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Miscellaneous Release—Data 281
Northeastern Ontario Rhyolite Database

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The publication can be downloaded from
http://www.geologyontario.mndm.gov.on.ca/mndmaccess/mndm_dir.asp?type=pub&id=MRD281

Users of OGS products are encouraged to contact those Aboriginal communities whose traditional territories may be located in the mineral exploration area to discuss their project.

INTRODUCTION

The intent of this digital database is to provide the user with an approximate location, physical character, age and chemical nature for the various "rhyolite" units in Ontario. This first release is restricted to northeastern Ontario. Subsequent releases will provide data for the rest of the province.

Over the last century, various descriptive field terms such as "rhyolite", "acid volcanics", "silicic volcanics", "felsite", "quartz and/or feldspar porphyry" and "felsic volcanics" have been used by many geologists in Ontario to identify rocks and rock units interpreted as rhyolite. These rocks are not necessarily true rhyolite; indeed, subsequent mapping supplemented with whole rock geochemistry and/or detailed petrographic analysis has often refuted earlier mapping. Nevertheless, for many parts of the province descriptive field terms still exist for labelling rhyolite units. Therefore, compilation of this database is very liberal and many of the polygons included as "rhyolite" may contain metavolcanic rocks or possibly even intrusive rocks that may not be true rhyolite. Users are cautioned to further investigate any area in which they are interested.

The various definitions listed below provided a starting framework for the compilation of "rhyolite" units in Ontario.

> **Rhyolite** – extrusive igneous rock that is the volcanic equivalent of granite. (*Encyclopaedia Britannica Online*)
>
> **Rhyolite** – A group of extrusive igneous rocks, typically porphyritic and commonly exhibiting flow texture, with phenocrysts of quartz and alkali feldspar in a glassy to cryptocrystalline groundmass; also, any rock in that group; the extrusive equivalent of granite. (*Glossary of Geology*, Bates and Jackson 1987)
>
> **Rhyolite** is an igneous rock in the class designated as "felsic" rock. This class of rock crystallizes from silicate minerals at relatively low temperatures and with relatively a high percentage of silica. It is at the low temperature extreme of the Bowen reaction series. (http://hyperphysics.phy-astr.gsu.edu/hbase/Geophys/rhyolite.html)
>
> **Rhyolite** can be considered as the extrusive equivalent to the plutonic granite rock, and consequently, outcrops of rhyolite may bear a resemblance to granite. Due to their high content of silica and low iron and magnesium contents, rhyolite melts are highly polymerized and form highly viscous lavas. They can also occur as breccias or in volcanic plugs and dikes. Rhyolites that cool too quickly to grow crystals form a natural glass or vitrophyre, also called obsidian. Slower cooling forms microscopic crystals in the lava and results in textures such as flow foliations, spherulitic, nodular, and lithophysal structures. Some rhyolite is highly vesicular pumice. Many eruptions of rhyolite are highly explosive and the deposits may consist of fallout tephra/tuff or of ignimbrites. (Wikipedia.org)

Whole rock lithogeochemistry is now widely used to support field interpretations. Various discrimination diagrams are used to define rhyolite geochemically; however, the lower silica limit varies between 65% and 73% SiO_2 (Cox, Bell and Pankhurst 1979; LeBas et al. 1986; Peccerillo and Taylor 1976; Winchester

and Floyd 1977). In addition, virtually all the Precambrian supracrustal rocks in Ontario are metamorphosed and portions have undergone hydrothermal alteration such that original chemistry is suspect at best. For these reasons, geochemical analyses with a lower silica limit of 65% were selected for inclusion in this database.

The geochemical analyses in this rhyolite database are derived from many sources and were collected over many years. Precision of major oxide and trace element data is widely variable and there was little attempt by the authors to standardize the reporting of the data. Users are cautioned that rock names attached to the analyses may not be accurate; for example, instances where silica analyses exceed 65% SiO_2 and the rock is called "basalt" may occur. Several analyses of felsic intrusive rocks are included in the database on the premise that some may represent syn-volcanic intrusions or may be extrusive rocks. Again, users are cautioned to critically examine the geochemistry in any area in which they are interested.

DESCRIPTION OF CONTENTS

The files comprising this digital data release are organized into 5 folders: 1) BASE, 2) GEOCHEMISTRY, 3) GEOCHRONOLOGY, 4) GEOLOGY and 5) MINERALIZATION.

1) The **BASE** folder contains layer files of geographic and cultural information (major lakes, roads and townships).

2) There are 2 subfolders within the **GEOCHEMISTRY** folder: EXCEL and SHAPEFILES.

The **EXCEL** subfolder contains 2 Microsoft® Excel® spreadsheets (*MRD 281 ZONE16 geochemical data.xls* and *MRD 281 ZONE17 geochemical data.xls*) with whole rock and trace element geochemical analyses for close to 3900 samples, details of sample locations (in latitude and longitude as well as in eastings and northings), and other data such as rock type.

The **SHAPEFILES** subfolder contains layer files for 2 layers: one containing geochemical analyses for samples taken within UTM zone 16 (*ZONE16.lyr*), the other containing geochemical analyses for samples taken within UTM zone 17 (*ZONE17.lyr*). Both layers include only those samples where SiO_2 values are greater than 65%. Although an attempt was made to collect all recent and archived geochemical data for these layers, it is likely that samples were missed, especially where the data only exist as analogue tables in OGS Open File Reports, or comprise thesis material.

3) The **GEOCHRONOLOGY** folder contains files for the layer that provides ages for various rock units within the area covered by the rhyolite database (*NEW_COMPILATION_AGES.lyr*).

4) Within the **GEOLOGY** folder are located files associated with the bedrock geology layer (*Geolines.lyr* and *Geopoly.lyr*) and the rhyolite location layer (*Rhyolite_Units.lyr*).

The bedrock geology layer is taken from the Ontario Geological Survey's Miscellaneous Release—Data 126–Revised, *1:250 000 Scale Bedrock Geology of Ontario*, published in 2010. In ArcGIS software (v9.3.1) left clicking with the "identify" button will provide a geological description for each polygon.

The rhyolite units layer contains polygons of known felsic metavolcanic rocks in northeastern Ontario. The shape of each polygon may not conform to the bedrock geology layer, as more recent mapping may supersede MRD 126–Revised. Further, many polygons on the bedrock geology layer coded as "intermediate to felsic" (units 2 and 6) contain mainly intermediate metavolcanic rocks and are not known to host rhyolite. Left clicking on each polygon will provide basic geological information and a reference to the most recent mapping.

5) The **MINERALIZATION** folder contains files for various layers related to mineral occurrences located within the geographic boundaries of the rhyolite compilation. One layer (*MINES.lyr*) contains locations of present and past-producing volcanogenic massive sulfide (VMS) deposits in northeastern

Ontario. A second layer (*Cu1.shp*) shows mineral occurrences where copper is the primary mineral commodity, regardless of genetic model (i.e., VMS, vein hosted, or otherwise). A third layer (*Zn2.shp*) shows mineral occurrences where zinc is the primary commodity, regardless of genetic model. All data for these layers are taken from the Mineral Deposit Inventory–2010, published by the Ontario Geological Survey in December 2010.

MAP PROJECTIONS, SCALE AND BASE MAP INFORMATION

Themes contained in this digital data release are set to a Geographic Coordinate System: GCS_North_American_1983, using North American Datum 1983 (NAD83). UTM coordinates for point data are provided in the appropriate attribute tables. The database was compiled from data at various scales. The base map information was derived from data downloaded from the Ontario Ministry of Natural Resources' Land Information Ontario, with modifications by staff of the Ministry of Northern Development, Mines and Forestry. When creating the layers, the map project (*.mxd* file) was set to a Lambert Conic Conformal projection for a more aesthetically pleasing display of data.

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