



Geological Survey Report

on the

H. D. CARLSON PROPERTY

HALLIDAY TOWNSHIP, ONTARIO

Larder Lake Mining Division

Introduction :

The Property described in this Report consists of a contiguous block of 48 unpatented mining claims all located within Halliday Township, Ontario; and situated approximately 40 airmiles south of the city of Timmins.

During the period from May 30th-October 4th, 1972 the entire claim group was covered by a systematic geological mapping program. Control for the mapping program was established by means of chain & compass lines run at 400-foot intervals and by airphotos enlarged to a scale of one inch to 660 feet. Results of the geological survey are shown on the attached Geological Plan Map (at a scale of one inch to 400 ft.) which forms an integral part of this Report.

Sources of Information :

This Report is based upon extensive personal knowledge of the Halliday Township Property itself, as well as surrounding regions, gained during the periods 1959-61 & 1964-72 while practising my profession initially as an Exploration Geologist and later as a Consulting Geological Engineer. All the major rock outcrops on the Property were personally examined by this writer.

Property Description :

The Property described in this Report consists of 48, unpatented, contiguous mining claims all located in Halliday Township, Larder Lake Mining Division, District of Sudbury, Ontario and numbered as follows:

<u>Claim Nos.:</u>	<u>Recorded:</u>
L.298959-299006 inclusive	October 22, 1970

An Assessment Work Credit of 40 days (Geophysical) has been recorded on each of the aforementioned 48 mining claims.

The recorded owner of the 48 claims on the date of this Report is Mr. H. D. Carlson (License No. M.18862); P.O. Box 183; Porcupine, Ontario.

Location & Access :

The Property is located in the central part of Halliday Township at approximately Latitude 47°54' N, Longitude 81°09' W. The Claim Group forms a rectangular-shaped block about two miles north-south by one and one-half miles east-west centered about Annie Lake. The Grassy River traverses the eastern part of the Property; the north end of Relic Lake covers the southwest corner; and a high-voltage power transmission line (H.E.P.C.) cuts diagonally across the western portion of the Claim Group.

Access to the Property can be readily gained in summer by ordinary vehicle via secondary dirt roads to the vicinity of the northern end of Relic Lake. The claims are also accessible by boat or canoe via the Grassy River. A maintenance road that follows along the general course of the power transmission line is extremely rough and now impassable to vehicular traffic in most sections due to washed-out culverts and swampy zones. A log bridge that crosses the Grassy River near the southern boundary of the Property has caved and is now suitable for pedestrian traffic only.

Topography :

The Property has a very flat relief with local areas of higher ground rising to a maximum of 50 ft. above the local drainage. Rock outcrop areas comprise less than 5% of the Claim Group and where present are covered by a thin but persistent layer of moss & humus. The main area of rock outcrops (flat-lying, smooth) have been exposed by bulldozing & trenching along the power

transmission line access road ... where possible, of course, said road follows areas of higher ground; a few rock outcrops occur as low bluffs along the banks of the Grassy River and the shores of Relic Lake. Extensive areas of marsh generally extend outward along both banks of the Grassy River. Many of the mining claims on the Property have no rock outcrops whatsoever - they are entirely covered by overburden which appears to consist essentially of thin glacial boulder clay tills overlain by outwash sand & gravel deposits of variable thicknesses.

Vegetation :

The higher, sand plain areas of the Property are covered by poplar & birch with second-growth jackpine; the lower, swampy areas contain muskeg & extensive zones of tag alders. Balsam, cedar, spruce & tamarack are also found locally - abundant cedar occurs along the shores of Relic Lake and along the north boundary of the Property; extensive zones of muskeg cover the south-eastern claims.

History of Exploration :

In 1965, Cominco Limited held a group of claims around Annie Lake which covered part of the present subject property. This company drilled several holes to investigate electromagnetic conductors in a wide band of intermediate pyroclastic rocks containing disseminated pyrite, pyrrhotite and minor chalcopyrite. The drill holes intersected zones of graphitic tuff containing disseminated to massive pyrite and nodular marcasite.

In 1967, Amax Exploration Incorporated held a block of claims northwest of Annie Lake which covered part of the present subject property. This company put down a drill hole some 2,000 feet north of Annie Lake which intersected andesitic-dacitic lapilli tuff and graphitic tuff-breccia containing disseminated pyrite, pyrrhotite, and minor chalcopyrite.

The Claim Group which comprises the Property described herein was recorded on October 22, 1970. During the period of November 1971 to February 1972 Geophysical Surveys (Electromagnetic, Magnetic) were conducted over the entire Claim Group. Control for said Surveys were chain & compass, north-south traverses spaced at 400-foot intervals; check control points were established by chaining and marking the north & south boundaries of the Property, the H.E.P.C. power transmission line, and an old timber access road that trends northeasterly across the central part of the Claim Group.

The following quotations are taken directly from a Report dated March 23, 1972 by Dr. H. D. Carlson, Consulting Geologist pertaining to results of said Geophysical Surveys: ...

" ... The instruments used for the survey were a Ronka EM16 VLF electromagnetic unit manufactured by Geonics Limited, and a Craelius Miximag magnetometer which has an overall accuracy of ± 50 gammas on the scale range used throughout the present survey.

The maximum magnetic reading on the property is 1,470 gammas, and the minimum reading is 410 gammas, so that the maximum magnetic relief over the ground is little more than one thousand (1,000) gammas. In general such magnetic relief as exists over the claim group as a whole is to be ascribed to such factors as:

- (1) variations in the sub-surface bedrock topographic relief:
- (2) variations in the accessory mineral magnetite content of the bedrocks underlying the survey station sites.

The survey work has not indicated the presence of any mafic or ultra-mafic intrusive bodies in the bedrock underlying the property. The presence of a somewhat higher than background magnetic zone in the region north of Annie Lake, where there are known to be both airborne and ground electromagnetic conductors present, may have some significance concerning the possible presence of sulphide mineralization of commercial interest there.

Nineteen electromagnetic conductive zones were located by the survey work. These all trend at least roughly parallel to the general strike of the underlying volcanic rock formations. It is very probable that the majority of these conductors are not genuine bedrock conductive zones, but are due to electrical conductivity associated with inclined wet interfaces between the bedrock surface and the overburden. It will be necessary to check these various conductors with another type of electromagnetic unit, preferably a horizontal loop, before any estimate of their economic significance can be made."

Geology :

The general area encompassing Halliday Township has been mapped geologically during several different periods by the Ontario Department of Mines ... the regional geology is shown on Geological Compilation Map No. 2046 Timmins-Kirkland Lake Sheet (1963) at a scale of 1 inch to 4 miles. More detailed coverage is given on O.D.M. Preliminary Geological Map No. P385, Halliday Township (1968) at a scale of 1 inch to 1320 feet. The latest results of mapping programs by the O.D.M. and data obtained from Assessment Work files is covered in Geological Report 79, Geology of Halliday & Midlothian Townships (1970), with associated

Map 2187 at a scale of 1 inch to 2640 feet.

The general Halliday Township Region is also covered by G.S.C. Aeromagnetic Map 286G (Rev.), "Sinclair Lake".

(a) Regional Geology :

Halliday Township encompasses the central portion of a "felsic volcanic dome" that extends westward into adjoining Sothman Township, and eastward into adjoining Midlothian Township. All the consolidated rocks of the region are of Precambrian age ... they consist essentially of an older, altered & deformed "Archean" basement complex (Metavolcanics, Metasediments, Mafic-Ultrabasic Intrusives) overlain in part by a younger "Proterozoic" ("Huronian") series of generally flat-lying sediments (Cobalt Group).

The aforementioned Archean-age Metasediments are not present in the immediate area of the Property; therefore, they will not be considered further herein.

The Metavolcanic complex consists of flows, tuffs, pyroclastics, breccias, & their schistose equivalents; their composition ranges from felsic types (Rhyolite, Dacite, Sericite Schist) to mafics (Andesite, Basalt).

Mafic (Gabbro, Diorite) to Ultramafic (Peridotite, Pyroxenite, Dunite, Serpentinite) Intrusives occur to the west in Sothman Township and to the east in Midlothian Township.

Dikes of "Matachewan" Diabase are numerous in the general region surrounding Halliday Township ... they occupy many of the north-trending faults & fractures in the country rock. On a regional basis, said Dikes are typified by long, linear Mag Anomalies with peak values a few hundred gammas above the general background intensities. Local areas of Diabase Dikes are not discernible on Regional Aeromagnetic Maps.

(b) Economic Geology :

During the period from 1909-66, the general Halliday Township Region was intensively prospected for gold; however, the only production achieved was of a very limited extent ... being by Stairs Exploration & Mining Co. Ltd. (during the brief period of September 1965 to April 1966) from their mine located in the northwestern part of Midlothian Township approximately four miles east of the Carlson Property.

Halliday Township contains a number of sulphide showings ... they include large, barren, massive Pyrite (Marcasite) deposits associated with Graphitic Tuffs or Argillaceous Sediments, and disseminated sulphides (Pyrite, Pyrrhotite, Chalcopyrite (Cu), Sphalerite (Zn), Galena (Pb)) generally within Flesic Metavolcanics. In general, the more massive sulphide deposits were initially located by means of Airborne Electromagnetic Surveys; the disseminated sulphide zones by detailed prospecting. To date, no commercial base metal deposits have been located in the general Halliday Township Region although a number of such occurrences are currently being evaluated.

The following quotes are excerpts taken from the aforementioned Ontario Department of Mines Geological Report 79, Geology of Halliday & Midlothian Townships (1970): ...

"RECOMMENDATIONS FOR FUTURE EXPLORATION

The most favourable areas for future mineral exploration are those of rhyolitic rocks with associated intermediate pyroclastic rocks and ultramafic and mafic intrusive rocks. Important features of the more promising areas are discussed below:

Nickel. The best possibilities for nickel mineralization in the map-area are the ultramafic and mafic sills and stocks in the upper (outer) rhyolitic strata. A zone of peridotite and gabbro sills and stocks, intruding the outer rhyolitic strata, extends eastward from Sothman Township & east-northeastward into Halliday and Midlothian Townships.

Asbestos. Stringers and veinlets of cross-and-slip-fibre asbestos cut the serpentized ultramafic intrusive rocks of the map-area. A cross-fibre asbestos zone approximately 4,000 feet along and 200 feet wide is present along the north shore of the west arm of Lloyd Lake in Midlothian Township. (Property of Allied Mining Corporation)

...The greater part of the property is occupied by an ultramafic sill or stock with a dunite-peridotite core surrounded by pyroxenite and gabbro.

Gold. In exploration for gold in this area, it should be noted that the known gold-bearing zones are in the lower metasediments overlying older rhyolitic strata; and also that the altered conglomerate is a more favourable host rock for gold-bearing quartz veins than are the altered arkose or greywacke.

Base Metals. The majority of the copper, and copper-lead-zinc orebodies in the Canadian Shield are found as replacement and "stratabound" sulphide bodies in fragmental volcanic rocks of rhyolitic or dacitic composition. The replacement sulphide bodies lie in favourable structural positions with feeder fracture systems below; the "strata-bound" sulphide bodies lie in permeable breccias capped by impermeable andesite or rhyolite. This common relationship may indicate a volcanic origin for these sulphide ores

and their concentration at or near a volcanic centre.

The Halliday rhyolitic dome is a volcanic centre and could have excellent possibilities of associated base metal sulphide deposits if the above theories are correct."

Detailed Geological Survey on the H. D. Carlson Property:

A. Rock Types :

All the bedrock on the Property is of Precambrian (Archean) age. Three principal rock categories have been distinguished and are described as follows:

1. Felsic (Rhyolitic) Metavolcanics:

Regional geology considerations suggest that these are the oldest rocks present. They weather creamy-white to greenish-brown and are a yellowish-green to light greenish-grey to grey colour on the fresh fracture. Two main types are present : ...

(a) Agglomerates:- some of which consist of flow-laminated, porphyritic, or massive variably coloured fragments in a distinctly different felsic matrix; others consist of fragments - ranging in size from one-quarter of an inch up to 10 inches in diameter - in a matrix of similar material; in a few places the matrix is distinctly darker coloured and appears to have aⁿ appreciable content of chlorite.

(b) Ignimbrites:- these are massive, porphyritic or flow-laminated, and are very fine-grained to aphanitic in texture.

2. Lapilli Tuff & Graphitic Argillaceous Tuff:

These rock types do not outcrop anywhere on the Property; however, they have been encountered in drill holes put down at three locations on the Claim Group ... said holes were located on mining claims L.299003, 298991 & 298985. In addition, two holes drilled immediately to the west of claims L.298983 & 298994 also intersected zones of Graphitic Lapilli Tuff which contained variable amounts of disseminated sulphide mineralization. The graphitic horizons coincide with E.M. Conductive Zones located in the aforementioned Geophysical Survey. The typical Graphitic Lapilli Tuff in drill core has been described as follows: ... fragments are irregularly-shaped, fine-grained, typically light grey, rhyolite & rhyodacite of 1/2" to 3/4" diameter (rarely of boulder size from 3" to 15"

diameter); the matrix is fine-grained, dark containing variable amounts of graphite (5-90%).

3. Intermediate (Dacitic) Metavolcanics:

These rock types stratigraphically appear to overlie the felsic Metavolcanics & Lapilli Tuffs. They are Dacitic Agglomerates consisting of lighter coloured fragments, from pea-sized or smaller up to 30 inches in diameter, in a darker-coloured matrix. The fragments are a mixture of angular, subangular to rounded, and elongated pieces of massive or amygdaloidal Rhyodacite, massive & flow-banded Rhyolite, scoriaceous Dacitic bombs, Andesitic lava, & Graphitic Tuff & Slate in that order of abundance. On the outcrop surface these rocks are medium-dark grey to light buff in colour depending upon the degree of weathering. Within outcrops on mining claim L.298995 the matrix of the Agglomerate contains fragments of black Graphitic Tuff enclosing ovoid nodules of Pyrrhotite up to two inches in length; here, these rocks show considerable pervasive carbonate alteration with accompanying quartz stringer & blotch silicification. On the majority of outcrops the Dacitic Agglomerates exhibit some minor rusty-weathering phenomena suggesting that they contain at least a minor amount of disseminated sulphides.

B. Sulphide Mineralization:

The Graphitic Lapilli Tuffs in general contain disseminated sulphide mineralization consisting of 1%-5% Pyrite and/or Pyrrhotite; minor amounts of Chalcopyrite are often found directly associated with the Pyrrhotite.

The Dacitic Agglomerates, particularly those exposed on mining claim L.298995, contain widely disseminated nodules of pyrrhotite up to two inches in length ... some of these nodules have minor amounts of associated Chalcopyrite mineralization; nowhere, however, does the copper content of these rocks approach economic concentrations. The mineralized Dacitic Agglomerates usually exhibit variable carbonate alteration accompanied by minor silicification, and contain 1%-2% disseminated, very fine-grained Pyrrhotite & Pyrite with trace amounts of Chalcopyrite, Galena & Sphalerite.

At the southwestern corner of the road on claim L.298995 an outcrop of Dacitic Agglomerate contains a narrow quartz-carbonate vein heavily

mineralized with Galena and minor amounts of Sphalerite & Chalcopyrite. The vein has a maximum width of four inches, strikes east-west, dips vertically, and has been traced for about 15 ft. along strike; the Galena content of the vein is about fifty percent. A selected grab sample of the vein material which contained about 50% Galena is reported by Mr. Carlson to have assayed 0.64 oz/ton of silver.

In the southwestern part of claim L.298989 there is a small, isolated outcrop area of Ignimbrite which has been considerably sheared & silicified, and is cut by quartz stringers. The shearing strikes a little east of north, and dips vertically. The quartz stringers & the silicified rock are variably mineralized with coarse to very fine-grained, disseminated Specular Hematite.

C. Structural Geology:

Inherent structures such as bedding planes, grain gradations, etc. were not observed on any of the outcrops of metavolcanic rocks anywhere on the Property. Regional geological considerations indicate that these formations are part of a large domal structure and that they are generally flat-lying on that part of the dome covered by the Carlson Claim Group. However, diamond drilling indicates that the Graphitic Lapilli Tuff horizon located on the extreme northern part of the Property (claims L.299003 & 4) dips steeply to the north.

Although direct field evidence is sparse, it would appear as if there has been at least some slight warping of the formations, and that the general trend of these generally gentle open folds is roughly east-west. X

A number of north-northeasterly trending fault zones appear to cut through the Property, and are displaced by other generally east-west trending faults. The lack of any continuous areas of rock outcrop on the Property severely prohibits any detailed mapping of the bedrock structures; and, therefore, the location of these aforementioned faults as shown has in most cases been postulated on the basis of results interpreted from the Geophysical Surveys and/or regional extrapolations of strong lineations indicated on airphotos. There is, however, good evidence for the fault which strikes up the east side of the Property in the fact that the rocks on the east bank of the Grassy River are considerably fractured in exposures immediately adjacent to the river; these subsidiary

fractures are mainly vertical and trend roughly east-west. Other fault locations are indicated by the sudden termination & displacement of E.M. Conductive Zones and/or abrupt changes in the lithology along strike of regional rock units.

Many of the airphoto lineations trend parallel to the local stratigraphy and are considered to represent local shearing and/or be reflections of contact zones between interstratified rock units. Other, randomly-oriented lineations reflect local directions of fracturing caused by the regional warping. Those lineations oriented at approximately N 11° E trend parallel to the regional glaciation direction as shown by glacial striae observed on outcrops on claim L.298969 located near Relic Lake.

Summary:

The H.D. Carlson Property is underlain entirely by an interstratified series of Precambrian age Felsic (Rhyolitic) Metavolcanics, Lapilli Tuff-Graphitic Argillaceous Tuff, and Intermediate (Dacitic) Metavolcanics ... the Tuffs appear to lie between the older Felsic & younger Intermediate Metavolcanics.

TABLE OF LITHOLOGIC UNITS

CENOZOIC

RECENT: Swamp & stream sediments

PLEISTOCENE: Sand, gravel, and silt

--- Unconformity ---

PRECAMBRIAN

ARCHAEAN:

INTERMEDIATE (DACITIC) METAVOLCANICS: Agglomerate, flows

LAPILLI TUFF & GRAPHITIC ARGILLACEOUS TUFF

FELSIC (RHYOLITIC) METAVOLCANICS: Agglomerates, Ignimbrites

* * * * *

The main sulphide mineralization present on the Carlson Property consists of disseminated Pyrite & Pyrrhotite, with minor amounts of Chalcopyrite and traces of Galena & Sphalerite in places. The sulphides have been found within Dacitic Agglomerates & Graphitic Lepilli Tuffs.

A number of north-northeasterly trending fault zones appear to cut through the Property, and are displaced by other generally east-west trending faults.

Results of the geological mapping program and structural interpretations by this writer are as shown on the attached Geological Plan Map.

* * * * *

Respectfully submitted,
KENNETH H. DARKE CONSULTANTS LIMITED

K. H. Darke

K.H. Darke, P.Eng.
Consulting Geological Engineer



DATED this 7th day of December 1972
Timmins, Ont.

Show instrument technical data in each space for
type of survey submitted or indicate "not applicable"

GEOPHYSICAL TECHNICAL DATA

GROUND SURVEYS

Number of Stations _____ Number of Readings _____

Station interval _____

Line spacing _____

Profile scale or Contour intervals _____
(specify for each type of survey)

MAGNETIC

Instrument _____

Accuracy - Scale constant _____

Diurnal correction method _____

Base station location _____

ELECTROMAGNETIC

Instrument _____

Coil configuration _____

Coil separation _____

Accuracy _____

Method: Fixed transmitter Shoot back In line Parallel line

Frequency _____
(specify V.L.F. station)

Parameters measured _____

GRAVITY

Instrument _____

Scale constant _____

Corrections made _____

Base station value and location _____

Elevation accuracy _____

INDUCED POLARIZATION - RESISTIVITY

Instrument _____

Time domain _____ Frequency domain _____

Frequency _____ Range _____

Power _____

Electrode array _____

Electrode spacing _____

Type of electrode _____

H.D. Carlson Property;

Halliday Township, Ontario;

Schedule "A" to accompany THE MINING ACT REPORT OF WORK ...

<u>Claim No.:</u>	<u>Days:</u>	<u>Claim No.:</u>	<u>Days:</u>	<u>Claim No.:</u>	<u>Days:</u>
L.298959	20	L.298975	20	L.298991	20
L.298960	20	L.298976	20	L.298992	20
L.298961	20	L.298977	20	L.298993	20
L.298962	20	L.298978	20	L.298994	20
L.298963	20	L.298979	20	L.298995	20
L.298964	20	L.298980	20	L.298996	20
L.298965	20	L.298981	20	L.298997	20
L.298966	20	L.298982	20	L.298998	20
L.298967	20	L.298983	20	L.298999	20
L.298968	20	L.298984	20	L.299000	20
L.298969	20	L.298985	20	L.299001	20
L.298970	20	L.298986	20	L.299002	20
L.298971	20	L.298987	20	L.299003	20
L.298972	20	L.298988	20	L.299004	20
L.298973	20	L.298989	20	L.299005	20
L.298974	20	L.298990	20	L.299006	20

* * * * *

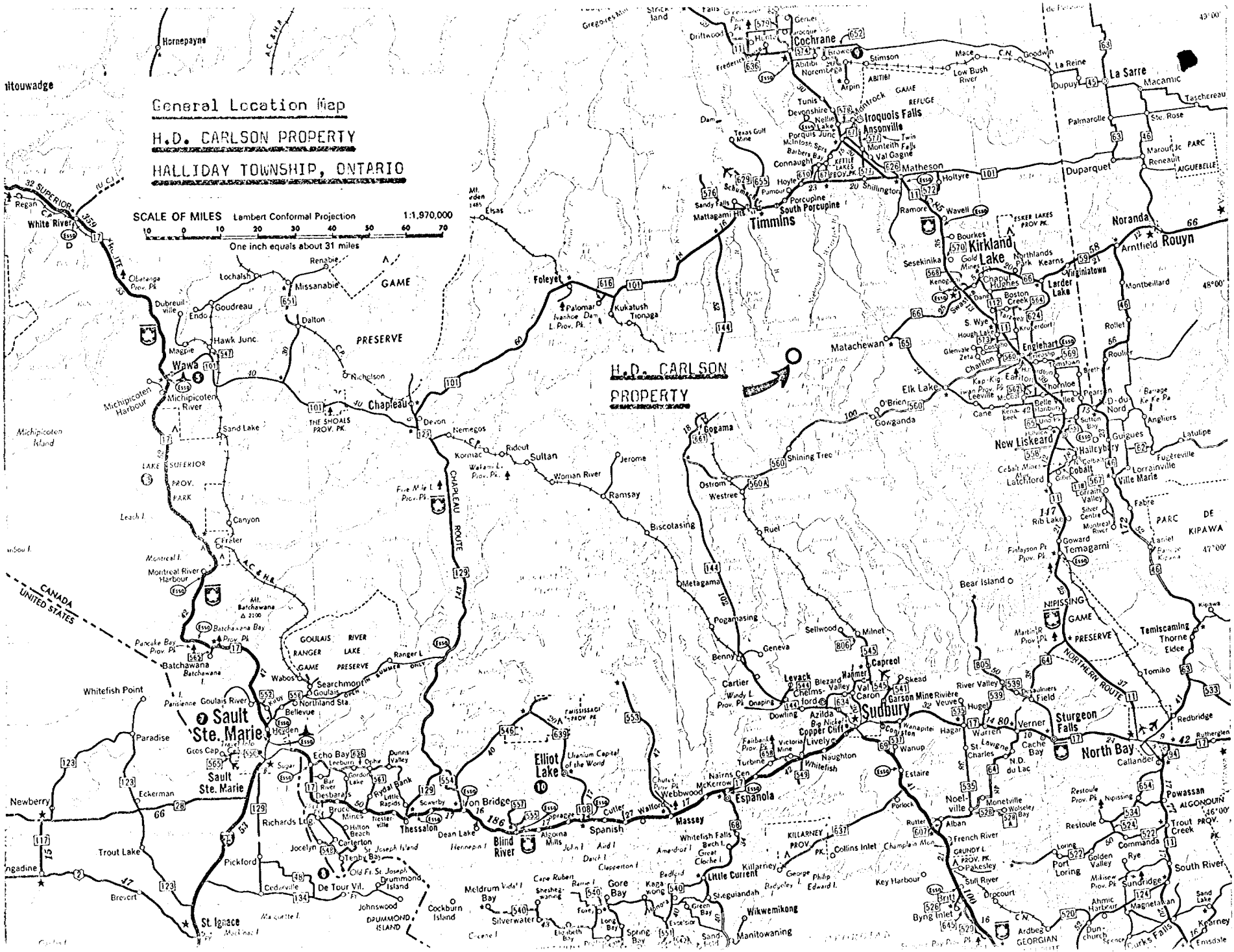


K.H. Darke, P.Eng.
Consulting Geological Engineer
Agent, Mr. H.D. Carlson

titowadge

General Location Map H.D. CARLSON PROPERTY HALLIDAY TOWNSHIP, ONTARIO

SCALE OF MILES Lambert Conformal Projection 1:1,970,000
One inch equals about 31 miles



**H.D. CARLSON
PROPERTY**



010-M

QWT YADILJAH

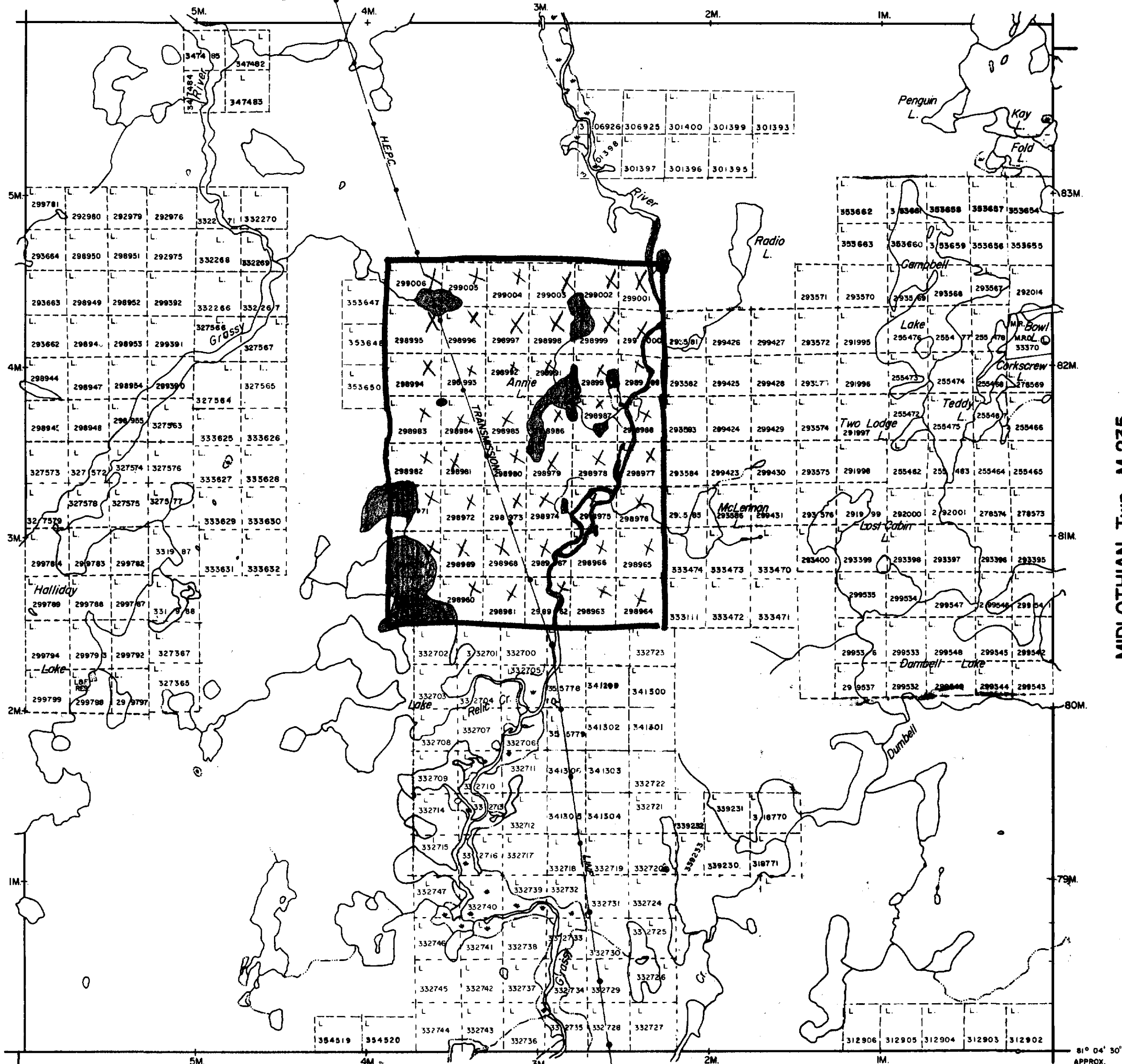
010-M

HUTT Twp. M-943

SOTHMAN Twp. M-121

MIDLOTHIAN Twp. M-235

MOND Twp. M-870



Geological

NOTES

400' surface rights reservation along the shores of all lakes and rivers.

DATE OF ISSUE
 JAN 2 1973
 ONT. DEPT. OF MINES
 AND NORTHERN AFFAIRS

LEGEND

- PATENTED LAND Ⓟ or ●*
 - PATENTED FOR SURFACE RIGHTS ONLY Ⓛ
 - LEASE Ⓞ
 - LICENSE OF OCCUPATION L.O.
 - CROWN LAND SALES C.S.
 - LOCATED LAND Loc.
 - CANCELLED C.
 - MINING RIGHTS ONLY M.R.O.
 - SURFACE RIGHTS ONLY S.R.O.
 - HIGHWAY & ROUTE NO.
 - ROADS
 - TRAILS
 - RAILWAYS
 - POWER LINES
 - MARSH OR MUSKEG
 - MINES
- *used only with summer resort locations or when space is limited

TOWNSHIP OF
HALLIDAY
 DISTRICT OF
 SUDBURY
 LARDER LAKE
 MINING DIVISION
 SCALE : 1 INCH = 40 CHAINS (1/2 MILE)

DR. *R.W.N.* PLAN NO. **M-910**
 DATE *FEB. 2, 71.*

ONTARIO
 DEPARTMENT OF MINES
 AND NORTHERN AFFAIRS

2.1104



010-M

QWT YADILJAH

010-M

HUTT Twp. M-943

Claim Location Map

H.D. CARLSON PROPERTY

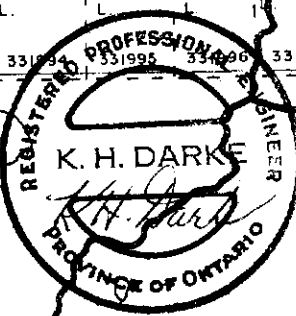
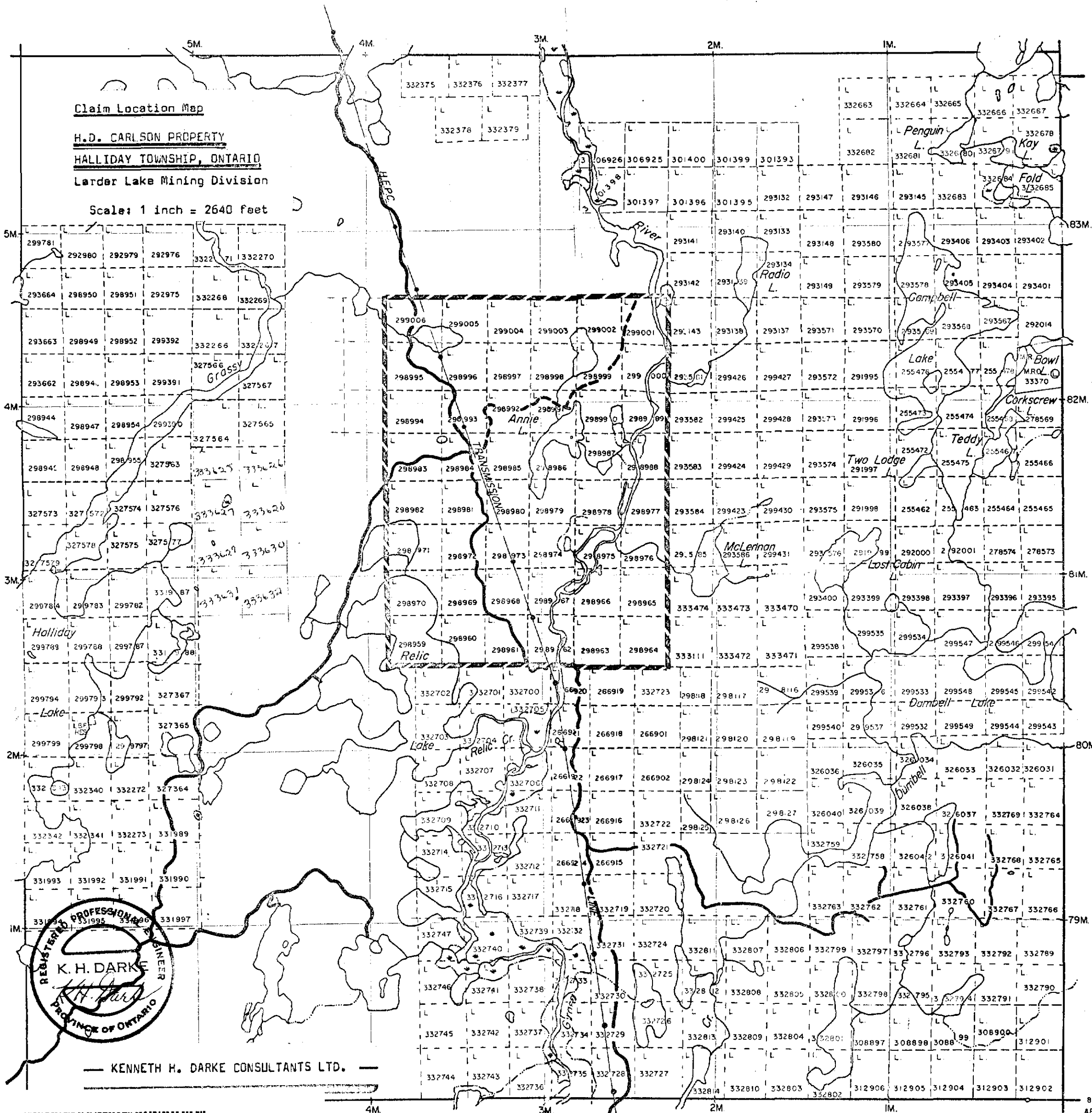
HALLIDAY TOWNSHIP, ONTARIO

Larder Lake Mining Division

Scale: 1 inch = 2640 feet

SOTHMAN Twp. M-1121

MIDLOTHIAN Twp. M-235



— KENNETH H. DARKE CONSULTANTS LTD. —





#4 Post

Bush road

trench

trench

trench

trench

trench

trench

trench

trench

trench

Sketch showing locations of rock trenches
on claim L. 298995
Halliday township
Scale: 1 inch = 50 feet.

H.D.

#3 Post



Sketch showing location of rock trench
on claim L. 298993
Halliday township
Scale: 1 inch = 100 feet.

