

1K - Chisholm Lk 82(1)A

Geological Evaluation of  
THE  
CHISHOLM LAKE COAL PROPERTY  
(N.T.S. 93L3)

A report of the 1982 field exploration activities  
by  
John Davies, M.Sc., P. Geol.  
Coal Project Geologist  
Suncor Inc. Resources Group

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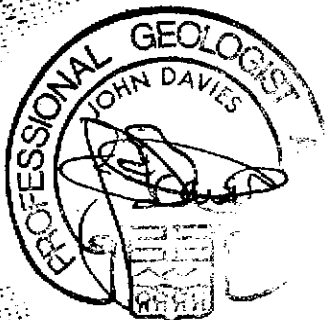
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by

December 15, 1982

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## SUMMARY

The Chisholm Lake coal property of Suncor Inc. comprises 32 licences covering 9716 hectares and is situated 35 km to the south west of Houston, B.C.

Between June and September 1982, reconnaissance geological mapping and two phases of exploration drilling were carried out. The objective of this work was to establish whether an economic coal deposit existed within the property.

The Chisholm Lake licences lie within the intermontane belt of west central British Columbia and are underlain by strata of Mesozoic age. Lithologies present within the property comprise sandstone, siltstone, mudstone and shale, having a shallow to moderate dip.

The area has not been subjected to intense deformation, but rather contains broad open folds. However, considerable faulting has occurred separating the area into numerous fault blocks.

Surface mapping did not discover the presence of coal bearing strata. The two phases of drilling which incorporated 274 metres of diamond core and 704 metres of open hole also failed to encounter coal deposits.

It is recommended therefore that Suncor allow the Chisholm Lake licences to lapse.

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## 1. INTRODUCTION

### 1.1 Location

The licences held by Suncor are situated approximately 35 km southwest of Houston, B.C. and 60 km south of Smithers (fig. 1). The property lies within NTS sheet 93L3 (Lamprey Creek)

Access to the southern part of the property (south of the Morice River) is provided by a good network of gravel logging roads, which join Highway 16 some 5 km west of Houston. The area to the north of the Morice River is only accessible by helicopter, although aircraft equipped with floats may possibly land on Chisholm Lake and also Thomas Lake at the northwest corner of the property.

### 1.2 Land Status

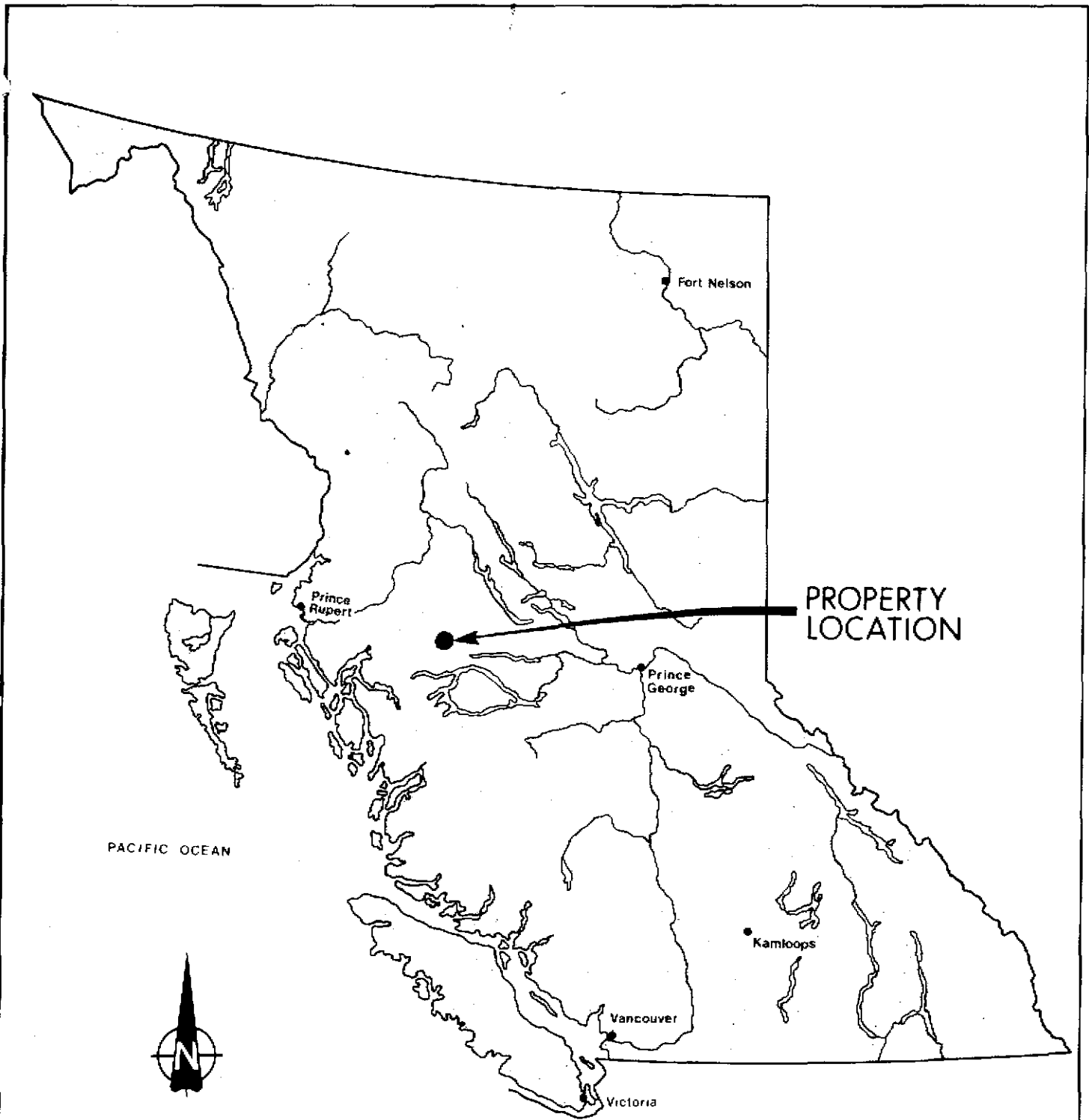
On 14th October, 1981, Suncor was issued coal licences (numbers 7260 to 7291 incl) covering 9716 hectares between Thomas Lake in the north and McBride Lake in the south. The licence configuration is shown in Appendix 1 and a list of licences, areas and date of issue is given in Table 1.


### 1.3 Previous Work

One of the earliest references to coal bearing strata and coal outcrops in the Chisholm Lake vicinity is contained in GSC Memoir 69 - "Coal Fields of B.C." (1915). It was reported by W. W. Leach that a seam incorporating about 1.0 metre of clean coal was discovered to the north of Chisholm Lake.

In 1954, G.S.C. Memoir 223 - "Mineral Resources of the Hazelton and Smithers Areas" was published and dealt briefly with the geology of the area. Two coal occurrences were noted near Chisholm Lake, being assigned to the U. Jurassic/L. Cretaceous Hazelton Group.





 Suncor Inc. Resources Group		COAL AND MINERALS DEPARTMENT	
<h3>CHISHOLM LAKE COAL LICENCES LOCATION MAP</h3>			
DATE NOV. 1982	SCALE 1:150 miles approx.	W.T.S. 93L	DRAWING No. 82-239

Work in the Smithers map area was undertaken periodically from 1964 to 1973 by Carter, Church, Kirkham, Richards and Tipper culminating in 1976 with the publication of G.S.C. Open File 351, "Geological Map of the Smithers Area - 93L". This document assigned the strata (including the coal) outcropping within Suncor's property to the L. Cretaceous (M. Albian) Red Rose Formation of the Skeena Group.

Although some doubt has recently been cast upon this classification, this report has largely adopted the terminology/age relationships presented in the above publication.

#### 1.4 Physiography

The property lies near the western edge of the Interior Plateau of West-Central British Columbia, which is bounded by the Coastal Range to the west and the Omineca Mountains to the east.

Within the licence block the maximum elevation attained is 1160 metres, being on the ridge to the south of the Morice River. The land surface in the northern one third of the property rises from below 700 metres in the Morice River valley to just under 1,000 metres near Thomas Lake. To the south of the Morice River, the ground rises steeply to 1160 metres where a gently undulating plateau falls gradually in a south westerly direction towards Collins Lake at an elevation of 830 m. On both the east and west sides of Collins Lake ridges rises steeply to elevations in excess of 1,000 metres, whereas to the south the ground continues to fall to 800 m at McBride Lake. The southern most portion of the property, to the north of Lamprey Lake, is gently undulating with a maximum elevation in the order of 980 m.

The principal river of the area is the Morice which flows west to east across the northern part of the property. It originates in Morice Lake some 10 km to the west and flows into the Bulkley River 6 km west of Houston.

TABLE 1

CHISHOLM LAKE COAL LICENCES

<u>Licence No.</u>	<u>Date Issued</u>	<u>MAP AREA</u>	<u>UNITS</u>	<u>HECTARES</u>
7260	Oct. 14/1981	93L3 Block B	47,48,57,58	304
7261	Oct. 14/1981	93L3 Block B	49,50,59,60	304
7262	Oct. 14/1981	93L3 Block B	67,68,77,78	304
7263	Oct. 14/1981	93L3 Block B	69,70,79,80	304
7264	Oct. 14/1981	93L3 Block B	87,88,97,98	304
7265	Oct. 14/1981	93L3 Block B	89,90,99,100	304
7266	Oct. 14/1981	93L3 Block C	41,42,51,52	304
7267	Oct. 14/1981	93L3 Block C	61,62,71,72	304
7268	Oct. 14/1981	93L3 Block C	81,82,91,92	304
7269	Oct. 14/1981	93L3 Block G	5,6,15,16	304
7270	Oct. 14/1981	93L3 Block G	7,8,17,18	304
7271	Oct. 14/1981	93L3 Block G	21,22,31,21	304
7272	Oct. 14/1981	93L3 Block G	23,24,33,34	304
7273	Oct. 14/1981	93L3 Block G	25,26,35,36	304
7274	Oct. 14/1981	93L3 Block G	41,42,51,52	304
7275	Oct. 14/1981	93L3 Block G	43,44,53,54	304
7276	Oct. 14/1981	93L3 Block G	45,46,55,56	304
7277	Oct. 14/1981	93L3 Block G	61,62,71,72	304
7278	Oct. 14/1981	93L3 Block G	63,64,73,74	304
7279	Oct. 14/1981	93L3 Block G	65,66,75,76	304
7280	Oct. 14/1981	93L3 Block G	83,84,93,94	303
7281	Oct. 14/1981	93L3 Block J	1,2,11,12	303
7282	Oct. 14/1981	93L3 Block J	3,4,13,14	303
7283	Oct. 14/1981	93L3 Block J	21,22,31,32	303
7284	Oct. 14/1981	93L3 Block J	23,24,33,34	303
7285	Oct. 14/1981	93L3 Block J	25,26,35,36	303
7286	Oct. 14/1981	93L3 Block J	41,42,51,52	303
7287	Oct. 14/1981	93L3 Block J	43,44,53,54	303
7288	Oct. 14/1981	93L3 Block J	45,46,55,56	303
7289	Oct. 14/1981	93L3 Block J	61,62,71,72	303
7290	Oct. 14/1981	93L3 Block J	63,64,73,74	303
7291	Oct. 14/1981	93L3 Block J	65,66,75,76	<u>303</u>
<u>32 Licences</u>			TOTAL AREA =	9716

The northern part of the property is drained by several minor creeks, the principal of which is Thomas Martin Creek which originates in Thomas and Oval Lakes. It flows southwards through the central part of the property and joins the Morice River. Two small creeks flow into Chisholm Lake which itself drains via Tagit Creek into the Morice River.

South of the Morice River, two main creeks provide drainage, Cedric Creek to the west and Lamprey Creek to the east. Lamprey Creek is the more important of these, originating in Lamprey Lake just south of the property. It flows in a north easterly direction along the eastern property boundary, draining Collins Lake and the central portion of the property before discharging into the Morice River. Much of the drainage in the southern one third of the property is to McBride Lake which is drained at its western end by McBride Creek and thus into Morice Lake.

Almost the entire area is heavily forested, although active logging to the south of the Morice River has provided numerous clearings. These cleared areas will probably be of a temporary nature as tree planting was being carried out over the summer. Natural clearings occur around the many lakes where the high water table promotes marsh development.

No precise climatic records were kept during the field season, however, in general, weather conditions were favourable to exploration. The property was first visited in early May when large areas still showed snow covering. By early June the property was virtually snow free although creeks were in spate and low areas exceptionally wet. June proved to be very dry and hot particularly towards the middle and end of the month. In July and August the weather was more variable, becoming wetter in August and cooling towards the end of the month. Early September was showery with occasional frosts at night.

There are no settlements within the property boundaries and no agriculture is practiced. Settlements indicated on the 1:50,000 map (1968 survey) have now disappeared leaving only the occasional derelict building to mark their existence.

## 1.5 1982 Field Work

The objective of the 1982 field season was to establish whether an economic coal deposit was present within the Suncor property. For this purpose, both reconnaissance geological mapping and exploration drilling were carried out between the beginning of June and the middle of September. The following personnel were involved throughout the summer:

John Davies - Project Geologist  
Rob Booker - Senior Geological Assistant  
John Alguire - Junior Geological Assistant  
Tom Brooks - Pilot - Highland Helicopter  
Dave Hocking - Pilot - Highland Helicopter

The reconnaissance mapping was undertaken during June by a two man field crew. The personnel were accommodated in a Smithers motel and supported by both a 4 x 4 truck and Bell 206B helicopter. The truck was used whilst working to the south of the Morice River where a good network of logging roads permitted reasonable access to the property. Due to the poor accessibility of the area north of the Morice River, helicopter support was required and was scheduled to coincide with the phase 1 drilling.

Exploration drilling activities were split into two phases. Phase 1 of the program commenced on 14th June, 1982 and was completed by 23rd June, 1982. This involved drilling two diamond core holes in the northern one third of the property where access problems required the use of a helicopter portable rig and logging unit. Both pieces of equipment were successfully handled by a Bell 206B Jetranger III. A week prior to the commencement of drilling, a contract crew was flown into the area to prepare the drill and helicopter landing pads. Immediately after completion of the drilling the same crew were recalled to reclaim the two drill sites. Additionally, surveyors were also transported to the area to accurately locate and provide elevations for the drill holes. All personnel were accommodated in Smithers for the duration of the drilling program and flown to the site either early morning or evening, a flight time of approximately 20 minutes.

The second phase of drilling was confined to the area south of the Morice River, commencing on the 9th September, 1982 and terminating on the 15th September 1982. A truck mounted rig and logging unit were used for the three rotary open holes. The personnel involved were accommodated at a motel in Houston and drove daily to the drill site, a journey of approximately one hour. Upon completion, all three holes were surveyed for location and elevation.

## 2. REGIONAL GEOLOGY

### 2.1 Stratigraphy

The Chisholm Lake coal licences lie at the western edge of the Intermontane Belt of west central British Columbia and are underlain primarily by strata of Mesozoic age.

The oldest known rocks of the area are of Permo-Triassic age and consist of massive limestone, basaltic breccias, tuffs and conglomerates. They are probably analagous to the Cache Creek/Takla Group described further north.

Towards the end of the Triassic, subsidence marked the development of the Hazelton Trough, into which were deposited lower to middle Jurassic sediments and volcanics. The lower most member of the Hazelton Group, the Telkwa Formation, is of Sinemurian to earliest Pliensbachian age and comprises a thick suite of calc-alkaline volcanics covering the entire region. Overlying the Telkwa Formation is the Nilkitkwa Formation of early Pliensbachian to Middle Toarcian age. It represents a distinct facies change and generally rests conformably upon the underlying strata. It comprises up to 1,000 metres of interbedded greywacke, andesitic to rhyolitic tuff and minor limestone. The overlying Smithers Formation is of Middle Toarcian to Lower Callovian age and comprises a primarily clastic sequence with occasional tuffaceous beds.

During the Middle and Upper Jurassic, uplift resulted in the formation of the Skeena Arch which effectively terminated deposition in the Chisholm Lake area. The Hazelton Trough was thus separated into two isolated basins, the Bowser Basin to the north and the Nechako Basin to the south.

This major hiatus lasted from the Oxfordian to the Hauterivian with the result that in the Chisholm Lake area erosion has removed much of the Hazelton Group, leaving only the lower most Telkwa Formation exposed. Prior to the recommencement of deposition in the area, the existing strata were deformed resulting in an unconformable relationship with the overlying deposits.

In the Hauterivian a marine transgression invaded the region from the west, gradually inundating the non-marine sediments and coal basins by mid to late Albian times. A final phase of volcanism in the Cenomanian brought to a close this episode of deposition. This assemblage, deposited during the lower and middle Cretaceous, has been assigned to the Skeena Group. The lower most member is the Kitsun Creek Formation (Hauterivian to Aptian) comprising conglomerates, greywackes, shale and minor coal. Penecontemporaneous volcanism resulted in the Rocky Ridge Volcanics, a suite of hornblende andesites, augite porphyrys and breccias. The overlying Red Rose Formation is of Albian age and contains marine and non-marine sediments including coal. The final member of the Skeena Group is the Brian Boru Formation of Upper Cretaceous age which is entirely volcanic in nature (tuffs and andesitic breccia).

A final phase of sedimentation occurred in the Maestrichtian and Eocene, comprising conglomerates, greywacke, shale and coal. This assemblage has been tentatively assigned to the Sustut Group.

The youngest rocks of the region originated from successive phases of volcanic activity throughout the Tertiary and are primarily of a basaltic and andesitic lithology.

During the Pleistocene large tracts of the lower lying areas were covered by glacial till and gravel, in places attaining thicknesses in excess of 30 metres. Finally, the larger river valleys have considerable accumulations of alluvium.

TABLE 2

## Stratigraphic Column

FORMATION	AGE	LITHOLOGY
<u>ALLIUM</u>	<u>HOLOCENE</u>	
<u>GLACIAL DEPOSITS</u>	<u>PLEISTOCENE</u>	Till, Gravel and Sand
<u>POPLAR BUTTE VOLCANICS</u>	<u>MIOCENE to PLEISTOCENE</u>	Olivine Basalt
<u>SHAWO GROUP</u>	<u>LATE EOCENE to EARLY MIOCENE</u>	
a) China Nose Breccia	Oligocene to Early Miocene	Basaltic Breccia
b) Buck Creek Volcanics	Late Eocene and Oligocene	Andesite and Dacite
<u>GOOSLY LAKE INTRUSIVES</u>	<u>EOCENE</u>	Syenonite and Gabbro
<u>SABINE INTRUSIVES</u>	<u>EOCENE</u>	Diorite and Granodiorite
<u>KASTBERG/MANIRA INTRUSIVES</u>	<u>EOCENE</u>	Pelite, Quartz Monzonite and Quartz Dye Porphyry
<u>GOOSA LAKE GROUP</u>	<u>LATE CRETACEOUS to EOCENE</u>	
a) Goosly Lake Volcanics	Maestrichtian	Trachyte and Rhyolite
b) Tiptophill Volcanics		Andesite and Dacite
<u>SUSTUT GROUP</u>	<u>LATE CRETACEOUS to EOCENE</u>	
a) Brothers Peak Formation	Paleocene	Conglomerate, Sandstone, Tuff and Minor Coal
b) Tango Creek Formation	Cenomanian	Conglomerate, Sandstone and Minor Coal
<u>BULKLEY INTRUSIVES</u>	<u>LATE CRETACEOUS</u>	Granodiorite, Quartz Monzonite, (Auegold Gabbro)
<u>SKEDNA GROUP</u>	<u>EARLY to LATE CRETACEOUS</u>	
a) Brian Boru Formation	Cenomanian	Porphyritic Tuff and Andesitic Breccia
b) Red Rose Formation	Middle to Upper Albian	Greywacke, Sandstone, Shale and Coal
c) Rocky Ridge Volcanics	Albian	Augite Porphyry, Andesite and Breccia
d) Ritoun Creek Sediments	Neotriassic to Albian	Conglomerate, Greywacke, Shale and Coal
<u>ONDREA INTRUSIVES</u>	<u>EARLY CRETACEOUS</u>	Granitic and Dioritic Intrusives
<u>BONGER LAKE GROUP</u>	<u>MIDDLE to LATE JURASSIC</u>	
a) Upper	Oxfordian to Kimmeridgian	Sandstone, Shale, Conglomerate and Coal
b) Lower (Ashwin Formation) (Trout Creek Basalt/Metalzul Volcanics)	Galloviaian and U. Oxfordian	Shale and Sandstone with Minor Conglomerate and Greywacke
<u>HAZELTON GROUP</u>	<u>EARLY to MIDDLE JURASSIC</u>	
a) Shethers Formation	Bejocian and Bathonian	Sandstone, Greywacke, Shale Conglomerate, Minor Tuff
b) Milkstone Formation	Pleinsbachian to Bejocian	Basalt Breccia and Tuff Grading up to Shale and Sandstone
(i) Red Tuff Member	Toarcian and Bejocian	Tuff, Basalt, Andesite, Dacite and Rhyolite
(ii) Arkwell Member		Andesite, Breccia, Tuff, Minor Greywacke and Limestone
c) Teliva Formation	Sinemurian	Basaltic to Rhyolitic Lavae, Minor Greywacke and Shale
<u>TOPLEY INTRUSIVES</u>	<u>EARLY JURASSIC</u>	Quartz Monzonite, Quartz Diorite and Granodiorite
<u>TRKLA GROUP</u>	<u>LATE TRIASSIC</u>	Andesite, Basalt, Minor Greywacke and Argillite
<u>ASITRA GROUP</u>	<u>PERMIAN</u>	Rhyolite, Tuff, Andesite, Agglomerate, Minor Limestone
<u>ULTRAMAFICS</u>	<u>CARBO-PERMIAN</u>	Serpentinite
<u>CACHE CREEK GROUP</u>	<u>CARBO-PERMIAN</u>	Argillite, Marble, Chert, Basalt.



## 2.2 Structure

The first phase of deformation to affect the region was probably of mid to late Triassic age. This resulted in the folding of the Permo-Triassic strata, however their limited exposure precludes any further description. It was probably this orogenic event that initiated the subsidence which resulted in the formation of the Hazelton Trough.

The initial movements of the Columbian and Pacific Orogenies probably resulted in the raising of the Skeena Arch, however little deformation is thought to have accompanied this uplift. The culmination of these Orogenies in the mid to late Cretaceous produced broad, open folds within the Mesozoic strata, although the structure becomes more complex in an easterly direction towards the Ominecas.

Although folding was relatively gentle, the area's structure has been complicated by repeated, closely spaced block faulting. The principal faults, which show most movement, have a northwest to southeast trend.

## 3. PROPERTY GEOLOGY

### 3.1 General

The work undertaken on the Suncor property in 1982 has not established any definite stratigraphic relationships amongst the formations encountered. However, this was not its aim. The reconnaissance mapping accomplished over the summer was designed only to ascertain whether or not coal bearing strata outcropped within the property or its immediate vicinity. The time allotted to this task was of necessity limited and the traverses undertaken were further restricted by access difficulties. The accompanying geological map (Appendix ) shows the traverse localities and drill hole positions. The principal faults and fold axes have been included, although the latter are mainly inferred from air photo interpretation. Finally, the principal areas of drift cover have been indicated, however this is not meant to imply that all other areas comprise extensive rock outcrop.

### 3.2 Stratigraphy

The strata outcropping within the property boundary have been assigned to the Red Rose Formation of the Cretaceous Skeena Group. Precise age relationships are uncertain, however a palynological study undertaken recently has clarified the situation somewhat. The youngest strata within the property appears to occur in the region of drill hole DDH-2. Here a sample of grey, carbonaceous mudstone from 20.0 metres yielded a palynomorph assemblage indicative of latest Albian/earliest Cenomanian age. Samples analysed from 47.5 m, 80.2 m and 130.8 m in the same drill hole indicate a successively older assemblage. The lower most sample indicates a middle Albian age. A surface sample from locality A1 (a fine grained micaceous sandstone) 2.5 km to the west of DDH-2, is of middle to late Albian age. DDH-1, 1.0 km northwest of 1A was also sampled for palynomorph assemblages at 22.6, 51.8, 111.4 and 129.5 metres. The uppermost sample indicated a late Albian age, whilst the lowest was middle Albian. These age relationships tend to support the presence of an anticlinal axis between DDH-1 and DDH-2 which had been inferred from dip measurements.

The strata to the south of the Morice River were also analysed for palynomorph assemblages. Localities 4A, 6B (dark grey shales) and 6D (fine grained sandstone) gave a middle Albian age whilst 8A (medium grained sandstone) indicated middle to latest Albian. Several other samples were analysed but unfortunately did not yield any palynomorphs. The inference from these results is that the area to the south of the Morice River is older than that to the north, probably indicating an east-west fault along the Morice.

The principal lithologies outcropping within the property are as follows:

Sandstone - primarily fine to medium grained ranging in colour from grey to green to salt and pepper. They are generally micaceous and glauconitic with occasional cross bedding and load casts. Bedding varies from

laminated to massive and geophysical logs in the drill holes suggest many contain a fair proportion of silt.

- Siltstone - generally dark grey, laminated to medium bedded and containing frequent interbedded sandstone and mudstone layers. They are usually gradational and do not themselves form thick units.
- Mudstone - This term has been applied to the argillaceous units encountered which do not exhibit a marked fissility. They are almost always dark grey in colour, sometimes carbonaceous, thinly bedded and gradational into siltstone.
- Shale - True shales are rare within the property, the largest outcrop being on the west side of Collins Lake in the vicinity of localities 7G and 7F. Here the shale is black, concretionary, slightly silty with a marked fissility.
- Coal - No coal seams were found within the property although a known outcrop some 2.5 km west of the licence boundary was visited. Thin coal stringers were seen in the sandstone and mudstone core from DDH-2. These were generally less than 1.5 cm thick, rich in vitrinite and probably represent isolated coalified logs.

The geological map of the property shows the individual outcrops where noted but due to the poor exposure, no attempt has been made to link these points. The more resistant sandstone units provide the majority of outcrop, usually forming ridges and knolls. The lower ground is most probably underlain by siltstones, mudstones and shales, a supposition borne out by the drill hole data.

The sequence of deposits encountered during the field work is indicative of both non marine and marine environments. The area north of the Morice River is characterized by non marine and brackish sedimentation. The majority of the deposits are fluvial, lacustrine and deltaic in origin with a shoreline situated somewhere to the south and west. Minor marine transgressions appear to have occurred periodically but have not contributed greatly to the accumulated strata.

South of the Morice an almost entirely marine sequence has been deposited. Many of the samples indicate a considerable distance from shore, particularly the shales of localities 7G and 7F and the mudstone in drill hole RH-03. The sandstones of this southern area exhibit a more pronounced greenish colour, possibly due to glauconite which is indicative of marine sedimentation. These sands probably represent both offshore bars and turbidite deposits, as both fining and coarsening upwards cycles can be seen.

### 3.3 Structure

The principal structural trend throughout the property is north east to south west with subsidiary east-west features.

Folding appears to have been relatively gentle resulting in broad open folds with dips rarely exceeding 60°. It is not possible to trace individual folds for any great distance due in part to the poor exposure and also to faulting.

The area has been broken up into several blocks by a series of high angled faults. There is no evidence of major thrusting within the property. The principal east-west fault is the Morice Fault which has downthrown the Upper Albian/Cenomanian to the north against the Middle Albian of the southern block. The amount of throw of this fault is open to conjecture but palynological data suggests movement possibly of no more than one or two hundred metres.

There is evidence for a major fault along Tagit Creek to the west of the property. Here Aptian or older strata have been upthrown against Middle to Upper Albian rocks. Additional faults have been assumed in the vicinities of drill holes DDH-1 and DDH-2. The former was drilled near the base of a sandstone scarp, which would now appear to be a fault scarp as evidenced by the brecciation and calcite veining present in the core. The fault would seem to be of a high angle and downthrows to the south. The latter hole was located close to Thomas Martin Creek and also shows considerable brecciation and calcite veining of the core. The fault plane may in fact intersect the drill hole at about 69.0 metres where a distinct kick occurs on the geophysical log. Downthrow would appear to be to the east as older strata occurs to the west. The amount of throw in both faults is considered to be small.

South of the Morice Fault, two major faults have been inferred from air photo interpretation. The first of these is Lamprey Fault which follows Lamprey Creek and forms an eastern boundary to the block on which the Suncor property is contained. It probably downthrows to the west, preserving the Skeena Group as a downfaulted block. If so, then the throw of this fault must be substantial. The second fault is Cedric Fault, along Cedric Creek, which forms the western boundary of the property. This fault probably downthrows to the east but the amount of throw seems less than that of the Lamprey Fault. The only other fault which deserves mention is McBride Fault which may be a westerly splay of the Lamprey Fault. It diverges from the latter some 4.5 km north east of McBride Lake and enters the eastern end of the lake, probably influencing the orientation of this part of the lake.

#### 4. Conclusion

The initial phase 1 drilling operations indicated that the area to the north of the Morice River has potential for coal occurrence. However, subsequent palynological studies has shown that the stratigraphic sequence encountered in the drill holes is substantially younger than the age assigned to the known coal outcrop west of the licences. It would seem therefore that although conditions necessary for coal

deposition may have been present in the Chisholm Lake area during the Aptian, subsequent tectonic activity has resulted in the downthrow of such coal seams several hundred metres below the Suncor property.

The area to the south of the Morice River was drilled in phase 2 with the knowledge that the palynological study had indicated older strata to be present. Despite drilling to a depth of almost 250 metres no coal was encountered, indeed no strata indicative of possible coal deposition were seen. The data obtained from these drill holes suggests a completely marine sequence and that a coal forming environment was never present in the area.

#### 5. RECOMMENDATIONS

The exploration work undertaken during the 1982 field season failed to find any coal within the Chisholm Lake property. Coal possibly occurring at depth is considered to be so deep and structurally complicated that an economic mining operation would not be feasible.

It is recommended therefore that the company does no further exploration on the licences and allows them to lapse.

### ACKNOWLEDGEMENTS

The author gratefully acknowledges the assistance provided throughout the project by Rob Booker, both in the field and office, John Alguire, the staff of the Highland Helicopters base at Smithers, B.C. and Mary Lynn Richardson, palynologist.

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APPENDIX 1

Licence Configuration



Exploration Division

1982 12 14

Province of British Columbia  
 Ministry of Energy, Mines and  
 Petroleum Resources  
 Parliament Buildings  
 Victoria, BC  
 V8V 1X4

MINISTRY OF ENERGY, MINES  
 AND PETROLEUM RESOURCES

DEC 15 1982

MINERAL TITLES FILE ROOM

Attention: Mr. Paul Hagen  
Coal Administrator

Dear Mr. Hagen:

Re: Geological Evaluation of the CHISHOLM LAKE Coal  
Property - Coal Licence Nos. 7260 to 7291, N.T.S.93L3

In compliance with the B. C. Coal Act Regulations, Suncor herewith submits duplicate copies of the final report concerning their Chisholm Lake Coal Licences.

Both the field work and preparation of the report were conducted by Mr. John Davies who has recently resigned from Suncor and returned to England. If you have any questions pertaining to this report, would you please direct them to Mr. R. D. Moss.

Best wishes for Christmas and the New Year.

Yours truly,

SUNCOR INC.

*Harold M. Fowler*  
 Harold M. Fowler  
 Land Supervisor

:AC

Enc.

**218**

REFERRED TO	DATE	INITIALS
C.G.C.		
D.C.G.C.		
G.C.		
F.M.C.		
M.T.D.R.		
P.L.C.R.		
C.O.A.L.		
D.G.C.		
FILE NO.		
FILING CLERK		



Province of British Columbia  
Ministry of Energy, Mines and Petroleum Resources

**APPLICATION TO EXTEND TERM OF LICENCE**

1. Suncor, Inc. agent for  
(Name) (Name)  
 500 - 4 Avenue, S. W. PO Box 38  
(Address) (Address)  
 Calgary, Alberta T2P 2V5

Valid FMC No. 244770

hereby apply to the Minister to extend the term of Coal Licence(s) No(s). N/A

for a further period of one year.

2. Property name Chisholm Lake

3. I am allowing the following Coal Licence(s) No(s), to forfeit. 7260. to 7291 inclusive

4. I have performed, or caused to be performed, during the period October 14, 1981 to October 12, 1982, work to the value of at least \$ 135,600

on the location of coal licence(s) as follows:

**CATEGORY OF WORK**

CATEGORY OF WORK	Licence(s) No(s).	Apportioned Cost
Geological mapping	7260. to 7291	15,638
Surveys: Geophysical	N/A	
Geochemical	N/A	
Other	7287, 7291	3,000
Road construction	N/A	
Surface work	N/A	
Underground work	N/A	
Drilling	7263, 7270, 7277, 7287, 7291	69,362
Logging, sampling, and testing	7260 to 7291	20,000
Reclamation	7287, 7291	3,600
Other work (specify)	7260 to 7291	24,000
Off-property costs	N/A	

5. I wish to apply \$ NIL of this value of work on Coal Licence(s) No(s). N/A

6. I wish to pay cash in lieu of work in the amount of \$ NIL on Coal Licence(s) No(s).

7. The work performed on the location(s) is detailed in the attached report entitled Geological evaluation of the Chisholm Lake Coal Property

(Date)

*John Davies*  
(Signature)  
 John Davies  
 Coal Project Geologist  
(Position)

GEOLOGICAL MAPPING

Yes  No

Area (Hectares)

Scale

Duration

Reconnaissance ... 9716 ... 1:15,840 ... June 1/82 to June 30/82
Detail: Surface
Underground
Other\* (specify)

Total Cost \$ 15,638

GEOPHYSICAL/GEOCHEMICAL SURVEYS

Yes  No

Method
Grid
Topographic .. Drill Hole Location and Elevation
Other\* (specify)

Total Cost \$ 3,000

ROAD CONSTRUCTION

Yes  No

Length
Width
On Licence(s) No.(s)
Access to

Total Cost \$

SURFACE WORK

Yes  No

Length Width Depth Cost
Trenching
Seam Tracing
Crosscutting
Other\* (specify)

Total Cost \$

UNDERGROUND WORK

Yes  No

No. of Adits Maximum Length No. of Holes Total Metres Cost
Test Adits
Other workings\*

Total Cost \$

DRILLING

Yes  No

Hole Size No. of Holes Total Metres Cost
Core: Diamond
Wireline .. NO .. 2 .. 282 .. 31,622
Rotary: Conventional .. 130mm .. 3 .. 704 .. 37,740
Reverse circulation
Other\* (specify)

Contractor .. D.W. Coates; Canwest Drilling
Where is the core stored? .. Charlie Lake, B.C.

Total Cost \$ 69,362

LOGGING, SAMPLING, AND TESTING

Yes  No

Lithology: Drill samples  Core samples  Bulk samples 
Logs: Gamma-neutron  Density 
Other\* (specify) .. Caliper, Resistivity, Deviation

Testing: Proximate analysis  FSI  Washability 
Carbonization  Petrographic  Plasticity

Other\* (specify) .. Palynology
Total Cost \$ 20,000

RECLAMATION

Yes  No

Details .. Sump Pit Filled
Total Cost \$ 3,600

OTHER WORK (Specify details)

Yes  No

Helicopter Support .. 24,000
Total Cost \$ 24,000

OFF-PROPERTY COSTS

Yes  No

Details
Total Cost \$

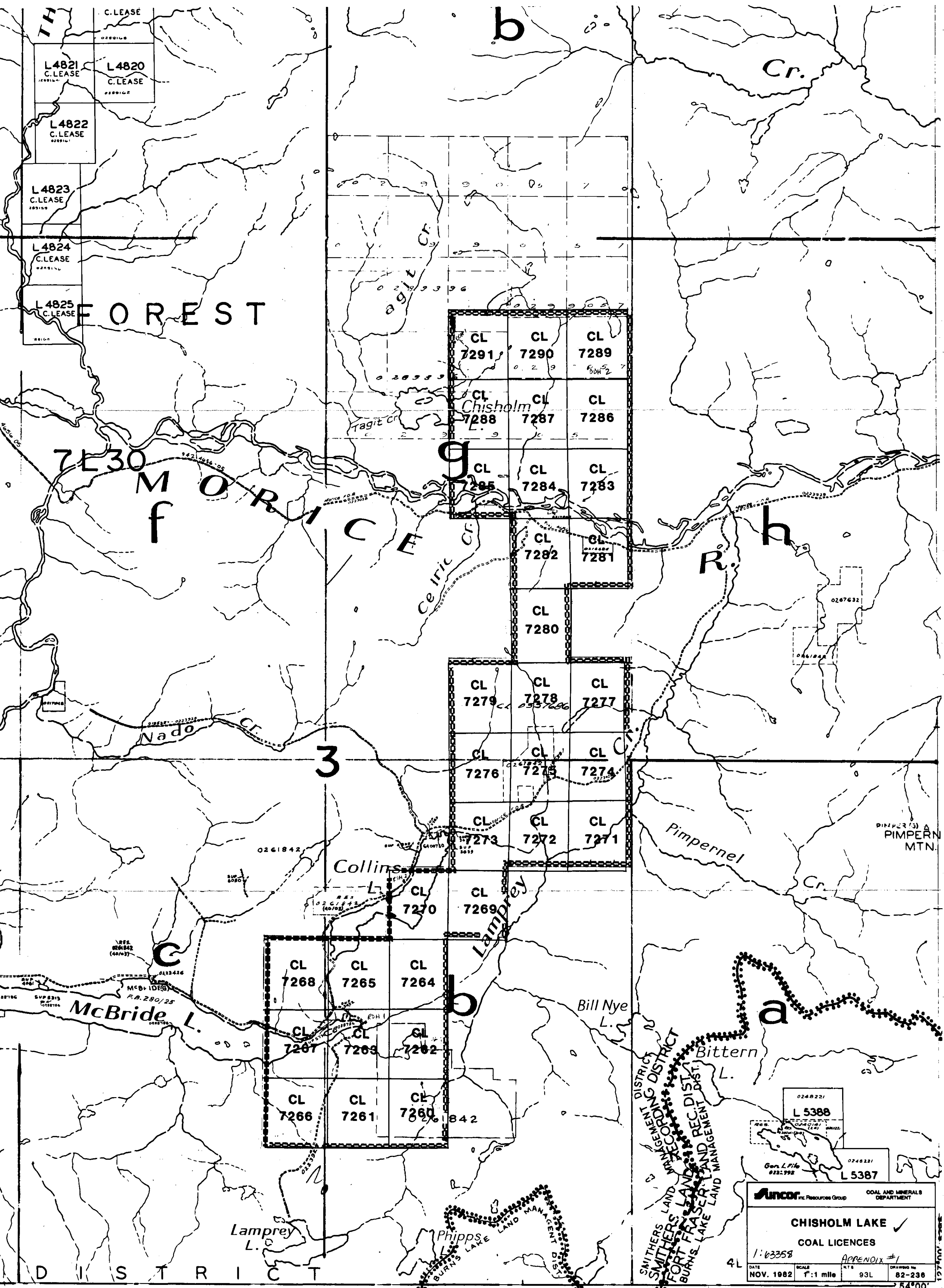
Total Expenditures \$ 135,600

(Date)

John Davies (Signature)

Coal Project Geologist (Position)

\*A full explanation of other work is to be included.



0248221  
L 5388

0248221  
L 5387

Gen. L. File  
022-992

**Suncor** Inc. Resources Group COAL AND MINERALS DEPARTMENT

**CHISHOLM LAKE** ✓  
COAL LICENCES

1:63358 APPENDIX #1

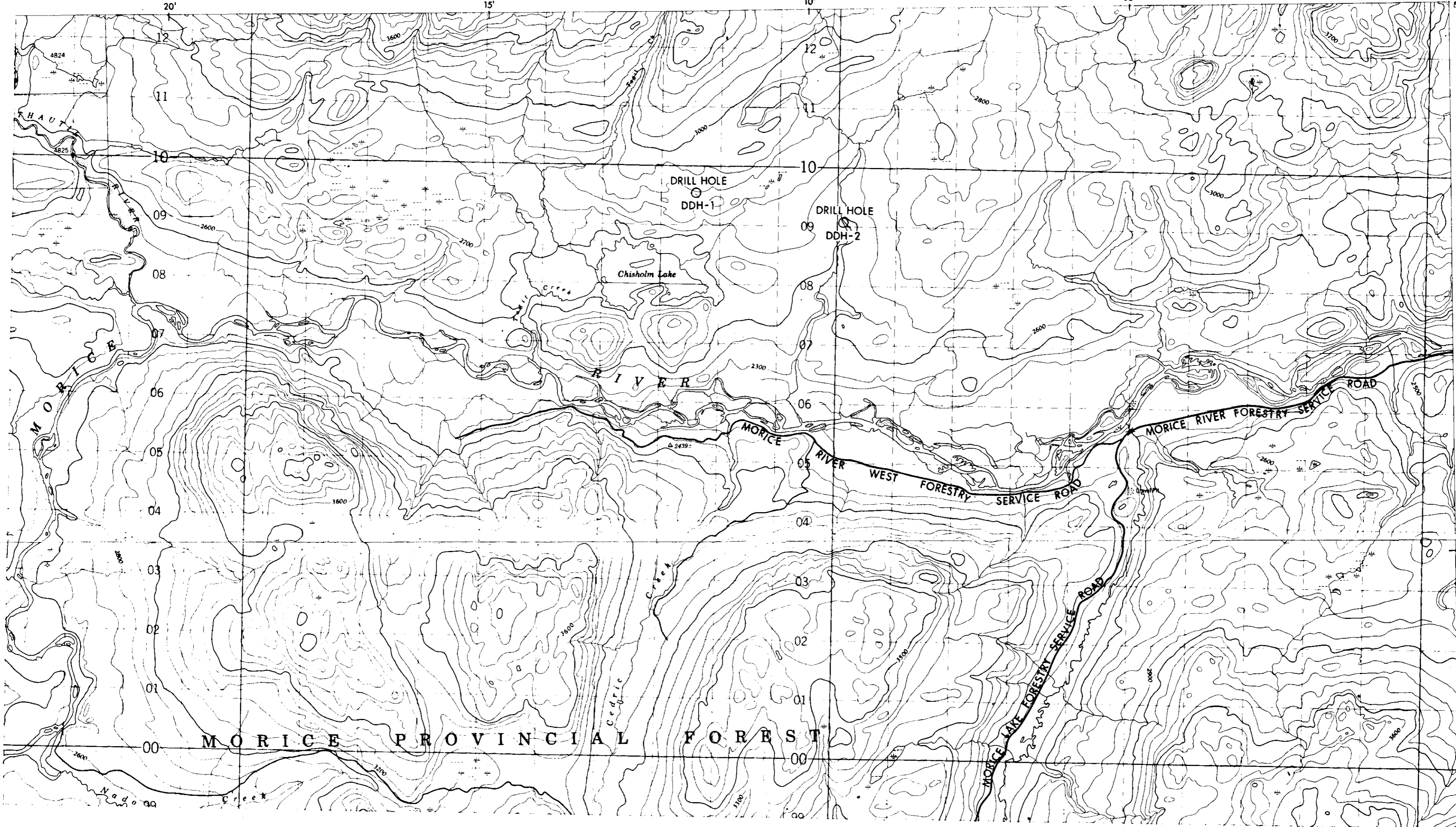
DATE	SCALE	SHEET	DRAWING NO.
NOV. 1982	1" = 1 mile	93L	82-236

54°00'

TR Chisholm Lake 81(2\*)A \*(1)

APPENDIX II

Phase I Drill Hole Location Map



KEY PLAN SCALE 1:50,000

*Chisholm Lk 82(1)A \*C)*

Suncor Inc. Resources Group		COAL AND MINERALS DEPARTMENT	
<b>PHASE 1</b> <b>DRILL HOLE</b> <b>LOCATION PLAN</b>			
<i>APPENDIX #2</i>			
DATE	SCALE	N.T.S.	DRAWING NO.
NOV. 1982	AS SHOWN	93L	82-236

218②

McWILLIAM - WHYTE - GOBLE & ASSOCIATES  
 B.C. LAND SURVEYORS  
 SMITHERS - PRINCE GEORGE  
 KAMLOOPS - SALMON ARM

REF. NO.: 2473-U.S.C.L.-5

PLAN SHOWING DRILL HOLE LOCATIONS  
IN VICINITY OF CHISHOLM LAKE, UNSURVEYED  
CROWN LAND, RANGE 5, COAST DISTRICT.

93L/6b U.T.M. ZONE 9U

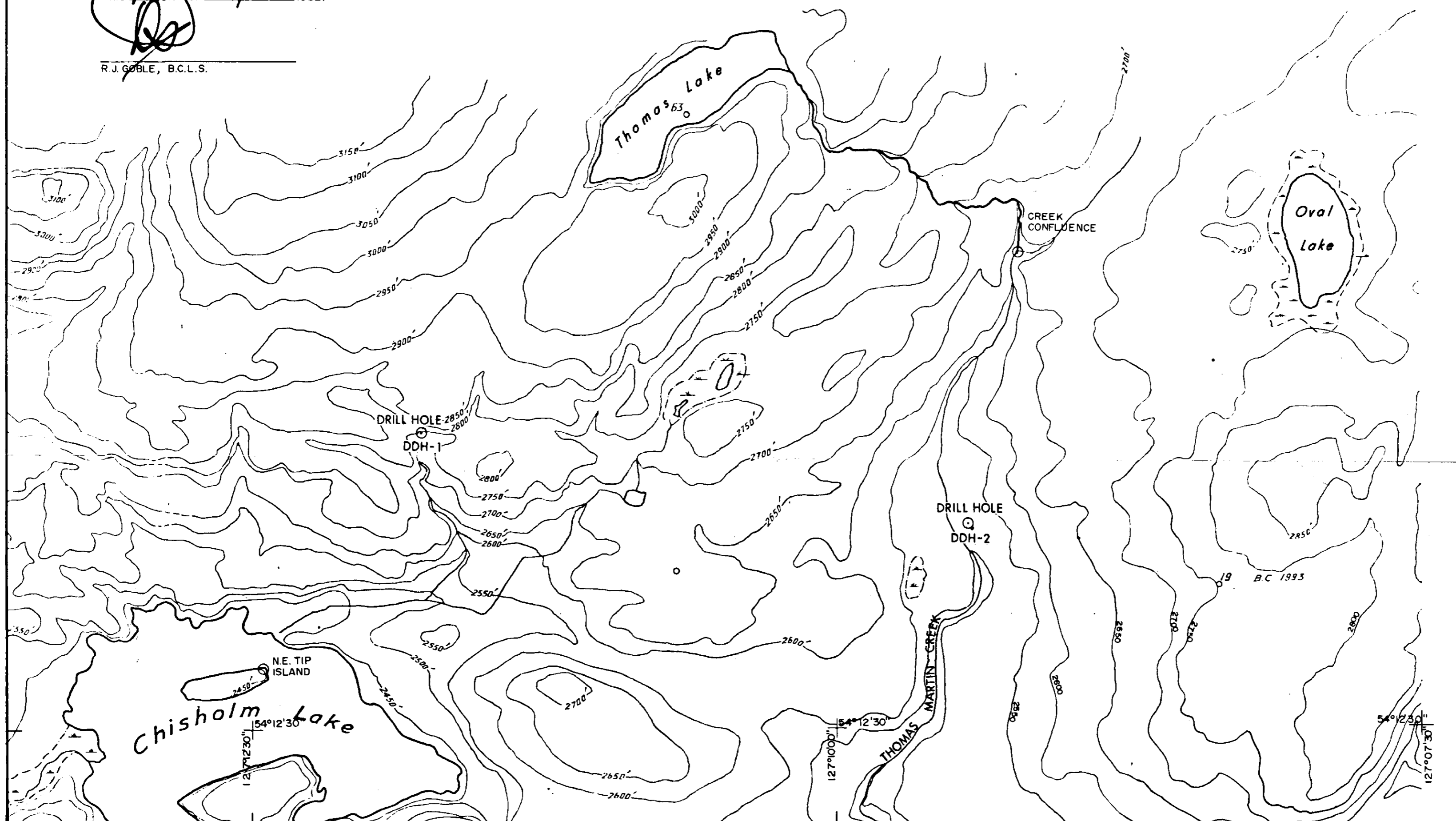
SCALE 1:15,840

CO-ORDINATES AND ELEVATIONS ARE IN METRES UNLESS OTHERWISE NOTED

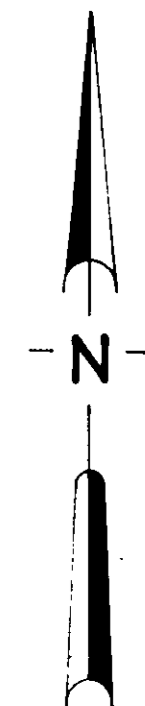
	U.T.M. CO-ORDINATES	ELEVATION
DRILL HOLE #1	N 6,009,107; E 620,118	770 (2525 ft)
DRILL HOLE #2	N 6,009,529; E 617,615	838 (2750 ft)
N.E. TIP UNNAMED ISLAND	N 6,008,400; E 616,875	
CHISHOLM LAKE		
CONFLUENCE OF TWO UNNAMED CREEKS NORTHEAST OF CHISHOLM LAKE	N 6,010,420; E 620,350	

CERTIFIED CORRECT  
THIS 9th DAY OF August 1982.

R.J. GOBLE, B.C.L.S.



218 (3)





APPENDIX III

Phase 1 Lithological Logs

SUNCOR INC.

218

JK Chisholm Lk 82(34)A \*(1)

COAL CORE LOG

Project CHISHOLM LAKE  
 Location N6009107; E620118  
 Elevation 770 metres  
 Date(s) Drilled 18 TO 22 JUNE 82  
 Dip/Direction VERTICAL  
 Date Logged 21 JUNE 82  
 Hole No. CHL/DDH-1/82  
 Logged By JD/RB  
 Page 1 of 4

Depth	S	DOL	LIM	BO	FR	Structure Desc.	Core Description	Remarks	ROD %	
									3040	3000
							Drift - primarily sandy clay			
6.71							Sandstone - medium grey, minor white speckling, fine to medium grained, thick bedded, strong, minor glauconite, frequent calcite veining, well sorted, sub-angular, some minor pyrite			64%
					F	80°; 11.23 to 12.34				10%
					FR	fracture 16.03 to 17.23				10%
						80° - pyrite				10%
					F	21.83 to 21.95				10%
22.12	P					60°	Sandstone - green-grey, fine grained, thin bedded, strong. Thin partings of mudstone	calcite veining present throughout core		10%
					F	27.62		palynology sample from 22.50 to 22.70		97%
					F	31.70	becoming slightly coarser with fewer partings of mudstone from 35.37			10%
						fault zone brecciated				95%
						60°				97%

Continued







SUNCOR INC.

218

Project CHISHOLM LAKE  
 Location N6009529, E617615  
 Elevation 838 metres

COAL CORE LOG  
 Dip/Direction VERTICAL  
 Date Logged 17th JUNE '82

Hole No. CHL/DDH-2/82  
 Logged By JD/RB  
 Page 1 of 4

Depth	S	B	L	R	Structure Desc.	Core Description	Remarks	ROD %		Core %
								30	40	
18.29						Glacial Drift - sand, gravel and stiff blue clay.				18.29
			J		80° slickensided	Mudstone - highly weathered, dark grey, silty, medium bedded, weak slickensided, coal stringers.				
20.27	P		J		45° slickensided + calcite		Palynology sample 19.91 to 20.07			86%
			J		60°	Sandstone - dark grey, fine grained faintly weathered, medium bedded mod. strong, coal stringers.				20.42
21.59						Mudstone - dark grey, v. silty, faintly weathered, thin bedded, weak slick. Dark grey sandstone between 22.17 and 22.55.				100%
23.61			J		75° calcite	Sandstone - dark to light grey, fine grained, thick bedded, strong, coal stringers, cross bedded.				23.47
			F		Calcite at 32.36					91%
34.44						Sandstone - light and dark grey speckled, medium grained. Faintly weathered, thick bedded, strong, coal stringers, occ. cross bedded.				100%
			J		80°					26.82
46.33	C		J		80° calcite	Sandstone - Medium grey, medium grained, fresh, thick bedded, strong, cross bedded, coarse with lenses of coal (1.5 cm) from 46.63 to 47.85. Finer and darker from 51.82	Coal sample 46.63 to 47.85			99%
	P		J		80° calcite		Palynology sample 47.45 to 47.00			29.52
54.25										98%
										32.61
										100%
										35.66
										100%
										38.71
										100%
										41.76
										100%
										44.81
										91%
										47.85
										100%
										50.90
										92%
										53.95

Continued

# SUNCOR INC.

## COAL CORE LOG

**Project** CHISHOLM LAKE  
**Location** N6009529; E617615  
**Elevation** 838 metres

**Dip/Direction** VERTICAL  
**Date Logged** 17 JUNE 82

**Hole No.** CHL/DDH-2/82  
**Logged By** JD/RB  
**Page** 2 of 4

Depth	Spm	Bot	Top	Structure Desc.	Core Description	Remarks	RQD %	UC %
					Continued			
54.25				F fracture zone at 54.25	<u>Sandstone</u> - dark grey, fine grained, medium bedded, fresh, strong, cross bedded, occ. fossil plants			100%
				F 55.78				57.00
				F fault zone 60.35 to 61.87				60.00
				J 61.87 to 62.90				61.87
65.53				F 67.97 calcite	<u>Sandstone</u> - light and dark grey, medium grained thick bedded, strong, occ. fine layers, some cross bedding			65.53
68.63					<u>Sandstone</u> - dark grey, fine grained, grading to coarse, strong			68.63
69.70					<u>Sandstone</u> - medium grey, medium grained, strong, thin bedded			69.70
71.02				J 80° calcite	<u>Sandstone</u> - light and dark grey speckled medium to coarse grained, thick bedded, strong to very strong			71.02
73.91				J 80°	<u>Sandstone</u> - dark grey, medium grained, medium bedded, plant remains, strong			73.91
75.29					<u>Sandstone</u> - dark grey, fine grained, thin bedded, plant remains, carbonaceous moderately strong			75.29
					(Continued)			75.29





# SUNCOR INC.

## COAL CORE LOG

Project ..... CHISHOLM LAKE  
 Location ..... N6009529; E617615  
 Elevation ..... 838 metres Date(s) Drilled 14 to 17 JUNE 82  
 Dip/Direction ..... VERTICAL  
 Date Logged ..... 17 JUNE 82  
 Hole No. .... CHL/DDH-2/82  
 Logged By ..... JP/RB  
 Page ..... 4 of 4

Depth	S	L	B	Structure Desc.	Core Description	Remarks	ROD %				100 %	
							20	40	60	80		
103.85					Continued							
			F	108.20	<u>Mudstone</u> - as before with siltstone intercalations  calcite and bentonite between 105.85 and 106.40							100%
109.38					<u>Siltstone</u> - dark grey, laminated, strong	core broken from 108.81 to 110.03 and 110.64 to 111.25						89%
110.70					<u>Mudstone</u> - as before							100%
110.00					<u>Siltstone</u> - as before							100%
115.35					<u>Siltstone</u> - as before							82%
			F	117.35	<u>Mudstone</u> - dark grey, laminated moderately strong, silty occ. interbedded siltstones becoming shaly and more argillaceous	core generally broken						100%
			J	124.59		palynology sample from 130.76 to 130.91						95%
												100%
												100%
												100%
131.67												100%
END					Hole cemented on completion							

APPENDIX IV

Phase I Geophysical Logs



# VERTICAL DEVIATION

# 218

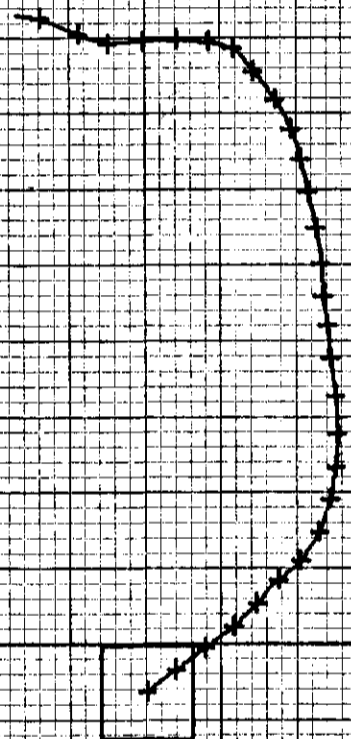
COMPU-LOG V8L1 DEVIATION  
DATA FROM : V8L2\*A

CLIENT : SUNCOR INC.  
LOCATION : CHISHOLM LAKE  
HOLE ID : DDH-1-82  
DATE OF LOG : 06-21-82  
PROBE : 9055A 0065

SCALE: .10 M/DIV  
MAG DECL: 24.0  
TRUE DEPTH: 142.0 M  
AZIMUTH: 349.0  
DISTANCE: .91 M

+ = 5.0 M INCR  
Δ = TOP OF ZONE  
◇ = BOTTOM OF ZONE

TRUE NORTH ↑



CENTURY GEOPHYSICAL CORPORATION

\*\*\*\*\* VERTICAL DEVIATION \*\*\*\*\*

COMPU-LOG VSLI DEVIATION

CLIENT : SUNCOR INC.

HOLE ID : DDH-1-82

LOCATION : CHISHOLM LAKE

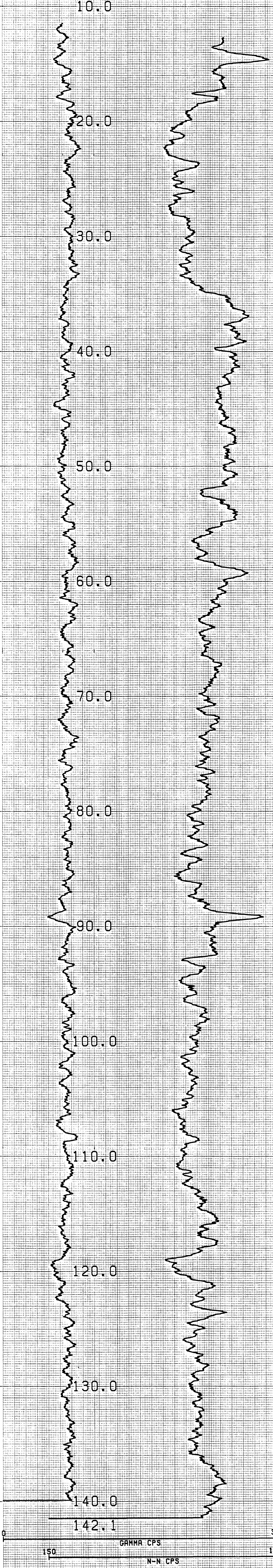
DATE OF LOG : 06-21-82

DATA FROM : VSL2\*A

PROBE : 9055A 0065

TD = TOTAL DEPTH  
 T = TOP OF ZONE  
 B = BOTTOM OF ZONE

DEPTH	TRUE DEPTH	NORTH DEV	EAST DEV	DISTANCE	AZIMUTH	SA	SAB
.00	.00	.00	.00	.00	.0	.0	.0
5.00	4.99	.02	.03	.04	53.5	.5	53.5
10.00	9.99	.05	.07	.09	53.5	.5	53.5
15.00	14.99	.08	.11	.14	53.1	.5	52.2
20.00	19.99	.11	.14	.18	51.3	.4	45.1
25.00	24.99	.14	.17	.22	49.6	.4	42.3
30.00	29.99	.17	.20	.26	49.6	.4	49.6
35.00	34.99	.21	.22	.31	47.3	.5	33.5
40.00	39.99	.25	.24	.35	43.8	.5	18.7
45.00	44.99	.29	.25	.38	40.3	.4	9.7
50.00	49.99	.33	.25	.42	36.7	.4	2.3
55.00	54.99	.38	.25	.46	32.7	.5	356.8
60.00	59.99	.43	.24	.50	29.0	.5	352.3
65.00	64.99	.48	.23	.53	26.4	.4	354.6
70.00	69.99	.52	.23	.57	24.2	.4	351.2
75.00	74.99	.56	.23	.60	22.3	.4	356.6
80.00	79.99	.61	.22	.65	20.1	.5	351.6
85.00	84.99	.65	.21	.69	17.9	.5	347.5
90.00	89.99	.70	.20	.73	16.1	.5	347.0
95.00	94.99	.74	.19	.76	14.4	.4	342.2
100.00	99.99	.78	.16	.79	12.2	.5	331.0
105.00	104.99	.81	.14	.83	9.7	.5	322.8
110.00	109.99	.84	.11	.85	7.6	.4	318.2
115.00	114.99	.85	.08	.86	5.4	.3	285.0
120.00	119.99	.86	.03	.86	2.6	.4	274.3
125.00	124.99	.85	-.00	.85	359.6	.5	267.8
130.00	129.99	.85	-.05	.85	356.5	.5	265.2
135.00	134.99	.86	-.09	.87	354.0	.4	287.7
140.00	139.99	.89	-.14	.90	351.0	.6	293.5
TD 142.00	141.99	.89	-.17	.91	349.0	.9	275.6



218<sup>3</sup>

COMPU-LOG V0L2 PLOT 06-21-82  
 DDH-1-82  
 SUNCOR INC.  
 CHISHOLM LAKE  
 HOLE DIAMETER = 07.6  
 PROBE # 9055A - 065  
 SENSOR #4 CAL STD CPS = 152  
 SENSOR #4 CAL RUN CPS = 250  
 SENSOR #4 CAL BIAS = 0  
 DATA V0L2WA TRUCK # P821  
 R. BERKLEY APPL. #2007L1

СЕРИЯ ГЕОФИЗИЧЕСКОЕ СОБЫТИЕ

CENTURY GEOPHYSICAL CORPORATION

\*\*\*\*\* VERTICAL DEVIATION \*\*\*\*\*

COMPU-LOG V8LI DEVIATION

CLIENT : SUNCOR INC.

HOLE ID : DDH-2-82

LOCATION : CHISHOLM LAKE

DATE OF LOG : 06-18-82

DATA FROM : V8L2+A

PROBE : 9055A 0065

TD = TOTAL DEPTH

T = TOP OF ZONE

B = BOTTOM OF ZONE

DEPTH	TRUE DEPTH	NORTH DEV	EAST DEV	DISTANCE	AZIMUTH	SA	SAB
.00	.00	.00	.00	.00	.0	.0	.0
5.00	4.99	-.04	-.14	.14	252.1	1.7	252.1
10.00	9.99	-.09	-.28	.29	252.1	1.7	252.1
15.00	14.99	-.13	-.42	.44	252.1	1.7	252.1
20.00	19.99	-.18	-.56	.59	252.1	1.7	252.1
25.00	24.98	-.23	-.70	.74	251.8	1.6	250.3
30.00	29.98	-.28	-.80	.85	250.1	1.2	239.3
35.00	34.98	-.33	-.91	.97	249.7	1.4	246.9
40.00	39.98	-.39	-1.04	1.11	249.3	1.5	246.3
45.00	44.98	-.44	-1.15	1.24	248.9	1.4	245.4
50.00	49.98	-.49	-1.27	1.36	248.8	1.4	247.4
55.00	54.97	-.53	-1.38	1.48	248.8	1.3	248.8
60.00	59.97	-.57	-1.50	1.60	249.1	1.4	252.3
65.00	64.97	-.60	-1.61	1.72	249.4	1.3	254.4
70.00	69.97	-.62	-1.72	1.83	249.9	1.1	257.6
75.00	74.97	-.62	-1.81	1.91	251.0	1.0	273.2
80.00	79.97	-.58	-1.90	1.99	253.1	1.2	294.4
85.00	84.97	-.53	-2.01	2.06	255.2	1.3	294.2
90.00	89.97	-.49	-2.12	2.17	256.9	1.2	288.8
95.00	94.96	-.43	-2.23	2.27	258.9	1.4	296.2
100.00	99.96	-.38	-2.35	2.38	260.7	1.4	294.9
105.00	104.96	-.32	-2.46	2.49	262.4	1.5	295.8
110.00	109.96	-.26	-2.59	2.60	264.2	1.6	296.0
115.00	114.96	-.20	-2.72	2.73	265.8	1.6	296.8
120.00	119.95	-.13	-2.85	2.85	267.2	1.6	295.6
125.00	124.95	-.08	-2.98	2.98	268.4	1.6	293.3
130.00	129.95	-.03	-3.11	3.11	269.3	1.5	289.8
TD 130.70	130.65	-.03	-3.12	3.12	269.4	1.4	291.4

218

218

# VERTICAL DEVIATION

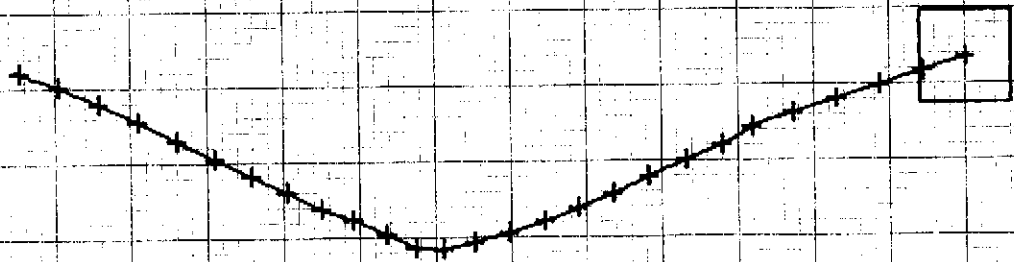
COMPU-LOG V8L1 DEVIATION  
DATA FROM : V8L2\*A

CLIENT : SUNCOR INC.  
LOCATION : CHISHOLM LAKE  
HOLE ID : DDH-2-82  
DATE OF LOG : 06-18-82  
PROBE : 9055A 0065

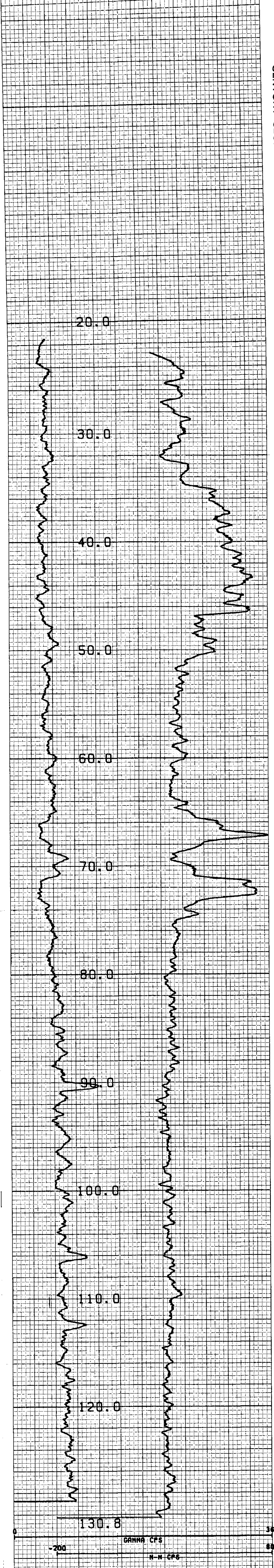
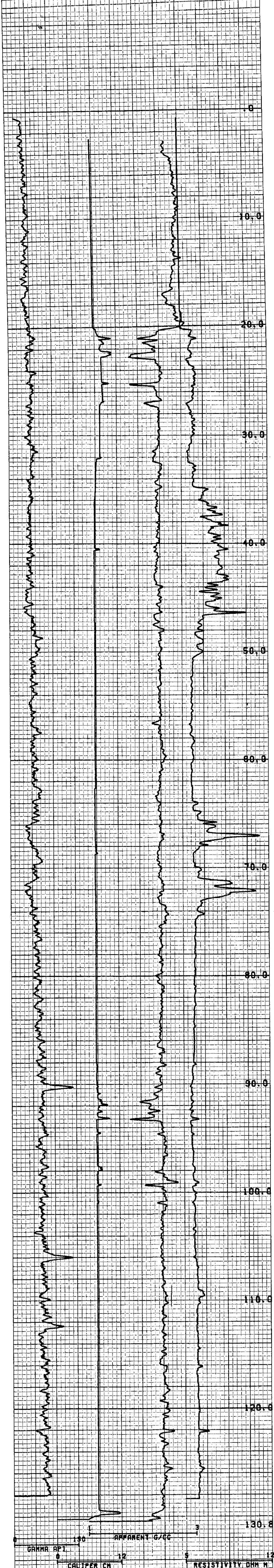
SCALE: .25 M/DIV  
MAG DECL: 24.0  
TRUE DEPTH: 130.7 M  
AZIMUTH: 269.4  
DISTANCE: 3.12 M

+ = 5.0 M INCR  
Δ = TOP OF ZONE  
◇ = BOTTOM OF ZONE

TRUE NORTH ↑







COMPU-LOG VBL2 PLOT 06-10-82

DDH-2-82  
SUNCOR INC.  
CHISHOLM LAKE

WIRE DIAMETER = 07.6  
PROBE # 4030R - 432  
SENSOR #1 CAL STA CPS = 6586  
SENSOR #4 CAL RUN CPS = 6100  
SENSOR #4 CAL BIAS = 36  
DATA VBL2WR TRUCK # P82  
R. WENKLEY APPL. #2030L1

218 (4)

COMPU-LOG VBL2 PLOT 06-10-82

DDH-2-82  
SUNCOR INC.  
CHISHOLM LAKE

WIRE DIAMETER = 07.6  
PROBE # 4030R - 065  
SENSOR #1 CAL STA CPS = 1872  
SENSOR #4 CAL RUN CPS = 7200  
SENSOR #4 CAL BIAS = 0  
DATA VBL2WR TRUCK # P82  
R. WENKLEY APPL. #1007L1

20.0

30.0

40.0

50.0

60.0

70.0

80.0

90.0

100.0

110.0

120.0

130.8

СЕМІЛІВА ГЕОБЪЇДЖІСІУГ СОВЪ

СЕМІЛІВА ГЕОБЪЇДЖІСІУГ СОВЪ

СЕМІЛІВА ГЕОБЪЇДЖІСІУГ СОВЪ

СЕМІЛІВА ГЕОБЪЇДЖІСІУГ СОВЪ

СЕМІЛІВА ГЕОБЪЇДЖІСІУГ СОВЪ

СЕМІЛІВА ГЕОБЪЇДЖІСІУГ СОВЪ

СЕМІЛІВА ГЕОБЪЇДЖІСІУГ СОВЪ

СЕМІЛІВА ГЕОБЪЇДЖІСІУГ СОВЪ

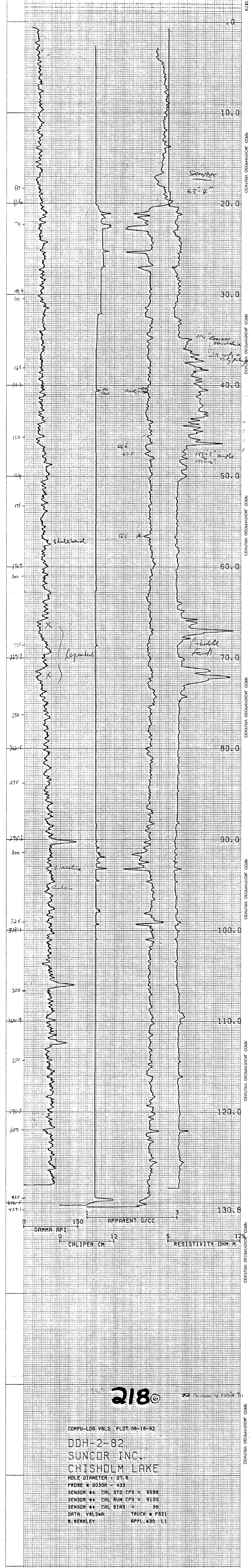
0 360  
 -200 GAMMA CPS 800  
 N-N CPS

# 218<sup>(3)</sup>

COMPU-LOG VBL2 PLDT 06-18-82

DDH-2-82  
SUNCOR INC.  
CHISHOLM LAKE

HOLE DIAMETER 1 07.6  
 PROBE # 9055A - 065  
 SENSOR #4 CAL STD CPS = 152  
 SENSOR #4 CAL RUN CPS = 250  
 SENSOR #4 CAL BIAS = 0  
 DATA VBL2WA TRUCK # P821  
 R. BERKLEY APPL. #1007L1



218

COMPU-LOG V8L2 PLOT 06-18-82  
 DDH-2-82  
 SUNCOR INC.  
 CHISHOLM LAKE  
 HOLE DIAMETER : 07.6  
 PROBE # 9030R - 433  
 SENSOR #4 CAL STD CPS = 6588  
 SENSOR #4 CAL RUN CPS = 6100  
 SENSOR #4 CAL BIAS = 36  
 DATA V8L2WA TRUCK # P821  
 R. BERKLEY APPL. #30 LI

СЕРТИФИКАЦИЯ СОФТ

APPENDIX V

Phase 2 Drill Hole Location Map

*J.R. Chisholm LL B2 (2\*)A 41)*

PLAN SHOWING DRILL HOLE LOCATIONS IN THE VICINITY OF COLLINS LAKE, UNSURVEYED CROWN LAND, RANGE 5, COAST DISTRICT.

93 L/6 a-b, 93 E/14 f-g-h.

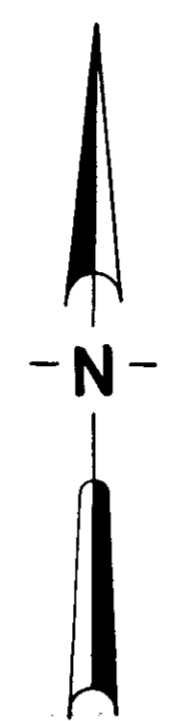
SCALE 1:15,840

CO-ORDINATES AND GEODETIC ELEVATIONS ARE IN METRES.

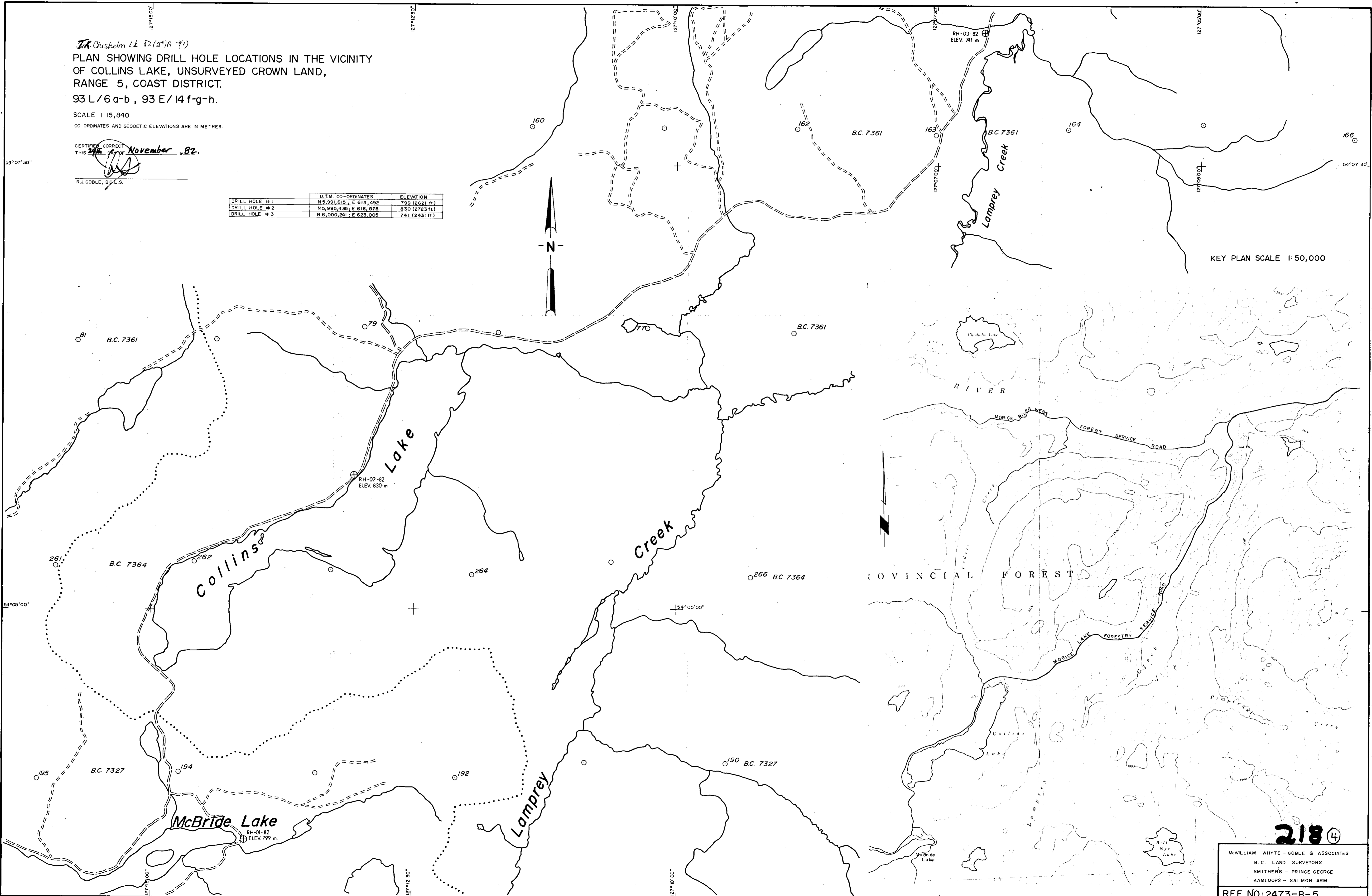
CERTIFIED CORRECT  
THIS PLAN OF November 1982

R.J. GOBLE, B.C.L.S.

DRILL HOLE #	U.T.M. CO-ORDINATES	ELEVATION
DRILL HOLE # 1	N 5,991,615; E 619,492	798 (2621 ft)
DRILL HOLE # 2	N 5,995,435; E 616,578	830 (2723 ft)
DRILL HOLE # 3	N 6,000,241; E 623,005	741 (2431 ft)



KEY PLAN SCALE 1:50,000



**218** (4)

McWILLIAM - WHYTE - GOBLE & ASSOCIATES  
B.C. LAND SURVEYORS  
SMITHERS - PRINCE GEORGE  
KAMLOOPS - SALMON ARM

REF. NO: 2473-B-5

PLAN SHOWING DRILL HOLE LOCATIONS  
IN VICINITY OF CHISHOLM LAKE, UNSURVEYED  
CROWN LAND, RANGE 5, COAST DISTRICT.

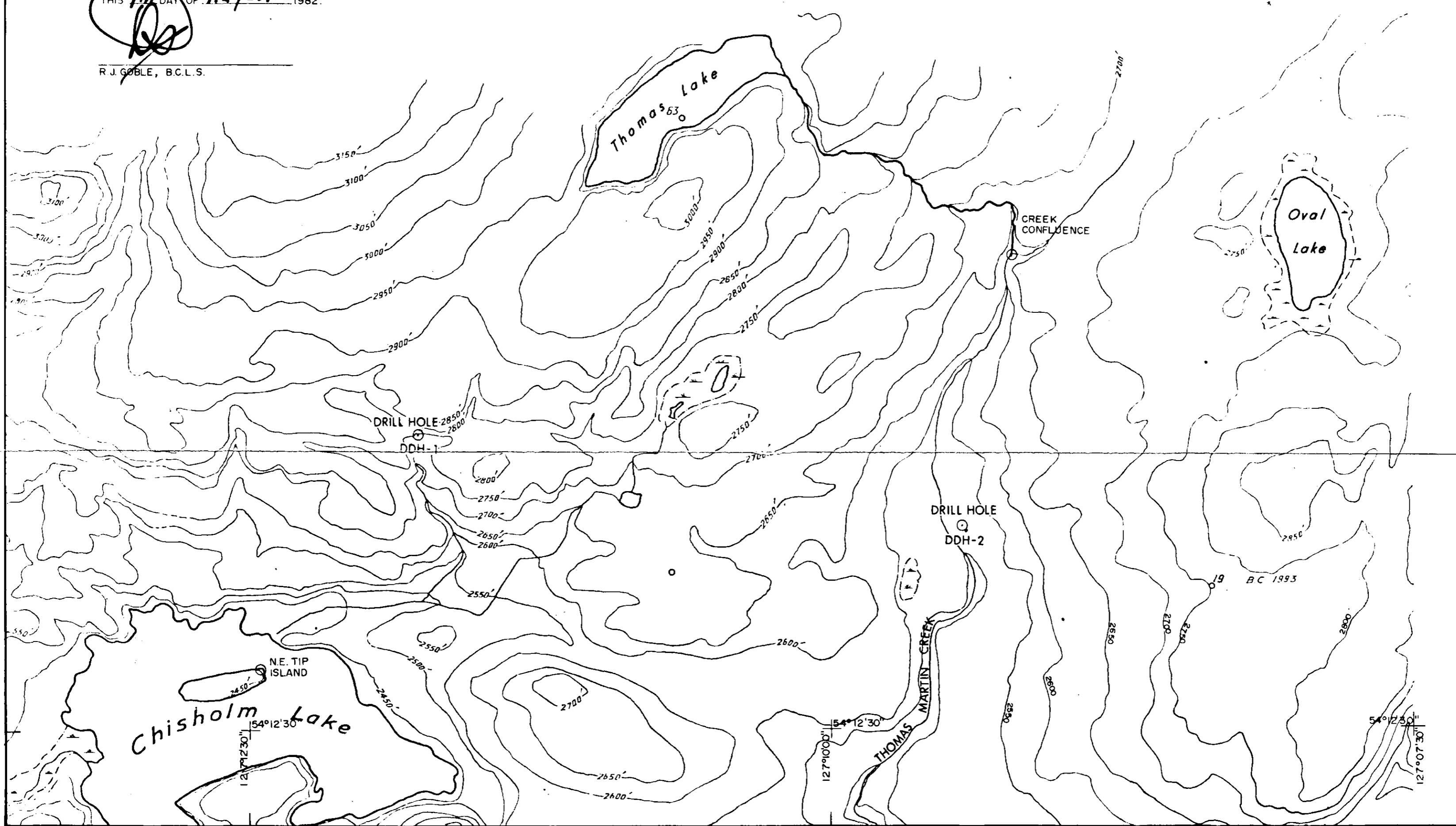
93L/6b U.T.M. ZONE 9U  
SCALE 1:15,840

CO-ORDINATES AND ELEVATIONS ARE IN METRES UNLESS OTHERWISE NOTED

DRILL HOLE #	U.T.M. CO-ORDINATES	ELEVATION
DRILL HOLE # 1	N 6,009,07 ; E 620,118	770 (2525 ft)
DRILL HOLE # 2	N 6,009,529 ; E 617,615	838 (2750 ft)
CHISHOLM LAKE		
NE TIP UNNAMED ISLAND	N 6,008,400 ; E 616, 875	
CONFLUENCE OF TWO UNNAMED CREEKS NORTHEAST OF CHISHOLM LAKE	N 6,010,420 ; E 620,350	

CERTIFIED CORRECT  
THIS DAY OF *August* 1982.

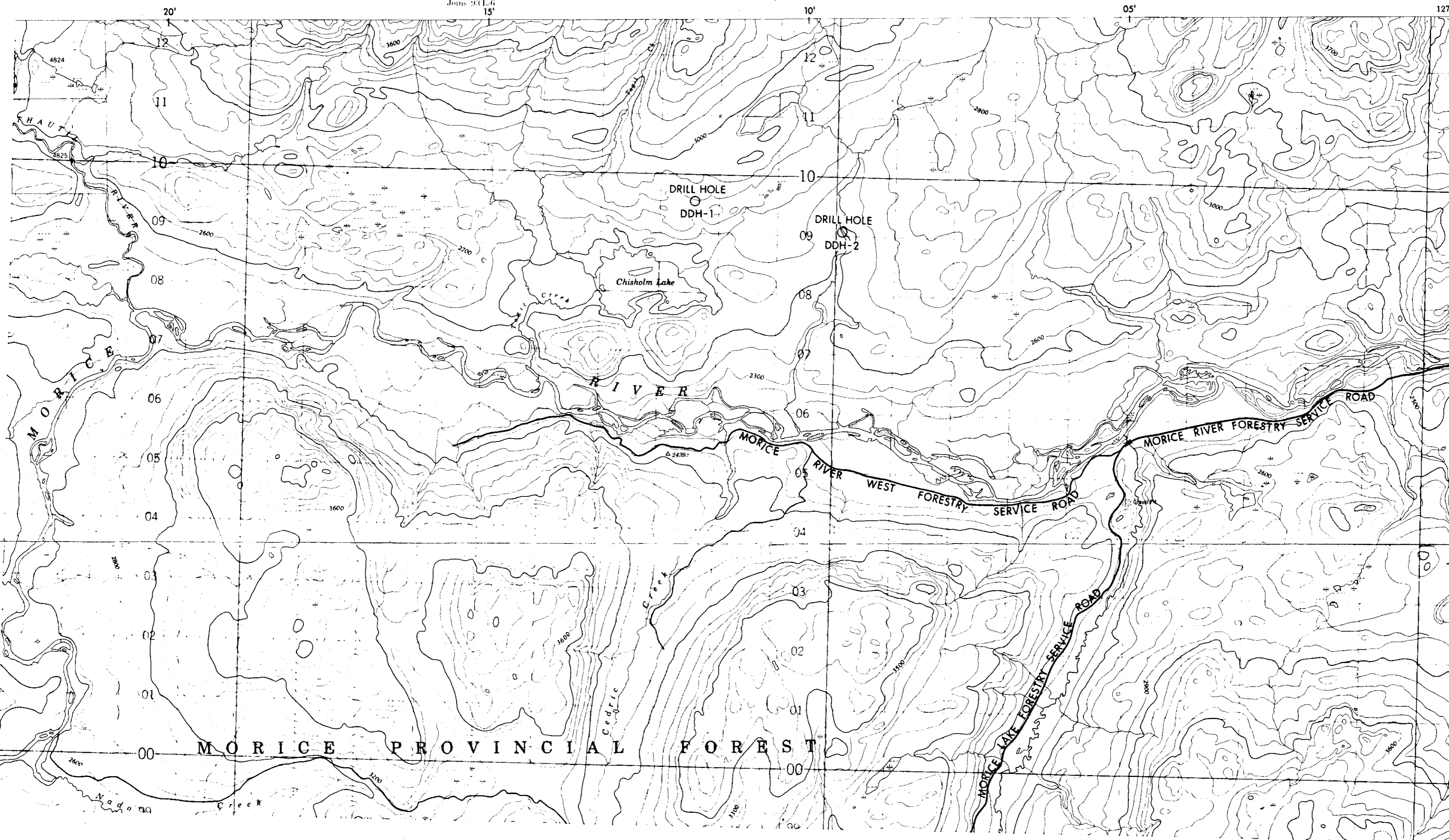
R.J. GOBLE, B.C.L.S.



CANADA

EDITION 1

93L/3



KEY PLAN SCALE 1:50,000

*Chisholm Lk 82(2)A 4/11*

**Auncor** COAL AND MINERALS DEPARTMENT

**PHASE 1  
DRILL HOLE  
LOCATION PLAN**

DATE: NOV. 1982 AS SHOWN SCALE: 93L DRAWING NO: 82-235

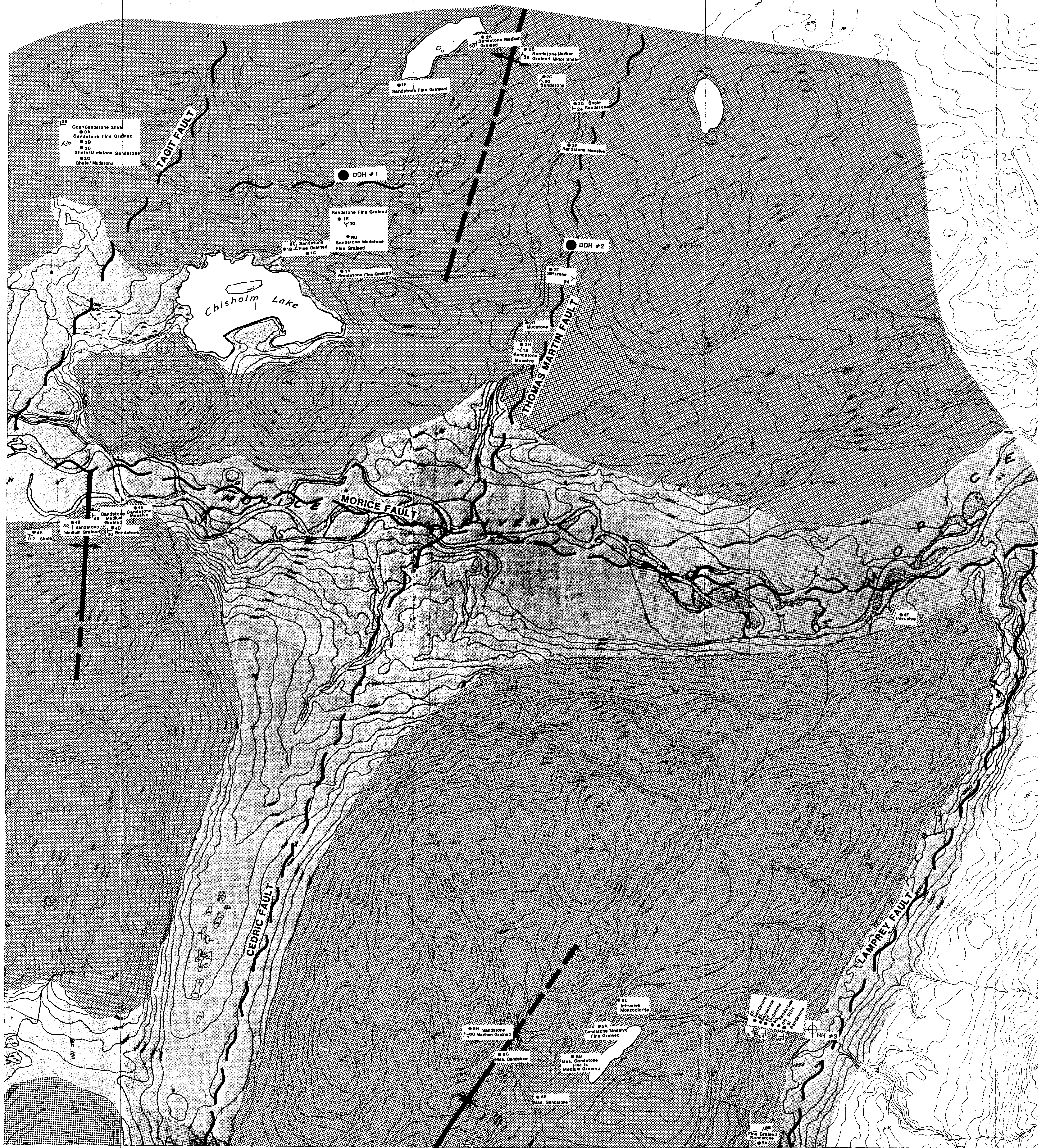
**218** (S)

McWILLIAM - WHYTE - GOBLE & ASSOCIATES  
B.C. LAND SURVEYORS  
SMITHERS - PRINCE GEORGE  
KAMLOOPS - SALMON ARM

REF. NO: 2473-U.S.C.L.-5

APPENDIX VIII

Geological Map (North Half)



**CHISHOLM LAKE  
MAP LEGEND**

- PLEISTOCENE & RECENT**  
ALLUVIUM, TILL, GRAVEL
  - CRETACEOUS & TERTIARY**  
ACIDIC VOLCANIC UNDIVIDED, FLOWS & BRECCIAS
  - CRETACEOUS**  
RED ROSE FORMATION: BLACK TO DARK GREY SHALE, CHERT, PEBBLE CONGLOMERATE, MICACEOUS GREYWACKE
- SYMBOLS**
- ANTICLINE
  - SYNCLINE
  - FAULT
  - UNIT BOUNDARY
  - DRILL HOLE - CORED
  - DRILL HOLE - NOT CORED
  - TRAVERSE NUMBER AND STATION
  - STRIKE & DIP

**Suncor** Inc Resources Group COAL AND MINERALS DEPARTMENT

**GEOLOGICAL MAP OF THE  
CHISHOLM LAKE COAL PROPERTY**

NORTH HALF

*Chisholm Lake 82(2)16 (1)*

DATE	SCALE	NTS	DRAWING NO.
NOV. 1982	1:15840	93L	82-237



APPENDIX VI

Phase 2 Lithological Logs



Continued

Hole No. RH-01-82

Page 2 Of 8

SUNCOR INC. RESOURCESProject: CHISHOLM LAKE - 06080

Hole Azimuth: \_\_\_\_\_

Coal Drill Hole Log

Area: \_\_\_\_\_

Hole Angle: \_\_\_\_\_

Location: \_\_\_\_\_

Date Drilled: \_\_\_\_\_

Hole Diameter: \_\_\_\_\_

Elevation: \_\_\_\_\_

Date Logged: \_\_\_\_\_

Core Diameter: \_\_\_\_\_

Cal., Den., Neu., Res.,

GEOPHYSICAL LOGS: Dev., Gamma, Sonic

Logged By: \_\_\_\_\_

BOX NO.	DEPTH AT BOX TOP	DEPTH	LEGEND	LITHOLOGICAL DESCRIPTION	SAMPLE	CORE RECOVERY %				R.O.D. %				FRAC. LOG	REMARKS
						20	40	60	80	20	40	60	80		
				<u>SILTSTONE</u> - dark grey, with numerous thin sandstone interbeds	32.00										
		40.00			38.10										
					44.20										
		50.00			50.29										
		56.50													
		60.00		<u>SANDSTONE</u> - medium grey, medium grained, strong											
				Continued on Next Page											

SUNCOR INC. RESOURCESProject: CHISHOLM LAKE - 06080

Hole Azimuth: \_\_\_\_\_

Coal Drill Hole Log

Area: \_\_\_\_\_

Hole Angle: \_\_\_\_\_

Hole Diameter: \_\_\_\_\_

Location: \_\_\_\_\_

Date Drilled: \_\_\_\_\_

Core Diameter: \_\_\_\_\_

Elevation: \_\_\_\_\_

Date Logged: \_\_\_\_\_

Cal., Den., Neu., Res.,

GEOPHYSICAL LOGS: Dev., Gamma, Sonic

Logged By: \_\_\_\_\_

BOX NO.	DEPTH AT BOX TOP	DEPTH	LEGEND	LITHOLOGICAL DESCRIPTION	SAMPLE	CORE RECOVERY %	R.O.P. %	FRAC. LOG	REMARKS
		63.00		<u>SILTSTONE</u> - dark grey, sandy	62.48	20 40 60 80	20 40 60 80		
		66.40		<u>SANDSTONE</u> - medium grey, medium grained					
		70.00		<u>SILTSTONE</u> - dark grey, strong with interbedded sandstones	68.58				
		79.30			74.68				
		80.00		<u>SANDSTONE</u> - medium grey, medium grained, becoming increasingly silty					
		90.00			86.87				

Continued on Next Page



SUNCOR INC. RESOURCES

Project: CHISHOLM LAKE - 06080

Hole Azimuth: \_\_\_\_\_

Coal Drill Hole Log

Area: \_\_\_\_\_

Hole Angle: \_\_\_\_\_

Hole Diameter: \_\_\_\_\_

Location: \_\_\_\_\_

Date Drilled: \_\_\_\_\_

Core Diameter: \_\_\_\_\_

Elevation: \_\_\_\_\_

Date Logged: \_\_\_\_\_

GEOPHYSICAL LOGS: Cal., Den., Neu., Res.,  
Dev., Gamma, Sonic

Logged By: \_\_\_\_\_

BOX NO.	DEPTH AT BOX TOP	DEPTH	LEGEND	LITHOLOGICAL DESCRIPTION	SAMPLE	CORE RECOVERY %	R.O.D. %	FRAC. LOG	REMARKS
		128.50		SANDSTONE - continued - dark grey, fine grained with coarser bands	123.44	20 40 60 80	20 40 60 80		
		130.00		SANDSTONE - medium grey, coarse grained with finer grained interbeds	129.54				
		134.60		SILTSTONE- dark grey, with numerous fine to medium grained sandstone interbeds	135.64				
		140.00			141.73				
		149.60			147.83				
		150.00		Continued on Next Page					

SUNCOR INC. RESOURCES

Project: CHISHOLM LAKE - 06080

Hole Azimuth: \_\_\_\_\_

Coal Drill Hole Log

Area: \_\_\_\_\_

Hole Angle: \_\_\_\_\_

Hole Diameter: \_\_\_\_\_

Location: \_\_\_\_\_

Date Drilled: \_\_\_\_\_

Core Diameter: \_\_\_\_\_

Elevation: \_\_\_\_\_

Date Logged: \_\_\_\_\_

Cal., Den., Neu., Res.,

GEOPHYSICAL LOGS: Dev., Gamma, Sonic

Logged By: \_\_\_\_\_

BOX NO.	DEPTH AT BOX TOP	DEPTH	LEGEND	LITHOLOGICAL DESCRIPTION	SAMPLE	CORE RECOVERY %				R.O.D. %				FRAC. LOG	REMARKS
						20	40	60	80	20	40	60	80		
		152.90		SANDSTONE - dark grey, medium to coarse grained											
				SILTSTONE - dark grey with interbedded fine grained sandstone	153.92										
		160.00 161.10			160.02										
		162.70		SANDSTONE - medium to coarse grained											
		164.00		SILTSTONE - sandy											
		165.50		SANDSTONE - medium grained											
				SILTSTONE - with fine grained sandstone interbeds	166.12										
		170.00													
					172.21										
		178.31													
		180.00		SANDSTONE	178.31										
				Continued on Next Page											

Hole collapsed at 171.10 m. No geophysical logs beyond this depth

SUNCOR INC. RESOURCES

Project: CHISHOLM LAKE - 06080

Hole Azimuth: \_\_\_\_\_

Coal Drill Hole Log

Area: \_\_\_\_\_

Hole Angle: \_\_\_\_\_

Hole Diameter: \_\_\_\_\_

Location: \_\_\_\_\_

Date Drilled: \_\_\_\_\_

Core Diameter: \_\_\_\_\_

Elevation: \_\_\_\_\_

Date Logged: \_\_\_\_\_

Cal., Den., Neu., Res.,

GEOPHYSICAL LOGS: Dev., Gamma, Sonic

Logged By: \_\_\_\_\_

BOX NO.	DEPTH AT BOX TOP	DEPTH	LEGEND	LITHOLOGICAL DESCRIPTION	SAMPLE	CORE RECOVERY %	R.O.D. %	FRAC LOG	REMARKS
				SANDSTONE - continued medium grey, medium grained with occasional thin bands of black muddy siltstone		20 40 60 80	20 40 60 80		
		190.00			184.40				
					190.50				
					196.60				
		200.00			202.69				
					208.79				
		210.00							



SUNCOR INC. RESOURCES

Project: CHISHOLM LAKE - 06080

Hole Azimuth:

Coal Drill Hole Log

Area:

Hole Angle:

Hole Diameter:

Location:

Date Drilled:

Core Diameter:

Elevation:

Date Logged:

Cal., Den., Neu., Res.,

GEOPHYSICAL LOGS: Dev., Gamma, Sonic

Logged By:

BOX NO.	DEPTH AT BOX TOP	DEPTH	LEGEND	LITHOLOGICAL DESCRIPTION	SAMPLE	CORE RECOVERY %				R.O.D. %				FRAC. LOG	REMARKS
						20	40	60	80	20	40	60	80		
		214.88		SANDSTONE - continued	214.88										
		220.00		SILTSTONE - black, muddy with occasional interbedded medium grained, grey sandstone	220.98										
		227.08			227.08										
		230.00		SANDSTONE - medium grey, medium grained, occasional siltstone bands											
		233.17													Hole wet from 6.00 m
				Hole completed 233.17 m and cemented											

Coal Drill Hole Log

Hole Diameter: 130 mm

Core Diameter: N/A

Project: CHISHOLM LAKE - 06080  
Area : Houston, B. C.  
Location: N5995435; E616578  
Elevation: 830.0m

Hole Azimuth: --  
Hole Angle : 90°  
Date Drilled: 12-14 SEPT82  
Date Logged : 12-14 SEPT 82

Cal., Den., Neu., Res.,  
GEOPHYSICAL LOGS: Dev., Gamma, Sonic

Logged By : JD/RB

BOX NO.	DEPTH AT BOX TOP	DEPTH METERS	LEGEND	LITHOLOGICAL DESCRIPTION	SAMPLE	CORE RECOVERY %				R.O.D. %				FRAC. LOG	REMARKS
						20	40	60	80	20	40	60	80		
		10		SILTSTONE - black, muddy, occasional thin fine, grained sandstone partings											150 mm casing set at 6.0m
		20													
		22.60													
		30.00		SANDSTONE - medium grey, medium grained becoming finer grained and silty from 25.30											
Continued on Next Page															

CONTINUED

SUNCOR INC. RESOURCES

Project: CHISHOLM LAKE - 06080

Hole Azimuth: \_\_\_\_\_

Coal Drill Hole Log

Area: \_\_\_\_\_

Hole Angle: \_\_\_\_\_

Location: \_\_\_\_\_

Date Drilled: \_\_\_\_\_

Hole Diameter: \_\_\_\_\_

Elevation: \_\_\_\_\_

Date Logged: \_\_\_\_\_

Core Diameter: \_\_\_\_\_

Cal., Den., Neu., Res.,

Logged By: \_\_\_\_\_

GEOPHYSICAL LOGS: Dev., Gamma, Sonic

BOX NO.	DEPTH AT BOX TOP	DEPTH	LEGEND	LITHOLOGICAL DESCRIPTION	SAMPLE	CORE RECOVERY %				R.O.D. %				FRAC. LOG	REMARKS
						20	40	60	80	20	40	60	80		
		33.60		MUDSTONE - black, silty	32.00										
		36.80		SILTSTONE - grey, sandy											
		37.80		MUDSTONE - black											
		40		SANDSTONE - medium grey, fine grained, silty	38.10										
		41.80													
		42.50		MUDSTONE - black											
		45.20		SANDSTONE - medium grey, fine grained, silty	44.20										
		50		MUDSTONE - black, silty with occasional thin partings of siltstone	50.29										
		60			56.39										

Continued on Next Page

CONTINUED

SUNCOR INC. RESOURCES

Project: CHISHOLM LAKE - 06080

Hole Azimuth: \_\_\_\_\_

Coal Drill Hole Log

Area: \_\_\_\_\_

Hole Angle: \_\_\_\_\_

Hole Diameter: \_\_\_\_\_

Location: \_\_\_\_\_

Date Drilled: \_\_\_\_\_

Core Diameter: \_\_\_\_\_

Elevation: \_\_\_\_\_

Date Logged: \_\_\_\_\_

Cal., Den., Neu., Res.,

GEOPHYSICAL LOGS: Dev., Gamma, Sonic

Logged By: \_\_\_\_\_

BOX NO.	DEPTH AT BOX TOP	DEPTH	LEGEND	LITHOLOGICAL DESCRIPTION	SAMPLE	CORE RECOVERY %				R.O.D. %				FRAC LOG	REMARKS
						20	40	60	80	20	40	60	80		
		60.60		MUDSTONE - continued											
		64.00		SANDSTONE - medium grey, medium grained, increasingly silty from 62.00	62.48										
				SILTSTONE - black, muddy											
		68.40			68.58										
		70		SANDSTONE - medium grey, fine to medium grained, silty, with occasional siltstone bands											
					74.68										
		77.60													
		80		MUDSTONE - black, silty with occasional siltstone horizons	80.77										
		86.80			86.87										
		88.30		SANDSTONE - silty											
		90.00		MUDSTONE - black, silty											
				Continued on Next Page											

SUNCOR INC. RESOURCES

Coal Drill Hole Log

Hole Diameter:

Core Diameter:

Project: CHISHOLM LAKE - 06080

Area:

Location:

Elevation:

Hole Azimuth:

Hole Angle:

Date Drilled:

Date Logged:

Cal., Den., Neu., Res.,

GEOPHYSICAL LOGS: Dev., Gamma, Sonic

Logged By:

BOX NO.	DEPTH AT BOX TOP	DEPTH	LEGEND	LITHOLOGICAL DESCRIPTION	SAMPLE	CORE RECOVERY %				R.O.D. %				FRAC LOG	REMARKS
						20	40	60	80	20	40	60	80		
		92.50		SANDSTONE - medium grey, fine grained with siltstone bands	92.96										
				SANDSTONE - dark grey, muddy											
		99.50			99.06										
		100.40		SANDSTONE - medium grained, silty											
				SILTSTONE - with thin sandstone bands											
		103.60													
		104.80		SANDSTONE-medium grained, silty											
				SILTSTONE & MUDSTONE - interbedded.	105.16										
		107.30													
		108.50		SANDSTONE - medium grained, silty											
		110		SANDSTONE & SILTSTONE - interbedded, medium grey	111.25										
		117.70			117.35										
		119.00		SANDSTONE - medium grained											
		120													

Continued on Next Page

SUNCOR INC. RESOURCES

Project: CHISHOLM LAKE - 06080

Hole Azimuth: \_\_\_\_\_

Coal Drill Hole Log

Area: \_\_\_\_\_

Hole Angle: \_\_\_\_\_

Hole Diameter: \_\_\_\_\_

Location: \_\_\_\_\_

Date Drilled: \_\_\_\_\_

Core Diameter: \_\_\_\_\_

Elevation: \_\_\_\_\_

Date Logged: \_\_\_\_\_

Cal., Den., Neu., Res.,

GEOPHYSICAL LOGS: Dev., Gamma, Sonic

Logged By: \_\_\_\_\_

BOX NO.	DEPTH AT BOX TOP	DEPTH	LEGEND	LITHOLOGICAL DESCRIPTION	SAMPLE	CORE RECOVERY %	R.O.D. %	FRAC. LOG	REMARKS
				SILTSTONE - dark grey with thin interbeds of fine sandstone and mudstone	123.44	20 40 60 80	20 40 60 80		
		128.40							
		129.50		SANDSTONE - medium grained	129.54				
		130		MUDSTONE - black, silty					
		132.20							
				SANDSTONE - medium grey, silty					
		135.90			135.64				
		136.60		MUDSTONE - black, silty					
		140		SANDSTONE - medium grey, fine grained, generally silty. Occasional coarser grained horizons and siltstone bands	141.73				
					147.83				
		150							

Continued on Next Page

SUNCOR INC. RESOURCESProject: CHISHOLM LAKE -06080

Hole Azimuth: \_\_\_\_\_

Coal Drill Hole Log

Area: \_\_\_\_\_

Hole Angle: \_\_\_\_\_

Hole Diameter: \_\_\_\_\_

Location: \_\_\_\_\_

Date Drilled: \_\_\_\_\_

Core Diameter: \_\_\_\_\_

Elevation: \_\_\_\_\_

Date Logged: \_\_\_\_\_

Cal., Den., Neu., Res.,

GEOPHYSICAL LOGS: Dev., Gamma, Sonic

Logged By: \_\_\_\_\_

BOX NO.	DEPTH AT BOX TOP	DEPTH	LEGEND	LITHOLOGICAL DESCRIPTION	SAMPLE	CORE RECOVERY %	R.O.D. %	FRAC LOG	REMARKS
		152.00		<u>SANDSTONE</u> - continued		20 40 60 80	20 40 60 80		
				<u>SILTSTONE</u> - dark grey, with occasional thin sandstone bands	153.92				
		160 160.80			160.02				
				<u>SANDSTONE</u> - medium grained					
		163.40							
				<u>SILTSTONE</u> - sandy					
		166.00			166.12				
				<u>SANDSTONE</u> - medium grained					
		168.20							
		170 171.00		<u>SILTSTONE</u> - sandy					
				<u>SANDSTONE</u> - medium grained	172.21				
		173.30							
		174.60		<u>SILTSTONE</u> - sandy					
		175.70		<u>SANDSTONE</u> - medium grained					
				<u>SILTSTONE</u> - medium grey with interbedded thin sandstones	178.31				
		180							
				Continued on Next Page					

SUNCOR INC. RESOURCES

Project: CHISHOLM LAKE - 06080

Hole Azimuth: \_\_\_\_\_

Coal Drill Hole Log

Area: \_\_\_\_\_

Hole Angle: \_\_\_\_\_

Location: \_\_\_\_\_

Date Drilled: \_\_\_\_\_

Hole Diameter: \_\_\_\_\_

Elevation: \_\_\_\_\_

Date Logged: \_\_\_\_\_

Core Diameter: \_\_\_\_\_

Cal., Den., Neu., Res.,

GEOPHYSICAL LOGS: Dev., Gamma, Sonic

Logged By: \_\_\_\_\_

BOX NO.	DEPTH AT BOX TOP	DEPTH	LEGEND	LITHOLOGICAL DESCRIPTION	SAMPLE	CORE RECOVERY %				R.O.D. %				FRAC LOG	REMARKS
						20	40	60	80	20	40	60	80		
				<u>SILTSTONE</u> - continued											
		186.40			184.40										
		189.90		<u>SANDSTONE</u> - medium grey, fine grained with siltstone partings											
		194.40		<u>SILTSTONE</u> - black, muddy	190.50										
		198.80		<u>SANDSTONE</u> - medium grey, medium grained	196.60										
		200		<u>SILTSTONE</u> - black, sandy	202.69										
		203.90													
		210		<u>SANDSTONE</u> - medium grey, medium grained becoming increasingly finer grained and silty	208.79										
				Continued on Next Page											



SUNCOR INC. RESOURCES

Project: CHISHOLM LAKE - 06080

Hole Azimuth: \_\_\_\_\_

Coal Drill Hole Log

Area: \_\_\_\_\_

Hole Angle: \_\_\_\_\_

Hole Diameter: \_\_\_\_\_

Location: \_\_\_\_\_

Date Drilled: \_\_\_\_\_

Core Diameter: \_\_\_\_\_

Elevation: \_\_\_\_\_

Date Logged: \_\_\_\_\_

Cal., Den., Neu., Res.,

GEOPHYSICAL LOGS: Dev., Gamma, Sonic

Logged By: \_\_\_\_\_

BOX NO.	DEPTH AT BOX TOP	DEPTH	LEGEND	LITHOLOGICAL DESCRIPTION	SAMPLE	CORE RECOVERY %				R.O.D. %				FRAC. LOG	REMARKS
						20	40	60	80	20	40	60	80		
		211.00		SANDSTONE - continued											
		213.00		SANDSTONE - medium grey, medium grained											
				SILTSTONE - dark grey	214.88										
		216.60		SANDSTONE - medium grey with siltstone interbeds											
		220.10													
		221.80		MUDSTONE - black, silty	220.98										
				SANDSTONE - medium grey, medium grained, silty with occasional thin siltstone bands											
		230			227.08										
					233.17										
		239.27			239.27										
		240		Continued on Next Page											

SUNCOR INC. RESOURCES

Coal Drill Hole Log

Hole Diameter:

Core Diameter:

Project: CHISHOLM LAKE - 06080

Area :

Location:

Elevation:

Hole Azimuth:

Hole Angle :

Date Drilled:

Date Logged :

Cal., Den., Neu., Res.,

GEOPHYSICAL LOGS: Dev., Gamma, Sonic

Logged By :

BOX NO.	DEPTH AT BOX TOP	DEPTH	LEGEND	LITHOLOGICAL DESCRIPTION	SAMPLE	CORE RECOVERY %				R.O.D. %				FRAC. LOG	REMARKS
						20	40	60	80	20	40	60	80		
		244.00		SANDSTONE - medium grey, medium grained	244.00										Hole wet from 6.00m.
				Hole completed at 244.00 metres and cemented											

SUNCOR INC. RESOURCES

Project: CHISHOLM LAKE - 06080

Coal Drill Hole Log

Area : Houston, B. C.

Hole Azimuth: --

Location: N6000241; E623005

Hole Angle : 90°

Hole Diameter: 130 mm

Elevation: 740.6m

Date Drilled: 14-15 SEPT 82

Core Diameter: N/A

Cal., Den., Neu., ~~XXXXXX~~

Date Logged: 14-15 SEPT

GEOPHYSICAL LOGS: Dev., Gamma, ~~XXXXXX~~

Logged By: RB

BOX NO.	DEPTH AT BOX TOP	DEPTH	LEGEND	LITHOLOGICAL DESCRIPTION	SAMPLE	CORE RECOVERY %				R.O.D. %				FRAC. LOG	REMARKS
						20	40	60	80	20	40	60	80		
		Meters		GLACIAL TILL											150mm casing set at 25.00m
		10													
		20													
		24.00													
		30		MUDSTONE - black, silty with occasional thin partings of siltstone and fine grained sandstone	25.91										
					32.00										
		40			38.10										
					44.20										
		50			50.29										
					62.48										
		60			68.58										
		70			74.68										

Continued on Next Page

SUNCOR INC. RESOURCES

Project: CHISHOLM LAKE - 06080

Hole Azimuth: \_\_\_\_\_

Coal Drill Hole Log

Area: \_\_\_\_\_

Hole Angle: \_\_\_\_\_

Hole Diameter: \_\_\_\_\_

Location: \_\_\_\_\_

Date Drilled: \_\_\_\_\_

Core Diameter: \_\_\_\_\_

Elevation: \_\_\_\_\_

Date Logged: \_\_\_\_\_

Cal., Den., Neu., Res.,

GEOPHYSICAL LOGS: Dev., Gamma, Sonic

Logged By: \_\_\_\_\_

BOX NO.	DEPTH AT BOX TOP	DEPTH	LEGEND	LITHOLOGICAL DESCRIPTION	SAMPLE	CORE RECOVERY %				R.Q.D. %				FRAC. LOG	REMARKS
						20	40	60	80	20	40	60	80		
		80		MUDSTONE AS ABOVE	80.77										
					86.87										
		90			92.96										
					99.06										
					105.16										
		110			111.25										
					117.35										
		117.40													
		120		SANDSTONE - medium grey, fine grained, silty with numerous partings of siltstone and medium grained sandstone	123.44										
					129.54										
		130			135.64										
					141.73										
		140			147.83										
		150													

Continued on Next Page

CONTINUED

SUNCOR INC. RESOURCES

Project: CHISHOLM LAKE - 06080

Hole Azimuth: \_\_\_\_\_

Coal Drill Hole Log

Area: \_\_\_\_\_

Hole Angle: \_\_\_\_\_

Hole Diameter: \_\_\_\_\_

Location: \_\_\_\_\_

Date Drilled: \_\_\_\_\_

Core Diameter: \_\_\_\_\_

Elevation: \_\_\_\_\_

Date Logged: \_\_\_\_\_

Cal., Den., Neu., Res.,

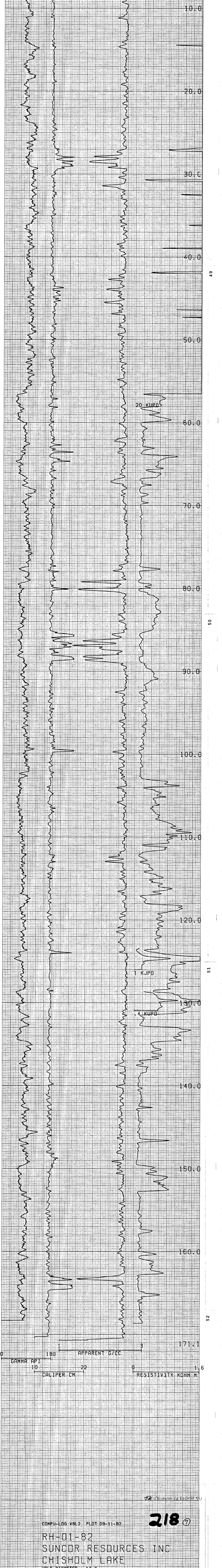
GEOPHYSICAL LOGS: Dev., Gamma, Sonic

Logged By: \_\_\_\_\_

BOX NO.	DEPTH AT BOX TOP	DEPTH	LEGEND	LITHOLOGICAL DESCRIPTION	SAMPLE	CORE RECOVERY %	R.O.D. %	FRAC. LOG	REMARKS
		151.60		MUDSTONE - black, silty	153.92	20 40 60 80	20 40 60 80		
		158.80							
		160		SILTSTONE - dark grey with partings of mudstone and fine grained sandstone	160.02				
					166.12				
		170			172.21				
				- fine grained silty sandstone between 177.20 and 178.40 and from 183.00 to 184.90	178.31				
		180			184.40				
		184.90							
		190		MUDSTONE - black, silty with occasional thin fine grained sandstone and siltstone horizons	190.50				
					196.60				
		200			202.69				
					208.79				
		210			214.88				
					220.98				
		220							
				Hole Completed at 227.08 meters	227.08				Hole dry on completion

APPENDIX VII

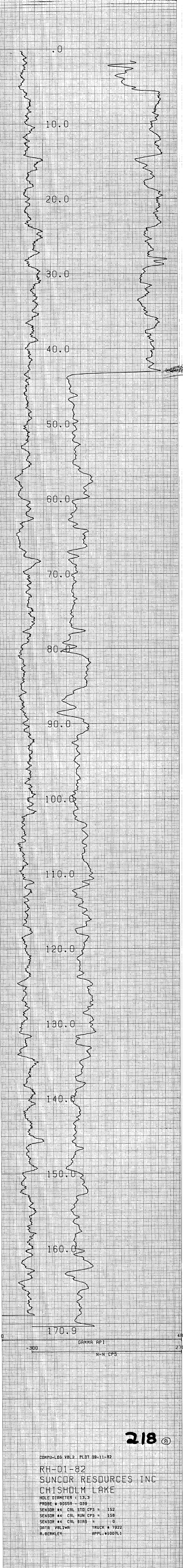
Phase 2 Geophysical Logs



COMPU-LOG V8L2 PLOT 09-11-82

**218** ①

RH-01-82  
 SUNCOR RESOURCES INC  
 CHISHOLM LAKE  
 HOLE DIAMETER : 13.3  
 PROBE # 9030A - 444  
 SENSOR #4 CAL STD CPS = 6588  
 SENSOR #4 CAL RUN CPS = 6732  
 SENSOR #4 CAL BIAS = 17  
 DATA V8L2WA TRUCK # 7922  
 R. BERKLEY APPL. #3035L1



26

27

28

29

30

218 ⑧

COMPU-LOG V8L2 PLOT 09-11-82  
 RH-01-82  
 SUNCOR RESOURCES INC  
 CHISHOLM LAKE  
 HOLE DIAMETER : 13.3  
 PROBE # 9055A - 039  
 SENSOR #1 CAL STD CPS = 152  
 SENSOR #1 CAL RUN CPS = 158  
 SENSOR #1 CAL BIAS = 0  
 DATA VOLC2WA TRUCK # 7922  
 R. BERKLEY APPL. #1007L1



# VERTICAL DEVIATION

# 218

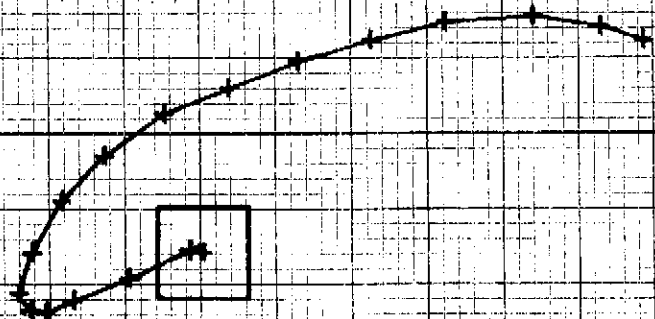
COMPU-LOG V8L1 DEVIATION  
DATA FROM : V8L2\*A

CLIENT : SUNCOR RESOURCES INC  
LOCATION : CHISHOLM LAKE  
HOLE ID : RH-01-82  
DATE OF LOG : 09-11-82  
PROBE : 9055A 0039

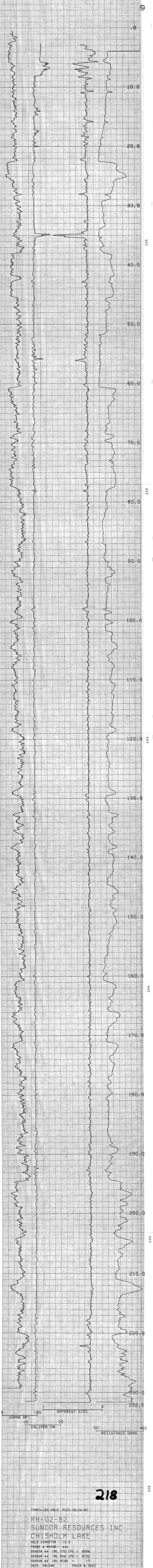
SCALE: .50 M/DIV  
MAG DECL: 24.5  
TRUE DEPTH: 170.7 M  
AZIMUTH: 64.6  
DISTANCE: 3.26 M

+ = 10.0 M INCR  
Δ = TOP OF ZONE  
◇ = BOTTOM OF ZONE

TRUE NORTH ↑







100  
101  
102  
103  
104  
105  
226

218

COMPI-LOG V8L2 PLOT 09-14-82

RH-02-82  
 SUNCOR RESOURCES INC  
 CHISHOLM LAKE

HOLE DIAMETER : 13.3  
 PROBE # 9030A - 444  
 SENSOR #4 CAL STD CPS = 6588  
 SENSOR #4 CAL RUN CPS = 6732  
 SENSOR #4 CAL BIAS = 17  
 DATA VOL2WA TRUCK # 7922  
 R. BERKLEY APPL #2030L1

# VERTICAL DEVIATION

# 218

COMPU-LOG V8L1 DEVIATION  
DATA FROM : V8L2\*A

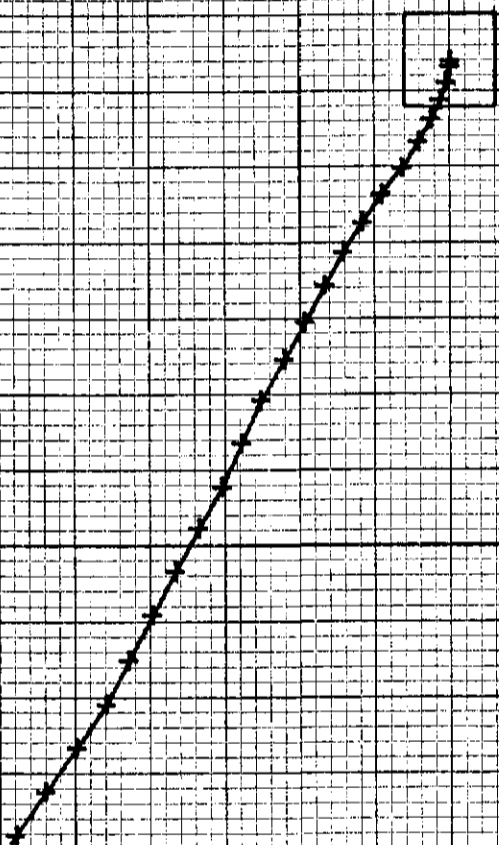
①

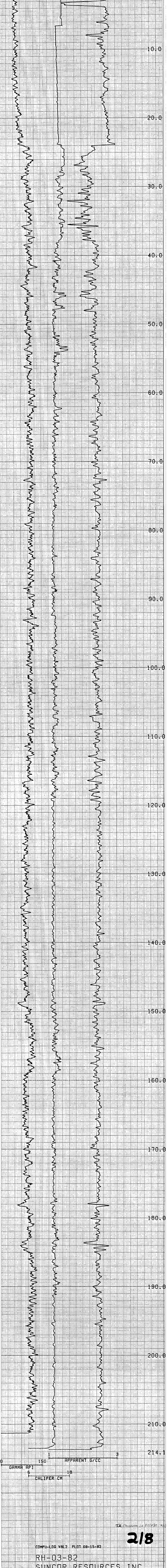
CLIENT : SUNCOR RESOURCES INC  
LOCATION : CHISHOLM LAKE  
HOLE ID : RH-02-82  
DATE OF LOG : 09-14-82  
PROBE : 9055A 0039

SCALE: 2.50 M/DIV  
MAG DECL: 24.5  
TRUE DEPTH: 229.8 M  
AZIMUTH: 209.7  
DISTANCE: 29.71 M

+ = 10.0 M INCR  
Δ = TOP OF ZONE  
◇ = BOTTOM OF ZONE

TRUE NORTH ↑

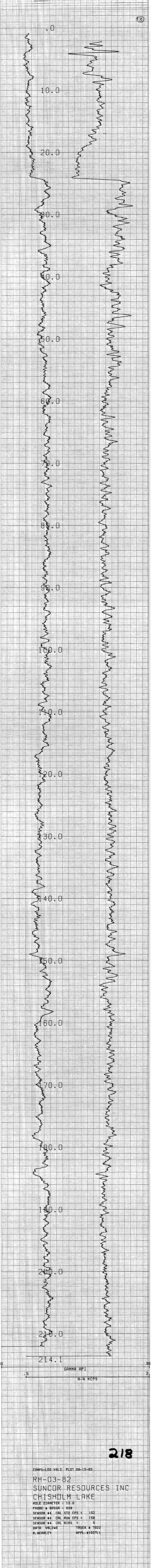




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**218**

COMPU-LOG V8L2 PLOT 08-15-82  
 RH-03-82  
 SUNCOR RESOURCES INC  
 CHISHOLM LAKE  
 HOLE DIAMETER : 13.0  
 PROBE # 9030A - 444  
 SENSOR #4 CAL STD CPS = 6588  
 SENSOR #4 CAL RUN CPS = 6732  
 SENSOR #4 CAL BIAS = 17  
 DATA V8L2WA TRUCK # 7922  
 R. BERKLEY APPL. #2630L1



218

COMPU-LOG VBL 2 PLOT 09-15-82  
 RH-03-82  
 SUNCOR RESOURCES INC  
 CHISHOLM LAKE  
 HOLE DIAMETER : 13.0  
 PROBE # 8055A - 039  
 SENSOR #4 CAL STD CPS = 152  
 SENSOR #4 CAL RUN CPS = 158  
 SENSOR #4 CAL BIAS = 0  
 DATA VBL2WA TRUCK # 7922  
 R. BERKLEY APPL. #10071

APPENDIX IX

Geological Map (South Half)



**CHISHOLM LAKE MAP LEGEND**

	PLEISTOCENE & RECENT ALLUVIUM, FILL, GRAVEL
	CRETACEOUS & TERTIARY ACIDIC VOLCANIC UNDIVIDED, FLOWS & BRECCIAS
	CRETACEOUS RED ROSE FORMATION - BLACK TO DARK GREY SHALE, CHERT PEBBLE CONGLOMERATE, MICACEOUS GREYWACKE

**SYMBOLS**

	ANTICLINE		DRILL HOLE - CORED
	SYNCLINE		DRILL HOLE - NOT CORED
	FAULT		TRAVERSE NUMBER AND STATION
	UNIT BOUNDARY		STRIKE & DIP

**Geological Resources Group**      **COAL AND MINERALS DEPARTMENT**

**GEOLOGICAL MAP OF THE CHISHOLM LAKE COAL PROPERTY**

SOUTH HALF

DATE: NOV. 1982      SCALE: 1:15840      N.T.S.      93L      DRAWING NO.: 82-238