Upload Instructions for Bulk Uploading to MetPetDB

NOTE* All of this information is available on the MetPetDB wiki.

Outline

The Upload Process

Appendices:

General Advice on file organization:

There are many functional ways to do this, but I like to keep all files (images, analyses, plots, etc) associated with a particular sample in a single folder. Nested folders are OK, but I have found over the years that it gets to be very confusing where data on a sample is spread among many different folders ("…now where did I put that X-ray map???").
So a file system might be organized like this:

- Sample
    - Sample information
        - Sample photograph
        - P-T conditions
        - Plots etc.
        - Summary information
    - Subsample1
        - Maps
        - Image
        - Mnz
        - Data
        - (Each of these can be in folders or not)
    - Subsample2
        - Maps
        - Images
        - Data
        - Etc.

This type of file structure is not necessary so long as the appropriate subsample is indicated in the respective spreadsheet (see below for specifics). The important thing is to keep the chain of evidence intact – that is, you know where every image, analysis, etc. comes from.

What is a subsample?

MetPetDB differentiates among subsamples. These are parts of a sample (hand sample) that are used for different purposes. A thin section is a subsample. A polished thin section for microprobe work is another subsample. Multiple polished thin sections are multiple subsamples. A rock chip mounted in epoxy for analysis or ground to a powder for bulk analysis is another subsample. It is important to keep track of which subsample is associated with each piece of data and one way to do this is to keep subsample-specific information inside individual folders. In order to create a subsample, you must find the main sample in "my samples" and below the listed attributes is a link called "Add Subsample". A subsample type must be specified from this list: Thin Section, Polished Thin Section, Rock Chip, or Mineral Separate.

Subsamples may also be created during chemical analysis bulk upload by providing a subsample name and the type of subsample for each new subsample. See Chemical Analysis Bulk Upload.

Uploading Data

There are 3 types of bulk uploads: Sample, Chemical Analysis, and Images. These must be done from a Microsoft Excel spreadsheet (.xls file). Only the first worksheet in a .xls workbook file (first tab at bottom left) will be uploaded, so be certain that the first sheet in the saved .xls file you are uploading contains the data you want uploaded for the correct type of upload.

All uploaded data will initially be private. They may then be made public once they are in MetPetDB. You are encouraged to check your uploaded data before making it public, as once it is public it is viewable and downloadable by other MetPetDB members.
Upload Tactics

MetPetDB recommends preparing a single excel file with a suite of data you would like to upload (the alternative would be an individual file for each of samples, chemical analyses, and images). The single file should have separate worksheets for samples, chemical analyses, and images, labeled as such. In this case, on each step of the upload process described below, you may browse for the same file, uploading a re-saved version of the file with the appropriate worksheet as the first (on top). In microsoft excel, worksheets can be dragged to the top by their tab.

This method allows all data for upload of a suite of samples to MetPetDB to be organized with a single file (apart from the individual image files), e.g. ExampleUploadSheet.xls.

The Upload Process

1. Upload your samples

First you need to prepare a sample upload worksheet in .xls format (download an example from the wiki). An upload worksheet contains data arranged in columns, each with an appropriate header. The first row is reserved for the column headers. Each additional row should contain data for each sample to be uploaded. Only some fields are required in order to upload your samples, as indicated here, but we encourage you to be thorough to maintain a database that is as versatile as possible.

What types of data must/can be included with your samples.
Lists of set data types:
Regions
Rock Types
Metamorphic Grades
Minerals
Non-numeric abbreviations for mineral modes
Detailed descriptions of sample attributes.
List of accepted headers.

Now you can upload the spreadsheet.

Save the excel file with your samples worksheet on top (the farthest tab to the left).

1. Log in to MetPetDB.
2. Click Upload Data (on the page menu bar).
3. Select the Samples radio button.
4. Choose your spreadsheet by clicking browse.
5. Click Upload. This will tell you if there are errors with your data, and how many samples will be added to MetPetDB.
6. Check to see which headers were matched to MetPetDB. Check if you have any errors by clicking the errors tab. If you have an error or made a mistake with a header, edit and save your spreadsheet, save it, and re-upload.
7. If you have no errors and all of your headers are matched by MetPetDB, you are ready to submit your data to MetPetDB. Click Submit Data.
8. Navigate to My Samples to see that your samples have uploaded. Or, alternatively, find your new samples with a search. In this case it will help to input your screen name as the owner to exclude published samples and the samples of others.

2. Upload your chemical analyses

First you need to prepare a chemical analyses upload worksheet in .xls format (download the example from the wiki).

The first row is reserved for the column headers. The second row is reserved for units (chemical analysis and precision). Each additional row should contain data for each analysis to be uploaded. Only some fields are required in order to upload your data, but we encourage you to be thorough to maintain a database that is as versatile as possible.

Be sure your data follows the requirements for chemical analyses.
- Lists of set data types:
- Subsample Types
- Minerals
- Elements
- Oxides
- Non-numeric abbreviations for measurements

Detailed description of chemical analysis attributes.
List of accepted headers.
Please note that chemical analyses must be in weight percent or ppm.

Now you can upload your chemical analyses.

1. Save the excel file with your chemical analyses worksheet on top (the farthest tab to the left).
2. Log in to MetPetDB.
3. Click Upload Data (on the page menu bar).
4. Select the Chemical Analyses radio button.
5. Choose your spreadsheet by clicking browse.
6. Click Upload. This will tell you if there are errors with your data, and how many analyses will be added to MetPetDB.
7. Check to see which headers were matched to MetPetDB. Check if you have any errors by clicking the errors tab. If you have an error or made a mistake with a header, edit and save your spreadsheet, save it, and re-upload.
8. If you have no errors and all of your headers are matched by MetPetDB, you are ready to submit your data to MetPetDB. Click Submit Data.
9. Navigate to My Samples to see that your samples have uploaded. Or, alternatively, find your new samples with a search. In this case it will help to input your screen name as the owner to exclude published samples and the samples of others.

3. Upload your images

Image upload is performed by compressing a folder containing the images (the image folder) plus a metadata spreadsheet. Images are referenced to a sample number which is required and possibly to a subsample, which is not required. Note: The sample must be uploaded/added first, before images can be uploaded.

Prepare Images

- The same image file may be uploaded to more then one sample (e.g. a map with multiple sample locations).
- Filenames should be cataloged in the accompanying image upload spreadsheet.
- Acceptable image formats are: .jpg , .gif , .tif , and .png.
- The current size limit is 50 megabytes per image.
- Images should be placed in an image folder.
    - Images may also be included in subdirectories/subfolders within the image folder. This requires that the image upload spreadsheet contains the path information for the images (e.g. [subfolder name]/image.png). See below for how to prepare the image upload spreadsheet.

Prepare Image Upload Spreadsheet

The image upload spreadsheet must have the image data are on the first worksheet. An upload spreadsheet contains data arranged in columns, each with an appropriate header. The first row is reserved for the column headers. Each additional row should contain data for each image to be uploaded. Only some fields are required in order to upload your images, as indicated below, but we encourage you to be thorough to maintain a database that is as versatile as possible (download an example from the wiki).

- Be sure your data follows the requirements for images.
- Lists of set data types:
    - Subsample Types
    - Image Types
- Detailed descriptions of image attributes.
- List of accepted headers.

Prepare Archive (.zip) File

Download an example from the wiki.

1. Save the image upload file with your images worksheet on top (the farthest tab to the left).
2. Compress/create the Archive (.zip).

- If you have archiving software, this is commonly done (in windows and in Mac OSX) by selecting/highlighting the files to be archived, right-clicking on one of them, and choosing "create archive of...".
- If the image upload spreadsheet is the only excel spreadsheet in the archive (.zip) file, it can have any name.
- If another .xls spreadsheet is included in the .zip archive (for any reason), the image upload spreadsheet must have the name image_upload.xls.
- If the image upload spreadsheet is within the image folder, the path of the images need not contain the image folder; however, if it was compressed external to the image folder, the images must have [image folder name]/ as the beginning of their path (the image file location is referenced to the image spreadsheet location).

Note that the Image Upload Spreadsheet must be in the archive (.zip).

Upload Archive (.zip)

1. Log in to MetPetDB.
2. Click Upload Data (on the page menu bar).
3. Select the Images radio button.
4. Choose your image archive (.zip) by clicking browse.
5. Click Upload. This will tell you if there are errors with your data, and how many analyses will be added to MetPetDB.
6. Check to see which headers were matched to MetPetDB. Check if you have any errors by clicking the errors tab. If you have an error or made a mistake with a header, edit and save your spreadsheet, save it, and re-upload.
7. If you have no errors and all of your headers are matched by MetPetDB, you are ready to submit your data to MetPetDB. Click Submit Data.
8. Navigate to My Samples to see that your samples have uploaded. Or, alternatively, find your new samples with a search. In this case it will help to input your screen name as the owner to exclude published samples and the samples of others.

Example Spreadsheets

There are some example files that are ready to be uploaded to MetPetDB on the wiki. If you already have these sample numbers in My samples, you must delete them to test the upload interface.

Detailed List of Sample Attributes/Headers

REQUIRED FIELDS

SAMPLE NUMBER

Each sample name must be unique to the sample owner. That is, there may be more than one sample with a specific number (e.g. 93-24) but only one sample with a particular owner can have this number. Note that there is no case sensetivity, so v-10=V-10.

ROCK TYPE

This is not an exercise in taxonomy. However, every rock in the database must have a name. The "Rock Type" must be from list of rock types (see Appendix A). Additionally, multiple rock names are not only permitted, but encouraged (simply add an additional rock names as "Comments" – see below). However, a single rock type is required. The list of rock types is largely from the British Geological Survey's recommendations.

LATITUDE

Must be between -90 and 90 (negative for south). Units are decimal degrees (DD.DDDDD). Note that five (5) decimal places corresponds to roughly 1 meter spatial resolution.

LONGITUDE

Must be between -180 and 180 (negative for west). Units are decimal degrees (DD.DDDDD).

OPTIONAL FIELDS ¶

LOCATION ERROR

Units are in meters.
Latitude/longitude errors are an optional field for samples that are not well located. Errors are assumed to be the same in all directions.

IGSN

IGSN (International Geological Sample Numbers) are unique identifiers that are created by SESAR (System for Earth SAmple Registration http://www.geosamples.org/). You must register your samples to obtain an IGSN. If you have an IGSN you can enter it here. We plan to have a tool for automatic sample registration through MetPetDB in the future.

REGION

This is the region from which the sample was collected. It can be any text you choose and there can be any number of regions. Regions can be geographic (e.g. Alps,

Valhalla Complex, Raging River Valley, Pine Island) or political (e.g. Vermont, Cooke County).
When specifying multiple regions, put each distinct region in a separate spreadsheet column. Each column should be headed by the word "Region".
Also: you may want to look through the database to see if your region already exists. Please conform to existing spellings for your region. Suggestions can be made to MetPetDB administrators.

COUNTRY

Where sample was collected. Pretty obvious, except where countries change names or the boundaries change. For consistency, input the country of collection at the time the sample was collected.

ALIAS (alternate sample number)

In some cases the same rock sample has been referred to by different sample numbers. These are sample aliases. There can be any number of aliases.

COLLECTOR

The name of the person who collected the sample. Preferred format: Lastname, First name middle initial.

DATE OF COLLECTION

Must be a date in MM-DD-YYYY, YYYY-MM-DD or a shortened version (i.e. YYYY, or, YYYY-MM). Notes on entering dates for upload to MetPedDB.

PRESENT SAMPLE LOCATION

Institution, department, or lab where the sample currently resides (in case someone wishes to find the sample).

METAMORPHIC GRADE

This is the grade of metamorphism. The grade must be from the list of metamorphic grades. A sample may have zero or more metamorphic grades. Alternate descriptions of the metamorphic grade are encouraged, and should included as "Comments".

REFERENCE

MetPetDB uses the year and the GeoRef accession number (the same as NAVDAT), which can be found from a GeoRef search. For example, “1983-018415”. Data that are published require a reference to the publication. References in non-publication data may be included to direct a user to a publication that includes a reference to this sample or another version of it.

COMMENT

There may be any number of comment columns. You can input alternate rock names or alternate descriptions of the metamorphic grade (or anything else) as comments.
RE: Bulk Upload For organization purposes, it is probably best to put separate types of information in separate comment columns, rather than strung together in a single

comment. The key to using the comment field is to put in information that will describe the sample, and will help others find it in a search.

MINERALS PRESENT and MINERAL MODES

A list of minerals present in the sample and, if available, the modes of the minerals are very useful information. For an individual spreadsheet, the format is to

(1) Put the name of a specific mineral as the column header. Headers must be from LIST OF MINERALS.
(2) If the mineral is present but the mode is unknown, put "x" in the field
(3) If the mineral is present and the mode is known, put the mode in the field (note: modes typically sum to 100%).
(4) If the mineral is not present, leave the field blank.

For example, for a suite of schists, this part of the spreadsheet might look like this:

Quartz	Plagioclase	Muscovite	Biotite	Garnet	Chlorite	Ilmenite	Zircon	Staurolite
x	x	x	x	x	x	x		
30	5	30	20	10	1			
x	x	x	20	x	<1	?	x	
x	x	x	x	x	x	x	x	

Any text or number field is permissible and signifies a mineral is present.

Common usage includes:

- [A number] = mode
- < or > [a number]
- x = present
- ? = may be present
- t = present in trace amounts

Detailed List of Chemical Analysis Attributes/Headers

REQUIRED FIELDS

SAMPLE NUMBER
Must correlate to existing sample in database. (Upload help)

SUBSAMPLE
Must correlate to existing subsample of the given sample number. If a subsample has not yet been created, you may create one here, but you must provide a subsample type (see below).

POINT
The analysis number. It should be unique to the subsample to allow differentiation between different points for a particular subsample. It should be an integer.

MINERAL
This must be in agreement with minerals or mineral modes listed as present for the sample. If the analysis is a bulk/whole rock analysis, this field should read bulk rock.

METHOD
Method of analysis, i.e. EMP, LA-ICPMS, SIMS, etc.

SUBSAMPLE TYPE – required to create subsamples at bulk upload
In order to create a subsample during bulk upload of chemical analysis, you must specify a type for the new subsample. Subsample types accepted: Thin section, Polished thin section, Rock Chip, or Mineral separate. Subsample type only needs to be specified for the first chemical analysis for a particular subsample in a list. For example, if you have 5 garnet analyses on a new polished thin section that you want to upload, you only need to enter "polished thin section" in the subsample type column for the first (topmost) analysis.

OPTIONAL FIELDS

ANALYTICAL FACILITY
The analytical facility where analysis was performed. This can be the name of an institution or department.

ANALYSIS DATE
Must be a date in MM-DD-YYYY, YYYY-MM-DD or any shortened version (i.e. YYYY, or, YYYY-MM). See: notes on entering dates for upload to MetPedDB.

ANALYST
The name of the person who analyzed the sample. Preferred format: Lastname, First initial.

REFERENCE IMAGE

The filename (including extension) of image on which the analysis location is referenced. If you do not know it you can find it by navigating to the image itself. The goal here is to allow the user to link to an image showing the context of a chemical analysis, so the reference image must be uploaded prior to chemical analysis upload. Attempting to add a reference image that is not already in the subsample in MetPetDB will give a bulk upload error message. If no reference image exists or one cannot be uploaded, leave this column blank and none shall be assigned.

X REFERENCE

The x coordinate location of the analysis on the reference image, measured in percent of total image width (in original orientaion). The origin is assumed to be at bottom left of image.

Y REFERENCE

The y coordinate location of the analysis on the reference image, measured in percent of total image height (in original orientaion). The origin is assumed to be at bottom left of image.

X STAGE

The stage X-coordinate recorded by a microscope or microprobe. These are in microns.

Y STAGE

The stage Y-coordinate recorded by a microscope or microprobe. These are in microns.

ELEMENTS/SPECIES – at least one required

Headers should be different elements/species (e.g. CaO, SiO2, Mg).
UNITS – must be in second row and in proper format, (e.g. wt%, ppm)
Non numerical values can be used to indicate information about an analysis as in the table below:

Values for Elements/Species can be numeric or these abbreviations:
n.d. = not determined
[blank] = not determined
n.a. = not determined (literally not analyzed)
- = not determined
b.d. = below detection
b.d.l. = below detection limit
< [a value] = less than the specified value

PRECISION

Uncertainty of measurement (relative or absolute).

Precision is entered for EACH SPECIFIC ELEMENT/SPECIES VALUE in the column directly to the right of the element/species. PRECISION VALUES WILL NOT APPLY TO ALL ELEMENTS/SPECIES, ONLY PRECEDING COLUMN. UNITS – must be in second row and in proper format, including –abs or -rel for absolute vs. relative.

WEIGHT PERCENT TOTAL

The total weight percent of measured elements/species for this point. This indicates the completeness of the analysis to a user.

REFERENCE – Note: required for published data

Data that are published require a reference to the publication. MetPetDB uses the GeoRef assension number (the same as NAVDAT), which can be found from a GeoRef search.

COMMENT

There may be any number of comment columns. You can input any type of description of the analytical strategy. RE: Bulk Upload For organization purposes, it is probably best to put separate types of information in separate comment columns, rather than strung together in a single comment. The key to using the comment field is to put in information that will describe the analysis, and will help others find it in a search.

Detailed List Image Attributes/Headers

REQUIRED FIELDS

SAMPLE NUMBER
Must correlate to existing sample in the database. (Upload help)

FILE (or PATH)
The complete filename of the image as it appears in the zipped folder, including a .xxx extension indicating the file format (e.g. samp1_polish_scan.jpg). Path notation may be used for subdirectories, using slashes between each subdirectory (e.g.: zipfolder/08-1xraymaps/08-1Femap.jpg)

IMAGE TYPE
Must be from list of acceptable image types. Note that abbreviations may be used for certain image types.

ELEMENT -required x-ray maps
The element or species that was measured to create an x-ray map.

OPTIONAL FIELDS

SUBSAMPLE
Must either (1) correlate to existing subsample of the given sample number, or (2) if a subsample has not yet been created, you may create one with an appropriate name here, as long as you provide the subsample type (see below).

SUBSAMPLE TYPE – required to create subsamples at bulk upload
In order to create a subsample during bulk upload of images, you must specify a type for the new subsample. Subsample types accepted: Thin section, Polished thin section, Rock Chip, or Mineral separate. Subsample type only needs to be specified for the first chemical analysis for a particular subsample in a list. For example, if you have a thin section scan of a new polished thin section that you want to upload, you only need to enter "polished thin section" in the subsample type column for the first (topmost) analysis.

SCALE
Full width of image measured along the actual sample in millimeters. For example, a horizontal scan of a full standard thin section should have a scale of ~46 mm.

COLLECTOR
The person who collected the image, as this may not be the sample owner. Preferred format: Lastname, First initial.

DWELL TIME
Value in milliseconds for x-ray maps.

CURRENT
Value in nanoAmps for x-ray maps.

VOLTAGE
Value in kilovolts for x-ray maps.

COMMENT
There may be any number of comment columns. You can input any type of description of the analytical strategy.

Appendix A. List of rock types

This rock type list is meant to give a general identifier to the type of sample. Please note that we are not attempting a rigorous rock classification here (in part because such efforts can be quite difficult). Rather, the goal is to provide a list of identifiers that will have general meaning to any student of geology. We expect that the "proper" way to do this may invite considerable discussion, so please contribute your comments.

- Slate
- Phyllite
- Schist
- Gneiss
- Migmatite

- Marble
- Calc-silicate

- Greenschist
- Amphibolite
- Blueschist
- Eclogite

- Granofels
- Hornfels
- Skarn

- Quartzite
- Serpentinite
- Jadeitite
- Glaucophanite
- Garnetite
- Pyroxenite
- Cordierite-Anthophyllite

- Cataclasite
- Mylonite

- Metapelite
- Metaarkose
- Metagreywacke
- Metabasite
- Metacarbonate
- Metagranite
- Metaigneous
- Metavolcanic

Appendix B. Notes on Sample Locations

Latitude and Longitude

Values should be entered in decimal degrees (DD.DDDDD) format. Five units after the decimal point provides a spatial accuracy of approximately 1 m (at the equator). Conversion from DD M.MMM or DD MM SS to DD.DDDDD is simple and can be done in a spreadsheet by recognizing that there are 60 S in one M and 60 M in on D.

Note that there is an optional error for latitude and longitude. If the sample is poorly located (worse than 1 meter) then an error should be specified.

With modern GPS, sample location is routine and most field geologists now locate samples with latitude and longitude routinely. For older data the latitude and longitude must be determined in some fashion. Here are several possible ways, depending on what information is currently available:

Location in UTM coordinates

If UTM coordinates are available for a sample, the conversion to DD.DDDDD can be done on a spreadsheet, but it is not trivial. The reader is referred Steven Dutch's excellent web site at http://www.uwgb.edu/dutchs/UsefulData/UTMFormulas.HTM
Fortunately, Steven has supplied a spreadsheet for these conversions.

Locations on topomaps

If samples are located only on paper copies of topographic maps then there are a couple of options, depending on what type of software you currently have or how much money you wish to spend.

1. You can try to read the latitude and longitude directly off of the topo map. This is time-consuming and not very accurate. It is typically more accurate and faster to read the UTM coordinates and do the conversion to DD.DDD (see above). Alternatively, one of the approaches below should work still better.
2. Use the web site http://www.topozone.com/ . Topozone.com has all US topographic maps. If you can find your sample location on the appropriate map, you can read off the latitude and longitude on the screen (be sure you have the correct format DD.DDDDD and the correct map datum (NAD83/WGS84) specified). You can copy and paste individual lat-long values. This service used to be free, but now requires a subscription to http://www.trails.com/.
3. If you have good GPS software on your computer with stored topographic maps you should be able to find your sample location on the topographic map and store it as a waypoint. Waypoint files are usually ASCII (text) and can be copied into a spreadsheet. I have used MacGPS Pro (for Macintosh only) with good success.

Locations from a GIS

You can find your sample location on Google Earth or another GIS and read off the latitude and longitude. It is possible to compile a .kml or .kmz file from a collection of points in google earth, yet the locations must then be transferred to your samples spreadsheet.

Appendix C. Metamorphic Grades

This is the list of metamorphic facies that can/will be assigned as a sample attribute. The goal here is to provide a general classification of the P-T conditions experienced by the sample. One objective here is to try and not be too specific, because we all know how complex a rock history can be. It might be desirable to provide for additional information such as a sequence of facies such as "Granulite with Blueschist overprint" in the comment field (see sample descriptors). Input on this subject is requested...

- Zeolite
- Prehnite-pumpellyite
- Greenschist
- Amphibolite
- Epidote amphibolite
- Granulite
- Blueschist
- Eclogite
- Hornfels
- Chlorite zone
- Biotite zone
- Garnet zone
- Staurolite zone
- Staurolite-kyanite zone
- Kyanite zone
- Sillimanite zone
- Andalusite zone
- Sillimanite-K feldspar zone
- Garnet-cordierite zone
- Migmatite zone
- Ultra high pressure

Ultra high temperature

Appendix D. List of Minerals

Alphabetical list is below.

Mineral (as in database)	*Also accept: (different names for the SAME THING)*
Tectosilicates	
Silica	
Quartz	
Coesite	
Tridymite	
Cristobalite	
Feldspar	
Plagioclase	
Albite	Perthite
Oligoclase	
Andesine	
Labradorite	
Anorthite	
Alkali feldspar	K-feldspar, K feldspar, Alkali-feldspar
Orthoclase	Microcline, Antiperthite
Sanidine	
Celsian	
Nepheline	
Kalsilite	
Leucite	
Sodalite	
Scapolite	
Analcite	
Zeolite	
Sheet silicates	
Mica	
White Mica	
Muscovite	
Paragonite	
Phengite	
Sericite	
Margarite	
Glauconite	
Biotite	
Phlogopite	
Annite	
Wonesite	
Lepidolite	
Clintonite	
Stilpnomelane	
Astrophyllite	
Pyrophyllite	

Talc	
Chlorite	
Serpentine	
Clay	
Kaolinite	
Illite	
Smectite	
Vermiculite	
Montmorillonite	
Apophyllite	
Prehnite	
Chain silicates	
Pyroxene	
Orthopyroxene	
Enstatite	
Ferrosilite	
Clinopyroxene	
Calcic pyroxene	Ca Pyroxene
Diopside	
Hedenbergite	
Augite	
Sodic pyroxene	Na Pyroxene
Jadeite	
Acmite	
Omphacite	
Aegirine	
Spodumene	
Clinoenstatite	
Wollastonite	
Pectolite	
Rhodonite	
Bustamite	
Pyroxmangite	
Sapphirine	
Aenigmatite	
Amphibole	
Orthoamphibole	
Anthophyllite	
Gedrite	
Clinoamphibole	
Fe-Mg clinoamphibole	
Cummingtonite	
Grunerite	
Calcic amphibole	Ca Amphibole
Tremolite	
Actinolite	
Hornblende	

Kaersutite	
Sodic Amphibole	Blue Amphibole, Na Amphibole
Glaucophane	
Riebeckite	
Richterite	
Katophorite	
Ekermannite	
Arfvedsonite	
Ortho- and Ring Silicates	
Olivine	
Humite	
Zircon	
Sphene	Titanite
Garnet	
Vesuvanite	
Sillimanite	
Andalusite	
Kyanite	
Mullite	
Topaz	
Staurolite	
Chloritoid	
Larnite	
Merwinite	
Spurrite	
Epidote Group	
Zoisite	
Clinozoisite	
Epidote	
Piemontite	
Allanite	
Lawsonite	
Pumpellyite	
Melilite	
Rankinite	
Tilleyite	
Beryl	
Cordierite	
Tourmaline	
Axinite	
Oxides	
Ilmenite	
Hematite	
Rutile	
Spinel Group	
Spinel	
Magnetite	

Chromite	
Hercynite	
Ghanite	
Periclase	
Cassiterite	
Corundum	
Anatase	
Brookite	
Perovskite	
Hydroxides	
Brucite	
Gibbsite	
Diaspore	
Boehmite	
Goethite	
Lepidocrocite	
Limonite	
Sulphides	Sulfides
Pyrite	
Pyrrhotite	
Chalcopyrite	
Sphalerite	
Galena	
Chalcocite	
Sulphates	Sulfates
Baryte	
Celestine	
Gypsum	
Anhydrite	
Carbonates	
Calcite	
Dolomite	
Magnesite	
Rhodochrosite	
Siderite	
Ankerite	
Phosphates	
Apatite	
Monazite	
Xenotime	
Native Elements	
Carbon	
Graphite	
Diamond	
Other	
Opaque	
Ilmenite	

Hematite	
Rutile	
Magnetite	
Pyrite	
Pyrrhotite	
Chalcopyrite	
Sphalerite	
Galena	
Fe-Ti oxide	
Ilmenite	
Hematite	
Rutile	
Magnetite	
Biopyribole	Biopyrobole

Alphabelical list:

Mineral (as in database)	Also accept: (different names for the SAME THING)
Acmite	
Actinolite	
Aegirine	
Aenigmatite	
Albite	Perthite
Alkali feldspar	K-feldspar, K feldspar, Kfeldspar, Alkali-feldspar
Allanite	
Amphibole	
Analcite	
Anatase	
Andalusite	
Andesine	
Anhydrite	
Ankerite	
Annite	
Anorthite	
Anthophyllite	
Apatite	
Apophyllite	
Arfvedsonite	
Astrophyllite	
Augite	
Axinite	
Baryte	
Beryl	
Biotite	
Boehmite	
Brookite	
Brucite	

Bustamite	
Calcic amphibole	Ca amphibole
Calcic pyroxene	Ca pyroxene
Calcite	
Carbon	
Carbonate	
Cassiterite	
Celestine	
Celsian	
Chain silicates	
Chalcocite	
Chalcopyrite	
Chlorite	
Chloritoid	
Chromite	
Clay	
Clinoamphibole	
Clinoenstatite	
Clinopyroxene	
Clinozoisite	
Clintonite	
Coesite	
Cordierite	
Corundum	
Cristobalite	
Cummingtonite	
Diamond	
Diaspore	
Diopside	
Dolomite	
Ekermannite	
Enstatite	
Epidote	
Epidote Group	
Feldspar	
Fe-Mg clinoamphibole	
Ferrosilite	
Galena	
Garnet	
Gedrite	
Ghanite	
Gibbsite	
Glauconite	
Glaucophane	
Goethite	
Graphite	
Grunerite	

Gypsum	
Hedenbergite	
Hematite	
Hercynite	
Hornblende	
Humite	
Hydroxides	
Illite	
Ilmenite	
Jadeite	
Kaersutite	
Kalsilite	
Kaolinite	
Katophorite	
Kyanite	
Labradorite	
Larnite	
Lawsonite	
Lepidocrocite	
Lepidolite	
Leucite	
Limonite	
Magnesite	
Magnetite	
Margarite	
Melilite	
Merwinite	
Mica	
Monazite	
Montmorillonite	
Mullite	
Muscovite	
Native Elements	
Nepheline	
Oligoclase	
Olivine	
Omphacite	
Ortho- and Ring Silicates	
Orthoamphibole	
Orthoclase	Microcline, Antiperthite
Orthopyroxene	
Oxides	
Paragonite	
Pectolite	
Periclase	
Perovskite	
Phengite	

Phlogopite	
Phosphates	
Piemontite	
Plagioclase	
Prehnite	
Pumpellyite	
Pyrite	
Pyrophyllite	
Pyroxene	
Pyroxmangite	
Pyrrhotite	
Quartz	
Rankinite	
Rhodochrosite	
Rhodonite	
Richterite	
Riebeckite	
Rutile	
Sanidine	
Sapphirine	
Scapolite	
Sericite	
Serpentine	
Sheet silicates	
Siderite	
Silica	
Sillimanite	
Smectite	
Sodalite	
Sodic Amphibole	Blue Amphibole, Na amphibole
Sodic pyroxene	Na pyroxene
Sphalerite	
Sphene	Titanite
Spinel	
Spinel Group	
Spodumene	
Spurrite	
Staurolite	
Stilpnomelane	
Sulphates	Sulfates
Sulphides	Sulfides
Talc	
Tectosilicates	
Tilleyite	
Topaz	
Tourmaline	
Tremolite	

Tridymite	
Vermiculite	
Vesuvanite	
White Mica	
Wollastonite	
Wonesite	
Xenotime	
Zeolite	
Zircon	
Zoisite	
Opaque	
Ilmenite	
Hematite	
Rutile	
Magnetite	
Pyrite	
Pyrrhotite	
Chalcopyrite	
Sphalerite	
Galena	
Fe-Ti oxide	
Ilmenite	
Hematite	
Rutile	
Magnetite	
Biopyribole	Biopyrobole

Appendix E. List of Acceptable Units

For Elements/Species:
wt% - weight percent
ppm – parts per million

For Precision:
abs – absolute (same units as Elemens/Species)
rel - percent relative