

Diamond Opportunities, Exploration and Mining in Ontario

Introduction

The first recorded discovery of an alluvial diamond in Canada was made somewhere near Peterborough prior to 1920. The 33-carat stone was found during the excavation of a railway cut between Ottawa and Toronto. Although the source of this stone has never been identified, it was presumably found in glacial drift. Alluvial diamonds continue to be unearthed. The most recently reported alluvial stone was a 1.39-carat gem-quality diamond panned from a streambed north of Wawa in 2002.

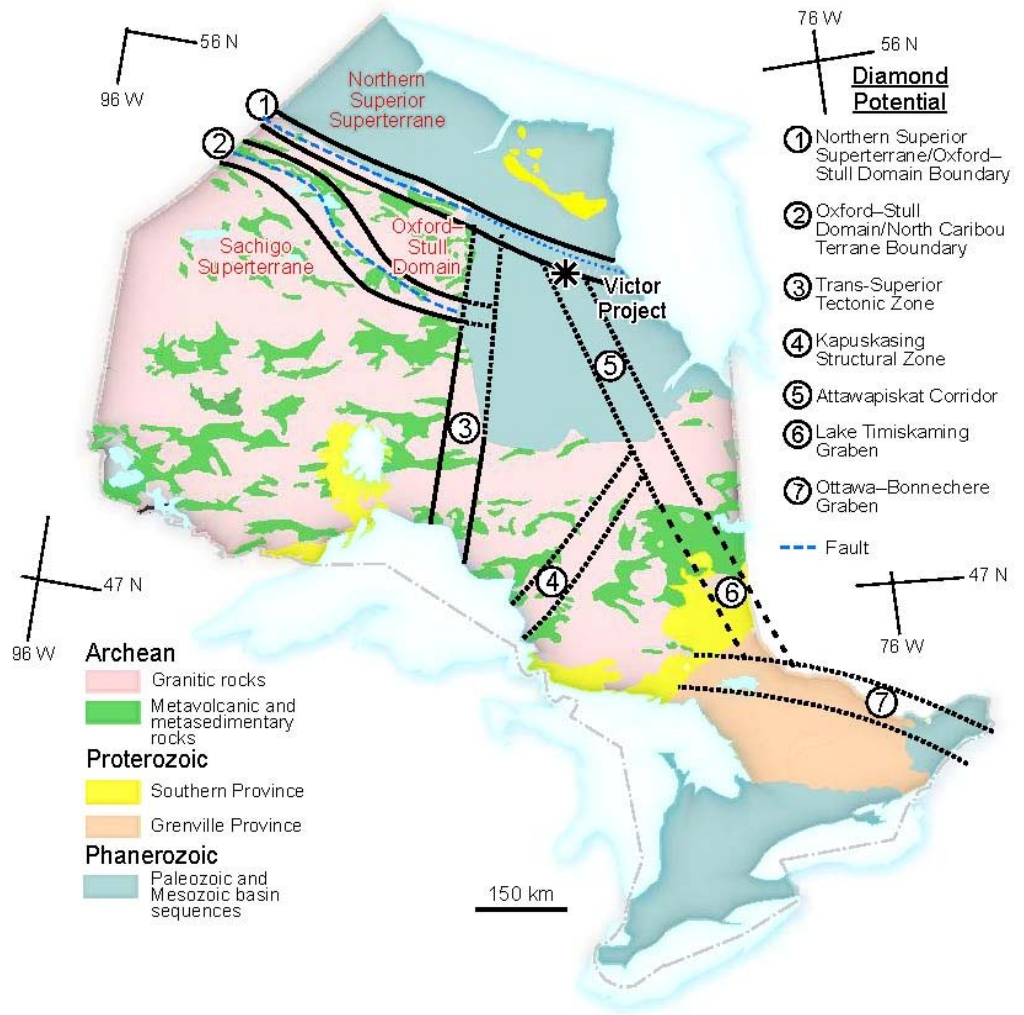
Distribution

Diamonds have been found in bedrock in four distinct types of rock in Ontario. Kimberlite, the most common host of diamond deposits, is found in areas across the province. Diamonds have also been found in unusual fragmental intrusive and extrusive rocks of Archean age in the Marathon, Wawa, Cobalt areas, and Fort Frances areas. They have also been found in lamprophyres in the Cobalt, Kirkland Lake and Marathon areas, and in lamproite in the James Bay Lowlands. Diamonds also were discovered in Archean conglomerates in the Wawa area in 2004.

The distribution of kimberlite around the world is not random. It is governed by the thickness of the Earth's crust. The crust must be at least 35 km thick. Crust this thick is found at the cores of continents.

These continental cores, or cratons, generally consist of rocks more than 2.5 billion years old that have had very little deformation for over a billion years. The Canadian Shield, which underlies two-thirds of the province Ontario, is a craton.

Kimberlites also have associations with large-scale "structural zones" such as rifts and the boundaries of crustal segments called domains and / or terranes. Such prospective zones in Ontario are shown on the map at right.



Kimberlite occurs in clusters of several pipes, and the pipes in a cluster are typically at most tens of kilometres apart. Within Ontario, there are several broad clusters of kimberlites associated with structural zones. Clusters of 19 kimberlite pipes and dikes in the Kirkland Lake area, 19 other kimberlite pipes and dikes in the New Liskeard–Cobalt area, and 25 pipes and dikes in the Attawapiskat River area are all associated with the Ottawa–Timiskaming Rift. Kimberlite dikes in south-eastern Ontario are also associated with this structure.

A cluster of 7 kimberlites lying about 150 kilometres south-west of the Attawapiskat cluster may be associated with the boundary between the North Caribou Terrane (part of the Sachigo Superterrane) and the Oxford–Stull Domain. Other kimberlites are found along the north side of the Trans-Superior Tectonic Zone and in the area of the Kapuskasing Structure.

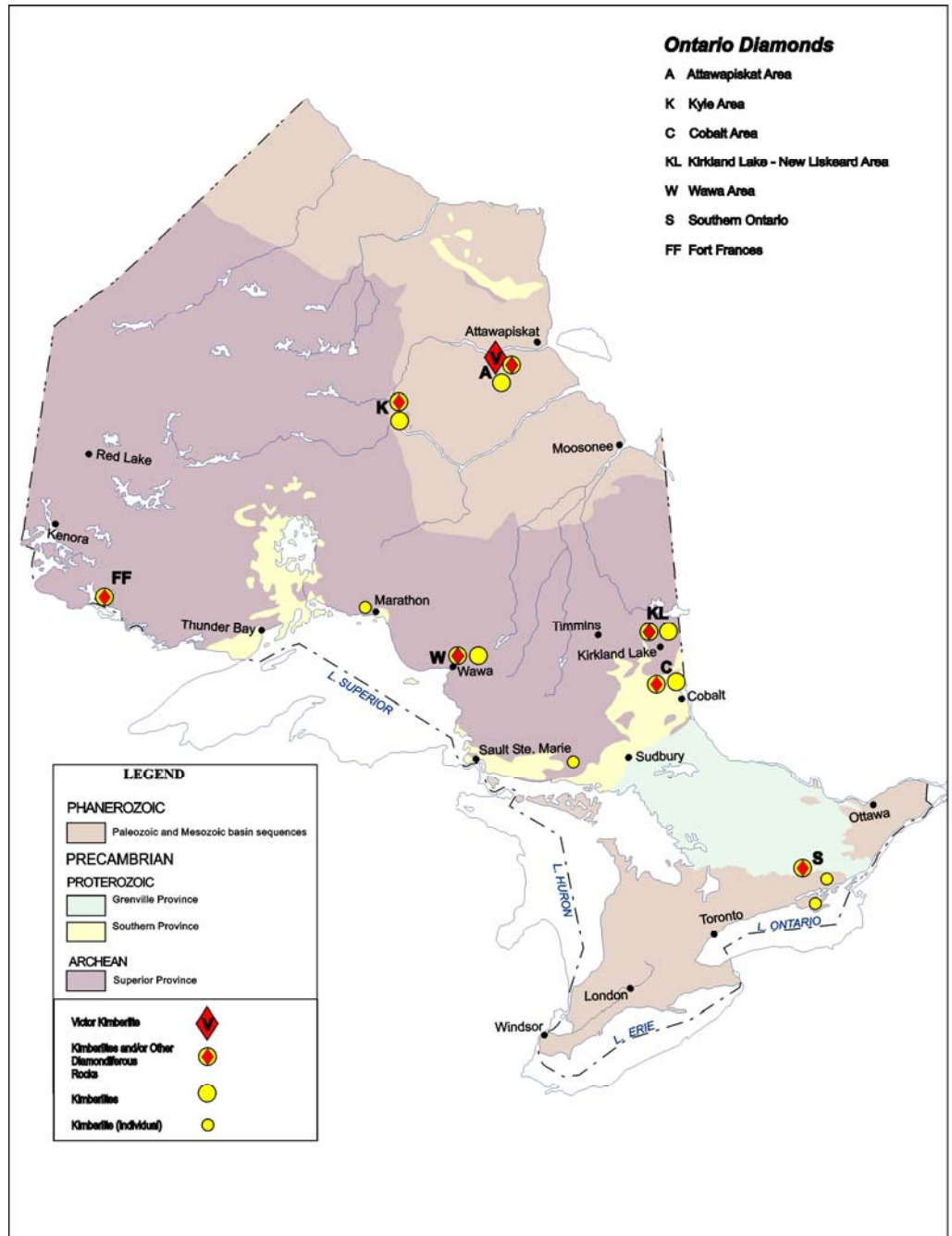
All of these structural features, plus the boundary between the Northern Oxford–Stull Domain and the Superior Superterrane offer highly prospective environments for diamonds.

Development

Although the possibility of diamonds in Ontario was first discussed in detail as early as 1899, serious exploration only began in 1960. It focused on the in the James Bay Lowlands. With the successful discovery of diamond-bearing kimberlite pipes in the late 1980s, interest in diamond exploration in Ontario increased substantially. Kimberlite is still the traditional diamond exploration target in the province, although unusual Archean-aged heterolithic breccias and other diamond-bearing rock types have also been a focus of exploration in the province.

The Victor Mine, Ontario's first diamond mine, is owned and operated by De Beers Canada Inc. It is located in the James Bay Lowlands, 90 kilometres west of the community of Attawapiskat. Construction began in early 2006, and production started in 2008. The mine was intended to have an annual output of 600 000 carats, but in 2009 production was 696 484 carats, and in 2010 it was 826 000 carats. Rough diamonds from Victor Mine have the second highest value per carat in the world, after Letsang Mine in Lesotho, Africa. The 2010 production from Victor Mine is valued at more than \$C338 million.

There have been spin-offs developments in Ontario related to the Victor Mine. In 2009, Canada's first diamond bourse opened in Toronto, and a diamond cutting facility was established in Sudbury. The cutting facility has since grown to become the largest in Canada. In the spring of 2010, the first Ontario diamonds went on sale in Toronto. The 131 stones had an estimated value of \$4 million, with \$2 million already cut and polished and the rest uncut. Individual stones started at \$1,400, with the most expensive at about \$170 000.



The map shows the distribution of diamond fields across Ontario, with the highest concentration in the northwestern and central regions. The legend indicates that the Victor Mine is the only diamond mine in Ontario, while other fields are represented by different symbols and colors.