MISCELLANEOUS RELEASE – DATA 91

Physical Rock Property Data
from the
Operation Treasure Hunt
Physical Rock Property Study
in the
Matheson and Kirkland Lake Areas

Ontario Geological Survey
Ministry of Northern Development and Mines
Willet Green Miller Centre
933 Ramsey Lake Road
Sudbury, Ontario, P3E 6B5, Canada

Results from the Physical Rock Property Study in the Matheson and Kirkland Lake Areas
Miscellaneous Release – Data 91
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREDITS</td>
<td>2</td>
</tr>
<tr>
<td>DISCLAIMER</td>
<td>2</td>
</tr>
<tr>
<td>CITATION</td>
<td>2</td>
</tr>
<tr>
<td>1. INTRODUCTION</td>
<td>3</td>
</tr>
<tr>
<td>2. CURRENT PROGRESS</td>
<td>3</td>
</tr>
<tr>
<td>3. EQUIPMENT AND PROCEDURES</td>
<td>3</td>
</tr>
<tr>
<td>4. DATA DESCRIPTION</td>
<td>5</td>
</tr>
</tbody>
</table>

Results from the Physical Rock Property Study in the Matheson and Kirkland Lake Areas

Miscellaneous Release – Data 91
CREDITS

These data were collected under Operation Treasure Hunt’s Physical Rock Property Study in the Matheson and Kirkland Lake Areas, a collaborative project between McMaster University and the Ministry of Northern Development and Mines.

List of accountabilities and responsibilities:
- McMaster University – sample collection, preparation, physical property determinations, data analysis and reporting
- Precambrian Geoscience Section, Ontario Geological Survey (OGS), Ministry of Northern Development and Mines (MNDM) – project management, final data publication, funding

DISCLAIMER

To enable the rapid dissemination of information, this digital data has not received a technical edit. Every possible effort has been made to ensure the accuracy of the information provided; however, the Ontario Ministry of Northern Development and Mines does not assume any liability or responsibility for errors that may occur. Users may wish to verify critical information.

CITATION

Information from this publication may be quoted if credit is given. It is recommended that reference be made in the following form:


MRD091 Can be downloaded at the following location:
http://www.geologyontario.mndm.gov.on.ca/mndmaccess/mndm_dir.asp?type=pub&id=MRD091

Results from the Physical Rock Property Study in the Matheson and Kirkland Lake Areas
Miscellaneous Release – Data 91
1. INTRODUCTION

This miscellaneous release of data is a provisional release of data collected under the Physical Rock Property Study in the Matheson and Kirkland Lake Areas. This project, funded by Operation Treasure Hunt is carried out under a collaborative agreement between the Precambrian Geoscience Section of the Ontario Ministry of Northern Development and Mines and McMaster University.

The data contained on this disk include measurements of specific gravity, magnetic susceptibility, magnetic remanence intensity, and galvanic (DC) resistivity. Determinations of porosity, gamma radiation, inductive conductivity, and acoustic impedance are also being made and release of these results will follow.

The goals of the project are to characterize the physical properties of rocks from the Matheson and Kirkland Lake areas of the Abitibi greenstone belt and to determine if certain lithologies or mineralization types can be discriminated on the basis of those properties. By examining the physical rock property signature in areas of existing mineralization the aim is to increase the accuracy of geophysical interpretations toward improving geologic knowledge in the search for ore deposits.

2. CURRENT PROGRESS

Sample collection was completed during the summer field season of 2000. Specimen preparation was completed by the end of the summer of 2001 during which time property determinations for a subset of 100 samples were completed. Determination of the remaining physical properties is ongoing for all samples. Final results and report can be expected by April, 2002.

3. EQUIPMENT and PROCEDURES

3.1 Equipment Specifications

<table>
<thead>
<tr>
<th>Property</th>
<th>Instrument</th>
<th>Accuracy</th>
<th>Sensitivity</th>
<th>Range</th>
<th>Accuracy</th>
<th>Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Gravity</td>
<td>Analytical Balance</td>
<td>0.0005 g</td>
<td>0.0001 g</td>
<td>0 – 30 g</td>
<td>0.01 g/cm³</td>
<td>0.01 g/cm³</td>
</tr>
<tr>
<td>Magnetic Susceptibility</td>
<td>Bartington MS-2</td>
<td>1 x 10⁻⁶ cgs</td>
<td>1 x 10⁻⁵ cgs</td>
<td>10⁻⁶ – 10 cgs</td>
<td>1 x 10⁻⁶ cgs</td>
<td>1 x 10⁻⁶ cgs</td>
</tr>
<tr>
<td>Magnetic Remanence</td>
<td>Schonstedt SSM-1a</td>
<td>5 x 10⁻⁶ emu/cm³</td>
<td>5 x 10⁻⁶ emu/cm³</td>
<td>1 - 10⁻⁶ emu/cm³</td>
<td>1 x 10⁻⁵ emu/cm³</td>
<td>1 x 10⁻⁵ emu/cm³</td>
</tr>
<tr>
<td>Galvanic Resistivity</td>
<td>GCM-2 Conductivity Meter</td>
<td>10⁻¹ ohms</td>
<td>10⁻¹ ohms</td>
<td>10⁻¹ – 10⁶ ohms</td>
<td>10⁻¹ ohms</td>
<td>10⁻¹ ohms</td>
</tr>
</tbody>
</table>

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Miscellaneous Release – Data 91
3.2 Procedures

Specific Gravity

The specimens were cleaned and left to dry for a minimum of 7 days to ensure moisture elimination. The dry specimens were weighed in air then submerged in water and weighed again. Using Archimedes’ principle the specific gravity was determined using the equation:

$$\rho = \frac{W_d}{W_d - W_w}$$

where $\rho$ is the specific gravity and $W_d$ and $W_w$ are the dry and submerged weights, respectively. The volume of the specimen can then be determined from the specific gravity and dry weight. This volume information is used in the determination of other physical property measurements such as MS where volume correction is required.

Magnetic Susceptibility

Magnetic susceptibility (MS) measurements were made using the low frequency (0.1 cgs) setting. The MS-2 sensor is configured for standard paleomagnetic specimens. The susceptibilities are measured at a standard volume of 10 cc, so each of the measurements needs to be volume corrected. This is calculated using:

$$\text{Volume-corrected MS} = \frac{(\text{observed MS} \times 10)}{\text{volume}}$$

Calibration of the instrument was achieved through reference to two points; the susceptibility of air which by definition is equal to zero, and a reference sample with known susceptibility. The manufacturers claim the instrument is linear over the full measurement range. Repeat calibration of the instrument was carried out after every 10 measurements.

Magnetic Remanence

Magnetic remanence (MR) was measured using the standard six orientation convention giving four measurements for each direction of x, y, z. The intensity is simply the length of the vector. The orientation of the magnetic vector relative to the specimen is calculated from the three orthogonal magnetic components. Rotation back to current horizontal reference frame is achieved by correction for the known specimen orientation. The accuracy of the orientation of the vector is +/- 5 degrees.

Galvanic Resistivity

The specimens were saturated with water by placing them in a pressurized container for 24 hours. Each specimen was placed in a 3.8 cm plastic sleeve to prevent surface conduction and then secured between two copper contacts that were attached to the resistance probes of the GCM-2 conductivity meter. Thin cloth pads dipped in a 0.09 M copper sulfate solution were used to reduce the effect of rough specimen surfaces on the contact seal.
4. DATA DESCRIPTION

The physical rock property data are provided in Microsoft Excel™ and tab delimited ASCII format. Each format type contains all of the data. The accompanying report is provided in Microsoft Word™ and Adobe PDF™ format.

The location information provided in the Microsoft Excel™ and tab delimited ASCII format files are given using the Universal Transverse Mercator (UTM) zone 17 north projection. This projection is defined by a central meridian of 81 degrees west, origin of 81 degrees west, 0 degrees north, a false easting of 500,000 and a false northing of 0. The central scale factor is 0.9996. The datum is NAD27.