



Géologie - Rédaction de Travaux Statutaires

CHEVRON CANADA RESOURCES LTD

GEOLOGICAL REPORT

KIRKLAND LAKE PROPERTY

BURT TWP, ONTARIO

SEPTEMBER 1986

RECEIVED
1986
MINING LANDS SECTION

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SUMMARY

The Kirkland Lake Property (Meunier Option) of CHEVRON CANADA RESOURCES LTD. was gridded and mapped during the months of July and August 1986. The line cutting was performed by R. Dupras, while the geological mapping was undertaken by Meegwich Surveys, both operating from Rouyn-Noranda, Quebec.

The property is underlain by Huronian age sediments comprised of conglomerates, quartzites, argillites and slates. Penetrative deformation is minimal, and primary structures such as bedding have been well preserved. Jointing, which is well developed on the property, is believed to be the result of movement along faults which affected the underlying Archean volcanic and sedimentary rocks.

Ore deposits in the Kirkland Lake area are associated with Archean rocks of the Timiskaming Group and the Kirkland Lake-Larder Lake Fault. This structure of regional importance has been projected westward into Burt Township, and may cut the Archean rocks underlying the property.

A second phase of exploration, which includes a geochemical survey, channel sampling and a restricted geophysical survey has been recommended. Upon obtaining encouraging results from phase II, a diamond drilling programme should be considered (phase III).

Respectfully submitted:

Chantal Patenaude, B.Sc

Geologist

INTRODUCTION

Within the frame of an extensive exploration programme, line cutting and geological mapping were undertaken, during the months of July and August 1986, on the Kirkland Lake Property (Meunier Option) of CHEVRON CANADA RESOURCES LIMITED, located in Burt Township, Northern Ontario.

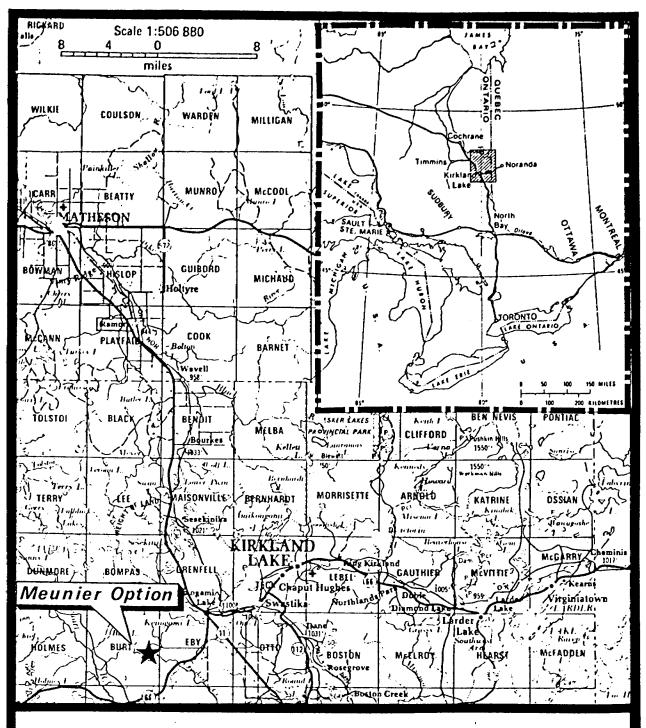
PROPERTY

The property surveyed is located in ranges III, IV and V, lots 2 to 7, in the eastern portion of Burt Township, and comprises 78 contiguous mining claims for an approximate surface area of 1248 hectares. A list of the claims is given in Appendix I.

LOCATION AND ACCESSIBILITY

The property is located in the eastern portion of Burt Township, Northern Ontario, 33 Km south-west of the mining town of Kirkland Lake.

It is easily accessible via highway 66 which crosses the southern portion of Eby Township, east of Burt Township. A logging road which branches off the main highway in a north-west direction crosses the south-



CHEVRON CANADA RES. LTD. KIRKLAND LAKE Project

~Location Map~

east corner of the block of claims and continues on to cross the entire northern portion of the property in an east-west direction.

TOPOGRAPHY

The property is located on the eastern edge of a glacial plain, approximately 3.2 km east of the Englehart River. The glacial deposits consist of sand, gravel and varved clays.

On the property, a series of north-south swamps are separated by gentle slopes where rocks outcrop.

PREVIOUS WORK

The property was previously held by Billiton Canada Ltd. and was partly covered by a reconnaissance geological mapping programme, as well as an airborne aeromagnetic and VLF survey. A ground geophysical (VLF) survey performed over the north-eastern portion of the property located several conductors (stratigraphic or mineralized?). A diamond drilling programme was then undertaken, in 1984, to test two of the conductors obtained. One of the holes remained in Huronian sediments, whereas the other one intersected Archean rocks. No encouraging assay results were obtained, and the property was dropped (for drill hole location see

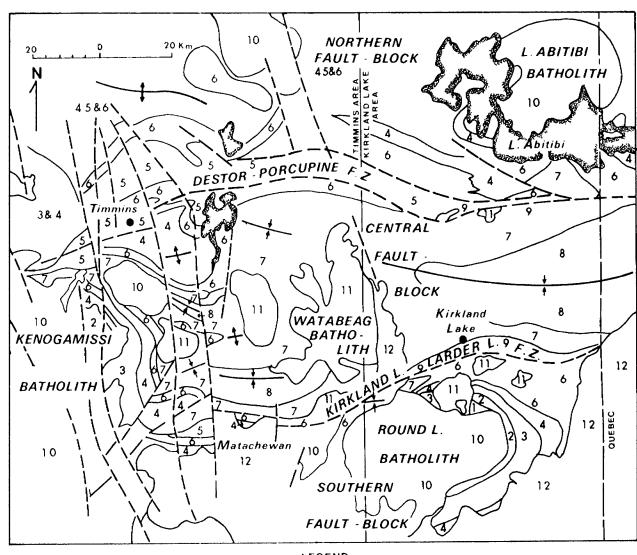
geological map enclosed).

GENERAL GEOLOGY

Kirkland Lake Area

The Kirkland Lake area is underlain by Archean volcanic, sedimentary and intrusive rocks comprised in the Abitibi Greenstone Belt. Two complete volcanic cycles, composed of komatiitic rocks, overlain by tholeitic and calc-alkalic rocks and capped by an upper alkalic sequence are present (G.P. Watson and R. Kerrich, 1983). A sedimentary assemblage made conglomerate, argillite, chert and iron formation separate the two cycles. In the Kirkland Lake gold camp, gold is found within the Timiskaming group which is the upper alkalic part of the second cycle. nian sediments (Proterozoic) unconformably overlay these rock formations west of the town of Kirkland Lake. Diabase dikes of Keweenawan (Proterozoic) age cut all the above rocks. The area is then covered by a thick Pleistocene deposit consisting of till, sand, gravel, and clay left behind during the retreat of the Wisconsin Glacier.

Three major east-west trending structures are found in the area: First, a synclinorium located between the Lake Abitibi Batholith (north of Lake Abitibi) and the Round Lake Batholith (south of Kirkland Lake), whose



LEGEND

Proterozoic

Keeweenawan diabase riot shown

12 Cobalt Group

Archean

Matachewan diabase not shown

Granitic rocks

- 11 Granodiorite monzonite, quartz monzonite, svenite
- 10 Massive to gneissic quartz diorite tonalite trondhjemite

Upper Supergroups

- 9 Timiskaming Group
- B Blake River Group

- 7 Kinojevis Group
- 6 Larder Lake Group
- 5 Porcupine Group

Lower Supergroups

- 4 Skead Group
- 3 Catherine Group
- 2 Wabewawa Group
- 1 Pacaud tuffs

CHEVRON CANADA RES. LTD.

Regional Geology of Kirkland Lake Area

KIRKLAND LAKE PROJECT

20 0 20 Km

DATE: AUGUST 1986

axis occurs midway between the 2 batholiths and plunges to the east. Secondly, two large fault zones, the Destor-Porcupine Fault Zone which cuts the northern limb of the synclinorium, and the Kirkland Lake-Larder Lake Fault Zone, striking at 065 degrees with an 80 dip, which cuts the southern limb of the synclinorium. These structures are beleived to have developed during the deposition of the volcanic succession and must be considered as having been associated with the origin of the rocks, therefore being pre-ore structures (Jolly, 1978). The gold-producing mines of Kirkland Lake are spacially distributed along the Kirkland Lake Fault (also called the Main Break). Several post-ore, northerly striking faults displace both volcanic and sedimentary piles in the Kirkland Lake area.

Three types of ore occurences have been proposed for the Kirkland Lake gold-camp:

Break ore, low grade bodies found within sections of the major breaks

Vein ore, gold-bearing quartz veins associated with the pre-ore fracturing

Breccia ore, less common, occurs in highly fractured, bleached rock containing lenses and pods of quartz with native Au and tellurides.

cambrian rocks. The volcanic pile consists of mafic to intermediate tuffs and iron formations, agglomerates, breccias and to a lesser extent felsic agglomerates. Conglomerates and greywackes which make up the sedimentary package overlie the metavolcanics. Plutonic rocks of granitic to dioritic composition intrude the aforementioned formations, and make up approximately 40 % of the area.

Proterozoic age Huronian sediments unconformably overlie the archean rocks. The sediments, part of the Gowganda Formation, consist of conglomerates, quartzites, slates, greywackes, grits, arkoses and argillites, the quartzites, greywackes and conglomerates being the major components of the assemblage.

Pleistocene and Recent glacial deposits of sandy boulder till and gravel mobilized by the receeding glacial Lake Barlow-Ojibway cover most of the area. The Englehart River which crosses the western part of Burt Township in a north-south direction has given rise to modern flood plain deposits of silt, sand and gravel.

Rocks in the Burt Township area show little or no penetrative deformation. Bedding, which can best be observed in the Huronian sediments, generally dips less than 20 degrees although dips as great as 80 degrees were observed. The strike varies a great deal, except in the southwestern part of the belt where it approac-

hes a consistent east-north-east trend. Local folding or faulting probably caused the occasional steep dip.

The Larder Lake Fault has been projected westward into Burt Township. The northeasterly-striking cleavages and joints have been interpreted as resulting from the movement along this structure. However evidence of post-Cobalt movement is ambiguous, and the exact location of the fault remains undetermined.

Throughout the years, evidence of gold, copper, molybdenum and lead mineralizations has been noted in quartz veins and shear zones, although no economical deposits have yet been discovered in the area.

PROPERTY GEOLOGY

Geological mapping of the property was undertaken during the month of August 1986 on a newly cut grid. The group of claims was divided into two blocks, Block I (B I) in the south and Block II (B II) in the north. A series of north-south lines were cut and picketed, and two base lines as well as three tie lines, having an east-west direction, were also cut to provide excellent grid control. Every line cut was prospected in the quest for rock outcrops.

Recent marshes and swamps cover approximately 60 % of

Recent marshes and swamps cover approximately 60 % of the property. On Block I, the swamps cover most of the area south of the base line, with the exception of small ridges in the south east corner and near lines 24W and 25W where a large north-south trending cliff occurs. Block II displays numerous large outcrops in the eastern portion of the grid, both north and south of the base line. The western part of the block, from line 8W north of the base line and line 22W south of the base line, is covered by swamps and flood plains caused by beaver dams.

The property is underlain by Proterozoic sediments of Huronian age. The rocks have a north-east strike and generally dip less than 20 degrees. Alteration is minimal and primary structures, such as bedding and ripple marks, have been very well preserved.

The sedimentary assemblage consists of quartzites, argillites, slates and conglomerates. Each unit is described below in order of importance.

The quartzite unit (5b), dominates the southwestern portion of the property. It is typically immature, massive (jointing in this unit occurs at intervals of 1 / 20 to 30 cm), and may be subdivided into three groups on the basis of composition.

5b, is characterized by a grey to buff weathering

surface and a medium grey fresh surface. It generally contains more than 50 % quartz, 30 % mafic minerals and 20 % feldspar crystals.

5b₂ , reddish grey on weathered and fresh surface, contains 40 to 50 % feldspars, 30 % quartz and 20 % mafic minerals.

 $5b_3$, noted on L6W / 6+50N (B I) and L0 / 9+75N (B II) is feldspar rich and therefore characterized by a reddish pink surface (both weathered and fresh). On L6W, very good banding and ripple marks have been noted. This subunit often occurs as vein-like lenses within the argillites or the slates.

Unit 5d , the argillite, occurs as a thin band in the east-central section of Block I, a broad zone in the east-central portion of Block II, as well as isolated outcrops in the western portion of both blocks. It is typically characterized by a greyish buff weathering surface, a medium grey fresh surface and interlocking grains. In this unit, jointing occurs at regular intervals of 1 / 5 to 10 cm. Stratigraphic changes between the argillites and the quartzites or the slates is gradational, and therefore it is considered a transitional unit.

Unit 5c, the slate, is characterized by a buff to white weathered surface, a dark grey fresh surface, and concoidal fracturing. It occurs as north-east trending bands throughout the eastern portion of the property,

or as pods contained within the argillites immediately north and south of the base line O, Block II. This unit is extremely brittle and jointing typically occurs at every 1 to 5 cm intervals.

Unit 5a, the conglomerate, occurs as a thin band in the central-western portion of Block II and as an isolated group of outcrops in the south-eastern corner of Block I. The conglomerate is made up of polymictic, unsorted, angular to subrounded fragments. Their composition ranges from granitic to syenitic, and occasionally quartzitic or argillaceous, with a size variation between 5 cm and 40 cm. They are in suspension in a medium grey quartzitic (5b) or argillaceous (5d) matrix. The fragments typically make up 25-30 % of the rock. This unit is practically not affected by jointing.

Unit 1, a mafic metavolcanic rock, was only sighted on LO, 6+90N (B I). The rock is fractured, brecciated and contains volcanic bombs of mafic composition. It is the only noted occurrence of Archean rocks on the property. The infiltration of chlorite along fracture planes and the presence of up to 2 % disseminated pyrite cubes, may indicate the presence of a major break at proximity to this outcrop.

STRUCTURAL GEOLOGY

The dominating structural feature on the property consists of extensive jointing, which displays various strike directions. The western portion of Block I is dominated by west of north (330 to 350 degrees) and north-east (40 to 60 degrees) directions; the remaining portion of Block I displays north of west (280 to 300 degrees) and north-east (40 to 60 degrees) directions; finally, near north (350 to 10 degrees) and near east (70 to 90 degrees) directions characterize Block II. The dip angle is mostly subvertical, but occasional shallower angles, +/- 70 degrees, have also been noted.

Fracturing and jointing of the Huronian group is considered to be the result of faulting in the underlying Archean rocks.

Bedding is very well preserved in the Huronian sediments. On the property, its direction is between 020 degrees to 040 degrees and it has a gentle dip, less than 020 degrees, to the north-west. Primary structures such as ripple marks have been noted on L6W, station 6+75N (BI).

ALTERATION AND VEINING

The rocks on the property have suffered very little deformation or alteration. Local moderate to weak

silicification has been noted at proximity to station 6+00S, Block II.

Hairline quartz veins occur as fracture filling in the north-eastern portion of the group of claims. The veining seems to be associated with the presence of slate pods in the argillites. This aspect will be discussed further in a later section.

MINERALIZATION

Pyrite is the only sulfide noted on the property during this geological mapping programme. It occurs as disseminated fine grains or as cubes along fracture planes. Its concentration ranges from trace to approximately 2%. The mineralization does not seem to be directly related to the occurrence of quartz veins.

DISCUSSION

According to the Ontario Geological Survey map no. P. 207 as well as field evidences gathered while mapping, the stratigraphic succession of the Cobalt Group would be:

HURONIAN

COBALT GROUP

5a Conglomerate

5b Quartzite

5d Argillite

5c Slate

The geological contacts inferred on the accompanying map (see attached pocket) may in fact represent differential topographic levels, since the property is comprised of rolling hills separated by marshes and swamps. Therefore, the interfingering effect could also be interpreted as "topographic contours".

Special attention should be given to the outcrops noted in the eastern portion of the property, north of the base line on lines 4W to 2W (B II) and on line 7W station 10+50S (B II). Both areas are comprised within the argillites (5d) and display subangular slate pods of various sizes. In both instances, multidirectional quartz veinning occurs. Although no mineralization is associated with the quartz veins nor the numerous jointing of the rocks, it is believed that this feature may be the result of movement of the underlying Archean rocks where economical base and precious metal deposits are known to occur.

CONCLUSIONS

The Kirkland Lake Property is underlain by a sedimentary assemblage of Huronian age. Geological mapping of the property indicated the presence of jointing and quartz infilling probably related to faulting which affected the underlying Archean metavolcanic rocks. It is known, through past exploration programmes in the area, that mineral deposits of economical importance occur at proximity to, or are comprised in, the Timiskaming Group metavolcanics. In order to detect the effects of the underlying Archean rocks on the Huronian sediments, and therefore determine the mineral potential of the property, a second phase of exploration is recommended.

CERTIFICATE

- I, Chantal Patenaude, of the City of Rouyn-Noranda, in the Province of Quebec, Canada hereby certify:
- That I am a consulting geologist, and have been engaged in my geological profession for approximately three years.
- That I am a graduate of McGill University (1983) with a B.Sc. in geology.
- 3. That I am a member of the Association des Prospecteurs du Quebec, member of the Society of Economic Geologists, and member of the Prospectors and Developers Association of Canada.
- 4. That my knowledge of the property described was acquired during the geological mapping programme of 1986 and through a study of government publications and reports.
- 5. That I have no interest either direct or indirect, nor do I expect to receive any, in the properties and securities of Chevron Canada Resources Ltd.

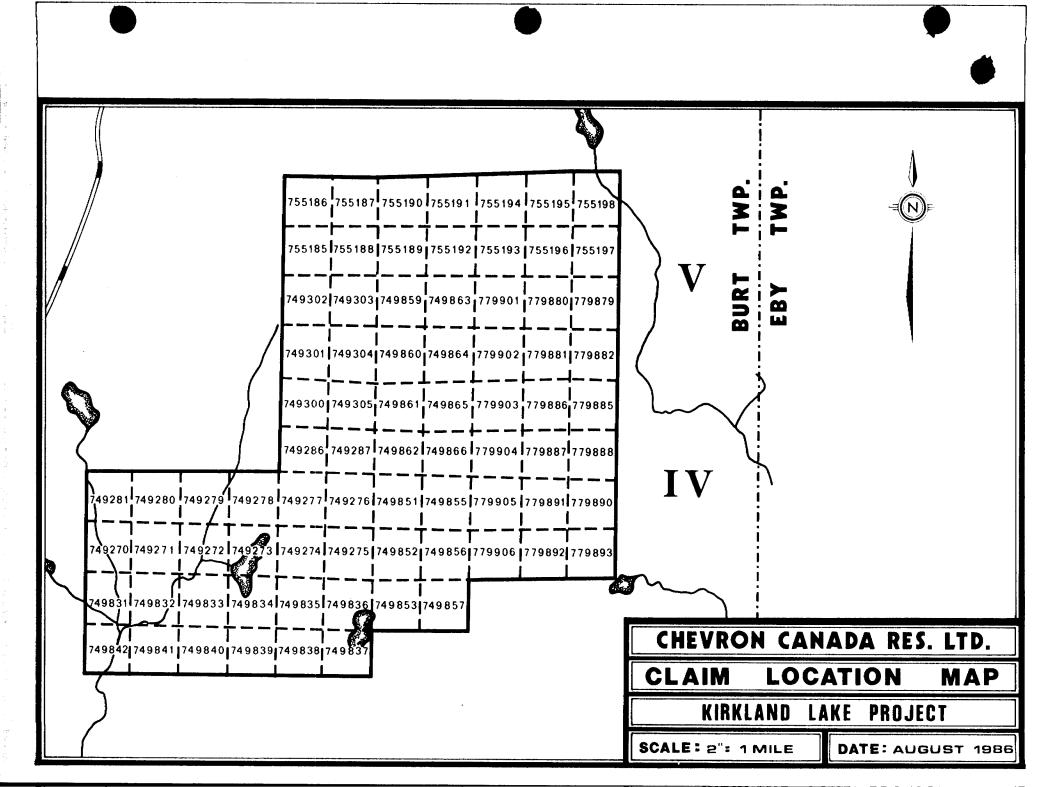
Dated at Rouyn-Noranda, Quebec, this 26th day of September 1986.

Chantal Patenaude

APPENDIX 1

LIST OF CLAIMS

749831	749832	749833	749834	749835
749836	749837	749838	749839	749840
749841	749842	749851	749852	749853
749855	749856	749857	749859	749860
749861	749862	749863	749864	749865
749866	749301	749302	749303	749304
749270	749271	749272	749273	749274
749275	749276	749277	749278	749279
749280	749281	749286	749287	749300
749305	755185	755186	755187	755188
755189	755190	755191	755192	755193
755194	755195	755196	755197	755198
779901	779902	779903	779904	779905
779906	779879	779880	779881	779882
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	Radiometric							
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REPORT OF WORK (cont)

BURT TOWNSHIP GEOLOGICAL SURVEY

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In Total

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Chevron Canada Resources Limited

Minerals Staff

Suite 1714 - 390 Bay Street, Toronto, Ontario M5H 2Y2 · Phone (416) 947-9166

October 27, 1986

S.E. Yundt, Director,
Land Management Branch,
Mining Lands Section,
Whitney Block, 6th Floor,
Queen's Park,
Toronto, Ontario
M7A 1W3

Dear Mrs Yundt:

Enclosed please find two copies of a Geological Survey Report prepared by Meegwich Surveys for Chevron Canada Resources in Burt Township, Larder Lake Mining Division.

Sincerely,

Sally Williams

encl.

MINING LANDS SECTION

TOWNSHIP LEGEND PATENTED LAND LARDER LAKE MINING DIVISION CROWN LAND SALE LEASES LICENSE OF OCCUPATION LOCATED LAND MINING RIGHTS ONLY DISTRICT OF TIMISKAMING SURFACE RIGHTS ONLY S. R.O. Areas withdrawn from staking lunder Section CANCELLED Mining & Surface rights withdrawn from stuling out prospection 43 of the Mining Act (R.S.O. 1970). sale or lease See 36 , The Many Act , A.S.O. 1980 349 Date 8 **Disposition** Order No. N. R. W 24/82 Nov 29, 1982 140 pm TO ONE INCHA 40 CHAINS SCALE 8. R.O. 400' surface rights reservation along the shares 75/12/75 W.71/76 (0058) S.R.Q. of all takes and rivers. 14/5/79 S.R.O. BOMPAS TWP NEW 92/30 129365 4/7/80 SREMAR (W 24/52 108 F21 29/11/82 755202 755203 P 755201 .75520 755198 1735199 755194 1755195 14 1755175 755178 455174 155182 755183 755186 1455181 755190 755191 (P) 755197 175520 755189 1755192 755193 1755196 755181 755184 155185 1755188 155177 1755180 779899 779898 779879 77987 44859 ,749863 779901 1779880 615 1749303 749290 749291 74929C 1 749297 749362 779902 779881 779832 779883 779400 1799292 749295 1749245 749860 ,749864 1795304 744101 5906 749284 749292 779885 1779884 1749865 779903 1779886 149861 417700 249294 749289 74130 FREA WITHORAWIN 755163 755166 749288 749293 755162 779888 744287 144561 , 744866 779904 1779887 149204 149285 194282 1744263 755164 175 44205 13767 15268 13768 755160 12561 749276 749851 749855 779989 149281 749280 779890 749319 749279 799277 47 TL 1 1149321 1 779893 779894 749327 749852 74985% 779906 1779892 3868638685 749370 749271 749272 749274 744171 T49832 135691 750004 1750001 749853 1749857 149835 ,749836 735644 7 749322 749323 P 749881 749832 735643 173564E 750002 749333 749328 750003 744840 1749839 749854 , 749853 749332 749536 1749897 799843 1749844 749845 ,749846 749324 747585 719594 799846 799647 749850 1749849 149335 1799330 **(₹**3) 7 750006 1750000 750012 1750009 F 749847 149839 1749890 149841 744842 750014 750013 Gravei File: 186049 735638 750015 P (Pa) 135640 ,735639 (P) (P) (F2) (P₂) 3 8 2 4 TWF." GROS 3 **ONTARIO** MINISTRY OF NATURAL RESOURCES

SURVEYS AND MAPPING BRANCH

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