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ROLE AND IMPACT OF MODERN GOVERNMENT-GENERATED GEOSCIENTIFIC DATA ON THE EXPLORATION INDUSTRY OF NOVA SCOTIA AND NEW BRUNSWICK[1]

by

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PURPOSE

The main purpose of this contract is to assess the impact on, and use made by the exploration industry of the geoscientific data being produced by the Federal Government and the Provincial Governments of Nova Scotia and New Brunswick under the Cooperative Agreements on Mineral Development (MDA's). An attempt will be made to quantify this use in terms of exploration dollars.

The principal focus is on the metallic mineral exploration community.

From the investigations related to the main purpose, there arose several other subjects which could be termed "subsidiary purposes". These include:

1) Delivery of the geoscientific data by the governments.

2) Role of industry in the selection of geoscientific programs.

3) The potential for cooperative programs amongst industry, government and universities.

4) Contracting of geoscientific projects to consultants.

SUMMARY OF CONCLUSIONS

Use of Geoscientific Data

1) The exploration industry makes extensive use of the geoscientific data produced under the MDAs both in Nova Scotia and New Brunswick.

2) The most useful data are the regional geological, airborne magnetic/gradient and geochemical maps.

3) Use of the data by independent consultants has been a prime factor in attracting exploration dollars from out of province.

4) The viability of the independent consultants' activities is dependent on the availability of this data.

5) Most respondents were exploring where they were because of known mineral deposits. The geoscientific data has allowed them to both focus and expand their activities.

6) Use of the data has led both directly and indirectly to the discovery of important prospects and many occurrences.

7) Tens of millions of dollars of exploration expenditures over the past five years can be attributed to the use of this data.

8) Expenditure of exploration dollars are made mainly in rural areas of the provinces.

9) Without appropriate geoscientific data, regional exploration for new mineral deposits would be essentially at a standstill.

10) In general, the exploration industry would be greatly dismayed if the geoscience programs were severely curtailed or eliminated.

Delivery of Data

1) In general, the exploration industry is satisfied with the manner of delivery of the geoscientific data.

2) The publication of data could be accelerated.

3) The rush to computerized output should not be done at the expense of the more traditional publication of paper maps.

4) There is a strong suggestion that more compilation of geoscientific data should be done in Nova Scotia.

5) The respondents are very pleased with the cooperation and accessibility of the provincial and federal geoscientists.

Role of Industry in Selection of Projects

1) The present advisory committee in New Brunswick is, on the whole, adequate, but could be improved.

2) The attitude of the government geoscientists in New Brunswick is attuned to the exploration industry.

3) The majority of respondents resident in Nova Scotia seem to have problems with the current status of input into the province's geoscience proposals, either feeling that there is not enough, or it's not necessary.

Cooperative Programs

1) Cooperative programs involving industry, universities and governments are feasible, but would be difficult to arrange.

2) Cooperation on a small scale presently exists between industry and government and industry and universities.

3) An organization such as the Mining Industry Technology Council of Canada (MITEC) may be a good group to organize major cooperative projects.

Contracting

1) Company respondents accept the concept of awarding geoscience contracts to consultants.

2) All regional geological mapping should be done by the government geoscientists.

3) Consultants had problems with lack of opportunity to bid on contracts, poorly defined specifications in some requests to bid, the awarding of contracts to out-of-province bidders and the perceived usurption of their business by government.

APPROACH

A series of questions was designed to elicit the information necessary to effect the purpose of the study. These are listed in Appendix I. Interviews were scheduled with individuals involved in exploration in the two provinces. The interviewees (respondents) included representatives of multinational mining companies, geoscientists from junior exploration companies, and consultants and contractors active in the mineral exploration industry. The breakdown of respondents by province is shown in Table 1.

Table 1 Distribution of Respondents

NEW BRUNSWICK	
Major Companies	7
Junior Companies	2
Consultants	3
NOVA SCOTIA	
Major Companies	9
Junior Companies	2
Consultants	2

Sixteen respondents were interviewed on a face-to-face basis using the questions as a framework. The discussions (save for two) were recorded on tape, with the respondents' permission. Notes were then taken from the recorded interviews and a narrative composed from the notes. The narratives were then sent to the repondents for editing. In no case were the identities of the company or respondent revealed in the narratives. Areas of exploration activity were generalized. The narratives can be found in Appendix II.

Four other respondents were interviewed by telephone and narratives produced from notes taken during the interviews. In addition, several people were consulted about the contract, but not interviewed, in the sense of the respondents. These included officers of the Provincial Mines branches, and individuals casually involved in exploration.

INTRODUCTION

Several years ago a small delegation of municipal councillors arranged a meeting with the Deputy Minister of Mines of a certain province. At the appointed hour they appeared at the appropriate office and settled comfortably into chairs in a small board room. The mayor, who was the spokesman for the group, then proceeded to explain to the Deputy Minister that the small city which he represented had fallen on hard economic times. However, he had noted that in the northern part of the province there were many mines which were providing both employment and wealth. His documentation was excellent particularly as he recognized the importance of the mining industry and the role it played in prosperity. He ended his presentation with a strong appeal that the government open its next mine near his city.

The concept that mines can be strategically placed where they will provide the most benefit may be held by a surprisingly large percentage of the general populace. To the contrary, however, mines are developed only where there are unusual concentrations of metals or minerals which are useful to mankind. Furthermore, the extraction of the valuable commodities must be profitably achieved if the mine is to survive.

Ore Deposit Models

There are a number of geologic processes which can produce concentrations of metals in sufficient quantities to constitute an ore. These have been active throughout the earth's history and appear to have been especially active during certain defined periods in specific geographic areas.

The study of the formation of ore bodies has evolved over the past decades through general and detailed observations of both the ore bodies themselves and the rocks which contain them. The investigations have taken place in the field and in laboratories and through them, it has become clear that certain kinds of ore bodies are always associated with specific types of rock. This relationship is often referred to as an "ore deposit model".

Ore deposit models exist, in varying degrees of soundness, for almost all kinds of mineral deposits. Individual geologists or exploration companies may hold confidential variants of the common model which they feel gives them a competitive edge in exploration.

Thus, if a mining company is interested in finding additional reserves of a particular metal, its exploration will be focussed in areas where the rock types are those which the model indicates are associated with deposits of the targeted metal. In a different situation, if a company would like to evaluate a large tract of land for its mineral potential, the application of ore deposit models in this evaluation is important. Given the distribution of various rock types within the tract, the potential for the occurrence of different types of mineral deposits can then be recognized.

The prime key to successful exploration is the use of the models in the selection of areas to explore. Used in this way, the models are more aptly termed **generic exploration models**. The ability to apply these models is directly dependent on the quality and quantity of the available geoscientific data, especially the geology. A perusal of the narratives in Appendix II clearly shows the importance of the models and the reliance the exploration community places on the geoscientific data.

Cooperative Agreements on Mineral Development

During the past seventeen years in New Brunswick and Nova Scotia new geoscientific data has been acquired through federal-provincial programs. For the last seven years data has been delivered through the Geoscience Sectors of Cooperation Agreements on Mineral Development (MDAs).

Under the DREE programs during the latter half of the 1970's, the provinces carried out the projects using both federal and provincial funds. Federal geoscientists were not formally involved except in two or three projects. Beginning in 1984, the MDA's were structured so that federal and provincial geoscientists each had responsibility for carrying out projects that were funded by the geoscientists' own department ("parallel delivery"). Which agency did what, and where, was decided by committees of geoscientists from both governments.

Each province has its industry advisory committee

which meets periodically with the government committee. Its function is to advise on, and evaluate, the various projects.

Nova Scotia MDA 1 spanned the period from 1984 to 1989. The contribution from both governments totalled $26.9 million with 60 percent from the federal government and 40 percent from the province. Approximately 62 percent of the funds were directed to Geoscience. This equates to $15.3 million or an average of $3.07 million per year. In the current two-year agreement, which expires March 31, 1992, the geoscience component has dropped to 35 percent and expenditures average $1.59 million per year.

New Brunswick MDA 1 was also in effect from 1984 to 1989. The contribution from both governments totalled $22.3 million with 67 percent from the federal government and 33 percent from the province. Approximately 55 percent of the funds were directed to Geoscience. This equates to $12.3 million or an average of $2.47 million per year. In the current five-year agreement which expires March 31, 1995, the geoscience component has dropped to 40 percent and expenditures average $0.80 million per year.

In 1988 responsibility for the federal-provincial Economic Regional Development Agreements (ERDAs) for Atlantic Canada was transferred to ACOA. According to Sampson and Donohoe (1991) two of the purposes of the MDAs are to:

1) "enhance the geoscience data base and understanding of the geology of the Province" and

2) "encourage private sector investment in the development of mineral resources in the Province".

Sampson and Donohoe (1991) also indicate that ACOA "sets the policy framework within which cooperative activities take place, and determines the themes for the various programs". They state further that the operative themes for the current MDA in Nova Scotia (and presumably in New Brunswick as well) are increased trade, the enhancement and transfer of technology, and improved competitiveness. Part of ACOA's function is to determine which economic sectors in Atlantic Canada are most likely to require support in fulfilling the goals of the current themes. Since the themes, which are set by Cabinet, seem to change from time to time, some difficulty can be expected in melding the goals of the MDAs with a shifting thrust from ACOA.

Competitiveness

"Competitiveness" is a fact of life. In order for our mining industry to survive, the bureaucratic and political climate in Canada must be perceived as being as favourably disposed to exploration and mining as it is elsewhere in the world. There are numerous factors which contribute to the favourability of this climate and they have been discussed at length by many others. For the purposes of this exercise, focus will be given to the presence, or absence, of sound geoscientific data as one of the contributory factors.

The survival of a national or provincial mining industry depends on the discovery of new ore bodies to replace the reserves which are currently being mined. The survival of a mining company depends on the same thing except that the new discoveries can be anywhere in the world. Exploration is the first step in the long process of establishing a new mine. A mining company will spend its exploration dollars where it feels its best chance of discovery lies. Canada is in competition with the world for this investment as are the provinces within Canada. It is therefore important to have the Federal and Provincial governments fully and actively supportive of the industry. To not do so would send a clear message to the international mining community that we are not open for business.

A strong indication of this support is to have government departments of mines that are proactive with respect to the mineral resource potential of their jurisdictions. Specifically, concerning the competition for exploration dollars, a strong component of the government service should be a continued upgrading and promotion of its geoscientific data base for it is this base that allows the explorationists to best apply their generic exploration models.

A second point is that having an active government role in the collection and dissemination of geoscientific data attracts entrepreneurial consultants and junior mining companies who use this data for

modern compilations designed to attract exploration dollars from companies not resident in that particular province or, even, in the country.

RESULTS

General

The results from the interviews and the conclusions drawn therefrom are reported in this section. All of the respondents were extremely cooperative and gave their opinions freely. Some of the discussions were wide-ranging as can be gathered by perusal of the narratives in Appendix II.

The comments are arranged in the order given in the section on Purpose which is:

1) Use of geoscientific data.
2) Delivery of data.
3) Role of industry in selection of projects.
4) Cooperative programs.
5) Contracting.

In some cases the topics are discussed for the provinces as a whole. In other situations it is necessary to distinguish between Nova Scotia and New Brunswick. This is primarily due to the inherent differences in the mining industry in the two provinces and in the structure of the government agencies which deliver the provincial component of the MDAs.

In the first instance, New Brunswick has a well established base metal mining industry in the Bathurst District, potash mining in the Sussex area, and coal mining near Minto. Limestone/dolomite, peat, building stone, silica and clays are also produced. Gold is recovered from a small heap-leach operation in the Bathurst area, and small amounts were produced from a mine east of Saint John in the late 1980's. Antimony was mined from a deposit near Lake George for many years, but this operation is dormant today.

In Nova Scotia, mineral output is dominated by the production of coal from the Sydney area on Cape Breton. Gypsum, with lesser anhydrite, is mined from five quarries and there are two active salt operations. Dolomite/limestone, barite, peat and shale are also produced. During the past ten years, tin has been mined from a large, low grade deposit at East Kemptville and lead/zinc from a deposit at Gays River. From 1986 to 1989 several gold properties reached the underground development stage but, for a variety of factors, none reached commercial production. Today, primarily because of the low price of gold, there is little current exploration for that metal.

The provincial contribution to the geoscience sector in New Brunswick is comprised of both A-base and MDA projects delivered out of Fredericton and regional offices in Bathurst and Sussex. In Nova Scotia, all geoscience projects are funded through the MDA and directed from Halifax.

Use of Geoscientific Data

All twenty respondents indicated that they used the geoscientific data produced under the MDAs. Eighteen of these stated that their use was "extensive" or that they "used it every day". When asked, "What type of this geoscientific data do you find most useful?", the answer was overwhelmingly the geology maps followed closely by the aeromagnetic/gradient data and the geochemical releases.

Main Data

Geology is the fundamental base upon which the generic exploration models are built and the derivative exploration programs planned. A good geology map, as one respondent said, is as important to the mineral industry as a road map is to tourism. Both must provide sufficient detail to get around and both must be continually updated.

The opinion of the majority of respondents was that regional geological mapping (at 1:50 000 scale) is of paramount importance and that the completion of mapping at this scale throughout both provinces should be an objective of the programs. This fundamental job should be balanced with more detailed mapping in specific areas of economic interest. A case in point is the Bathurst area of New Brunswick.

Regional maps of the Bathurst area were published by the Geological Survey of Canada in 1974 although some of the field work that contributed to this publication was done in the 1950's. These

maps provided a good feel for the overall geology of the area, and showed the location of important mineral occurrences and mines. Some additional, more detailed mapping by the Province in the late 1970's provided new information, but, in general did not change the overall picture. Exploration was focussed by generic exploration models developed from this data base.

During the last MDA (1984-1989) the Federal government initiated a project to remap the Bathurst area and the Provincial government started a program of more detailed and critical examination of smaller areas within the Bathurst region. The remapping by the Geological Survey of Canada was necesary because in the years since the last mapping, various observations by industry geologists and other individuals had indicated that the geology was much more complex than originally shown, that the details of the ore deposit models of the formation of the Bathurst base metal deposits had changed, and that the area as a whole was far more accessible through a vast network of lumber roads.

The respondents active in the Bathurst area were unanimous in their opinion that the preliminary results from this program of remapping have provided an important stimulus to renewed exploration.

Under the MDAs, the Federal government has completed airborne magnetic and gradient maps of large parts of both provinces. The differing magnetic responses of different rock units produce a magnetic pattern which can be displayed in map form. This pattern then is a reflection of the geology underlying the area flown and is a key factor in further refining the total geological picture as it will often provide information in areas which cannot be mapped because of surficial cover, lakes, etc. The government also makes this data available in digital form so that companies, consultants, etc., can acquire it and produce more detailed maps through utilization of their own computer programs. Indeed, this information is one of the important inputs into the various GIS systems in use.

The geochemical releases are the third most widely used type of geoscientific data. Under the MDAs most of the geochemical surveys are of a regional nature. The basic procedure involves collecting samples of the selected medium at prescribed intervals and having those samples analyzed for a variety of elements, especially those which are of economic interest such as lead, copper, gold, silver, etc. The purpose is to identify areas where there may be elevated amounts of particular elements (anomalies) which would suggest that these areas may be more favourable for the occurrence of mineral deposits.

A variety of mediums have been sampled in this way in the two provinces. The most common is stream silts, but there are also surveys utilizing lake sediments, water, deposits left by receding glaciers (till), bark, leaves and twigs from trees and soils and rocks.

Geochemical data is used in two ways by the exploration companies:

1) In the generic exploration models, the correlation between the location of anomalous samples and the distribution of specific rock units known to be associated with mineral deposits of one type or another is examined. Here, it is again clear that the geological base must be accurate.

2) The other use is more direct. Since an anomaly may reflect the occurrence of a mineral deposit, companies or individuals may stake the ground in the vicinity of the anomaly. Normally, if the ground is acquired by a company, a follow-up program will be planned to assess the claims for their potential. In the case of an individual, the approach may be to do a limited amount of work to verify the anomalous nature of the particular medium, and then attempt to attract a company to finance the follow-up work. The more competitive the particular area is, the more likely that staking will follow closely on the heels of the geochemical release.

Other Data

Other regional geoscientific data is also incorporated into compilations, or is used directly. Chief among these are the airborne radiometric maps and the surficial geology maps.

The radiometric surveys measure the differences in the natural radioactivity of different rock types and are thus another useful tool to aid in the interpretation

of the geology. In addition to this general use, this data can also be used in the direct exploration for deposits of uranium. Coverage of the two provinces on a coarse scale is extensive. More detailed surveys have shown to be of more use, especially in Nova Scotia where this data has been especially important in helping to distinguish amongst several types of granite and isolating the ones that were thought to have some genetic relationship to the occurrence of mineral deposits.

The surficial maps record the distribution of various types of sands, gravels and soils that generally mask the bedrock. This material is generally called "overburden". These maps are of direct aid in helping to interpret the geochemical anomalies, because they provide a description and interpretation of the origin of many of the sampling media used. Respondents, whose interests included the production of sands and gravels, feel that the surficial maps are the most important type of geoscientific publications. A case was cited in Nova Scotia where a company carried out considerable work on a gravel deposit first brought to its attention by work of the Provincial government.

Other data, used in varying degrees by the respondents, include:

1) The study of peatlands in both provinces (technically not in the Geoscience sector) where one respondent indicated that work done by his firm in assessing this data for clients had led directly to the opening of three new peat operations.

2) The Carboniferous Drilling Program in New Brunswick where the province carried out a drilling program to evaluate the economic potential of an area of poorly exposed rocks covering a large portion of the eastern part of the province. Among the data collected were the chemical and physical qualities of groundwater. This information was released to the public in 1981. One respondent indicated that his company had received an inquiry from an offshore firm as to the possibility of locating potable water supplies meeting certain criteria in the province. The data in the publication was sufficiently detailed to allow the respondent to indicate that there were water resources that satisfied the client's standards. The possibility of a significant investment in the province can be attributed directly to the availability of this information.

3) An adjunct to geological investigations sometimes involves the dating of rock units. The techniques used are sophisticated laboratory procedures and involve the separation of specific minerals and the measurement of minute quantities of different isotopes of lead. Although considered esoteric by some geoscientists, the information gained from these studies has had a profound effect on the interpretation of the geology of some areas. An excellent example of this is in the southern part of New Brunswick where the dating of rocks by the Provincial government in 1991 has shown that one particular type is older than previously thought and is, in fact, the same age as similar rocks in Maine with which are associated ore bodies containing copper and zinc. This information has enhanced the economic potential of this belt of rocks and, as a result, renewed exploration commenced after the release of the data, and additional programs are planned for 1992.

4) When gravity data is available it is used in conjunction with other regional data. One respondent indicated that this information was of value in his construction of a generic exploration model for the search for deposits of lead and zinc in sedimentary basins.

5) Airborne VLF (Very Low Frequency electromagnetic measurements) data is frequently collected along with either the magnetic or radiometric surveys flown by the Federal government. This information is of help in aiding in the interpretation of the geology of an area and is another data level in GIS compilations. Generally, however, the respondents found that this data was of limited use.

6) The continual updating of the mineral occurrence files and the release of this data in digital form was found to be useful as yet another compilation level.

7) Detailed 1:10 000 scale compilation maps of data collected by government and industry (from

assessment files) in parts of the Bathurst area in New Brunswick have been used by most respondents active in that area. These maps bring together and synthesize a wealth of information and are often looked upon as a time-saving feature by companies and individuals.

8) Although not collected throughout the MDA program, several respondents indicated that they used Landsat imagery as an important tool in their compilations. This data, which is available in digital form, is excellent for tracing structural features in the bedrock.

9) Finally, and again not funded through the Geoscience sector, the availability of diamond drill core stored in government facilities both in New Brunswick and Nova Scotia was considered by the respondents to be of great value in that this core could be readily examined.

Detailed descriptions of mineral deposits were of interest, but were not cited as information critical to the exploration process.

Most company respondents indicated that they were working where they were because there were known mines or important occurrences of metals in the area. This is especially evident in the Bathurst District of New Brunswick where there are currently two mines operated by Brunswick Mining and Smelting and at least 33 additional deposits with defined tonnages (McCutcheon, 1990).

The respondents were asked if they would have gathered the geoscientific data themselves, had it not been available. With one exception, the answer was "no". In the case of the exception, this respondent indicated that in one area in New Brunswick, his company would have flown its own magnetic survey and carried out its own geochemical sampling, but on a smaller scale than that completed by the government.

In another case, one respondent stated that his company was forced to conduct its own airborne magnetic survey because of a hole in the government coverage.

The general conclusion is that those involved in exploration depend largely upon the governments to provide the basic geoscientific data necessary for them to effectively carry out their work. As some respondents from the major companies indicated, without this data, their work would probably be confined to individual properties and that exploration in a regional sense, would be extremely limited. It was also clear that without this data, the independent entrepreneurs would be unable to function in the manner they have. Since their work is largely responsible for attracting exploration dollars from outside the provinces, activity would undoubtedly decline.

Role of Consultants

It became evident in the interviews that independent consultants/contractors played a significant role in advising companies that wanted to commence exploration in a particular area. Using the Bathurst District as an example again, three respondents indicated that an independent consultant was instrumental in the selection of specific areas in which to concentrate, once the decision was made to start exploration in the camp. The consultant's analysis of the geoscientific data base was the most important factor in the selection of these areas.

In another case, an independent geologist and his colleagues proposed a gold exploration program in an area in northern New Brunswick. The program was predicated on a generic exploration model developed from a compilation of available geoscientific data. The proposal was marketed to appropriate exploration companies and sufficient funds were raised to go ahead with the exploration. The work resulted in the discovery of the Alcida deposit in 1985 which, although not in production, is one of the most significant gold prospects in New Brunswick. The respondent who was responsible for this program, and others of a similar nature, commented that without the government-generated data, this project would not have been conceived and it is likely that this prospect would not have been discovered.

The announcement of the Alcida find in 1985 precipitated a major exploration upswing in areas of similar geology, not only in the immediate area, but also in other parts of New Brunswick and in similar geological terrains in Nova Scotia, Newfoundland and the Gaspe area of Quebec. The intense activity during this period is also due to the wide-spread

availability of flow-through financing. The discovery was responsible for the establishment of an exploration office by one of the syndicate participants in Bathurst.

In Nova Scotia compilations of geoscientific data by an independent consultant has allowed him to attract a major Canadian mining company to the province. It is unlikely that this company would have become involved in exploration here had it not been for the fact that the consultant was able to formulate cogent generic exploration models from the data.

Discoveries

The respondents were asked if the use of the geoscientific data had led to the discovery of an occurrence, prospect or mine. The general response to this question was that the data certainly had an important part to play in discoveries by directing a company into an area, but it could not be said that it was solely responsible. In addition to the cases cited in previous paragraphs, there follows here some other examples of the role the use of geoscientific data has played in exploration successes.

1) The respondent from the company that discovered a significant base metal deposit in northwest New Brunswick indicated that the government-generated geoscientific data had a substantial role to play in the discovery. In the first place, the company was attracted to the area by anomalies found in a stream silt geochemical release. While following up these anomalies, it was noted that the rocks showed features that suggested they may be the type that could host base metal deposits. Subsequent geological mapping by the Provincial government confirmed the attractiveness of the rocks. In addition, the geologist in charge of the government project discovered sections of these rocks that showed alteration features that were characteristic of those associated with some types of base metal ore bodies. The company explored this area in more detail and, in drilling, eventually intersected ore-grade amounts of copper and zinc. The property has now been optioned to a major mining company and the discovery has resulted in extensive staking and exploration in the area by competitive companies.

2) This same respondent related that in another situation, follow-up of a geochemical release and the relationship of the anomalies to patterns evident from the airborne magnetic maps led to the discovery of an alteration zone again similar to that which would be expected to occur in the vicinity of a base metal deposit. The significance of this find was enhanced by the fact that a previously unmapped favourable rock unit was found associated with the alteration during the remapping of the Bathurst Camp by the Geological Survey of Canada.

3) Compilation of geoscientific data by an independent consultant in Bathurst prompted the staking of claims by another geologist. Preliminary exploration on the claims resulted in the discovery of a showing of lead and zinc within a favourable geological setting.

4) Geological mapping in the Antigonish Highlands of Nova Scotia under the last MDA program uncovered a showing of base metal mineralization. This showing and surrounding area were staked by a junior mining company which carried out an exploration program culminating in the drilling of a few holes. Although the occurrence itself was not proven to be commercial, the geological mapping and subsequent exploration were important in indicating that the rocks in this part of the province have a potential for hosting base metal deposits and that this potential had not been previously recognized.

5) A respondent indicated that recent multi-element analytical work carried out on tills by the provincial government in southwest Nova Scotia suggested that there were sources of tin mineralization other than the mine at East Kemptville.

6) Another respondent referred to a high-calcium limestone deposit in Cape Breton that is on the verge of going into production in order to supply the Point Aconi fluidized bed power plant which will burn a fine mixture of coal and limestone. The nature and quality of this deposit were established by drilling by the Nova Scotia government in 1963-64. This is yet another example of the longevity of certain kinds of geoscientific data and that there can be a long time between the collection of the data and the

time it is profitably used. The respondent added that geoscientific data should not be gathered to satisfy short-term objectives, but it is required to form part of a solid data base which can be used well into the future by exploration companies and individuals.

7) As a final example, discovery of significant deposits of uranium at Millet Brook in Nova Scotia in 1976 was only made possible by the availability of regional geological maps produced by the Geological Survey of Canada between 1967 and 1969. The maps were of sufficient quality to allow a company geologist to develop a generic exploration model based on his knowledge of the uranium deposits in France which occur in the same types of rocks.

Expenditures

The respondents found it difficult to quantify how much money their companies may have saved by utilizing the government geoscientific data, but clearly it would be significant (Table 2).

Table 2. Money Saved by Companies Using Government-Collected Geoscientific Data

RESPONDENT	MONEY SAVED BY USING DATA
1	Probably none.
2	Wouldn't hazard a guess
3	Hundreds of thousands of dollars during flow-through era.
4	$250,000 in 1991.
5	$250,000 in 1990.
6	$1,000,000 per year over past five years.
7	Couldn't estimate.
8	Not asked.
9	Difficult to estimate, but substantial.
10	Not asked; new in area.
11	Not asked.
12	Difficult to quantify.
13	Equivalent to cost of having collected it.
14	Not asked.
15	Not asked.
16	A few hundreds of thousands of dollars over the past five years.
17	Couldn't estimate.
18	Not asked.
19	Not asked; new in area.
20	Not asked; new in area.

It was also difficult for them to estimate their expenditures in directly following up leads developed by using geoscientific data. As has been mentioned elsewhere, the data has been mainly used to formulate generic exploration models which tend to focus the work in specific areas. The expenses then incurred in exploration in that area can be considered an indirect (or "direct", as one respondent stated) result of the presence of the data (Table 3). Direct expenditures can be ascribed to programs that are specifically initiated to follow-up such things as a geochemical anomaly in a stream silt release. With respect to this category, five respondents indicated that their combined total of expenditures in New Brunswick and Nova Scotia was $1.5 million during the past two years.

Table 3. Money Spent on Follow-up of Geoscientific Data

RESPONDENT	MONEY SPENT ON FOLLOW-UP OF GEOSCIENTIFIC DATA
1	$3,000,000 over seven years.
2	$500,000 over past two years.
3	1/4 to 1/3 of budget, or several millions of dollars during the flow-through era.
4	No specific answer.
5	$500,000 in 1990 on claims staked on basis of data.
6	33 percent of budget over past five years.
7	$300,000 to $400,000 in 1991.
8	$1,000,000 by clients in 1991.
9	$500,000 budgeted for 1992 outside Bathurst; "much of" about $45,000,000 in Bathurst Camp over past 5 years.
10	Not asked; new in area.
11	None.
12	Average of $400,000 per year spent by clients over past 10 years.
13	$500,000 to $750,000 annually.
14	$100,000 in 1991.
15	Large portion of budget spent indirectly.
16	$300,000 in direct follow-up in 1991.
17	$100,000 over last three years.
18	Difficult to quantify. Probably all expenditures by clients if brought in on the basis of data.
19	Not asked; new in area.
20	Not asked; new in area.

Turning to "indirect" expenditures related to work based on generic exploration models, it was surprising how much of the respondents' budgets were classified in this category. One respondent was of the opinion that if companies were attracted to an area by geoscientific compilations, either by government or independent consultants, then resulting expenditures were, in fact, due to the presence of the data. One case such as this, led to the spending of $1.0 million by three companies in 1991.

Another respondent, who represents a major mining company well-established in New Brunswick, indicated that his company and a subsidiary had spent approximately $45.0 million over the past five years on exploration mainly in New Brunswick and particularly in the Bathurst Camp, and that a large part of that had been directed to the follow-up of ore deposit models and that the creation of these models depended to a large part on government-derived geoscientific data.

"Several millions of dollars" were spent as a result of finding and delineating the Alcida gold deposit, as described previously. Another respondent representing a major company indicated that about one-third of his budget could be categorized as follow-up of exploration models based on geoscientific publications. Yet another respondent said that his company had spent $0.5 million over the past two years in this fashion.

In discussing expenditures, in general, well over 75 percent was spent in the province where the exploration was taking place. These monies flowed to provincially-based geophysical and diamond drill contractors, line-cutters and claim stakers, as well as to local merchants, motel operators and heavy equipment companies. In addition to this, 14 of the respondents' companies are resident in either New Brunswick or Nova Scotia with a total permanent employment of well over 100 directly supported by exploration activities. Many of these companies also hire temporary geoscientists on a contract basis.

Another point which has been brought out, is that, because of the nature of the distribution of rocks favourable for the occurrence of mineral deposits, well over 50 percent of the exploration expenditures take place in rural parts of the provinces. The dollars spent support local merchants, motel operators and garages.

Reaction to Reduction

Finally with respect to the use of the geoscientific data by the exploration industry, the respondents were asked what their reaction would be to a severe reduction (or elimination) of the geoscience sector in future federal/provincial MDA programs. The majority of answers ranged from "disappointed" to "disastrous". Most concern was registered by the respondents who made the most use of the data. Examples of some of the comments are:

- "This would be turning one's back on a constructive industry."
- "The MDA objective is to assist industry in finding mines and creating wealth."
- "This would be a clear sign that the governments do not want mining."
- "The geoscience sector produces data that attract exploration dollars from outside the province."

A minority of respondents (4), however, did not seem as concerned. One indicated that as long as geological mapping was continued, he wouldn't be upset. Another recognized the fact that governments were under fiscal restraints, but that there should be some minimum level of funding for the geoscience sector.

A third respondent felt that the sector should be supported in New Brunswick but that the programs in Nova Scotia had been over-staffed and over-funded and that he couldn't see any possibilities for additional viable projects. The fourth was of the opinion that the exploration industry really hadn't digested all of the data produced during the past few years and that there could be a slow-down in order to catch up.

The main conclusions concerning use of geoscientific data are as follows:

1) **The exploration industry makes extensive use of the geoscientific data produced under the MDAs both in Nova Scotia and New Brunswick.**

2) **The most useful data are the regional geological, airborne magnetic/gradient and geochemical maps.**

3) **Use of the data by independent consultants has been a prime factor in attracting exploration dollars from out of province.**

4) **The viability of the independent consultants' activities is dependent on the availability of this data.**

5) **Most respondents were exploring where they were because of known mineral deposits. The geoscientific data has allowed them to both focus and expand their activities.**

6) **Use of the data has led both directly and indirectly to the discovery of important prospects and many occurrences.**

7) **Tens of millions of dollars of exploration expenditures over the past five years can be attributed to the use of this data.**

8) **Expenditure of exploration dollars are made mainly in rural areas of the provinces.**

9) **Without appropriate geoscientific data, regional exploration for new mineral deposits would be essentially at a standstill.**

10) **In general, the exploration industry would be greatly dismayed if the geoscience programs were severely curtailed or eliminated.**

Delivery of Data

The respondents were generally pleased with the manner of delivery of the geoscientific data from the responsible provincial and federal agencies. When asked if any improvements could be made in the delivery, several comments were made. The most common one was that publication of data could be accelerated. Most of the concerns referred to access to data from multi-year projects in which interim reports were less than adequate. One respondent felt that this situation could be improved by upgrading the reports in the annual Review of Activities published by each province and issued in conjunction with the Open Houses where the project results are displayed in poster sessions.

Another respondent suggested that timeliness could be affected by the tendency for some geoscientists to prefer publishing their data in scientific journals and not in open file reports. Other problems cited included loss of contract geoscientists hired for MDA work before the completion of final reports and the relative inaccessibility of technical data pertaining to projects led by out-of-province geoscientists.

Several respondents commented on the availability of data on floppy disks. Some were of the opinion that all geoscientific data should be accessible in this format and it was clear that the information released in this manner was appreciated. On the other hand, four respondents were upset because they perceived that the tendency was to move in that direction at the expense of making the data available in paper form. They pointed out that prospectors, independent geologists and many junior mining companies did not have the necessary hardware to utilize the computer-oriented format.

Criticism was also directed to two recent geochemical releases in New Brunswick where the information included a base map showing the location of the samples taken, a series of overlay maps at a much smaller scale on which computer-drawn interpretations of the distribution of analyses of the individual metals were shown. These maps were accompanied by a computer-printed list of the data. The respondents felt that full-scale maps of the survey area showing the analytical value of each element at each eample location should also be available from the government.

With respect to the data available in computer format, one respondent was critical of a release from Nova Scotia where there were errors of location and other mistakes present in the data.

Three respondents active in the Bathurst Camp felt that the detailed geological mapping of critical areas should be accelerated, and that there should be more effort made to complete the 1:10 000 scale compilation maps of the camp.

Three respondents from Nova Scotia recommended that the provincial government make a

concerted effort to collate and compile geoscientific information and make the resulting maps and data files available to the public. It was pointed out that data is being accumulated at a pace that is exceeding the efforts to appraise it. One respondent pointed out that there was not a decent compilation of known lead/zinc occurrences in the province and that this should be remedied. It was also suggested that now that Mines and Energy is part of the Department of Natural Resources, that consideration be given to placing provincial geoscientists in regional Lands and Forests offices.

Other individual comments included: contouring of VLF data collected during the airborne magnetic and radiometric surveys; updating topographic maps; streamlining acquisition of publications from the New Brunswick government where prepayment is required; the need for more surficial mapping especially where coordinated with bedrock mapping, airborne geophysical and geochemical surveys.

The respondents were unanimous in their appreciation of the cooperation received from the provincial and federal geoscientists responsible for carrying out the various projects. They felt that these people were approachable at all times. Newcomers to the province were especially grateful for the help given.

One respondent said that his company had optioned a property in the northern part of New Brunswick from another group. A geologist in the provincial government had compiled the technical data on this property, including the drilling information, on computer disk and made it available to the company when he learned that negotiations for the option had been completed. In another case, a major, Canadian, out-of-province company acquired claims in Nova Scotia on the basis of field trips conducted by geoscientists from the provincial and federal governments.

Conclusions derived from the discussions on delivery of data are as follows:

1) **In general, the exploration industry is satisfied with the manner of delivery of the geoscientific data.**

2) **The publication of data could be accelerated.**

3) **The rush to computerized output should not be done at the expense of the more traditional publication of paper maps.**

4) **There is a strong suggestion that more compilation of geoscientific data should be done in Nova Scotia.**

5) **The respondents are very pleased with the cooperation and accessibility of the provincial and federal geoscientists.**

Role of Industry in Selection of Projects

Eighteen of the respondents were asked if industry should have a larger role in the selection of geoscientific projects. The present role was outlined so that the respondents could judge whether or not that function should be increased.

Currently industry advisory boards exist in both provinces. They meet on appropriate occasions with the government geoscience committees which are responsible for formulating and carrying out the various projects. Normally the industry committee will advise the government of the suitability of specific projects to the exploration industry and will also provide constructive comments about the results of projects.

In Nova Scotia the industry committee is appointed by the Chamber of Mineral Resources of Nova Scotia and in New Brunswick by the New Brunswick branch of the Prospectors and Developers Association.

Thirteen respondents felt that industry input into the selection of geoscientific projects under the current committee set-up was adequate. All respondents from New Brunswick were of this opinion. In general, these people thought that the government presented sound projects that were of benefit to industry. One respondent suggested that industry should be prepared to accept programs that were of benefit to the province and that governments should initiate sound projects that are requested by industry. Some comments were made to the effect that governments should have long range plans in which their geoscientific programs are laid out. In order to accomplish this, the programs should not be dictated by the short wave-length interests of the

exploration community.

Two respondents thought that industry should have a larger role in the selection of geoscientific projects, and, for various reasons, three other respondents felt that industry should not be involved at all. These five respondents were from Nova Scotia.

The two who suggested a larger role were basically of the opinion that the provincial government lacked individuals with industrial experience and were therefore not attuned to the needs of the explorationists. In addition there was a tendency for provincially proposed projects to be more academic in nature and required a strong pragmatic input from industry.

The reasons given by the individuals supporting less involvement included: a perception that advice went "in one ear and out the other"; that suggestions by an industry committee member may alert the competition; and that government should be able to do their own thing as long as they are turning out usable data.

Conclusions on the role of industry in the selection of projects are as follows:

1) **The present advisory committee in New Brunswick is, on the whole, adequate, but could be improved.**

2) **The attitude of the government geoscientists in New Brunswick is attuned to the exploration industry.**

3) **The majority of respondents in Nova Scotia seem to have problems with the current status of input into the province's geoscience proposals, either feeling that there is not enough, or it's not necessary.**

Multi-Agency Projects

Eighteen respondents were asked about what their views were about the possibility of initiating cooperative geoscience projects amongst industry, governments and universities. These projects may require funding by all participants and exchange of information and personnel.

Sixteen of the respondents suggested that such projects should be feasible but there was no unanimity whatsoever about how they could be structured. Some thought that they should be restricted to claim groups, others saw the only possibilities in regional studies and, in these cases, only where there was no active exploration. Proprietary information could be handled by a period of confidentiality, in the opinion of some. Conversely, several respondents thought a project would be feasible only if the data was immediately available to the public.

Two respondents from New Brunswick perceived that a total lack of cooperation existed now amongst the University of New Brunswick, the Department of Natural Resources and Energy and the Research and Productivity Council, all of whom were involved in geoscientific projects. One suggestion was made that an organization such as Mining Industry Technology Council of Canada (MITEC) may be able to draw these groups together. This organization has recently been expanded to include a sector which will address mineral exploration in Canada. It acts as a clearing house for geoscientific proposals related to exploration and will arrange cooperative projects and appropriate funding.

During the course of discussions, it was shown that there is cooperative work going on now, albeit of an informal nature. Five respondents pointed out that their companies had been involved with government geoscientists on specific work on their properties. This work has involved the investigation from diamond drill holes using sophisticated geophysical equipment, advice on geological problems, detailed geochemical projects, collection of samples from mines for detailed study, etc. In most of these cases, the government supplies the personnel and laboratory facilities and the companies provide proprietary data or access to it. It was pointed out that neither group receives any "credit" for this work and one respondent suggested that these arrangements could be more formal.

Three respondents indicated that they had financed research projects involving university faculty and graduate students and that some of these projects had resulted from contracts awarded by the federal side of the MDAs. Many companies also supported bachelor and graduate theses by providing suitable topics for research.

One of the two respondents who were concerned about this kind of joint venture felt that the small companies and individual contractors and consultants would be left out in the cold. He cited one example in which a large mining company and a university cooperated in the detailed study of a mineralized area in which the company had large claim holdings. None of the surface work such as line cutting, geochemistry and geophysics was contracted out.

Conclusions that emerged from the discussion of multi-agency projects are:

1) **Cooperative programs involving industry, universities and governments are feasible, but would be difficult to arrange.**

2) **Cooperation on a small scale presently exists between industry and government and between industry and universities.**

3) **An organization such as the Mining Industry Technology Council of Canada (MITEC) may be a good group to organize major cooperative projects.**

Contracting

Seventeen respondents were asked if they were satisfied with the approach of contracting out geoscientific work to consultants and university researchers.

Responses fell into two categories, those that dealt with the concept, and those that addressed the mechanics of awarding contracts. The first group essentially represented company geoscientists. In general the awarding of contracts to individuals and firms outside the government met with qualified acceptance. Concern was expressed mainly about the quality and timeliness of the work and that the contractors must be carefully screened and the work closely monitored. Several cases were mentioned in which this had not been done and either the resulting publications were not up to par, or were needlessly delayed.

A second qualification was that geological mapping projects should always be done by government and that consultants and university researchers should only be involved where specific problems are identified or specific tasks are required. Three of the company respondents were a little concerned about the confidentiality of data when work was being done by contractors who could be perceived to be in competition with the company. One of these respondents allowed that he probably wouldn't be as free with proprietary information as he would be if the project was being done by a government employee.

The second category of responses reflected the opinions of the contractors and consultants themselves. Four areas of concern were registered. The first was the lack of opportunity to bid. Decreased funding to the geoscience sector has resulted in fewer contracts being awarded. Most of these are from the federal side. One respondent was critical of the Nova Scotia government, where all work was done by its staff resulting, he suggested, in a lack of fresh ideas.

The second problem was the awarding of contracts for Maritimes work to contractors resident outside the area. All respondents in this category, and some representing companies as well, were of the opinion that all necessary expertise can be found in Nova Scotia and New Brunswick. The general opinion is that contracts are awarded basically to the low bidder, without really taking into account the experience and qualifications of all bidders. One respondent said that the motto for awards should be, "quality and timeliness at a reasonable price".

A third point related to the specifications that accompany requests to bid. One respondent felt that these were not tailored to the proposed project. For example he mentioned a situation where the specifications for a stream silt geochemical survey in New Brunswick were the same for a similar program in the Northwest Territories. This resulted in a higher cost than necessary, and, more importantly, a much more widely spaced sample interval than was optimum for the New Brunswick project. Another respondent had the perception that the terms of evaluation of a bid were not necessarily the same as the specifications.

There was considerable concern expressed about government geoscientists providing too much advice to exploration companies. It was pointed out that there is a point beyond which this help could be

construed as being in direct conflict with a consultant's expertise. This problem is related to the "informal" cooperation between industry and government mentioned in the previous section.

Finally, two contractors in New Brunswick were upset with the Department of Natural Resources and Energy initiating in-house programs that were formerly contracted out. A specific example was the decision to complete the 1:10 000 scale compilation maps of the Bathurst Camp within the Department, rather than contracting the work out as it had been done previously. The reason given was that the government could do the work less expensively, but there was considerable skepticism voiced that this would be the case. Additional concern was expressed about the provincial government establishing its own GIS program when there were at least two consulting groups in the province that were set up to handle this kind of work. If the government was concerned about providing this kind of output to the general public, then it would have been more cost effective to have contracted this work to one or both of these companies.

Conclusions arising from the discussions on contracting are as follows:

1) **Company respondents accept the concept of awarding geoscience contracts to consultants.**

2) **All regional geological mapping should be done by the government geoscientists.**

3) **Consultants had problems with lack of opportunity to bid on contracts, poorly defined specifications in some requests to bid, the awarding of contracts to out-of-province bidders and the perceived usurption of their business by government.**

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APPENDIX I - List of Questions

1) What use have you made of the geoscientific data produced during the past ten years through the DREE and MDA programs?

2) What type of this geoscientific data have you found most useful?

3) Would you be exploring where you are if this data had not been available?

4) Were you attracted to this province because of the quantity and quality of this geoscientific data?

5) Would you have gathered the base line data yourself had it not been available?

6) What would you estimate your cost savings have been by utilizing data collected by the government?

7) What would you estimate your expenditures have been in following up leads obtained from this data?

8) How much of these expenditures would have flowed to provincial contractors, suppliers and merchants?

9) Can you say that the use of this data has led to the discovery of a mineral occurrence? Of an important prospect? Of a mine?

10) Are you satisfied with the methods of delivery of the geoscientific data (open files, open houses, microfiche, computer discs, etc.)?

11) Do you have any suggestions as to how delivery could be improved?

12) Do you feel that industry should play a larger role in the selection of geoscientific projects?

13) Do you think that there may be a place for industry/government cooperative geoscientific projects involving interchange of information and personnel and funding by all participants?

14) Do you find that the individuals carrying out geoscientific studies are accessible and approachable at all times and are willing to discuss what they are doing?

15) Are you satisifed with the approach of contracting out geoscientific work to consultants and university researchers?

16) What would your reaction be to a severe reduction in the geoscience sector of future federal/provincial programs?

APPENDIX II - Narratives

RESPONDENT I

During the summer of 1976 a Calgary based company carried out an exploration program for uranium in a number of selected areas in Canada. The areas that were ultimately investigated were chosen after a review of available geological data throughout Canada in the winter months preceding the summer field season.

The individual hired by the company to supervise the overall program had international experience in uranium exploration and was intimately familiar with all of the different geologic settings which were conducive to the formation of economic concentrations of uranium (ore deposit models). Thus from the available data base he was able to recognize rock patterns and the occurrences of certain minerals which were clues to environments similar to those which he knew contained uranium in other parts of the world (generic exploration model).

This data base, although created before the advent of the cooperative agreements, was nevertheless produced by similar techniques. In the particular instance to which this account pertains, a geological mapping program carried out by the Geological Survey of Canada in central and western Nova Scotia between 1967 and 1969 culminated in the publication of a series of geological maps and an accompanying report describing features of the various rock types encountered during the mapping.

Most of the rocks within the area mapped were granites of one sort or another. These were all described in the report and their distribution shown on the maps. In addition, known occurrences of metallic and non-metallic minerals of possible commercial interest were indicated on the maps in their appropriate locations and described in the report.

From this information the respondent recognized a combination of features which was identical to an area in France which was noted for its uranium deposits, many of which had been mined since 1946. As a consequence, this area was included in those selected for the 1976 program, despite the fact that there were no known occurrences of uranium in the area.

The method of exploration used by the company consisted of mounting radiation detecting equipment in a helicopter and flying over the area of interest in closely spaced parallel lines and monitoring the radiation response on charts in the aircraft. An increase in radioactivity would produce a "spike" on the recording chart. Such a response was found south of Windsor. Subsequent ground follow-up located a showing of uranium-bearing minerals. This discovery led to the acquisition of mineral claims and progressively more advanced and detailed exploration.

The nature of the uranium deposits discovered (for there were many found) is essentially identical to those in France. The deposits could be economically mined under the right conditions. Unfortunately, today there exists a provincial moratorium on further development of, and exploration for, uranium.

KEY POINTS

1) It is highly unlikely that these deposits would have been discovered had it not been for the availability of fundamental geological data collected by the federal government.

2) The company spent over $3,000,000 from 1976 to 1983 in exploring and delineating the deposits and in additional exploration in similar geological environments in other parts of the province. This led to the establishment of a permanent regional office in Nova Scotia which is still there.

3) Virtually all of the money was spent in the province and was paid to various contractors and merchants many of whom were located in rural areas. The exploration work, at one time, provided permanent employment for 15 persons and at the height of the summer exploration programs, temporary employment for 30 persons, mainly university students.

RESPONDENT 2

In its exploration program during the past four years this company has made extensive use of geoscientific data produced by the cooperative programs and older information generated by the Geological Survey of Canada, the Nova Scotia Department of Mines and Energy and the New Brunswick Department of Natural Resources and Energy.

During the past two years the company's efforts have been concentrated in the specific geological areas of Nova Scotia where the primary target has been deposits of lead and zinc. In these regions selection of areas for more detailed exploration is greatly influenced by an appraisal of the available regional geological data in published government maps and reports. The selection process is further refined by analysis of regional geophysical and regional geochemical data sets, both of which are products of the cooperative geoscientific programs.

The company has indicated that they would not have had the resources to acquire all of this base line data, nor would they have had the experts to properly evaluate the geological data which was used by the government scientists to produce the regional maps.

The company would not hazard a guess as to what cost savings were realized by having the government data available. Expenditures, however, that could be attributable to follow-up of this data probably totalled $500,000 over the past two years. Most of these expenditures stayed in the province and were paid to diamond drill contractors, geophysical contractors, local suppliers, merchants and other businesses. In addition, the company maintains an office in the province with a staff of ten.

The respondent was cautious when asked if the use of the data had led to a discovery and preferred to refrain from commenting on this point.

The company is generally satisfied with the methods of delivery of the data both from the provincial and federal sides. There was minor criticism about delays in getting information out to users, especially with projects that were of three to five years duration. Preliminary maps could be a little more detailed.

There was some hesitancy to see a large role for industry in the selection of geoscientific projects. Advisory committees are sufficient. The real benefit of many of the projects lies in their fair degree of longevity whereas industry tends to act on a shorter wave length with differing year-to-year priorities. It would not be advantageous to see programs tied largely to the whims of the industry.

There is a place for industry/government cooperative projects in which there is exchange of data and funding by all participants. There are good examples in other parts of the world. Company interests have to be protected, though, and selectivity of projects is important.

The respondent finds that, for the most part, the individuals carrying out the geoscientific projects are highly accessible and are willing to help and share data. There was some concern expressed about contracting out programs to private consultants and university researchers. The main problem seemed to be the lack of proper supervision of some contractors and potential for abuse of sensitive information.

There was great dismay expressed with the thought that the geoscience sector of cooperative programs could be severely curtailed or eliminated. The respondent believed that industry must do everything possible to prevent that.

KEY POINTS

1) The accessibility of high quality regional geophysical, geochemical and geological data was an essential factor in the exploration process. The company's finances precluded it from contracting these surveys of such magnitude on its own.

2) The company estimates that it has spent in the order of $500,000 in exploration, the basis of which was derived, in large part, from the analysis of modern geoscientific information. The bulk of these expenditures stayed in the province. This figure does not, however, represent the total exploration expenditures in Nova Scotia for this period.

RESPONDENT 3

This respondent and his associates have been involved in the creation and execution of mineral exploration programs in Nova Scotia and New Brunswick for the past ten years. All of these programs have been operated on a syndicate or joint venture basis and are essentially grass-roots in nature. In a typical situation, geoscientific data from a selected area would be collected, compiled and studied. By superimposing various data sets (such as stream geochemistry, airborne magnetics, geology, and satellite imagery) specific target sub-areas are identified for initial prospecting and acquisition of mineral rights by staking.

In the case of a syndicate, a proposal for participation is marketed in the exploration community. As a rule, three or four partakers are sought who will share the costs of the ensuing exploration program. This approach provides some exposure for both senior and junior mining companies that are not active in the province and is an excellent method of attracting new blood.

The backbone of these initiatives is the geoscientific data base provided through the cooperative mineral agreements. It is fair to say that if this information was not available, these programs would not exist. In a recent compilation in a specific area of Nova Scotia, it was important to be able to distinguish amongst various types of granitic rocks because the respondent's research had indicated that the likelihood of economic mineralization was much greater in areas near a specific variety. This differentiation was accomplished by utilizing recently released federal MDA airborne radiometric data in conjunction with provincial research into the actual age of the rocks. The results provide a cohesive and compelling picture, one that should have relatively little problem in attracting participatory exploration dollars.

It would be financially impossible for this respondent to have gathered this data by conducting his own surveys.

During the flow-through era, on a project along a major crustal structure in northern New Brunswick, the savings to the syndicate by being able to use the data base were "hundreds of thousands of dollars" and between one-quarter and one-third of the exploration budget was spent on following up on specific leads generated by the government data. Approximately two-thirds of the total expenditures flowed to local contractors and suppliers.

The program described in the previous paragraph led to the discovery of a significant gold deposit and eventually to the establishment of a permanent exploration office for one of the syndicate participants. One must estimate that several millions of dollars were expended from the inception of the program to the present. This can all be credited to the discovery of the gold deposit in an exploration program wholly based on evaluation of the geoscientific data base collected during the cooperative MDA program.

The respondent is pleased with the style, manner and timeliness of the delivery of data to the users and has no suggestions as to how it could be improved.

It is the respondent's opinion that industry should have nothing to do with the selection of geoscientific projects. He also feels that cooperative projects amongst industry, government and universities should be feasible but sees no evidence that they have worked in the past. Emphasis should probably be on regional programs, rather than on specific details.

In general individuals carrying out the geoscientific programs are approachable and are willing to discuss what they are doing. Concern was expressed over the policy of contracting work out to the private sector in that the respondent felt that there should be more screening of potential candidates and the work should be regularly monitored and more rigorously supervised.

The respondent felt, at least in the areas he had researched, that there was sufficient data and expressed the opinion that the exploration industry really hadn't caught up with it. These comments referred specifically to the regional data (airborne magnetic and radiometric surveys, regional geochemistry, etc.). There now should be a period of assessment and compilation of the data into synoptic maps that would be of benefit to the exploration geologist, particularly one who is resident outside the provinces of Nova Scotia and New Brunswick. From this work may arise specific, detailed field projects in critical areas.

KEY POINTS

1) Availability of geoscience data has allowed the respondent to formulate exploration programs which have attracted participants and dollars to Nova Scotia and New Brunswick.

2) An important gold discovery was made on one of these programs. This resulted in the establishment of an exploration office by one of the participants in the discovery. Considerable exploration was subsequently carried out from this office and the majority of this stayed within the province.

RESPONDENT 4

This respondent is president of a junior mining company that has been able to attract investment to Nova Scotia by marketing a viable base metal exploration play to a major mining concern. In this particular situation, the company had acquired the claims on the basis of known information.

In addition to the claims cited above, the president, who is also a geologist by profession, has, for the past five years, researched areas in which his company could become involved. This is an ongoing exercise. The respondent indicated that he used the geoscientific data produced under the cooperative agreements "every day". He found that the most useful data were the airborne magnetic data, the lake and stream geochemistry releases and both the recent and pre-MDA geological maps and reports.

In the case of the claims mentioned in paragraph one, the geological maps produced by the Nova Scotia government, were of sufficient detail and accuracy to allow the respondent to identify significant features which were characteristic of the geology of deposits elsewhere in the world which occurred in the same kinds of rocks (ore deposit model, as described on page 5). Thus, in connection with the occurrences of base metals within the claim group, the project was saleable, especially to companies which were also familiar with the characteristics of these kinds of deposits.

Both the airborne magnetic data and the stream geochemistry, used in conjunction with the geology, were valuable in pin-pointing specific areas for more expensive ground geophysics. The respondent suggested a figure of no less than $250,000 which his company would have had to spend, if this data had not been available in the public domain. The respondent wanted to make it clear that it was not the MDA work which attracted them to the area, but that it was useful after.

In other areas in Nova Scotia where this company had worked, in one case, claims were acquired on the basis of old historical data, and the MDA work in the general area was not of sufficient detail to provide any additional geoscientific insights as to the nature of the mineral deposits staked. In another situation, claims were staked on the basis of gold anomalies in stream sediment samples, analyses of which were released in a report by the provincial government.

About 90 percent of the exploration expenditures caried out by this company flowed to provincial contractors and merchants. The respondent did not indicate what the level of expenditures was.

The respondent indicated that he was satisfied with the manner and timeliness of the delivery of results of the geoscientific programs.

When asked whether or not there should be more industry involvement in the selection of programs, the respondent considered this a tough question in the sense that suggesting programs that might be undertaken would alert competition to what his company may be interested in. With respect to industry/government/university cooperatively funded programs, there was qualified acceptance but it would depend to a large degree on the specific situation and the company's stage of exploration if asked to participate.

The respondent had no specific concerns about the contracting out of projects, other than they should be monitored. He also suggested the possibility of mining companies actually carrying out research programs partly or wholly funded by government funds.

When asked about his feelings should the geoscience sector of future MDA programs be severely curtailed or eliminated, he felt that governments were in a tight financial position but that there should be some minimal level of funding.

The respondent added:

1) That there should be catalogues and compilation maps produced so that the interested users can determine quickly just what data is available for a particular area.

2) Now that the Department of Mines and Energy has been rolled into the Department of Natural Resources, the government should think seriously of establishing regional geology offices within the far-flung Lands and Forests offices.

KEY POINTS

1) The availability of airborne magnetic and gradient data was instrumental in allowing the company to target specific areas for detailed ground follow-up.

2) The geological reports and maps of the area which were produced by the provincial government under the cooperative program were of sufficient detail so as to allow the respondent to identify specific features common to the type of deposit for which he was searching. This information was instrumental in attracting exploration capital from outside the province.

RESPONDENT 5

This respondent is Manager of Exploration for a small junior mining company active in both metallic and non-metallic exploration. The period covered is the past three years. Almost all of the company's work is in Nova Scotia with a small amount in Newfoundland. There has been no activity in New Brunswick.

The respondent uses geoscientific data produced under the cooperative agreements on a regular basis. He has found that the most useful information is the regional geological mapping, regional stream geochemical surveys and airborne magnetic/gradient surveys. In the case of industrial minerals, he is pleased with the reports produced on barite, gypsum and aggregate materials and feels that there should be more of this kind of documentation. He also finds that the geological maps of the limestone-bearing basins are of great use.

With respect to the metallic mineral exploration programs, claims were staked on the basis of recently completed regional geological mapping in conjunction with the use of airborne magnetic-gradient data. The respondent indicated that his company would not have been active in that area if the data had not been available and that its existence represented a savings to this company of $250,000. The exploration mounted on these claims amounted to $500,000, all of which flowed to provincial contractors and merchants. In this situation - no data, no expenditures, and the company funds would be spent elsewhere possibly in another province or outside Canada.

When asked if the use of the geoscientific data had led directly to the discovery of a mine, the respondent stated that drilling done by the Department of Mines and Energy on a limestone deposit in 1963-64, the results of which were reported in a government publication, was responsible for the acquisition of the property some twenty years later. This deposit is now on the verge of production. This is a good example of the longevity and usefulness of geoscientific information; that this data is not being collected to satisfy short-term objectives, but is required to provide a solid data base which can be used well into the future by exploration companies and individuals.

The respondent is satisfied with the delivery of the data to the public.

Strong support was given to the suggestion that industry should play a larger role in the selection of geoscientific projects. The respondent felt that too much emphasis was being placed on "pet projects" of the government geologists which were of little use to industry, that there were not enough base-line studies and that industry wanted the "facts" and not an interpretation of the data. Support was also given to the concept of industry/government cooperative programs with funding from both sides.

The respondent indicated that he had experienced no problems in approaching the geoscientists responsible for specific programs, and found that they were generally helpful. He had heard, second hand, of a situation in which a particular worker had considered the data his own and would not discuss it.

Displeasure was expressed about the lack of contracting out of work in Nova Scotia by the

provincial government. The respondent felt that too much work was being done "in-house" by the same people with the same ideas. Private contractors and university people bring fresh ideas to the projects. "We're not getting the best bang for our buck." It was intimated that proposals for work sent to the provincial government by independent geologists seem to be ignored and that there was a perception that some of these ideas may have been incorporated into the government programs.

The respondent would be very disappointed if funding for the geoscientific programs was severely curtailed or eliminated. There are geologists on staff doing excellent mapping and it would be a shame to see this work come to a stop.

In additional comments, it was suggested that more compilation work is needed. For example, there is not a decent data base for lead/zinc deposits and occurrences in the province. A few major deposits are being described, but there are no comprehensive descriptions of other numerous prospects.

KEY POINTS

1) About $500,000 in expenditures, most of which flowed to provincial contractors and merchants, would not have occurred if it had not been for the availability of geoscientific data upon which the respondent based his staking and ensuing exploration program.

2) The acquisition of a limestone property, which is about to go into production, on the basis of 20-year old geoscientific information attests to the usefulness of the data over long periods of time.

RESPONDENT 6

This respondent is Regional Exploration Manager for a large multinational, vertically integrated mining company. His responsibilities include the conception and supervision of exploration programs for base metals in Atlantic Canada. The company has been active in both Nova Scotia and New Brunswick. The work is directed from a regional office in Nova Scotia which presently has a staff of ten geologists and support people. This report covers the past five years of activity.

The company geologists have made extensive use of the geoscientific data delivered through the cooperative agreements. In one area in Nova Scotia the company relied mainly on confidential data from past work which they had in their files. In this specific area, it so happened that there was no modern airborne magnetic/gradient coverage. As a result the company was forced to acquire this data by contracting its own survey. The area covered was considerably smaller than the area covered by the gap in the data and it was difficult to integrate the resulting data with that from government sponsored airborne surveys adjacent the uncovered area. The cost of the survey was $40,000. A recent research program awarded to a private consultant under the cooperative agreement dealt with the details of the rocks hosting the base metal deposit under investigation by the company . The respondent felt that the information received from this project was useful.

Elsewhere in Nova Scotia, in one area, the company actively supported a recent geological mapping program designed to provide more detail in an area of considerable mineral potential. In general, the respondent expressed some concern about not being able to get geochemical analytical data in a compatible computer format so that his staff could massage the data to its own satisfaction.

In New Brunswick the company made extensive use of the MDA-produced airborne magnetic/gradient and VLF surveys in developing a conceptual model for the potential occurrence of base metal deposits. Used in conjunction with recent government geological maps and the company's private data base, the company staked large blocks of claims and pin-pointed areas for their own, more detailed airborne geophysical surveys . In addition, use of the regional stream geochemical data led to the option of a claim group from a local prospector.

In another area of New Brunswick the company made extensive use of 1:10,000 compilation maps of all geotechnical data. These maps were produced by an independent geologist in a contract issued under the cooperative agreement. The company also made use of reprocessed airborne magnetic/gradient data compiled by an outside contractor from magnetic tapes acquired from the government.

In the province as a whole the respondent made

frequent use of the digitized mineral occurrence data.

When asked about what kind of geotechnical data his company found most useful, he felt that they were the high quality airborne magnetic/gradient data and the regional geological mapping. Compilation work is usually done in-house, but if it is available in the public domain, it is useful. He felt, also, that mineral deposit studies were not of specific value.

The respondent estimated that the savings to his company because of the availability of all of this data was in the order of $1,000,000 per year; that about 33 percent of his budget was spent following up leads obtained from MDA data; and that ninety percent of their expenditures flowed to provincial contractors and merchants.

Use of the data has led to the discovery of mineral occurrences, but not to the definition of an important prospect or mine.

The respondent is pretty satisfied with the ways in which the geoscientific data is delivered to the public. He feels that there could be some improvement in centralizing distribution.

When asked about industry input to the selection of topics for geoscientific study, the respondent was of the opinion that there already existed enough input and added that he felt that governments may have been following industry too closely and, as a consequence, some projects were short-sighted. Concentration should be on complete coverage of the provinces with the objective of providing a data base that can be consulted by a generation of explorationists. He was supportive of industry/government cooperative projects and cited several cases where his company was already involved in such ventures. He would appreciate doing this kind of work on a more formal contractural basis so that industry would receive more recognition for its input.

There were no complaints about accessibility and approachability of geoscientists carrying out the projects.

The respondent appeared to favour work done in-house by the government agencies, except in cases where specific expertise was needed. He felt that it was impractical to have experts in all geoscientific fields housed in these agencies. His company would probably not have been so cooperative with potentially competitive contractors as it was with government and university geoscientists.

The respondent stated that if the geoscience sector of future cooperative agreements was severely curtailed or eliminated, then this would be a clear sign that the government does not want mining in Canada and would like the resources left in the ground.

In additional comments, concern was expressed about the high overheads in administering the cooperative agreements and the perceived lack of efficiency in their operation. More and more money is being tied up in negotiations, arguments and discussions which he felt were largely negative to the intent of the Agreements. He suggested the process could be streamlined and added that the best solution was just to hand the agencies their allotments directly and to get on with the job.

KEY POINTS

1) It is clear that this respondent's exploration expenditures would have been considerably less had it not been for the availability of government-generated geoscientific data.

2) Regional geological mapping and airborne magnetic/gradient surveys are the most useful geoscientific data.

RESPONDENT 7

This respondent represents a major international mining and exploration company which has returned to New Brunswick after an absence of some years. He is responsible for carrying out his company's exploration program and has established a field office in the area.

Preparatory to launching his program, the respondent reviewed all pertinent data published by both the federal and provincial governments and assembled compilation maps of the geotechnical information. The most important data included stream silt geochemical analyses, airborne magnetic surveys and detailed compilation maps produced by

the provincial government.

The availability of these data has allowed the company to focus its exploration; they have provided a basis against which to judge the merits of potential options; and there is sufficient detail to enable the company to test its ore deposit models. In addition, an important stimulus to the entry of this company into this area, was a computerized geotechnical compilation produced by a provincially-based consultant, in which areas of superior potential were outlined. This compilation was achieved through the use of modern geotechnical information produced under the MDA programs.

The company also staked a large block of claims on the basis of new geological mapping by the federal government which identified favourable rock strata in an area where previous mapping showed relatively uninteresting geology. The importance of this new mapping was stressed and the low government budget directed towards it was criticised.

The respondent indicated that his company was attracted to this particular part of the province because of its history of mining and not because of the abundance of geotechnical data. As mentioned above, however, these data allowed for focussing its work.

The respondent could not estimate the cost savings to his company by having these data available, but was able to say that about $300,000 to $400,000 were spent on follow-up of clues received from its studies of the information. Virtually all of this expenditure flowed to provincial contractors and merchants.

Use of this knowledge has not led directly to a discovery, but was instrumental in guiding the company into the correct area.

The respondent felt that the program of 1:10 000 scale compilations of geotechnical data in mineralized areas should be completed. It was also his opinion that publication of geological data was not as timely as it could be; that too much emphasis was placed on producing the information in scientific journals, and that the details were not forthcoming. Another concern was with the lack of updated topographical maps of his area. Many of those in existence are over twenty years old and do not show today's roads, etc. Acquisition of aerial photographs was also a problem.

A definite role is seen for a strong industrial advisory committee within the MDA structure. He felt that cooperative projects involving government, industry and universities were fine, as long as benefits were immediately available to the public. He thought that contracting out government geoscientists to major companies for in-house work wouldn't fly.

He felt that all those involved in the collection of data were cooperative and extremely helpful and he was supportive of the contracting out of MDA projects to private consultants and university researchers.

In the respondent's view, the geoscience sector of the MDA programs is the most important sector.

KEY POINTS

1) Although this company was attracted to the area by its mining history, it was the presence of quality geoscientific data that allowed for proper focus, and that without this information the company's efforts and expenditures would have been significantly less.

2) There is a need for continued detailed geological mapping in areas of mineral potential.

RESPONDENT 8

This respondent is a consulting geoscientist based in New Brunswick and has been intensively involved in mineral exploration in that province for the past 25 years.

The respondent makes extensive use of the airborne total field magnetic data, produced by the federal government, and geological maps published by both the federal and provincial governments. It is his opinion that the Bathurst district, for example, would be ten years behind its current development without this new aeromagnetic information.

The respondent pointed out at least three specific examples in which his compilation work, presented in a computerized GIS format, was instrumental in attracting out-of-province companies to the province

during the past two years. The combined expenditures by these companies is over $1,000,000. Much of this was paid out to provincial contractors and merchants and to individuals hired by the companies as technical support.

He couldn't say that the use of this data has led directly to a discovery, but he did point out that, as a result of his modelling described above, claims were staked in a particular area and subsequent field work unearthed zinc and lead mineralization.

The respondent felt that, in some cases, the output of data was not consistent with the amount of monies expended to collect this data. He cited one case in which the published results from a project that cost over $200,000 to complete appeared to represent much less work. He was also of the opinion that data, especially geological, wasn't readily available to the public.

Several points were made with respect to improvement of data collection and delivery. He recommends that a monitoring system be introduced that insures quality and timeliness of projects whether performed by provincial or federal agencies, or by contractors. He feels that the provincial agency seems to lack focus and mandate and suggests that they formulate a five-year plan, after due deliberation, and stick with it. He suggested that the stream silt geochemistry contracts issued by the federal government could be improved, in that the specifications for the contracts are not tailored to the survey areas. He also feels that as much data as possible should be made available in digital format.

There is a need for more detailed geological mapping, particularly in the Bathurst district. Older maps simply do not provide the detail necessary for proper interpretations.

The respondent feels that industry should have input into proposed geoscientific programs, but not the final say. He envisages a weighted committee with representation from the federal and provincial governments and from industry. Industry should be prepared to support programs that are of value to the province and not necessarily to industry. Governments should also be prepared to undertake projects which industry sees as critical.

Concern was expressed about the possibility of cooperative projects amongst government, industry and universities. He felt that such ventures would not be readily available to small companies and prospectors. He cited, as an example, a cooperative project between a New Brunswick university and a large mining firm in which he thought government money was involved. The project included line-cutting, ground geophysics and soil surveys. None of this work was contracted out. He went on to say, that the university was able to develop and finance equipment and expertise which put it in direct competition with established consulting and contracting firms already present in the province.

The respondent has no complaints about the cooperativeness of individuals involved in the geoscientific projects.

The respondent feels, as a contractor, that he really has not had much opportunity to bid on many contracts for which he has the necessary experience. He is particularly concerned about the provincial government direction to do more things in-house. For example, he mentioned the fact that the government was now producing detailed compilation maps of the Bathurst area, whereas previously, this work had been contracted out.

Loss of funds for geoscience under the MDA programs would mean that provincial projects would die. It is essential that good geological mapping be continued and that airborne magnetic surveys be completed for the province.

KEY POINTS

1) The respondent's compilation and manipulation of MDA-derived geoscientific data played a major role in attracting major exploration companies to the province resulting in expenditures of over $1,000,000 in 1991. It is fair to say that all of these companies may not have been present had it not been for this data bank.

2) Expenditures for geoscience could be better directed and monitored.

RESPONDENT 9

This respondent is a geologist with a large, international, vertically integrated mining and exploration company. He works out of an office in New Brunswick where his main responsibility is the generation and scientific appraisal of exploration programs in New Brunswick and Nova Scotia. In that capacity he works with, and is knowledgeable of, the total range of geoscientific information produced under the Mineral Development Agreements in both provinces.

The respondent indicated that he uses the geoscientific data every day. There are not many reports published that don't have some relevance to his research. Release dates are tracked closely and, based on the information contained, the company will stake aggressively.

Geological maps are the most important product of government programs. The respondent makes use of both historic and modern maps of regional and detailed scale. Airborne magnetic and gradient maps are also important and these surveys should be extended in a systematic way so that the two provinces are totally covered. The dating of rock units has also been of great use in assessing the geological potential of an area to hold mineral deposits. More of this should be required during mapping programs.

The respondent indicated that there was enough of a history of mining in the Maritimes that his company would have a presence regardless of the availability of the geoscience data. But he added that they would be a long way away from spending the kind of money they have in the past ten years. Good government maps allow the development of good generic exploration models that make it easier to convince management that money should be spent in a particular area. Regional and local correlations of rock units allow for expansion of programs along the trend from known occurrences. For example, recent geological mapping by the provincial government in southern New Brunswick, combined with age-dating techniques, has resulted in a recognition of the enhancement of the mineral potential of the region. Similar examples can be found elsewhere in New Brunswick and Nova Scotia. The company has allocated $500,000 to follow up on some of these MDA-prompted leads.

It was stated that there was no way in which the company could have embarked on a program to gather all of this data by itself. It would have taken decades and the end result would have been an incoherent assemblage of data which would defy attempts at correlation.

The respondent indicated it was difficult to estimate the amount of money that was saved by the company by utilizing government-generated data. However, it is clear that this is substantial. Expenditures outside the Bathurst district are almost all predicated on analysis of geoscientific data, especially geology and assessment files. Ninety-five percent of exploration expenditures flow to provincial contractors and merchants as well as to company staff based in New Brunswick. The total money spent has exceeded $37,500,000 during the past five years. An additional $1,500,000 to $2,000,000 per year has also been spent by a subsidiary company during this period. Much of this work has been directed towards follow-up of ore deposit models based on government-derived data.

Follow-up of leads obtained from the geoscientific data has led indirectly to the discovery of a lot of prospects because the company had entered the area on the basis of appraisal of the data.

In general, the respondent is satisfied with the methods of delivery of the geoscientific data. He suggests that the project descriptions in the yearly Reports of Activities could stand substantial improvement especially by including maps and more details pertaining to the work. The aim should be that these reports, interim or otherwise, should be as close to publication quality as possible. A good model would be the annual report of activities (Current Research) published by the Geological Survey of Canada. This is especially the case in situations where a worker may be reporting on a five-year project. It is only at the end that a detailed report may be available and, indeed, in some cases, these reports are not written at all because of the loss of the project leader due to termination of an MDA employment contract. Some cases were cited in which final reports had to be patched together by A-base personnel from notes and sketches left by the departed geoscientist.

The primary emphasis of the geoscientific work should be on systematic regional mapping, keyed to

the 1:50,000 topographic index, in which various levels of data are collected for each area. This would include geological, surficial, geochemical and airborne geophysical information. The resulting publications are then useful to a variety of additional clients such as construction engineers, environmental geologists, foresters, municipalities, etc. Esoteric work like isotope studies is better left to the universities.

The respondent does not see a large role for industry in the selection of geoscientific projects. Some consultation is necessary, but if the governments adopt the policy of regional mapping, such as described in the previous paragraph, the programs should flow smoothly from area to area.

In certain circumstances he sees some merit in cooperative government-industry-university programs. At present, however, he feels that there is a complete lack of cooperation between New Brunswick universities and the Geological Surveys branch of the Department of Natural Resources and Energy. He suggests that the imminent establishment of an exploration sector under MITEC may be the solution to better working relationships.

The respondent finds that, in most cases, the individuals carrying out the geoscientific projects are approachable and are of help.

There is no problem in using contractors to carry out selected geoscientific projects as long as the resulting work is timely and of high quality. Both provinces have capable people that could be used. One problem that he sees relates to the potential of the contractor becoming involved in competition and that he would have an unfair advantage. Governments should be able to enter fields thought by contractors to be their exclusive domain as this is one of the ways that the individual prospector and small companies can benefit from technical advances.

The respondent would consider it tragic if the collection of geoscientific data was eliminated. It would be a blow to the mineral industry. He compared the relative lack of exploration activity in Maine and New Hampshire where geoscientific data bases are feeble in comparison with that in New Brunswick where the rocks are similar. New data spawn new ideas and resurgent exploration.

KEY POINTS

1) Geological maps are the most important geoscientific outputs.

2) Levels of exploration expenditure by this company would be well below current amounts without the extensive government-generated data base.

3) Approximately $500,000 will be spent on new projects in New Brunswick and Nova Scotia in 1992. These projects were generated on the basis of analysis of recent geoscientific data produced under the MDA agreements.

4) Governments should concentrate on completing regional geoscientific maps which would include geology, surficial geology, airborne magnetic/gradient data, geochemistry, etc. This information is then available to many users.

RESPONDENT 10

This respondent is a geologist for a multinational, vertically integrated mining and exploration company. During 1991 his company became active in New Brunswick and he was assigned the task of managing its exploration program.

The respondent indicated that he was on the steep portion of the learning curve and that the available published geoscientific data was making his job a lot easier. At this stage he has found that the geological maps and reports have been most useful. He is aware of other information which will add to his knowledge base, but hasn't had a chance to fully digest this material.

He indicated that his company was interested in the region and that a consultant's analysis of geoscientific data, particularly the airborne magnetics, played an important role in convincing them to acquire the claims that they have.

The respondent sees a role for industry consultation in the selection of geoscientific projects. He also feels that cooperative government-industry-university projects would be appropriate in the right situation.

He was extremely pleased with the cooperation and help given to him by the geoscientists involved in the MDA programs and stated that this was an important part of his learning process.

No problem was seen with contracting out geoscientific projects except for regional geological mapping.

KEY POINTS

1) Analysis of geoscientific data by a consultant attracted his company to the area.

2) Availability of the data, particularly the geology, has been of key importance in this respondent becoming familiar with the potential of the area in a relatively short period of time.

RESPONDENT 11

This respondent was exploration manager for Atlantic Canada for a multinational, vertically integrated mining and exploration company. In this position he supervised exploration programs for gold and base metals in New Brunswick, Nova Scotia and Newfoundland from a base in Nova Scotia. The comments that follow apply mainly to Nova Scotia.

The respondent indicated that in the mainland part of Nova Scotia most of their exploration was centered around historically-known gold deposits and that the regional geoscientific data available was of little help to the detailed nature of their work. On Cape Breton Island the company initiated a gold exploration program largely on the basis of a 1970's stream silt geochemical release. During their program the company carried out its own regional stream geochemical surveys, geological mapping and airborne magnetic and electromagnetic surveys.

Regional geological mapping is the most important geoscientific function under the MDA programs.

During their programs in Nova Scotia, the company hired Nova Scotia personnel and contracted most of their line cutting, diamond drilling, etc. to provincial firms.

The reports produced under the MDA are of good quality.

The respondent was of the opinion that industry liaison with the government had not been fruitful in that suggestions made "went in one ear and out the other". He felt that there was too much bureaucracy in the process, especially at the federal level.

He saw little evidence that the federal government, in particular, would welcome cooperative programs with industry and cited an example in which he had requested, and offered to pay for, some specialized expertise from the Geological Survey of Canada to help out with a particular geological problem, but was turned down. There was much more cooperation of this sort with the provincial government.

The respondent indicated that he would not be too upset if the regional geophysical and geochemical programs came to an end and stressed again the critical importance of continued geological mapping. He added that some money should be directed towards the importance of Nova Scotia's mineral endowment to the tourist industry . There are many occurrences of semi-precious stones valued by amateur collectors and there are several geological areas that would be of interest to tourists. A series of brochures or a provincial guidebook should be prepared as an aid to those who may like to pursue this subject.

KEY POINTS

1) This respondent has not made extensive use of the geoscientific data.

2) Regional geological mapping is the most important function of a geoscientific program.

RESPONDENT 12

These respondents are principals of a consulting/contracting company based in New Brunswick. They have been active in the energy, industrial mineral and exploration fields for over ten years and have had a variety of clients during this period.

The respondents indicated that they use the geoscientific data on an ongoing basis and that this information is essential to the work they do for their clients. They have found that the most useful data is bedrock and surficial mapping although they have also made use of geochemical and geophysical releases, peatland inventory and the results from the Carboniferous Drilling Program.

They will often do work for a client that doesn't have staff or expertise in an area. A lot of this kind of work has been targeted on industrial minerals, exotic commodities, water, fuel, aggregates and building stone.

They found it difficult to quantify cost savings due to the presence of the data. They supposed that there would be considerable savings to their clients by virtue of the fact that information is readily available in usable formats. An example cited was the situation in which an offshore company wanted to know if there were potable ground water sources that satisfied a list of criteria. Two data files had been produced by the New Brunswick government that contained exactly the information required and confirmed that there were sources that met the inquirer's standards. As a result, there is the potential for a significant investment in the province.

The respondents pointed out that they don't spend their own money but that of their clients. This averages about $400,000 per year. About $75,000 of this would go to provincially-based geochemical and geophysical contractors. The bulk of the remainder is tied up in local salaries and expenses.

Work for a client on the peatlands data released under both the New Brunswick and Nova Scotia MDA's has resulted in at least three new operations having gone into production.

The respondents are reasonably satisfied with the methods of delivery of the geoscientific data particularly in Nova Scotia where certain information is available through Precision Microfilming. They find that delivery in New Brunswick is slower as it is done in-house. They were also critical of the requirement of up-front cash in New Brunswick when ordering publications and suggested that the use of credit cards would alleviate this situation.

Industry should make an attempt to have more input when new geoscience projects are being proposed. Their feeling was that governments tended to ignore industry suggestions and they hoped that the committee now in place would have more success than previous ones.

The respondents could visualize cooperative projects on a broad basis where proprietary company information would not necessarily delay publication of the results. It was pointed out that there is very little cooperation now amongst the Department of Natural Resources and Energy, the provincial universities and the Research and Productivity Council, all of whom work with and produce geoscientific data. A role for industry may be to pull these groups together.

Geoscientific investigators working under the MDA programs were found to be accessible and cooperative.

In the past, the respondents' company had their share of contracted work from the governments. There is not enough money now to spread around. Concern was expressed also about the New Brunswick Department of Natural Resources and Energy developing in-house programs to supplant the kinds of work previously contracted out. Specific examples included the initiation of its own GIS system and detailed compilations of the Bathurst district.

The respondents think it would be a mistake to eliminate or seriously curtail the geoscientific work being carried out under the MDA's. They suggest that there could be a better definition of what should be accomplished and that some realignment of priorities may be necessary. The gathering of basic geoscientific information is of paramount importance. The perception that once an area has been mapped, no further work is required, is an illusion that has been proven false on numerous occasions. It was also pointed out there is an unknown quantity of unpublished data sitting on the shelf at DNRE and that the evaluation, cataloguing and publication of this information should receive top priority before any other plans are made.

KEY POINTS

1) Intensive use of the geoscientific data by this company has indirectly led to yearly expenditures of $400,000 by its clients.

2) Bedrock and surficial geological maps are the most useful geoscientific data.

3) These respondents have made use of a wide variety of published data and that some work done years ago may have relevance today, especially unpublished data resident in government files.

RESPONDENT 13

This respondent is manager of New Brunswick exploration for a junior exploration and mining company. He is responsible for the generation and management of exploration programs mainly in northern New Brunswick where the company maintains an exploration office with a staff of four.

The respondent makes use of all geoscientific data produced under the MDA agreements. Of most value are the geological maps, particularly the more detailed versions which have resulted from recent mapping projects. New exposures of rock, for example along lumber roads, often lead to new ideas and new interpretations of the geology. Regional stream silt geochemical data is important, particularly in the new releases where more elements are analyzed. Of equal importance are the airborne magnetic and gradient maps. Surficial geology maps have been used by the mining division to locate construction material and the recent publication of till sampling maps has been welcomed.

The company is exploring in northern New Brunswick because of its mining operation and it was pointed out that if the mine had not been there, then there would likely be no exploration. The importance of the geoscientific data becomes apparent when one is in the area.

The company would not have had the financial resources to have gathered the data themselves, nor would they have had the time to do it. If the data had not been available, there would be no exploration. The cost savings to the company by having this data is probably equivalent to the cost of having collected it.

The respondent estimates that between $500,000 and $750,000 has been spent yearly on exploration related to follow-up of MDA-generated geoscientific publications. About seventy-five percent of this would have flowed to Maritime diamond drill contractors.

The respondent indicated that the use of this data had a substantial role to play in the recent discovery of an important deposit of lead and zinc in an area previously thought uninteresting for the occurrence of mineral deposits. The company was initially attracted to the area by a stream silt release and while there recognized that the rocks may be favourable for hosting ore. Subsequent geological mapping by the New Brunswick government confirmed this impression and uncovered outcrops of highly altered rocks that are often found in close proximity to ore bodies. Additional work by the company in the immediate area of this alteration eventually resulted in the lead/zinc discovery in a drill hole.

In another situation the company was attracted to an area, again by examination of government geochemical data and airborne magnetic maps. This follow-up resulted in the discovery of a mineral occurrence in highly altered rocks. Recent geological mapping in this area has identified a specific "favourable" rock unit associated with the mineral occurrence. The point made here, is that this area had been mapped in the past at a time when access was extremely limited and the importance of certain rock units was not recognized.

The respondent is generally satisfied with the delivery of the geoscientific data but had a few points to make. In the first place, it is his opinion that the release of geochemical data is becoming too geared to computer formats and that it is difficult for individuals who do not have the necessary hardware to get the data in a form which is readily useable. A second suggestion was to change the scale of the two-mile-to-the-inch claim maps to 1:125,000 which would be more consistent with metric scales on other maps.

The respondent seemed satisfied with the role that industry has in the selection of geoscientific projects. Much of what is presented by government is technically sound. He recognizes the fact a smaller amount of money must be spread through the system.

He felt that cooperative projects between industry and government would be beneficial and went on to

add that there have been a number of situations in the past year or two where his company and government geologists have cooperated on specific topics. Normally these are informally arranged and are of mutual benefit. Perhaps it would be advantageous to introduce a little more formality to this system.

The respondent enjoys good relationships with the geoscientists and wishes that the GSC geologists were a little closer. He would like to see more access to projects while in progress.

With respect to contracting out work, the respondent sees no problem with quality of output. He does have some concern about awarding contracts to out-of-province bidders, when perfectly competent contractors exist in New Brunswick. He feels the federal government should be more discerning in their selection.

"Disastrous" was the comment when asked what his feelings would be if the geoscience program was eliminated. Industry would be stagnated. It is difficult enough now to attract new companies to the province. Elimination of further geoscientific work may signal a reluctance on the part of the province to support the mining industry. The objective of the MDA is to assist in finding mines and creating wealth. Clearly defined objectives are required. The better the climate created, the more competitive the industry will be.

KEY POINTS

1) Follow-up of geoscientific data has led to the discovery of an important, new lead/zinc deposit.

2) Geological maps are the most useful of the geoscientific data produced, followed closely by geochemical and airborne magnetic/gradient maps.

RESPONDENT 14

This respondent is a geologist employed by a company that has primary interests in industrial minerals. He is located at the head office which is in Nova Scotia.

The respondent often uses data produced under the MDA. With respect to output from the geoscience component he has found that the surficial maps are of most use especially in the search for aggregate deposits. Less use is made of the regional geological maps; airborne geophysical data and geochemical surveys are of little help.

The respondent is especially pleased with the detailed work carried out under the Economic Development sector of the MDA. His company has made good use of the aggregate studies carried out in the Cumberland Basin where substantial deposits of gravel were identified. The publication on gypsum deposits of Nova Scotia has been very helpful in the company's feasibility study of one of its deposits.

The purchase of the Kline reports under the last MDA was considered to be an excellent move. These reports deal in depth with individual industrial minerals many of which are found in Nova Scotia. These reports are being updated.

The respondent indicated that his company had spent $45,000 on assessment of the gravel deposits indentified in the Cumberland Basin report and has earmarked another $25-$30,000 for continued work in 1992. Considerable sums have also been spent on the gypsum project.

He finds that the geologists and other personnel within the Department of Natural Resources sector responsible for industrial minerals are extremely cooperative and helpful.

The respondent indicated that he would be upset if this kind of work was discontinued under future MDA's. With respect specifically to the geoscience sector, more surficial maps would be useful.

KEY POINTS

1) The surficial geological maps are the most important product of the geoscience sector, with respect to the respondent's interest in industrial minerals.

RESPONDENT 15

This respondent is Vice President of Exploration for a junior mining and exploration company and is also an independent consultant and contractor. He is based in New Brunswick and has had over twenty years experience in that province.

The respondent makes extensive use of the geological, geochemical and airborne magnetic and radiometric data. Geological maps are to the exploration industry as road maps are to the tourist industry. Both are essential to get around and both need to be continually updated.

Geological maps are probably the most important. He feels that the governments have fallen behind in updating and/or remapping critical areas. He points out that access to many areas has been vastly improved in the past ten years because of widespread lumbering activities. He cited one example where he located three new base metal showings along a new lumber road in an area he himself had mapped fifteen years previously. In addition, new concepts on the origin of mineral deposits and the importance of the recognition of certain rock types associated with the deposits make it essential that the geology is revisited.

Stream silt geochemistry is also of great help in targeting areas for further work. The airborne magnetic and gradient data have been especially useful in the Bathurst District. These types of surveys should be expanded. The availability of core from previous drilling programs, stored in government facilities, is of great benefit.

The respondent wondered how anyone could possibly explore without this data. Small companies and independent prospectors require it to be operative and it would be cost-prohibitive for even the major companies to attempt to collect this information for their own account. He indicated that he starts his work where the MDA finishes.

He found it difficult to estimate just how much money would have been spent directly following up leads from the release of geoscientific data. He felt, however, that a large percentage of his budget would have been expended indirectly on the basis of the presence of this information. Assessment data is also important and very often the work recorded in these files was done because government geoscientific publications led that company into the area. Another point made is that one cannot put a time-limit on some of the analytical data. For instance the respondent indicated that, on three separate occasions, over three decades, he had followed up geochemical data released in 1966.

About ninety percent of his company's expenditures flowed to provincial contractors, employees and merchants.

The respondent was generally satisfied with the methods of delivery of the geoscientific data but had some specific suggestions to make to improve the output. He found some of the recent geochemical releases were very difficult to deal with in that the most of the information was produced on small-scale transparent overlays which were fine for a quick overview, but impossible to work with in any detail. He suggests that individual element maps should be available on request. VLF profiles plotted on the backs of 1:50,000 magnetic maps are not easy to decipher. Perhaps the data could be contoured instead.

He was also of the opinion that the federal government should concentrate on the regional work and the provincial government on the more detailed area-specific work.

The present industry/government advisory commitee seems to be functioning fairly well now. Industry points are being heard but the federal government listens more carefully than the province. It is difficult to predict what industry may be interested in the future. The most important aspect is to have a steady flow of material coming out so that if there is a sudden interest in a new commodity or new area, there will be comprehensive geoscientific data available to consult.

The respondent sees a role for cooperative government-industry-university projects. Proprietary information could be protected by a short period of exclusive use of the generated data. There would be fewer problems if the joint project was confined to discrete claim groups.

No problems were experienced with the cooperativeness and helpfulness of the individuals involved in the geoscientific programs.

The respondent felt that a contract should not be awarded solely on the lowest bid. More attention should be paid to the reliability and experience of the bidders. "Quality and timeliness at a reasonable price" should be the operative motto.

He would be "extremely upset" if the geoscience sector of the MDA was downgraded or eliminated. He pointed out that a lot of the exploration money that is spent in the province does not originate there but is attracted to the province because of perceived opportunities for the discovery of mineral deposits. These opportunities arise from the analysis of sound geoscientific data.

KEY POINTS

1) Geological maps are the most important output of the geoscience programs. Much more updating is still required.

2) Small companies and consultants would be essentially inactive without the geoscientific data.

RESPONDENT 16

This respondent is District Geologist for a multinational mining and exploration company. The company has an office in New Brunswick from which he directs exploration programs in Atlantic Canada. The company's main targets are base metal deposits. Most of the comments that follow pertain to New Brunswick.

The respondent makes use of most geoscientific data produced under the MDA programs. Of these he finds that the geological data is most useful, particularly the more recent detailed and updated maps of the Bathurst area. He noted, however, that the lack of outcrop locations on the recent maps is annoying. The airborne magnetic and gradient data is important, more so than the geochemical and airborne radiometric information.

He indicated that his company would be active in the Bathurst district even if the geoscientific data was lacking; however, their work in the district has been extensively aided by access to this data, particularly, in this case, the airborne magnetic and gradient maps. In Nova Scotia, the MDA publications have been of some use. He is not sure whether or not his company would be there if this data was lacking.

The respondent said that he would doubt if his company would have gone out and acquired all of these data itself. It would be more likely for them to have focussed on a single prospect or claim group. He estimates that savings to his company by having these data available are in the order of a few hundred thousand dollars over the past five years.

He found it difficult to estimate just how much of his budget was actually spent on following up leads generated by analysis of the geoscientific data. He suggested that $40,000 to $50,000 in Nova Scotia and $250,000 in northern New Brunswick could fit into this category.

The company contracts out all of its geophysics, mainly to provincial contractors. Most of the money spent benefits provincial merchants.

The respondent allowed that he could not attribute any discoveries directly to the use of the geoscientific data but that there was probably an indirect contribution.

The only comment related to delivery of the data was that timeliness could be improved.

The respondent was satisfied that the present consultative situation was working and sees no larger role for industry. He recommends that the industry group be sure to include a good cross-section of those active in the province. The objectives to be obtained in the MDA should be clearly spelled out. In these days of fiscal restraint goals should be adjusted to conform with reduced budgets.

He felt that some sort of cooperative programs amongst industry, governments and universities were almost necessary but that they may be tricky to arrange. He cited one example where work on one of their properties in Nova Scotia by government, in cooperation with his company, provided information that was helpful to both groups, and that it was work that his company would not have done on its own account.

He has found that the individuals working on the geoscientific projects are cooperative and helpful.

The respondent thought that contracting out certain geoscience projects to consultants and university people was not a bad approach, particularly when the governments are cash-strapped. Usually these people can carry out a project more cheaply than government and they very often possess skills that are not available in the government departments. He cautioned, however, that this must not affect the continuity of programs, particularly those directed to geological mapping.

He thought that it would be a serious mistake to curtail or eliminate the collection of geoscientific data under the MDA. It would be turning one's back on a very constructive industry. It would be a disservice. Taxpayers' dollars are generally well-spent and contribute to the long-term generation of wealth as ore deposits are mined.

KEY POINTS

1) Although initially attracted to the Bathurst area because of its mining history, the availability of solid government-produced geoscientific data has allowed the company to continue its exploration in a focussed and meaningful way, despite the fact that the company does not have a production base in the area.

2) New exploration projects are generated each year, many on the basis of newly released geoscientific data.

RESPONDENT 17

This respondent is eastern exploration manager for a large Canada-wide mining and exploration company. As such, he is responsible for the supervision of exploration programs in Atlantic Canada. The company's interest lie in both precious and base metals. The following comments apply to the company's activities in New Brunswick and Nova Scotia.

The company purchases most geoscientific publications for its library where they are available for consultation when a potential area is selected for exploration. The geological and airborne geophysical data are excellent sources to help put together a regional picture. Geochemical releases aid in pin-pointing targets. He indicated that the company frequently acquires the data in raw form in computer format when it is available, and will then make its own interpretation of the information.

The respondent indicated that his company would be exploring in their selected areas even without this data. He did add, however, that his interest in one area was whetted by examination of drill core, from a previous exploration program, that was stored in a government facility.

He also pointed out that if the regional geochemistry and airborne magnetic data had not been available for an area in southern New Brunswick, his company would have acquired the information itself, but would do so at a different scale. He indicated that the geochemical survey would probably cost in the order of $40,000 to $50,000.

The respondent cited three cases in which his company staked claims and carried out preliminary exploration on the basis of geochemical releases. These were in central and southern New Brunswick and in Nova Scotia. The total expenditures on these programs was slightly above $100,000.

About seventy-five percent of a total operating project budget is spent within the province where the work is being conducted.

No new occurrences have been discovered that can be directly related to follow-up of the geoscientific releases.

The respondent is generally happy with the delivery of the geoscientific data but had some criticism on the release of stream geochemical data in both Nova Scotia and New Brunswick. In the former case, the raw digital data contained numerous errors. In both cases he comments that the individuals involved in producing the data seem to have little appreciation of the nature and treatment of gold analyses.

He feels that there is a fair bit of consultation going on now between industry and government. In general he feels that industry interests are so diverse that its input should really be on a broad basis.

When asked about the feasibility of cooperative programs amongst industry, government and

universities, he thought it was a good idea, but didn't know how it could be structured. Companies are usually quite sensitive about their proprietary information, as they feel it gives them an edge in competitive exploration. He did add that informal relationships between individual government geoscientists and companies were welcome but the line must be drawn somewhere so as not to tread on the toes of private consultants.

The respondent finds that the individuals responsible for carrying out the geoscientific programs are cooperative and helpful.

He guesses he is satisfied with the procedure of contracting out some of the geoscience projects.

The respondent pointed out that the approach for carrying out the geoscience projects in the two provinces was different. In New Brunswick there was not an effort to add much staff. In his opinion, the Nova Scotia program has been overfunded and overstaffed and that they are scraping the bottom of the barrel in trying to come up with meaningful projects. The MDA supports the structure they have created.

KEY POINTS

1) Geological maps and data from the airborne magnetic/gradient surveys are essential to produce generic exploration models. The geochemical data is used more for pin-pointing specific areas.

2) Follow-up of information gained from geochemical releases has led to staking and to preliminary exploration on the claims acquired.

RESPONDENT 18

This respondent is an independent consultant based in Nova Scotia. He has had extensive field experience both within that province and elsewhere in Canada and overseas.

The respondent indicated that he makes quite a bit of use of the geoscientific data produced under the MDA programs in Nova Scotia. The principal application is in the creation of compilation maps designed to highlight specific areas that have good potential for the occurrence of base metal deposits. The main purpose of this work is two-fold, first to attract new exploration companies to the province, and, second, to assist companies in focussing on good target areas.

The combination of regional geochemistry and airborne magnetic and gradient data when superimposed on regional geological maps is an effective way to outline more favourable areas for exploration. The detailed geological maps of sedimentary basins published by the Nova Scotia government are invaluable for more precise targeting.

He pointed out that even relatively old aeromagnetic data, when remassaged by modern computer techniques has provided valuable information. This project was carried out by the federal government under the current MDA and is an example of the long-time usefulness of some forms of geoscientific information.

Lack of the geoscientific data would make his job a lot more difficult. Independent consultants and small exploration companies do not have the resources to fund the collection of the basic regional data. He added, that without the detailed geologic maps of the sedimentary basins referred to above, it would have been virtually impossible for him to have applied his generic exploration models which are so important in presenting an area as potentially ore-bearing.

The respondent found it difficult to quantify the money that might have been spent in follow-up of geoscientific data in that this money was being spent by his clients. Certainly, however, if his use of this information was the key in bringing a new company into the province, then that company's expenditures are a direct result of the availability of the data.

He was aware of two cases in which the MDA work itself led to important discoveries. In the first instance, an occurrence of massive sulphides was found. This ground was subsequently staked and drilled by an exploration company. In the second instance, detailed chemical analyses of overburden samples suggested a new possible source of tin mineralization.

The respondent was generally satisfied with the delivery of the geoscientific data and had a few

suggestions to improve it. He felt that the government could issue preliminary black and white line maps of the geology in a more timely manner; he would like to see all data available on floppy disk; and he would like to ensure that the mineral occurrence updating is continued.

He feels that industry should have more say in the selection of geoscientific projects. The government's applied research approach coupled with industry's more pragmatic slant should provide an excellent balance to most projects.

When asked about his views about cooperative projects amongst industry, government and universities he felt that this could be feasible in specific regions which were more or less dormant with respect to exploration, such as the gold-bearing rocks in mainland Nova Scotia. In areas that were perceived as quite active and competitive, however, he didn't feel that this approach would be feasible. With respect to university participation, it was his view that this should be restricted to specific problems identified during geological mapping by the government.

The respondent finds that the individuals carrying out the geoscientific work are approachable, cooperative and helpful.

He had some concerns about federal and provincial geologists being used as "consultants" by mining and exploration companies and that there was a grey area in which this work was infringing on territory rightfully held by consultants in private industry who are an integral part of the geologic fabric of the province. On the bidding for Maritime projects, Maritime-based contractors and consultants should be given additional points for being resident in the region. He also thought that there was a perception that the terms of reference issued to solicit bids for a project are not always the same as the terms of evaluation of the bids.

"Horror!" was his reaction to the suggestion of a severe reduction or elimination of the geoscience sector in future MDA's.

KEY POINTS

1) The respondent was able to attract new exploration dollars to Nova Scotia by using the government-generated geoscientific data to help in outlining areas favourable for the occurrence of base metals.

2) The combination of regional geological, geochemical and geophysical maps is essential in formulating exploration programs.

RESPONDENT 19

This respondent is District Geologist for a multinational vertically integrated mining and exploration company. His company has recently become involved in exploration in Nova Scotia and New Brunswick. Their principle targets are deposits of base metals. The following comments apply to New Brunswick only.

The company makes use of all pertinent geoscientific data in producing compilation maps of areas of interest. Of particular importance are the geological, aeromagnetic and geochemical data along with Landsat imagery which is especially useful in establishing a framework around which the rest of the geoscientific data can be fitted. Most of this work was compiled in a GIS format by a consultant who is resident in the province. The incorporation of claim-holding maps into this system has been helpful to the company in assessing its targeting.

The respondent indicated that it was probable that his company would be in the area even without the availability of the geoscientific information, but more than likely only on a property scale. The compilations produced from the data have allowed for a better appreciation of the regional setting of their properties and have helped guide additional staking.

The company' s work has really just started so there are no expenditures that can be credited against follow-up of geoscientific data.

The respondent has no problems with the delivery of the geoscientific output and finds the personnel involved in the projects to be cooperative and extremely helpful. He cited one example where a government geologist had compiled extensive drill information from a property on computer diskette and provided a copy of it to the company when the company optioned the property. The result was a

considerable savings in time, effort and money by the company.

The respondent feels that industry should have as much input as necessary into the selection of geoscientific programs so that the work reflects the needs of industry. He sees no problems with industry-government cooperative programs so long as there is a built-in period of confidentiality in cases where industry has provided proprietary information and dollars.

He is not opposed to the approach of contracting out certain geoscientific projects to consultants as long as confidentiality is maintained and the work is done to government specifications.

The respondent felt that elimination or severe reduction of the geoscientific work would have a negative impact.

KEY POINTS

1) Compilation of geoscientific data by a consultant was a key factor in guiding exploration once in the area. Without this, the respondent felt that his company would only be involved in an optioned property.

RESPONDENT 20

This respondent is a geologist with a major, vertically integrated Canadian mining company which has become recently active in Nova Scotia. His company is principally interested in base metal deposits. A regular interview was not conducted.

The respondent indicated that he became interested in the area through field trips and discussions with both Federal and Provincial geologists who were responsible for having carried out the work in the area. This exposure led to the acquisition of a block of claims and a modest exploration in 1991.

He finds that the standard of work done is of excellent quality and that the geoscientists he had encountered were competent, cooperative and helpful.