gem property lying in Bendor quartz diorite and granodiorite near the eastern contact of the intrusive body where a large "tongue" 1/2 to 3/4 miles wide extends easterly 3 miles to Gun Lake. Fergusson sediments and serpentine one mile south and more than 1000 feet higher, and serpentine, Pioneer greenstone and metamorphosed Noel sediments 3/4 mile to the north at 6,000 feet elevation, suggest that the batholith has been only just de-roofed.

A broad brown stained zone of faulting extends from the

Northern Gem tunnels up and over the ridge between Roxey and Jewel creeks. Within this zone are irregular bodies of massive sulphides and also disseminated sulphides in bleached granodiorite. Both the massive and disseminated types of mineralization contain cobalt, gold, and uranium in commercial quantities.

Stratigraphy.

The Northern Gem showings lie within a zone of faulting in granodiorite near the east contact between the Bendor batholith and younger sedimentary and volcanic rocks. The granodiorite is light grey, medium grained, and ferromagnesian minerals are biotite and hornblende. Near the workings feldspar porphyry dykes have been intruded into the granodiorite. One and one-quarter miles southwest from the main workings a 2 mile by 3/4 mile body of gabbro breccia is included in the granodiorite.

The property lies at the junction of the main batholith and a "tongue" which extends 2-1/2 miles to the east. To the south one mile, and 1000 to 1200 feet higher in elevation sedimentary rocks of the Fergusson group overlie the granodiorite. Three-quarters of a mile to the north of the showings rocks of the group, serpentine, Noel, and Pioneer formations are in contact with the batholith. It is evident, therefore, that the Northern Gem mineralization, as presently exposed, lies only a short distance below what had been the easterly sloping roof of the Bendor batholith.

In Gun Creek, at the mouth of Roxey Creek, a 2-mile length of Bralorne intrusive has been exposed.

Table of Formations.

Era	Period	Formation	Lithology
Cenozoic	Modern		Recent: stream deposits; volcanic ash; slide debris; soil
			Pleistocene: fluvioglacial, glacial, and stream deposits
Cenozoic and(?) Mesozoic	Post Lower Cretaceous		Kersantite and basaltic dykes
		Bendor intrusives	Hornblende-biotite-quartz diorite (mainly); granite; granodiorite; diorite; (batholith and related stocks and dykes)
			Feldspar and hornblende porphyrite dykes and related, dioritic stocks; felsitic to aphanitic dykes; (may be post-Bendor)
Mesozoic	Jurassic(?)		Quartz albitite, albitite, and related, less sodic, dykes; greenstone dykes
		President intrusives	Peridotite (mainly); dunite, pyroxenite; (may be partly serpentinized)
			Serpentine (mainly)
		Sumner gabbro	Diallage-olivine gabbro
		Bralorne intrusives, may be in part younger than the President intrusives	Soda granite (albite feldspar) Gabbro, augite diorite and quartz diorite; metadiorite (mainly sodic plagioclase)

Table of Formations (Cont'd)

Era	Period	Formation	Lithology
	Triassic and (or) Jurassic	Hurley formation	Banded, argillaceous and tuffaceous sediments with abundant limy types; fossiliferous limestone; conglomeratic and agglomeratic beds; cherty halleflinta and trachytic flows; intercalated andesitic (greenstone) flows
		Pioneer formation	Green, massive, amygdular to finely crystalline andesites and meta-andesites; andesitic tuffs and breccias; associated, intrusive, dioritic phases
		Noel formation	Banded, argillaceous and tuffaceous sediments; thinly banded chert and argillite associated with greenstone; conglomerate, tuffs, and breccias
Palaeozoic	Permian(?)	Fergusson series	Mainly green, but in part reddish, massive to highly schistose, amygdaloidal, and in part ellipsoidal, andesitic to basaltic lavas; tuffs and breccias; associated limestone pods
			Mainly thinly interbedded chert and dark grey to black or reddish, slaty to schistose, graphitic argillite; massive chert; some crystalline limestone

Structure

The mineral showings on the Northern Gem property are located within a broad zone of faulting. This zone passes under talus below the lower tunnel and is covered by overburden at the top of the ridge between

Roxey and Jewel creeks. Between these two locations, 700 feet on plan and 400 feet in vertical section, it is strongly evident extending from the tunnels north 80 degrees east up the precipitous sidehill and on the top of the ridge. Rather than a well defined fault with a wide gouge zone, it is a series of shears from hangingwall to footwall. It is up to 60 feet wide and dips 60 to 80 degrees southerly. Numerous minor shears, characterized by relatively wide zones of brown-weathering carbonate, intersect this fault zone at many angles. The most common of these sets of shears strikes a few degrees east of north and dips 30 degrees easterly. Within the fault zone occur irregular and lense shaped masses of almost solid sulphides surrounded by granodiorite highly bleached and sericitized. Within these bleached zones also occur irregular zones of disseminated sulphides. In general the sulphide zones and bleached granodiorite lie parallel to the confining hangingwall and footwall of the faulted zone.

Structural control may have been exerted on the deposition of the ore by the cross shears. This is most evident on the lower level. On the upper level and in an open cut near the top of the ridge, however, the shares appear to cut the sulphide mineralization. Additional evidence will be required to determine the influence, if any, that the subsidiary shearing may have exerted on the ore deposition.

Mineralogy.

Both the massive and disseminated sulphide zones are composed of arsenopyrite, danaite (arsenopyrite with up to 12% cobalt) and

loellingite-safflorite. Loellingite is an iron diarsenide which may contain cobalt, and safflorite is a cobalt-iron diarsenide. The gangue minerals with the massive sulphides are, in order of abundance, allanite, apatite, orthoclase feldspar, quartz, chlorite, sericite, calcite, molybdenite, and uraninite.

The gangue minerals in the bleached granodiorite are sericite, residual quartz, feldspar and kaolinized feldspar, grading into normal granodiorite. John S. Stevenson, in his report to the B.C. Minister of Mines, 1948, classed the massive sulphide zones as pegmatite, largely because of the contained allanite and uraninite. The writer suggests that the pegmatitic nature of these zones is doubtful, since they have practically all the characteristics of high temperature vein-replacements, and since allanite is also known to be a gangue mineral in replacement deposits and uraninite likewise is known to occur with veined sulphide hydrothermal deposits. Erythrite stain occurs on the sulphide outcrops.

The gold is believed to be finely disseminated throughout the sulpharsinides and gangue. Uraninite is associated with the gangue minerals in irregular swarms of crystals about 400 mesh in size.

SURFACE SHOWINGS

Massive and disseminated bodies of sulphides carrying cobalt, gold, and uranium are exposed on the Northern Gem property within a broad faulted and fractured zone extending from the prospect tunnels up and over the steep sidehill, a distance of 700 feet laterally and 350 feet vertically. Both upper and lower ends of the zone pass under surface

talus and gravel.

About 150 feet southwest of the lower tunnel portal, just below the trail, there is a zone of disseminated sulphides in bleached granodiorite. A sample across 30 feet of this assayed 0.27% cobalt. Immediately above the upper tunnel portal is a zone of massive sulphides 30 feet long and 2 to 8 feet wide. About 20 feet north of the east end of this is a 50 foot zone of massive, sulphides a few inches wide, at the west end, to 10 feet wide at the east end where an open cut has been excavated on it 58 feet above the upper tunnel. About 60 feet north of the upper end of this last described zone there is a narrow shear along the contact of a feldspar porphyry dyke in which occur sulphide mineralization and strong radioactivity. About 60 feet below the top of the ridge, on the precipitous sidehill, a small lense of massive sulphides occurs within the faulted zone. Immediately below the ridge top two small open cuts have exposed narrow but extremely high grade zones of cobalt, gold, uranium, and in one narrow band molybdenum. A series of open pits extending several hundred of feet easterly down the gently sloping sidehill into Jewel Creek are now caved.

UNDERGROUND WORKINGS.

The upper and lower adit tunnels, directed easterly into the faulted and fractured zone below high-grade exposures of sulphide mineralization have both encountered rich cobalt-gold-uranium mineralization and neither has delimited same.

The upper tunnel, at an elevation of 6250 feet above sea level,

is an adit drift to the east under high-grade surface showings. Extremely rich zones of massive sulphides and lower grade disseminated sulphides have been encountered over a length of 120 feet. There is 5 to 6 feet of ore in the face and the average width is estimated to be 3 feet.

The lower tunnel 59 feet below the upper, is an adit crosscut. Considerable wasted work was done, but a 50-foot zone of high-grade sulphide mineralization, up to 25 feet wide was encountered, which has not been delimited. One hundred and twenty five feet in from the portal a raise was driven 34 feet at about 45 degrees slope in which sparsely disseminated sulphides were encountered. Also at the southwest end of the tunnel a raise was driven 45 feet at a slope of 30 degrees, the floor being a shear zone with which massive sulphide mineralization is associated in the tunnel. Little or no ore was encountered in the raise.

In summary, the two prospect tunnels have encountered ore at elevation 6192 feet, and 6250 feet similar in grade and occurrence to that exposed on the surface in the open cut directly above at elevation 6310 feet above sea level.

THE 1956 PROGRAM

Work has commenced in early June and carried through until October 27, 1956.

Repairs to the road and several small bridges were made on the Gun Creek road and the road from Gun Creek to the mine camp was cleaned out and re-built in places.

Camp was set up on the east bank of Roxey Creek. It comprised

4 tents with wood floors and walls and a cookhouse of wooden frame construction. Powder house, blacksmith shop, and compressor house were constructed near the lower terminus of the tramline about 1/4 mile east of camp.

From the portal of the upper tunnel a single cable tramline was set up to service underground operations from a location on the road about 1300 feet down the steep slope from the tunnels.

Four holes were diamond drilled from 2 locations in the lower tunnel. The holes were directed below the lower tunnel. Massive sulphides were encountered in holes 1 - 56 and 4 - 56, 75 and 60 feet respectively below the lower tunnel, and disseminated sulphides in holes 2 - 56 and 3 - 56, 120 and 40 feet respectively below the tunnel level. The logs of the holes with sulphide intersections are described under the heading "diamond drilling", and plans and sections of all holes included with the maps in the pocket of this report.

All the equipment and supplies necessary for mining were placed on the property and are available for commencement of work next spring.

The upper tunnel was enlarged, straightened out, ditched, and track and pipes installed, so that it is completely ready for mining.

DIAMOND DRILLING

A-X core size was used, and a total of 667 feet drilled in 1956:

No. Length	Location	Direction	Angle	From	To	Au Oz/T	Ag Oz/T	Co %	U_3O_8 %
1-56	50 ft. in	S 55 E	-30	133½	135	0.22	-	0.21	-
167 ft	Lower Tunnel			138	139	0.54	-	0.54	Nil
				139	145	3.26	0.40	2.42	"
				145	146½	2.40	0.20	0.25	"
				146½	151½	Lost Core			
				151½	152½	1.52	-	0.20	"
2-56	50 ft. in								
225 ft	Lower Tunnel	S 55 E	-40	177	185½	0.04	-	0.13	-
				185½	192	0.02	-	0.01	-
3-56	100 ft. in	S 72 E	-30	83	88½	0.04	-	0.08	-
125 ft	Lower Tunnel			88½	97	0.04	-	0.11	-
4-56	100 ft. in	S 72 E	-40	186	192	Massive Sulphides			
180 ft	Lower Tunnel					Not yet sampled			

From the lower level 12 holes had been diamond drilled by Estella Mines. The cores have been logged by the writer and are shown on the accompanying plans and sections. The split core is stored at the property. Diamond drill hole Number 8 - location not known.

The holes having core which was sampled, are as follows:

No. Length	Location	Direction	Angle	Length of core ft.	Au Oz/T	Co. %
1	Lower Tunnel	S 82 E	0	2.5	0.20	1.28
30 ft	Southwest Drift			20.0	Disseminated sulphides and lost core	
				10.9	0.36	1.39
				3.5	Disseminated sulphides	
2	Lower Tunnel	S 88 E	0	1.7	0.28	0.93
24 ft	Southwest Drift			1.3	Lost core and massive sulphides	
3	Lower Tunnel					
28 ft	Southwest Drift	S 12 E	0	1.5	0.28	2.34
				1.5	Lost core and massive sulphides	
				9.5	0.35	0.90
4	Lower Tunnel	S 17 W	0	6.5	Lost core and massive sulphides	
28 ft	Southwest Drift					
5	do.	S 52 E	-25	3.3	Lost core and heavy sulphides	
				4.7	Massive to disseminated sulphides	
6	do.	S 88 E	-25	9	Lost core and massive sulphides	
97 ft				22	Lost core and massive to disseminated sulphides	
7	do.	N 43 W	-25	16	Lost core and massive to disseminated sulphides	
68 ft				4	Lost core and disseminated sulphides.	

The 12 holes drilled totaled 737 feet in length.

SAMPLING AND ASSAYS

The surface and underground showings were sampled by J. L. Stevenson, B.C. Department of Mines, and are listed in Minister of Mines Annual Report 1948, pp. A112-119. Most of these are also shown on the map accompanying this report, and will not be repeated herein. The owners and several reputable engineers known to the writer have sampled the property with results similar to the above named, and these are available but will not be listed here.

The writer concurs with C. Rutherford, P. Eng., 1952, in his summation of average values based upon J. L. Stevenson's sampling as follows:-

The most important showings of ore are seen in the Upper Adit where ore occurs almost continuously for 120' in length. Total work done at this horizon being 160'. Values in uranium are quite erratic, the better ones showing in the pegmatite lenses while the cobalt and gold values continue more like a definite vein in the zone of pegmatite lenses. While uranium values are low in the East face of the tunnel, gold and cobalt values are still good and the zone shows about 5' wide. Systematic sampling on this horizon gives the following averages, -

No. of Samples	Length of ore	Width	Gold (oz)	Uranium (%)	Cobalt %
20	120'	36"	.765	.388	3.068

The outcrops directly above this tunnel in 8 samples gave averages, -

Width	Gold (oz)	Uranium (%)	Cobalt %
51"	.5136	.01	2.836

Average of surface and Upper Tunnel or, -

Width	Gold (oz)	Uranium %	Cobalt %
40"	.672	.2499	2.974

In addition to the assays taken into the averages of surface sampling the upper surface workings previously mentioned as being 450' above and 600' East of Upper Adit show some really spectacular assays, these were not taken into averages but as a matter of interest were as follows, -

Width	Gold (oz)	Uranium %	Cobalt %
3"	4.56	.27	2.8
Picked	23.34	.375	4.6
Picked	7.04	.75	4.5
15"	45.92 (1607.20)	2.80	5.7

The lower Adit was not as successful in opening ore as the Upper and only three samples have been taken averaging as follows, -

Width	Gold (oz)	Uranium %	Cobalt %
71"	1.60	.335	3.23

While it would appear that these lower workings should have penetrated ore, further testing would need to be done.

DEVELOPMENT POSSIBILITIES

The Northern Gem property has "hardly been scratched". Two prospect tunnels have been driven beneath surface showings at the lower end of the zone and high grade ore exists in the faces of both tunnels. The favorable zone in which the ore occurs extends a known

700 feet and both ends pass under surface overburden and talus. The highest grade mineralization found on the property lies 300 feet above the tunnels within the favorable zone. The limited amount of diamond drilling completed to date proves continuance of the mineralization 120 feet below the lowest tunnel. Hence over a horizontal range of at least 700 feet and a vertical range of more than 450 feet, bodies of massive and disseminated sulpharsenides carrying cobalt, gold, and uranium are known to occur. But the favorable zone is a complex of faults and fractures and should extend considerable distances laterally under the surface cover and to depth.

Tonnage and grade calculations made on the ore presently indicated do not represent the worth of the property. It is, however, in this case important to estimate these in order to indicate the potential of the property, and on this basis the following are herewith presented:

Tonnage indicated by upper adit tunnel, is as follows:-

1. Length of shoot, 135 feet.
2. Height of shoot, 85 feet, being to surface and 25 feet below tunnel level.
3. Average width of shoot 40 inches.
4. Average weight, 1 ton being 10 cubic feet in place.

$$\frac{135(40)}{12} \quad (85) \quad (0.1) = 3825 \text{ tons.}$$

Tonnage indicated by lower adit tunnel, is as follows:-

1. Length of shoot, 70 feet.
2. Height of shoot, 40 feet, being 20 feet above and 20 feet below tunnel level.

3. Average width of shoot, 60 inches.

4. Average weight, 1 ton being 10 cubic feet in place.

70 (5) (40) (0.1) = 1400 tons.

Tonnage indicated by 1956 diamond drilling:-

1. The same as that on the lower level but extended 120 feet deeper.

2. Average weight, 1 ton being 10 cubic feet in place.

70 (5) (120) (0.1) = 4200 tons.

Total indicated tonnage: 9425 tons.

METALLURGY

Metallurgy was the chief problem connected with the Northern Gem property ten years ago. Extensive work by the University of British Columbia and British Columbia Research Council resulted in the development in the 1940's of a flow sheet involving medium-to-high temperature and pressure leaching which would result in an indicated recovery of 90% cobalt and 98% gold. Results of recently completed research by Sheritt Gordon Mines and others have, however, so improved these methods that the Northern Gem Mining Corporation has been advised that treatment by leaching at normal pressure and temperature sufficiently low that no external heating is required, is applicable to the ore and recoveries as good or better than previously anticipated are assured. It is the intention of the company, therefore, to process the ore at the mine site, the final products being cobalt metal, gold and uranium oxide.

ECONOMIC CONSIDERATIONS

The value per ton of the ore now indicated on the Northern Gem property is unusually high. Geologic conditions are favorable for the occurrence of additional ore on the property. All possible efforts should, therefore, be made to explore the property thoroughly with the object of proving up as much ore as possible. The property may be developed into a high-grade small tonnage producer in the 25 to 100 ton-per-day class. It is possible, however, that sufficient tonnage of both massive and disseminated types of ore may be found to warrant a medium grade, medium tonnage producer in the 200 to 400 ton per day class. An unusual feature of the property is now evident, and that is the fact that the ore presently found can be mined, treated and marketed at an excellent profit, after all capital and other costs have been paid. As evidenced by the following pages such is not recommended, but should the expenditure herein recommended be made, and no more ore found, it is important to know that these and all other previous expenditures by this company along with an excellent profit could be taken from the presently known ore.

TIMBER, WATER AND POWER.

There is a limited supply of timber in the vicinity of the property for camp and mine use. For extensive construction and long-term mining, however, timber will have to be acquired from lumber mills operating along the P.G.E. Railway.

Ample water is available underground and in Roxey Creek for mining and domestic use.

The falls on Roxey Creek, just below camp, are, the writer is informed, capable of developing about 400 H.P.

SUMMARY AND CONCLUSIONS

The Northern Gem property, located in the Bridge River region of Southern British Columbia, is accessible by road.

High-grade cobalt-gold-uranium mineralization has been found in a geologically favorable zone upon which only a small amount of exploratory work has been done. The possibilities of developing sufficient ore to warrant an operation producing cobalt, gold, and uranium oxide, at an unusually high profit, are excellent.

The metallurgical problems connected with the economic recovery of the cobalt, gold, and uranium are solved. As soon as mine development has been carried to the stage where a definite daily operating capacity can be decided upon, a flow sheet can be designed, and plans for placing the property into production finalized.

RECOMMENDATIONS

The following is recommended as a minimum works program and capital outlay May 1st to August 31st, 1957:

1.	Road re-location and repairs	$12,000.00
2.	Camp accommodations	6,000.00
3.	Road and mining equipment: Turn in 2 old trucks for 2 new ones " " old bulldozer for larger one Purchase additional compressor	20,000.00
4.	Mining on upper level: Drift 500 feet Crosscut 100 feet	15,000.00
5.	Establish a new adit tunnel 125 feet below lower tunnel	15,000.00
6.	Join by raises the 3 tunnels,	8,000.00
7.	Underground diamond drilling: Upper level 3,000 feet Lower level 2,000 " New level 2,000 "	35,000.00
8.	Ore storage,	2,000.00
9.	Continued metallurgical work,	5,000.00
10.	Geological and Geophysical Surveys of property	2,000.00
11.	Office, supervision, management, contingencies	20,000.00
	Total Estimated Minimum Cost -	$140,000.00

Detailed plans for continued exploration of the property will be contingent upon results obtained by August 31st, 1957. The following winter program is, therefore, herewith recommended with the provision that, although the scope of the work should be adhered to

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the details may be altered to suit prevailing requirements:

1.	Camp accommodations	$15,000.00
2.	Snow plow equipment	15,000.00
3.	Mining equipment	15,000.00
4.	Two lower adit tunnels at approximately 250 and 375 feet below the present lower tunnel	40,000.00
5.	Road connection to lowest tunnel location	5,000.00
6.	Raise to join underground workings	10,000.00
7.	Diamond Drilling	40,000.00
8.	Office, supervision, management and contingencies	20,000.00
	Total Estimated Cost	$160,000.00

It is recommended, therefore, that the sum of $300,000.00 be provided in 1957 for works programs on the Northern Gem property.

Alfred R. Allen
Consulting Geological Engineer.

Vancouver, B. C.,
November 15, 1956.