

861965

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Please keep.*

**Underground Exploration Proposal**

**and**

**Cost Estimate**

**on the**

**IDAHO GOLD ZONE**

**of**

**CAROLIN MINES LTD.**

**(Situated near Hope, Southern British Columbia)**

**by:**

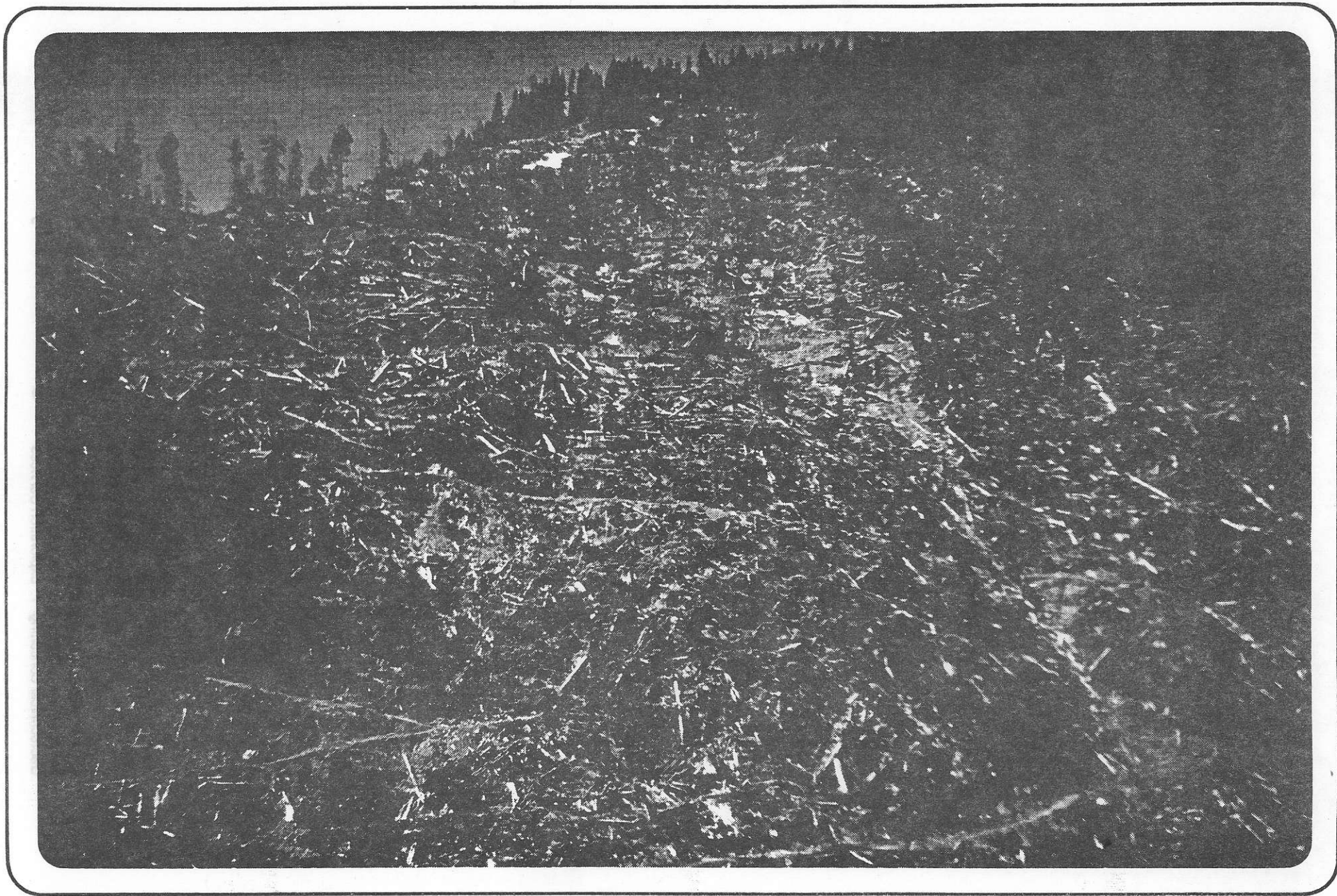
**D. R. Cochrane, P. Eng.,  
and D. J. Griffith, B. Sc.,  
June 14, 1976,  
Delta, B. C.**



**Cochrane Consultants Limited**  
4882 Delta St., Delta, B.C. V4K 2T8 946-9221  
Geotechnical Consulting / Exploration Services

**geology  
geophysics  
geochemistry**

Figure 1. Idaho Side Hill (looking north west)



*Figure 1. Idaho Side Hill (looking north west)*

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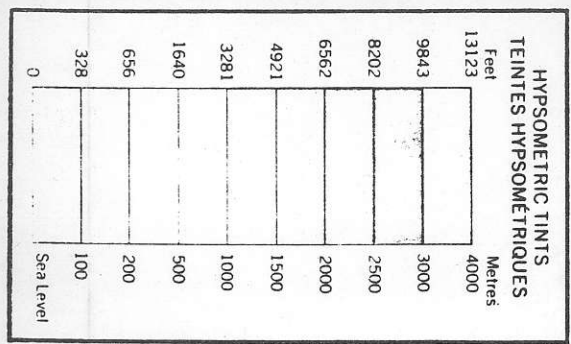
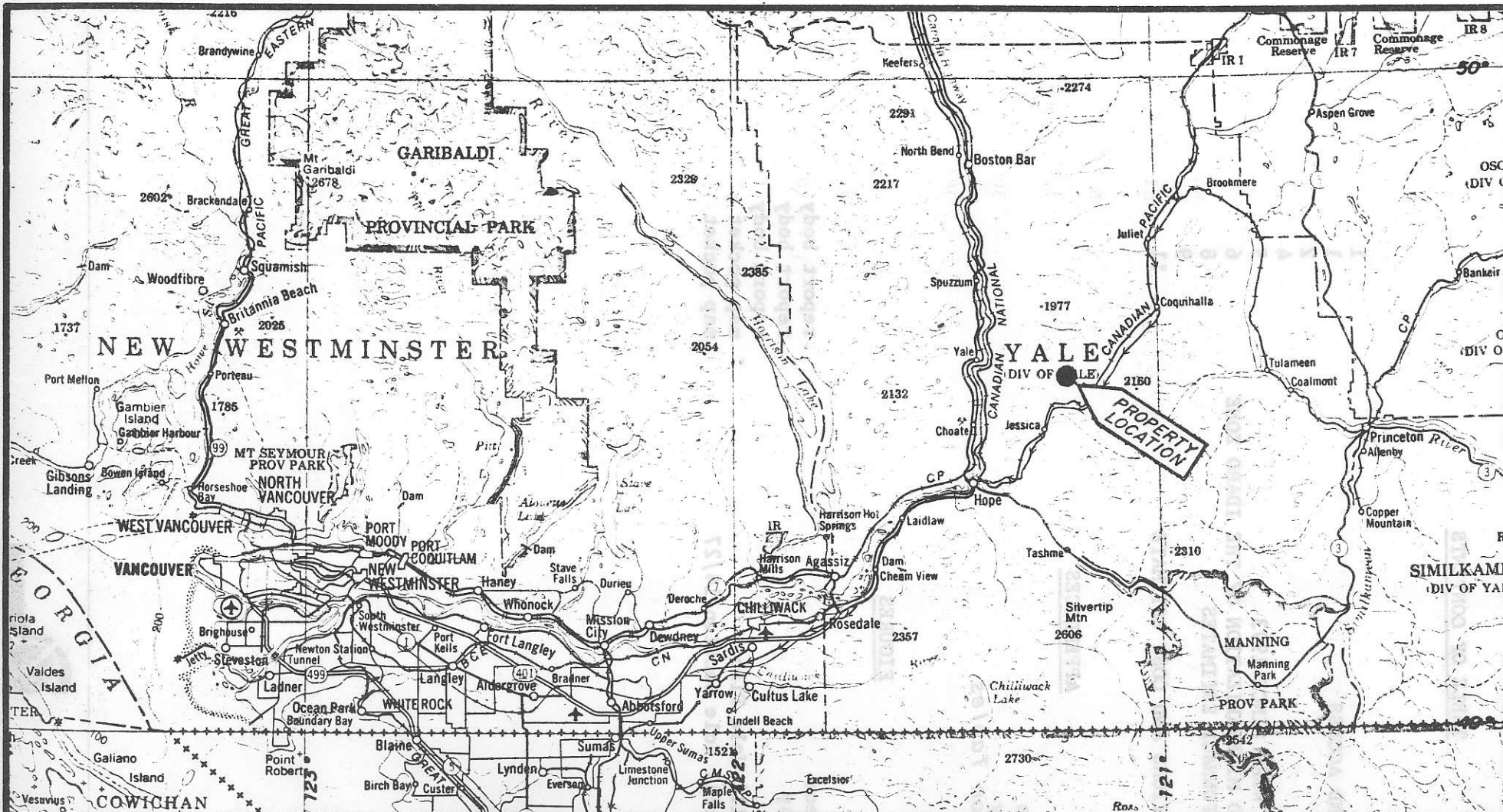
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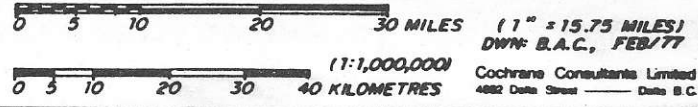
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Above map is from Dept. of Energy, Mines & Resources "Vancouver NM 9/10", 1969.

**LADNER CR. PROJECT**  
 Ladner Cr./Coquihalla R., B.C.  
 New Westminister M.D.  
 N.T.S.: 92H/11W  
**CAROLIN MINES LTD.(N.P.L.)**  
 LOCATION MAP Figure 2



## A. PREAMBLE

In the spring of 1973, Carolin Mines Ltd. of Vancouver optioned a group of claims collectively known as the Ladner Creek group and situated just outside of Hope in Southern British Columbia. During 1973 and 1974 extensive exploration work was conducted, and was centered mainly on the Idaho Zone, a gold bearing sulphide-arsenide deposit adjacent to the former producing Aurum Gold Mine. In the spring of 1975, after expenditures of about \$750,000.00 by Carolin, the property was optioned by Precambrian Shield Resources and Numac Oil and Gas and exploration work continued until the fall of 1975, with additional expenditures of approximately \$280,000.00.

Early in June 1976, Carolin Mines Ltd. repurchased the property from Precambrian/Numac, and Carolin now owns, once again 100% of the property.

This note describes recommendations for additional work on the gold deposits and estimates costs. In keeping with modern practise, metric units have been used where applicable, and, in order to avoid possible misinterpretation, a conversion table is appended.

## B. LOCATION AND ACCESS

The property is situated in the northern portion of the Cascade Mountains, some 20 air kilometers northeast of the town of Hope, in southern British Columbia. Most of the claims lie north of the "South West Fork", and west of the Main Fork of Ladner Creek. Facile road access to the southern claims sector is provided by a logging-



mining road which proceeds northerly then westerly from the Coquihalla River road at a point near kilometer 28 and close to "Jessica" a station on the now abandoned West Kettle Railway Line, The access road is easily passable by car or truck in the summer months, but is occasionally "washed out" in the freshet seasons. Access to the northernmost claims is by pack trail or by charter helicopter and the latter is available from a base in Hope.

The National Topographic System Code for the claims area is 92 H/11 (west ½): the latitude is  $49^{\circ}30'N$ , and longitude  $121^{\circ}15'W$ . (see Figure 1)

#### C. PROPERTY

Carolin Mines Ltd., with an office at 811-850 West Hastings in Vancouver, B.C. holds title by option to eight Crown granted claims and thirty-six (36) located claims and fractions from Summit Mining Co. of Hope, B.C. In addition, Carolin owns outright thirty-four (34) adjoining "CARO" claims and fractions. Precambrian Shield Resources Ltd., during their option period, staked additional claims which are now being transferred to Carolin. The claims form a contiguous block situated in the New Westminster Mining Division and are shown on B.C. Department of Mines claim Map 92H/11W (M). (See Figure 2)



The following tables list pertinent claims information.

TABLE A ORIGINAL OPTIONED MINERAL CLAIMS

1. Crown Grants

<u>Name</u>	<u>Lot No.</u>	<u>Acres</u>	<u>Expiry Dates*</u> (taxes paid to)
Aurum #1 to #6 incl.	1236 to 1241	227.52	July 2, 1976
Idaho	1234	40.75	" "
Tramway	1235	51.15	" "

2. Located Claims and Fractions

<u>Name</u>	<u>Record No.(s)</u>	<u>Expiry Date</u> (work recorded to)
Home Gold #1 to #15	14723-14737	August 21, 1982
Gold Star #1 to #4	11365-11368	July 28, 1980
Cabin #1 to #9, #11 & #13	11903-11/13/15	July 21, 1980
Cabin #10, 12 & 14	11916/18/20	July 21, 1982
Cabin #20 FR	11917	July 21, 1982
Cabin #21 FR	11918	July 21, 1980
Sylvia FR	11364	July 20, 1980

TABLE B CAROLIN MINES - list of claims and fractions owned outright

<u>Name(s)</u>	<u>Record No. (s)</u>	<u>Expiry Date</u>
CARO #1 to 23, and 25	28614-28639	June 29, 1980
CARO 24 & 26	28638/40	June 29, 1982
CARO #29 to #30	28641/42	June 29, 1982
CARO #1, & #3 FR	28643/28645	June 29, 1980
CARO #2 FR	28644	June 29, 1982
CARO #5 FR	28646	June 29, 1982
CARO #6 FR	28647	June 29, 1980

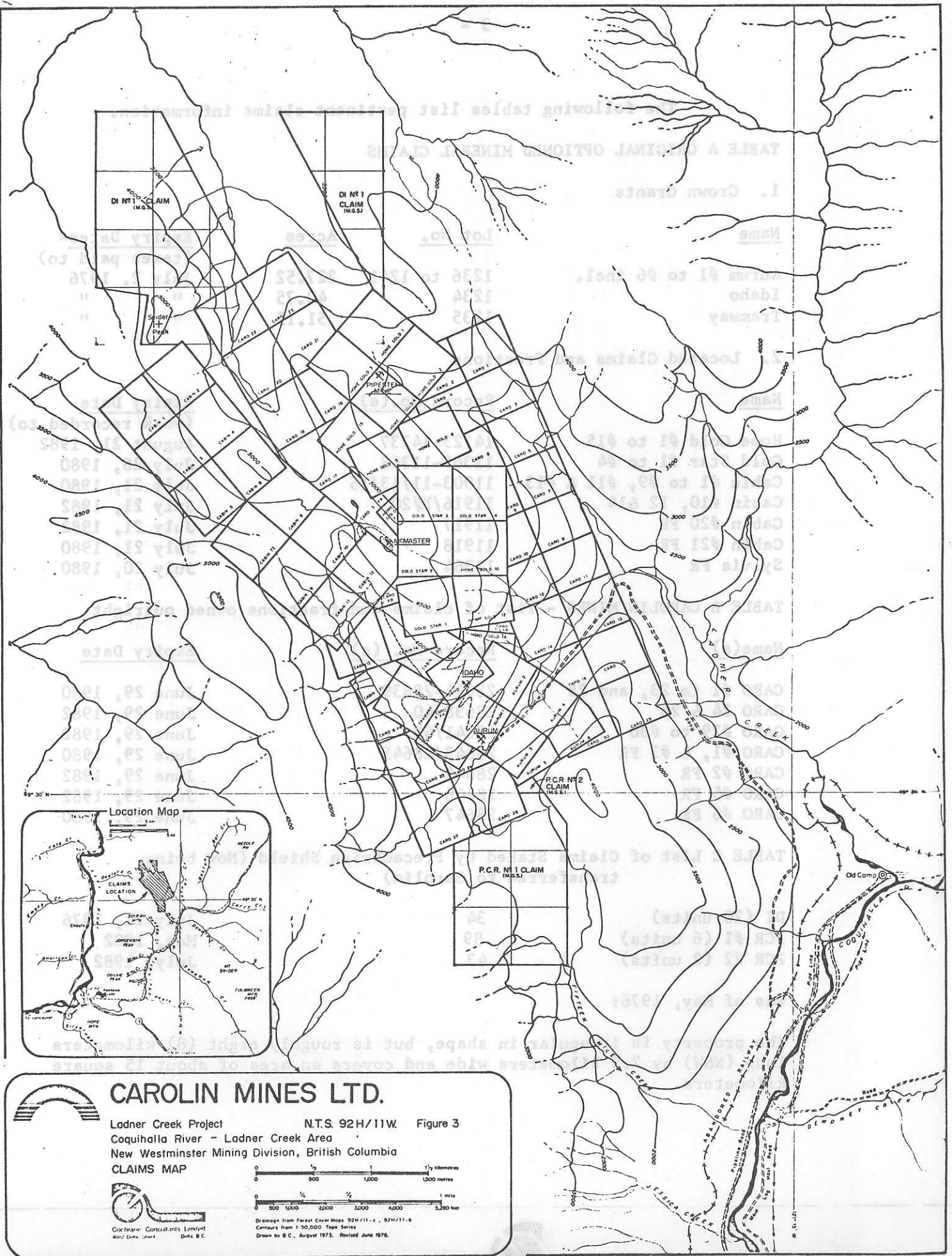
TABLE C List of Claims Staked by Precambrian Shield (Now being transferred to Carolin)

DI (20 units)	34	July 11, 1976
PCR #1 (6 units)	89	May, 1982
PCR #2 (2 units)	43	July, 1982

\*as of May, 1976:

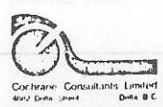
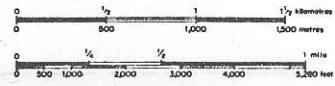
The property is irregular in shape, but is roughly eight (8) kilometers long (NNW) by 2.5 kilometers wide and covers an area of about 15 square kilometers.





# CAROLIN MINES LTD.

Ladner Creek Project N.T.S. 92H/11W. Figure 3  
 Coquitalla River - Ladner Creek Area  
 New Westminster Mining Division, British Columbia  
**CLAIMS MAP**



Drainage from Forest Cover Maps 92H/11-c, 92H/11-d  
 Contours from 1:50,000 Top Series  
 Drawn by B.C., August 1975. Revised June 1978.

Coxburn Consultants Limited  
 4007 Date Street  
 Delta B.C.



D. HISTORY

A detailed account of the history of the Coquihalla Gold Belt is to be found in the various reports of Dr. C. E. Cairnes and in numerous B.C. Dept. of Mines Annual Reports of the Minister of Mines of the area, to which the reader is referred to for historic detail.

A terse version is given in various Cochrane and Cochrane-Griffith reports and a brief summary is presented below.

The discovery of the lode-gold deposits of the Coquihalla gold belt was a by product of the famous late 1850 placer gold rush on the Fraser River which was in full bloom as British Columbia joined the Canadian Confederation as a Province in 1871. Detailed placer work, even to the point of "panning the soil" culminated in the discovery of the Aurum Mine mother lode which produced spectacular specimens of native free gold, after old timers tunnelled along the serpentine-slate contact in underground adits, cross cuts, stopes and raises. A staking rush followed the Aurum discovery in 1923 and Carolin Mines now owns a respectable portion of the subsequent "finds" which were once well known mining names in the early 1930s. They include the Aurum and Pipestem Mines (or Home Gold) from which recorded production totalled just over 800 ounces of gold to less well known prospects such as the Idaho, Tramway, Rush of the Bull, Golden Cache and Gem Mines. The gold mines in the belt all closed down prior to the Second World War. The present claim group owned by Carolin covers all of the above named gold occurrences and it is the first time in history that one company has had the opportunity of investigating a good portion of the Coquihalla Gold Belt in its entirety.



E. BACKGROUND AND WORK SINCE 1973

Exploration work on the Ladner Creek property since 1973 has included close to 7000 meters of B.Q. wire line drilling (in 39 holes), geochemical soil sampling, assaying, geophysical surveying, geological mapping, transit surveying, trenching, road building, mill testing, and preliminary re-evaluation of the old mine workings.

Diamond drilling has been centered almost exclusively on the Idaho zone, and drilling has outlined a sizeable gold deposit and the "average", (statistically speaking), hole intersected 30 meters grading close to 0.10 troy ounces of gold per ton, and within this width there are wide sections that are significantly higher in grade. The Idaho zone has now been traced for almost 400 meters north-northwesterly and is still open to the north.

The results of the geochemical soil sampling work on the property is most encouraging and one of the anomalies was trenched and drill tested in the fall of 1975. This resulted in the discovery of the McMaster Zone, which is geologically and mineralogically similar to the Idaho, and is located just over one kilometer to the north. Several other geochemical "gold in soil" anomalies are, as yet, untested.

Two mill tests have been conducted on bulk samples from the Idaho Zone, by Britton Research of Vancouver, B.C. The results show that mineralized rock is amenable to direct cyanidation with recoveries in the order of 85 to in excess of 90%. At present, the proposed procedure would be to pre-concentrate the ore by floatation and then cyanide the float cons after regrinding.

F. GEOLOGY AND MINERALIZATION OF THE IDAHO ZONE

The geology of the area has been described in various G.S.C. publications including Summary Report, 1919 Part B; 1920 Part A; Memoir 139 "Coquihalla River Area" (1924); and Summary Report, 1929 Part A.

The Carolin claims straddle the north trending Coquihalla Serpentine Belt, which lies between the Paleozoic Cache Creek (Hozameen) series on the west, and the upper Jurassic Ladner slates on the east. Cache Creek rocks consist chiefly of interbedded cherts and shales and the Ladner Group is predominantly slates and argillites. The Idaho zone lies within what is believed to be the Lower Ladner Group and the regional trend of the host rocks is northwesterly. Rock units dip at steep to moderate angles northeasterly in the Idaho Zone area. The serpentine contact is some 200 to 300 meters west of the Idaho Zone, and this contact is nearly vertical. The host rocks of the Idaho Zones are greywackes, argillites and slates which have been variously albitized, carbonatized and silicified. The upper Idaho mineralized band appears to conform to the general bedding attitudes of the Ladner Slates.

In the Idaho Zone anomalously high gold values are found in silicified albite-carbonate bands which contain up to 20% by volume sulphides and arsenides. Normally pyrrhotite and pyrite are the most abundant metallic minerals followed by arsenopyrite and chalcopyrite. Visible native gold is not common, and the deposit may be described as a "no see um".



The sulphides and arsenides occur in streaks and bands within the altered fractured host rocks as well as in disseminations for some distance on each side of the well mineralized zones. Gold values are moderately uniform and the gold appears to be associated with pyrite (see report by Dr. A. J. Sinclair).

A generalized and simplified vertical geological section through the Idaho from top to bottom may be described as follows:

- (a) non mineralized argillite
- (b) grey green greywacke, becoming fractured and chloritic
- (c) upper mineralized Idaho Zone of albite-carbonate rock containing appreciable gold values
- (d) black to grey (graphitic) slates
- (e) lower mineralized Idaho Zone
- (f) unmineralized greywacke to conglomerate with narrow mineralized bands.

Mineralization is best classified as A. H. Lang's "E" type of ore, that is "sulphide replacement--consisting chiefly of auriferous arsenopyrite, pyrite and pyrrhotite."

Silver values are generally low (i.e., less than 1 oz. Ag/ton) and copper is often present in the 0.01 to 0.03% range within the auriferous zones.



G. GRADE and TONNAGE ESTIMATES

Grade and tonnage calculations have kept pace with drilling since late in 1973. The following table lists current estimates and references are described (to and including hole #39).

<u>Tonnage</u> (millions of short tons)	<u>Average Grade</u> (Au oz./ton)	<u>Remarks</u> <u>and References</u>
2.19	0.110	Griffith/Cochrane: Drill indicated assuming continuity between drill fences, fifty feet each side rule, 0.050 oz./ton cut off.
2.716	0.113	Clarke: Drill indicated and possible, 0.050 oz./ton cut off.
1.369	0.163	Clarke: Drill indicated and possible, 0.090 oz./ton cut off.
4.2	0.098	Montgomery: Geological reserves, geological cut off.
1.7	0.148	Montgomery: Geological reserves, 0.090 cut off grade.

Preliminary statistical computer analysis by Montgomery and Sinclair have determined that the following important relationships exist:

(a) Statistically, the Idaho Zone is remarkably uniform and no major surprises (i. e. lack of continuity between drill fences) are anticipated.

(b) The "statistical" range of sample correlation is 150 feet and interpolation and extrapolation of data is viable up to 500 feet.

#### H. DISCUSSION

Exploration work on the Ladner Creek property and in particular the exploration work on the Idaho Zone to date has determined that:

(a) mineralization consists of pyrite, pyrrhotite, arsenopyrite and fine free gold in an albite-carbonate-quartz-chlorite host rock.

(b) the mineralized bands appear to be conformable to bedding in the Ladner slates and several such bands exist within the sedimentary pile (i.e. upper upper Idaho, upper Idaho, lower Idaho, upper McMaster, lower McMaster, etc.)

(c) the geochemical soil sampling results suggest that other auriferous bands are present on this property, and in addition, that the intrusive, located in the center of the property, is also mineralized with anomalously high amounts of gold.



(d) The Idaho zone consists basically of two limbs, which intersect on the west side, and plunge and dip at moderate angles to the north. The average drill hole intersected 30 meters of 0.1 ounce per ton gold and the zones are open to the north.

(e) Mill tests have shown the auriferous zone material is amenable to cyanidation within acceptable limits of recovery.

(f) The Idaho Zones are truncated (i.e. outcrop) in the south by topography, and rakes into the hillside so that surface diamond drilling to the north requires continuously increased dead rock drilling. (hole 37, the most northerly is 1618 feet deep). The surface diamond drill coverage is therefore restricted and widespread at the north end of the deposit.

(g) It is now, therefore, more economically expedient to underground develop the deposit, and drill and test from underground rather than to drill and further develop from surface. Long surface drill holes are deflecting to such an extent that target area intersection is not always possible; and it is now economically unjustified to correct the deviation (wedge) in all long surface holes.

(h) Underground drifting in the Idaho Zone is now required in order to provide:

1. first hand knowledge of the horizontal, vertical and lateral extent of the deposit.
2. access for underground drilling.
3. bulk samples for assaying, mill testing and geological investigations.
4. determine the continuity of the deposit between drill hole fences, especially at the north end of the deposit.

I. RECOMMENDATIONS and COST ESTIMATE

In view of the foregoing, the author strongly recommends further detail engineering studies and an underground exploration test of the Idaho Zones. This program should be somewhat flexible, and, in addition, due to the current inflation trends, a contingency factor of 20% has been used in place of the 1970 10%, and 1974-5 15% figure. The purpose of the program is twofold, namely:

(a) to test the lateral, vertical, and currently "drilled off" length of the Idaho, in order to more accurately estimate reserves in this area; and in addition, to determine suitable mining and milling practices; and

(b) to test the northerly extension of the deposit.

A detailed cost estimate of the recommended program is presented below:

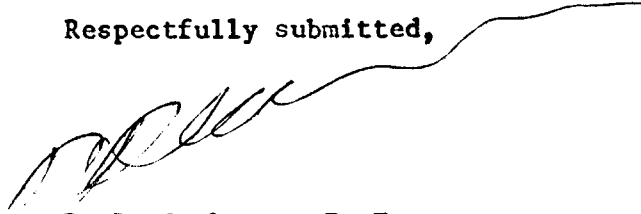
1. Rehabilitate access road from the Coquihalla to the Ladner Creek bridge.	\$ 2,500.00
2.* Construct a new road from Ladner Creek bridge to portal site.	12,500.00
3. Prepare portal and buildings site	12,500.00
4. Prepare muck storage (sample) space	5,000.00
5.* Erect dry, warehouse-shop, first aid facilities and office building (based on 6 mo. lease arrangements and including moving).	20,000.00
6. Survey and collar portal	6,000.00
7. Exploration decline, keeping to 15%, and "in ore" (as close as possible), 600 metres @ \$490.00 per metre	294,000.00



8. Exploration cross-cutting, test raising, drill station slashing, 350 metres @ \$400.00 per metre	\$140,000.00
9. Exploration winze from north end of the main decline to test the northerly persistence of zones, 300 metres @ \$500.00 per metre	150,000.00
10. Underground diamond drilling, including logging and assaying, 6,000 metres @ \$40.00 per metre	240,000.00
11. Mill testing, assaying underground muck, geological mapping, etc.	50,000.00
12. Test stoping	47,500.00
13. Transportation and communications	15,000.00
14. Engineering and supervision	42,500.00
15. Contingencies @ 20% of sub-total of \$1,037,500.00	207,500.00
	<hr/>
	<u>TOTAL</u> \$1,245,000.00
	<u>SAY</u> \$1,250,000.00

If part 9, the north exploration winze to test the persistence of the zone to the north is unsuccessful, then a full feasibility study of the deposit, and the method, rate, and economics of mining, would be required. If part 9 of the program is successful, additional funds will be required in order to further explore and delimit the extent of the mineralized zones.

Respectfully submitted,

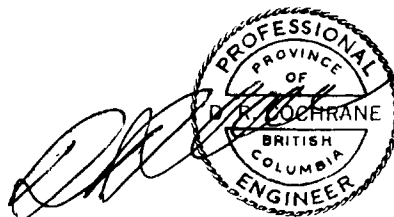
  
D. R. Cochrane, P. Eng.,  
June 13, 1976, Delta, B. C.



CERTIFICATE

I, Donald Robert Cochrane, of the Municipality of Delta, British Columbia, do hereby certify that:

1. I am a consulting geological engineer with an office at 4882 Delta St., Delta, B. C.
2. I am a graduate of the University of Toronto (1962) with a degree in Applied Geology (B.A. Sc.) and a graduate of Queen's University (1964) with a degree in the economic field of Geology. (M. Sc., Eng.)
3. I have practiced my profession continuously since graduation while being employed by such companies as Noranda Exploration Co. Ltd., Quebec Cartier Mines, and Meridian Exploration Syndicate. I have been in private independant practice since 1969.
4. I have no interest, either direct or indirect in the properties or securities of Carolin Mines Ltd., nor do I expect to acquire any such interest.
5. I am a member in good standing of the Association of Professional Engineers (A.P.E.) of the Province of British Columbia, and also a member of the A.P.E. in the Province of Ontario, Saskatchewan, Alberta and the Yukon Territories.
6. I first examined the Ladner Creek property on June 25, 1973 on behalf of Carolin Mines, and have been consulting regularly on the project since that date. The consulting work includes frequent "on property" examinations. I spent a total of eight (8) days "on property" in July, 1977 and spent several additional "in office" days.



August 2, 1977  
Delta, B. C.

(signed) D. R. Cochrane, P. Eng.

APPENDIX II

Bibliography:

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## Conversion Tables

## Simple Conversion Table of Length

Inches	1	2	3	4	5	6	7	8	9	10	11	12
Centimetres	2.54	5.08	7.62	10.16	12.70	15.24	17.78	20.32	22.86	25.40	27.94	30.48 (approx 0.3 m)
Feet	1	2	3	4	5	6	7	8	9	10		
Metres	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0		
Miles	1	2	3	4	5	6	7	8	9	10		
Kilometres	1.6	3.2	4.8	6.4	8.0	9.7	11.3	12.9	14.5	16.1		

## Simple Conversion Table of Weight

Ounces (av)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Grams	28.3	56.7	85.0	113.4	141.7	170.1	198.4	226.8	255.1	283.5	311.8	340.2	368.5	396.9	425.2	453.6*
Pounds	1	2	3	4	5	6	7	8	9	10						
Kilograms	0.45	0.91	1.36	1.81	2.27	2.72	3.18	3.63	4.08	4.54						

\* (approx 0.45 kg)

## Simple Conversion Table of Area

Square Inches	1	2	3	4	5	6	7	8	9	10
Square Centimetres	6.45	12.90	19.36	25.81	32.26	38.71	45.16	51.61	58.06	64.52
Square Feet	1	2	3	4	5	6	7	8	9	10
Square Metres	0.09	0.19	0.28	0.37	0.46	0.56	0.65	0.74	0.84	0.93
Acres	1	2	3	4	5	6	7	8	9	10
Square Metres	4 047	8 094	12 141	16 187	20 234	24 281	28 328	32 375	36 422	40 469

## Simple Conversion Table of Volume

Ounces (fl.)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Millilitres	28.4	56.8	85.2	113.7	142.1	170.5	198.9	227.3	255.7	284.1	312.5	341.0	369.4	397.8	426.2	454.6
Ounces (fl.)	17	18	19	20												
Millilitres	483.0	511.4	539.8	568.3 (approx. 0.57 L)												
Pints	1	2	3	4	5	6	7	8	9	10						
Litres	0.57	1.14	1.70	2.27	2.84	3.41	3.98	4.55	5.11	5.68						
Gallons	1	2	3	4	5	6	7	8	9	10						
Litres	4.5	9.1	13.6	18.2	22.7	27.3	31.8	36.4	40.9	45.5						

.. from "Metrics &amp; Measurements, Canada Metric Commission.

$$36'' = 30.48 \times 3$$
$$3' = 0.9144 \text{ m}$$
$$=$$



**Cochrane Consultants Limited**  
4882 Delta St., Delta, B.C. V4K 2T8 946-9221  
Geotechnical Consulting / Exploration Services

geology  
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geochemistry

August 2, 1977

Progress Report # 77 - 1

Carolin Mines Ltd.; Ladner Creek Project

In early May, 1977, financing was arranged for the work proposed in my June 14, 1976 report on "Underground Exploration Proposal on the Idaho Gold Zone". By early June, the surface surveying had been completed, the contract had been let to Fry and Associates, a new access road had been started to the portal site, and necessary camp facilities had been installed.

Work has progressed well but somewhat slower than expected, due mainly to equipment troubles and patches of inclement weather. The -20% decline is currently at just over the 100 metre mark and is designed to intersect the surface drill hole #13 at the 140 metre mark. Drill hole #13 cut several good sections in the proposed decline intersection area which included results such as 0.266 oz. Au/ton across 2.92 metres and 0.330 oz. Au/ton across 0.82 metres.

A muck storage area has been cleared in order to accomodate the decline muck on a round by round basis, and a sample plant has been purchased and mobilized to the minesite in order that samples may be prepared for assay pruposes.

Preliminary computed data processing has commenced to optimize sample patterns and intervals. Dr. A. J. Sinclair of U.B.C. is handling this phase of affairs. Mr. W. E. Clarke, P. Eng. has been retained to advise on the underground work and Mr. T. Worthington, P. Eng. has been retained to consult on milling and sampling. Ker, Preistman and Associates in co-operation with B. C. Research have been retained to advise on Environmental aspects.

Tenders have now been recieved from three diamond drill contractors, and the contract for 1500 metres of underground drilling will be let early next week.

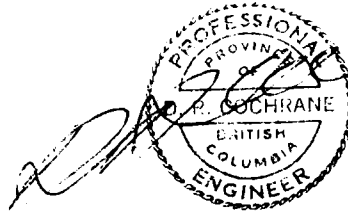
Mr. B. Cochrane (A.O.C.A.) has commenced preparation of mine plans and sections on a metric scale. Mr. B. Smith (former surveyor at Giant Mascott) is in charge of the underground surveying and sampling at the minesite.



In summary then, the first six (6) items in my June 14, 1976 report have been completed and work is progressing on recommendation #7 (the decline).

The total of the field related expenditures to date is approximately \$125,000.00 and is close to the estimated budget.

Respectfully submitted



D. R. Cochrane P. Eng.

