Suggestions for papers submitted to Stratigraphic Notes

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As noted in the Introduction to this volume, Stratigraphic Notes is intended to be an outlet for publication of short papers on stratigraphy, changes in stratigraphic nomenclature, and explanation of stratigraphic names and concepts used on published geologic maps. This paper provides authors with suggestions for content and format of papers in which geologic names are proposed, or their definitions and supporting information are modified. Offered suggestions are based on experience compiling the U.S. Geologic Names Lexicon (Geolex, https://ngmdb.usgs.gov/Geolex/search), in the hope that authors will find them useful in organizing and presenting their observations and interpretations in a succinct and straightforward fashion appropriate to Stratigraphic Notes. Suggestions are based on the detailed guidance and rules found in Suggestions to Authors of Reports of the U.S. Geological Survey (Hansen, 7th ed., 1991; U.S. Geological Survey, 8th ed., in press) and the North American Stratigraphic Code (NACSN, 2021).

The Appendix shows the suggested topics and section headers for articles on new geologic names or changes to names. Within the body of this paper, guidance on content for some of those sections is provided; for reasons of clarity, suggestions pertinent to changes to formal geologic names are discussed separately from those for proposing new names.

Changes to formal geologic names

In this section, guidance is offered for designation of reference and principal reference (section, locality, or area), followed by guidance on some of the more demanding changes to nomenclature (age modification, redefinition, revision, abandonment, and reinstatement). Examples of the suggested figures to include in reports are given at the end of this paper.

Designation of reference (section, locality, or area)

A reference (section, locality, or area) is suggested for completeness and so others may examine varying characteristics and (or) boundaries of a geologic unit not clearly evident at the type or principal reference (section, locality, or area). Please include: (1) a description of its geographic location; (2) measured stratigraphic section(s); (3) geologic unit description; (4) boundaries; and (5) thickness. The reference (section, locality, or area) should be precisely located. Include coordinates and North American Datum (e.g., latitude/longitude, Universal Transverse Mercator, NAD83, WGS84), the Public Land Survey System (Section, Township, Range) location, the name and series of the USGS topographic quadrangle, and the County (or Parish), State, and State or federal public land; see example under Designation of type (section, locality, or area), below.

Suggested figures to include when designating a reference (section, locality, or area): (1) index map showing area of study; (2) topographic map showing geographic location of reference (section, locality, or area); (3) measured stratigraphic section(s); and (4) photographs.

Designation of principal reference (section, locality, or area)

This generally is applied to formal geologic units for which no type was designated (notably those proposed before 1933), the type has become inaccessible, or the type has been destroyed. In some cases, principal reference sections have been designated because the original type section could not be located or reconstructed (e.g., see Gill and others, 1970, p. 24). Please include: (1) a description of its geographic...
location; (2) measured stratigraphic section(s); (3) geologic unit description; (4) boundaries; and (5) thickness. See guidance offered for Designation of reference (section, locality, or area), above.

Age modification
Indicate whether the age of a geologic unit is changed regionally or locally, and provide the following: (1) reasons for divergence from ages reported by previous workers and (2) evidence for age change.

- Biostratigraphic determinations should include: (a) sample locality information; (b) lithologic descriptions of samples; and (c) faunal and(or) floral lists.
- Numerical age determinations should include: (a) interpretive statements about what the numerical age represents (such as cooling, exhumation, intrusion, metamorphism, or exposure); (b) descriptions of analytical techniques, calibration methods, and uncertainty estimates; (c) sample locality information; (d) lithologic descriptions of samples; and (e) minerals or organic materials analyzed (e.g., zircon, biotite, wood).

Sampling sites should be precisely located. Include coordinates and North American Datum (e.g., latitude/longitude, Universal Transverse Mercator, NAD83, WGS84), the Public Land Survey System (Section, Township, Range) location, the name and series of the USGS topographic quadrangle, and the County (or Parish), State, and State or federal public land.

Suggested figures to include when changing the age of a geologic unit: (1) index map showing area of study; (2) topographic map showing locations of samples collected; (2) measured sections showing stratigraphic positions of samples collected; and (3) correlation chart.

Redefinition
Indicate whether the lithic term of a geologic name (e.g., formation- and lithodeme-ranked units) is changed regionally or locally. Please include: (1) reasons for divergence from lithic designations of previous workers; and (2) geologic unit description. If making a correction, also include: (1) reference (section, locality, or area); (2) measured stratigraphic section(s); (3) boundaries; and (4) thickness.

Suggested figures to include when changing the lithic term of a geologic name: (1) index map showing area of study; (2) topographic map showing geographic location of reference (section, locality, or area); (3) measured stratigraphic section(s); (4) photographs: (5) stratigraphic table; and (6) correlation chart.

Revision
Revision involves changes in rank, upper and(or) lower boundaries, formal subdivisions, or assignment to a formal geologic unit of higher rank. Indicate whether the geologic unit is revised regionally or locally, and include: (1) reasons for divergence from previous workers; (2) reference (section, locality, or area); (3) measured stratigraphic section(s); (4) geologic unit description; (5) boundaries; and (6) thickness.

Suggested figures to include when revising a geologic unit: (1) index map showing area of study; (2) topographic map showing geographic location of reference (section, locality, or area); (3) measured stratigraphic section(s); (4) photographs; (5) stratigraphic table; and (6) correlation chart.

Abandonment
Provide (1) a discussion of reasons for abandonment and (2) a replacement name(s), which can be formal or informal. For example, “The original description of the Oranda Formation includes knobby limestone at its base with shale and siltstone, in part calcareous, above. Because of difficulties in recognizing the Oranda as a readily mappable lithologic unit, we are herein abandoning the name. The lower knobby-weathering limestones are assigned to the underlying Edinburg Formation. The overlying calcareous shale and siltstone and shaly limestone are included in the base of the lower member of the Martinsburg Formation, herein named the Stickley Run Member.” (Epstein and others, 1995, p. 6). Suggested figures to include when abandoning a geologic name: (1) index map showing area of study; and (2) stratigraphic table.

Reinstatement
The original definition of an abandoned name may be accepted or modified in the report. Include a discussion of: (1) reasons for reinstatement and (2) treatment of geologic units supplanted.

Suggested figures to include when reinstating a geologic name: (1) index map showing area of study; (2) topographic map showing geographic location of type (or principal reference) and reference (section, locality, or area); (3) measured stratigraphic section(s); (4) photographs; (5) stratigraphic table; and (6) correlation chart.
Proposing new formal geologic names

There are a number of requirements necessary when proposing a new formal geologic unit; of particular note are: (1) derivation of name; (2) designation of type (section, locality, or area); and (3) geologic unit description and distinguishing features.

Suggested figures to include when proposing a new formal geologic name: (1) index map showing area of study and, if possible, the geographic feature from which the unit is named; (2) topographic map(s) showing geographic location of type and reference (section, locality, or area); (3) measured stratigraphic section(s); (4) photographs; (5) stratigraphic table; and (6) correlation chart.

Derivation of name

The geographic feature from which the geologic name is taken must be at or near the place where the distinguishing characteristics of the geologic unit are best observed. The geographic feature must be officially recognized by the U.S. Board on Geographic Names (BGN) (https://geonames.usgs.gov/domestic/index.html). Names of geologic units should be from long-lasting geographic features such as rivers, lakes, summits, ridges, valleys, or incorporated municipalities. Please do not name a geologic unit after a person, borehole, quarry, or mine. If a geologic unit is to be named in an area without named geographic features, a new geographic name must be proposed through the BGN. Instructions and application forms for proposing new geographic names are available at https://geonames.usgs.gov/docs/pubs/BGN_DNC_Proposal_2021.pdf or https://www.usgs.gov/core-science-systems/ngp/board-on-geographic-names/how-do-i. These forms should be completed at an early stage in the preparation of a report. Authors are responsible for avoiding duplication of names. An author planning to propose a new formal geologic unit should check Geolex (https://ngmdb.usgs.gov/Geolex) and associated GNC records (https://ngmdb.usgs.gov/Geolex/stratres) to determine that a geographic name has not been used for another previously named geologic unit in the United States. After confirming the availability of the name, the author should reserve the name with the GNC secretary (GN@usgs.gov).

Designation of type (section, locality, or area)

The type (section, locality, or area) should be precisely located. Include: (1) a description of the geographic location; (2) coordinates and North American Datum (e.g., latitude/longitude, Universal Transverse Mercator, NAD83, WGS84); (3) the Public Land Survey System (Section, Township, Range) location; (4) the name and series of the USGS topographic quadrangle; (5) County (or Parish); (6) State; and (7) State or federal public land. For example, “The type section is designated in an east cut bank of an unnamed tributary to Rocky Fork Creek, on the east side of the northbound lane of U.S. Highway 63 at the western edge of Finger Lakes State Park, 0.25 mile north of crossroad (Peabody Road) and 4.5 miles northwest of Browns, in SW¼ SW¼ NW¼ NE¼ sec. 36, T. 50 N., R. 13 W., lat. 39° 04’ 48” N., long. 92° 19’ 46” W., NAD27, Browns 7.5’ quadrangle, Boone County, central Missouri.”

Unit description and distinguishing features

A geologic unit should be described “so clearly that any subsequent investigator can recognize that unit unequivocally” (NACSN, 2021, article 9, p. 170). Characteristics of the rocks or sediments may include lithology (dominant and subordinate), color (fresh and weathered), induration, grain size, mineralogy, bedding characteristics, biologic remains, geochemistry, geophysical properties (including magnetic signatures), geomorphic expression, structural attitudes. Characteristics that differentiate a geologic unit from other units should be discussed.

Important topics to discuss

Whether proposing revisions to existing nomenclature or introducing new geologic names, the following items are considered important topics to discuss in reports.

Historical background of previous usage

Please include a historical background of previous studies and nomenclature used, especially if the proposed changes (e.g., new name, revised name) partially or wholly replaces an existing geologic unit (formal or informal).
Suggested figures to include when discussing previous nomenclature of a geologic unit: (1) index map showing area of study; and (2) stratigraphic table.

**Boundaries**
The nature and placement of the upper and lower boundaries of a geologic unit should be discussed. Suggested figures to include when discussing the boundaries of a geologic unit: (1) index map showing area of study; and (2) photographs.

**Geographic extent and thickness**
The geographic extent and lateral variations of a geologic unit should be discussed. If known, the maximum, minimum, and/or average thickness of a geologic unit should also be discussed. Suggested figures to include when discussing the geographic extent and thickness of a geologic unit: (1) index map showing area of study; (2) measured stratigraphic section(s); and (3) correlation chart.

**Age and correlation**
If known, the geologic age of a unit, as well as correlations with other units, within or near the study area, should be discussed. Include evidence, such as biostratigraphic and numerical age determinations. If the age is being modified in the report, please refer to Age modification, above. A suggested figure to include when discussing the age and correlation of a geologic unit is a correlation chart.

**Inferred geologic history**
The inferred geologic history of a geologic unit should be supported by evidence (e.g., field observations, laboratory results) given in the report.

**Acknowledgements**
I sincerely thank Robert E. Powell (USGS Research Geologist) and Gregory J. Walsh (USGS Research Geologist) for their detailed and thorough reviews.

**References**


Appendix. Suggested format

Authors should, in the introduction of their reports, provide a brief description of the study area and the geologic setting, and a summary of the proposed changes to nomenclature.

In the body text of the report, the geology of an area is usually discussed chronologically—the oldest unit first and the youngest last. This order may not apply to some local areas where geologic information is based largely on subsurface records, such as groundwater aquifers, oil fields, and areas where rocks are poorly exposed; in such areas, an author may find it advantageous to discuss the stratigraphy from youngest to oldest.

For each instance of a new or modified geologic name, the following organization of elements is recommended. The headings are the geologic name followed by “Named,” if it’s a new name, or type of modification (e.g., “Revised”) in parentheses; for example, “Hoopers Island Formation (Named),” or “Dakota Sandstone (Revised).” The subheadings are the elements of a new or modified geologic unit that should be discussed; some are optional.

[Geologic Name] (Named)

  Introductory paragraph (no subheading needed) stating the reasons for proposing the new formal name. For clarity, please include the designation of category (e.g., lithostratigraphic, lithodemic) and rank (see NACSN, 2021, table 2, p. 169 for categories and ranks).

  Historical background

  Derivation of name

  Type section, locality, or area

  Reference section, locality, or area (optional)

  Unit description and distinguishing features

  Boundaries
Geographic extent and thickness (if thickness is unknown, please so indicate)

Age and correlation (if age is unknown, please so indicate)

Inferred geologic history (optional)

[Geologic Name] ([(type of modification)])

Some suggested terms to use to indicate the type of modification are: “Abandoned,” “Age modified,” “Redefined,” “Revised,” and “Reinstated.” Authors should include an introductory paragraph (no subheading needed) stating the reasons for modifying the geologic name.

Historical background

Please also include information on the derivation of the name and the type (section, locality, or area) from the original publication or, if applicable, the principal publication.

Principal reference section, locality, or area (include if designated herein)

Reference section, locality, or area (optional)

Unit description and distinguishing features

Boundaries

Geographic extent and thickness (if thickness is unknown, please so indicate)

Age and correlation (if age is unknown, please so indicate)

Inferred geologic history (optional)

For additional guidance, I also recommend perusing articles in the U.S. Geological Survey “Stratigraphic Notes” series published 1982–1995:


Suggested figures to include in reports:

![Index Map](image)

Fig. 1. Example of an index map showing the area of study and locations of geographic features discussed in the text (from Witkind and Hardy, 1984, fig. 1).
Fig. 2. Example of a generalized geologic map of the study area (from Epstein and others, 1995, fig. 1). Authors have highlighted the line of outcrop of their newly named Stickley Run Member of the Martinsburg Formation.
Fig. 3. Example of part of a USGS topographic map (northwest corner of Harrisburg 7.5' quadrangle, Alabama, 2002) showing geographic locations of fictional type (A) and reference (B, C) sections. A high resolution GeoTiff of the quadrangle was downloaded from USGS topoView (https://ngmdb.usgs.gov/topoView). It was cropped and saved as a 300 dpi GIF file using Adobe Photoshop.
Fig. 4. Example of a measured stratigraphic section (from Epstein and others, 1995, table 1). This is the type section of the Stickley Run Member of the Martinsburg Formation near Middletown, Virginia. The rock-color terms (e.g., N4, 5Y 5/1) are from Goddard and others (1948).

<table>
<thead>
<tr>
<th>Article</th>
<th>Thickness</th>
<th>Article</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limestone, thin-bedded and laminated, and calcareous shale; medium-dark-gray (N 4) limestone beds as much as 9 in. (23 cm) thick. Covered above to Cedar Creek</td>
<td>28.0</td>
<td>6.4</td>
<td></td>
</tr>
<tr>
<td>Shaly limestone, laminated to thin-bedded (0.5–3 in. (1–8 cm) thick), medium-dark-gray (N 4), medium-olive-gray (5Y 5/1)-weathering, very fine grained, interbedded with grayish-black (N 3) calcareous shale</td>
<td>21.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limestone, thin-bedded and laminated, medium-dark gray (N 4), and calcareous shale</td>
<td>4.6</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td>Same as unit 15</td>
<td>10.3</td>
<td>3.1</td>
<td></td>
</tr>
<tr>
<td>Limestone, thin-bedded and laminated, medium-dark gray (N 4), and calcareous shale; limestone beds as much as 6 in. (15 cm) thick and making up about 30 percent of the unit</td>
<td>11.0</td>
<td>2.2</td>
<td></td>
</tr>
<tr>
<td>Same as unit 15. Some of the limestone beds as much as 6 in. (15 cm) thick</td>
<td>20.8</td>
<td>6.3</td>
<td></td>
</tr>
<tr>
<td>Shaly limestone, laminated, medium-dark-gray (N 4)</td>
<td>4.0</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>Same as unit 15</td>
<td>17.3</td>
<td>5.3</td>
<td></td>
</tr>
<tr>
<td>Metabentonite, moderate-yellowish brown (10YR 5/4)-weathering, sheared, interlayered with calcite thickensides</td>
<td>0.2</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Calcareous siltstone, medium-dark gray (N 4); medium-olive-gray (5Y 5/1)-weathering, that stands out in relief</td>
<td>1.1</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Shaly limestone, laminated to thin-bedded (0.5–1 in. (1–2.5 cm) thick), medium-dark-gray (N 4), medium-olive-gray (5Y 5/1)-weathering, very fine grained, composing about 8 percent of unit and interbedded with grayish-black (N 3) calcareous shale in graded and upward-fining cycles 1–6 in. (2–15 cm) thick (fig. 5). Base of each cycle abrupt</td>
<td>11.3</td>
<td>3.4</td>
<td></td>
</tr>
</tbody>
</table>

Edinburgh Formation:

1. Limestone, medium-dark-gray (N 3), medium-dark-gray (N 5)-weathering, calcareous silt shale | 6.0 | 1.8 |
2. Limestone, dark-gray (N 3), medium-dark-gray (N 4)-weathering, knobby, nodules average about 2 in. (5 cm) long, very fine grained, interbedded with dark-gray (N 3) to medium-dark-gray (N 4), medium-gray (N 5)-weathering, calcareous silt shale | 13.5 | 4.1 |
3. Limestone, medium-dark-gray (N 4), medium-gray (N 5)-weathering, very fine grained, poorly bedded | 1.5 | 0.5 |
4. Limestone, dark-gray (N 3), medium-dark-gray (N 4)-weathering, very fine to fine-grained, medium- to thick-bedded, unevenly bedded, fossiliferous | 51.0 | 15.5 |
5. Limestone, dark-gray (N 3), medium-dark-gray (N 4)-weathering, very fine to fine-grained, medium- to thick-bedded, unevenly bedded, fossiliferous | 58.5 | 17.8 |

Incomplete thickness of Edington Formation

Incomplete thickness of Stickley Run Member
### Fox Hills Formation:

37. Sandstone, pale-yellowish-gray, very fine grained, massive; weathers yellowish gray; contains some concretionary masses __________________________ 33

36. Shale and sandstone interbedded, soft; weathers yellowish gray; contains local concretionary ledges of brown-weathering sandstone as much as 2 ft thick... 32

35. Sandstone, pale-yellowish-gray, very fine grained; contains *Ophiomorpha* _______ 1

USGS D6333:

- *Crassostrea* sp.
- *Pholadomya* n. sp.
- *Tancredia*? sp.
- *Ethmocardium* n. sp.
- *Legumen* sp.
- *Cymbophora* sp.
- *Baculites* sp.

34. Shale, gray, sandy________________________ 8

33. Shale, dark-brown, carbonaceous__________ 4

USGS D6332:

- *Crassostrea* sp.

32. Coal, lignitic, impure, black_______________ 1

31. Sandstone, pale-yellowish-gray, concretionary at base, soft at top; weathers light gray; contains *Ophiomorpha* ____________ 51

30. Sandstone and shale, interbedded in equal amounts, soft; weathers yellowish gray... 31

29. Sandstone, pale-yellowish-gray, very fine grained, concretionary at top______________ 11

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**Total Fox Hills Formation**________ 172

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Fig. 5. Example of part of a measured stratigraphic section (reference section of the Fox Hills Formation) along Indian Springs Creek in Carbon County, south-central Wyoming (from Gill and others, 1970, p. 40). The authors have included the stratigraphic positions of the fossil collections. The fossils were identified by W.A. Cobban (USGS). Thicknesses are given in feet.
Fig. 6. Example of a stratigraphic table (from Epstein and others, 1995, fig. 2). This table shows the history of nomenclature in the study area (northern Shenandoah Valley of Virginia). The authors included a graphic columnar section to illustrate the placement of the lower boundary of their newly named Stickley Run Member of the Martinsburg Formation.
Fig. 7. Example of a correlation chart (from Gill and others, 1970, table 1). This is part of a chart of Upper Cretaceous rocks in south-central Wyoming and nearby areas.