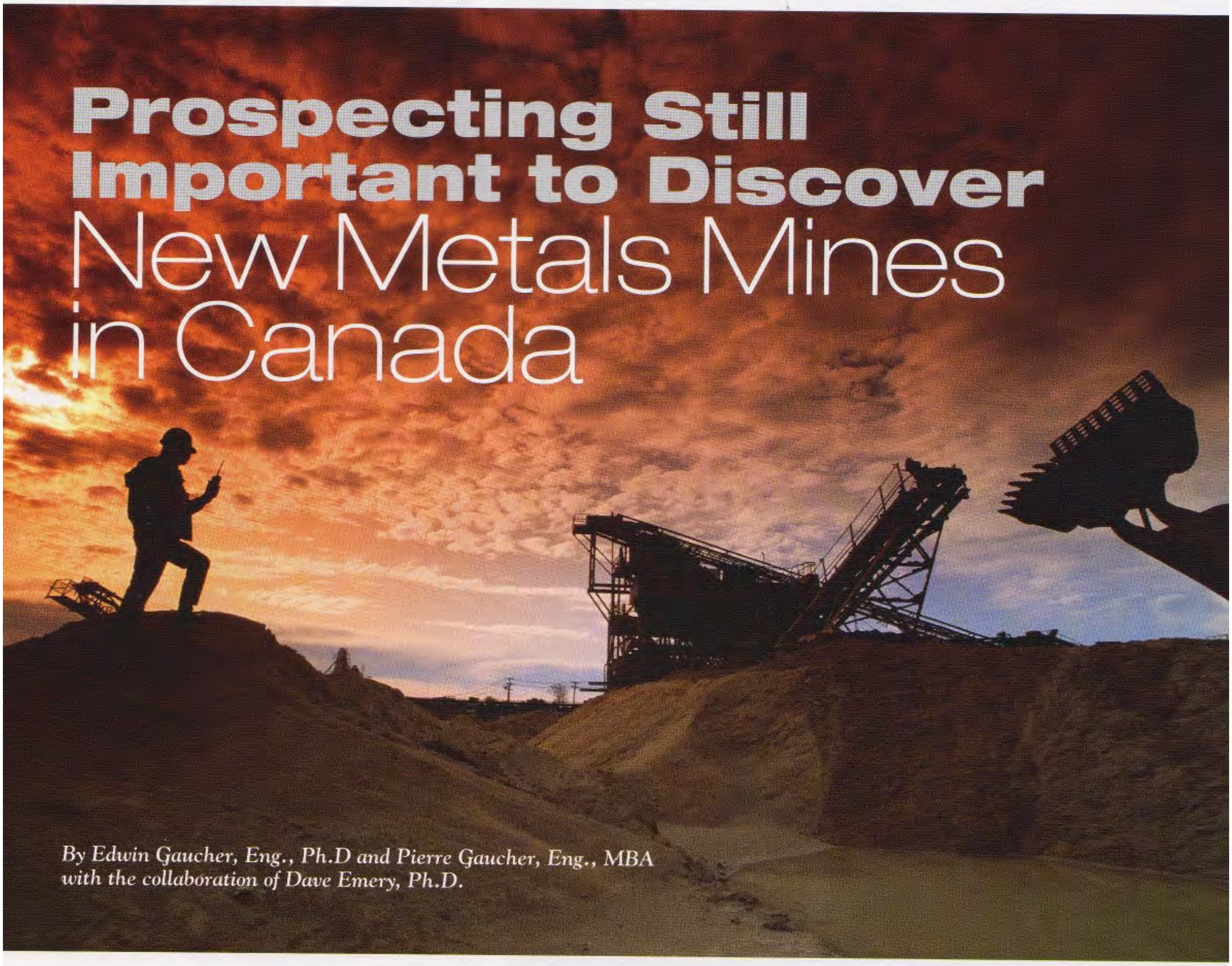
Prospecting Still Important to Discover New Metals Mines in Canada



By Edwin Gaucher, Eng., Ph.D and Pierre Gaucher, Eng., MBA with the collaboration of Dave Emery, Ph.D.

In-situ conductivity surveys of diamond-drill holes (DDH) with the Sulfides, Susceptibility, Waste (SSW) and of DDH cores with the Multi-Parameter Probe (MPP) indicate that airborne or ground EM surveys will not detect many metal ore bodies, except when they happen to occur next to a layer rich in graphite or pyrrhotite. This suggests that many major mines remain to be found in Canada—but how?

The decision to write this article was taken in November 2002 while listening, dumbfounded, to the story of a ten-million-dollar exploration program over a huge area in northern Quebec. After finding some 50,000 kilometres of airborne Mag, then EM, preceded and followed by geochemistry and geology, only four diamond-drill holes were completed on two already known and already drilled showings. Perhaps the company was expecting that a geochemical signature would signal the presence of a valuable ore body, like in many parts of the world characterized by residual soil. Evidently, the company forgot that often in Canada, because of the continental glaciations, even in the Texas Gulf (the world's largest sulphide ore body) has only a small anomaly in the till, never coming to the surface (ref. 1). Perhaps it is time to review what may be the right approach to exploration in Canada.

DIFFICULTIES OF EXPLORING IN CANADA

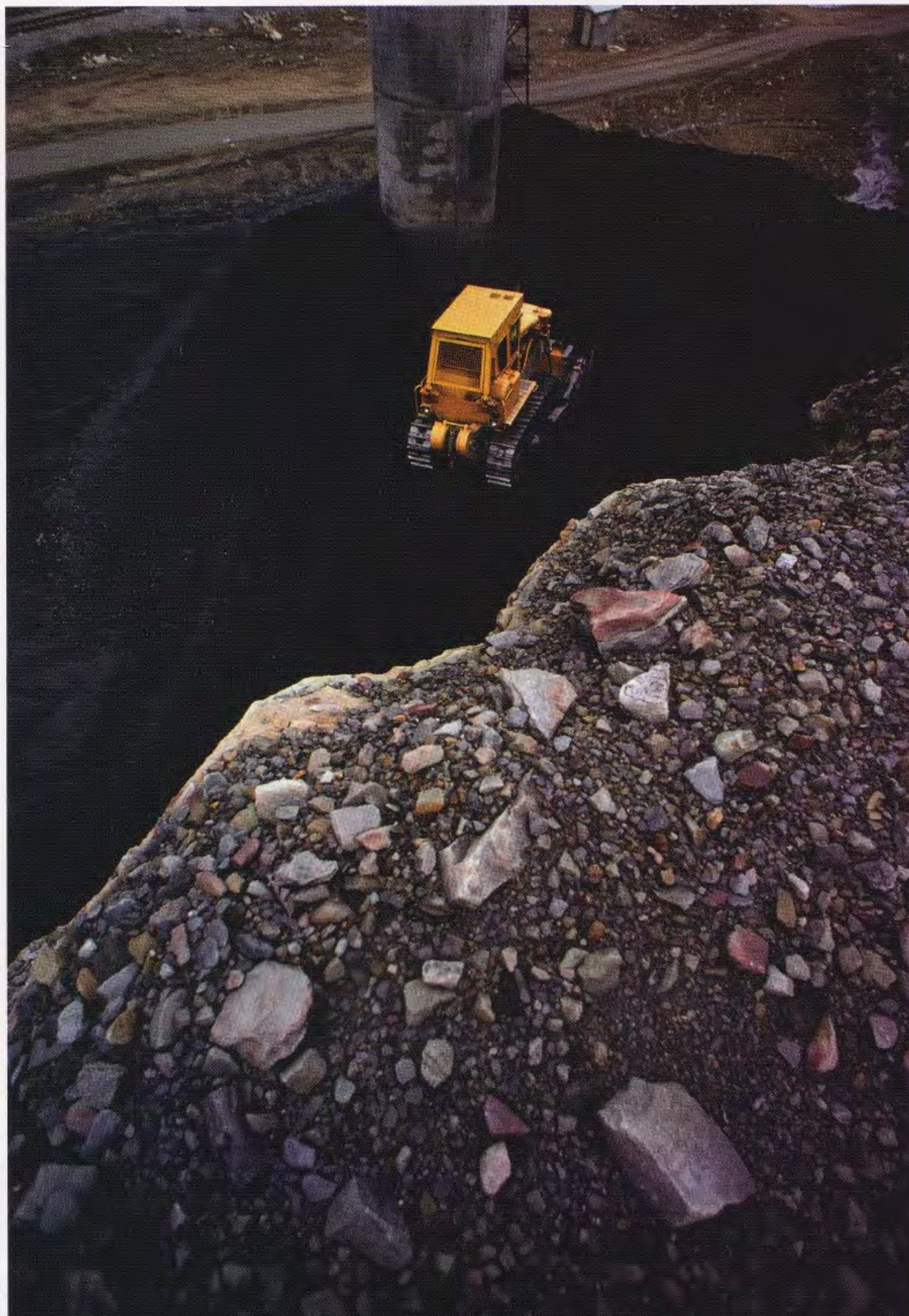
In Canada, drilling airborne EM conductors systematically is not necessarily the best solution, as perhaps only one in 10,000 conductors caused by graphite or pyrrhotite is spatially associated with a minable ore body. For example, from

1960 to 1980, Inco probably drilled more than 10,000 strong magnetic conductors across Canada; Umex drilled 2000+ anomalies (ref. 2), and with Soquem, we drilled more than 500 (ref. 3). None of these drill holes resulted in a single mine, except when drilled next to a showing previously discovered by an independent prospector.

As the odds of discovery in mining camps are likely much higher, in the order of one in one hundred (ref. 4), I have excluded from the compilation any drilling around "mining camps", where for example, Soquem was lucky to discover Doyon and Louvem. Inco was and is still very successful in Sudbury. For those not familiar with Doyon, it was probably the biggest gold mine in Canada when put into production in 1980.

Reverse-circulation drilling of overburden does not seem to be a solution, as it is quite expensive. Its most celebrated discovery, the Golden Pond for Inco, was not the result of till sampling but occurred when an RC drill penetrated into bedrock and hit a gold vein (ref. 5). At Hemlo, geochemistry of humus was very effective to define the ore body, especially when ore was lying directly under moss (ref. 6). Stripping moss or prospecting with a sounding bar might have been more cost-effective.

Even in the most intensively prospected area of Canada, between Val d'Or and Rouyn, the gold ore from Doyon was hidden under less than 1.5 metres of till on a hill, over an area of 25 metres by 8 metres wide (ref. 7). At Kidd Creek, a wide area of massive chalcopyrite was hidden under less than four feet of moss, next to a conductor (ref. 5). That non-magnetic conductor, long neglected, was reputed to have been used by airborne EM crews from a major nickel company to check the operation of their EM instruments when flying out of the Timmins airport.

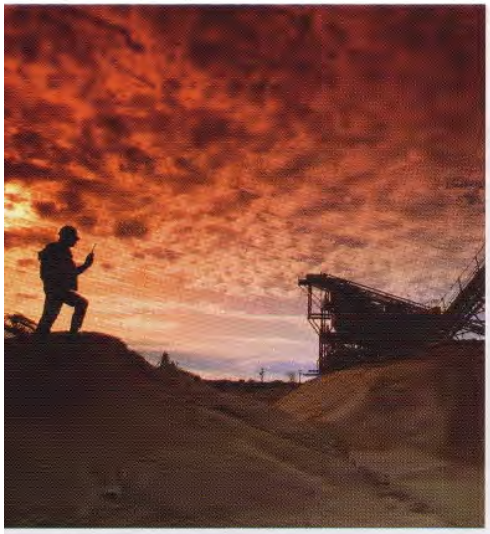


HOW MINES WERE AND STILL ARE OCCASIONALLY FOUND IN CANADA

For years, Canada has been a haven for prospectors in spite of extensive till cover. To illustrate the trends we can subdivide exploration into three periods.

Period ending toward 1950

Compilations by geologists (ref. 8) attribute 78 per cent of discoveries before 1945 in Northwestern Quebec to surface prospecting. Across Canada, many showings were discovered on outcrops or by float washed clean around lakeshores easily examined from a canoe. Other discoveries, such as Opemisca or the iron ores of Labrador, resulted from samples sent in with bundles of furs by first-nation trappers. Railroad construction resulted in the discoveries of Sudbury and Sullivan, BC. Later, road construction brought its share of discoveries: prospectors today are still



following road-building crews of forestry companies. At least around Val d'Or, when looking for quartz veins or float, prospectors ran "seismic" surveys by probing moss with steel pins and digging down when a ringing sound suggested the presence of quartz.

Period from 1950 to 1965

From 1950 to 1965, discoveries were mostly attributed to geophysics. The reality is more complex because prospectors also played important roles in that period. A number of discoveries attributed to geophysics were either trenched or sampled by prospectors before geophysics were run. For example, Brenda mines in BC was extensively trenched by prospectors before the first IP reading was ever taken, as witnessed at a Vancouver CIM meeting by the reaction of a prospector during the presentation of the IP survey over the orebody by Dave Fountain. It is listed as an IP discovery. Lemoine mine in Chibougamau was drilled on an Input target located at the head of a previously-traced train of high-grade float followed by prospectors. This is one of the rare cases where in the CIMM paper describing the discovery, full credit is given to the input of prospectors. At a lecture at Harvard in 1959, Dr. Hugh McKinstry mentioned that a trapper who brought in a nickel-rich sample contributed to the discovery of the Thompson ore body. The sample was probably collected by the trapper on a lonely sub-outcrop just east of Cook Lake (Thompson). A strong but only moderately magnetic conductor was underlying the outcrop. Until then, all drilling by Inco was done on strongly magnetic conductors. Previously at Thompson, in spite of several hundred DDH that tested such conductors, only marginal 1 per cent nickel deposits were discovered. After the discovery of Thompson Nickel mine, Dr. McKinstry was requested by Inco's management to revise the criteria (ref. 9) used to select drill targets.

In areas covered by heavy overburden, ore float probably led companies to explore. For example, a huge float of zinc ore several meters across was identified before the discovery of the Mattagami mine. The float can still be seen in times of drought about 500 meters below the rapids of the Bell River, some 15 kilometres south of the mine (ref. 10).

Prospecting by trenching also played a major role in discoveries from 1955 to 1970. Thousands of trenches were dug with pick and shovel to check airborne EM anomalies. From the early sixties, prospectors explored with small vertical loops or with VLF EM and thus flagged axes of airborne anomalies. To find where bedrock was closest to the surface, they tested along the axis with steel pins and then trenched the anomaly. During these years, geologists for Noranda in Rouyn-Noranda did not accept to drill a conductor unless prospectors found a showing on it. While prospecting with Beep Mats, the author encountered many such trenches. In places, trenches were too short and missed dipping conductors, which we later discovered and sampled using Beep Mats. A dipping conductor displaces the EM axis a few meters down dip.

Period from 1965 to today

After 1966, particularly during the boom caused by flow-through shares, exploration in Canada relied mainly on systematic drilling of anomalies, especially during the period when one had only January and February to spend the shareholders equity. But even in that period, a number of discoveries can be credited to prospecting. The Kidd Creek orebody, whose associated conductor was known for years, was finally drilled by Texas Gulf because their geologists observed a rhyolite outcrop next to the conductor trenched by an unknown prospector. The trenches contained some zinc mineralization that motivated that company to drill their 150th DDH, the first one to discover an ore body.

The OK ore body in Northwestern Canada was also discovered because of a float sampled by George Manners Jr. while field-checking geology prior to an airborne survey. After sampling zinc-rich float on the shore of a lake in early spring, he grabbed his VLF and defined a conductor under the lake by walking on the ice. George Podolsky (ref. 11) mobilized a drill quickly before the ice melted. He actually took a picture of the helicopter flying the EM survey over the drill site while already examining the core of the discovery. Despite this, the ore body is listed as an airborne EM discovery.

Prospecting should also be credited for the discovery of Troylus Mines. Finding a number of large, rusty, but not conductive gold-bearing float convinced Stefan Lopatka to run an IP survey and to drill resulting anomalies. Finally, the discovery hole was spotted under the huge float that now sits in front of the mine office. Previous to the discovery, the program had consisted of drilling more than fifty barren airborne EM targets. The discovery and assaying of rusty gold floats changed the approach.

At Eastmain Mine, a prospector's trench exposing a gold vein was most likely older than the airborne survey credited for the discovery. The trench crossed a trapper's portage between two tiny lakes. A crew from Geosig, led by the author, visited the trench in 1982 while running a MaxMin survey over the area.

It has become common-place to hear colleagues say that the era of "donkey-type" prospecting is over, that all near surface mines have been discovered and that now is the time to look for deeper ore bodies with the aid of high technology. And yet year after year, new mines are discovered with "old-time" methods of sampling gossans and float. Mines will be found at great depths by pure high technology, but mostly, if not exclusively, around existing mines. Elsewhere, especially in Canada, our high technology methods are not specific enough to detect which of the numerous significant near-surface conductors or IP anomalies may be a mine. Trying to check them one by one using DDH is prohibitively expensive; one way to avoid such high costs is with the use of Beep Mats to assay a great number of conductors. Beep Mats detect many ore that the EM will miss as they will perceive even tiny pyrrhotite veinlets even in non-conductive ore such as the surface sub crop of the Silidor gold quartz vein (ref. 12).

REFERENCES

Ref. 1: Fortescue, J.A.C. and Holbrook, E.H.W. 1969 Progress Report, Geological Survey of Canada, Paper 67-23 Part II, 101p..

RJ Garrett, 1969, CIM special Volume II, Geochemical study of Louvicourt Twp, Pages 157-159.

But this is not always the case: R. DiLabio (GSC Bulletin 323, 1981) mapped in a till an extensive copper anomaly which extended down ice right from the outcrop of the Icon ore body. It was so rich in chalcopyrite that it was successfully mined and treated in the sink and float concentrator.

Ref. 2: R. Coda, ex manager of Umex, personal communication.

Ref. 3: Mine Doyon, a major gold mine, was discovered in that period by Soquem. The discovery DDH was drilled without geophysics, strictly on geology. A year later geophysical surveys indicated that the ore body did respond to MaxMin and IP. The authors relating the discovery forgot to mention the sequence.

Ref. 4: M. Moreau, ex president Eldorado Mining, from his experience around Flin Flon, MB.

Ref. 5: Conclusion of EG examination in 1985 of over 100 RC holes, with T. Podolsky, V.P. Exploration for Inco.

Ref. 6: C. F. Gleason and D.G. Sheehan (1987) Humus and till geochemistry over the Doyon, Bousquet and Williams Gold deposits, pages 58 to 66, CIMM volume 80, No. 898.

Ref. 7: The shallow overburden was confirmed verbally by Roger Doucet.

Ref. 8: Lulin, J.M. (1990). Une analyse du développement minier du Nord-ouest québécois, p.17-34.

CIM Special Volume 43.

Ref. 9: Hugh Frazer (1985). The Great Thompson Nickel Discovery, pages 126, 143, 226, 273.

Ref. 10: Roger Lambert, personal communication.

Ref. 11: George Podolski, Oral presentation at the 1975 Society of Exploration Geophysics Convention in Denver.

Ref.12: Field tests with Rejean Pineault, Noranda geophysist and Maurice Rive, MRN resident geologist. ■

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