NEAR SURFACE MINERAL POTENTIAL OF THE PLAINS OF WESTERN CANADA, WITH SPECIAL REFERENCE TO SASKATCHEWAN

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ABSTRACT

With the recent discovery of diamondiferous kimberlite in the Prince Albert area, southern Saskatchewan, the entire plains area is being viewed with renewed exploration interest. Thus, exploration activity has grown from being concentrated in the northern part of the province (primarily the Precambrian Shield) to include the southern part of the province where the geologic conditions are radically different.

Immediately south of the Shield, bedrock consists of relatively hard rocks that were little deformed by the overriding ice sheets. Here the thickness of glacial sediments is tens of metres and the stratigraphy is relatively simple. Farther south, bedrock comprises soft, deformable sediments, the drift is commonly hundreds of metres thick, and the stratigraphy is complex. An understanding of Late Cretaceous, Tertiary and Quaternary geologic environments and deposits that have undergone subsequent erosion, transport, and deposition is crucial to effective exploration.

Kimberlites are known to intrude rocks as young as the Ashville Formation. Gold is found in preglacial gravels and other aggregate deposits, along with minerals such as garnet and magnetite. Industrial minerals such as clays, bentonite, silica sand, and building stone are exposed at various locations throughout Saskatchewan.

A database, compiled over the last 30 years, provides the foundation of this new exploration focus. New approaches in utilizing this data could result in new mineral development on the Prairies.

INTRODUCTION

The recent discovery of diamondiferous kimberlite in the Prince Albert area has led to renewed exploration activity in the Plains of Western Canada. This paper is intended to review the potential of selected mineral resources in that part of western Canada, primarily Saskatchewan, underlain by Phanerozoic rocks.

Most of the area was covered by continental ice sheets several times during Quaternary time. As the Quaternary geological conditions are very different from those encountered in the Precambrian terrain in the north, this paper will address some problems encountered in the south. Exploration techniques that can be used throughout the region will be discussed briefly, but the main focus is to identify some potential economic mineral resources and problems that might be encountered during an exploration program.

For the purposes of this paper, ‘near surface’ is defined to be within approximately 100 m of the present land surface or to the base of the drift. It is recognized that this arbitrary depth is clearly too great for economic recovery of many resources such