CHARACTERIZATION OF TOURMALINE FROM THE MAW ZONE, GRYPHON ZONE, AND SANDSTONES ABOVE THE PHOENIX URANIUM DEPOSITS, ATHABASCA BASIN, SASKATCHEWAN

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INTRODUCTION

Tourmaline has previously been reported in the Athabasca Basin. In this study, we have characterized the occurrence and mineral chemistry of tourmaline from three different locations on the Wheeler River property, namely Denison Mines Corp. (Fig. 1). The Maw Zone is a Mesoarchean age orthogneissic greenstone belt of the Superior Province. The Gryphon and Phoenix Zones are Mesoproterozoic age greenstone belts of the Superior Province. Petrography and mineral chemistry of tourmaline from these zones have not been reported previously. The objectives of this study are to: 1) determine if tourmaline is present at these locations; 2) characterize the occurrence and mineral chemistry of tourmaline from these different locations on the Wheeler River property; and 3) to determine if tourmaline is a source of uranium mineralization.

METHODS

Sampling Sites

Sampling sites were identified based on previous work by Denison Mines Corporation (2014) and Quirt et al. (1991). Samples were collected from outcrop, drill core, and polished thin sections. Samples were analyzed for mineral chemistry using electron microprobe analysis (EMPA) and X-ray diffraction (XRD).

Results

Tourmaline was found in all three locations. Petrography of tourmaline from each location is presented in the following sections.

Petrography

1) Tourmaline in all three locations crystallized after quartz in sandstone. Correlation of tourmaline crystallization with quartz suggests that tourmaline formed after hydrothermal fluids passed through the sandstone.

2) All tourmaline studied show high vacancy (> 53%) in the X-site and classified as Dravite.

3) Similar chemistry and mineral parageneses suggest that tourmaline of all studied areas is a mixture of fine-grained tourmaline and fine-grained tourmaline from the Phoenix samples are more than 100 m from the mineralization. McArthur River uranium mineralization.

Summary

1) Tourmaline in all three locations crystallized after corrosion of detrital quartz in sandstone.

2) All tourmaline studied show high vacancy (> 53%) in the X-site and classified as Dravite.

Mineral Chemistry

General Formula of Tourmaline

X Y Z (T, O, H) (BO)3 V W

References


Acknowledgments

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Table 1: List of sample locations, lithology of the host rocks, and distance to uranium mineralization

<table>
<thead>
<tr>
<th>Location</th>
<th>Lithology</th>
<th>Distance to Uranium Mineralization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phoenix Zone</td>
<td>Maw Zone ZQ-09 Sandstone, Manitou Falls Fm, Dunlop Member</td>
<td>0.6 km</td>
</tr>
<tr>
<td></td>
<td>Phoenix WR-345 Sandstone, Read Fm</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Phoenix WR-293 Sandstone, Uppermost Read Fm/Lowermost Read Fm</td>
<td>220 m</td>
</tr>
<tr>
<td>Gryphon Zone</td>
<td>Maw Zone ZQ-09 Sandstone, Read Fm</td>
<td>20 km</td>
</tr>
<tr>
<td></td>
<td>Phoenix WR-302 Sandstone, Read Fm</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Phoenix WR-299 Sandstone, Read Fm</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Figure 1: Geologic map of Wheeler River property at the unconformity showing Basement rocks in the lower part of the property (after Denison Mines Corp., 2014). Inset: Geological map of the Maw Zone with location of the property (after Adlakha et al., 2015).