ONTARIO GEOLOGICAL SURVEY

Miscellaneous Release—Data 371

Ontario Specific Gravity Data for Bedrock Samples Acquired from 1970 to 2014

Explanatory Notes to Accompany Specific Gravity Data

Compiled by

D.R.B. Rainsford, A. Carter-McAuslan and L.C. Ashick-Stinson

2018

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DISCLAIMER

Every possible effort has been made to ensure the accuracy of the information presented in this report and the accompanying data; however, the Ministry of Energy, Northern Development and Mines does not assume liability for errors that may occur. Users should verify critical information.

CITATION

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

Rainsford, D.R.B., Carter-McAuslan, A. and Ashick-Stinson, L.C. 2018. Explanatory notes to accompany specific gravity data, 31p. [PDF document]; report *in* Ontario specific gravity data for bedrock samples acquired from 1970 to 2014, Ontario Geological Survey, Miscellaneous Release—Data 371.

NOTE

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1. Introduction

The Ontario Geological Survey (OGS) has routinely measured the specific gravity of rock samples submitted to the OGS Geoscience Laboratories (Geo Labs) for chemical analysis. The specific gravity results, spanning nearly 5 decades, have been published in numerous Miscellaneous Releases—Data (MRDs). For this digital compilation, the specific gravity data have been extracted from these MRDs and compiled into a single georeferenced database, and summary statistics have been calculated. During the compilation process, the various source data sets were standardized to common formats and an array of checks and corrections were applied to help improve the quality of the final compilation.

The resulting specific gravity data set contains 26 079 geolocated records from rock samples collected across the province of Ontario between 1970 and 2014. The majority of the data were obtained from specific gravity measurements of Archean rocks, with smaller populations of data from Proterozoic and Paleozoic eras. It is hoped that this compilation will be a valuable reference source for those requiring rock density estimates for uses such as geophysical modelling and mineral resource calculations.

2. Specific Gravity Measurements

The procedure for measuring specific gravity has been consistent over the time period that the data have been acquired. The procedure, initially documented by the Geoscience Laboratories (Ontario Geological Survey 1990) and updated in the current Standard Operating Procedure (Geoscience Laboratories 2018), is summarized as follows.

The specimen is dried and excess dust or dirt brushed off. The dry specimen is weighed in air on the top loader of a balance. It is then suspended below the balance, submerged in water and weighed again. Using Archimedes' principle, the specific gravity was determined using the equation:

$$\rho = W_d / (W_d - W_w)$$

where ρ is the specific gravity and W_d and W_w are the dry and submerged weights, respectively.

Presently, a Denver Instruments model TR12001 electronic scale with a precision of 0.1g is used. Electronic scales of similar type have been used for this work at least as far back as 2000. It is likely that early measurements would have been made using mechanical balances with similar precision.

Four "standard" rock samples of various sizes are used as a control. The specific gravity is ascertained for one of the standards every 15 samples processed. The standard is selected to most closely match the size of the rock specimens being weighed. A replicate sample, comprising a second piece of rock (if available), from the same sample submitted, is measured every 20th sample to check for the consistency of results.

3. Data Compilation

The specific gravity data were compiled from multiple sources, including PETROCH, published MRDs and an OGS "Labwork" internal geochemical database. Because of the differences in formats, content and ages of the databases and data sets, different procedures were needed to compile the data to a consistent standard. These are described in the following sections.

3.1. PETROCH DATA

The original PETROCH lithogeochemical database contains 27 476 samples (Haus and Pauk 1993; Ontario Geological Survey 2010). The PETROCH data were processed by the following steps:

1. The 5 regional, CSV-formatted ASCII files were imported into ESRI® shapefiles and georeferenced according to the recorded latitude and longitude information.
2. A query was made to select only those records with specific gravity information. The unselected records (i.e., with no specific gravity information) were then purged.

Inspection of the rock names in the database revealed a high degree of inconsistency in the naming of samples. This was because the rock names were transcribed from sample tags and resulted in the inclusion of multiple types of abbreviations, synonyms, spelling errors and informal nomenclature. An example of the variations of entries for "andesite" is shown in Table 1. To enable the data to be queried by rock type, it was clear that consistent rock names were required. As a result, a master list of standardized rock types was prepared and the rock names in the PETROCH database were modified to conform to the master list. A "Reduction List" containing the master list of rock names and the variants appearing in the PETROCH database is provided in Appendix 1.

Table 1. The PETROCH database includes diverse rock names; this table lists the variations for "andesite".

ALK ANDESITE	ANDESITE-(META)	ANDESITE-C	ANDESITIC FLOW
ALTERED ANDESITE	ANDESITE, AMYGDULES	ANDESITE-C,A	ANDESITIC TUFF
AND/DACITE FLOW	ANDESITE,FLOW	ANDESITE-CARB	ANDESTITE LAP TUFF
ANDESITE AMYGD	ANDESITE,MASSIVE	ANDESITE-C-PILLOW	ANESITE-C
ANDESITE BRECCIA	ANDESITE,MYL	ANDESITE-F	CALC-ALK-ANDESITE
ANDESITE BXCALCALK	ANDESITE, PILLOWED	ANDESITE-K	CPXPHYRIC ANDESITE
ANDESITE CALCALK	ANDESITE,PILLOWED	ANDESITE-P	DIORITIC ANDESITE
ANDESITE DACITE-C	ANDESITE,SILFIED	ANDESITE-PORPH	FOLICATED ANDESITE
ANDESITE DIKE	ANDESITE/DACITE	ANDESITE-T	INT VOLC/ANDESITE
ANDESITE FLOW	ANDESITE/DIORITE	ANDESITE-T,AMYGDAL	MAFIC-FLOW-ANDESITE
ANDESITE LAP TUFF	ANDESITE/DIORITIC	ANDESITE-T,FE	SHEARED ANDESITE
ANDESITE LAPILLI	ANDESITE/HI MG THL	ANDESITE-T,MG	VES PILL. ANDESITE
ANDESITE TUFF	ANDESITE-A	ANDESITE-TF	
ANDESITE TUFF BREC	ANDESITE-A-(META)	ANDESITIC AGGL	

3.2. PUBLISHED MISCELLANEOUS RELEASES—DATA AND INTERNAL LABORATORY DATABASE

Specific gravity data acquired after the publication of the PETROCH database were obtained from numerous MRDs and an internal OGS "Labwork" database. The Labwork database contained all lithogeochemical data acquired between 2009 and 2014. The specific gravity data contained in the MRDs are part of lithogeochemical data that were published after the completion of bedrock mapping projects. No specific gravity data from MRDs published between 1993 and 2002 were used, because either the data were absent or rock names were not included in the published data. A list of data sets used in the compilation is provided in Appendix 2. The Labwork data were processed by the following steps:

1. The Labwork data were imported into a single shapefile and re-exported as 4 separate shapefiles according to UTM zones (15N to 18N). The geographic location (latitude and longitude) of each point were then calculated from the UTM co-ordinates and the 4 shapefiles were remerged into 1 shapefile.
2. Records without specific gravity values were purged.

3. Lithogeochemical data published in MRDs between 1993 and 2008 (i.e., in the period between those covered in the PETROCH and Labwork databases) and containing specific gravity data were compiled into a single spreadsheet and imported into a shapefile. Latitude and longitude were then calculated from UTM co-ordinates and records without specific gravity values were removed using the same steps outlined in 1 and 2.

Rock type names were standardized to conform with the Reduction List described in the PETROCH database processing. In cases where the rock names for samples in the Labwork database were not the same as those used in the published MRDs for the same samples, the names appearing in the MRDs were deemed to be correct, on the basis that the project geologist revised the identification of the rock type after the field season. Additional rock type names were introduced, for those rock types not occurring in the PETROCH database, but which are present in the Labwork database and/or MRDs.

3.3. COMBINED DATABASES AND DATA SETS

The 2 shapefiles resulting from the processing of the PETROCH and the combined Labwork database and MRD data were imported as feature classes into an ESRI® geodatabase and merged to create a single database of lithogeochemical analyses and specific gravity values. This master database was then subjected to a series of QA/QC procedures and corrections that are described in "Quality Assurance–Quality Control (QA/QC)". After the QA/QC procedures were completed, the specific gravity information, rock type, location and other attributes were extracted to a shapefile and a Microsoft® Excel® workbook for publication. The distribution of data points included in this publication is shown in Figure 1.

A total of 130 standardized rock names are included in the combined data set. These are listed, along with summary statistics, in Table 4 in Appendix 3.

3.4. AGE AND GEOLOGICAL PROVINCE FIELDS

As part of the QA/QC process, and to allow for more detailed searches of rock types of different age and affinity, a field was added for geological province. This field was not present in the original data sources. During the process of assigning rock types to geological provinces, a variety of errors in the assigned age of the rock were identified and corrected.

Four main geological provinces are present in Ontario: the Superior Province (Archean, rocks >2500 Ma), the Southern Province (Proterozoic, rocks >1000 to <2500 Ma), the Grenville Province (Proterozoic, rocks between 542 and 2500 Ma), and the Phanerozoic (rocks younger than 542 Ma).

The Superior Province was further subdivided into "Superior Province-dike" and "Superior Province-Alk". Superior Province-dike contains mafic dikes (diabase) that may be Archean or Proterozoic in age. Superior-Alk contains alkalic rocks and carbonatites of Proterozoic and Archean age that are located in the Superior Province. These subdivisions separate true granite–greenstone rocks from other rock types present in the Superior Province that may not be Archean in age and which are not associated with greenstone belts.

The Southern Province was also divided into "Southern", "Southern-NW" and "Southern-SUD". Southern Province includes rocks ranging in age from 1700 to 2500 Ma located in northeastern Ontario between Sault Ste. Marie and the Quebec border. This includes rocks of the Huronian Supergroup. Rocks in this area that are part of the Sudbury Structure, including the Sudbury Igneous Complex, and the Onaping, Onwatin and Chelmsford formations are assigned to Southern-SUD. Finally, Proterozoic rocks in northwest Ontario, the majority of which are associated with the Midcontinent Rift (*circa* 1100 Ma), are assigned to Southern-NW.

3.5. ROCK NAMES AND METAMORPHISM

Neither the original data sources, nor the compiled specific gravity data set, provide any indication of metamorphic grade. The assignment of geological provinces address this deficiency to some degree, for example, most rocks from the Grenville Province are more highly metamorphosed than are rocks from the Superior and the Southern provinces. It was not practical to attempt to assign metamorphic grade to the data set without creating more problems than it might resolve.

Furthermore, rock names in the data set represent over 30 years of collection by different geoscientists. In the 1980s, for instance, many geoscientists took the approach of assigning rock names by protolith rather than field appearance, whereas, more recently, the approach has shifted to the opposite; thus, one person's "mudstone" may be another person's "pelite" or "gneiss para". Consequently, when doing searches by rock names, it should be kept in mind that if one is searching by a particular rock name,

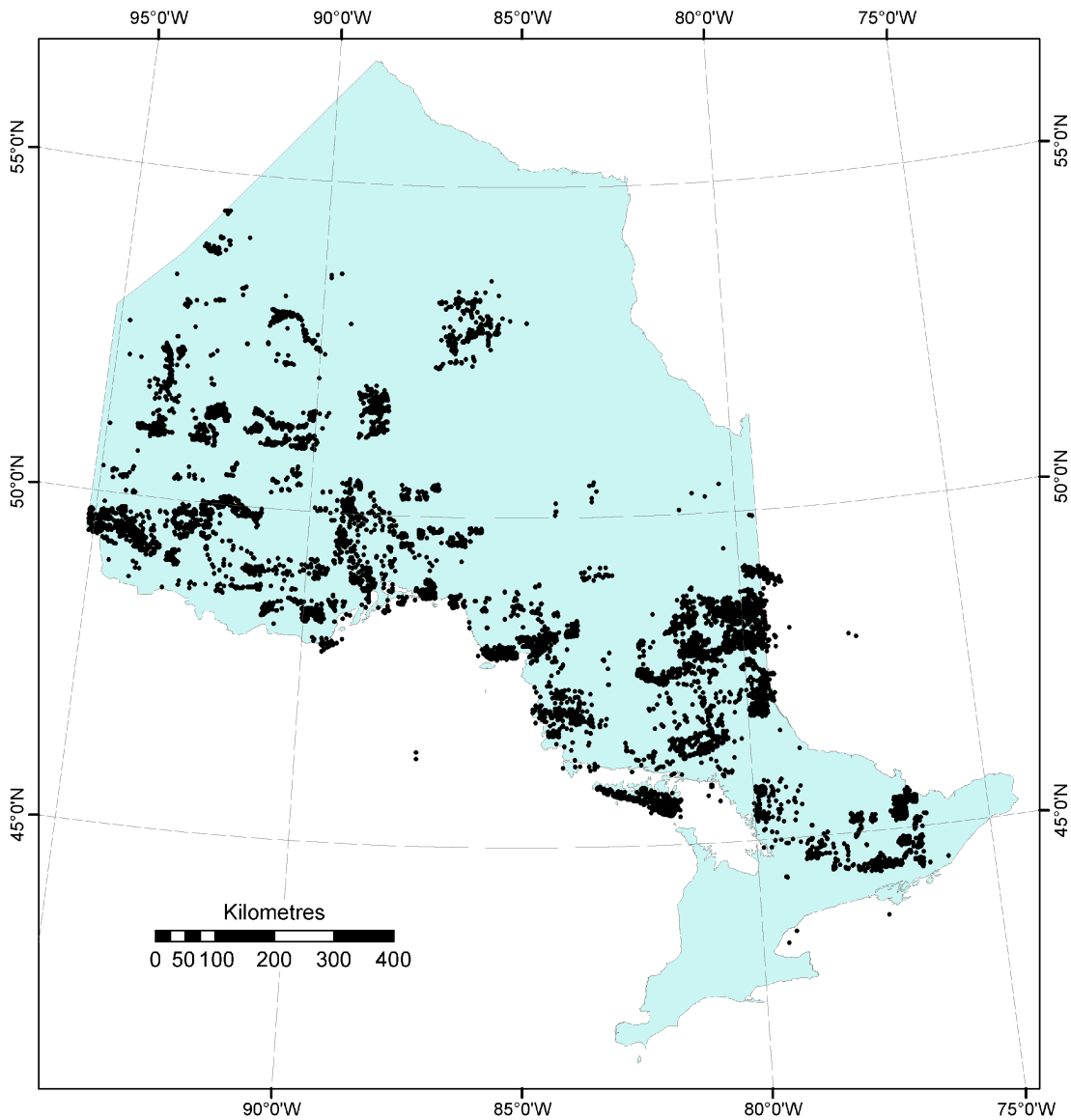

Figure 1. Distribution of specific gravity data points from combined databases superimposed over an outline of the province of Ontario.

that the search may not capture the full breadth of available samples. Similarly, in the 1980s, rocks from the Southern Province were commonly termed “quartzite” (sedimentological), whereas now they would probably be classed as a “sandstone”. In contrast, a “quartzite” (metamorphic) in the Grenville Province would refer to a highly metamorphosed “sandstone”. These nuances should be kept in mind when constructing any rock name search using the data set.

4. Quality Assurance–Quality Control (QA/QC)

A suite of queries and checks were run on the combined master database to detect misidentified rock types, missing attributes, incorrect co-ordinates, duplicates and other errors. The QA/QC procedures are as follows:

1. A series of queries were run using the major oxide data to identify rock chemistry (not included in this publication) inconsistent with their assigned rock names. The criteria were set to be sufficiently tolerant so as to catch only gross errors. For records that were flagged, the assigned, standardized rock names were rechecked against the rock types recorded in the original databases and corrected where possible. In cases where the rock type in the original databases could not reasonably be reconciled with the geochemical data, the records were deleted. The criteria in Table 2 were used to flag records for inspection.

   Table 2. Search criteria used to flag incorrect rock names.

Amphibolite group	<10 weight % Fe+Mg	Marble group	<25 weight % CO_2
Basalt group	>60 weight % SiO_2	Norite group	>60 weight % SiO_2
Carbonate group	<25 weight % CO_2	Peridotite group	>50 weight % SiO_2
Dolostone group	<25 weight % CO_2	Pyroxenite group	>50 weight % SiO_2
Gabbro group	>60 weight % SiO_2	Quartz group	<75 weight % SiO_2
Felsic group	<50 weight % SiO_2	Quartzite group	<60 weight % SiO_2
Granite group	<60 weight % SiO_2	Rhyodacite	<50 weight % SiO_2
Intermediate group	>70 weight % SiO_2	Rhyolite group	<60 weight % SiO_2
Iron Rock group	<30 weight % Fe+Mg	Sövite group	<20 weight % CO_2
Limestone group	<25 weight % CO_2	Tholeiite	>60 weight % SiO_2
Mafic group	>60 weight % SiO_2	Ultramafic group	>50 weight % SiO_2

2. Missing attributes, such as the year the sample was collected, were added where possible. Missing year information could usually be deduced from the sample number which almost invariably contains 2 digits indicating the year the sample was collected. Missing geologists’ names were inferred from MRD authorship. Geologists’ names were also standardized to include author initials.

3. The following tests were run to detect gross location errors:
   a) All records were flagged that plot outside of Ontario.
   b) Where samples were collected within established townships, a spatial query was run to determine the township based on the co-ordinate information. The resulting township names were compared with those listed in the original databases and mis-matches were flagged.

   The records flagged with potential location errors were assessed on an individual basis. Some of the records flagged as out-of-province were found to have additional information indicating that the samples had been collected outside of Ontario and those records were retained unchanged. Many records that had been flagged were found to have been assigned the wrong UTM zone and plotted correctly once the appropriate zones were assigned. In some cases, a gross error could be identified and corrected in the first few digits of a UTM co-ordinate when compared with numerically contiguous samples collected by the same geologist in the same year. In other

cases, records flagged because of mismatching township names were found to be close to the initially recorded townships and numerically contiguous samples, and the locations were deemed to be correct, requiring only a change in the township attribute. Flagged records whose apparent location error could not be resolved using one of these techniques were removed.

4. Duplicate records, arising from the inclusion of the same sample data in more than one of the constituent databases, were identified by querying the master database. Repeated records were then purged.
5. Specific gravity values ≥5.0 were removed from the database. Four records meeting this criterion were identified, compared with the associated rock type names and deemed to be erroneous.

4.1. POSITIONAL ACCURACY

The location accuracy of the measurements ranges from approximately 10 m to up to the dimensions of half a township (about 5 km). The reason for this variation is, in large part, the result of changes in technology. Early samples were located on 1:50 000 scale topographic maps and UTM or latitude and longitude co-ordinates were estimated by eye. Subsequently, handheld GPS units were introduced into the field. The accuracy of GPS locations has varied since its adoption partly because of improvements in technology and partly as a result of a period of "Selective Availability" during which time the obtainable GPS accuracy was reduced.

Some samples were simply assigned co-ordinates based on the township within which they were collected. This is manifest by an apparent clustering of multiple samples at a single point when plotted in plane view. The single location could be associated with 12 or more samples (Figure 2). This phenomenon

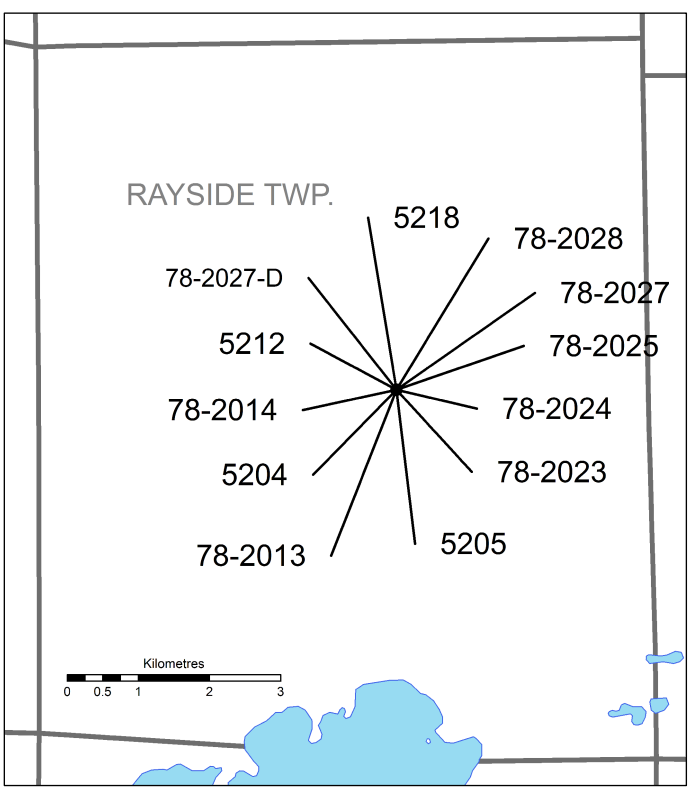

Figure 2. Example of the apparent clustering of samples from Rayside Township, as a result of samples being located only by township name.

was observed only in the older PETROCH data. No attempt was made to modify these locations; instead, the affected records "POSIT_FLAG" is set to "M", "P" or "S" (Multiple samples in same location, Problematic, Suspicious) as they originally appeared in the PETROCH database.

It is likely that co-ordinates, estimated from sample locations hand-plotted on 1:50 000 scale topographic maps, have an accuracy of ±200 m. The early GPS units, used in the field, were reported to have an accuracy of ±50 m when Selective Availability was applied, and about ±20 m when Selective Availability was removed. The accepted locational accuracy of the GPS-enabled field mapping tablets currently in use is ±10 m. The years and associated estimated accuracies are summarized as follows:

- before 1995 (digitized locations from 1:50 000 scale maps): ±200 m
- 1995–1999 (GPS locations with Selective Availability applied): ±50 m
- after 1999 (GPS locations Selective Availability discontinued): ±10 m

With this assessment in mind, the "POSIT_FLAG" has been assigned a numeric, probable accuracy value based on the year the sample was collected. The POSIT_FLAG attribute was left unchanged, where the records already carried a single letter flag (i.e., P, S or M) from the original PETROCH database as these codes indicate positional errors unrelated to the methods of location used. The criteria for designations "P" (problematic), "S" (suspicious) and "M" (multiple) were not described in the report accompanying the PETROCH database and they appear not to have always been used consistently. The user is advised to treat records with any of these designations as being inaccurately located with positional errors of up to 5 km.

5. Discussion

The combined data set contains specific gravity information on 130 rock types. Summary statistics (mean, median, standard deviation, minimum and maximum values of the specific gravity) for each rock type are presented in Table 4 in Appendix 3. Populations for individual rock types range from single values to 3400. Of these, 80 rock types are represented by 20 or more samples. Statistics from those rock types with populations of less than 20 samples should be regarded as likely to be unreliable.

Some of the rock type names appearing in the data are specific in terms of composition (e.g., "andesite"). Other rock types, such as "schist" (data set name "schist other"), although in common use, are descriptive of texture and represent a range of compositions. As a result, rock types identified by compositional names in the specific gravity data tend to have smaller ranges and standard deviations than those identified by non-compositional names.

Choosing a single value to represent the density of a particular rock type should be done with care. Where populations are small, "outliers" of unusually high or low values may unduly influence the mean. It is advisable to compare the mean and median values to determine whether they differ significantly. If there is a significant difference, then it is recommended that a histogram of values be plotted and examined to determine whether the median is a more "representative" value. Even when the populations are large, histograms can be helpful for assessing the type of distribution (e.g., normal) and determining whether it is unimodal or multimodal.

Although the data are not evenly spread across Ontario, they are widely distributed, with central and northern parts of the province having the highest concentration of specific gravity measurements. Consideration should also be given to the location of the specific gravity data points with respect to the area of interest. Specific gravity values closer to the area of interest may be more pertinent than those located farther away. Because the data are also georeferenced, the data may be easily windowed and locally derived statistics calculated and can be compared with global equivalents.

6. Conclusion

The OGS has acquired specific gravity measurements from over 26 000 samples, collected over a 44 year period, as part of its bedrock geology mapping program. More data continue to be collected each field season. The accompanying data set, compiled from numerous previously released OGS publications, is made available in both GIS-compatible and workbook formats. Basic QA/QC measures have been applied to identify and, where possible, correct gross errors in the data. Minor errors (e.g., transcription errors) will not have been detected and may still remain in the data. However, the large population sizes of many of the rock types reduces the effect of individual errors.

High-quality specific gravity data are important for a number of key uses. Foremost among these is to provide density estimates that can be used to model gravity data. These data can also be used to calculate tonnages or volumes prior to resource extraction. In addition, specific gravity data also provide a simple way to distinguish between rocks with mafic and felsic composition, and can also be used as an input for seismic velocity calculations.

This data set complements the magnetic susceptibility database compiled by the OGS from measurements made on outcrop during the course of bedrock geology mapping (Muir 2013). As magnetic susceptibility has only been acquired since 2001 (as compared to 1970 for the specific gravity data) and not all outcrops were sampled for geochemical analysis, the data sets are not directly comparable. However, many specific gravity and magnetic susceptibility measurements can be correlated by means of their sample numbers.

7. References

The following references are noted in the report text and Appendix 2, List of Data Sources:

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Appendix 1. Reduction List

List of standardized rock names (bold) along with variants appearing in the PETROCH database.

- **ALBITITE**
  - ALBITE-RICH DIKE
  - ALBIT-RICH UNIT
  - ALBITITE DIKE
  - ALBITITE
- **ALKALINE**
  - ALKALINE
  - ALKALINE TUFF
  - FRAGMENTAL-A
  - FRAGMENTAL-A-TUFF
  - AKALIC INT TUFF
  - ALKALIC MAFIC TUFF
  - ALKALIC TUFF
- **ALT SPODUMENE**
- **ANORTHOSITE**
  - ANORTHO-GABBRO
  - ANORTHOSITE GAB
  - ANORTHOSITE PEG
  - ANORTHOSITE-M
  - ANORTHOSITIC GABBR
  - GABBRO ANORTHOSITE
  - GABBRO ANORHOSTIC
  - GABBRO,ANORTHOSITI
  - GABBRO-ANORTHOSITE
  - ANOR GABBRO
  - CORUNDUM ANORTHOSITE
- **AMPHIBOLE PORPHYRY**
  - AMPHIBD PORPH TUFF
  - APHIB PORH FLOW
  - PORPHYRY PL-HB
  - PORPHYRY HBD-FELD
  - PORPHY HBD
- **AMPHIBOLITE**
  - BIO AMPHIBOLITE
  - APMHIBOLITE
  - BASALT AMPHIBOLITE
  - BI-HB-QTZ-PL-AMPH
  - C-GR AMPHIBOLITE
  - CARBONATE AMPHIBOL
  - GARNET AMPHIBOLITE
  - GT AMPHIBOLITE
  - HB AMPHIBOLE
  - INT.AMPHIBOLITE
  - MAFIC AMPHIBOLITE
  - MAFIC FLOW-AMPHIB
  - NEM.AMPHIBOLITE
  - AMPHIBOLITE+QTZ
  - AMPHIBOLITE C-GN
  - AMPHIBOLITE BASALT
  - AMPHIIBOLITE DIKE
  - AMPHIBOLITE DYKE
  - AMPHIBOLITE ORTHO
  - AMPHIBOLE SHRD
  - TREMOLITE
  - SHEARED AMPHIBOLITE
  - MASSIVE AMPHIBOLITE
- **ANDESITE**
  - AND/DACITE FLOW
  - ANDESITE AMYGD
  - ANDESITE BRECCIA
  - ANDESITE BXCALCALK
  - ANDESITE CALCALK
  - ANDESITE DACITE-C
  - ANDESITE FLOW
  - ANDESTITE LAP TUFF
  - ANDESITE LAPILLI
  - ANDESITE TUFF
  - ANDESITE TUFF BREC
  - ANDESITE, PILLOWED
  - ANDESITE, AMYGDULES
  - ANDESITE,MASSIVE
  - ANDESITE,MYL
  - ANDESITE,SILFIED
  - ANDESITE-(META)
  - ANDESITE-A
  - ANDESITE-A-(META)
  - ANDESITE-C
  - ANDESITE-C,A
  - ANDESITE-C-PILLOW
  - ANDESITE,FLOW
  - ANDESITE,PILLOWED
  - ANDESITE-CARB
  - ANDESITE-F
  - ANDESITE-K
  - ANDESITE-P
  - ANDESITE-PORPH
  - ANDESITE-T
  - ANDESITE-T,AMYGDAL
  - ALK ANDESITE
  - ANDESITE-T,FE
  - ANDESITE TUFF
  - ANDESITE-T,MG
  - ANDESITE-TF
  - ANDESITE/DACITE
  - ANDESITE/DIORITE
  - ANDESITE/DIORITIC
  - ANDESITE/HI MG THL
  - ANDESITE LAP TUFF
  - ANDESITE LAPILLI
  - ANDESITE TUFF BREC

- ANDESITE DIKE
- ANDESITIC AGGL
- ANDESITIC FLOW
- ANDESITIC TUFF
- ANESITE-C
- ALTERED ANDESITE
- CPXPHYRIC ANDESITE
- DIORITIC ANDESITE
- FOLICATED ANDESITE
- ALK ANDESITE
- VES PILL. ANDESITE
- CALC-ALK-ANDESITE
- SHEARED ANDESITE
- INT VOLC/ANDESITE
- MAFIC-FLOW-ANDESITE

- **ANKERITE**
  - ANKERITE,BRG-GRYWK
  - ANKERITIC QZTZITE
- **ARGILLITE**
  - ARGILL/MAG.IRONST
  - ARGILLITE,GRAPHTI
  - ARGILLITE-CARB
  - ARGILITE-U
  - ARGILLITE/SILT
  - GRAPHITIC ARGILL
  - GREYWACKED ARG
- **ASBESTOS**
- **ASH**
  - ASH FLOW
  - ASH
- **BARITE**
- **BASALT**
  - ALK BASALT
  - ALTERED BASALT
  - BASALT ALTERED
  - AMPHITE BASALT
  - BASALT (ANDESITE)
  - ALK BASALT
  - ALKALIC BASALT
  - BASALT AMYG
  - BASALT BRECCIA
  - BASALT CALCALK
  - BASALT CAARBONATIZE
  - BASALT DIKE
  - BASALT FLOW
  - BASALT MASSIVE
  - BASALT PILL FSP
  - BASALT PILL
  - BASALT PILLOW BREC
  - BASALT PILLOWED
  - BASALT PLAG POR
  - BASALT PORPH
  - BASALT PORPH.
  - BASALT PORPHYRY
  - BASALT SILICIFIED
  - BASALT TUFF
  - BASALT TFF-PILL
  - BASALT VARIOLITIC
  - BASALT VESICULAR
  - BASALT W PY
  - BASALT W ASPY
  - BASALT, BRECCIATED
  - BASALT, CHLORITIZED
  - BASALT, PILLOWED
  - BASALT, MASV FLOW
  - BASALT,PORPH
  - BASALT, ALTERED
  - BASALT,BIOTITIC
  - BASALT,CALCIFIED
  - BASALT,CARB ALT”D
  - BASALT,CPX-HB PORD
  - BASALT,DIKE
  - BASALT,FG,PY
  - BASALT,FOLIATED
  - BASALT,GLOMEROPORP
  - BASALT,MASSIVE
  - BASALT,MINOR ALT”N
  - BASALT,PILL FSP
  - BASALT,PILLOWED
  - BASALT,PLAG PHYRIC
  - BASALT,PORPHYRITIC
  - BASALT,PLAG PHYRIC
  - BASALT-ALTERED
  - BASALT,SILICIFIED
  - BASALT,TF,MASS
  - BASALT-(META)
  - BASALT-A
  - BASALT-A-(META)
  - BASALT,VEINED
  - BASALT,VAROLITIC
  - BASALT-ALTERED BX
  - BASALT-ALTERED
  - BASALT-ANDESITE
  - BASALT-B
  - BASALT-BX
  - BASALT-C
  - BASALT-CARB
  - BASALT-CHL
  - BASALT-FRACTURED
  - BASALT-HEM
  - BASALT-I
  - BASALT-K
  - BASALT-K,FE
  - BASALT-M
  - BASALT-MG
  - BASALT-PILLOW
  - BASALT-PILLOWED
  - BASAL-SER VEINED
  - BASALT-SER
  - BASALT-SHEARED

- BASALT-U
- BASALT/ANDESITE
- BASALT:PLANAR FABR
- BASALTIC AGGLOMATE
- BASALTIC FLOW
- BASALTIC-C
- BASSALT TUFF
- BLASTIC BASALT
- BRECCIATED BASALT
- CARBONATIZED BAS
- COARSE BASALT
- COARSE GRAINED BAS
- CONTROL SAMPLE BAS
- CORE OF PILLOW
- CPX BASALT
- CPX-PHYRIC BASALT
- CPX-PILLOW-BASALT
- CPX-PLAG-BASALT
- F.P.BASALT
- FAULT GAUGE BASALT
- FE-BASALT
- FOOTWALL BASALT
- GABBROIC BASALT
- GABBROID BASALT
- GARNET BASALT
- HNB PHYRIC BASALT
- HNB-PHYRIC BASALT
- MAG-BASALT
- MASS BASALT
- MASS CPX BASALT
- MASSIVE BASALT
- METABASALT
- METABASALT,ALT
- METABASALT,SILIFCD
- MG BASALT
- PALEOSAL BASALT
- PHYRIC PILLOW BAS
- PILLOW BASALT
- PILLOWED BASALT
- PLAG PHYRIC BASALT
- PLAG PILLOW BASALT
- PLAG-PHYRIC BASALT
- PLAG-PILLOW BASALT
- PORPHYRITIC BASALT
- PYROXENITIC BASALT
- REXLIZED BASALT
- SERICITIC BASALT
- SHEARED BASALT
- SILIC BASALT W PY
- SILIC BASALT
- SILICIFIED BASALT
- TALC BX BASALT
- ALKALIC BASALT
- AMPH-BASALT
- BASALT(ANDESITE)
- BASALT-ALTERED
- BASALT-ANDESITE
- BIOTITIC BASALT
- BLEACHED-BAS-BREX
- CALC-ALK-BASALT
- CPX-PLAG-BASALT
- AMYG BASALT FLOW
- AP-BI-MB
- AP-DI-BI-FEL-MB
- AP-DI-MB
- AP-DI-MY-MB
- APHYRIC PILLBASALT
- FELD-PHYRIC BASALT
- BASALT AMPHIBOLE
- VARIOLITIC-BASALT
- TRAP
- HB BLASTIC BASALT
- MAFIC-VOLC-BASALT
- SULPHIDIC BASALT
- SHEARED PORPH. BAS
- SECOND CYCLEBASALT

- **BIOTITE**
- **BIOTITE PORPHYRY**
- **CALCITE**
- **CARBONATE**
  - PORPHYRY-CARB
  - TUFF-I,CARB
  - TUFF-I,CARB
  - TUFF-C,F
  - FE-CARB
- **CARBONATITE**
  - SILICOCARBONATITE
- **CHERT**
- **CHROMITITE**
  - CHROMITE/BIOTITE
- **DACITE**
  - DACIE-C
  - DACITE BRECCIA
  - DACITE FLOW
  - DACITE FRAGMENTAL
  - DACITE LAPILLI
  - DACITE PILLOW
  - DACITE TUFF
  - DAC-SPHERULTES
  - DAC-SPERULITES
  - DACITE/ANDESITE
  - DACITE ASH TUFF
  - DACITE DIKE
  - DACITE LAPILLI TUF
  - DACITE LAPILLI/TUF
  - DACITE LAPILLITUFF
  - DACITE TUFF BRECCI
  - DACITE XTAL TUFF
  - DACITE,ALTERED

- DACITE,CLAST
- DACITE,DIKE
- DACITE,FLOW
- DACITE,FP PORPHYRY
- DACITE,PC-PHY
- DACITE,PORPHYRY
- DACITE,TUFF
- DACITE-A
- DACITE-A-(META)
- DACITE-C
- DACITE-CARB
- DACITE-RHYOLITE
- DACITE-T
- DACITE-T,MG
- DACITE-U
- DACITE/RHYOLITE
- DACITE?
- DACITE AGGLOMRATE
- DACITE ASH
- DACITE FLOW-DOME
- DACITE TUFF
- ALTERED DACITE
- VARIOLITIC DACITE
- CALC-ALK-DACITE
- FLOW-BANDED DACITE
- SPHERULITIC DACITE
- FRAGMENTAL,DACITIC
- HNB-PLAG DACITE
- INT VOLC/DACITE

- **DIABASE**
  - DIABASE
  - DBSE DKE
  - DI-MB-GREY
  - DI-PHLOG-MB
  - DIABASE (META)
  - DIABASE 11A(NW)
  - DIABASE 11B(NW)
  - DIABASE 11C(EW)
  - DIABASE DIKE
  - DIABASE DYKE
  - DIABASE PORPHYRY
  - DIABASE,ALTERED
  - DIABASE,MG
  - DIABASE,QUARTZ
  - DIABASE,CAR-SIL-AB
  - DIABASE,CARB
  - DIABASE,CARB-SIL
  - DIABASE,CARB-SILFD
  - DIABASE,CARBONATED
  - DIABASE,DIKE
  - DIABASE,DYKE
  - DIABASE,GD-TRANS
  - DIABASE,PICRITIC
  - DIABASE,PLAG PHYRI
  - DIABASE,QV-CARB
  - DIABESE-(META)
  - DIABASE-VARIOLITIC
  - BASALT, DIABASIC
  - C-GN DIABASE 11D
  - CARBONATIZED DBS
  - METADIABASE
  - SILICIFED DIABASE
  - GRANOPHYRE –NIP DBS
  - OLIVINE DIABASE
- **DIORITE**
  - ALD”D DIORITE
  - ALT”D QTZ-DIORITE
  - DIORITE BIOTITE
  - DIORITE HB
  - DIORITE HYBRID
  - DIORITE PORPH
  - DIORITE RX
  - DIORITE SILL
  - DIORITE,ALT,MT
  - DIORITE,ALT,PY
  - DIORITE,FELD PORPH
  - DIORITE,SHEARED
  - DIORITE-A
  - DIORITE-META
  - DIORITE-QTZ
  - DIORITE/ANDESITE
  - DIORITE/GABBRO
  - DIORITE FLOW
  - DIORTITE
  - SHEARED DIORITE
  - SHRD QTZ DIORITE
  - CLOATY DIORITE
  - CLOATY METADIORITE
  - DRTE BI-HB
  - DRTE,HB-PRY
  - DYKE-DIORITIC
  - SUBL-QTZ-DIORITE
  - SHEARED DIORITE
  - SHRD QTZ DIORITE
  - HB LEUCODIORITE
  - HORNBLENDE DIORITE
  - LEUCO QTZ DIORITE
  - LEUCO DIORITE
  - MAFIC-DIORITE
  - MEL QTZ DIORITE
  - MELANOCRATIC DIORITE
  - META QTZ DIORITE
  - PEGMATITIC DIORITE
  - OPX QUARTZ DIORITE
- **DOLOSTONE**
  - DOLOMITE
- **DUNITE**
  - DUNITE
  - DUNITE,SERP

- **FELDSPAR**
  - FSP CLAST
- **FELDSPAR PORPHYRY**
  - FELD PORPH
  - FELD PORPHRY DIKE
  - FELD PORPHYRY DIKE
  - FELD PORPHYRY
  - FELD-HBD PORPHYRY
  - FELD-PORPH IN BREC
  - FELD-QTZ PORPHYRY
  - FELDSPAR PORPH
  - FELDSPAR PORPH-F
  - FELDSPAR PROPHYRY
  - PORPHYRY FELD
  - PORPHYRY FELD-HBD
  - PORPHYRY FELDSAPR
  - PORPHYRY QTZ-FELD
  - PORPHYRY,QTZ-FELD
  - PORPHYRY,FELD
  - PORPHYRY-FELD
  - PORPHYRY-QTZ,FELD
  - FELD-PORPH-STK-WK
  - FLDSP PORPH DIKE-I
  - FLDSP PORPH DIKE-I
  - FSP PORPHYRY
  - FS PORPHYRY
  - FSP-QTZ PORPHYRY
  - HAZ-FELD-PORPHYRY
  - HB-FSP PORPHYRY
  - MASS FSP PORPHYRY
  - MASS.FELDSPORPHYRY
  - QZ-FELD PORPHYRY
  - FELSIC
  - ACID LAVA DKINSON
  - ALTERED FELSIC TUF
  - BRECCIA, FELSIC
  - BRECCIA,FELSIC
  - BRECCIA-F
  - CHERTY FELSIC TUFF
  - FELSIC-INT TUFF
  - FELSIC ASH FLOW
  - FELSIC ASH TUFF
  - FELSIC ASH
  - FELSIC AUGEN TUFF
  - FELSIC BANDED TUFF
  - FELSIC BRECCIA
  - FELSIC CLAST
  - FELSIC CRYSTAL TUF
  - FELSIC CRYSTAL TUFF
  - FELSIC DIKE
  - FELSIC FLOW
  - FELSIC FLOW-DOME
  - FELSIC FLOW/TUFF
  - FELSIC FLOW?FELSIC FRAG
  - FELSIC INT TUFF
  - FELSIC INTR
  - FELSIC LAP TUFF
  - FELSIC LAPILLI TUF
  - FELSIC LAPILLISTONE
  - FELSIC METAVOLC
  - FELSIC PORPH
  - FELSIC PORPHYRY
  - FELSIC PYRO BRECCA
  - FELSIC PYRO BREC
  - FELSIC PYROCLASTIC
  - FELSIC TUFF?
  - FELSIC TUFF ALTERD
  - FELSIC TUFF BRECC
  - FELSIC TUFF BX
  - FELSIC TUFF
  - FELSIC TUFF,QTZ-FP
  - FELSIC VARIOLES
  - FELSIC VOLC FLOW
  - FELSIC VOLC XL TUF
  - FELSIC VOLC
  - FELSIC VOLC-LAP TU
  - FELSIC VOLCANIC
  - FELSIC XL TUFF
  - FELSICXTAL TUFF
  - FELSIC, FLOW
  - FELSIC, FRAG
  - FELSIC,TUFF
  - FELSIC,FLOW
  - FELSIC,FRAG
  - FELSIC,MASSIVE
  - FELSIC,MATRIX
  - FELSIC,PORPHY
  - FELSIC,PORPHYRY
  - FELSIC,SILICIFIED
  - FELSIC,TUFF
  - FELSIC-CARB
  - FELSIC-QZ PORPH
  - FELSIC-SUBV
  - FELSICS, MASSIVE
  - FELSICS,MASSIVE
  - FELSITE DIKE
  - FELSITE DIKE/SILL
  - FELSITE FIKE/SILL
  - FELSITE FLOW-DOME
  - FELSITE INTR
  - FELSITE
  - FELSITE,PROPHYRY
  - FELSITE,FOLLIATED
  - FELSITE,SHRD+PY
  - FELSITE,SHRD
  - TUFF-F
  - BANDED FELSIC TUFF
  - BRECCIA FEL-INTER
  - CGN FELSIC XL TUFF
  - FEL CRYSTAL TUFF
  - FELS CRYSTAL TUFF

- FRAMENTAL-F
- TUFF FV
- TUFF,FELSIC
- FVLC XTL LAP TUF
- FRAGMENTAL-F
- FVLC (WCKE?)
- FVLC FLOW-TUFF
- FVLC TUFF BRX
- FVLC XTL TUFF
- HAZ-FELSIC DYKE
- I-FBRECCIAT
- I-FEL HET TBXA
- I-FLC INTRUSIVE
- I-FVLC
- I-FVLC BRX
- I-FVLC XTTF
- SILIC FEL VOLC
- SILIC FEL BREC
- INT-FELSIC CLAST
- INT.FELSIC.LAPILLI TF

- **FENITE**
- **GABBRO**
  - GABB
  - GABB/MVLC
  - GABBRO+SULPHIDES
  - GABBRO ALT
  - GABBRO COARSE
  - GABBRO DIKE
  - GABBRO FRAG
  - ALKALI GABBRO
  - ALTERED GABBRO
  - BASALT-GABBRO
  - BASALT/GABBRO
  - C-GN GABBRO
  - CHL. GABBRO
  - CPX GABBRO
  - CPX MELAGABBRO
  - FGR. GABBRO
  - GABBRO FRAG/MATRIX
  - GABBRO HB
  - GABBRO LEUCO
  - GABBRO OR CGN FLOW
  - GABBRO PEGMATITE
  - GABBRO PEGMATITIC
  - GABBRO PORPH
  - GABBRO SILL
  - GABBRO,ALTERED
  - GABBRO,CG
  - GABBRO, CHILL ZONE
  - GABBRO, CHILLED
  - GABBRO DENDRITIC
  - GABBRO, FE-STAINED
  - GABBRO, FG
  - GABBRO, FG-MG
  - GABBRO, GN-TRANS
  - GABBRO, HBLD
  - GABBRO, MG
  - GABBRO, PEG
  - GABBRO, PLG-RICH
  - GABBRO, VARIED TEX
  - GABBRO, MAFIC DIKE
  - GABBRO, OL LEUCO
  - GABBRO, MG-FG
  - GABBRO, OL
  - GABBRO, OL,CHROM
  - GABBRO,PEG OL
  - GABBRO,PLAG PHYRIC
  - GABBRO-DIKE
  - GABBRO-CARB
  - GABBRO-DIORITE
  - GABBRO-K
  - GABBRO-LEUCOCRATIC
  - GABBRO-M
  - GABBRO-META
  - GABBRO-QTZ
  - GABBRO SHEARED
  - GABBRO-U
  - GABBRO/BASALT
  - GABBROIC DIKE
  - GABBROIC SILL
  - GARRRO
  - HBL-M-GABBRO
  - HBL. METAGABBRO
  - HBLD GABBRO
  - HORN GABBRO
  - HORNBLENDE GABBRO
  - HOUSE GABBRO
  - HW.7 GABBRO
  - GARNET LEUGOGABBRO
  - GARRRO
  - KALADAR GABBRO
  - L-GABB
  - L-GABBRO
  - LEUCO GABBRO
  - LEUCO-GABBRO
  - LEUCOGABBRO
  - LINEATED METAGABBR
  - M GN GABBRO
  - M-GABBRO
  - MELA GABBRO
  - MELAGABBRO
  - META GABBRO
  - META L-GABBRO
  - META-GABBRO
  - METAGABBRO DYKE
  - METAGABBRO
  - OLIVINE GABBRO
  - PORPHYRITIC GABBRO
  - QTZ GABBRO
  - SHEARED GABBRO
  - SILIC. GABBRO

- SULPHIDESGABBRO
- GT HB MESSOCR GAB
- MALIGNITE

- **GABBRONORITE**
  - GABBRO/NORITE OLI
  - GABBRO/NORITE
  - BABBRONORITE FINE
  - GABBRONORITE MAGN
  - GABBRONORITE, TRAN
  - GABBRONORITE,LEUCO
  - GARBBRONNORITE
  - HBLD GABBRONORITE
  - LEUCOGABBRONORITE
- **GARNET**
  - GARNETIFEROUS
  - GARNETIFEROUS DIKE
  - GARNETITE
- **GNEISS**
  - BI-AMPH-GN
  - BI-CA-SYN-GN
  - BI-HB-GR-GN
  - BI-HB-MT-GR-GN
  - BI-HB-PL-AMPH-GN
  - BI-HB-SYN-GN
  - BI-MT-SYN-GN
  - BI-QTZ-PL-GN
  - BI-SYN-GN
  - BIO GRANITE GNEISS
  - BIOTITE GNEISS
  - BIOTITE GNS
  - GIOTITE-HB GNEISS
  - C GN GABBRO GNEISS
  - CA-HB-PLAG-SYN-GN
  - CA-HB-SYN GN
  - DIORITE GNEISS
  - EP-CHL-ALT'N GN
  - FELSIC GNEISS
  - GABBROIC GNEISS
  - GR FACIES QT-FP-GN
  - GRANITE GNEISS
  - GRANODIORITE,GNSIC
  - GRNT GNS
  - HB BI GNEISS
  - INT GNEISS
  - INT GNEISS-(MELLON'
  - MAFIC GNEISS
  - MAGACRYST GNS
  - MONZONITE GNEISS
  - QT-FP GNS
  - QTZ BIO GNT GHEISS
  - QTZ-PLAG-B10 GN
  - QZ-FP GNS
  - SYENITE,GNEISSIC
  - TONALITE-GNEISSIC
  - TONALITE GNEISS
  - TONALITE,BI,GNS
  - AMPH GNS
  - AMPH-PL-GN
  - AUGEN GN
  - AUGEN GNS
  - CA-BI-SYN-GN
  - GABBRO, GN-TRANS
  - GREY GNEISS
  - MAFFIC ORTHOGNEISS
  - ORTHOGNEISS
  - QTZ MONZONITE GNEISS
  - QTZ-FELD-B10 GN
  - QUARTZ- FELDSPARGNS
  - RUSTY GT-SILL GNS
  - AMPHIBOLE GNEISS
  - AMPHIBOLITE C-GN
  - APHIBOLE GNEISS
  - AMPH-PL-GN
  - AMPH GNS
  - TONALITE-GNEISSIC
  - GT-PBL ORTHOGNEISS
- **GRANITE**
  - AL-MT-BI-GR-PEG
  - APLITE
  - APLITE GRANITE
  - APLITIC
  - APLITE DIKE
  - APLITIC GRANITE
  - APLITE/FELSITE
  - BI-MT-GR-PEG
  - BIOTITE GRANITE
  - F G LEUCO GRANITE
  - F G-LEUCO GRANITE
  - F GN BIOTITE GRANITE
  - GR-PEG-CORE ZONE
  - GRANITE B1
  - GRANITE BEIGE
  - GRANITE BROWN
  - GRANITE DIKE
  - GRANITE DIKE-SILL
  - GRANITE GREY
  - GRANITE SILL
  - GRANITE PINK
  - GRANITE PORPH PINK
  - GRANITE PORPH
  - GRANITE RED
  - GRANITE WHITE
  - GRANITE
  - GRANITE, HB RICH
  - GRANITE, MGN HEM
  - GRANITE, PEGMATITE
  - GRANITE PORPHYRY
  - GRANITE, PEG,S
  - GRANITE,S
  - GRANITE,S,HMG-DTXT

- GRANITE-BIOT
- GRANITE-FENITIZED
- GRANITE-FRESH
- GRANITE-META
- GRANITE-PORPH BIOT
- GRANITIC-DIKE
- GRNT,CLOTTY
- HBD GRANITE
- ADDINGTON BATH
- HORNBLENDE GRANITE
- MICROGRANITE
- MUSC AUGEN GRANITE
- MUSC POTASSIC PEG
- MUSCOVITE BIO GRAN
- MUSCOVITE GRANITE
- PEG LEUCO-GRANITE
- ALTERED GRANITE
- AB-MUSC GRANITE
- GARNET GRANITE
- GRAN PRY DYK
- HBD GRANITE
- LEUCOGRANITE
- LEUCOGRANITIC BREC
- MAGNETITE BIO GRAN
- MANETITE GRANITE
- METAGRANITE
- PORPH GRANITE
- POTASSIC GRANITE
- BI-HB-GR
- GR-PEG-CAT
- LEUCOCRA GRANIT
- MEGACRYST GRTE
- MELANOCRATIC GRAN

- **GRANODIORITE**
  - GRANOD PORPHYRY
  - GRANODIORITE B1
  - GRANODIORITE,FGR
  - GRANODIORITE,HMG
  - GRANODIORITE,LAB
  - GRANODIORITE,MGCG
  - GRANODIORITE,MGR
  - GRANODIORITE,QZ
  - GRANODIORITE?
  - GRANODIORITIC ORTH
  - GRANOPHYRE DIKE
  - GRANOPHYRE
  - GRDR-MEGACRYSTIC
  - GRDR
  - GRDR,BI
  - GRDR,CLAST
  - GRDR,KF MXTC
  - GRDR,MV,TM,GT
  - GRDR,QZ,PRY,KF,MXT
  - GRDR,STR FLT
  - GRDR-MEGACRYSTIC
  - FS GRANODIORITE
  - SHEARED GRANODIORITE
  - FS GRANODIORITE
- **GRANULITE**
- **GRAPHITE**
- **GREENSTONE**
- **HORNBLENDE PROPHYRY**
  - HB PORPHYRY
- **HORNBLENDITE**
- **HORNFELS**
  - GABB ANOR-HORNFELS
- **HYALOCLASTITE**
  - HYALOCLASTITE-F
  - HYALOCLASTITE-T,MG
  - HYALOTUFF
  - HYDROCLASTITE
- **INTERMEDIATE**
  - AMPHIBD INTRM TUFF
  - AN BRG INTM FLW
  - BRECCIA-I
  - FRAGMENTAL-I LPTF
  - FRAGMENTAL-I TFBX
  - FRAGMENTAL-I TUFF
  - FRAGMENTAL-I
  - FRAGMENTAL-I,BRECC
  - FRAGMENTAL-I-M
  - INT CLASTIC
  - INT CRYSTAL TUFF
  - INT FEL BRECCIA
  - INT FEL FLOW
  - INT FEL VOLC
  - INT FLOW OR SED
  - INT FLOW
  - INT INTR
  - INT LAPILLI TUFF
  - INT LAPILLISTONE
  - 'INT PORPH FLOW
  - INT PORPHYRY FLOW
  - INT PYROCL BRECCIA
  - INT PYROCLASTIC BX
  - INT SYNVOLC DIKE
  - INT TO MAFIC FLOW
  - INT TO MAFIC LAPST
  - INT TUFF AMPHIBED
  - INT TUFF BX
  - INT TUFF
  - INT VOLC FLOW
  - INT VOLC
  - INT VOLC/PORPH
  - INT
  - INT. CPX CLAST
  - INT. TUFF
  - INT.LAP TUFF

- INT.LAPILLI TUFF
- 'INT.PYROCLASTIC
- INT.TUFF'
- INTEMED TUFF'
- INTER CLAST
- 'INTER MASSIVE FLOW
- INTER VOLC
- INTER. TUFF
- INTERM-MAFIC
- INTERMED ASH TUFF
- INTERMED FLOW
- INTERMED TUFF'
- INTERMED XTAL TUFF
- INTERMED-AMPHIB
- INTERMED-SHEARED
- INTERMEDIATE DIKE
- INTERMEDIATE FLOW
- INTERMEDIATE TUFF
- INTERMEDIATE VOLC
- INTERMEDIATE
- 'INTERMEDIATE, PLUG
- INTERMEDIATE, TUFF
- 'INTERMEDIATE,CLAST
- INTERMEDIATE,FLOW
- INTERMEDIATE,FRAG
- INTERMEDIATE,INTR
- 'INTERMEDIATE,MASSV
- 'INTERMEDIATE,MATRX
- INTERMEDIATE,TUFF
- INTERMEOIATE DIKE
- INTERMIATE TUFF
- INTM DIKE
- INTM FLW
- INTM PORPHYRY
- INTMED ASH TUFF
- INTMED FLOW'
- INTMED PORPH FLOW
- INTMED XTAL TUFF
- INTR PYRO BRECCIA
- 'INTR TUFF
- INTRM LAP TUFF
- INTRM TUFF'
- ALTD INTERMED FLOW
- IMT TUFF
- INT CLAST
- TUFF-I
- VOLC,INTM
- TUFF-I
- CARB.INT.FELS.VOLC
- IVLC (MVLC?) FLOW
- IVLC (MVLC?) TUFF
- IVLC FLOW
- IVLC FLOW?
- IVLC MSV FLOW
- IVLC TO FVLC CLAST
- IVLC TO FVLC
- IVLC XTL TUFF
- IVLC,PLW TO MSV
- TUFF,I-M,GT'FRS
- SILL-I

- **IRON ROCK**
  - BANDED IRON FM
  - BANDED IRON FM.
  - BIF
  - IRON FORMATION
  - IRONSTONE MAGNETIT
  - IRONSTONE
  - IRONSTONE,MT-AMPH
  - IRONSTONE,MT-SILT
  - CHERTY IRONSTONE
  - FE SILICATE IRONSTONE
  - IRON ORE
- **K-FELDSPAR**
- **KAOLIN**
- **KIMBERLITE**
- **KOMATIITE**
  - BASALTIC KOMATIITE
  - KOM BASALT
  - KOM PILLOW
  - KOMAIITE FLOW
  - KOMAT BASALT
  - KOMAT PYROX
  - KOMATIITE BRECCIA
  - KOMATIITE
  - KOMATIITE, PILLOWED
  - KOMATIITE-B
  - KOMATIITE-B,MG,T
  - KOMATIITE-B,U
  - KOMATIITE-CARB
  - KOMATIITE-I
  - KOMATIITE-T
  - KOMATIITE-T,MG
  - KOMATIITE-U
  - KOMATIITIC BASALT
  - KOMATIITIC FLOW
  - KOMATIITIC PILL
  - KOMATIITIC-B
  - KOMATIITIC-U
  - CARB KOMATIITE
- **LAMPROPHYRE**
  - LAMP DIKE
  - LAMP,HB
  - LAMPH,HB PHY
  - LAMPROHYR
  - LAMPROHYRE
  - LAMPROPHYE
  - LAMPROPHYRE DIKE
  - LAMPROPHYRE
  - LAMPROPHYRE,HB
  - LAMPROPHYRE-MICA

- LAMPROPHYRL
- LAMPYROPHYRE DIKE
- BIO.LAMPROPHYRE

- **LATITE**
- **LIMESTONE**
  - ESP LST
- **MAFIC**
  - ALTERED MAFIC FLOW
  - ALTERED MAFIC META
  - AMPH MAFIC LAPILLI
  - AMPH MAFIC VOLC
  - AMPHIB MAFIC FLOW
  - AMPHIB MAFIC TUFF
  - AMPHIV MAFIC VOLC
  - AMPHIBD MAFIC FLOW
  - AMPHIBD MAFIC TUFF
  - AMYG MAFIC FLW
  - BASIC METAVOLC
  - CARB MAFIC INT
  - CARB.INT.MAFIC VOL
  - CGN MAFIC LAP TUFF
  - COPPER-MAFIC
  - FG MAFIC FLOW
  - FLOW,COARSE,MAFIC
  - FLOW,PILLOW,MFC
  - FRAGMENTAL-M TO I
  - FRAGMENTAL-M
  - FRAGMENTAL-M,ALTER
  - FRAGMENTAL-MAFIC
  - FS MAFIC DIKE
  - FS MAFIC METAVOLC
  - MAF TO INT METAVOL
  - MAFIC APHIB VOLC
  - MAFIC ASH TUFF
  - MAFIC BANDED TUFF
  - MAFIC BRECCIA
  - MAFIC CPX TUFF
  - MAFIC DIKE
  - MAFIC DYKE
  - MAFIC FEEDER DIKE
  - MAFIC FLOW ALTERED
  - MAFIC FLOW AMPHIBD
  - MAFIC FLOW MSV
  - MAFIC FLOW PILLOW
  - MAFIC FLOW
  - MAFIC FLOW,FE-ALT
  - MAFIC FSP PORPHYRY
  - MAFIC INCLUSION
  - MAFIC INT BRECCIA
  - MAFIC INTR
  - MAFIC LAPILLI TUFF
  - MAFIC LAPILLISTONE
  - MAFIC LAVA
  - MAFIC MASSIVE FLOW
  - MAFIC MASSIVE
  - MAFIC MCTAVOLC
  - MAFIC METAVOLC
  - MAFIC METAVOLCANIC
  - MAFIC MSV
  - MAFIC OR UM FLOW
  - MAFIC PILLOW FLOW
  - ALTERED MAFIC VOLC
  - BANDED MAFIC
  - CARB MAFIC VOLC
  - CARBONATED MAFIC
  - INT MAFIC FLOW
  - INT MAFIC VOL BX
  - INT MAFIC VOLC
  - INT MAFIC
  - INT.MAFIC BRECCIA
  - INT.MAFIC PILL.VOLC
  - MAFIC PILLOW VOLC
  - MAFIC PILLOWED FLO
  - MAFIC PORPH FLOW
  - MAFIC PORPHRY DIKE
  - MAFIC PYROCLASTIC
  - MAFIC SILL
  - MAFIC TUFF AMPHIBD
  - MAFIC TUFF BRECCIA
  - MAFIC TUFF
  - MAFIC VESICULAR FL
  - MAFIC VLC
  - MAFIC VOL AMYG
  - MAFIC VOLC AMPHIB
  - MAFIC VOLC FLOW
  - MAFIC VOLC
  - MAFIC VOLC. XENOL.
  - MAFIC VOLC./SED
  - MAFIC VOLCANIC
  - MAFIC VOLCANICS
  - MAFIC WACKE/TUFF
  - MAFIC, DIKE?
  - MAFIC, FLOW
  - MAFIC,BRECCIATED
  - MAFIC,FLOW
  - MAFIC,INTRUSIVE
  - MAFIC,LAYERED
  - MAFIC,MASSIVE
  - MAFIC,PILLOWED
  - MAFIC-A
  - MAFIC-AMPHIB
  - MAFIC-INTEMEDIATE
  - MAFIC-PILLOWED
  - MAFIC-T
  - MAFIC-UMAFIC FLOW
  - MAFIC-VOLC-AMPH
  - MAFIC-VOLC-FOLIATE
  - MAFIC/INTER FLOW
  - MAFICS,MASSIVE
  - MAFICS, PILLOWED
  - MAFICS,PILLOWED

- VOLCANIC,MAFIC
- VOLC,MFC
- VOLC,MFL-UM
- TUFF-M
- TUFF MV
- TUFF ASH MAFIC
- SILIC. MAFIC VOLC
- SILIC MAFIC FLOW
- SHEARED MAFIC FLOW
- SHEARED MAFIC INCLUSION
- I-MVLC CHLORITOID
- MASSIVE MAFIC FLOW
- SI MFC FLOW
- REXLLZE MAFIC FLOW
- MSV I-MVLC
- MVLC

- **MARBLE**
  - CALCITIC MARBLE
  - DOLOMITIC MARBLE
  - DOLOMITE MARBLE
  - HAZ-MARBLE
- **MIGMATITE**
  - BI MIGMATITE
  - GRANITE MIGMATITE
  - LEUCOSOME
  - MELANOSOME
  - MIGM MONZOGRANITE
  - MIGM-DIORITE PHASE
  - MIGM0LEUCOSOME
  - MOBILIZATE
  - MOBILIZATE,CD,SL
  - AMPHIB MIGMATITE
  - OPX-GT-BT LEUCOSM
  - WACKE-MIGM
  - MELANOSOM(RESISTE)
- **MONZODIORITE**
  - ANOR TO MONZODRT
- **MONZOGRANITE**
  - BIOT MONZOGRANITE
- **MONZONITE**
  - MONZONITE PORPH
  - MONZONITE STOCK
  - MONZONITE, QUARTZ
  - MONZONITE-F
  - BIO QTZ MONZONITE
  - BIOT QTZ MONZON
  - FELD PORH QTZ MON
  - HB BO QZ MONZONITE
  - OTZ MONZ FRAG/MAT
  - OTZ MONZ FRAG
- **MUDSTONE**
  - BANDED MUDSTONE
  - CLAYSTONE
  - SILICEOUS MUDSTONE
  - SHALEY MUDSTONE
  - SHEARED MUDSTONE
  - CHERTY SILTSTONE
  - COPPER RD-SILTSTONE
  - SILTSTONE,ARG.
  - SILSTONE,LAM'D
  - SILTSTONE,MSV
  - SILTSTONE,CHERTY
  - SILTSONTE,CHLORITE
  - SILTSTONE,INTFLOW
  - SANDY SILTSTONE
  - SAND-MUDSTONE
  - MUDROCK
  - MUDSHALE
  - MUDSTONE,LAM
- **MYLONITE**
  - MYLONITIC-GR
  - MYLONITE-PORPHYRY
  - MYLONITE (QDIOR)
  - MYLO METASEDIMENT
- **NORITE**
  - FELSIC NORITE
  - BIOTITIC NORITE
  - LEUCOCRATIC NORITE
  - MAFIC NORITE
- **PELITE**
- **PERIDOTITE**
  - ALTERED PERIDOTITE
  - PERIDOTITE PX.
  - PERIDOT
  - PERIDOTITE
  - PERIDOTITE,GABBROI
  - PERIDOTITE,LAVA
  - PERIDOTITE,PYROXEN
  - PERIDOTITE,SERPENT
  - PERIDOTITE-CARB
  - PERIDOTITE-FELD
  - PERIDOTITE-K
  - PERTIDOTITIC FLOW
  - PERIODOTITE
  - SILIC PERIDOTITE
- **PHENITE**
- **PSEUDOTACHYLITE**
  - PSEUDOTACH MATRIX
  - MATRIC OF PSEUDOT
- **PYROXENITE**
  - CLINOPYROXENITE
  - PYROXENITE(SERP)
  - PYROXENITE-META
  - META-PYROXINITE
  - M-CGR META PYREX
  - OLIVINE PYROXENITE
  - OLIVINE CLINOPYROX

- **PHYLLITE**
  - COPPER-PHYLITE
- **PUMICE**
- **QUARTZ**
  - BRECCIA-QTZ
  - QTZ
- **QUARTZITE**
  - QUARTZITE, BRECCIA
  - QUARTZITE,BRECCIA
- **RHYODACITE**
  - RHYODACITE-C
  - RHYODACITE-A
  - RHYODACITE CALCALK
  - RHYODACITE TUFF
  - RHYODACITE, LAPSTON
  - RHYODACITE,MASSIVE
  - RHYODACITE,PORPH
  - RHYODACITE,TEC'ZD
  - RHYODAC
- **RHYOLITE**
  - RHYOLITE ASH FLOW
  - RHYOLITE BRECCIA
  - RHYOLITE CALCALK
  - RHYOLITE FLOW
  - RHYOLITE FRAG
  - RHYOLITE PORPH
  - RHYOLITE TUFF BREC
  - RHYOLITE TUFF BX
  - RHYOLITE TUFF
  - RHOLITE TUFF-FLOW
  - RHYOLITE,CLAST
  - RHYOLITE,LAPILLIST
  - RHYOLITE,POPHYRY
  - RHYOLITE,PORPHYRY
  - RHYOLITE,VARIOLITE
  - RHYOLITE-(META)
  - RHYOLITE-A
  - RHYOLITE-C
  - RHYOLITE-C,S
  - RHYOLITE-CARB
  - RHYOLITE-T
  - PORPHYRY RHYOLITE
  - CALC-ALK-RHYOLITE
  - CHERTY RHYOLITE
  - SPHER RHY FLW
  - FLOW,QTZEYE RHY
  - GRHYOLITE
- **RODINGITE**
- **SANDSTONE**
  - ALTERED SANDSTONE
  - BIOTITE SANDSTONE
  - CHLOR SS
  - ARENITE MICA
  - ARENITE PEBBLY
  - ARENITE
  - QUARTZ ARENITE
  - ARENITE FELD
  - CALC-ARENITE
  - FELSPATHIC AREN
  - SUBLITHARENITE
  - CARB ARKOSE
  - SUBARKOSE
  - SANDSTONE-CARB
  - SANDSTONE-VOLCANIC
  - SANDSTONE, ARKOSIC
  - SANDSTONE,MSV
  - FUCHSITE ARENITE
  - LAMINATED ARENITE
  - LITHQTZ ARENITE
  - LITHARENITE
  - LITHIC ARKOSE
  - META-ARENITE
- **SCHIST**
  - ACT. TALC SCHIST
  - AMPHIBOLITE SCHIST
  - ANDESITE, SCHISTOSE
  - AP-CA-BI-SCH
  - AP-CA-FEL-BI-SCH
  - BASALT,SCHIST
  - BIO-CHL-SCHIST
  - CA-HB-BI-FEL-SCH
  - CARB-QTZ-BIO-SCHIS
  - CHL-ANK-SER-SCHIT
  - CHL. SCHIST BASALT
  - CHLORITE SCHIST
  - FELSIC SCHIST
  - FELSIC VOLC SCHIST
  - TLC-CHL-DOL-SCHIST
  - TALC-CHL-DOL-SCHST
  - TALC CHLORITE SCH
  - TALC SCHIST
  - ST-CD SCHIST
  - BIOTITE SCHIST
  - CHL-CAL SCHIST
  - FELD-PORPH SCHIST
  - GRANET SCHIST
  - GRAPHITE SCHIST
  - GRAPHITIC TALC SCH
  - INT SCHIST
  - MAFIC FLOW SCHIST
  - MAFIC SCHIST
  - MICA SCHIST
  - PEB-DYKE SCHIST
  - PORPH AMPHIB SCH
  - QTR-MUSCOVITE SCH
  - QTZ BIO SER SCHIST
  - QTZ BIOTITE SCHIST
  - QTZ MUSC SCHIST

- QTZ SER SCHIST
- QTZ-CARB-BIO-SCH
- QTZ-CHL-SER-SCHIST
- QTZ-CHLO-SER-SCH
- QTZ-MUSC SCHIST
- QTZ-SER SCHIST
- QTZ-SER-CHL-SCH
- QTZ-SER-DIOT-SCHIS
- QTZ FELD SCHIST
- QTZ-GT-SILL SCHIST
- QTZ FELD SCHIST
- QTZ-GT-SILL SCHIST
- SCHIST & BIO HALO
- SCHIST,CHERTY
- SCHIST,CHLOR-CARB
- SCHIST,FELSIC
- SCHIST,GRAPHITIC
- SCHIST,METADACITE
- SCHIST,METAVOLC
- SCHIST,PY IF
- SCHIST,PY
- SCHIST,PYRITIZED
- SCHIST,SEDIMENTS
- SCHIST,SER-CARB
- SCHIST,SER-CHL-CAR
- SCHIST,SER-TL
- SCHIST,SERICITE
- SCHIST,VEINED
- SCHIST,VOLCANIC
- SCHIST-WACKE
- SCHIST-CARB
- SCHISTOSE BASALT
- SCHISTOSE UNIT
- GARNET TOUR BIOTIT
- HB SCHIST BASALT
- LT GREEN SCHIST
- SIL-CARB-MICA SCHI
- SIL-MICA SCHIST
- SIL-TOUR SCHIST
- SCHIST-WACKED
- SCHIST-CARB
- SCHISTOSE BASALT
- SCHISTOSE UNIT
- SER-CHL-ANK SCHIST
- SER-CHL SCHIST
- SER-QTZ SCHIST
- SERICITE-QTZ SCHIS
- SERICITE SCHIST

- **SHALE**
  - GRAPHITIC SHALE
- **SIDERITE**
- **SILTSTONE**
- **SKARN**
- **SLATE**
- **SOAPSTONE**
- **SULPHIDES**
  - SULPHIDE VEIN
  - SULPHIDE ZONE
  - SULPHIDE IRONSTONE
- **SYENODIORITE**
  - SYENODIORITE-CARB
- **SYENOGRANITE**
  - BIOT SYENOGRANITE
- **SYENITE**
  - AMPHIBOLE SYENITE
  - SYENITE (MAFIC)
  - SY PORP DIKE
  - SYENITE DIKE
  - SYENITE FELSITE
  - SYENITE FP
  - SYENITE PORPH
  - SYENITE PORPHYRY
  - SYENITE RED HBLE
  - SYENITE RED
  - SYENITE,QTZ-AMPH
  - SYENITE,AMPHIBOLE
  - SYENITE,CANCRINITE
  - SYENITE,GARNET
  - SYENITE,HORNBLENDE
  - SYENITE,MELAN NEPH
  - SYENITE,NEPHELINE
  - SYENITE,PY
  - SYENITE,PYROXENE
  - SYENITE,QTZ-AMPH
  - SYENITE-CARB
  - SYENITE-HYBRID
  - SYENITE-I
  - SYENITE-M
  - SYENITE-M,POR
  - SYENITE-QTZ
  - AMP STENITE
  - AMP SYENITE
  - AP-CA-BI-SYN
  - BI-SYENITE
  - BI-HB-SYN
  - BI-HB-SYN-SN
  - BI-MT-SYN
  - BI-SYN
  - BIOTITE SYENITE
  - C-PY-MT-BI-NE-SYN
  - CA-BI-SYN
  - HB-BT SYENITE
  - HB-SYENITE
  - HORNBLENDE SYENITE
  - HB-BT SYENITE
  - HB-SYENITE
  - HORNBLENDE SYENITE
  - LEUCOCRATIC SYENITE

- MAFIC NEPH SYENITE
- MAFIC SYENITE
- MELANOCRATIC SYENITE
- MT-BT SYENITE
- MT MORIAH SYENITE
- NEPHELINE SYENITE
- HB-BI SYENITE

- **SYLVITE**
- **THOLEIITE**
  - THOL FE
  - THOL MG
  - THOLEIITE
  - THOLEIITE,FE
  - THOLEIITE,MG
  - THOLEIITE-MG
  - THOLEIITIC BASALT
  - BASALT T
  - BASALT,T,MG
  - BASALT,TM
  - BASALT-T
  - BASALT-T,AMYGDAL
  - BASALT-T,FE
  - BASALT-T,MG
  - BASALT-T,MG,C
  - BASLAT-T,MG,CARB
  - BASALT-T,MGR
  - BASALT-T,PILLOWED
  - BASALT-TM
  - BASALT-TM,CARB
  - BASALT-TM?
  - CARB. THOL.BASALT
  - BASALT-FE THOL
  - BASALT-MG THOL
  - FE-RICH THOL BAS
- **TONALITE**
  - TNLT BI-HB
  - TNLT HB
  - TNLT SSBI-HB
  - TNLT
  - TNLT,FGR
  - TNLT,MGR,FLT
  - TNLT/GRDR,BI,HB
  - TONALITE B1
  - 'TONALITE B1-HB
  - TONALITE HB-B1
  - TONALITE HYBRID
  - TONALITE,BI
  - TONALITE,BI,MGR
  - TONALITE,BI-MT
  - TONALITE,CLAST
  - TONALITE,HB,BI
  - TONALITE,LATE
  - TONALITE,PYRITIZED
  - TONALITE-META
  - BI TONALITE
  - BI-HB TONALITE
  - BIOTITE TONALITE
  - ELZAVIR BATHOLITH
  - MT TONALITE
- **TOSCANITE**
- **TUFF**
  - BEDDED TUFF
  - BEDDEDTUFF/SEDI
  - CRYSTAL TUFF
  - CRYSTAL-LITHIC TUF
  - ALTERED TUFF
  - BANDED TUFF
  - BANDED TUFF/SILTST
  - CSE BEDDED TUFF
  - FP CRYSTAL TUFF
  - FRESH HELEN FW TUF
  - FRESH LUCE FW TUFF
  - FSPR XL TUFF
  - LAP. TUFF
  - LAPILLI TUFF
  - LITHIC TUFF
  - PYRITIC TUFF
  - SHRD TUFF
  - SULPHIDE & TUFF
  - TUFF BRECCIA
  - TUFF OR SED?
  - TUFF
  - TUFF,LAPILLI
  - TUFF-B
  - TUFF-C
  - TUFF-CARB
  - TUFF-FELD
  - TUFF-K
  - TUFF-QTZ,FELD
  - TUFF-TALC,CHLORITE
  - TUFF-XL TUFF
  - TUFF/CHERT
  - AMPHIB ASH TUFF
  - TUFF?
  - CDX-PHYRIC TUFF
  - FELDSPAR XT TUFF
  - FELDSPATHIC TUFF
  - SHEARED TUFF
  - HNB-PHYRIC TUFF
  - HNB-PLAG TUFF
  - LAPILLI TUFF FELS
- **TRACHYTE**
  - TRACH LAPILLI TUFF
  - TRACHYANDESITE
  - TRACHYBASALT
  - TRACHYE-M
  - TRACHYTE BRECCIA
  - TRACHYTE FELD
  - TRACHYTE PORPH
  - TRACHYTE TUFF BREC

- TRACHYTE TUFF
- TRACHYTE TUFF-M
- TRACHYTIC CLAST
- TRACHYTIC CONGLOM
- TRACHYTIC DYKE
- TACHYTIC TUFF
- MAFIC TRACHYTE

- **TROCTOLITE**
- **TRONDHJEMITE**
  - BIO TRONDHJEMITE
  - TRONDJEMITE
  - TRONDHJ-TONALITE
  - TRANDHJ-QTZ DIORIT
  - TRONDHJ-QFP
  - TRDJ
- **ULTRAMAFIC**
  - UM FLOWS
  - UM FLOW
  - UM FEEDER DIKE
  - ULTRAMAFIC?
  - ULTRAMAFIC,DIKE
  - ULTRAMAFIC
  - ULTRAMAFIC XENO
  - ULTRAMAFIC VLC(?)
  - ULTRAMAFIC VLC
  - ULTRAMAFIC TUFF
  - ULTRAMAFIC SILL
  - ULTRAMAFIC ROCK
  - ULTRAMAFIC PYRO
  - ULTRAMAFIC METAVOL
  - ULTRAMAFIC INTRUSV
  - ULTRAMAFIC INTR
  - ULTRAMAFIC INCLUSI
  - ULTRAMAFIC FLOW
  - ULTRAMAFIC DYKE
  - ULTRAMAFIC(?)
  - ULTRAMAFIC CUMULT
  - ULTRA MAFIC
  - ULMF?
  - DIOP-RICH ULTRAMF.
  - TUFF-U
  - SILIC TUFF
- **WACKE**
  - WACK-SHEARED
  - WACKE-FELDSPATHIZE
  - WACKE-AMPHIB
  - WACKE,STAUR-RICH
  - WASKE,MSV
  - WACK,HB-BI
  - WACK,GARNET-RICH
  - WACK,C GN
  - FELSPATHIC WACKE
  - WACKE TO QTZ AREN
  - WACKE PEBBLY
  - WACKE SHEARED ALT
  - WACKE-VOLCANICLASTIC
  - CARB ARK WACKE
  - CBED GREY WACKE
  - FELSIC WACKE
  - TUFF WACKE
  - SHEARED WACKE
  - FPWACKE,BI
  - FPWK(IVLC?)
  - GREYWACKE
  - GT-BT WACKE MESO.
  - LTWK/SLST VS WVLC
  - MAFIC RICH WACKE
  - MASSIVE WACKE
- **WEBSTERITE**

Appendix 2. List of Data Sources

Table 3. List of MRDs used to compile the specific gravity data set (*see* References for full citations).

Miscellaneous Release—Data (MRD) Number	Author(s)
132	MacDonald and Tremblay (2004)
147	Hart (2005)
156	Schandl (2005)
211	Houlé and Hall (2006)
222	Préfontaine and Buse (2007)
240	Easton (2010)
242	Stone (2010)
250	Haus and Pauk (2010)
266	Hart (2009)
277	Berger et al. (2011)
282	Ayer and Chartrand (2011)
287	Duguet (2011)
289	Préfontaine et al. (2012)
292	Berger (2012)
293	Buse (2012)
295	Kuzmich, Hollings and Campbell (2012)
299	Barrett et al. (2013)
309	Magnus (2013)
315	Lodge (2015)
316	Duguet (2014)
319	Trevisan et al. (2015)
323	Easton and Azar (2017)
327	Duguet (2016)
329	Hinz et al. (2016)
330	Gélinas, Lodge and Gibson (2016)
334	Azar (2016)
339	McDivitt (2016)
342	Ratcliffe (2017a)
346	Ratcliffe (2017b)
347	Metsaranta (2017)

Appendix 3. Summary Statistics

The following table contains summary statistics for each rock type represented in the specific gravity data set.

Table 4. Summary statistics compiled from the specific gravity ("S.G.") data set.

ROCK TYPE	COUNT	MEAN S.G.	MEDIAN S.G.	STD. DEV.	MIN. S.G	MAX. S.G.
ALBITITE	13	2.67	2.64	0.093	2.59	2.95
ALKALINE INTR	3	2.70	2.71	0.012	2.69	2.71
ALKALINE VOLC	79	2.78	2.78	0.065	2.66	3.06
AMPHIBOLE PORPHYRY	9	2.82	2.81	0.058	2.76	2.97
AMPHIBOLITE	414	2.99	2.99	0.146	2.41	3.82
ANDESITE	676	2.85	2.83	0.109	2.62	3.34
ANORTHOSITE	172	2.83	2.80	0.120	2.52	3.38
ARENITE	2	2.63	2.63	0.014	2.62	2.64
ARGILLITE	76	2.79	2.77	0.214	1.80	3.46
ASBESTOS	1	2.44	2.44	0.000	2.44	2.44
ASH VOLC	9	2.77	2.80	0.067	2.68	2.84
BARITIC SED	4	3.64	3.59	0.137	3.54	3.83
BASALT	3400	2.92	2.93	0.120	2.27	3.40
BIOTITE PORPHYRY	1	2.82	2.82	0.000	2.82	2.82
CARBONATE	14	2.81	2.81	0.069	2.66	2.90
CARBONATE OTHER	42	2.86	2.87	0.088	2.67	3.03
CARBONATE SED	118	2.85	2.84	0.081	2.60	3.08
CARBONATITE	36	3.03	2.99	0.229	2.77	3.71
CHERT	18	2.70	2.70	0.042	2.63	2.77
CHROMITITE	19	3.60	3.78	0.501	2.62	4.25
CONGLOMERATE	62	2.82	2.81	0.118	2.58	3.09
DACITE	489	2.76	2.75	0.090	2.53	3.26
DIABASE	916	2.98	3.01	0.094	2.63	3.25
DIORITE	621	2.82	2.80	0.127	2.50	3.65
DOLOSTONE	1417	2.77	2.79	0.077	2.26	3.14
DUNITE	19	2.64	2.63	0.133	2.33	2.95
FELDSPAR PORPHYRY	287	2.71	2.70	0.064	2.52	3.08
FELSIC INTR	126	2.70	2.69	0.091	2.56	3.03
FELSIC SED	12	2.77	2.78	0.090	2.64	2.93
FELSIC TUFF	198	2.72	2.71	0.083	2.48	3.29
FELSIC UNDEF	27	2.74	2.72	0.095	2.55	2.99
FELSIC VOLC	909	2.74	2.72	0.093	2.55	3.68
FENITE	5	2.74	2.73	0.045	2.69	2.80
FUCHSITE	2	2.70	2.70	0.148	2.59	2.80
GABBRO	1481	2.97	2.97	0.131	2.06	4.22
GABBRONORITE	100	2.99	2.98	0.107	2.69	3.31
GARNETITE INTR	1	3.29	3.29	0.000	3.29	3.29
GNEISS AMPHIBOLITIC	16	2.91	2.89	0.105	2.72	3.10
GNEISS BIOTITIC	30	2.80	2.76	0.173	2.62	3.29
GNEISS DIORITIC	13	2.86	2.84	0.073	2.79	3.03

ROCK TYPE	COUNT	MEAN S.G.	MEDIAN S.G.	STD. DEV.	MIN. S.G	MAX. S.G.
GNEISS FELSIC	75	2.68	2.67	0.064	2.52	2.92
GNEISS INTERMEDIATE	41	2.80	2.78	0.101	2.64	3.01
GNEISS MAFIC	57	2.96	2.97	0.127	2.62	3.20
GNEISS OTHER	169	2.79	2.74	0.138	2.58	3.23
GNEISS PARA	8	2.68	2.67	0.101	2.56	2.85
GNEISS TONALITIC	66	2.76	2.74	0.091	2.63	3.03
GRANITE	991	2.68	2.65	0.134	1.72	4.29
GRANODIORITE	767	2.69	2.68	0.072	2.54	3.69
GRANULITE	9	2.77	2.76	0.174	2.58	3.16
GREENSTONE	2	2.95	2.95	0.134	2.85	3.04
GREYWACKE	315	2.79	2.75	0.143	2.49	4.07
HORNBLENDE PORPHYRY	2	2.89	2.89	0.141	2.79	2.99
HORNBLENDITE	22	3.07	3.07	0.083	2.89	3.27
HORNFELS	11	2.88	2.87	0.137	2.68	3.10
HYALOCLASTITE	18	2.92	2.89	0.106	2.70	3.10
INTERMEDIATE INTR	60	2.76	2.74	0.092	2.63	3.12
INTERMEDIATE TUFF	122	2.77	2.75	0.097	2.34	3.12
INTERMEDIATE UNDEF	19	2.80	2.79	0.104	2.59	3.00
INTERMEDIATE VOLC	925	2.81	2.79	0.127	1.86	3.96
IRON ROCK	116	3.23	3.17	0.354	2.54	4.31
KAOLIN	85	2.57	2.57	0.037	2.34	2.79
K-FELDSPAR	2	2.51	2.51	0.198	2.37	2.65
KIMBERLITE	5	2.52	2.54	0.064	2.41	2.58
KOMATIITE	309	2.90	2.91	0.106	2.58	3.22
LAMPROPHYRE	83	2.89	2.87	0.151	2.56	3.41
LATITE	20	2.77	2.76	0.052	2.71	2.88
LIMESTONE	148	2.69	2.68	0.072	2.45	3.00
MAFIC INTR	169	2.90	2.90	0.113	2.61	3.13
MAFIC TUFF	39	2.88	2.89	0.097	2.71	3.10
MAFIC UNDEF	66	2.97	2.97	0.178	2.59	3.74
MAFIC VOLC	2440	2.94	2.97	0.121	1.97	3.66
MARBLE	144	2.80	2.76	0.117	2.66	3.34
MIGMATITE	51	2.76	2.75	0.115	2.61	3.10
MONZODIORITE	56	2.80	2.78	0.151	2.61	3.69
MONZOGRANITE	89	2.65	2.65	0.056	2.57	2.96
MONZONITE	221	2.70	2.67	0.104	2.14	3.14
MUDSTONE	160	2.78	2.77	0.122	2.50	3.17
MYLONITE	18	2.74	2.69	0.227	2.57	3.59
NORITE	47	2.86	2.82	0.114	2.69	3.26
PEGMATITE	2	2.70	2.70	0.007	2.69	2.70
PELITE	34	2.83	2.81	0.132	2.67	3.26
PERIDOTITE	357	2.87	2.86	0.178	2.20	3.44
PHENITE	2	2.78	2.78	0.007	2.77	2.78
PHYLLITE	3	2.78	2.82	0.110	2.66	2.87
PSEUDOTACHYLITE	54	2.79	2.79	0.097	2.63	3.14
PUMICE	2	2.75	2.75	0.049	2.71	2.78
PYROXENITE	144	3.05	3.03	0.163	2.52	3.45

ROCK TYPE	COUNT	MEAN S.G.	MEDIAN S.G.	STD. DEV.	MIN. S.G	MAX. S.G.
QUARTZ VEIN	35	2.66	2.65	0.054	2.53	2.78
QUARTZITE	86	2.70	2.67	0.089	2.59	3.00
RHYODACITE	36	2.76	2.74	0.080	2.65	3.01
RHYOLITE	597	2.71	2.70	0.078	2.38	3.06
RODINGITE	2	3.34	3.34	0.064	3.29	3.38
SANDSTONE	526	2.70	2.68	0.083	2.32	3.23
SCHIST BIOTITIC	14	2.82	2.78	0.138	2.71	3.10
SCHIST CHLORITIC	15	2.78	2.78	0.096	2.56	2.96
SCHIST FELSIC	13	2.75	2.75	0.093	2.64	2.92
SCHIST INTERMEDIATE	20	2.84	2.83	0.110	2.69	3.06
SCHIST MAFIC	23	2.94	2.94	0.122	2.72	3.16
SCHIST OTHER	112	2.79	2.77	0.184	2.10	3.71
SCHIST QUARTZITIC	41	2.72	2.71	0.100	2.39	3.02
SCHIST SERICITIC	26	2.75	2.75	0.078	2.63	2.94
SCHIST TALC	15	2.90	2.88	0.134	2.66	3.27
SEDIMENT OTHER	7	2.92	2.87	0.198	2.65	3.27
SHALE	3	2.71	2.71	0.045	2.67	2.76
SHOSHONITE	6	2.80	2.80	0.040	2.76	2.85
SILTSTONE	35	2.73	2.73	0.148	2.45	3.03
SKARN	41	3.12	3.14	0.364	2.62	4.47
SLATE	8	2.78	2.77	0.103	2.66	2.91
SOAPSTONE	8	2.88	2.88	0.033	2.84	2.94
SOVITE	144	2.91	2.89	0.121	2.64	3.39
STEATITE	3	2.98	2.92	0.110	2.92	3.11
SULPHIDES	11	3.20	3.00	0.502	2.66	3.86
SYENITE	944	2.72	2.70	0.109	2.52	4.07
SYENODIORITE	13	2.73	2.71	0.073	2.62	2.87
SYENOGRANITE	19	2.64	2.63	0.057	2.58	2.82
SYLVITE	1	3.64	3.64	0.000	3.64	3.64
THOLEIITE	688	2.94	2.95	0.107	2.55	3.29
TONALITE	486	2.72	2.70	0.098	2.01	3.59
TOSCANITE	5	2.80	2.76	0.073	2.74	2.88
TRACHYTE	121	2.77	2.75	0.066	2.63	2.92
TROCTOLITE	12	2.96	2.95	0.056	2.89	3.07
TRONDHJEMITE	184	2.69	2.69	0.048	2.52	2.86
TUFF CHERTY	476	2.82	2.80	0.142	1.59	3.36
TUFF CRYSTAL	69	2.66	2.63	0.107	2.50	3.10
TUFF LAPILLI	230	2.97	3.02	0.149	2.39	3.73
TUFF OTHER	331	2.77	2.75	0.132	2.23	3.94
ULTRAMAFIC INTR	89	2.91	2.92	0.170	2.45	3.33
ULTRAMAFIC UNDEF	72	2.88	2.94	0.198	2.40	4.05
ULTRAMAFIC VOLC	127	2.92	2.92	0.137	2.64	3.57
WEBSTERITE	3	3.33	3.35	0.035	3.29	3.35

Appendix 4. Description of Data and Formats

The specific gravity data set is made available in ASCII column delimited (CSV), Microsoft® Excel® (XLSX) workbook and georeferenced ESRI® shapefile formats.

The field names used in the ASCII and workbook files and shapefile attribute table are as follows.

Table 5. Description of attribute table field names.

Field name	Description
OBJECTID_	Database index number
LON_NAD83	Longitude, North American Datum 1983 (NAD83), decimal degrees
LAT_NAD83	Latitude, North American Datum 1983 (NAD83), decimal degrees
UTM_ZONE	UTM zone
DATUM	Datum for UTM co-ordinates: North American Datum 1927 (NAD27) or North American Datum 1983 (NAD83)
UTM_E	UTM easting
UTM_N	UTM northing
POSIT_FLAG	Estimate of positional accuracy, metres or M, P, S (Multiple, Suspicious, Problematic)
AREA_TP_LK	Area or Township or area near Lake
SAMPLE_NO	Geochemical sample number
MRD_NO	Miscellaneous Release—Data (MRD) publication number; “na” indicates data source was the Labwork database
GEOLOGIST	Geologist’s name (or the name of the first author from a multi-authored source data set)
YEAR	Year sample collected
ROCKTYPE	Standardized rock name
AGE	Geological era *
GEOL_PROV	Geological Province ^
SG	Specific gravity, g/cm^3

* The AGE entry indicates the broad geological time unit to which the collected sample belongs:

- for Precambrian rocks:
  ARCH – Archean
  PROT – Proterozoic
  PREC – Precambrian
  UNKN – unknown, typical applies to diabase dikes
- for Phanerozoic rocks:
  QUAT – Quaternary
  CRET – Cretaceous
  SILU – Silurian
  CAMB – Cambrian
- Broader units are indicated if the stratigraphic position of a Phanerozoic rock has not been precisely determined, i.e., CENO (Cenozoic), MESO (Mesozoic) and PALE (Paleozoic).

^ The GEOL_PROV entry indicates the broad geological area to which the collected sample belongs:

- Superior Province (older than 2500 Ma, typical granite–greenstone rocks)
- Superior Province-dike (diabase and lamprophyre dikes in the Superior Province that may be Archean, Proterozoic or unknown (unassigned) in age)

- Superior Province-Alk (alkalic and carbonatitic rocks in the Superior Province that may be Proterozoic or Archean in age)
- Southern Province (Proterozoic rocks)
- Southern Province-NW (Southern Province rocks in northwestern Ontario, the majority of which are associated with the Midcontinent Rift)
- Southern Province-SUD (Southern Province rocks associated with the Sudbury Structure (Sudbury Igneous Complex, Onaping, Onwatin and Chelmsford formations)
- Grenville Province (Archean and Proterozoic rocks (2500 to 542 Ma) affected by the Grenville Orogeny at *circa* 1050 to 1000 Ma)
- Phanerozoic rocks (rocks younger than 542 Ma)