Gulf Minerals Canada Limited

010

REID PROJECT
AIRBORNE ELECTROMAGNETIC SURVEY
REID, LOVELAND, MAHAFFY AND THORBURN
TOWNSHIP AREAS, ONTARIO

1982

S. D. Robinson
January, 1982
Minerals
NTS 42A/11, 12, 13, 14

Based on Report by
D. C. Fraser and Z. Dvorak
Dighem Limited
June, 1980

Gulf

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TABLES

ENCLOSED IN REPORT

ILLUSTRATIONS

ENCLOSED IN REPORT

ENCLOSED IN POCKETS

1.0 INTRODUCTION

A DIGHEM II airborne electromagnetic survey of 426 line miles (682 line kilometres) was flown between April 13 and 17, 1980, for Gulf Minerals Canada Limited, over two areas in Reid and Loveland Townships of Ontario (Figures 1 and 2). Of the 426 line miles (682 line kilometres) flown, 354 line miles (566 line kilometres) covered 518 claims held by Gulf Minerals Canada Limited, (Figures 3 and 4; Table II [Appendix II]).

The Lama C-GDEM jet helicopter flew with an average airspeed of 132 kilometres per hour and EM bird height of 33 metres. The equipment consisted of a Sperry radio altimeter, Geocam sequence camera, 60 Hz monitor, Barringer 8-channel hot pen analog recorder, and a Geometrics G-704 digital data acquisition system with a Cipher 70 7-track 200-bpi magnetic tape recorder. The sensor was towed at an average height of 58 metres. The analog equipment recorded four channels of EM data at approximately 900 Hz, and one ambient EM noise channel (for the standard receiver). The digital equipment recorded the EM data with a sensitivity of 0.2 ppm/bit.

The Appendix provides details on the data channels, their respective noise levels, and the data reduction procedure. The quoted noise levels are generally valid for wind speeds up to 35 km/h. Higher winds may cause the system to be grounded because excessive bird swinging produces difficulties in flying the helicopter. The swinging results from the 5 m^2 of area which is presented by the bird to broadside gusts.

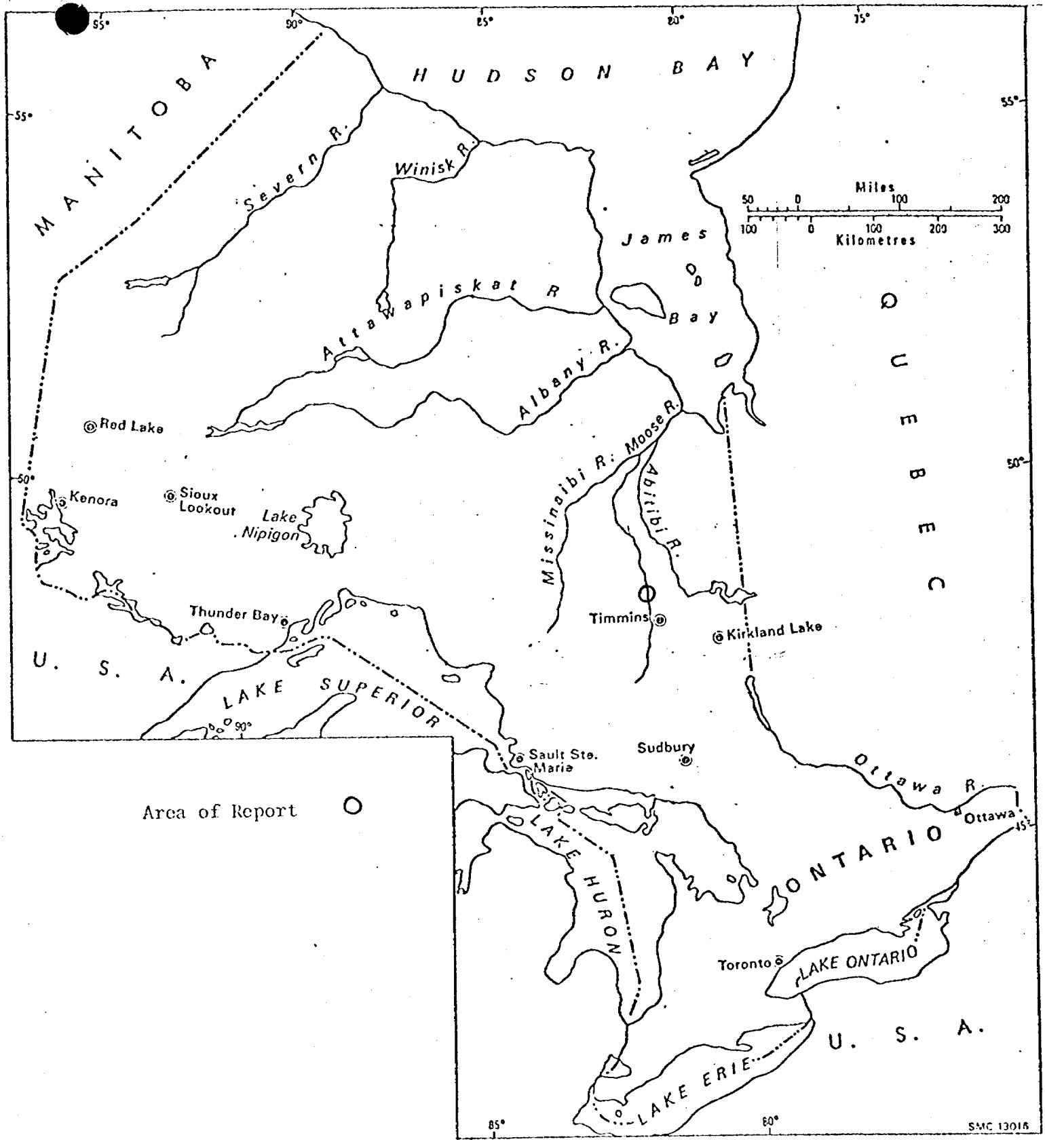

Figure 1 Location Map

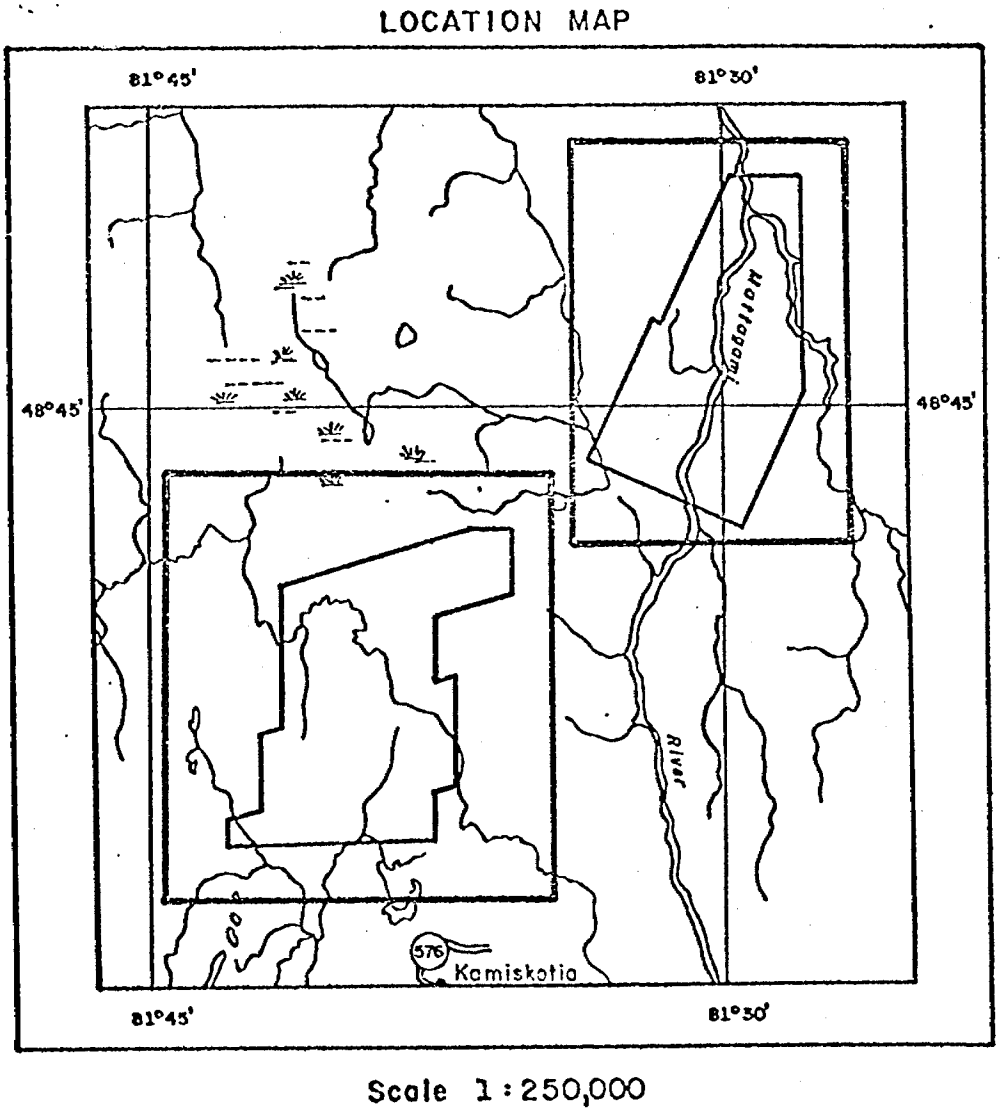

Figure 2. Area of Survey

2.0 DATA PRESENTATION

DIGHEM electromagnetic responses fall into two general classes, discrete and broad. The discrete class consists of sharp, well defined anomalies from discrete conductors such as sulphide lenses and steeply dipping sheets of graphite and sulphides. The broad class consists of wide anomalies from conductors having a large horizontal surface such as flatly dipping graphite or sulphide sheets, saline water-saturated sedimentary formations, conductive overburden and rock, and geothermal zones. A vertical conductive slab with a width of 200 metres would straddle these two classes.

The vertical sheet (half plane) model is the most common model used for the analysis of discrete conductors. All anomalies plotted on the electromagnetic map are interpreted according to this model. The following section entitled "Discrete Conductor Analysis", describes this model in detail, including the effect of using it on anomalies caused by broad conductors such as conductive overburden.

The conductive earth (half space) model is the most suitable model for broad conductors.

2.1 Discrete Conductor Analysis

The EM anomalies appearing on the electromagnetic map are interpreted by computer to give the conductance (i.e., conductivity-thickness product) in mhos of a vertical sheet model. DIGHEM anomalies are divided into six grades of conductance, as shown in Table I. The conductance in mhos is the reciprocal of resistance in ohms.

TABLE I

EM Anomaly Grades

Anomaly Grade	Mho Range
6	≥ 100
5	50 - 99
4	20 - 49
3	10 - 19
2	5 - 9
1	≤ 4

The mho value is a geological parameter because it is a characteristic of the conductor alone; it generally is independent of frequency, and of flying height or depth of burial apart from the averaging over a greater portion of the conductor as height increases.* Small anomalies from deeply buried strong conductors are not confused with small anomalies from shallow weak conductors because the former will have larger mho values.

Conductive overburden generally produces broad EM responses which are not plotted on the EM maps. However, patchy conductive overburden in otherwise resistive areas can yield discrete-like anomalies with a conductance grade (cf. Table I) of 1, or even of 2 for conducting clays which have resistivities as low as 50 ohm-m. In areas where ground resistivities can be as low as 1 ohm-m, anomalies caused by weathering variations and similar causes can have conductance grades as high as 4. The anomaly shapes from the multiple coils often allow such surface conductors to be recognized, and these are indicated by the letter "S" on the map. The remaining anomalies in such areas could be bedrock conductors. The higher grades indicate increasingly higher conductances. Examples: DIGHEM's New Insco copper discovery (Noranda, Quebec, Canada), yielded a grade 4 anomaly, as did the neighbouring copper-zinc Magusi River ore body; Mattabi (copper-zinc, Sturgeon Lake, Ontario, Canada), and Whistle (nickel, Sudbury, Ontario, Canada) gave grade 5; and DIGHEM's Montcalm nickel-copper discovery (Timmins, Ontario, Canada) yielded a grade 6 anomaly. Graphite and sulphides can span all grades but, in any particular survey area, field work may show that the different grades indicate different types of conductors.

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* This statement is an approximation. DIGHEM, with its short coil separation, tends to yield larger and more accurate mho values than airborne systems having a larger coil separation.

Strong conductors (i.e., grades 5 and 6), are characteristic of massive sulphides or graphite. Moderate conductors (grades 3 and 4) typically reflect sulphides of a less massive character or graphite, while weak bedrock conductors (grades 1 and 2), can signify poorly connected graphite or heavily disseminated sulphides. Grade 1 conductors may not respond to ground EM equipment using frequencies less than 2000 Hz.

The presence of sphalerite or gangue can result in ore deposits having weak to moderate conductances. As an example, the three million ton lead-zinc deposit of Restigouche Mining Corporation near Bathurst, New Brunswick, yielded a well defined grade 1 conductor. The 10 percent by volume of sphalerite occurs as a coating around the fine grained massive pyrite, thereby inhibiting electrical conduction.

On the electromagnetic map, the actual mho value and a letter are plotted beside the EM grade symbol. The letter is the anomaly identifier. The horizontal rows of dots, beside each anomaly symbol, indicate the anomly amplitude of the flight record. The vertical column of dots gives the estimated depth. In areas where anomalies are crowded, the identifiers, dots and mho values may be obliterated. The EM grade symbols, however, will always be discernible, and the obliterated information can be obtained from the anomaly listing appended to this report.

The purpose of indicating the anomaly amplitude by dots is to provide an estimate of the reliability of the conductance calculation. Thus, a conductance value obtained from a large ppm anomaly (3 or 4 dots) will be accurate, whereas one obtained from a small ppm anomaly (no dots), could be inaccurate.

The absence of amplitude dots indicates that the anomaly from the standard (coaxial maximum-coupled) coil is 5 ppm or less on both the inphase and quadrature channels. Such small anomalies could reflect a weak conductor at the surface, or a stronger conductor at depth. The mho value and depth estimate will illustrate which of these possibilities best fits the recorded data. The depth estimate, however, can be erroneous. The anomaly from a near-surface conductor, which exists only to one side of a flight line, will yield a large depth estimate, because the computer assumes that the conductor occurs directly beneath the flight line.

Flight line deviations occasionally yield cases where two anomalies, having similar mho values but dramatically different depth estimates, occur close together on the same conductor. Such examples illustrate the reliability of the conductance measurement while showing that the depth estimate can be unreliable. There are a number of factors which can produce an error in the depth estimate, including the averaging of topographic variations by the altimeter, overlying conductive overburden, and the location and attitude of the conductor relative to the flight line. Conductor location and attitude can provide an erroneous depth estimate because the stronger part of the conductor may be deeper or to one side of the flight line, or because it has a shallow dip.

A further interpretation is presented on the EM map by means of the line-to-line correlation of anomalies. This provides conductor axes which may define the geological structure over portions of the survey area.

The majority of massive sulphide ore deposits have strike lengths of a hundred to a thousand metres. Consequently, it is important to recognize short conductors which may exist in close proximity to long conductive bands. The high resolution of the DIGHEM system, and the line-to-line correlation given on the EM map, are especially important for a proper strike length evaluation.

DIGHEM electromagnetic maps are designed to provide a correct impression of conductor quality by means of the conductance grade symbols. The symbols can stand alone with geology when planning a follow up program. The actual mho values are plotted for those who wish quantitative data. The anomaly ppm and depth are indicated by inconspicious dots which should not distract from the conductor patterns, while being helpful to those who wish this information. The map provides an interpretation of conductors in terms of length, strike direction, conductance and depth. The accuracy is comparable to an interpretation from a ground EM survey having the same line spacing.

2.2 X-Type Electromagnetic Responses

DIGHEM II maps contain x-type EM responses in addition to EM anomalies. An x-type response is below the noise threshold of 2 ppm, and reflects one of the following: a weak conductor near the surface, a strong conductor at depth (e.g., 100 to 120 metres below surface), or noise. Those responses that have the appearance of valid bedrock anomalies on the flight profiles are mentioned in the report. The others should not be followed up unless their locations are of considerable geological interest.

2.3 The Thickness Parameter

DIGHEM II can provide an indication of the thickness of a steeply dipping conductor. The ratio of the anomaly amplitude of channel 24/channel 22 generally increases as the apparent thickness increases, i.e., the thickness in the horizontal plane. This thickness is equal to the conductor width if the conductor dips at 90 degrees and strikes at right angles to the flight line. This report refers to a conductor as thin when the thickness is likely to be less than 3 metres, and thick when in excess of 10 metres. Thick conductors can be high priority targets

because most massive sulphide ore bodies are thick, whereas non-economic bedrock conductors are usually thin. An estimate of thickness cannot be obtained when the strike of the conductor is subparallel to the flight line, when the conductor has a shallow dip, when the anomaly amplitudes are small, or when the resistivity of the environment is below 100 ohm-m.

2.4 Reduction of Conductive Overburden Response

The DIGHEM II system yields four channels which generally are free of the response of conductive overburden. These are the inphase difference channel 33, the quadrature difference channel 34, and the two anomaly recognition functions of channels 35 and 36. Channels 35 and 36 are used to trigger the conductance channel 37 which identifies discrete conductors. In highly conducting environments, channel 36 is not generated because it is subject to some corruption by highly conductive earth signals.

Discrete conductors usually occur in the bedrock, such as sulphides or graphite, rather than in the overburden, such as conductive clay. Only discrete conductors are plotted on the EM map. Broad (i.e., non-discrete) conductors are not plotted on this map.

2.5 Reduction of Magnetite Response

Magnetite produces a form of geological noise in the inphase channels of all EM systems. Rocks containing as little as 1% magnetite can yield negative inphase anomalies. When magnetite is widely distributed throughout a survey area, the inphase EM channels may continuously rise and fall, reflecting variations in the magnetite percentage, flying height, and overburden thickness. This can lead to difficulties in recognizing deeply buried bedrock conductors, particularly if conductive overburden also exists. However, the response of magnetite generally vanishes on the inphase differences channel 33. This feature can be a significant aid in the recognition of conductors which occur in rocks containing accessory magnetite.

3.0 CONDUCTORS IN THE SURVEY AREA

The electromagnetic maps (Plates I and II), show the locations of conductors and their interpreted conductance and depth. Dip and thickness indications are given when warranted by the data. The strike direction and length of conductors are also shown when the anomalies can be correlated from line to line.

The EM maps indicate which anomalies are believed to be caused by cultural and surficial sources. Generally, such anomalies are not commented on below, as the discussions are directed to identifying bedrock conductors.

3.1 Reid Township Area

The anomalies discussed below are illustrated on Plate I:

Responses 1xA-3xA	A weak bedrock conductor, which appears to be slightly magnetic, is indicated by these x-type responses.
Anomaly 3A-4xA	This grade 3 anomaly and the associated x-type response reflect a non-magnetic bedrock conductor which may extend beyong the survey boundary.
Anomaly 7A-9A	These grade 1 to 3 anomalies reflect a thin bedrock conductor which crosses a diabase dyke.
Anomaly 7B-9xB	A thin bedrock conductor is indicated by these grade 2 and 3 anomalies.
Anomaly 9B-10xB	This grade 2 anomaly and an associated x-type response reflect a thin non-magnetic bedrock conductor.

Anomalies 10xA-21A, 16xD-19xB	These bedrock conductors are indicated by grade 3 to 5 anomalies and associated x-type responses.
Anomaly 18C-21xA	A thin bedrock conductor is indicated by these grade 3 to 5 anomalies.
Anomaly 15C	This single-line grade 1 anomaly reflects a thin conductor which may occur in the bedrock. Because of its close correlation with a road, the area should be investigated for culture.
Anomalies 25xA-29xD, 26A-27A	These grade 1 to 4 anomalies and associated x-type responses reflect a pair of bedrock conductors.

3.2 Loveland Township Area

The anomalies discussed below are illustrated on plate II.

A number of EM anomalies in the north central part of the survey area were caused by a north-south running powerline.

Anomaly 103B	This single-line grade 4 anomaly reflects a thin bedrock conductor.
Group 1	These grade 1 and 2 anomalies and associated x-type responses reflect bedrock conductors.
Anomaly 139A, Response 137xA	This single-line grade 3 anomaly and the x-type response reflect thin bedrock conductors.

4.0 RECOMMENDATIONS

It is recommended that line cutting and ground geophysical surveys be carried out over selected portions of the airborne electromagnetic anomalies in order to define diamond drill targets.

A. D. Robinson
Feb. 2, 1982

APPENDIX I

THE FLIGHT RECORD AND PATH RECOVERY

APPENDIX I

The Flight Record and Path Recovery

The flight record is a roll of chart paper containing the geophysical profiles. The profiles are generated by computer at a scale identical to the geophysical maps. The flight record contains several channels of information, as follows:

Channel Number		Scale Units/mm	Noise
21	altitude	10 feet	5 feet
23	standard * coal-pair inphase	1 ppm	1-2 ppm
23	standard coil-pair quadrature	1 ppm	1-2 ppm
24	whaletail ** coil-pair inphase	1 ppm	1-2 ppm
25	whaletail coil-pair quadrature	1 ppm	1-2 ppm
28	ambient noise monitor (standard receiver)	1 ppm	0 ppm
29	ambient noise monitor (whaletail receiver)	1 ppm	0 ppm
33	differences function inphase	1 ppm	1-2 ppm
34	differences function quadrature	1 ppm	1-2 ppm
35	first anomaly recognition function	1 ppm	1-2 ppm
36	second anomaly recognition function	1 ppm	1-2 ppm
37	conductance	1 mho	
40	log resistivity	.03 decade	
41	apparent depth	3 m	

* Coaxial

** Horizontal coplanar

The log resistivity scale of 0.03 decade/mm means that the resistivity changes by an order of magnitude in 33 mm.

The fiducial marks on the flight record represent points on the ground which were recognized by the aircraft navigator. Continuous photographic coverage allowed accurate photo-path recovery locations for the fiducials, which were then plotted on the geophysical maps to provide the track of the aircraft.

The fiducial locations on both the flight records and flight path maps were examined by a computer for unusual helicopter speed changes. Such changes often denote an error in flight path recovery. The resulting flight path locations, therefore, reflect a more stringent checking than is provided by standard flight path recovery techniques.

The following brief description of DIGHEM II illustrates the information content of the various profiles.

The DIGHEM II system has two transmitter coils which are mounted at right angles to each other. (The transmitted frequency is given in the Introduction). Thus, the system provides two completely independent surveys at one pass. In addition, the flight chart profiles (generated by computer) include an inphase channel and a quadrature channel which essentially, are free of the response of conductive overburden. Also, the EM channels may indicate whether the conductor is thin (e.g., less than 3 metres), or has a substantial width (e.g., greater than 15 metres). Further, the EM channels include a channel of resistivity and another of conductance. A minimum of 10 EM channels are provided. The DIGHEM II system, therefore, gives information in one pass which cannot be obtained by any other airborne or ground EM technique.

The upper channel (numbered 21) is the radio altitude. Channels 22 and 23 are, respectively, the inphase and quadrature of the coaxial coil-pair, which is termed the standard coil-pair. This coil-pair is equivalent to the standard coil-pair of all inphase-quadrature airborne EM systems. Channels 24 and 25 are the inphase and quadrature of the additional coplanar coil-pair which is termed the whaletail coil-pair.

Channels 31 and 32 are inphase and quadrature sums functions of the standard and whaletail channels; they provide a condensed view of the four basic channels 22 to 25. The sums channels normally are not plotted.

Channels 33 and 34 are inphase and quadrature differences functions of the standard and whaletail channels. The differences channels are almost free from the response of conductive overburden. Channel 37 is the conductance. The conductance channel essentially is an automatic anomaly picker calibrated in conductance units of mhos; it is triggered by the anomaly recognition functions shown as channels 35 and 36.

Channel 40 is the resistivity, which is derived from the whaletail channels 24 and 25.

APPENDIX II

TECHNICAL DATA STATEMENT

APPENDIX II

Technical Data Statement

The technical data statement contains the pertinent information.

Table II lists the 518 claims for which assessment credits are being applied for. The survey represents 14,160 days of assessment credit calculated at the rate of 40 days per mile on 354 line miles. So, 14,160 days divided by 518 claims is 27.3 days per claim. The days per claim being applied for are listed in Table II, and in many cases, it is less than 27.3 since geophysical work is limited to 80 days per claim.

Gulf Minerals Canada Limited

TABLE II

Airborne Electromagnetic Survey - Claims Covered

Loveland Township

Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For
P. 506387	27.3	P. 508762	27.3	P. 508871	27.3	P. 508929	27.3
P. 506388	27.3	P. 508763	27.3	P. 508872	27.3	P. 508930	12.7
P. 506475	27.3	P. 508764	27.3	P. 508873	27.3	P. 508931	12.7
P. 506476	27.3	P. 508765	27.3	P. 508896	27.3	P. 508932	12.7
P. 506477	27.3	P. 508766	27.3	P. 508897	27.3	P. 508933	27.3
P. 506478	27.3	P. 508767	27.3	P. 508898	27.3	P. 508934	27.3
P. 506479	27.3	P. 508768	27.3	P. 508899	27.3	P. 508935	27.3
P. 506480	27.3	P. 508803	27.3	P. 508900	27.3	P. 508936	27.3
P. 506481	27.3	P. 508804	27.3	P. 508901	27.3	P. 508937	27.3
P. 506482	27.3	P. 508805	27.3	P. 508902	27.3	P. 508938	27.3
P. 506483	27.3	P. 508806	27.3	P. 508903	27.3	P. 508939	27.3
P. 506484	12.7	P. 508807	27.3	P. 508904	27.3	P. 508940	27.3
P. 506485	12.7	P. 508808	27.3	P. 508913	27.3	P. 508941	27.3
P. 506486	12.7	P. 508809	27.3	P. 508914	27.3	P. 508942	27.3
P. 506487	12.7	P. 508810	27.3	P. 508915	27.3	P. 508943	27.3
P. 506488	12.7	P. 508811	27.3	P. 508916	27.3	P. 508944	27.3
P. 506489	12.7	P. 508812	27.3	P. 508917	27.3	P. 508945	27.3
P. 506490	12.7	P. 508813	27.3	P. 508918	27.3	P. 508946	27.3
P. 506491	12.7	P. 508814	27.3	P. 508919	27.3	P. 508947	27.3
P. 506492	12.7	P. 508815	27.3	P. 508920	27.3	P. 508948	27.3
P. 506493	12.7	P. 508816	27.3	P. 508921	12.7	P. 508949	27.3
P. 506494	12.7	P. 508817	27.3	P. 508922	12.7	P. 508950	27.3
P. 506495	12.7	P. 508820	27.3	P. 508923	12.7	P. 508951	27.3
P. 506496	12.7	P. 508821	27.3	P. 508924	12.7	P. 508952	27.3
P. 506497	12.7	P. 508866	27.3	P. 508925	12.7	P. 508953	27.3
P. 506498	12.7	P. 508867	27.3	P. 508926	27.3	P. 508954	27.3
P. 406499	12.7	P. 508868	27.3	P. 508927	27.3	P. 508955	27.3
P. 506500	12.7	P. 508869	27.3	P. 508928	27.3	P. 508956	27.3
		P. 508870	27.3				

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TABLE II (Cont'd)

Airborne Electromagnetic Survey - Claims Covered

Loveland Township (Cont'd)

Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For
P. 508957	12.7	P. 508987	27.3	P. 511026	12.7	P. 511057	27.3
P. 508958	12.7	P. 508988	12.7	P. 511027	12.7	P. 511058	27.3
P. 508959	12.7	P. 508989	27.3	P. 511028	12.7	P. 511059	27.3
P. 508960	27.3	P. 508990	27.3	P. 511029	12.7	P. 511060	27.3
P. 508961	27.3	P. 508991	27.3	P. 511030	12.7	P. 511061	27.3
P. 508962	27.3	P. 508992	27.3	P. 511031	12.7	P. 511062	12.7
P. 508963	27.3	P. 511001	12.7	P. 511032	12.7	P. 511063	12.7
P. 508964	12.7	P. 511002	12.7	P. 511033	12.7	P. 511064	12.7
P. 508965	12.7	P. 511003	12.7	P. 511034	12.7	P. 511065	12.7
P. 508966	12.7	P. 511004	12.7	P. 511035	12.7	P. 511066	12.7
P. 508967	27.3	P. 511005	12.7	P. 511036	12.7	P. 511067	27.3
P. 508968	27.3	P. 511006	12.7	P. 511037	27.3	P. 511068	27.3
P. 508969	27.3	P. 511007	12.7	P. 511038	12.7	P. 511069	27.3
P. 508970	12.7	P. 511008	27.3	P. 511039	12.7	P. 511070	27.3
P. 508971	12.7	P. 511009	27.3	P. 511040	27.3	P. 511071	27.3
P. 508972	12.7	P. 511010	27.3	P. 511041	27.3	P. 511072	27.3
P. 508973	27.3	P. 511011	27.3	P. 511042	27.3	P. 511073	12.7
P. 508974	27.3	P. 511012	27.3	P. 511043	27.3	P. 511074	27.3
P. 508975	27.3	P. 511013	27.3	P. 511044	27.3	P. 511075	27.3
P. 508976	27.3	P. 511014	27.3	P. 511045	27.3	P. 511076	27.3
P. 508977	27.3	P. 511015	27.3	P. 511046	27.3	P. 511077	27.3
P. 508978	27.3	P. 511016	27.3	P. 511047	12.7	P. 515543	27.3
P. 508979	27.3	P. 511017	27.3	P. 511048	27.3	P. 515545	27.3
P. 508980	27.3	P. 511018	27.3	P. 511049	27.3	P. 515546	27.3
P. 508981	27.3	P. 511019	12.7	P. 511050	27.3	P. 515547	27.3
P. 508982	27.3	P. 511020	12.7	P. 511051	12.7	P. 515548	27.3
P. 508983	27.3	P. 511021	12.7	P. 511052	12.7	P. 515551	27.3
P. 508984	27.3	P. 511022	12.7	P. 511053	12.7	P. 515552	27.3
P. 508985	27.3	P. 511023	12.7	P. 511054	12.7	P. 515553	27.3
P. 508986	27.3	P. 511024	12.7	P. 511055	12.7	P. 515554	27.3
		P. 511025	12.7	P. 511056	12.7	P. 515555	27.3

TABLE II (Cont'd)

Airborne Electromagnetic Survey - Claims Covered

Loveland Township (Cont'd)

Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For
P. 515556	27.3	P. 515595	27.3	P. 516890	12.7	P. 522336	12.7
P. 515557	27.3	P. 515596	12.7	P. 522324	27.3	P. 522337	12.7
P. 515558	27.3	P. 515597	27.3	P. 522325	27.3	P. 522338	27.3
P. 515559	27.3	P. 515598	27.3	P. 522326	27.3	P. 522339	27.3
P. 515560	27.3	P. 515599	27.3	P. 522327	27.3	P. 522340	27.3
P. 515571	27.3	P. 515600	27.3	P. 522328	27.3	P. 522341	27.3
P. 515572	27.3	P. 516883	12.7	P. 522329	27.3	P. 522342	27.3
P. 515573	27.3	P. 516884	12.7	P. 522330	12.7	P. 522343	27.3
P. 515574	27.3	P. 516885	12.7	P. 522331	12.7	P. 528374	27.3
P. 515591	27.3	P. 516886	12.7	P. 522332	12.7	P. 528375	27.3
P. 515592	27.3	P. 516887	12.7	P. 522333	12.7	P. 528376	27.3
P. 515593	27.3	P. 516888	12.7	P. 522334	12.7	P. 528377	27.3
P. 515594	27.3	P. 516889	12.7	P. 522335	12.7		

Thorburn Township

Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For
P. 515504	27.3	P. 515512	27.3	P. 515519	27.3
P. 515505	27.3	P. 515513	27.3	P. 515520	27.3

Mahaffy Township

Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For
P. 504785	27.3	P. 508771	27.3	P. 508995	27.3	P. 508998	27.3
P. 504845	27.3	P. 508772	27.3	P. 508996	27.3	P. 508999	27.3
P. 508770	27.3	P. 508773	27.3	P. 508997	27.3	P. 509000	27.3

Gulf Minerals Canada Limited

TABLE II (Cont'd)

Airborne Electromagnetic Survey - Claims Covered

Reid Township

Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For
P. 506281	27.3	P. 506311	27.3	P. 506343	27.3	P. 506373	22.7
P. 506282	27.3	P. 506312	27.3	P. 506344	12.7	P. 506374	12.7
P. 506283	12.7	P. 506313	27.3	P. 506345	12.7	P. 506375	12.7
P. 506284	12.7	P. 506314	27.3	P. 506346	12.7	P. 506376	12.7
P. 506285	12.7	P. 506315	27.3	P. 506347	12.7	P. 506377	12.7
P. 506286	12.7	P. 506316	27.3	P. 506348	12.7	P. 506378	12.7
P. 506287	12.7	P. 506317	12.7	P. 506349	12.7	P. 506379	12.7
P. 506288	22.7	P. 506318	27.3	P. 506350	12.7	P. 506380	12.7
P. 506289	12.7	P. 506321	27.3	P. 506351	22.7	P. 506381	12.7
P. 506290	12.7	P. 506322	27.3	P. 506352	27.3	P. 506382	12.7
P. 506291	12.7	P. 506323	27.3	P. 506353	27.3	P. 506383	12.7
P. 506292	12.7	P. 506324	27.3	P. 506354	27.3	P. 506384	27.3
P. 506293	12.7	P. 506325	27.3	P. 506355	27.3	P. 506385	27.3
P. 506294	12.7	P. 506326	27.3	P. 506356	27.3	P. 506386	27.3
P. 506295	27.3	P. 506327	27.3	P. 506357	27.3	P. 506395	27.3
P. 506296	27.3	P. 506328	27.3	P. 506358	27.3	P. 506401	27.3
P. 506297	27.3	P. 506329	27.3	P. 506359	27.3	P. 506402	27.3
P. 506298	27.3	P. 506330	27.3	P. 506360	27.3	P. 506403	27.3
P. 506299	27.3	P. 506331	27.3	P. 506361	27.3	P. 506404	27.3
P. 506300	27.3	P. 506332	27.3	P. 506362	27.3	P. 506405	27.3
P. 506301	27.3	P. 506333	27.3	P. 506363	27.3	P. 506406	27.3
P. 506302	27.3	P. 506334	27.3	P. 506364	27.3	P. 506407	27.3
P. 506303	27.3	P. 506335	27.3	P. 506365	27.3	P. 506408	27.3
P. 506304	27.3	P. 506336	27.3	P. 506366	27.3	P. 506409	27.3
P. 506305	27.3	P. 506337	27.3	P. 506367	27.3	P. 506410	27.3
P. 506306	27.3	P. 506338	27.3	P. 506368	27.3	P. 506411	27.3
P. 506307	27.3	P. 506339	27.3	P. 506369	27.3	P. 506412	27.3
P. 506308	27.3	P. 506340	27.3	P. 506370	27.3	P. 506413	27.3
P. 506309	27.3	P. 506341	27.3	P. 506371	27.3	P. 506414	27.3
P. 506310	27.3	P. 506342	27.3	P. 506372	27.3	P. 506415	27.3

Gulf

Gulf Minerals Canada Limited

TABLE II (Cont'd)

Airborne Electromagnetic Survey - Claims Covered

Reid Township (Cont'd)

Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For
P. 506416	27.3	P. 506448	27.3	P. 508793	27.3	P. 508879	27.3
P. 506417	27.3	P. 506449	27.3	P. 508794	27.3	P. 532099	27.3
P. 506418	27.3	P. 506450	27.3	P. 508795	27.3	P. 537458	27.3
P. 506419	27.3	P. 506451	27.3	P. 508796	27.3		
P. 506420	27.3	P. 506452	27.3	P. 508797	27.3		
P. 506421	27.3	P. 506453	27.3	P. 508798	27.3		
P. 506422	27.3	P. 506454	27.3	P. 508799	27.3		
P. 506423	27.3	P. 506455	27.3	P. 508800	27.3		
P. 506424	27.3	P. 506456	27.3	P. 508801	27.3		
P. 506425	27.3	P. 506457	27.3	P. 508802	27.3		
P. 506426	27.3	P. 506458	27.3	P. 508846	27.3		
P. 506427	27.3	P. 506459	27.3	P. 508847	27.3		
P. 506428	27.3	P. 506460	27.3	P. 508848	27.3		
P. 506429	27.3	P. 508774	27.3	P. 508849	27.3		
P. 506430	27.3	P. 508775	27.3	P. 508850	27.3		
P. 506431	27.3	P. 508776	27.3	P. 508851	27.3		
P. 506432	27.3	P. 508777	27.3	P. 508852	27.3		
P. 506433	27.3	P. 508778	27.3	P. 508853	27.3		
P. 506434	27.3	P. 508779	27.3	P. 508854	27.3		
P. 506437	27.3	P. 508780	27.3	P. 508855	27.3		
P. 506438	27.3	P. 508781	27.3	P. 508856	27.3		
P. 506439	27.3	P. 508782	27.3	P. 508857	27.3		
P. 506440	27.3	P. 508783	27.3	P. 508858	27.3		
P. 406441	27.3	P. 508784	27.3	P. 508859	27.3		
P. 406442	27.3	P. 508785	27.3	P. 508860	27.3		
P. 406443	27.3	P. 508786	27.3	P. 508861	27.3		
P. 406444	27.3	P. 508787	27.3	P. 508862	27.3		
P. 506445	27.3	P. 508788	27.3	P. 508863	27.3		
P. 506446	27.3	P. 508789	27.3	P. 508864	27.3		
P. 506447	27.3	P. 508792	27.3	P. 508878	27.3		

Gulf

APPENDIX III

ATTESTATION OF QUALIFICATIONS

APPENDIX III

Attestation of Qualifications

1. I received a B.Sc. in Geology from Sir George Williams University, Montreal, in 1971.

2. I received a M.Sc. in Geology from the University of Ottawa, Ottawa, in 1974.

3. I have been actively employed in the mining industry since May, 1974, with McIntrye Mines Ltd., Shell Canada Resources Ltd., and presently with Gulf Minerals Canada Limited.

4. I have not and presently do not hold any interests in the mining claims in Reid Township, Ontario.

5. I reside at 29 Silverton Avenue, Downsview, Ontario

S. D. Robinson
Project Geologist
January, 1982

Ministry of Natural Resources
Ontario

Report of Work
(Geophysical, Geological, Geochemical and Expenditures)

#59

Reid-Loveland, Mahaffy, & Thorburn

The Mini

42A14SW8892 2.4614 REID

900

Type of Survey(s)	Township or Area
Airborne Electromagnetic Survey	Reid, Loveland, Mahaffy and Thorburn Townships

Claim Holder(s)	Prospector's Licence No.
Gulf Minerals Canada Limited	T-403

Survey Company	Survey Dates (linecutting to office)	Total Miles of line Cut
Dighem Limited	13 Day 04 Mo. 80 Yr. — 17 Day 04 Mo. 80 Yr.	N/A

Name and Address of Author (of Geo-Technical report)

S. Robinson 29 Silverton Avenue, Downsview, Ontario

Special Provisions Credits Requested

Instructions		Days per Claim
For first survey: Enter 40 days. (This includes line cutting)	Geophysical - Electromagnetic	
	- Magnetometer	
For each additional survey: using the same grid: Enter 20 days (for each)	- Radiometric	
	- Other	
	Geological	
	Geochemical	

Man Days

Instructions		Days per Claim
Complete reverse side and enter total(s) here	Geophysical - Electromagnetic	
	- Magnetometer	
	- Radiometric	
	- Other	
	Geological	
	Geochemical	

Airborne Credits

Note: Special provisions credits do not apply to Airborne Surveys.		Days per Claim
	Electromagnetic see attached list	X
	Magnetometer	
	Radiometric	

Expenditures (excludes power stripping)

Type of Work Performed

Performed on Claim(s)

Calculation of Expenditure Days Credits

Total Expenditures $ ÷ 15 = Total Days Credits

Instructions
Total Days Credits may be apportioned at the claim holder's choice. Enter number of days credits per claim selected in columns at right.

Mining Claims Traversed (List in numerical sequence)

Mining Claim Prefix	Mining Claim Number	Expend. Days Cr.
see attached list		

Mining Claim Prefix	Mining Claim Number	Expend. Days Cr.

RECORDED
MAR 4 1982
Receipt No.....

RECEIVED
MAR 16 1982
MINING LANDS SECTION

Total number of mining claims covered by this report of work. 517

For Office Use Only

Total Days Cr. Recorded	Date Recorded	Mining Recorder
12,338.3	March 4/82	
	Date Approved as Recorded: Dec. 30/82	Regional/Branch Director / ~~Regional Mining Recorder~~

Report Completed

Date of Report	Recorded Holder or Agent (Signature)
February 1982	S. Robinson

Certification Verifying Report of Work

I hereby certify that I have a personal and intimate knowledge of the facts set forth in the Report of Work annexed hereto, having performed the work or witnessed same during and/or after its completion and the annexed report is true.

Name and Postal Address of Person Certifying

S.D. Robinson

29 Silverton Avenue, Downsview, Ontario

Date Certified	Certified by (Signature)
Feb 26/82	S. Robinson

Ontario

Ministry of Natural Resources

File _____

GEOPHYSICAL – GEOLOGICAL – GEOCHEMICAL TECHNICAL DATA STATEMENT

TO BE ATTACHED AS AN APPENDIX TO TECHNICAL REPORT
FACTS SHOWN HERE NEED NOT BE REPEATED IN REPORT
TECHNICAL REPORT MUST CONTAIN INTERPRETATION, CONCLUSIONS ETC.

Type of Survey(s) Airborne electromagnetic

Township or Area Reid, Loveland, Mahaffy & Thorburn Twp.

Claim Holder(s) Gulf Minerals Canada Limited

Survey Company Dighem Limited

Author of Report S. D. Robinson

Address of Author 29 Silverton Ave., Downsview, Ont.

Covering Dates of Survey April, 1980 (linecutting to office)

Total Miles of Line Cut N/A

SPECIAL PROVISIONS CREDITS REQUESTED

ENTER 40 days (includes line cutting) for first survey.

ENTER 20 days for each additional survey using same grid.

DAYS per claim

Geophysical

--Electromagnetic _____

--Magnetometer _____

--Radiometric _____

--Other _____

Geological _____

Geochemical _____

AIRBORNE CREDITS (Special provision credits do not apply to airborne surveys)

Magnetometer _____ Electromagnetic X Radiometric _____
(enter days per claim)

X - See Table II

DATE: Feb. 2, 1982 SIGNATURE: S. D. Robinson
Author of Report or Agent

Res. Geol. _____ Qualifications _____

Previous Surveys

File No.	Type	Date	Claim Holder

MINING CLAIMS TRAVERSED
List numerically

(prefix) (number)

If space insufficient, attach list

TOTAL CLAIMS _____

OFFICE USE ONLY

GEOPHYSICAL TECHNICAL DATA

GROUND SURVEYS - If more than one survey, specify data for each type of survey

Number of Stations _____ Number of Readings _____

Station interval _____ Line spacing _____

Profile scale _____

Contour interval _____

MAGNETIC

Instrument _____

Accuracy – Scale constant _____

Diurnal correction method _____

Base Station check-in interval (hours) _____

Base Station location and value _____

_____

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 _____

Method ☐ Time Domain ☐ Frequency Domain

Parameters – On time _____ Frequency _____

– Off time _____ Range _____

– Delay time _____

– Integration time _____

Power _____

Electrode array _____

Electrode spacing _____

Type of electrode _____

SELF POTENTIAL

Instrument _____ Range _____

Survey Method _____

_____

Corrections made _____

_____

RADIOMETRIC

Instrument _____

Values measured _____

Energy windows (levels) _____

Height of instrument _____ Background Count _____

Size of detector _____

Overburden _____

(type, depth – include outcrop map)

OTHERS (SEISMIC, DRILL WELL LOGGING ETC.)

Type of survey _____

Instrument _____

Accuracy _____

Parameters measured _____

_____

Additional information (for understanding results) _____

_____

_____

AIRBORNE SURVEYS

Type of survey(s) Electromagnetic

Instrument(s) Dighem II EM Bird

(specify for each type of survey)

Accuracy 0.2 ppm/bit

(specify for each type of survey)

Aircraft used Lama C-GHEM jet helicopter

Sensor altitude 58 m

Navigation and flight path recovery method Continuous photographic coverage and fiducial marks on the flight record.

Aircraft altitude 175 feet Line Spacing 660 feet

Miles flown over total area 426 Over claims only 354

GEOCHEMICAL SURVEY – PROCEDURE RECORD

Numbers of claims from which samples taken _____

_____

_____

Total Number of Samples _____

Type of Sample _____
(Nature of Material)

Average Sample Weight _____

Method of Collection _____

_____

Soil Horizon Sampled _____

Horizon Development _____

Sample Depth _____

Terrain _____

_____

Drainage Development _____

Estimated Range of Overburden Thickness _____

_____

_____

SAMPLE PREPARATION
(Includes drying, screening, crushing, ashing)

Mesh size of fraction used for analysis _____

_____

_____

_____

General _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

ANALYTICAL METHODS

Values expressed in: per cent ☐
p. p. m. ☐
p. p. b. ☐

Cu, Pb, Zn, Ni, Co, Ag, Mo, As,-(circle)

Others _____

Field Analysis (_____ tests)

Extraction Method _____

Analytical Method _____

Reagents Used _____

Field Laboratory Analysis

No. (_____ tests)

Extraction Method _____

Analytical Method _____

Reagents Used _____

Commercial Laboratory (_____ tests)

Name of Laboratory _____

Extraction Method _____

Analytical Method _____

Reagents Used _____

General _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Gulf Minerals Canada Limited

TABLE II

Airborne Electromagnetic Survey - Claims Covered

Loveland Township

Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For
P. 506387	27.3	P. 508762	27.3	P. 508871	27.3	P. 508929	27.3
P. 506388	27.3	P. 508763	27.3	P. 508872	27.3	P. 508930	12.7
P. 506475	27.3	P. 508764	27.3	P. 508873	27.3	P. 508931	12.7
P. 506476	27.3	P. 508765	27.3	P. 508896	27.3	P. 508932	12.7
P. 506477	27.3	P. 508766	27.3	P. 508897	27.3	P. 508933	27.3
P. 506478	27.3	P. 508767	27.3	P. 508898	27.3	P. 508934	27.3
P. 506479	27.3	P. 508768	27.3	P. 508899	27.3	P. 508935	27.3
P. 506480	27.3	P. 508803	27.3	P. 508900	27.3	P. 508936	27.3
P. 506481	27.3	P. 508804	27.3	P. 508901	27.3	P. 508937	27.3
P. 506482	27.3	P. 508805	27.3	P. 508902	27.3	P. 508938	27.3
P. 506483	27.3	P. 508806	27.3	P. 508903	27.3	P. 508939	27.3
P. 506484	12.7	P. 508807	27.3	P. 508904	27.3	P. 508940	27.3
P. 506485	12.7	P. 508808	27.3	P. 508913	27.3	P. 508941	27.3
P. 506486	12.7	P. 508809	27.3	P. 508914	27.3	P. 508942	27.3
P. 506487	12.7	P. 508810	27.3	P. 508915	27.3	P. 508943	27.3
P. 506488	12.7	P. 508811	27.3	P. 508916	27.3	P. 508944	27.3
P. 506489	12.7	P. 508812	27.3	P. 508917	27.3	P. 508945	27.3
P. 506490	12.7	P. 508813	27.3	P. 508918	27.3	P. 508946	27.3
P. 506491	12.7	P. 508814	27.3	P. 508919	27.3	P. 508947	27.3
P. 506492	12.7	P. 508815	27.3	P. 508920	27.3	P. 508948	27.3
P. 506493	12.7	P. 508816	27.3	P. 508921	12.7	P. 508949	27.3
P. 506494	12.7	P. 508817	27.3	P. 508922	12.7	P. 508950	27.3
P. 506495	12.7	P. 508820	27.3	P. 508923	12.7	P. 508951	27.3
P. 506496	12.7	P. 508821	27.3	P. 508924	12.7	P. 508952	27.3
P. 506497	12.7	P. 508866	27.3	P. 508925	12.7	P. 508953	27.3
P. 506498	12.7	P. 508867	27.3	P. 508926	27.3	P. 508954	27.3
P. 406499	12.7	P. 508868	27.3	P. 508927	27.3	P. 508955	27.3
P. 506500	12.7	P. 508869	27.3	P. 508928	27.3	P. 508956	27.3
		P. 508870	27.3				

29 23 25

Gulf Minerals Canada Limited

TABLE II (Cont'd)

Airborne Electromagnetic Survey - Claims Covered

Loveland Township (Cont'd)

Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For
P. 508957	12.7	P. 508987	27.3	P. 511026	12.7	P. 511057	27.3
P. 508958	12.7	P. 508988	12.7	P. 511027	12.7	P. 511058	27.3
P. 508959	12.7	P. 508989	27.3	P. 511028	12.7	P. 511059	27.3
P. 508960	27.3	P. 508990	27.3	P. 511029	12.7	P. 511060	27.3
P. 508961	27.3	P. 508991	27.3	P. 511030	12.7	P. 511061	27.3
P. 508962	27.3	P. 508992	27.3	P. 511031	12.7	P. 511062	12.7
P. 508963	27.3	P. 511001	12.7	P. 511032	12.7	P. 511063	12.7
P. 508964	12.7	P. 511002	12.7	P. 511033	12.7	P. 511064	12.7
P. 508965	12.7	P. 511003	12.7	P. 511034	12.7	P. 511065	12.7
P. 508966	12.7	P. 511004	12.7	P. 511035	12.7	P. 511066	12.7
P. 508967	27.3	P. 511005	12.7	P. 511036	12.7	P. 511067	27.3
P. 508968	27.3	P. 511006	12.7	P. 511037	27.3	P. 511068	27.3
P. 508969	27.3	P. 511007	12.7	P. 511038	12.7	P. 511069	27.3
P. 508970	12.7	P. 511008	27.3	P. 511039	12.7	P. 511070	27.3
P. 508971	12.7	P. 511009	27.3	P. 511040	27.3	P. 511071	27.3
P. 508972	12.7	P. 511010	27.3	P. 511041	27.3	P. 511072	27.3
P. 508973	27.3	P. 511011	27.3	P. 511042	27.3	P. 511073	12.7
P. 508974	27.3	P. 511012	27.3	P. 511043	27.3	P. 511074	27.3
P. 508975	27.3	P. 511013	27.3	P. 511044	27.3	P. 511075	27.3
P. 508976	27.3	P. 511014	27.3	P. 511045	27.3	P. 511076	27.3
P. 508977	27.3	P. 511015	27.3	P. 511046	27.3	P. 511077	27.3
P. 508978	27.3	P. 511016	27.3	P. 511047	12.7	P. 515543	27.3
P. 508979	27.3	P. 511017	27.3	P. 511048	27.3	P. 515545	27.3
P. 508980	27.3	P. 511018	27.3	P. 511049	27.3	P. 515546	27.3
P. 508981	27.3	P. 511019	12.7	P. 511050	27.3	P. 515547	27.3
P. 508982	27.3	P. 511020	12.7	P. 511051	12.7	P. 515548	27.3
P. 508983	27.3	P. 511021	12.7	P. 511052	12.7	P. 515551	27.3
P. 508984	27.3	P. 511022	12.7	P. 511053	12.7	P. 515552	27.3
P. 508985	27.3	P. 511023	12.7	P. 511054	12.7	P. 515553	27.3
P. 508986	27.3	P. 511024	12.7	P. 511055	12.7	P. 515554	27.3
		P. 511025	12.7	P. 511056	12.7	P. 515555	27.3

Gulf

TABLE II (Cont'd)

Airborne Electromagnetic Survey - Claims Covered

Loveland Township (Cont'd)

Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For
P. 515556	27.3	P. 515595	27.3	P. 516890	12.7	P. 522336	12.7
P. 515557	27.3	P. 515596	12.7	P. 522324	27.3	P. 522337	12.7
P. 515558	27.3	P. 515597	27.3	P. 522325	27.3	P. 522338	27.3
P. 515559	27.3	P. 515598	27.3	P. 522326	27.3	P. 522339	27.3
P. 515560	27.3	P. 515599	27.3	P. 522327	27.3	P. 522340	27.3
P. 515571	27.3	P. 515600	27.3	P. 522328	27.3	P. 522341	27.3
P. 515572	27.3	P. 516883	12.7	P. 522329	27.3	P. 522342	27.3
P. 515573	27.3	P. 516884	12.7	P. 522330	12.7	P. 522343	27.3
P. 515574	27.3	P. 516885	12.7	P. 522331	12.7	P. 528374	27.3
P. 515591	27.3	P. 516886	12.7	P. 522332	12.7	P. 528375	27.3
P. 515592	27.3	P. 516887	12.7	P. 522333	12.7	P. 528376	27.3
P. 515593	27.3	P. 516888	12.7	P. 522334	12.7	P. 528377	27.3
P. 515594	27.3	P. 516889	12.7	P. 522335	12.7		

13 5 6 10

Thorburn Township

Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For
P. 515504	27.3	P. 515512	27.3	P. 515519	27.3
P. 515505	27.3	P. 515513	27.3	P. 515520	27.3

6

Mahaffy Township

Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For
P. 504785	27.3	P. 508771	27.3	P. 508995	27.3	P. 508998	27.3
P. 504845	27.3	P. 508772	27.3	P. 508996	27.3	P. 508999	27.3
P. 508770	27.3	P. 508773	27.3	P. 508997	27.3	P. 509000	27.3

Gulf Minerals Canada Limited

TABLE II (Cont'd)

Airborne Electromagnetic Survey - Claims Covered

Reid Township

Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For
P. 506281	27.3	P. 506311	27.3	P. 506343	27.3	P. 506373	22.7
P. 506282	27.3	P. 506312	27.3	P. 506344	12.7	P. 506374	12.7
P. 506283	12.7	P. 506313	27.3	P. 506345	12.7	P. 506375	12.7
P. 506284	12.7	P. 506314	27.3	P. 506346	12.7	P. 506376	12.7
P. 506285	12.7	P. 506315	27.3	P. 506347	12.7	P. 506377	12.7
P. 506286	12.7	P. 506316	27.3	P. 506348	12.7	P. 506378	12.7
P. 506287	12.7	P. 506317	12.7	P. 506349	12.7	P. 506379	12.7
P. 506288	22.7	P. 506318	27.3	P. 506350	12.7	P. 506380	12.7
P. 506289	12.7	P. 506321	27.3	P. 506351	22.7	P. 506381	12.7
P. 506290	12.7	P. 506322	27.3	P. 506352	27.3	P. 506382	12.7
P. 506291	12.7	P. 506323	27.3	P. 506353	27.3	P. 506383	12.7
P. 506292	12.7	P. 506324	27.3	P. 506354	27.3	P. 506384	27.3
P. 506293	12.7	P. 506325	27.3	P. 506355	27.3	P. 506385	27.3
P. 506294	12.7	P. 506326	27.3	P. 506356	27.3	P. 506386	27.3
P. 506295	27.3	P. 506327	27.3	P. 506357	27.3	P. 506395	27.3
P. 506296	27.3	P. 506328	27.3	P. 506358	27.3	P. 506401	27.3
P. 506297	27.3	P. 506329	27.3	P. 506359	27.3	P. 506402	27.3
P. 506298	27.3	P. 506330	27.3	P. 506360	27.3	P. 506403	27.3
P. 506299	27.3	P. 506331	27.3	P. 506361	27.3	P. 506404	27.3
P. 506300	27.3	P. 506332	27.3	P. 506362	27.3	P. 506405	27.3
P. 506301	27.3	P. 506333	27.3	P. 506363	27.3	P. 506406	27.3
P. 506302	27.3	P. 506334	27.3	P. 506364	27.3	P. 506407	27.3
P. 506303	27.3	P. 506335	27.3	P. 506365	27.3	P. 506408	27.3
P. 506304	27.3	P. 506336	27.3	P. 506366	27.3	P. 506409	27.3
P. 506305	27.3	P. 506337	27.3	P. 506367	27.3	P. 506410	27.3
P. 506306	27.3	P. 506338	27.3	P. 506368	27.3	P. 506411	27.3
P. 506307	27.3	P. 506339	27.3	P. 506369	27.3	P. 506412	27.3
P. 506308	27.3	P. 506340	27.3	P. 506370	27.3	P. 506413	27.3
P. 506309	27.3	P. 506341	27.3	P. 506371	27.3	P. 506414	27.3
P. 506310	27.3	P. 506342	27.3	P. 506372	27.3	P. 506415	27.3

Gulf

Gulf Minerals Canada Limited

TABLE II (Cont'd)

Airborne Electromagnetic Survey - Claims Covered

Reid Township (Cont'd)

Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For	Claim No.	Days Applied For
P. 506416	27.3	P. 506448	27.3	P. 508793	27.3	P. 508879X	27.3
P. 506417	27.3	P. 506449	27.3	P. 508794	27.3	P. 532099	27.3
P. 506418	27.3	P. 506450	27.3	P. 508795	27.3	P. 537458	27.3
P. 506419	27.3	P. 506451	27.3	P. 508796	27.3		3
P. 506420	27.3	P. 506452	27.3	P. 508797	27.3		
P. 506421	27.3	P. 506453	27.3	P. 508798	27.3		
P. 506422	27.3	P. 506454	27.3	P. 508799	27.3		
P. 506423	27.3	P. 506455	27.3	P. 508800	27.3		
P. 506424	27.3	P. 506456	27.3	P. 508801	27.3		
P. 506425	27.3	P. 506457	27.3	P. 508802	27.3		
P. 506426	27.3	P. 506458	27.3	P. 508846	27.3		
P. 506427	27.3	P. 506459	27.3	P. 508847	27.3		
P. 506428	27.3	P. 506460	27.3	P. 508848X	27.3		
P. 506429	27.3	P. 508774	27.3	P. 508849X	27.3		
P. 506430	27.3	P. 508775	27.3	P. 508850X	27.3		
P. 506431	27.3	P. 508776	27.3	P. 508851X	27.3		
P. 506432	27.3	P. 508777	27.3	P. 508852X	27.3		
P. 506433	27.3	P. 508778	27.3	P. 508853X	27.3		
P. 506434	27.3	P. 508779	27.3	P. 508854X	27.3		
P. 506437	27.3	P. 508780	27.3	P. 508855X	27.3		
P. 506438	27.3	P. 508781	27.3	P. 508856X	27.3		
P. 506439	27.3	P. 508782	27.3	P. 508857X	27.3		
P. 506440	27.3	P. 508783	27.3	P. 508858	27.3		
P. 406441	27.3	P. 508784	27.3	P. 508859	27.3		
P. 406442	27.3	P. 508785	27.3	P. 508860X	27.3		
P. 406443	27.3	P. 508786	27.3	P. 508861X	27.3		
P. 406444	27.3	P. 508787	27.3	P. 508862X	27.3		
P. 506445	27.3	P. 508788	27.3	P. 508863X	27.3		
P. 506446	27.3	P. 508789	27.3	P. 508864X	27.3		
P. 506447	27.3	P. 508792	27.3	P. 508878X	27.3		
Gulf	30		30		30		

12,338.3

517 claims

Ministry of Natural Resources
Ontario

Geotechnical Report Approval

File 2.4614

Mining Lands Comments

[X] To: Geophysics Mr Barlow.

Comments

[X] Approved [ ] Wish to see again with corrections | Date Oct 30/82 | Signature

[ ] To: Geology - Expenditures

Comments

[ ] Approved [ ] Wish to see again with corrections | Date | Signature

[ ] To: Geochemistry

Comments

[ ] Approved [ ] Wish to see again with corrections | Date | Signature

[ ] To: Mining Lands Section, Room 6462, Whitney Block. (Tel: 5-1380)

1993 (81/10)

Marcy 12, 1982 2.4614

Mining Recorder's Office
Ministry of Natural Resources
60 Wilson Avenue,
Timmins, Ontario
P4N 2S7

Dear Sir;

We have received reports and maps for an Airborne Geophysical (Electromagnetic) survey submitted on mining claims P 406411 et al i in the Townships of Reid, Loveland, Mahaffy and Thorburn.

This material will be examined and assessed and a statement of assessment work credits will be issued.

Yours very truly

E.F. Anderson
Director
Land Management Branch

Whitney Block, Room 6450
Queen's Park
Toronto, Ontario
M7A 1W3
Phone 416/965-1380

J. Skura

cc: Gulf Minerals Canada Limited
Toronto, Ontario
Attn: S. Robinson

cc: Dighem Limited
Downsview, Ontario

GMC 1020

Gulf Minerals Canada Limited
SUITE 1400, 110 YONGE STREET, TORONTO, ONTARIO M5C 1T4. (416) 362-6825

March 3, 1982

Mr. Fred W. Matthews,
Ministry of Natural Resources,
Room 6450,
Whitney Block,
Queen's Park,
Toronto, Ontario

Dear Mr. Matthews:

Enclosed herewith are two copies of an airborne electromagnetic survey dated January, 1982, performed by Dighem Limited (Toronto, Ontario), for Gulf Minerals Canada Limited (Toronto, Ontario), on property in Loveland, Thorburn, Mahaffy, and Reid Townships. Property location maps and a Technical Data statement are included in each copy of the report.

The above mentioned report is being filed in duplicate by the undersigned for assessment credit to be distributed as outlined in Table I and Appendix II in the report.

Would you please acknowledge receipt of the report and address all correspondence to the undersigned.

Yours truly,

Stanley D. Robinson

Stanley D. Robinson
Project Geologist

SDR/dda

Encl.

cc: S. R. Brower

Gulf

Thorburn Twp. (M.601)

Byers Twp. (M.265)

Macdiarmid Twp. (M.294)

Robb Twp. (M.309)

4M. 3rd BASE LINE surveyed in 1905 by O.L.S. A. NIVEN

1st MERIDIAN LINE surveyed in 1905 by O.L.S. A. NIVEN

Byers Lake

Power Line

Creek

Loveland

Creek

Kamiskotia River

Kamiskotia River

2.4614

CLM 246

CLM 247

CL 1490

No Open Ground

THE TOWNSHIP OF

LOVELAND

DISTRICT OF COCHRANE

PORCUPINE MINING DIVISION

SCALE: 1-INCH = 40 CHAINS

LEGEND

PATENTED LAND	(P)
CROWN LAND SALE	C.S.
LEASES	(L)
LOCATED LAND	Loc.
LICENSE OF OCCUPATION	L.O.
MINING RIGHTS ONLY	M.R.O.
SURFACE RIGHTS ONLY	S.R.O.
ROADS	
IMPROVED ROADS	
KING'S HIGHWAYS	
RAILWAYS	
POWER LINES	
MARSH OR MUSKEG	
MINES	
CANCELLED	C.

NOTES

400' Surface Rights Reservation along the shores of all lakes and rivers

This township lies within the Municipality of CITY of TIMMINS.

DATE OF ISSUE
DEC 10 1982
Ministry of Natural Resources
TORONTO

PLAN NO. M-293

ONTARIO
MINISTRY OF NATURAL RESOURCES
SURVEYS AND MAPPING BRANCH

ONTARIO

MINISTRY OF NATURAL RESOURCES

SURVEYS AND MAPPING BRANCH

2.4614

THORBURN

M.601

PORCUPINE MINING DIVISION

DISTRICT OF COCHRANE

Scale - 40 Chains = 1 Inch

NOTE

400' Surface Rights Reservation around all Lakes and Rivers.

NORTH AST.

GEARY

MOBERLY

REID

LOVELAND

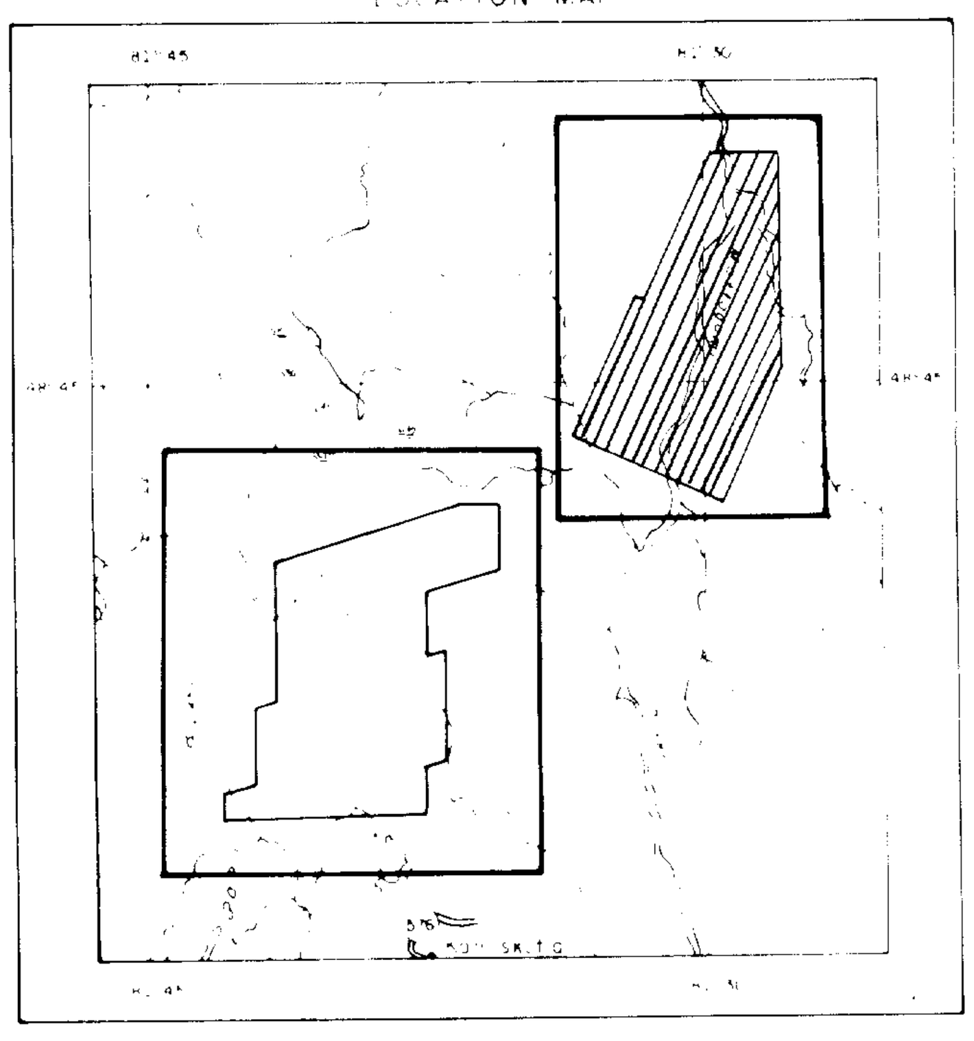
5.M. 4.M. 3M 2M. 1.M.

5M 4M 3.M. 2M 1.M

Thorburn Creek

Enid Creek

79.83 79.14 80.37 79.83 69.68 78.82



DIGHEM II SURVEY

REID TOWNSHIP, ONTARIO

ELECTROMAGNETICS

FOR

GULF MINERALS CANADA LTD.

0 1/8 1/4 1/2 3/4 1
MILES

REGISTERED PROFESSIONAL ENGINEER
D. C. FRASER
PROVINCE OF ONTARIO

Flight line

1252 1256

Fiducials and numbers

ANOMALY GRADE	EM GRADE SYMBOL	MHO RANGE
6	●	≥ 100
5	●	50 – 99
4	●	20 – 49
3	◉	10 – 19
2	○	5 – 9
1	○	≤ 4
	×	Possible conductor

DIGHEM anomalies are divided into six grades of conductivity – thickness product. This product in mhos is the reciprocal of resistance in ohms. The mho is a measure of conductance, and is a geologic parameter. Most swamps yield Grade 1 anomalies but highly conducting clays can give Grade 2 anomalies. The multi-coil anomaly shapes often allow surface conductors to be recognized, and these are indicated by the letter S on this map. The remaining Grade 1 and 2 anomalies could be weak bedrock conductors. The higher grades indicate increasingly higher conductances. Examples: The ore bodies of the Magusi River camp yield Grade 4 anomalies, while Mattabi and Whistle give Grade 5. [illegible] and sulphides can span all grades but, in this survey [illegible] field work may show that the different grades indicate different types of conductors.

identifier → C 38 ← mho value

Depth is greater than 50 feet, 100 feet, 150 feet, 200 feet

Inphase and Quadrature of [illegible] coil is greater than 5 ppm, 10 ppm, 15 ppm, 20 ppm

Refer to list of anomalies in survey report for the actual ppm values for all coils, and for conductor depths.

The actual mho value is plotted beside the EM grade symbol. The letter is the anomaly identifier. The horizontal rows of dots indicate anomaly amplitude on the flight record, and the vertical column gives the estimated depth. This depth may be unreliable because the stronger part of the conductor may be deeper or to one side of the flight line, or because of a shallow dip or conductive overburden effects.

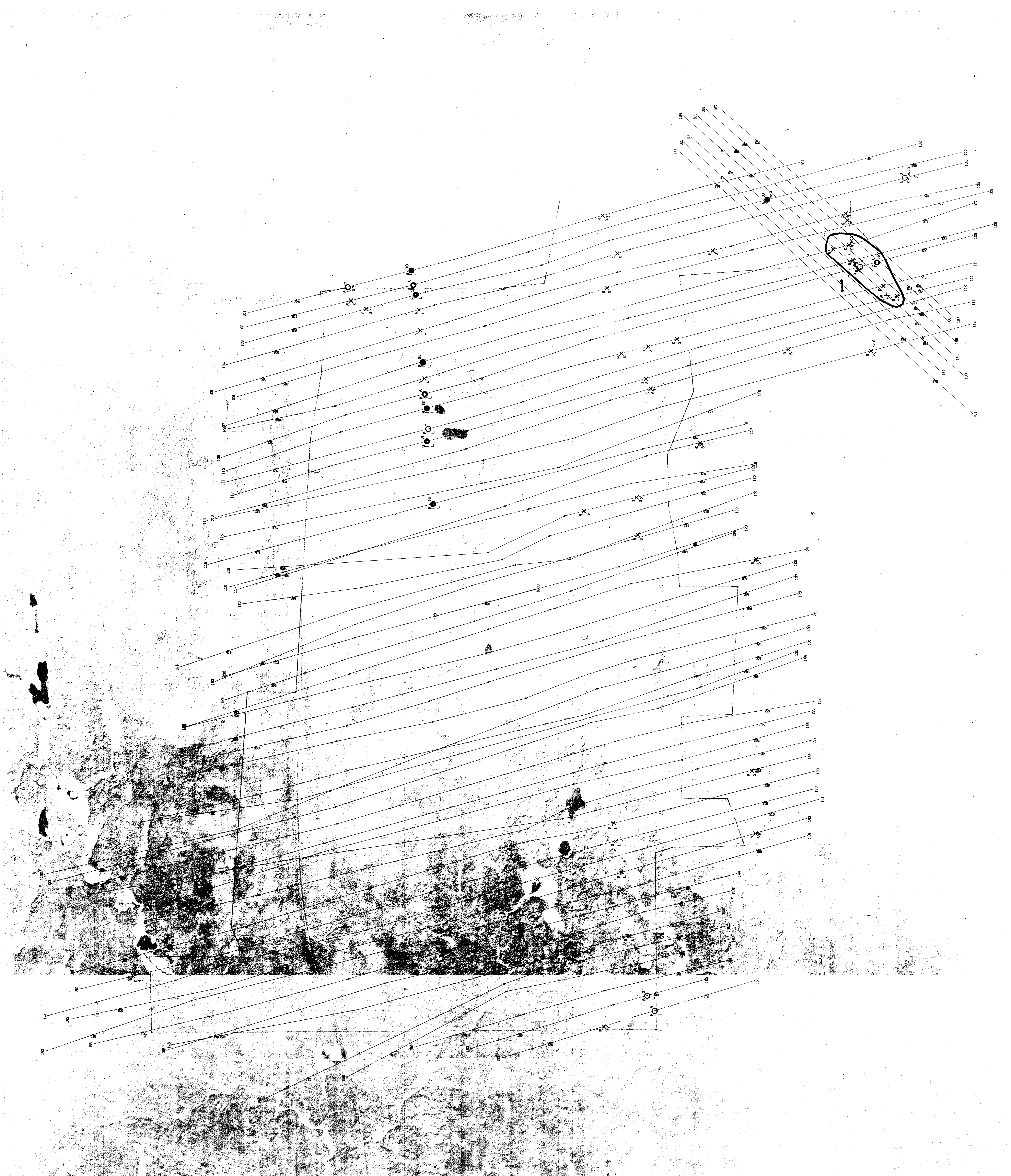
▬	Conductor axis
S	Probable surface response
S?	Possible surface response
L	Probable line (power, telephone, pipe, or fence)
L?	Possible line
?	Questionable anomaly
V O	Apparent thickness > 10 m
>	Dip
100 ɣ	Direct magnetic correlation of 100 gammas

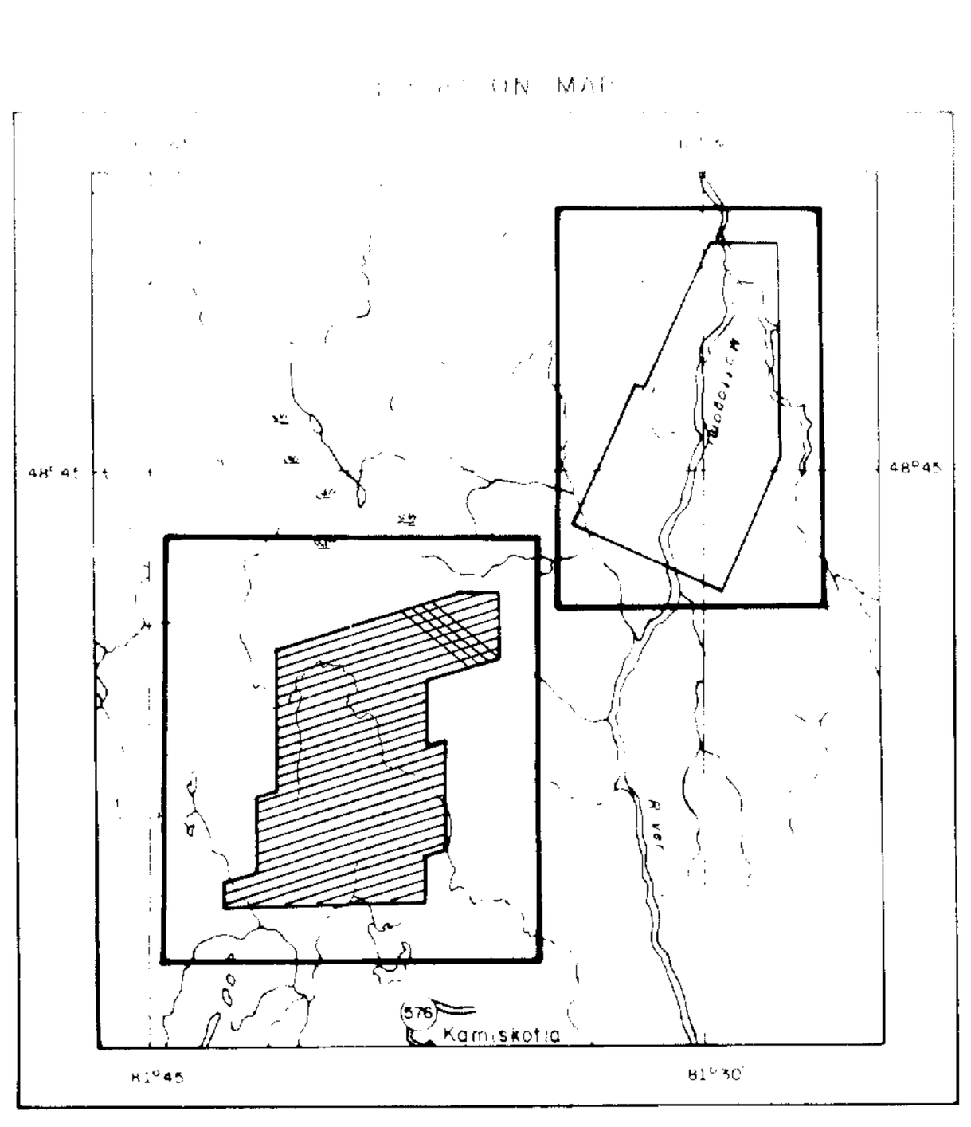
DIGHEM maps are designed to provide a correct impression of conductor quality by means of the conductance grade symbols. The symbols can stand alone with geology when planning a followup program. The actual mho values are plotted for those who wish quantitative data. The anomaly ppm and depth are indicated by inconspicuous dots which should not distract from the conductor patterns, while being helpful to those who wish this information. The map provides an interpretation of all conductors in terms of length, strike direction, conductance and depth. The accuracy is comparable to an interpretation from a ground EM survey having the same line spacing.

Plate I

42A14SW8882 2.4614 REID

220





Scale 1:250,000

DIGHEM II SURVEY

LOVELAND TOWNSHIP, ONTARIO

ELECTROMAGNETICS

FOR

GULF MINERALS CANADA LIMITED

0 1/8 1/4 1/2 3/4 1
MILES

REGISTERED PROFESSIONAL ENGINEER
D. C. FRASER
PROVINCE OF ONTARIO

Flight line

Fiducials and numbers

EM GRADE SYMBOL	MHO RANGE
●	100
●	50 - 99
●	20 - 49
◉	10 - 19
○	5 - 9
( )	< 4
×	Possible conductor

The remaining Grade 1 and 2 anomalies could be weak bedrock conductors. The higher grades indicate increasingly higher conductances. Examples: The ore bodies of the Magusi River camp yield Grade 4 anomalies, while Mattabi and Whistle give Grade 5. Graphite and sulphides can span all grades but, in this survey area, field work may show that the different grades indicate different types of conductors.

Identifier — mho value — Inphase and Quadrature — Depth is greater than 100 feet, 200 feet — Refer to list of anomalies in survey report for the actual ppm values for all coils, and for conductor depths.

The actual mho value is plotted beside the E.M. grade symbol. The letter is the anomaly identifier. The horizontal rows of dots indicate anomaly amplitude on the flight record, and the vertical column gives the estimated depth. This depth may be unreliable because the stronger part of the conductor may be deeper or to one side of the flight line, or because of a shallow dip or conductive overburden effects.

Symbol	Meaning
╱	Conductor axis
S	Probable surface response
S?	Possible surface response
L	Probable line (power, telephone, pipe, or fence)
L?	Possible line
?	Questionable anomaly
⬭	Apparent thickness
>	Dip
100γ	Direct magnetic correlation of 100 gammas

DIGHEM maps are designed to provide a correct impression of conductor quality by means of the conductance grade symbols. The symbols can stand alone with geology when planning a followup program. The actual mho values are plotted for those who wish quantitative data. The anomaly ppm and depth are indicated by inconspicuous dots which should not distract from the conductor patterns, while being helpful to those who wish this information. The map provides an interpretation of all conductors in terms of length, strike direction, conductance and depth. The accuracy is comparable to an interpretation from a ground E.M. survey having the same line spacing.

Plate II

42A14SW8892 2.4614 REID

230