

Guide to using the NGMDB's Geologic Names Check's Report

The National Geologic Map Database's (NGMDB's) Geologic Names Check Tool provides a cursory check of *formal* geologic names that are applied to geologic units in a GeMS-compliant DescriptionOfMapUnits table (DMU). This tool is intended to provide the basis for a check of geologic names and their age and areal extent against the U.S. Geologic Names Lexicon (Geolex, <https://ngmdb.usgs.gov/Geolex/>).

This tool is a python script intended to be executed along with the GeMS Validate Database script, both of which are in the GeMS Tools toolbox of ArcGIS geoprocessing tools. The results of these two scripts provide the information necessary for map authors and managers of the U.S. National Geologic Map Database (NGMDB) to determine whether a geologic map database is in compliance with the GeMS schema (see <https://ngmdb.usgs.gov/Info/standards/GeMS/>).

The script first queries the DMU for the map unit names and related content. The script then queries Geolex to identify possible matches with any formal geologic names that are among the map unit names in the DMU. Finally, the script creates a spreadsheet for review by the map author.

After inspection and author comments have been completed, the spreadsheet is to be submitted to the NGMDB along with the results of the GeMS Validate Database script. The secretary of the Geologic Names Committee (GNC) will then evaluate and compile into the U.S. geologic names lexicon (Geolex) information from the author-provided comments and references and(or) from the map (when published).

The Geologic Names Check report spreadsheet

The output of the tool is an Excel spreadsheet that reports the results of checking the names in the DMU table against the Geolex database (an example, "Geolex_DMU_namescheck.xlsx", can be found in the Resources folder of the GeMS Tools toolbox and in the "Resources/Get help" section of the GeMS website). The spreadsheet will be given the same name as the geodatabase that contains the input DMU table and is saved in the same directory as the input DMU. This tool also can process a file (e.g., Excel or CSV) as input. The spreadsheet provides space for authors to comment upon and(or) justify the use of their chosen names. It is organized into three sections:

- DMU Contents (information extracted from your GeMS DMU table)
- Geolex Results (possible matches with geologic names in the DMU)
- Author Review (this is the section you need to complete).

DMU Contents (green section of spreadsheet):

This section shows selected fields from the DMU table (i.e., *HierarchyKey*, *MapUnit*, *Name*, *FullName*, *Age*, and *Extent*). *Name* is the field first evaluated by the script, but if no Geolex names are found there, *Fullname* will be evaluated. The other fields are for use by the author when comparing geologic age and extent to the values in Geolex, and to assist the NGMDB staff by providing some context if clarification of author comments is needed. The values reported in this section, except for *Extent*, are verbatim from the DMU. *Extent* is currently collected at runtime through the tool parameter form although it might possibly in the future be calculated from features in the geodatabase.

[A section from “Geolex_DMU_namescheck.xlsx” is provided below for each of the three steps in the process; it shows examples of the results to expect from the tool depending on different map unit names and does not represent a realistic stratigraphy.]

DMU Contents					
HierarchyKey	MapUnit	Name	FullName	Age	Extent
01		NO GEOLEX NAMES IN NAME OR FULLNAME			VA, WV
01-01	Qal	Alluvium	Alluvium	Holocene	VA, WV
01-02	Qs	Sand	Sand	Holocene	VA, WV
01-03	Qls		Landslide debris	Holocene	VA, WV
01-04	Qac		Alluvium and colluvium	Holocene	VA, WV
02		NAME EQUALS FULLNAME WITH GEOLEX NAMES			VA, WV
02-01	Dh	Hampshire Formation	Hampshire Formation	Devonian	VA, WV
02-02	Dmn	Marcellus Shale and Needmore Formation, undivided	Marcellus Shale and Needmore Formation, undivided	Middle and Lower Devonian	VA, WV

Geolex Results (yellow section):

The tool searches for geologic names recorded in Geolex that are found in each DMU *Name* (but then searches *FullName* if no names are found) and reports the search results in the section of the spreadsheet shown below. Fields reported from Geolex are: *GeolexID*, *Name* (the geographic part of the geologic name only), *Usage*, *Age*, *Extent*, and *Geolex URL*. If multiple usages recorded in Geolex are associated with a single name found in the DMU, all usages and the states in which they are used (i.e., the *Extent*) are reported on separate rows in the spreadsheet. Where that occurs, the value for the DMU *HierarchyKey* is repeated with an appended incrementing character; those characters serve only to properly re-sort the spreadsheet if the user were to reorganize it. The *URL* and *Age* are listed once for each Geolex *Name*.

The value in the *Usage* field is verbatim from Geolex, so it may include parenthetical phrases or symbols which clarify some property of the usage. These are explained in a footnote that appears below the Web search results after entering a name at <https://ngmdb.usgs.gov/Geolex/> and are included here as well:

- Asterisk (*) indicates published by U.S. Geological Survey authors.

- "No current usage" (†) implies that a name has been abandoned or has fallen into disuse. Former usage and, if known, replacement name given in parentheses ().
- Slash (/) indicates name does not conform with nomenclatural guidelines (CSN, 1933; ACSN, 1961, 1970; NACSN, 1983, 2005). This may be explained within brackets ([]).

Geolex Results					
GeolexID	Name	Usage	Age	Extent	URL
1955	Hampshire	Hampshire Formation	Late Devonian*	MD, PA, VA, WV	https://ngmdb.usgs.gov/Geolex/Units/Hampshire_1955.html
		Hampshire Group	Late Devonian*	WV	
2635	Marcellus	Marcellus Formation	early Middle Devonian (Eifelian)*	WV	https://ngmdb.usgs.gov/Geolex/Units/Marcellus_2635.html
		Marcellus Formation of Hamilton Group	early Middle Devonian (Eifelian)*	NY, PA	
		Marcellus Member of Millboro Shale	early Middle Devonian (Eifelian)*	VA	
		Marcellus Shale	early Middle Devonian (Eifelian)*	KY, NJ, OH, TN, VA, WV	
		Marcellus Shale of Hamilton Group	early Middle Devonian (Eifelian)*	MD, NY, OH, PA, TN, VA, WV	
		Marcellus Shale Member of Romney Formation	early Middle Devonian (Eifelian)*	MD	
2961	Needmore	Needmore Shale	early Middle Devonian (Eifelian)*	MD, PA, VA, WV	https://ngmdb.usgs.gov/Geolex/Units/Needmore_2961.html
		Needmore Shale of Onondaga Group	early Middle Devonian (Eifelian)*	PA	
		Needmore Shale Member of Romney Formation	early Middle Devonian (Eifelian)*	MD	

Author Review (orange section):

In this third and final step of the process, the author and(or) GeMS file creator must compare the content in the green and yellow sections and provide input where needed as detailed below. Please note that only the formal geologic names found in your DMU will need to be examined.

For only the formal geologic names, when the author and(or) GeMS file creator compares the content of rows in the DMU Contents and Geolex Results sections and finds a difference between them, the Author Review section is where this should be noted. The fields in this section are described below.

Author Review				
Extent Match?	Usage Match?	Age Match?	Remarks	References
no				
no				
no				
no				
no				
no				
no				
yes				
yes				
yes				
no				
yes				
yes				
yes				
no				
yes				

Extent Match? The script populates this section by comparing the state abbreviations in the DMU Extent field to those in Geolex's areal extent field. "yes" indicates a match, otherwise, "no". For map units that don't include a formal geologic name (e.g., a materials-based map unit such as Alluvium), please ignore the spreadsheet row entirely. For formal names, if the entry is "no", unless you otherwise indicate in the Remarks field, it's assumed that the "areal extent" field in Geolex should be updated to include the state in which your map occurs. If the formal geologic unit is only found locally (e.g., it occurs only in your study area), please indicate this in the Remarks field.

NOTE: In this version of the tool, the logic for checking matches of age and status (formal vs informal usages) has not been devised, and may never be, owing to complexities especially for geologic names usages.

Usage Match? In many cases, there will be more than one spreadsheet row for a single map unit entry in your DMU. This happens, for example, in cases where there is more than one geologic unit in your map unit (e.g., Formation A and Formation B, undivided; or Formation C of Group X). The usage of each name should be evaluated.

- For each geologic name in your DMU, enter "yes" for the Geolex *Usage* that exactly matches the *Name* or *Fullname* in the DMU. Ignore any other spreadsheet rows for that name.
- If there are no exact Geolex matches for the *Name* or *Fullname* in your DMU, please enter "yes" in one of the rows and leave any other rows for that name blank. For example, if the DMU shows "Smith Sandstone" and Geolex has the *Usages* "Smith Formation" and "Smith Limestone", choose one to mark as "yes" and ignore the other. Then, (1) indicate the discrepancy in the Remarks field, and (2) in the References field,

include the original or principal reference¹ for your usage and, if applicable, a reference to the current definition of the geologic unit (e.g., perhaps there have been changes to boundaries, rank, assignment to larger units, subdivisions). That information will be used to evaluate an update to Geolex.

- If there are differences in stratigraphic rank, or in the name of the larger ("parent") unit, please include the reference(s)¹ in which the formally named geologic unit changed rank or was assigned to (or unassigned from) a larger unit.
- If there are differences in usage, notably for formation-rank units (e.g., Dakota Sandstone, Dakota Formation), please indicate if your usage is local or regional.
- If you find an exact match, but on this map you are revising the unit (e.g., by changing the upper or lower boundaries), please indicate the nature of the revision in the Remarks field.

Age Match? If the geologic age indicated in the DMU is not within the age range indicated in Geolex, please include the reference(s)¹ in which the age of the formal geologic unit was changed. Commonly, chronostratigraphic terms are used in DMUs (e.g., Lower Cretaceous, Upper Cretaceous) whereas Geolex uses the geochronologic equivalents (Early Cretaceous, Late Cretaceous); those differences need not be considered when checking for the age match.

Finally, regarding whether a unit has Formal or Informal status:

- If Informal in the DMU but Formal in Geolex -- please include the reference¹ in which the formally named geologic unit was abandoned. If the geologic unit has never been formally abandoned and is considered informal by your agency, please briefly state reasons.
- If Formal in the DMU but Informal in Geolex -- please include the original or principal reference¹ and, if applicable, a reference¹ to the current definition of the geologic unit (e.g., perhaps there have been changes to boundaries, rank, assignment to larger units, subdivisions).

¹ References should be formal publications (i.e., not guidebooks, abstracts, or open-file reports), as defined in Article 4 of the 2005 Code (p. 1561), available online at https://ngmdb.usgs.gov/Geolex/resources/docs/AAPG_Bull-89_NACSN2005-rev2016.pdf.