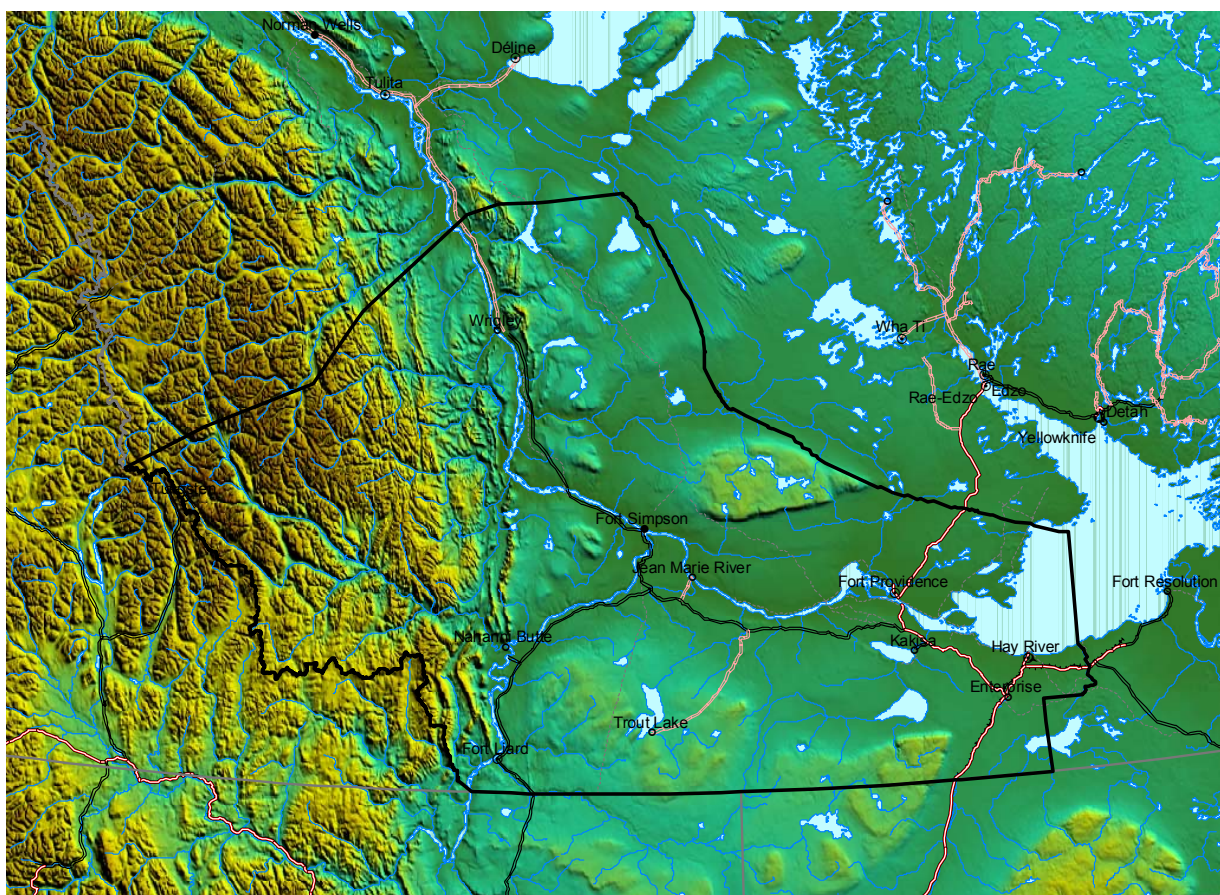


Mineral Potential Mapping Deh Cho Territory, NWT

Final Report



Prepared for:

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Executive Summary

The mineral potential evaluation requested by Deh Cho Land Use Planning Committee (DCLUPC) is information to be considered as part of the decision making process on regional land-use planning. The C. S. Lord Northern Geoscience Centre (C. S. Lord) has been contracted to deliver the mineral potential evaluation for the Deh Cho territory in the form of a series of Mineral Potential Maps. Based on the large geographic extent of the area, combined with time, data and knowledge constraints, a ‘knowledge-driven’ mineral potential mapping approach has been taken (Eddy, et. al. 2003, Appendix E). In combination with the Geologic Survey of Canada ranking scheme, a set of Mineral Potential Maps has been produced showing geological favourability and ranking of Resource Assessment Domains (Domains) for nine (9) significant mineral deposit-types.

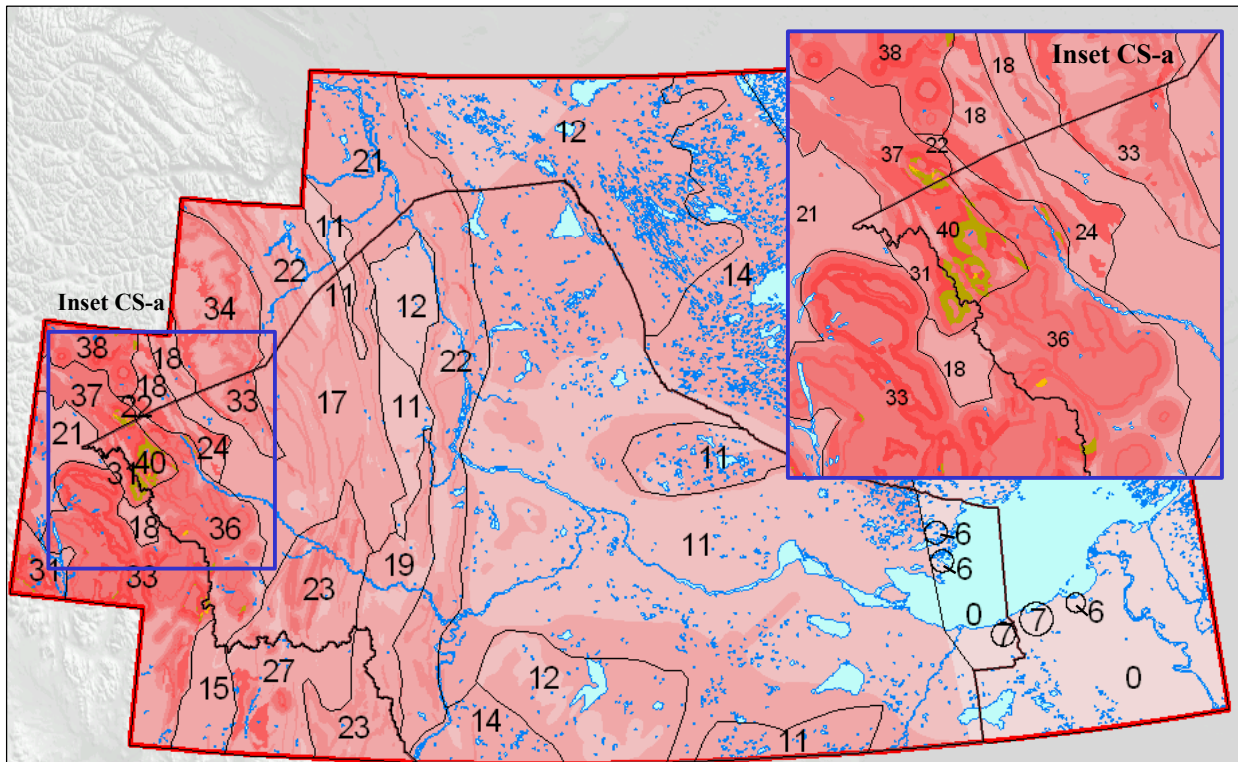
The nine mineral deposit-types considered here were selected from a list of twenty types thought to be have the potential to occur in the Deh Cho territory. These deposit-types were selected from an initial list of eighty-two mineral deposit-types and sub-types identified in the *Geology of Canadian Mineral Deposit-types* (Eckstrand, 1996). Of the nine considered in this study, the results show significant potential for:

- | | |
|---|--|
| <ul style="list-style-type: none"> • Sedimentary exhalative sulphides (SEDEX) zinc-lead, • Sediment-hosted stratiform copper, • Mississippi Valley-type lead-zinc, • Vein copper, • Skarn deposits (emerald, gold, tungsten, copper, and lead-zinc). | <p>And to a lesser extent:</p> <ul style="list-style-type: none"> • Stratiform iron, and • Granite pegmatite (tantalum, cesium and lithium). |
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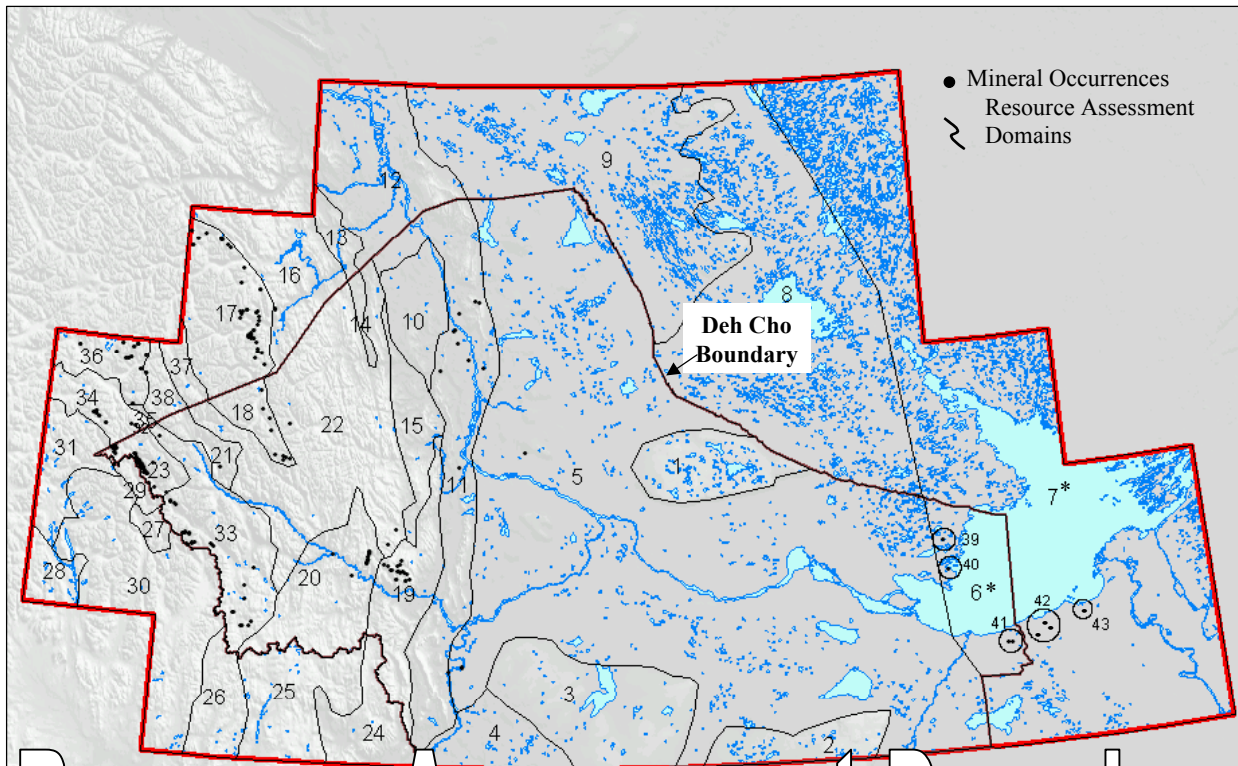
The most significant potential appears in the western part of the study area, within the mountainous Cordilleran geologic province. Specifically, within the Deh Cho boundary, six Resource Assessment Domains (Domains): 11, 18, 20, 21, 23, 33, reveal high to very high mineral potential for a number of deposit-types (see Resource Assessment Domain figure next page). It is these specific domains that the potential for discovery of new mineral deposits is most likely. The general conclusion is that the Deh Cho shows at least ‘some’ mineral potential (if not one type, then another) in all locations. There is nowhere within the Deh Cho territory that can be said to have ‘no potential’.

A ‘Cumulative Mineral Potential’ map illustrates this conclusion (see Resource Assessment Domain figure next page) with sum of rankings values of 22, 33, 23, 24, 40, and 33 respectively out of a maximum assigned 40.

Although the potential in the western portion is relatively higher than the central and eastern portions, it must be understood that new discoveries, data, and knowledge about the study area continue to emerge, and there may be ‘high’ potential for some commodities (e.g. Diamonds) in areas that were evaluated as relatively low in this study or not assessed.



Cumulative Mineral Potential



Resource Assessment Domains

Introduction

The Deh Cho Land Use Planning Committee's (DCLUPC) requirement for mineral potential information is considered here as part of their regional land-use planning process. The DCLUPC have chosen to use a Geographic Information System (GIS) based mapping approach to identify land-use options for resource development, protection, and traditional use. This approach is expected to highlight locations where multiple uses may be complimentary, and/or where they may conflict. It is anticipated that this approach will contribute to an on-going optimization of land-use planning options and strategies.

Among all potential uses and land-values, the *mineral potential* of the Deh Cho land is a significant component. As with other places in the North, minerals represent one of the few options for substantive economic development. This project proceeded within the context of these current needs and constraints of the DCLUPC requirements, and is aimed at delivering the most accurate and meaningful information about mineral potential for the Deh Cho territory that could be made available under the given time and resource constraints.

Information Requirements

The C. S. Lord Northern Geoscience Centre (C. S. Lord) was contracted by the Deh Cho Land use Planning Committee (DCLUPC) to deliver "*A Spatial Analysis and Literature Review of Mineral Potential in the Deh Cho Territory, NWT*". The C. S. Lord proposed to carry out the spatial analysis and report the results in the form of a series of Mineral Potential Maps. C. S. Lord was asked to deliver a mineral potential map within a very limited (3-4 month) time frame. The financial resources to carry out the project were only available until March 31, 2003. The products intended use is in community consultation on Land Use Planning during the spring and summer of 2003.

Approach and Methodology

The overall approach to preparing Mineral Potential Maps involves a process of synthesizing and integrating both formal and informal (global and local) knowledge and data. The output of this process (a series of Mineral Potential Maps) is an information product that is designed for specific contextual use (in this case the DCLUP). The approach used here involves a combination of methods that facilitate the transformation of primary data and knowledge into contextualized information that meets the requirements of the DCLUP. Figure 1 summarizes the main elements of the approach in four general stages or steps.

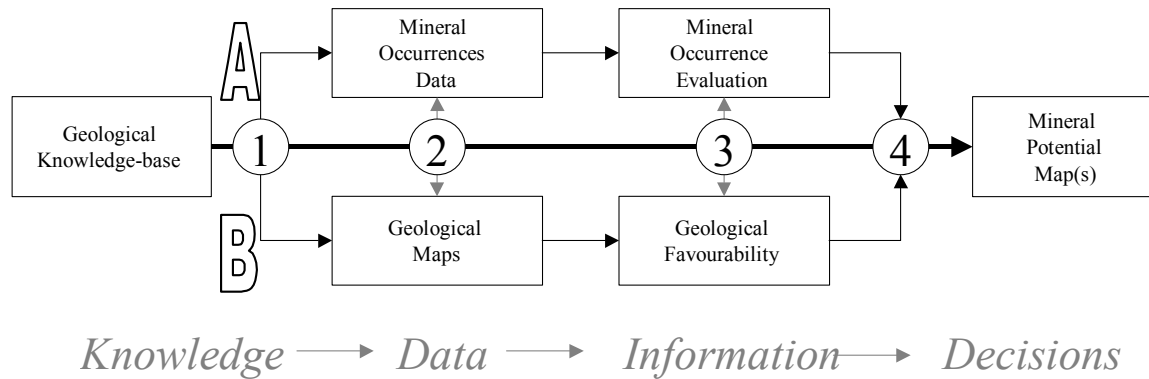


Figure 1. General schematic outlining the approach and methodologies employed in the preparation of the Mineral Potential Maps of the Deh Cho region.

The four steps in the process are divided into two mutually interactive information streams:

- A) Knowledge and Data on Mineral Deposits and Occurrences and
- B) Knowledge and Data on the Geology of the Deh Cho territory (regional, general knowledge) as represented in geological maps, supporting literature, and the knowledge of local expertise.

The information content of the Mineral Potential Maps produced by this approach reflects these two information streams:

- 1) Geological Favourability, and
- 2) Mineral Occurrences Evaluation.

The four steps involve a dialogue between the two information streams and formulate the overall structure of this report. The general approach is summarized as follows.

Step 1 –Scope and Context

This step involves asking a number of important questions such as: What is the extent of the study area? Who are the users of the information and what will the information be used for? When is the information needed? What are the time and resource constraints? From here, the resource geologist consults the existing geological knowledge base to determine what knowledge and data is most appropriate for the requirement. These inputs fall into the respective minerals and geology information processing streams, which mutually interact and reinforce specific methodological operations along the processing stream.

Step 2 – Data and Knowledge

Based on the scope and context, appropriate data is gathered for preparation of Mineral Potential Map product. The choices for the selection of some data and exclusion of others must be clearly stated and justified within the context and constraints identified in the first step. The data maintains a differentiation of mineral and geological in reflection of two aspects:

- 1) The **mineral occurrences data** represent what is known in terms of existing or known mineral potential, and
- 2) The **geological data** (maps) are used to assess geographical areas for which the mineral potential is not known.

In many ways, the selection and initial preparation of the data requires detailed examination of both data types to make aware all uncertainties and limitations of the initial database in preparation for applying specific analysis and interpretation methods. There are a number of basic geographical factors that must also be considered such as the coincidence of location of specific data elements within the geographical boundaries of the study area, as well as scale differences. For example, geological maps represent generalized interpretations of primary field data and are often presented at scales significantly broader than local mineral occurrence data. All of these factors need to be taken into account in preparation of the analysis and interpretation.

Step 3 – Analysis and Interpretation

It is necessary to frame the analysis and interpretation of mineral potential around *mineral deposit-types*, and/or specific mineral commodities. Both the geological maps and mineral occurrence data need to be associated with knowledge about how various types of mineral deposit form. Various specific methods may be employed at this stage, most of which are dependent upon the geographic scale and extent of the study area, the scale and qualities of the data available, and the mineral deposit-types or commodities being considered. This study makes use of a modified Fuzzy Logic (Eddy et al, 2003, Appendix C) method to map geological favourability, which is evaluated in combination with known mineral occurrences, to produce mineral potential rankings of sub-divisions of the Deh Cho territory referred to as Resource Assessment Domains.

Step 4 –Results and Recommendations

The final step in the process involves preparing the result maps in a variety of presentation styles and formats for the intended audience(s). This involves cartographic techniques for visualizing mineral potential in map form, as well as evaluating the results and implications for intended use. In this study, the results of all deposit-types considered are presented in the form of a Cumulative Mineral Potential map. But as with all maps, there are always limitations and constraints in their use, especially for complex land-use planning processes. A series of recommendations are made to make the best use of the knowledge and data available at this time.

Scope and Context

The aim of this project is to deliver an evaluation of mineral potential for the entire Deh Cho territory, giving equal consideration to all locations so that land-use options, in conjunction with other land-use interests, can be adequately accommodated. Consideration is given to the immediate and on-going intended use of these maps as a partial input into a land-use decision-making process. This is taken into account as the primary influence in determining the most appropriate scale and resolution of both the inputs (data sources), and the outputs (Mineral Potential Maps), and the choice of method in relating the two. Within this context, the maps are intended to assist in regional land-use decision-making. They are not of a suitable resolution for identifying specific exploration target areas. Significantly higher resolution data, as well as other types of data (such as ground-based geophysics and geochemistry) would be required to conduct such a detailed assessment. The results presented at this scale represent a starting point in such a process, and should be applied under the consultation of a mineral resource assessment geologist.

The requirements for this mineral potential assessment are:

1. The whole of the Deh Cho territory must be evaluated equally.
2. The data and knowledge used must be the most recent and appropriate for application.
3. The results must be meaningful to the Deh Cho Land Use Planning process (i.e. maps must be easily readable and understood by different stakeholders)
4. The Mineral Potential Maps must be able to provide a basis for decisions among a variety of possible land-use scenarios.
5. All limitations, constraints, and uncertainties in the results must be clearly communicated.

Knowledge and Data

The primary constraint in determining which data and knowledge is appropriate for the scope and context is the geographical extent of the study area, and the requirement to map mineral potential on a relatively consistent basis throughout the Deh Cho territory. Typically, such scope would require considerable effort in compiling numerous local reports, maps, and study of local mineral occurrences in comparison to global deposit-types and models. This study benefits from the availability of three primary sources of data and knowledge that have been systematically and authoritatively compiled for this region, and lends itself appropriate for this requirement.

- 1) The geological base is the 1:1,000,000 scale digital map by Journey and Williams (1995), “A Window on Cordilleran Geology”.
- 2) The mineral occurrence information base is from NORMIN.DB, The Northern Minerals Database.
- 3) And the Mineral Deposit-type/Deposit Model information is taken from “The Geology of Canadian Mineral Deposit Types” by Eckstrand et al, (1996).

Minerals Knowledge

All mineral potential mapping exercises are based on the mineral deposit-types or -models. Mineral deposits are natural concentrations of one or more mineral commodities (Eckstrand et al, 1996). Mineral deposits having similar geological characteristics and suites of commodities occur in comparable settings at numerous locations throughout the world in rocks of different ages. Mineral deposits that are similar constitute a mineral deposit-type.

A mineral deposit-type is a collective term for mineral deposits that:

- a) share a set of geological attributes, and
- b) contain a particular mineral commodity or combination of commodities such that (a) and (b) together distinguish them from other types of mineral deposits.

Two important concepts that follow from this knowledge are:

- 1) Mineral deposits of the same type are likely to have a common or similar mode of genesis.
- 2) And most importantly, rock assemblages which contain the geological attributes that are characteristic of a particular mineral deposit-type have the best potential for containing mineral deposits of that type.

Each mineral deposit-type is identified on the basis of common characteristics found among deposits of a given type. These characteristics are usually descriptive in nature. Such characteristics are sometimes explained in terms of possible geological and mineralogical processes or genesis. Such explanations are regarded as mineral deposit-models. The differentiation between type and model varies considerably. For example, characteristics of some deposit-types might be significantly more descriptive, whereas others might be more genetic (or process-related).

Mineral deposit criteria is regarded as being any set of key descriptive and/or genetic characteristics that define a minimum set of criteria that are necessary for the potential of a deposit-type to occur within a particular geological setting. For many deposit-types such initial criteria often relates to regional level geological setting, tectonic or stratigraphic setting, or associated rock-types, from which the potential for a deposit-type to occur is to be considered.

However, some deposit-types (e.g. Diamonds) do not have any initial criteria that can be treated on a regional level. Although diamonds are almost universally associated with kimberlites, they can occur in any geologic environment and are difficult to detect in regional level data. The application of regional geological maps and generalized mineral deposit criteria, even with the best of local expert knowledge, remains restricted in what can be said of the potential of any large region for some types of deposits. It is primarily for this reason that any given mineral potential mapping exercise, or non-renewable resource assessment process, can never come to any final conclusion, nor identify absolute potential for a region.

All mineral potential mapping hinges on the use of some form (formal or informal, global or local) mineral deposit criteria.

The criteria used in this study were derived from The Geology of Canadian Mineral Deposit-Types (Eckstrand et al, 1996). The Geology of Canadian Mineral Deposit-Types provides

detailed descriptions for 27 broad categories (or types) of mineral deposits, each of which may contain two or more sub-types. Together, they constitute 82 sub-types that need to be considered as part of any comprehensive Mineral Potential Mapping project. In effect, there will not be potential for all deposit-types within a given study area due to limited constraints of the geological setting. A significant sub-step at this stage is to determine which deposit-types best represent the possibilities of mineral potential for the range of geological characteristics that occur in the study area.

Geology Knowledge

The Deh Cho territory straddles two geologic provinces in Canada, the flat Interior Platform province in the east, and the mountainous Cordilleran Orogen province in the west (Figure 2). The Interior Platform consists of relatively flat lying sedimentary rocks of Phanerozoic age that have been deposited by sedimentary process and have remained relatively undisturbed since deposition. The Cordilleran Orogen is comprised of folded, faulted and thrust rocks of sedimentary, volcanic, plutonic and metamorphic origin. Although the majority of the rocks within the Cordilleran portion of Deh Cho territory contain deformed equivalents of Deh Cho territory Platform rocks, there is also a significant component of rocks that span a much longer time period of deposition and a genesis (mode of deposition). An example of these different rock types are the thrust-to-surface, sedimentary, Pre-Cambrian (1600-1000 million years old) rocks at Cap Mountain, and the Mid-Cretaceous (130-87 million years old), Selwyn plutonic suite of intrusive (volcanic) rocks adjacent to the Yukon border in the western Deh Cho territory. It is these two geological provinces that strongly influence the regional physiography, separating the mountainous Cordillera in the west, from the flat lying Interior Platform in the central and eastern portions of the study area. These differences in physiography also influence local and regional ecology, as well as human settlement patterns and interaction with the land. In spite of the more rugged terrain, the diversity of genesis, deformation and age is one of the reasons the Cordilleran may be considered 'more interesting' from a mineral potential point of view. It is also important to consider that one of the most significant known mineral deposits in the Deh Cho territory is the world-class, past producing Pine Point lead-zinc mine which occurs within the less-interesting Interior Platform province. The geological setting in both geological provinces offer potential for a variety of mineral deposits.

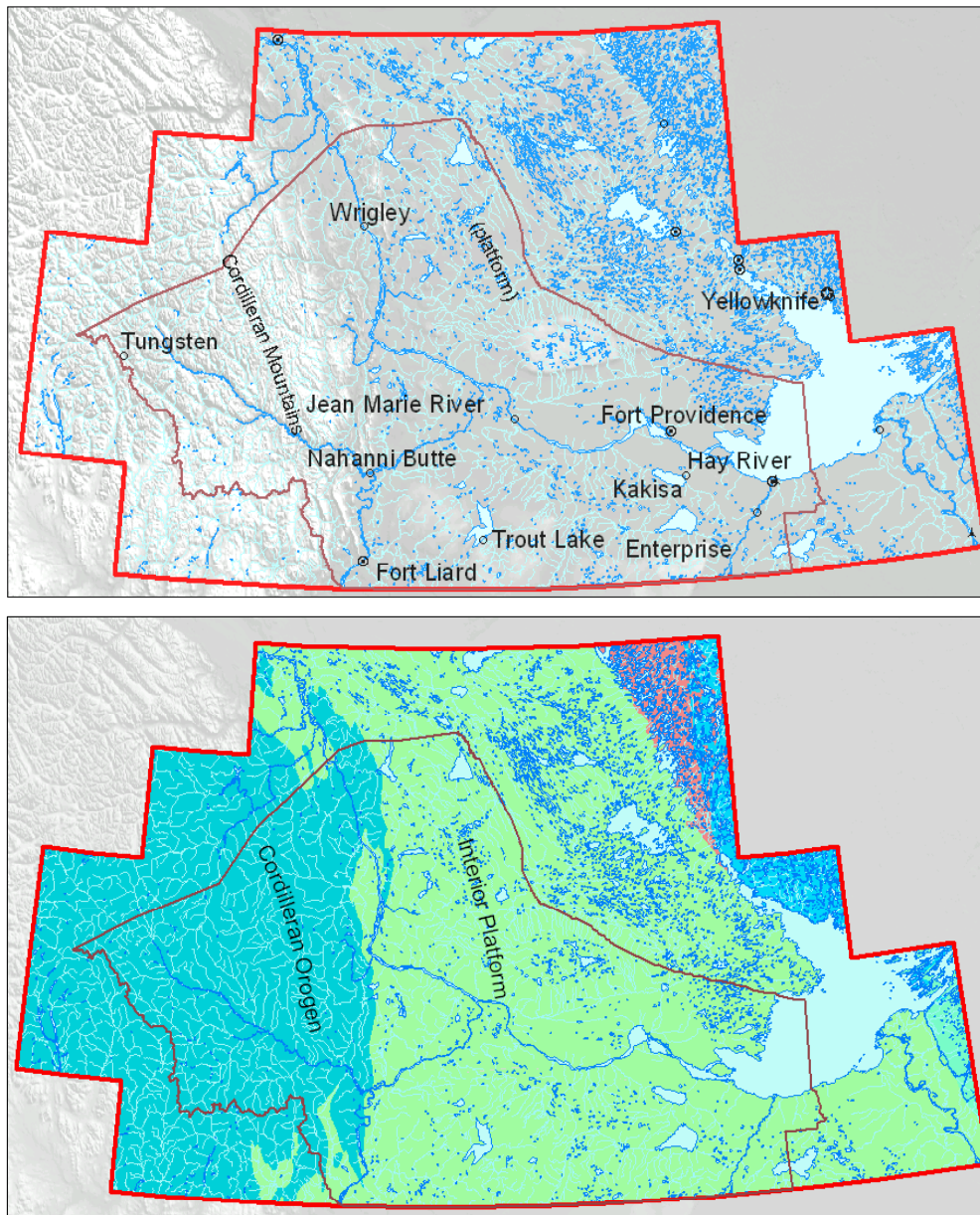


Figure 2. Physiography and geological provinces of the Deh Cho region.

Geology Data

For this study, we make use of the 1:1,000,000 tectonic assemblage (geology) map compiled by Journey and Williams (1995). A reproduction of this map is provided in Enclosure A. The geology illustrated by this compilation work provides a basis from which a selection of the most likely deposit-types from The Geology of Canadian Mineral Deposit Types (Eckstrand et al, 1996)

The use of local scale geological data, such as geochemistry, geophysics, and location specific mineral occurrence properties, are severely limited for an area this size and under the time/resource constraints of the current project. This knowledge can be brought-in to increase the resolution/evaluation at later stages, in high priority areas where deemed necessary and appropriate. For purposes of this evaluation, the data and knowledge selected for use are those that cover the entire Deh Cho area in a consistent fashion, are authoritative, and can meet the immediate needs of this type of Mineral Potential Mapping requirement.

Mineral Data

The mineral occurrence data is taken from the NORMIN.DB, The Northern Minerals Database 2003/05/01 (<http://www.nwtgeoscience.ca/normin>, CS Lord Northern Geoscience Centre, Yellowknife, Northwest Territories). A summary list of mineral occurrences in the study area, (indexed by deposit-type) is provided in Appendix A. The processing and selection of records and fields from this database are described below in the Analysis and Interpretation section. Additional fields were added to the tables in Appendix A as part of this study. These Mineral Occurrence locations are shown in Enclosure A.

NORMIN.DB data are provided without warranty of any kind, either expressed or implied. The information may be used with the strict understanding that neither the federal nor territorial governments nor their ministers, employees, or agents shall be liable to any persons for any loss or damage of any nature, whether arising out of negligence or otherwise, which may be occasioned as a result of use of this information.

Data in NORMIN.DB are translated from public records. The federal Department of Indian Affairs and Northern Development and the Government of the Northwest Territories cannot guarantee the accuracy of the public records or of the data recorded in NORMIN.DB. The NORMIN.DB website or CS Lord Northern Geoscience Centre staff should always be consulted for the latest data or for assistance in using the data. Data do not represent every mineral deposit in an area or every reference to an area. Data are not necessarily the most recent available or the most relevant for a user's needs.

Analysis and Interpretation

The analysis and interpretation (Step 3) of this study proceeded through a series of sub-processing stages. Figure 3 provides an information-processing path of the sequence of sub-steps taken between Steps 3 and 4 (in reference to Figure 1).

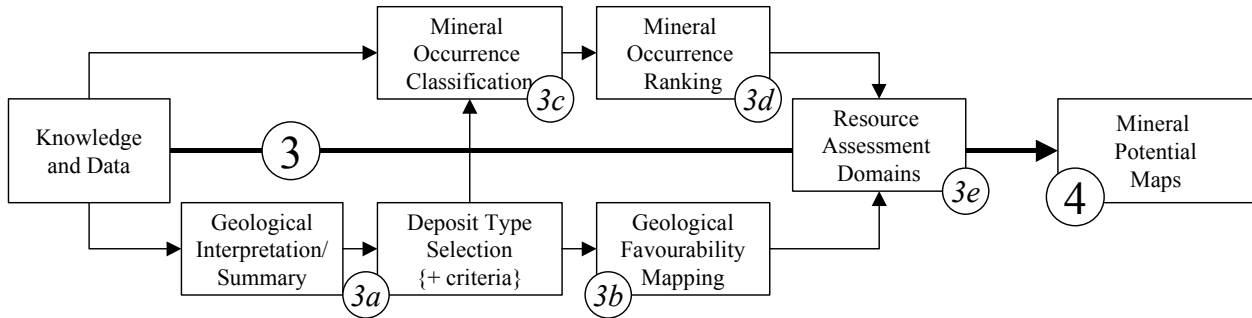


Figure 3. Stages of processing involved in the preparation of the Mineral Potential Maps.

Geological Interpretation and Deposit-type Selection (3a)

As noted above, the first step in the analysis is an interpretation of the geological setting of the Deh Cho territory to assess which deposit-types are most likely to occur in the study area. Enclosures A (Geological Map) provides the most recent synopsis of the geological characteristics of the study area.

Information associated with the geological units provide the basis from which a sub-set of deposit-types was selected as those more likely (3a) to occur within the region, due to the limited geological constraints that are required for certain types of deposits to occur. The rationale for selection is based partly on a cross comparison of deposit-type criteria and geological setting, local knowledge of known deposits and occurrences, as well as active exploration interests. The selected deposit-types are listed in Table 1. The selected deposit-types represent those that are known to occur or most likely to occur given the geological constraints of the study area. Primary diamonds are included in the selected list. Diamond potential in the Deh Cho territory presents a unique challenge in representing its potential and is included here to illustrate not only its significance, but some of the limitations in mapping mineral potential on regional scales (see discussion under Limitations and Constraints and Appendix B).

Table 1. Selected Deposit-types Considered for Mineral Potential Map in this Study.

Type # *	Deposit-type Name	Mineral commodities
6.1	Sedimentary exhalative sulphides (SEDEX)	Copper-lead-zinc
8.3	Sedimentary-hosted stratiform copper	Copper
10.0	Mississippi Valley-type lead-zinc	Lead-zinc
17	Vein copper	Copper
20.1	Skarn lead-zinc-silver	Lead-zinc-silver-gold
20.3	Skarn gold	Gold, bismuth, tellurium
20.5	Skarn tungsten	Tungsten, gold, silver, molybdenite
21.0	Granitic pegmatite	Beryllium, lithium, cesium, tantalum, muscovite mica, feldspar, etc.,
25.0	Primary diamonds	Diamonds
*(Eckstrand et al, 1996)		

Note that other deposit-types also have the potential to occur such as, but not limited to, those identified in Table 2. However, it was not possible to model all of these types under the limited time constraints of this project.

Table 2. Deposit-types with potential to occur but not analyzed/assessed.

Type #	Deposit-type Name	Mineral commodities
1.2	Placer Gold	Gold
7, 12, 13	Three types of uranium deposits	Uranium
16	Clastic metasediment-hosted vein Ag-Pb-Zn	Silver, Lead, Zinc
18	Vein-stockwork Sn/W	Tin-Tungsten
19	Porphyry copper	Copper, Gold, Molybdenum, Tungsten, Tin, Silver
20.2	Skarn copper	Copper
22	Kiruna/Olympic Dam (Iron Oxide Copper-Gold (IOCG))	Gold, Copper, Iron, Silver
23	Peralkaline Rock-Associated Rare Metals	Niobium, Tantalum, Beryllium, Zirconium, Yttrium and Rare Earth Elements (REE)

Geological Favourability Mapping (3b)

The next step involved using the geological data and the selected mineral deposit criteria to map the geological favourability component of the Mineral Potential Map for each selected deposit-type. Geological knowledge of each deposit-type, aided by an understanding of its genesis, allows us to identify geological areas most likely to contain undiscovered deposits of that type. The key linkages between data and expert knowledge are the relationships expressed in mineral deposit-type model criteria. As with all geoscientific-mapping applications, the ability to relate data (representations of our observations in the real world) with our knowledge (our understanding of those observations) cannot always be achieved with absolute certainty. In other words, the method must provide room for geologists to accommodate varying degrees of certainty or uncertainty in inferring such relationships.

For this component, a Fuzzy Logic method is used. Fuzzy logic is defined as “reasoning involving fuzzy sets, that is, where elements do not fit within compact boundaries. Involves probability concepts” (Jackson, 1997).

Using a scaleable, relative-favourability legend, the geological favourability component of mineral potential for multiple commodities/deposit-types can be portrayed in map form in a style that can be easily digested by people of diverse disciplines and roles in a multi-stakeholder land-use decision environment. This is a well-grounded scientific method (Eddy, 1996, Bonham-Carter 1994, An et. al. 1991) and can be used in later stages of assessment in combination with other Mineral Potential Map methods as newer and higher-resolution data (mapping, geochemistry, geophysics) become available. The specific *aporia* approach applied here is based on that in Eddy, et. al. (2003, Appendix C). The legend presented in Figure 4 is to be used to reference the colour schemes representing the geological favourability component in each Mineral Potential Map and also to convey the assessment of mineral potential for all deposit-types collectively (a Cumulative Mineral Potential map).

To simplify, the fuzzy logic method presents geological favourability on a gradational scale that represents a range of answers to a general question “Is there potential for Z at location x, y”? In applying this approach for Mineral Potential Mapping, we simply replace ‘Z’ with the deposit-type, then seek to justify the geological favourability by inferring the linkages between the definitive criteria for each deposit-type, with data provided in the geological map. The choice of colours represents a gradational ‘hot’ (very high potential), to ‘cold’ (no potential, or low potential).

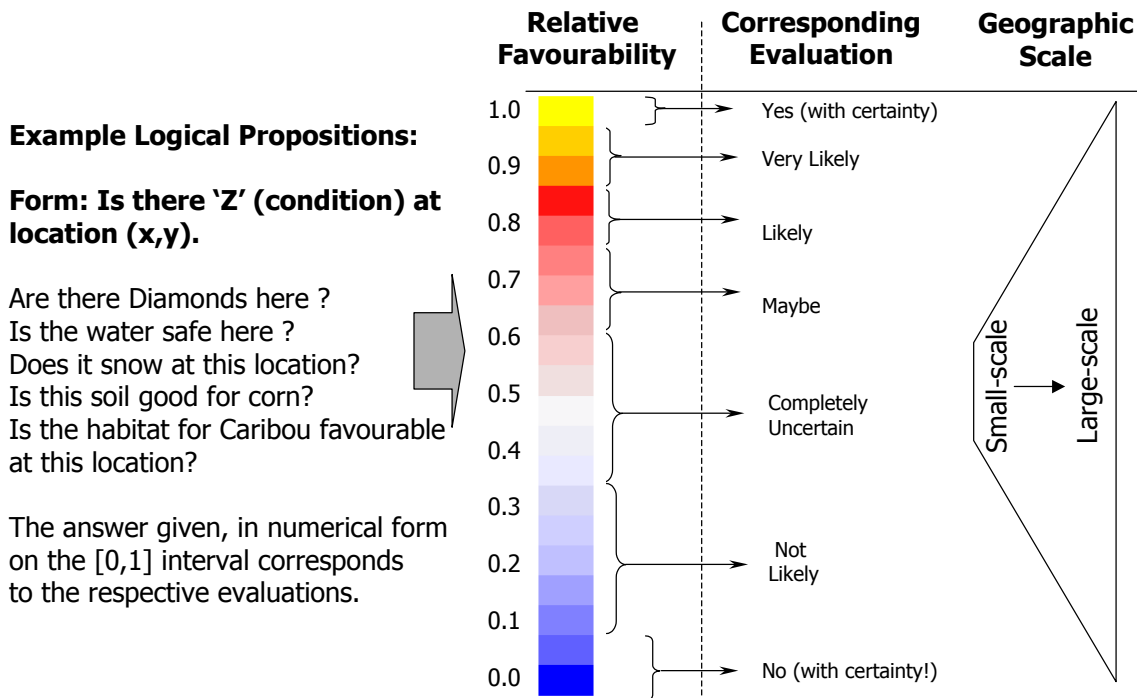


Figure 4. The modified Fuzzy Logic legend used for representing geological favourability.

The fuzzy geological favourability legend is scaled numerically on a 0.0-1.0 interval, where 1.0 equals Yes (with certainty – there is potential), and 0.0 equals No (with certainty - there is no potential). In this method (Eddy, et. al., 2003, Appendix C), the middle value (0.5) represents complete uncertainty for cases where the geologist cannot give a clear yes or no answer to the question. The intermediate values (ranging from 0.1 to 0.5 and 0.5 to 0.9) provide a gradational scale for answers in between these extents (for answers such as maybe, not likely, etc.). The certainty of the answer to the question “Is there potential for deposit-type or commodity Z?” depends on the scale of the data used to support the answer. Small-scale data pertains to regional-national level data (i.e. 1:5,000,000 maps), and large-scale pertains to very local scale data (i.e. actual occurrences, ground-truth information). For each Mineral Potential Map presented, this legend represents the geological favourability component. This is why as can be seen in some of the results, yellow areas only show up in the immediate vicinity of known occurrences. The range of colours surrounding the known occurrences reflects the general scale of data used to map the geological favourability for each deposit-type.

Mineral Occurrence Classification and Ranking (3c-3d)

Parallel to mapping geological favourability, the selection of deposit-types permits an evaluation of the known occurrences for comparison with the results of the geological favourability mapping (3c-3d). Not all mineral occurrences can be treated with equal certainty with respect to their associations with a specific deposit-type. This process involves another level of interpretation by examining the descriptive information of each occurrence and assessing potential association to selected deposit-types. In some cases, mineral occurrences (especially known deposits) have been studied in great depth, and their classification against one of the Canadian Mineral Deposit-types (Eckstrand et al, 1996) has been verified. But for the majority of occurrences, there is not enough information to draw firm conclusions. This can be problematic in mapping some occurrences for comparison against different deposit-types that contain the same commodities (i.e. Pb-Zn, or Au). To accommodate this problem, the fuzzy favourability legend was also used to indicate the degree of confidence in classifying each mineral occurrence according to one of the selected deposit-types. This is illustrated in Figure 5, which is a sample of records taken from the tables presented in Appendix A.

Figure 5. An example table of mineral occurrences (see Appendix A)

Descriptive Information (recorded in NORMIN)					Interpretive Information (applied in for this study)			
GISID	Latitude	Longitude	Name	Commodities	DevStage	DepType	FAV	SigRank
14	62.1889	-128.8992	Cali	Li	Local Examin	Gran Peg	0.75	2
53	62.1997	-123.4386	Camsell Mountai	Zn-Pb	xTo Be Assig	MVT	0.80	3
54	63.1167	-123.5000	Camsell Range (Pb-Zn	xTo Be Assig	MVT	0.80	3
231	61.9528	-128.2625	Cantung Mine	W-Cu-Bi-Zn-	Producer	W Skarn	0.90	1
223	63.4222	-123.2250	Cap Mountain	Cu	xTo Be Assign	Sed-host Cu	0.65	3
225	63.4167	-123.1667	Cap Mountain (Eastern Slo	Fe	xTo Be Assign	Strat Fe	0.60	4
132	60.9803	-126.5681	Chuck	Au	Reconnaissan	Placer Au	0.75	3

Each occurrence was classified according to one of the selected deposit-types (recorded in the DepType field). The 'FAV' (for Fuzzy Assignment Value) records the assessed level of confidence that the occurrence matches the deposit-type. For example, the Cantung Mine is assigned a value of 0.90 to indicate the high degree of confidence that it is a Tungsten Skarn deposit-type. In other cases (e.g. Stratiform Iron), a lower confidence level indicates that more information is required to make an assessment.

The result of this analysis provides a ranking of significance factor to the occurrences to aid in their interpretation with the geological favourability. A known deposit or operating mine (e.g. Cantung) is obviously more significant than an occurrence for which only little information is available (or is significantly smaller in size). A four class ranking scheme is applied here as follows:

- 1 – Very significant, known deposit, well understood.
- 2 – Significant, not a deposit, but a significant occurrence.
- 3 – Moderately significant, potentially a given deposit-type, but limited information.
- 4 – Low Significance, limits and uncertainties in descriptive information, and confidence of classification.

Resource Assessment Domains (3e)

A comprehensive Mineral Potential Map provides a ranking of different sub-areas based on an evaluation of the combination of geological favourability and the known occurrences. This is the basis for the modified Geological Survey of Canada's Mineral and Energy Resource (MERA) ranking scheme (Scoates et. al., 1986) provided in Table 3.

A modification to the Geological Survey of Canada (GSC) ranking scheme applied in this study is the assignment of numerical score values to each ranking (from 0 to 7 with each rank). As will be seen below, this scoring is used partly as a basis in preparing a Cumulative Mineral Potential map, and as a 'Sum of Rankings' component to that map. Notice also that the mineral occurrence ranking (along the column axis in Table 3) shows a number of fields that are not likely or possible in a Mineral Potential Map. The highest score of 7 (Very high – Rank A) is not possible if there are no known deposits, or if the quality of information for those deposits is suspect. Likewise, it is also not possible to assign a score of 1 (Very Low – Rank G), if the quality of information is poor. Additionally, it is also not likely to assign a score of 0 (not assessed) for areas where there is good quality information available.

Table 3. Mineral potential ranking based on GSC MERA ranking system.

MINERAL POTENTIAL RANKING	MINERAL OCCURRENCE RANKING			
	Confidence Ranking			
	Rank 1: Abundant reliable information	Rank 2: Moderate amount of information	Rank 3: Some information	Rank 4: Very little and/or unreliable info
<u>Rank A - Very High – Score = 7:</u> Geologic environment is favourable. Significant deposits/accumulations are known. Presence of undiscovered deposits/accumulations is very likely.				X
<u>Rank B- High – Score = 6:</u> Geologic environment is favourable. Occurrences are present but significant deposits/accumulations may not be known to be present. Presence of undiscovered deposits/accumulations is likely.				
<u>Rank C- Moderate to High – Score = 5:</u> Intermediate between moderate and high potential.				
<u>Rank D- Moderate – Score = 4:</u> Geologic environment is favourable. Occurrences may or may not be known. Presence of undiscovered deposits / accumulations is possible.				
<u>Rank E – Low to Moderate – Score = 3:</u> Intermediate between low and moderate potential.				
<u>Rank F- Low – Score = 2:</u> Some of the aspects of the geological environment may be favourable but are limited in extent. Few if any occurrences are known. Low probability that an undiscovered deposits/accumulations are present				
<u>Rank G- Very Low – Score = 1:</u> Geologic environment is unfavourable No occurrences are known. Very low probability that an undiscovered deposit/accumulations are present.				X
<u>Rank H- Not Assessed – Score = 0:</u> Deposit-types unknown, overlooked, beyond the scope of the assessment, or not worth mentioning at the time the assessment was done (could be a higher ranking in the future).	X	X		
Notes: The X denotes fields that are unlikely to be used. The criteria for assessing mineral potential follows the Geological Survey of Canada’s Mineral and Energy Resource assessment ranking scale (Scoates et al, 1986).				

This ranking scheme is applied on an aerial basis using Resource Assessment Domains (Domains). Domains are used as a sub-regional geographical framework that reveals contrasting patterns of geological favourability and mineral occurrence clusters. There are a number of methods for delineating Domains in a study area. They may be based on geological unit groupings, on physiographic domains, metallogenic domains, or possibly ecological units if desired. In this study, they were mapped from contrasting potential patterns in the set of geological favourability maps. The Domains for the Deh Cho study area are shown in Figure 6.

Domains 6 and 7 are not assessed for geological favourability due to lack of geological information. The Journey-Williams (1996) base map does not show geology for this area, which demonstrates limitations on the base information. Sub-Domains (39-43) were added because of the very significant mineral occurrences in this region related to the Pine Point lead-zinc past producing mine.

As can be seen in the following Mineral Potential Maps, these Domains contrast geological favourability patterns as well as clusters of known mineral occurrences, and therefore provides a fair representational framework for the entire Deh Cho region. These Domains are used as the basis for assigning the ranking values, and the calculation of a 'sum of rankings' as part of the Cumulative Mineral Potential map.

Figure 6. Resource Assessment Domains (Domains) used in this study.

Results and Recommendations

Reading the Maps

The results are presented as Mineral Potential Maps for each selected deposit-type and as a Cumulative Mineral Potential map encompassing all deposit-types selected for analysis. This section summarizes the symbology used in each Mineral Potential Map. The maps take into account the mineral occurrence, geology, and Domain ranking elements. There are three layers of information in each map:

- 1) Geological Favourability,
- 2) Mineral Occurrences (and rankings), and
- 3) Resource Assessment Domain rankings.

An example of each of these elements is provided in the example map in Figure 7.

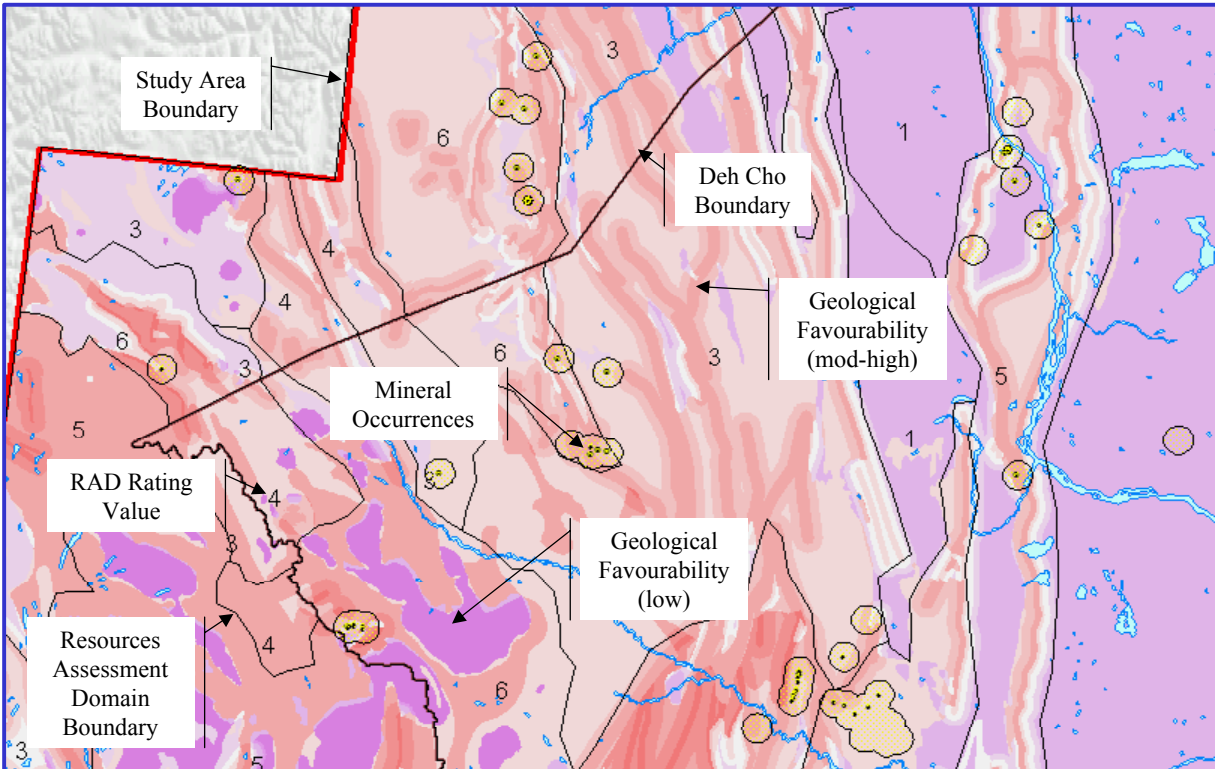


Figure 7. Example Mineral Potential Map showing the symbology for geological favourability, mineral occurrences, resource assessment domains, and ranking values.

(Note: example taken from Deposit Type 10.0 – MVT Pb-Zn Mineral Potential Map.)

The results for each deposit-type are presented in map form, with a brief summary of each of the three elements:

Geological Favourability – is presented according to the Fuzzy Favourability legend presented in Figure 4. Recall that pinkish to red areas are the positive potential areas, and the light to dark bluish areas are the ‘negative’ potential areas for the given deposit-type. Greyish-white colours indicate areas of uncertainty, which often occur in transition between the blue and red end-members of the spectrum of colours.

Mineral Occurrences – are presented as point locations. Mineral occurrence rankings are provided in Appendix A

Ranking of Resource Assessment Domains – are presented as empty polygon areas (i.e. not filled or coloured) with labels of the assigned ranking values (or scores as indicated in Table 3).

This presentation approach permits a combination of Mineral Potential Map elements to be viewed simultaneously in one map. This is expected to aid in discussion about the results (as part of land-use planning options) as well as convey as clearly as possible the range of certainty and uncertainty in the assessment. Readers can see that although a Resource Assessment Domain may have received a high score (e.g. 6), not all areas within that a Domain is equally a 6 ranking. The geological favourability underlay reveals more specific locations for which these values apply. Therefore, it can be seen that in cases where there may be conflicting land-use interests, delineating these areas within a Domain may help reduce the possibility of perceived conflicting land-values.

CMDT 3.0 – Stratiform Fe

Geological Favourability

Geological favourability for Stratiform Fe is quite limited within the Deh Cho territory. Most units were assigned very low values (below 0.40), except those with chemical sedimentary rocks (Enclosure A), which are restricted to units in the northwest and south-central portions of the study area.

Mineral Occurrences

There are only two known occurrences in proximity to higher ranked areas.

Ranking of Resource Assessment Domains

The sparse geological favourability and sparse mineral occurrences results in rankings score of 1 (very low favourability) for most of the study area. Only four Domains receive a ranking score of 3 (low to moderate) or 4 (moderate) in the northwest (Domains 16, 17, 18), while two Domains receive a score of 2 (Domains 11, 24). Only two of these (11, 18) fall within the Deh Cho boundary.

CMDT 3.0 – Stratiform Fe Mineral Potential Map

CMDT 6.1 – SEDEX

Geological Favourability

Higher values are assigned to units associated with documented rift-related packages or non-passive sedimentary sequences in the west. Unit descriptions do not provide enough detail to differentiate active volcanic related sedimentary sequences from passive ones. This is illustrated by values ranging from 0.50-0.57 (pinkish) assigned to acknowledge the possibilities.

Mineral Occurrences

There are 37 mineral occurrences that correspond well with SEDEX model characteristics, and they all occur in the westernmost portion of the study area. These are dominantly Zn and V bearing occurrences. Several Pb-Ag-Cu bearing occurrences are included in this set, although their correspondence with SEDEX model criteria is not as strong.

Ranking of Resource Assessment Domains

Most Domains are assigned a very low (1) to low (2) ranking score, with the exception of some regions showing increased geological favourability (Domains 17, 18, 21, 29, 34-36, Figure 6), but with few known occurrences. High geological favourability combined with a cluster of known occurrences in Resource Assessment Domain 23 results in a ranking of 6 for this area, the most significant potential area that falls within the Deh Cho boundary.

CMDT 6.1 – SEDEX Mineral Potential Map

CMDT 8.3 – Sediment-hosted Cu

Geological Favourability

High geological favourability is restricted to the western and northwestern interior. Units associated with rift settings are considered more favourable, as well as the presence of volcanic rocks, rebeds and evaporites. Higher values (0.58-0.61) are given for units indicating the presence of these environments, lower positive values (0.51-0.57) are given for units that may possibly contain ox-redox exposed units. Negative values correspond to the plutonic rocks (blue) in the west.

Mineral Occurrences

The 49 occurrences classified under this deposit-type all fall within the northwest area in what is locally referred to as the 'copper belt'. Although only two of these occurrences fall within the Deh Cho territory, they are an extension of the copper belt from the north.

Ranking of Resource Assessment Domains

Most Domains are assigned a very low (1) to low (2) ranking. Values of 4 and 5 correspond with areas where the geological favourability is considered reasonably high (in the northwest outside of the Deh Cho boundary), but few or no occurrences are known. Domains 17 and 18 receive a ranking of 6 because of both the high geological favourability and the number of known occurrences that match this deposit-type in that area.

CMDT 8.3 – Sediment-hosted Cu Mineral Potential Map

CMDT 10.0 – MVT Pb-Zn

Geological Favourability

Of all deposit-types considered Mississippi Valley-type lead zinc (MVT Pb-Zn) is considered to be of most significant potential in both the west and east. Low values are assigned to volcanic and plutonic units highlighted in blue in the west, and moderate values (0.48-0.55) assigned to units that might contain platform carbonates and shales in the central platform region. Higher positive values (0.58-0.63) are assigned to units with known platform carbonate and shale sequences. Values increase with proximity to mapped faults. The assessment of the eastern and western areas is elaborated further in conjunction with a review of the known mineral occurrences and warrants a separate view of these two areas.

Mineral Occurrences

The western half of the Deh Cho territory contains seventy-five known occurrences that show a correlation with MVT Pb-Zn deposit-type criteria. The majority of these occurrences coincide with moderate to high geological favourability. Occurrences in the southeast portion of this area (Prairie Creek occurrences) are also tentatively classified as MVT-type occurrences. Jefferson, et. al. (2003) have suggested that these occurrences might better fit under an alternative deposit-type (Manto-Pb-Zn Skarn). (Note: we have tentatively retained the MVT classification until further investigation. The 'total' mineral potential evaluation is not affected by this discrepancy).

The southeast Deh Cho area (adjacent to Pine Point deposits) contains 10 very significant MVT Pb-Zn occurrences. The geological favourability for this area was not assessed due to the eastern limits of Journey's (1995) map. However, these occurrences are deemed significant enough to warrant a ranking and evaluation as part of this analysis. All 10 occurrences, including one past producing mine, Pine Point, are ranked very significant, and have been confirmed to be MVT Pb-Zn occurrences.

Ranking of Resource Assessment Domains

Many areas in the west receive moderate to high values supported by the moderate to high geological favourability and numerous known mineral occurrences. Three Domains 19, 30, 31 (Figure 6) receive a score of 5, and three other Domains 17, 18, 20 (Figure 6) receive a score of 6. Note that the ranking of Domains 19 and 20 (Figure 6) are pending a possible reclassification as another deposit-type, but would simply transfer this ranking to that other deposit-type (Manto-Pb-Zn Skarn).

The ranking of Domains 39-43 (Figure 6) in the east is warranted on the basis of the locally and globally known significance of these occurrences. Three of these areas receive a ranking of 6, and two areas receive a ranking of 7. Those with a value of 7 are those with known deposits. (Note also that this is the only deposit-type for which a ranking of these specific domains is needed. All other deposit-types are ranked as 0 for Not assessed in domains 39-43).

CMDT 10.0 – MVT Pb-Zn Mineral Potential Map

CMDT 17.0 – Vein Cu

Geological Favourability

The assignment of values to geological units for Vein-Cu is particularly difficult primarily because of their general nature of occurrence. While there are some primary sedimentary sequence correlations, these types of deposits are not necessarily constrained by geological settings or rock types. Therefore, all units are given a base value of 0.55 and increased values are assigned for Proterozoic sedimentary rocks, especially if they are associated with igneous intrusions or are interpreted to be rift-related sequences.

Mineral Occurrences

The study area is sparse of known Vein-Cu occurrences. One occurrence correlates with high geological favourability, however, this area also corresponds with the ‘copper belt’ of high Sediment-hosted Cu potential. As with some of the MVT occurrences mentioned previously, in either case, these domains are viewed to have high Cu potential.

Ranking of Resource Assessment Domains

All domains, with the exception of those not assessed, are assigned a base 3 ranking score indicating a minimum of low to moderate potential. Scores of 4 and 5 are assigned to a number of domains in the west coincidental with higher geologically favourable environment environments.

CMDT 17.0 – Vein Cu Mineral Potential Map

CMDT 20 – Skarn (20.1 – Pb/Zn, 20.3 – Au, 20.5 – Skarn W and Emeralds)

Note: Because of the strong similarities of the Skarn-type deposit characteristics, the results of these three deposit sub-types are presented together. While there is only subtle difference in geological favourability, the individual rankings for each sub-type is affected more by the differences of the known occurrences for each sub-type.

Geological Favourability (all sub-types)

In each of the three Skarn sub-types, the geological favourability is relatively the same with a few minor differences. The similarities are strongest at locations where carbonate rocks (Skarn host rocks) have been, or may have been affected by either contact (close to plutons) or regional metamorphism. The differences for each of the three sub-types pertain to known age or lithological host constraints associated with the different commodities of the sub-types. In these cases, base values are assigned to geological units according to sub-type criteria. In all cases, the geological favourability is significantly higher in the west, especially in the vicinity of the known plutons (Enclosure A). Carbonate-bearing units in the interior (at some distance away from plutons) are considered moderately favourable based on the possibility that they may have been affected by regional metamorphism (to varying degrees). Note however, such differentiation (between degrees of regional metamorphism) is not documented in Journey's (1995) map, nor possible to represent at that scale. Therefore, all carbonate-bearing units are considered as initially potentially favourable for Skarn mineralization.

Mineral Occurrences

- CMDT 20.1 – Skarn Pb-Zn (also Manto). Eighteen occurrences of this sub-type have been identified in the western portion of the study area. Several of these are derived from advanced exploration investigation, while the remainder are reconnaissance or have yet to be verified as Skarn Pb-Zn occurrences. All occurrences intersect with areas of moderate to high geological favourability.
- CMDT 20.3 – Skarn Gold (Au). There are only four known occurrences that correspond to this sub-type, two of which have a low internal ranking in terms of their correspondence to this specific sub-type. However, as with Skarn Pb-Zn, they coincide with areas of high geological favourability.
- CMDT 20.5 – Skarn Tungsten (W). Of the three sub-types, Skarn (tungsten) W is the most significant. Of the fifteen known occurrences, one is a producing mine (Cantung Mine), and three others have reached advanced exploration stages. Many of these occurrences cluster within the vicinity of the Cantung Mine, which increases the likelihood that significant Skarn W potential is high in this area.

Ranking of Resource Assessment Domains

Note: As with the geological favourability discussed above, the base rankings applied to the resource assessment domains reflect similarities among the three sub-types. At the scale of applying the modified Geological Survey of Canada ranking scheme, the subtle differences in geological favourability for each sub-type (especially in the central platform areas) become diffused. In most cases, all eastern, central, and mid-western domains (those favoured only for their carbonate-bearing significance) are scored very low (1) or low (2). A ranking score of 3 (low to moderate) is assigned for domains that intersect with areas where carbonates may have possibly been regionally metamorphosed. The distinct differences among the three sub-types occur in the western portion where differences in the known occurrences have significant bearing on the rankings.

- CMDT 20.1 – Skarn Pb-Zn (lead-zinc). The higher geologically favourable areas (as indicated by the concentric patterns in the vicinity of known plutons) are ranked as either moderate (4) or moderate to high (5). Domains 20 and 25 receive a low-moderate score (3). More significantly, Domains 33 and 36 each receive a score of 6 (High) because of the coincidence of both high geological favourability and significant known occurrences.
- CMDT 20.3 – Skarn Au (gold). Two significant occurrences are known in Resource Assessment Domain 36, which is assigned a high ranking (6). Other occurrences, although potentially significant, have yet to be validated as this specific sub-type, and therefore their respective Domains (23, 28, 30) retain a ranking of moderate to high (5).
- CMDT 20.5 – Skarn W (tungsten). As discussed previously, this sub-type represents the only active producing mine in the region, hence, domain 23 is assigned a Very High (7) ranking. Fourteen other occurrences in adjacent Domains (33, 34) warrant a High ranking (5) for these areas.

CMDT 20.1 – Skarn Pb-Zn Mineral Potential Map

CMDT 20.3 – Skarn Au Mineral Potential Map

CMDT 20.5 – Skarn W Mineral Potential Map

CMDT 21.0 Pegmatites

Geological Favourability

The geological setting for pegmatite occurrence is primarily associated within and in close proximity to known plutons (Enclosure A). However, areas affected by regional scale faults (and other deformational features) also present possibilities for pegmatite occurrence. The generally uncertain values associated with these faulted areas illustrates this evaluation. For the most part however, geological favourability is increased within and near known plutonic rocks.

Mineral Occurrences

All eleven occurrences have been reasonably confirmed as pegmatite-type, however, only coincides with an area of high geological favourability. A significant cluster of occurrences exists within a faulted region at a considerable distance away from known plutons.

Rankings of Resource Assessment Domains

All domains outside of the known pluton-rich domains are assigned a Very Low ranking (1) or Low (2). The domains coincident with plutons in the west are assigned Moderate to High (4-5).

CMDT 21.0 Pegmatites Mineral Potential Map

CMDT 25.0 – Primary Diamonds

Geological Favourability

The potential for primary diamond occurrences requires the occurrence of deep-seated igneous intrusions, such as kimberlites or lamproites. Although these are primarily known to occur within Shield areas (such as the Slave Province, north of Yellowknife), they are known to occur in a wide range of geological environments and ages. It is possible that these intrusions occur within the Interior Platform or Cordilleran as they do elsewhere in the world (Eckstrand et al, 1996). However, their nature of occurrence (small size) makes it very to represent potential on a regional scale. As a result, the geological favourability component has been mapped at 0.50 (or *aporia* (Eddy, 2003), complete uncertainty) it cannot be said whether or not diamonds occur in the study area.

Mineral Occurrences

None known.

Rankings of Resource Assessment Domains

It was not possible to assess diamond potential, so all domains received a value of 0 (Table 3).

CMDT 25.0 – Primary Diamonds Mineral Potential Map

Cumulative Mineral Potential (CMP) Map

In the previous sections, the mineral potential for each deposit-type was represented by mapping relative favourability of the geological setting, combined with ranking of areas using the modified Geological Survey of Canada ranking scheme (Table 3). Each deposit-type representation revealed a range of potential, and it can be said that the potential for some deposit-types (e.g. Stratiform Fe) are consistently low across the study area, while the potential for others (e.g. Vein Cu) are consistently moderate to high. Other deposit-types (e.g. SEDEX, MVT, Skarn) reveal a range of Low to Very High potential depending on the correspondence between geological favourable settings and geographical location. Individually, they provide important information for land-use decision makers, however they may also be combined collectively to provide another layer of information as an aggregate of all types considered. In this section, a Cumulative Mineral Potential (CMP) map is represented as a composite of the individual Mineral Potential Maps presented above.

Geological Favourability

The calculation of cumulative geological favourability is based on combining all of the geological favourability maps for all deposit-types considered in this study. This layer uses the same relative favourability legend as in all other maps (Figure 4). It was calculated by taking the maximum potential of all deposit-types and increasing the net value for locations where there is high potential for more than one type. For example, if in one location, the geological favourability for a deposit-type was given a value of 0.65, and there is no other high potential deposit-types for that same location, then this map shows that location as 0.65 (the maximum of all types). But in some locations, the geological favourability is high to very high for more than one type (as is seen in SEDEX, MVT, and Skarn for similar locations). The geological favourability in the Cumulative Mineral Potential map takes into account the possibility that there is good potential for more than one type in some locations. Therefore, the calculation shows an increased affect for locations where there is high potential for more than one type.

This combination results in relatively higher cumulative favourability values in the range of 0.80 to 0.96. In reference to the favourability legend presented in Figure 4, such values represent a relatively confident answer to the more general question “Is their mineral potential at location x-y”? The range of colour from medium red to dark red on this map indicates a geologic favourability assessment of Likely to Very Likely (Figure 4). In some locations (i.e. where there are validated occurrences and known mineral deposits), the answer is “Yes” (significantly higher values than 0.65-0.75). The redness of this map indicates that no location within this region can be said to be of low cumulative mineral potential.

Sum of Rankings (Resource Assessment Domains)

It can be seen that some areas have relatively higher potential than others. The ranking scheme applied to each deposit-type individually is incorporated here as a ‘Sum of Rankings’ information layer. All ranking values are presented in Table 4. Note that the resulting numerical scale (to values as high as 40) does **not** equate to the corresponding evaluations of the modified Geological Survey of Canada ranking scheme. The sum of rankings simply reflects

the overall relative cumulative potential of all deposit-types considered in this study. The sum of rankings values in the western interior are significantly higher than those in the central and interior platform areas.

Specifically, within the Deh Cho boundary, six Domains (11, 18, 20, 21, 23, 33, Figure 6) reveal high to very high mineral potential for a number of deposit-types, with sum of rankings values of 22, 33, 23, 24, 40, and 33 respectively. It is these specific domains that the potential for discovery of new mineral deposits is most likely.

The sum of rankings and geological favourability shown here are calculated from all nine deposit-types selected for this study. The inclusion or exclusion of specific deposit-types from this type of calculation will inevitably affect how cumulative mineral potential is viewed in terms of the relative ranking of potential for different locations across the Deh Cho territory. It is for this reason that mineral potential information must always be considered relative and contextual depending on the selection of deposit-types or commodities of interest, as well as the limitations of data, knowledge, and methodologies employed in the analysis and interpretation of potential. These are just a few significant aspects that are important to consider when applying this information for examining land-use options.

Table 4. Individual Rankings and Sum of Rankings Values by Resource Assessment Domain.

(Note: 'light blue cells' indicate 'Not assessed').

RAD No.	DT 3.0	DT 6.1	DT 8.3	DT 10.0	DT 17.0	DT 20.1	DT 20.3	DT 20.5	DT 21.0	DT 25.0	Sum of Ratings
1	1	1	1	1	3	1	1	1	1	0	11
2	1	1	1	1	3	1	1	1	1	0	11
3	1	1	1	1	3	1	2	1	1	0	12
4	1	2	1	1	3	1	2	1	2	0	14
5	1	1	1	1	3	1	1	1	1	0	11
6	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0
8	1	1	1	1	3	2	2	2	1	0	14
9	1	1	1	1	3	1	2	1	1	0	12
10	1	1	1	1	3	1	1	2	1	0	12
11	2	1	2	5	3	2	2	3	2	0	22
12	1	2	2	4	4	2	2	2	2	0	21
13	1	1	1	1	3	1	1	1	1	0	11
14	1	1	1	1	3	1	1	1	1	0	11
15	1	1	1	1	3	1	1	1	1	0	11
16	3	1	4	3	3	2	2	2	2	0	22
17	4	3	6	6	5	2	3	3	2	0	34
18	3	3	6	6	5	2	3	3	2	0	33
19	1	1	2	5	3	2	2	2	1	0	19
20	1	1	2	6	3	3	2	3	3	0	23
21	1	3	4	3	5	2	2	2	2	0	24
22	1	1	1	3	3	2	2	2	2	0	17
23	1	6	2	4	5	5	5	7	5	0	40
24	2	1	4	3	3	2	3	3	2	0	23
25	1	2	1	3	5	3	4	4	4	0	27
26	1	1	1	2	3	2	2	2	1	0	15
27	1	2	1	4	3	2	2	2	1	0	18
28	1	1	2	3	5	5	5	4	5	0	31
29	1	4	2	3	5	4	4	4	4	0	31
30	1	2	2	5	4	5	5	5	4	0	33
31	1	2	2	5	3	2	3	2	1	0	21
32	0	0	0	0	0	0	0	0	0	0	0
33	1	2	1	6	4	6	5	6	5	0	36
34	1	4	5	6	3	4	4	6	4	0	37
35	1	3	5	3	3	2	2	2	1	0	22
36	1	3	5	3	4	6	6	5	5	0	38
37	1	1	1	4	4	2	2	1	2	0	18
38	1	3	1	4	3	1	2	1	2	0	18
39	0	0	0	6	0	0	0	0	0	0	6
40	0	0	0	6	0	0	0	0	0	0	6
41	0	0	0	7	0	0	0	0	0	0	7
42	0	0	0	7	0	0	0	0	0	0	7
43	0	0	0	6	0	0	0	0	0	0	6

Cumulative Mineral Potential Map (CMP)

Simplified (Four Class) Cumulative Mineral Potential Map

Limitations and Constraints

The use of any modeling criteria derived from local and global knowledge, as well as formal and informal knowledge of what constitutes “mineral potential” must be treated in the context that new knowledge and new discoveries continue to be made, which at times, may alter the assumptions and conclusions built into existing models. These results are presented within the context of a pre-cautionary approach. This is to say that it is not wise for resource geologists to assess any given location as having no mineral potential or even low mineral potential. Only that for specific deposit-types, some locations are relatively lower or higher depending on the geological characteristics and supporting evidence.

Where potential is identified as relatively higher it does not preclude the potential for relatively lower areas being ranked higher in the future, with the use of different data, knowledge, or in consideration for other types of commodities.

For example, the potential for Diamonds in the Interior Platform is being given significant attention. Over six (6) million hectares (~25,000 km²) has recently (Feb. 2003) been permitted by Diamondex in Inuvialuit, Sahtu and Gwich'in Territories (see Appendix D) on the basis of favourable sampling results in the summer of 2003. Diamondex is the same group who made the Snap Lake diamond discovery northeast of Yellowknife, now being developed by DeBeers into Canada's first underground diamond mine. Diamondex is planning to spend \$2,000,000 in the summer of 2003 on exploring for diamonds in the Interior Platform.

The geology underlying these areas presently being explored is similar to that which underlies the Deh Cho territory, and by extrapolation it could be said that portions of the Deh Cho territory have similar potential for the occurrence of diamonds.

Based only on the geology, and what we know about primary diamond deposits in Canada, this area (Interior Platform) would be considered low for diamond potential. Although exploration for diamonds has been going on in the Interior Platform for over 30 years by DeBeers and others (Blackwater Lake area) and significant diamond indicator minerals have been found: no kimberlite (host for diamonds) nor diamonds have been discovered. Therefore, conclusions based only on geology and known diamond/kimberlite occurrences would not suggest potential for diamonds in this geologic environment. However, because of the degree of industry interest and level of investment this region can be considered to be of some significant potential.

This is much the same as the Lac de Gras area appeared before the discovery of diamonds. Prior to 1985 no one recognized the diamond potential in the area. The Northwest Territories is now supplying 10% of the world's diamonds by value (Appendix D). Diamonds represent one commodity for which there may be significant potential but cannot be adequately conveyed within the mapping approach applied here. The Mineral Potential Maps presented here represent a minimum of potential commodities but cannot conclude that some areas are low or no potential.

These results also do not take into account economic, social, political, environmental and engineering factors that play a significant role in bringing a potential area into the status of

actuality. Another level of assessment would need to be undertaken for these factors to be considered. The implications of these constraints are discussed further in the conclusions and recommendations section below.

It is possible to portray mineral potential for the entire Deh Cho territory through the application of this specific approach. But this study is based on 1:1,000,000 scale mapping which is too coarse for the level of detail that may be required in the land-use decision making process in some areas. The results presented here are highly generalized. The Deh Cho would benefit from more detailed Mineral Potential Map and assessment in some sub-regions, perhaps for specific commodities of interest, and in locations where greater clarity and resolution is required.

Conclusions

1. The most significant potential appears in the western part of the study area, within the mountainous Cordilleran. Both the individual Mineral Potential Maps and the Cumulative Mineral Potential Map illustrate this conclusion. In particular, this region is regarded as high to very high for Skarn, SEDEX and MVT Pb-Zn.
2. The general conclusion is that the entire Deh Cho area contains at least some mineral potential, if not because of one mineral deposit-type, then another, or some combination of types. There is nowhere within the Deh Cho area that can be said to have no potential or low potential.
3. Although not assessed for geological favourability during this study, significant MVT Pb-Zn occurrences within the eastern portion of the Deh Cho boundary (Pine Point) show high to very high potential. The proximity of these occurrences to existing infrastructure and resources warrants significant attention and future study.
4. The Cumulative Mineral Potential portrayed by these maps: to be relatively higher in the west relative to the central and eastern portions may change based on new information. New discoveries, data, and knowledge about the study area continue to emerge, and there may be high potential for some commodities (e.g. Diamonds) in areas that are evaluated as relatively low in this study.

Recommendations

1. It is recommended that no decisions regarding the promotion, development or withdrawal of areas should be made on the basis of the Mineral Potential Maps presented here without the guidance of a resource assessment geologist.
2. It is recommended that a second phase of Mineral Potential Mapping be carried-out at 1:500,000 to 1:250,000 for selected deposit-types, and in locations where the DCLUPC consider important for their planning purposes.
3. In conjunction with Recommendation 2, a fieldwork component (new data collection) may necessary to augment the rankings applied here. While it is not possible to conduct fieldwork at the same level of detail for the entire Deh Cho region, specific sub-areas considered important by the DCLUPC should be given attention.

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Appendix A - Mineral Occurrences Data

Appendix B – Media Releases of Diamond Exploration Interests

Appendix C – “Mineral Potential Analyzed and Mapped at Multiple Scales - A Modified Fuzzy Logic Method Using Digital Geology”

Enclosure A – Geology and Mineral Occurrences of the Deh Cho territory

Enclosure B – Cumulative Mineral Potential Map of the Deh Cho territory