3.0 INTERPRETATION METHODOLOGY

3.1 LINEAMENT CONCEPT

The lineament notion exists since 1903, well before the advent of satellite images and image analysis techniques done on numerical data. The word itself has undergone several modifications and, even today, there is little agreement between the specialists.

Since the appearence of the first satellites photos in the mid '60s, then the first numerical images in 1972, several lineament studies were done, some on one and same area. The most noticeable difficulty of the technique was its lack of reproductability.

As a matter of fact, it was uncommon to see two completely different lineament interpretation for the same image. The reasons for this was the absence of any agreement about the lineament definition. Thus, while some specialists, cautious in their interpretation, were tracing only the lineaments that they were sure of the lithological signification, others were tracing the most lineaments possible in order to extract the maximum informations from the image and were modifying their maps in a huge amount of intersecting lines. These extremes have conducted to a lineament definition in the mid '70s as lineament studies were in vogue. O'Leary (1978) defines therefore the geological lineament as a simple or complex linear feature, detected in surface, where the different portions, aligned according to a straight line or a curve, stand out distinctively from their surrounding and reflect possibly a phenomenon generated below the surface.

3.1 LINEAMENT CONCEPT (cont.)

Despite this elaborated definition, several kinds of interpretation remain. Thus, some specialists prefer to trace lineaments they really observe, while others trace continuous lineaments from smaller aligned ones, facilitating the relationship between them.

From the experience acquired by the author in geological remote sensing and mineral exploration (as far as the academic and applied consulting is concerned), here are the main characteristics of the geological remote sensing interpretation that will be find in this study:

1. Multi-temporal interpretation:

several interpretations of the same image have been done (four in total), spread on two weeks at different days and different moment in the day as well (morning, afternoon and evening). All the interpretations were done from scratch, without the lineaments subsequently interpreted. This exercise is intended to simulate the interpretation that several specialists would have done of the same image so as to prevent variations when the interpretation is actually performed.

2. Correlation between the lineaments:

lineament interpretation is an interpretation and not only an observation of actual lineaments. Then, if two aligned lineaments represent a single structure, a larger lineament will be traced and will include the two small ones.

3. Level of lineament interpretation:

the level of interpretation is elaborated but simple in terms of presentation. In structural geology, a structural feature occurs rarely alone. Regional strains allows fracturation patterns rather than isolated phenomenons.

3.1 LINEAMENT CONCEPT (cont.)

4. Lineament classification:

lineaments that are present on the satellite image do not have all the same expression. In this case, if one maps the lineaments in the same fashion, the interpretation will not take into consideration the differencies between lineaments. Classification concepts are enumerated in the next section.

The author of this report does its work on the basis of lineament classification regarding its geographical extension (length of lineament), its surface expression (order of lineament) and its direction (principal and secondary trends of lineaments).

3.2 LINEAMENT CLASSIFICATION

As mentionned earlier, several types of classification have been achieved on lineaments following their observation and mapping. The purposes of these classifications are to characterize and to group lineaments susceptible to represent one or many specific geological phenomenons as to facilitate their interpretation. Lineaments are classified accoording to the next three criterions: their geographical extension, their surface expression and their preferential direction.

The first classification characterizes the geographical extension of lineaments. Some lineaments are longer, representing contacts or important structures while others are smaller like subsidiary structures to major faults. Applied to the needs of the present study, lineaments are classified according to their geographical extension as regional and local lineaments. A study of local lineaments will be done by taking into consideration the results when more local exploration targets will be defined.

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3.2 LINEAMENT CLASSIFICATION (cont.)

The second classification will be focused on the surface expression of lineaments, as some lineaments stand out clearly while other stand out in a more subtle fashion. Spatial image analysis, decribed previously in this report, has for objective to put in evidence by data processing the more subtle lineaments. Then, as the image analysis becomes more and more elaborated, we are in a position to generate more lineaments and more informations susceptible to help in final interpretation of actual geological features.

For that reason, a lineament classification coming from various interpretation steps must be done. Thus, lineaments coming from non-processed image (with only contrast enhancement and filtering) are considered as first-order lineaments. These lineaments represent usually major structures of which a strong expression is due to their shallow depth or to their geological importance, related to horizontal (or vertical) movements which they have generated.

Lineaments coming from processed images (for example strong filtering, RADAR simulation) are considered as second-order lineaments. These lineaments represent subtle structures that need a lot of complex processing to express. Reasons for that matter are either the lower importance of a structure or its position deeper in the sub-surface.

Finally, the third step of interpretation features the grouping of lineaments into major and minor trends. Regional strains rarely generate one lonely structure but a trend composed by a certain number of lineaments. Accordingly, the lineaments are grouped into families of the same trend. These families are numbered for example as a 10-family, meaning that lineaments from 10 to 19 would be characterized by a particular direction. A 20-family would feature another trend and so on. This means that lineaments coming of a particular direction of a particular fracturation event would be grouped into one single family.

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TABLE OF THE REGIONAL LINEAMENTS INTERPRETATION - EXAMPLE

No of lineament	Family	Order	Interpretation
10	10	1st	Lineament not directly involved in the property (it touches the northern part) but is part of the understanding of the N-E direction fractures
11	10	1st	Same as 10, starts from the northern part of Fox-Deer lake to the western limit of the property. It is very important for the understanding of lineament no. 12
12	10	2nd	Important lineament considering the northern part of the property. It is considered to be a splay for the structure of lineament 10. It could be an important structure for mineralization on the northern part of the property
13	10	1st	Very important N-E trending structure. It has the clearest surface expression, passing through the Moose Creek. Should be a very important structure to target mineralization north of zone 75 or the main zone
14 & 15	10	1st	Structures that touch the southern part of the property. Lineament 14 is a very long lineament coming from the south

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