GENETIC CLASSIFICATION OF BRECCIAS

**Introduction**

Despite showing an important association with numerous types of gold deposits, magmatic breccias remain an enigmatic type for many geologists. This classification of breccias is genetic and is based on the inferred role of magmas, magmatic volatiles and their interaction with groundwater, it is taken from a classic study by Liles et al. (1985) and a revised and expanded classification by Liles (1988).

Alteration:

- Maar, tuff
- Commonly
- Exfoliated fragments

Magmatic breccias are a non-uniform feature of numerous geothermal environments (especially magmatic arcs), and may have a distinct fabric or identity as part of a preserved history of magmatic hydrothermal activity. Some examples of large gold deposits hosted within large magmatic breccias include the Porphyry (vein sub-hedral) and Cordilleran (vein sub-parallel) environments (Workshop manual, Kingston-McKee, consulting, 2005).

Classification of breccias is genetic and based on the inferred role of magmas, magmatic volatiles and their interaction with groundwater. These include identifiable breccia textures and composition, particular important natural features (e.g. microtextures, polished surface, cross-cutting relationships). Magmatic breccias are genetically classified into seven categories based on these criteria.

Clarity, the below classification system is not suitable for use, and can be used to help identify the type of breccia. It is important that variations in breccia facies are recognized and that their distribution determined. This will help in other tectonic provinces within the same environment. Field classification of breccia types is based on the analysis of: clast composition, degree of fragmentation, matrix composition, hydrothermal alteration of clasts and the presence/absence of important clast types.

<table>
<thead>
<tr>
<th>Code</th>
<th>Breccia Category</th>
<th>Energy Source</th>
<th>Mobile Phase</th>
<th>Geometry</th>
<th>Source</th>
<th>Component</th>
<th>Other Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Intrusion</td>
<td>Magma</td>
<td>Groundwater</td>
<td>Irregular</td>
<td>Mobile</td>
<td>Absent</td>
<td>Infrequent</td>
</tr>
<tr>
<td>2</td>
<td>Phreatic Breccia</td>
<td>Magma</td>
<td>Groundwater</td>
<td>Irregular</td>
<td>Groundwater-supported</td>
<td>Rounded to sub-rounded</td>
<td>None</td>
</tr>
<tr>
<td>3</td>
<td>Phreatomagmatic Breccia</td>
<td>Magma and external water</td>
<td>Groundwater Supported</td>
<td>Irregular</td>
<td>Groundwater-supported</td>
<td>Rounded to sub-rounded</td>
<td>None</td>
</tr>
<tr>
<td>4</td>
<td>Tectonic Breccia</td>
<td>Earthquake</td>
<td>Groundwater</td>
<td>Irregular</td>
<td>Groundwater-supported</td>
<td>Rounded to sub-rounded</td>
<td>None</td>
</tr>
<tr>
<td>5</td>
<td>Magmatic Phreatic</td>
<td>Magma</td>
<td>Groundwater</td>
<td>Irregular</td>
<td>Groundwater-supported</td>
<td>Rounded to sub-rounded</td>
<td>None</td>
</tr>
<tr>
<td>6</td>
<td>Magmatic Phreatomagmatic</td>
<td>Magma and external water</td>
<td>Groundwater Supported</td>
<td>Irregular</td>
<td>Groundwater-supported</td>
<td>Rounded to sub-rounded</td>
<td>None</td>
</tr>
<tr>
<td>7</td>
<td>Magmatic Tectonic</td>
<td>Earthquake</td>
<td>Groundwater</td>
<td>Irregular</td>
<td>Groundwater-supported</td>
<td>Rounded to sub-rounded</td>
<td>None</td>
</tr>
</tbody>
</table>

**1. Magmatic Hydrothermal**

- Quartz-tourmaline breccia with evolved fragments, thermal clay mine, Connemara, Connemara.

**2. Phreatic Breccias**

- Cause by the expansion of steam and gas from circulating groundwater, and driven by magmatic heat. Involvement of magmatic volatiles is unimportant. Also referred to as hydrothermal or epithermal breccias.

**3. Magmatic Phreatic**

- Breccias caused by the flashing of magma and the water. Geologically and genetically similar to phreatomagmatic breccias.

**4. Phreatomagmatic Breccias**

- Breccias formed due to the direct interaction of magma and external water. Commonly form dextral breccias.

**5. Magmatic**

- Breccias generated by the explosive decompression of magmatic volatiles. These breccias include vent breccias and magmatic dikes.

**6. Intrusion Breccias**

- Breccias caused by the replacement of an intrusive body, but not associated magmatic-hydrothermal fluids.

**7. Tectonic Breccias associated with regional and local tectonics, strike and dextral faulting:**

- Pronounced brittle fracture of existing faulting or strike, with later hydrothermal alteration, King Island, Tasmania, Australia.

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