GEOLOGIC MAP OF ALASKA—GUIDE TO THE DIGITAL DATABASE FILES

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INTRODUCTION

This release of database files for the Geologic Map of Alaska, U.S. Geological Survey Scientific Investigation Map 3340 (http:dx.doi.org/10.3133/sim3340), is intended to provide users with access to the digital version of the Geologic Map of Alaska. The main component of this digital release is a geologic map geodatabase prepared using ArcGIS. Within this geodatabase are two versions of the compiled geology. A detailed version that is presented for use at a nominal scale of 1:500,000, although the individual datasets herein contain data suitable for use at larger scales, and a generalized version used to produce the 1:1,584,000-scale paper map. The publication web page also contains printable files for the two generalized geologic map sheets and an accompanying descriptive pamphlet. These databases and derivative maps represent a major update of the pre-existing geologic map of Alaska (Beikman, 1980), reflecting many years of new geologic mapping and recompilation of older mapping.

The geologic map geodatabase depicts the geology of the entire state of Alaska and overlaps and updates all previously published regional geologic maps published as part of the USGS National Survey and Analysis project for Alaska. These include Patton and others (2006; 2009; 2011), Richter and others (2006), Shew and others (2006), Till and others (2006; 2008; 2011), Wilson and others (1998; 1999; 2005; 2006a,b,c; 2008; 2012a,b; 2013), Wilson and Hults (2012), and Wilson (2013) and included digital files.

The detailed geologic data provided here has been compiled from a wide variety of sources, ranging from published and unpublished 1:500,000-, 1:250,000-, and 1:63,360-scale quadrangle and regional

geologic maps to large-scale field mapping. To produce the generalized paper map, lumping of geologic units and additional processing of the spatial data has resulted in a significantly simpler presentation of the geology of the state. Supplemental stand-alone tables accompany the detailed spatial datasets of the geology. There are no supplemental stand-alone tables accompanying the generalized geologic datasets.

The supplemental stand-alone tables were generated by extracting information from the legends of the source maps and from unpublished data by the compilers of this map. They record an abstracted map unit description, lithologic and age information, and references. Once entered, the information from a source map can be correlated with other maps throughout the state using key fields that link the sources together and allow them to connect to other related stand-alone tables created specifically for the compilation units. These tables are what make the detailed geologic datasets capable of producing a new statewide compilation while still maintaining connections to the original source map information for each geologic feature.

SPATIAL DATASETS

The spatial datasets and associated databases for this report are provided in a variety of formats that can be used with ArcGIS or other GIS capable software. We also provide an ArcGIS MXD file that will display both the generalized and detailed geology, includes the supplemental related stand-alone tables, and provides enhanced query and display capabilities.

Spatial data contents

The spatial datasets for the Geologic Map of Alaska consist of:

1. A zip file of geodatabases and associated files containing base layers, generalized and detailed geology, and stand-alone tables. These files are for use with ArcGIS version 10.0 or greater.
   SIM3340_gdb.zip
   - **carto_data**
     - AKgeol_carto.gdb – Cartographic datasets used for the base information on the PDFs of the published geologic map
       - annotation/AKState_anno – Place name annotation
       - communities/AKtowns – Cities and larger towns
       - countries/Canada_coast – Canadian coastline
       - countries/Russia_coast – Russian coastline
       - quadrangles/quad250k_polygon – 1:250,000-scale Alaska quadrangles
       - roads/AKroads – Major Alaska roads
       - water/AKlakes – Alaska lakes
       - water/ocean_background – Large polygon used for ocean background
   - **fonts**
     - FGDCGA_.TTF – FGDCGeoAge font used for special geologic age symbol in unit labels
     - FGDCGeoSymXX.ttf – Five numbered font files containing symbols used by some of the geologic lines in AKgeologyAC.style
   - **geologic_data**
     - AKStategeol.gdb – Geologic datasets for both the generalized and detailed geology and stand-alone tables imported from the FileMaker databases
       - **Feature classes**
       - AKStategeolarc_generalized – Major faults shown on published map
       - AKStategeolpoly_generalized – Geologic units shown on published map
       - AKStategeol_dike – Dikes for detailed geology
       - AKStategeol_lineament – Lineaments for detailed geology
       - AKStategeol_arc – Detailed geologic linework

AKStategeol_poly – Detailed geologic units
radiometric_ages – Sample locations of radiometric age determinations
u_pb_ages – Sample locations of U/Pb age determinations

Stand-alone tables

lineid – Attributes for each unique *lineid* assigned in AKStategeol_arc
nsaunits – Unit information from original source geologic maps
nsakey – Symbol, label, and description for each unique *nsaclass* value
nsaqkey – Symbol, label, description, and source for each unique *qclass* value
nsaage – Age information for each unique *nsaclass* value
nsalith – Lithology information for each unique *nsaclass* value
nsasetting – Geologic setting for each unique *nsaclass* value
nsarefs – Reference for each unique *source* value

Relationship classes

Note: The following relationships are all between AKStategeol_poly and one of the seven preceding nsa tables
AKgeol_NSAUNITS – One to one relationship based on *sourceclass*
AKgeol_NSAKEY – One to one relationship based on *nsaclass*
AKgeol_NSAQKEY – One to one relationship based on *qclass*
AKgeol_NSAAGE – One to one relationship based on *nsaclass*
AKgeol_NSALITH – One to many relationship based on *nsaclass*
AKgeol_NSASETTING - One to one relationship based on *nsaclass*
AKgeol_NSAREFS – One to one relationship on *source*

styles

AKgeologyAC.style – Symbology used for geologic lines
wpgcmykg.style – Symbology used for geologic units

AKStategeol.mxd – ArcGIS map document for viewing and querying the generalized and detailed geologic datasets. See following section for contents of MXD.

2. A zip file of shapefiles exported from the generalized and detailed geology datasets in the file geodatabase. These files can be used with any version of ArcGIS or other GIS software capable of reading shapefiles.

SIM3340_shp.zip

AKStategeolarc_generalized.shp – Major faults shown on published map
AKStategeolpoly_generalized.shp – Geologic units shown on published map
AKStategeol_dike.shp – Dikes for detailed geology
AKStategeol_lineament.shp – Lineaments for detailed geology
AKStategeol_arc.shp – Detailed geologic linework
AKStategeol_poly.shp – Detailed geologic units
radiometric_ages.shp – Sample locations of radiometric age determinations
u_pb_ages.shp – Sample locations of U/Pb age determinations
lineid.dbf - Attributes for each unique *lineid* assigned in AKStategeol_arc

See the metadata for descriptions of the data structures for these datasets.

ArcGIS map document

After contents of the geodatabase zip package SIM3340_gdb.zip have been downloaded and extracted to the local hard drive, there will be a new folder named AKgeol_web_gdb. Within this folder is the map document AKStategeol.mxd which can be opened by users who have ArcGIS version 10.0 or

greater installed on their computer. The MXD should not be moved from this folder before opening it, because this will break the links to the associated GIS databases. Double clicking on the MXD will launch ArcMap and open the file. Once open, users are free to view, query, print, or modify the properties of any of the layers in this MXD. Listed below are the contents of AKStategeol.mxd followed by a few preset properties users should be aware of when working with the MXD.

AKStategeol.mxd – Group layers are shown in bold.

Base_layers

AKState_anno – Place name annotation
AKtowns – Cities and larger towns
quad250k_polygon – 1:250,000-scale Alaska quadrangles
AKroads – Major Alaska roads

Generalized_geology

AKStategeolarc_crater – Craters shown on published map
AKStategeolarc_generalized – Major faults shown on published map
AKlakes – Alaska lakes
glacier_overprint – Glacier polygons shown with stipple pattern
AKStategeolpoly_generalized – Geologic units shown on published map

Age_dates

radiometric_ages – Sample locations of radiometric age determinations
u_pb_ages – Sample locations of U/Pb age determinations

Detailed_geology

AKStategeolarc_LineID – Faults assigned a lineid value
AKStategeol_dike – Dikes for detailed geology
AKStategeol_lineament – Lineaments for detailed geology
AKStategeol_arc – Detailed geologic linework
AKStategeol_poly – Detailed geologic units

Background

Russia_coast – Russian coastline
Canada_coast – Canadian coastline
ocean_background – Large polygon used for ocean background

Tables

lineid – Attributes for each unique *lineid* assigned in AKStategeol_arc
nsaqkey – Symbol, label, description, and source for each unique *qclass* value
nsaage – Age information for each unique *nsaclass* value
nsarefs – Reference for each unique *source* value
nsaunits – Unit information from original source geologic maps
nsakey – Symbol, label, and description for each unique *nsaclass* value
nsalith – Lithology information for each unique *nsaclass* value
nsasetting – Geologic setting for each unique *nsaclass* value

Scale ranges have been set for the layers in the MXD to control when they will be drawn. When it first starts, the MXD will be displaying base layers, generalized geology, and background using the symbology in the published PDF files. These three group layers will display when the map view is zoomed out beyond the 1:1,584,000 publication scale (1 inch = 25 miles) of the generalized geology. Zooming in past 1:1,584,000 will turn off the generalized geology layers and start to turn on the more detailed geology layers. The detailed polygons will be the first layer to display together with the base layers and background layers. No additional layers will be shown until the scale of the display reaches 1:500,000. Once this scale is reached the entire group of base layers will turn off and the remaining detailed geology layers and age determination layers will turn on with the exception of the

AKStategeolarc_LineID layer. This is an optional layer that users can display as needed. The background layers will remain on at all scales.

Using the pre-established relationship classes in AKStategeol.gdb, it is possible to apply selections between the detailed geology polygons and the seven nsa stand-alone tables. For example, after opening the attribute table for AKStategeol_poly, related records for selected polygons can be selected in the tables by going to the Related Tables button in the attribute table window's toolbar and then choosing one of the relationships listed. This will open the table in a new tab and display the selected related record(s), if any.

A Definition Query has been set in the AKStategeol_arc layer to hide geologic contacts that separate polygons with the same state label to the left and right sides of the line. These lines are still present in the feature class and can be shown on screen if the Definition Query is removed.

Spatial data properties

All of the 1:250,000- and 1:63,360-scale geologic maps on which this compilation is based were published using the Universal Transverse Mercator projection, North American Datum 1927 (NAD27). Because of the distortions that use of the UTM projection would produce on a map of small scale and large area, state and regional-scale products derived from this data that cross UTM zones should be plotted using a more appropriate Albers Equal-Area projection. The spatial datasets for this compilation all use the Albers Equal-Area projection. The datum has been transformed from NAD27 to the more modern North American Datum 1983 (NAD83). The parameters for this projection most commonly used in Alaska are as follows:

Projection: Albers Equal-Area

Horizontal datum: NAD83

Spheroid: GRS_1980

1st Standard parallel: 55 degrees North

2nd Standard parallel: 65 degrees North

Central meridian: 154 degrees West

Latitude of projection origin: 50 degrees North

Units: meters

False easting (meters): 0

False northing (meters): 0

The detailed geologic feature classes and stand-alone geodatabase tables here are linked through use of key fields. These fields link to the associated stand-alone databases in slightly different ways. The primary link on a statewide basis is a field called *nsaclass*. This field provides a linkage through the databases to the age and lithology of the map units in the detailed geology. *Nsaclass* is used to cover the entire geologic time scale, whereas *qclass* is restricted to and provides finer detail for Quaternary map units. *Nsaclass* and the similar *qclass* field have been added to the polygon feature-class (PFC) of the detailed statewide geology. These fields are also found in the text databases of supplemental stand-alone data. These fields represent the link that correlates individual map units between sources. *Nsaclass* is used to make regional unit assignments and generally reflects a known or an inferred correlation of map units. For example, all "Surficial deposits, undivided" are assigned an *nsaclass* code of 100. The schema for *nsaclass* was developed as regional maps throughout Alaska were compiled and therefore reflects an iterative process. As new or additional information becomes available, the *nsaclass* code for a particular map unit may have been changed as the compilation and release of regional maps progressed, either to reflect lumping or, more generally, a finer separation of map units. In a few cases, the *nsaclass* code

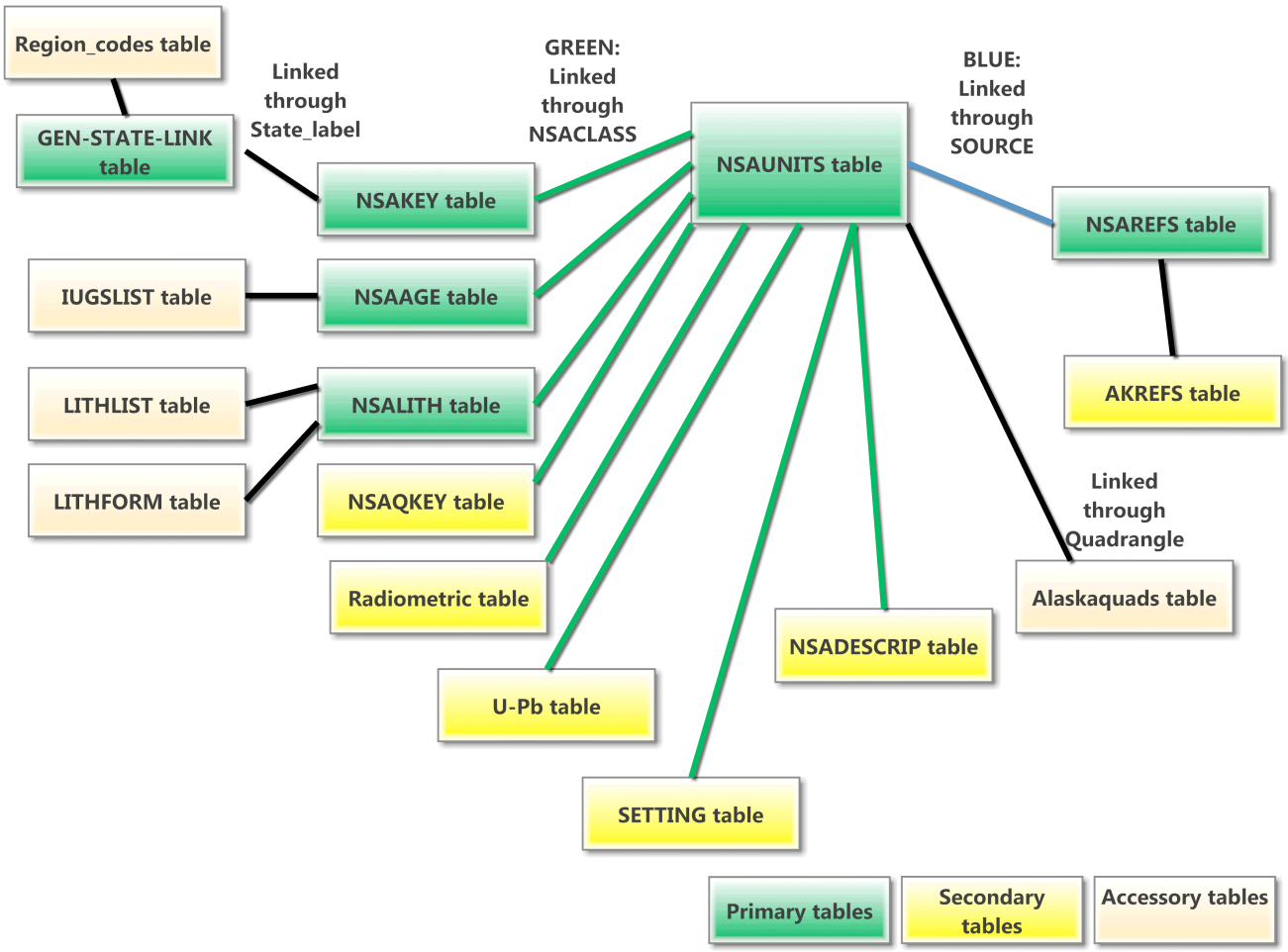
may have been redefined through the compilation process also; in most cases this reflects a more precise definition of the *nsaclass* to restrict the variety of map units that should be assigned.

Fields called *source*, *nsamod*, and *nsasub* have also been added to the PFC. *Source* is a coded reference citation, indicating the manuscript or other source for the map information. The format for *source* is XX###, where XX is the two letter quadrangle code (CAPITAL letters) and ### is a three digit number (using leading zeros) to indicate a specific reference. *Nsamod* provides information with respect to hydrothermal alteration or contact metamorphism of a map unit, either for the entire unit or for an individual polygon. *Nsasub* is used primarily for unconsolidated or Quaternary map units where we have information about the underlying bedrock, or in rare cases, unconsolidated map unit; this field is not universally populated. *Nsasub* uses the same coding scheme as *nsaclass*. In this way, the *nsaclass* field needs only to store the primary map unit information. Fields also in the PFC are *class*, *label*, *symbol,* and *source_class*. *Source_class* concatenates the source and class fields to provide a unique identifier for each original source map unit and therefore unit description.

The line feature-class (LFC) stores attributes indicating the type of line features in the statewide geodatabase. Inherent in the coding is information defining the type of line shown, such as a stratigraphic or fault contact, and location (certain, approximate, inferred, or concealed). In addition, each arc within the spatial databases has a *source* attribute. In coding of these lines, their direction is utilized to define on which side decoration is located, such as the teeth of a thrust fault symbol. Protocol is that decoration is always on the right side as viewed from the origin. This means that the upper plate of a thrust is always on the right, the inside of a caldera is to the right, and the ticks point up-glacier for glacial limit lines, etc.

SUPPLEMENTAL STAND-ALONE DATABASE TABLES

In order to manage the textural and coding information related to the geologic map, we created a series of related and interlinked databases. As used here, each of the files are stand-alone databases that can be linked as needed through common fields. Within their native FileMaker Pro software and in the runtime application (included as part of this data release), each of the databases have multiple views or layouts providing selective views of the contained information. In the descriptions below of the various databases included in this release, the term “portal” will be mentioned. In this context, a portal is a feature of the database software that allows viewing of data in other databases or tables from within the selected database. Portals not only allow viewing of information, but also can be used in searches or to update related databases. Different layouts may contain different portals. As provided here, in addition to the native database format files (.fmp12), as well as “.dbf” and “.csv” (comma separated values) files, we also include a runtime version of the primary databases, which are maintained using the commercial FileMaker Pro (versions 11 through 13) database software. These databases are can be directly connected to the ArcGIS geodatabase through an ODBC protocol; however, the data can also be linked through the dbf files that accompany this report. In a stand-alone mode, these databases can be used to guide searches of the coverages seeking particular sorts of information.



Eighteen database tables are included as part of this report. The form for twelve of the tables is described here and six of the database tables are provided in appendices. They are:

Table 1. NSAUNITS: Contains abstracted geologic unit descriptions for each source map. Seven PFC fields, *class*, *nsaclass*, *qclass*, *nsamod*, *nsasub*, and *source*, mentioned above, are contained in this database.

Table 2. NSAKEY: A statewide database that shows which units from the NSAUNITS database are correlated as a first cut. This data also shows a color symbol and label for each *nsaclass* that were used as the compilation proceeded in order to generate draft maps. Note that these are **not** the colors and labels used on the published state map. NSAKEY is linked to the NSAUNITS database through the *nsaclass* field. The required ArcGIS stylesheet is included with this report.

Table 3. NSAQKEY: Database similar to NSAKEY but it is used to provide finer scale subdivisions of the Quaternary surficial deposits and volcanic rocks; it assigns tentative color symbols and labels in order to generate draft maps for maps of the Quaternary units. Linked to NSAUNITS through q*class*.

Table 4. NSADESCRP: This database contains the unit descriptions used on the various regional geologic maps, which means there will be multiple unit descriptions for any *nsaclass* value that appeared on more than one regional map. Additionally, the regional maps may have created map units that combine multiple *nsaclass* values. Linked to the NSAUNITS database through the *nsaclass* field. See also table 11, GEN_STATE_LINK.

Table 5. NSAREFS: References for the source maps for the state geologic map. Linked to the NSAUNITS database through the *source* field.

Table 6. NSALITH: This database provides information on the specific rock types that an *nsaclass* value represents. It includes the lithology (rock type), lithologic form or mode of occurrence, and relative proportion of the unit that rock type represents. As each *nsaclass* lithology reflects a composite unit, the lithologies are therefore generalizations and may not exactly match any specific source map unit. The lithology coding schema used is hierarchical (5 levels) to aid in searching for specific rock types (syenite), or general categories (plutonic rocks). Linked to the NSAUNITS database through the *nsaclass* field.

Table 7. NSAAGE: Similarly to the NSALITH table, this database provides composite maximum and minimum age assignments for a given *nsaclass*. Linked to the NSAUNITS database through the *nsaclass* field.

Table 8. RADIOMETRIC: Database listing K/Ar, Ar/Ar, Rb/Sr, fission-track, and other radiometric age determinations.

Table 9. U-PB: Database listing U/Pb age determinations.

Table 10. IUGSLIST: Provided as a database containing the minimum and maximum ages for every Eon, Era, Period, Epoch, and Age. Linked to the NSAAGE database through *Eon, Era, Period*, and *Epoch*. The age assignments are based on a slight modification (2006) of the IUGS time scale (Gradstein and others, 2005), a change from some of the previously released regional maps in this series, which were based on the 1983 DNAG time scale (Geological Society of America, 1983).

Table 11. GEN_STATE_LINK: This database ties the NSAUNITS, NSAKEY, and other database tables together to indicate which *nsaclass* codes are aggregated to become the units in the DMU as well as the more generalized units on the printed map.

Table 12. SETTING: Database containing the assigned geologic setting for map units by *nsaclass*. Linked to NSAUNITS and to SETLIST tables.

Appendix 1. LITHLIST: Database containing all the lithologic terms (rock types) used in the lithologic coding. Note, the metamorphic rock schema in this list is somewhat modified from previous releases of these databases. Linked to the NSALITH database.

Appendix 2. LITHFORM: Database containing the lithologic-form terms used for lithologic coding of geologic units – duplicated here in appendix 1 of this document. Linked to the NSALITH database.

Appendix 3. Ancillary tables: SETLIST: Database containing terms used for geologic setting; AKREFS, ALASKAQUADS; and REGION_CODES:

RUNTIME APPLICATION

Included with this data release is a runtime application of the FileMaker Pro database tables. This application, which only functions under the Windows operating system, is provided as a zipped directory which contains the database tables and the necessary files to provide much of the functionality of the FileMaker Pro software. To use this application, unzip the supplied zip file, which will create a folder (directory) containing needed files. Within that folder will be a file named Alaska_Geology.exe. Double click on this file to start the runtime application. The database tables can be scrolled by clicking on the book-like icon in the upper left corner. Searches can be made by selecting the “Find mode”, found under the “View” tab and typing the desired search item in the appropriate field on the Find screen. A complete explanation of the software is not appropriate here, but experimentation will reveal many capabilities.

DATABASE STRUCTURES

NSAUNITS database

The main database for the project is called NSAUNITS. Entered into this database (table 1) are brief abstracts of the unit descriptions from each source map, which are then classified into regional or statewide units. Many of the fields in this NSAUNITS database are verbatim from the source maps; upon entry the map units from each source were coded using the *nsaclass* attribute. This then automatically links them to the age and lithology tables that are tied to the *nsaclass* value. Thus, the age and lithologic information in the database tables may, in some cases, conflict with the information on the legends of the original source maps. This may reflect new information or interpretation for map units from which maps may have been compiled decades ago. This database is the root for correlations of units, although not necessarily the final word (more on this below). For example, Early Cretaceous granodiorite from various maps might get the same *nsaclass* and therefore be assigned to a single map unit, yet when drawn to produce a particular map, it might be given the same symbol and color as granite and quartz monzonite of that age (only for that map). The standard view (called "GSA color") of the database in FileMaker Pro software has portals to four other related databases, NSAKEY, NSAREFS, NSAAGE, and NSALITH, which show the related values in these databases. These databases are linked through either the *nsaclass* or *source* fields in the NSAUNITS database. The first seven fields in the database come directly from the source map, each of the other fields is assigned either at the time of entry into the database or later.

Table 1. NSAUNITS field definitions.

	Field name	Information type	Field type	Links
1	*Quadrangle*	1:250,000-scale quadrangle, with the name fully spelled out. If a map covers multiple quadrangles, each quadrangle will have a set of entries for the appropriate units from that map in the database.	Text	
2	*Map unit*	Label on the source map for geologic unit. Some maps do not use labels; hence a color or pattern description would be entered here. In other cases, a unit subdivided using an overprint pattern (such as contained limestone lenses) will have an entry for each variation.	Text	
3	*Unit name*	Map unit name from the source map. If a map is divided into regions, terranes, or allochthons, etc., or the unit name explicitly mentions stratigraphic divisions, then this information is included in the unit name (for example, "Lisburne Group, Kuna Formation", or "Greenstone of Venetie Subterrane of Arctic Alaska Terrane").	Text	
4	*Age*	Geologic age of the unit as given in the source. (Note this is the age and not the stratigraphic position.) In some cases, the age assignment has been subsequently revised; nevertheless, the age from the original source map is entered.	Text	

Table 1. NSAUNITS field definitions (cont.)

	Field name	Information type	Field type	Links
5	*Description*	An abstracted version of the unit description from the source map. Focuses on lithology and important relationships as described on the source map. May includes special notes regarding this unit from the source. This field, though of essentially unlimited length, was originally kept short. Later entries tend to be the entire unit description from the source map.	Text	
6	*Fossil*	Brief notes on any fossil control mentioned on the source map.	Text	
7	*Radiometric age*	Brief notes on radiometric ages.	Text	
8	*Source*	Unique code assigned to each source; uses the two-letter quadrangle code and a three-digit number. By default, 001 is reserved for the topographic map for each quadrangle. Numbers above 100 indicate sources that were not captured digitally.	Text and number combined	NSAREFS, Spatial database
9	*Rock class*	General classification of unit: Igneous, Sedimentary, Metamorphic, Unconsolidated, or Melange. For mixed units, the dominant category.	Text, defined values	
10	*Nsamod*	An item to indicate if unit is altered, contact metamorphosed, or has a queried unit assignment. Some maps show contact metamorphosed areas as separate units; these units are assigned the *nsaclass* for the appropriate protolith and have "HFS" selected as *nsamod* value. If only a few polygons of a unit are altered or contact metamorphosed, then the *nsamod* value will be set only for those polygons in the spatial database. Queried units, for example,Tk? versus Tk, have the same *nsaclass* codes, but Tk? will have "Q" selected as *nsamod* value.	Text, defined values	Spatial database
11	*Class*	Unique numeric code assigned to each source unit. (Unique only within a given quadrangle and specific to each source.)	Number	Spatial database

Table 1. NSAUNITS field definitions (cont.)

	Field name	Information type	Field type	Links
12	*Nsaclass*	Regional numeric code assigned to like units – the main key field in the database.	Number	Spatial database and most of the other databases
13	*Maplabel*	Label relationally derived from the NSAKEY database.	Text	NSAKEY
14	*Qclass*	Similar to *nsaclass*; allows finer subdivision of Quaternary geologic units.	Number	Spatial database, NSAQKEY
15	*Nsasub*	Uses the same coding as nsaclass, generally used to define the bedrock unit that underlies surficial deposits. Not universally populated.	Number	Spatial database
16	*Mod_date*	Date record was last modified or corrected. Field first implemented is Feb. 2010; for records entered earlier that are unchanged, the field is blank.	Date	
17	*Source_class*	Concatenated field that uniquely identifies a given source map (*source*) geologic unit (*class*).	Text	Spatial database

Using the NSAUNITS database, a user can determine the disposition of any geologic unit from any source map for the map area that is in the statewide database. It includes unit descriptions from maps used for different purposes or at different stages of the project that may not be explicitly reflected in this regional compilation.

Each source map used in the compilation will have its geologic units entered in this database. If a source map covers more than one quadrangle, units are entered for all covered quadrangles; however, only the geologic units that actually appear in a quadrangle will be entered for a quadrangle. The reference record for the source map will have an entry for each quadrangle covered by the map.

Within the database itself (see runtime version), portals in the NSAUNITS database provide views into the NSADESCRP, NSAKEY, NSALITH, NSAAGE, and NSAREFS database tables, allowing the user to see the linked data applicable to any record.

NSAKEY database

The second most used database is called NSAKEY (table 2). This table is analogous to an INFO lookup table from which labels and colors are applied to the map. In fact, the primary lookup table used within ArcGIS for many derivative products is derived directly from this database by importing it (NSAKEY) into INFO. The primary field in this database is *nsaclass*, linking it to the NSAUNITS, NSALITH, NSAAGE, and SETTING databases and to the spatial databases for each quadrangle. It is here that each unit gets assigned a symbol (color), overprint pattern, and tentative label to be used on some geologic map products. Note, the labels and assignments provided in this database table are **not** the same as those used on the generalized or detailed digital state map or the various regional maps, for each of those maps, the colors used were chosen as appropriate. This database allows control of the symbols and labels assigned to units and it helps to eliminate undesired duplication. The database also includes a *description* field, which summarizes the regional unit in a sentence or less. Portals in the NSAKEY database provide a view into NSAUNITS and back into itself (NSAKEY). The portal that

looks inward is particularly useful because it allows a user to see instantly what other units have been assigned a particular symbol. This is important, because although our shadeset or stylesheet ostensibly has 999 colors, in reality, only about 60 to 70 can be distinguished by eye on plots. As a result, colors must be assigned to more than one unit and on some maps overprint patterns have been used to distinguish subsets. The NSAKEY database is also used to assign duplicate colors and labels to units that are lumped in some map products, but otherwise need to be maintained as separate units in the database.

Table 2. NSAKEY field definitions

	Field name	Information type	Field type	Links
1	*Symbol*	Color number used, derived from an ARC/INFO shadeset.	Number	NSAKEY (self-linked)
2	*Overprnt*	Pattern, also derived from an ARC/INFO shadeset or ArcGIS stylesheet. Generally not used.	Number	
3	*Label*	Map label printed on map products.	Text	
4	*Nsaclass*	Regional numeric code assigned to like units – the main key field in the database.	Number	NSAUNITS, Spatial database
5	*Description*	Brief (5–10 words) summary of unit on a regional basis.	Text	

NSAQKEY database

The NSAQKEY database (table 3) is similar to NSAKEY but it is used to subdivide the Quaternary surficial deposits by assigning color symbols and labels to the Quaternary units. The table can also be used as a lookup table to assign the symbols, overprints, and labels to the surficial deposits. Within the FileMaker software, this database table contains a portal into the NSAUNITS database table, showing which map units or which sources are included in the *qclass* assignment.

Table 3. NSAQKEY field definitions

	Field name	Information type	Field type	Links
1	*Symbol*	Color number used, derived from an ARC/INFO shadeset or ArcGIS style sheet.	Number	
2	*Overprint*	Pattern, also derived from an ARC/INFO shadeset or ArcGIS style sheet. Generally, not used	Number	
3	*Unit Label*	Map label printed on map products.	Text	

Table 3. NSAQKEY field definitions (cont.)

	Field name	Information type	Field type	Links
4	*Nsaclass*	Regional numeric code assigned to like units – the main key field in the database.	Number	NSAUNITS, Spatial database
5	*Qclass*	Numeric code used to subdivide surficial deposits.	Number	NSAUNITS, Spatial database
6	*Geologic Unit*	Brief (5–10 words) summary of unit on a regional basis.	Text	

NSADESCRIP database

This database (table 4) ties *nsaclass* numbers to the more complete unit descriptions associated with the regional geologic map compilations. This table is linked to the NSAUNITS database through the *nsaclass* field and has portals into NSAUNITS and NSAKEY databases. Export versions are named nsadscrp.csv and nsadscrp.dbf

Table 4. NSADESCRIP field definitions

	Field name	Information type	Field type	Links
1	*Map*	Abbreviated name for regional map to which record applies.	Text	
2	*Label*	Map unit label as used on regional maps.	Text	
3	*Name*	Map unit name as used on regional maps.	Text	
4	*Nsaclass*	Regional numeric code assigned to like units – the main key field in the database.	Number	Spatial database, NSAUNITS
5	*Age*	Assigned age (range) from regional map.	Text	
6	*Description*	Full text of unit description as used on the regional map.	Text	
7	*Source*	Source for unit descriptions (not the same form the "*source*" in other database tables).	Text	

NSAREFS database

The NSAREFS database (table 5) contains the reference citation for each source map and (or) other publications used. Included in the reference database will be maps that have been digitized, as well as other publications that result in changes to the map (for example, a paper reassigning some rocks from one unit to another or providing new age determinations). It will also list as "written commun." the source of unpublished information responsible for changes to particular aspects of the map. If a source map covers multiple quadrangles, it will be assigned an identification code for each quadrangle covered. This database has a portal into NSAUNITS, showing the map units from that source that have been entered in the NSAUNITS database.

Table 5. NSAREFS field definitions

	Field name	Information type	Field type	Links
1	*Source*	Unique code assigned to each source that uses the two-letter quadrangle id and a three-digit number. This field is forced to have only unique entries by the database software.	Text and number, must be unique	NSAUNITS, Spatial database
2	*Refnum*	A unique tracking number assigned by the database to each reference.	Number, auto entry	
3	*Reference*	USGS style reference citation. Also lists written communications where appropriate for modifications to maps.	Text	

NSALITH database

The NSALITH database (table 6) contains lithologic coding for each *nsaclass* in the database. It uses a lithologic dictionary that is contained in linked database tables called LITHLIST and LITHFORM (listed in appendices 1 and 2, herein). It allows for the entry of as many lithologies for a unit as needed and therefore has a many-to-one relationship through the *nsaclass* field. This database has a portal into the NSAUNITS database, showing which source map units have been assigned that *nsaclass*.

One field, which is automatically generated, combines the values of five other fields in the database. This field allows searching of the database at any level of the lithologic hierarchy without the need to be concerned about the level of a given term. Possible searches, for example, are for any unit containing carbonate rocks or for any unit where limestone is a major lithology. Another field captures the information from the most specific part of the lithologic assignment; depending on the information about the map unit, this could be anything from the value in the *lith1* to *lith5* fields. The *rank* field has four defined values allowed that indicate how much of the map unit the lithology represents. The values are Major, meaning greater than or equal to 33 percent; Minor, between 10 and 33 percent; Incidental, less than 10 percent; and Indeterminate (major). Major is added to the indeterminate category to insure “fail safe” or inclusive searches for major rock types, as rock types listed in the indeterminate category could well be major components of a map unit. These can be eliminated from search results by explicitly omitting “Indeterminate” from the result.

Table 6. NSALITH field definitions

	Field name	Information type	Field type	Links
1	*Nsaclass*	Regional numeric code assigned to like units – the main key field in the database.	Number	NSAUNITS
2	*Lith1*	Highest level lithologic classification.	Text, value list	
3	*Lith2*	Next level lithologic classification, values are based on the value of *lith1* field.	Text, value list	
4	*Lith3*	As above, based on the value of *lith2* field.	Text, value list	
5	*Lith4*	As above, based on the value of *lith3* field.	Text, value list	

Table 6. NSALITH field definitions (cont.)

	Field name	Information type	Field type	Links
6	*Lith5*	As above, based on the value of *lith4* field.	Text, value list	
7	*Form*	Description of form of units, uses a value list based on the value of *lith1* field.	Text, value list	
8	*Rank*	Values allowed are Major, Minor, Incidental, and Indeterminate (major).	Text, value list	
9	*Percent*	Optional field containing an estimate of percent of unit that given lithology represents. This information is rarely available in Alaska.	Number	
10	*Lith_comment*	Free form comment field – optional.	Text	
11	*Totallith*	Text string that combines the information in all of the *lith* fields, allowing searches based on any aspect of the lithologic hierarchy.	Text, auto entry	
12	*Lowest*	Calculated field that captures the most specific part of the lithologic assignment	Text, autoentry	
13	*Record_no*	Unique tracking number assigned by the database to each record.	Number, auto entry	

NSAAGE database

The NSAAGE database table (table 7) is used like the NSALITH table to assign a uniform age to each *nsaclass* unit. The fields in it are assigned using a data dictionary (using the IUGSLIST database table) derived from a slightly modified (2006) version of the IUGS time scale (Gradstein and others, 2005) to assign maximum and minimum ages to geologic units. Previous version of this database used the 1983 DNAG time scale (Geological Society of America, 1983). The database software then creates a field that has the full definition of the minimum or maximum age of the unit, allowing searches based on any part of the time scale, similar to the *totalith* field described above. For example, searches could be for units that are Paleozoic but no older than Devonian. Because minimum and maximum numeric ages are also populated in the databases, any unit can be searched based on a numeric maximum and minimum age as well.

Note that the ages assigned in this database are for an *nsaclass* unit and may not necessarily match the assignments made on any given source map. The assignment of a geologic unit to an *nsaclass* controls the lithology and the age referenced to that unit by the database. For example, a source map may call a unit Paleozoic, yet current knowledge may indicate that unit is actually Permian in age. The NSAUNITS database will show the Paleozoic age as shown in the source whereas the NSAAGE database will most likely show the Permian age assignment, based on current knowledge and the assignment of an appropriate *nsaclass*.

Table 7. NSAAGE field definitions

	Field name	Information type	Field type	Links
1	*Nsaclass*	Regional unit code as used above.	Number	NSAUNITS, Spatial database
2	*Min_eon*	The minimum or youngest age assignment for the eon of the unit, based on geologic interpretation.	Text, value list	
3	*Min_era*	As above, for era.	Text, value list	
4	*Min_period*	As above, for period.	Text, value list	
5	*Min_epoch*	As above, for epoch.	Text, value list	
6	*Min_age*	As above, for age.	Text, value list	
7	*Full_min*	Complete, concatenated minimum age assignment.	Text, auto entry	
8	*Max_eon*	The maximum or oldest age assignment for the eon of the unit, based on geologic knowledge.	Text, value list	
9	*Max_era*	As above, for era.	Text, value list	
10	*Max_period*	As above, for period.	Text, value list	
11	*Max_epoch*	As above, for epoch.	Text, value list	
12	*Max_age*	As above, for age.	Text, value list	
13	*Full_max*	Complete, concatenated maximum age assignment.	Text, auto entry	
14	*Type*	Field that defines whether the age assignment is relative, based on stratigraphic position, or absolute, based on radiometric age. Default value is Relative.	Text, values are Relative or Absolute	
15	*Cmin_age*	The most precise minimum age coded, derived from the *full_min* field.	Text, auto entry	
16	*Cmax_age*	The most precise maximum age coded, derived from the *full_max* field.	Text, auto entry	
17	*Min_Ma*	Numeric, either from the DNAG table or radiometric determinations.	Number, auto entry	
18	*Max_Ma*	Numeric, either from the DNAG table or radiometric determinations.	Number, auto entry	

Table 7. NSAAGE field definitions (cont.)

	Field name	Information type	Field type	Links
19	*Age_comments*	Free form comment field – optional.	Text	
20	*Mod_date*	Field indicating last time field was modified. Field added May 2013; blank indicates record has not been modified since then		

RADIOMETRIC DATABASE

The RADIOMETRIC database table (table 8) contains radiometric age data for samples analyzed by K/Ar, $^{40}Ar/^{39}Ar$, Rb/Sr, fission-track, and other methods for age determination, but not including U/Pb determinations. This table can be linked through the *nsaclass* field to the other database tables. Populating the *nsaclass* field in this database is an ongoing effort, hence not all ages have assigned *nsaclass* values. Ages for which *nsaclass* has been assigned may not necessarily match the age range assigned to the geologic unit represented by that *nsaclass* if the age was interpreted as not reflecting the emplacement age of the unit. Users should carefully examine the sample data to ensure that the measured age is appropriate to their intended usage. Export versions are named radio.csv and radio.dbf.

Table 8. RADIOMETRIC field definitions

	Field name	Information type	Field type	Links
1	*Quad*	1:250,000-scale quadrangle.	Text	
2	*Latdeg*	Degrees of latitude.	Number	
3	*Latmin*	Minutes of latitude (to be added to degrees).	Number	
4	*Latdir*	Hemisphere of sample location (N or S), default is N.	Text	
5	*Longdeg*	Degrees of longitude.	Number	
6	*Longmin*	Minutes of longitude (to be added to degrees).	Number	
7	*Longdir*	Hemisphere of sample location (W or E), default is W meaning longitude value is a positive number.	Text	
8	*Sample*	Sample number.	Text	
9	*Rock_type*	Rock type of sample dated.	Text	
10	*Method*	Dating method used. For $^{40}Ar/^{39}Ar$ determinations, will indicate type of determination if reported.	Text	
11	*Mineral*	Mineral or phase dated.	Text	
12	*Age*	Reported in age in millions of years.	Number	
13	*Comment*	Comments about analysis or sample.	Text	
14	*Reference*	Reference citation for age determination.	Text	
15	*Latitude*	Calculated in decimal degrees from *Latdeg* and *Latmin.*	Number	
16	*Longitude*	Calculated in decimal degrees from *Longdeg* and *Longmin*. Converted for GIS use such that western hemisphere values are negative numbers.	Number	

Table 8. RADIOMETRIC field definitions (cont.)

	Field name	Information type	Field type	Links
17	*Error*	Analytical error for age determination.	Number	
18	*Rec_no*	Record number of entry in database for editing purposes	Number	
19	*Nsaclass*	Regional unit code as used above.	Number	NSAUNITS, Spatial database
20	*Isochron age*	For $^{40}Ar/^{39}Ar$ ages, isochron age if reported.	Number	
21	*Isochron error*	Assigned analytical error.	Number	
22	*Plateau age*	For $^{40}Ar/^{39}Ar$ ages, plateau age if reported.	Number	
23	*Plateau error*	Assigned analytical error.	Number	
24	*Fusion age*	For $^{40}Ar/^{39}Ar$ ages, total fusion or integrated age if reported.	Number	
25	*Fusion error*	Assigned analytical error.	Number	
26	*Mod_date*	Field indicating last time field was modified. Field added May, 2013, blank indicates records has not been modified since then		
27	*Location_check*	In some references, the reported latitude and longitude do not match the described or map location; this field indicates if the location was checked and is consistent.	Yes, blank indicates not checked	

U-PB database

The U-PB database table (table 9) contains radiometric age data for samples analyzed by uranium-lead (U-Pb) methods for age determination. This table is linked through the *nsaclass* field to the other database tables. Populating the *nsaclass* field in this database is an ongoing effort, hence not all ages have assigned *nsaclass* values. Ages for which *nsaclass* has been assigned may not necessarily match the age range assigned to the geologic unit represented by that *nsaclass* if the age was interpreted as not reflecting the emplacement age of the unit. Users should carefully examine the sample data to ensure that the measured age is appropriate to their intended usage.

Table 9. U-PB field definitions

	Field name	Information type	Field type	Links
1	*Quad*	1:250,000-scale quadrangle.	Text	
2	*Latdeg*	Degrees of latitude.	Number	
3	*Latmin*	Minutes of latitude (to be added to degrees).	Number	
4	*Latdir*	Hemisphere of sample location (N or S), default is N.	Text	
5	*Longdeg*	Degrees of longitude.	Number	
6	*Longmin*	Minutes of longitude (to be added to degrees).	Number	

Table 9. U-PB field definitions (cont.)

	Field name	Information type	Field type	Links
7	*Longdir*	Hemisphere of sample location (W or E), default is W meaning longitude value is a positive number..	Text	
8	*Sample*	Sample number.	Text	
9	*Rock type*	Rock type of sample dated.	Text	
10	*Method*	Dating method used.	Text	
11	*Mineral*	Mineral or phase dated.	Text	
12	*Age*	Reported in age in millions of years.	Number	
13	*Error*	Reported analytical error	Number	
14	*Sigma*	Number of standard deviations of reported analytical error	Number, value 1 or 2	
15	*Comment*	Comments about analysis or sample.	Text	
16	*Reference*	Reference citation for age determination.	Text	
17	*Nsaclass*	Regional unit code as used above.	Number	NSAUNITS, Spatial database
18	*Latitude*	Calculated in decimal degrees from *Latdeg* and *Latmin.*	Number	
19	*Longitude*	Calculated in decimal degrees from *Longdeg* and *Longmin*. Converted for GIS use such that western hemisphere values are negative numbers.	Number	
20	*206Pb/238U*	Age, if reported.	Number	
21	*206Pb/238U error*	Associated error, if reported.	Number	
22	*207Pb/235U*	Age if reported	Number	
23	*207Pb/235U error*	Associated error, if reported.	Number	
24	*207Pb/206Pb*	Age, if reported.	Number	
25	*207Pb/206Pb error*	Associated error, if reported.	Number	
26	*208Pb/232Th*	Age, if reported.	Number	
27	*208Pb/232Th error*	Associated error, if reported.	Number	
28	*206Pb/204Pb*	Age, if reported.	Number	
29	*206Pb/204Pb error*	Associated error, if reported.	Number	
30	*Upper intercept*	Age, if reported.	Number	
31	*Upper intercept error*	Associated error, if reported.	Number	
32	*Lower intercept*	Age, if reported.	Number	

Table 9. U-PB field definitions (cont.)

	Field name	Information type	Field type	Links
33	*Lower intercept error*	Associated error, if reported.	Number	
34	*Mod_date*	Field indicating last time record was modified. Field added May, 2013, blank indicates no modification or edits since then.		

IUGSLIST database

Provided as a database (table 10) containing the minimum and maximum ages for every Eon, Era, Period, Epoch, and Age. Linked to the NSAAGE database through *Eon, Era, Period*, and *Epoch*. The age assignments are based on a slight medication (2006) of the IUGS time scale (Gradstein and others, 2005), a change from the earliest releases in this series, which were based on the 1983 DNAG time scale (Geological Society of America, 1983).

Table 10. IUGSLIST field definitions

	Field name	Information type	Field type	Links
1	*Eon*	Eon	Text	
2	*Era*	Era	Text	
3	*Period*	Period	Text	
4	*Epoch*	Epoch	Text	
5	*Age*	Age	Text	
6	*Minimum_Ma*	Minimum age for the stratigraphic interval of the record in millions of years.	Number	
7	*Maximum_Ma*	Maximum age for the stratigraphic interval of the record in millions of years.	Number	
8	*Rec_no*	Record number in database for sorting use.	Number	
9	*Concat*	Concatenated field including *Eon*, *Era*, *Period*, *Epoch*, and *Age* where defined in record.	Text	
10	*Far_right*	Right most term from *Concat* field	Text	

GEN_STATE_LINK database

This database (table 11) ties the NSAUNITS, NSAKEY, and other database tables together to indicate which *nsaclass* codes are aggregated to become the units in the DMU as well as the more generalized units on the printed map. This database was a tool used to group the various *nsaclass* values into the approximately 450 map units defined in the digital version of the map and the approximately 220 map units on the printed version of the map. The *sequence* field allows the map units of the digital map to be sorted in the traditional order for geologic maps, separated by rock class and then sorted by youngest age. However, note that if a map unit is part of a stratigraphic package, for example a Formation within a Group, all the units of that package are listed together, in age order and the package is placed in the sequence on the basis of the age of its youngest member. The dbf and csv versions are named genstate.csv and genstate.dbf.

Table 11. GEN_STATE_LINK field definitions

	Field name	Information type	Field type	Links
1	*State_label*	Label used in the DMU and digital version of the state map. This is in a standard text font and does not use special characters. Px is used for Proterozoic and IP for Pennsylvanian.	Text	Spatial database
2	*Description*	Map unit description from the Description of Map Units (DMU) in the pamphlet.	Text	
3	*Unit_name*	Unit name as used in the DMU	Text	
4	*Sequence*	A sorting code using a letter for lithologic type and then a number placing units in age order. Matches order in the DMU. A is unconsolidated units; B, sedimentary rocks; C, volcanic rocks; D, plutonic rocks; E, metamorphic rocks; and F, tectonic rock units or assemblages.	Text	Spatial database
5	*Age_range*	Age range of the map unit in the DMU, which does not necessarily match the units on the printed map, which because of grouping of DMU units, may span a longer time interval.	Text	
6	*Min_Age*	Minimum age for the stratigraphic interval of the record in millions of years.	Number	
7	*Max_Age*	Maximum age for the stratigraphic interval of the record in millions of years.	Number	
8	*State_sym*	Number defining symbol (color) in the WPGCMYK style for ArcGIS for the digital version.	Number	
9	*Region*	Code (see fig. 3) indicating the general region(s) of the state in which the map unit appears.	Text	
10	*Rank*	Rank order of unit: 1 is primary unit, 2 and 3 secondary and higher order subunits.	Number	
11	*Lith_type*	Unconsolidated units; Sedimentary; Igneous-volcanic; Igneous-plutonic; Metamorphic; Tectonite.	Text	
12	*Group_label*	Label on printed map; uses FDGC_Geoage font.	Text	
13	*Group_name*	Name used in List of Map Units (LMU) on printed map.	Text	
14	*Group_symbol*	Number defining symbol (color) in the WPGCMYK style for ArcGIS	Number	
15	*Group_ID*	Sequence number for grouped units of printed map.	Number	

SETTING database

Provided as a database (table 12) containing the assigned geologic setting for map units by *nsaclass*. Linked to NSAUNITS and to SETLIST tables. The geologic settings are a slight modification of those used on the Circum-Arctic bedrock geologic map (Harrison and others, 2008).

Table 12. SETTING field definitions

	Field name	Information type	Field type	Links
1	*Nsaclass*	Regional numeric code assigned to like units – the main key field in the database.	Number	Spatial database and most of the other databases
2	*Setting*	Text describing the geologic setting, chosen from value list in the SETLIST data table	Text	SETLIST

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APPENDIX 1. LITHOLOGIC DATA DICTIONARY

Lith1	Lith2	Lith3	Lith4	Lith5
Unconsolidated				
	Coarse-detrital			
		Boulders		
		Gravel		
		Sand		
	Fine-detrital			
		Clay		
		Silt		
	Coral			
	Marl			
	Peat			
Sedimentary				
	Clastic			
		Mixed-clastic		
			Conglomerate-mudstone	
			Conglomerate-sandstone	
			Sandstone-mudstone	
			Siltstone-mudstone	
		Conglomerate		
		Sandstone		
			Arenite	
				Calcarenite
				Feldspathic-arenite
				Litharenite
				Quartz-arenite
			Arkose	
			Graywacke	
				Feldspathic-wacke
				Lithic-wacke
			Quartzose-sandstone	
		Siltstone		
		Mudstone		
			Claystone	
				Bentonite
			Shale	
				Black-shale
				Oil-shale
				Phosphatic-shale
		Sedimentary-breccia		
	Carbonate			
		Dolostone		
		Limestone		
			Boundstone	
			Chalk	
			Coquina	
			Floatstone	

APPENDIX 1. LITHOLOGIC DATA DICTIONARY (CONT.)

Lith1	Lith2	Lith3	Lith4	Lith5
Sedimentary	Carbonate	Limestone		
			Grainstone	
			Lime-mudstone	
			Packstone	
			Rudstone	
			Wackestone	
		Marlstone		
	Chemical			
		Banded-iron-formation		
		Barite		
		Chert		
		Diatomite		
		Evaporite		
			Anhydrite	
			Gypsum	
			Salt	
		Novaculite		
		Phosphorite		
	Coal			
		Anthracite		
		Bituminous		
		Lignite		
		Sub-bituminous		
Igneous				
	Plutonic			
		Granitic		
			Alkalli-feldspar-granite	
				Alkali-granite
			Granite	
				Monzogranite
				Syenogranite
			Granodiorite	
			Leucocratic-granitic	
				Alaskite
				Aplite
				Pegmatite
				Quartz-rich-granitoid
			Tonalite	
				Trondhjemite
		Charnockite		
		Syenitic		
			Alkali-feldspar-syenite	
			Monzonite	
			Quartz-alkali-feldspar-syenite	
			Quartz-monzonite	
			Quartz-syenite	

APPENDIX 1. LITHOLOGIC DATA DICTIONARY (CONT.)

Lith1	Lith2	Lith3	Lith4	Lith5
Igneous	Plutonic	Syenitic	Syenite	
		Dioritic		
			Diorite	
			Monzodiorite	
			Quartz-monzodiorite	
			Quartz-diorite	
		Gabbroic		
			Gabbro	
				Gabbronorite
				Norite
				Troctolite
			Monzogabbro	
			Quartz-gabbro	
			Quartz-monzogabbro	
		Anorthosite		
		Ultramafic		
			Hornblendite	
			Peridotite	
				Dunite
				Kimberlite
			Pyroxenite	
		Foidal-syenitic		
			Foid-syenite	
			Cancrinite-syenite	
			Nepheline-syenite	
			Sodalite-syenite	
		Foidal-dioritic		
		Foidal-gabbroic		
		Foidolite		
		Melilitic		
		Intrusive-carbonatite		
	Hypabyssal			
		Felsic-hypabyssal		
			Hypabyssal-dacite	
			Hypabyssal-felsic-alkaline	
			Hypabyssal-latite	
			Hypabyssal-quartz-latite	
			Hypabyssal-quartz-trachyte	
			Hypabyssal-rhyolite	
			Hypabyssal-trachyte	
		Mafic-hypabyssal		
			Hypabyssal-andesite	
			Hypabyssal-basalt	

APPENDIX 1. LITHOLOGIC DATA DICTIONARY (CONT.)

Lith1	Lith2	Lith3	Lith4	Lith5
Igneous	Hypabyssal	Mafic-hypabyssal	Hypabyssal-basaltic-andesite	
			Hypabyssal-mafic-alkaline	
		Lamprophyre		
	Volcanic			
		Alkalic-volcanic		
			Basanite	
			Foidite	
			Phonolite	
		Felsic-volcanic		
			Dacite	
			Latite	
			Quartz-latite	
			Quartz-trachyte	
			Rhyolite	
			Trachyte	
		Mafic-volcanic		
			Andesite	
			Basalt	
			Basaltic-andesite	
		Ultramafic		
			Komatiite	
			Picrite	
Metamorphic				
	Amphibolite			
	Eclogite			
	Gneiss			
		Biotite-gneiss		
		Calc-silicate-gneiss		
		Hornblende-gneiss		
		Muscovite-gneiss		
	Granoblastic			
		Granofels		
		Hornfels		
	Granulite			
	Hydrothermally-altered			
		Greisen		
		Keratophyre		
		Skarn		
		Spilite		
	Metaigneous			
		Greenstone		
		Metaintrusive		
			Metaanorthosite	
			Metadiabase	
			Metadiorite	
			Metagabbro	

APPENDIX 1. LITHOLOGIC DATA DICTIONARY (CONT.)

Lith1	Lith2	Lith3	Lith4	Lith5
Metamorphic	Metaigneous	Metaintrusive	Metagranite	
			Metaultramafic	
				Metadunite
				Metaperidotite
				Metapyroxenite
		Metavolcanic		
			Metarhyolite	
			Metadacite	
			Metaandesite	
			Metabasalt	
		Orthogniess		
		Serpentinite		
	Metasedimentary			
		Calc-silicate-rock		
		Metacarbonate		
			Marble	
		Metaclastic		
			Argillite	
			Metaconglomerate	
			Metasandstone	
				Metagraywacke
			Metasiltstone	
			Pelitic-schist	
			Phyllite	
			Quartzite	
			Slate	
		Paragneiss		
	Migmatite			
	Schist			
		Amphibole-schist		
		Calc-silicate-schist		
		Mica-schist		
			Biotite-schist	
			Muscovite-schist	
		Quartz-feldspar-schist		
Tectonite				
	Cataclastite			
	Mylonite			
		Phyllonite		
	Mélange			
Water				
Ice				
Indeterminate				

APPENDIX 2. LITHFORM DATA DICTIONARY

Lith1	Lithologic form		Lith1	Lithologic form
Unconsolidated			Igneous	
	Alluvial			Batholith
	Beach			Diabase
	Bed			Dike or sill
	Colluvial			Dome
	Eolian			Flow
	Eolian, loess			Flow, pillows
	Estuarine			Laccolith
	Flow, mass movement			Mélange
	Fluvial			Pluton
	Glacial			Pyroclastic
	Glacial, drumlin			Pyroclastic, air fall
	Glacial, esker			Pyroclastic, ash-flow
	Glacial, outwash			Pyroclastic, cinder cone
	Glacial, rock glacier			Pyroclastic, tuff
	Glacial, till			Stock or pipe
	Lacustrine			Volcaniclastic
	Landslide			Volcaniclastic, lahar
	Mass wasting			Volcaniclastic, volcanic breccia
	Solifluction		Metamorphic	
	Swamp			Amphibolite
	Tailings			Amphibolite, epidote-amphibolite
	Terrace			Eclogite
	Terrace, marine			Blueschist
	Terrace, stream			Granulite
Sedimentary				Greenschist
	Bed			Hornfels
	Calcareous			Hornfels, biotite
	Carbonaceous			Hornfels, hornblende
	Coquina			Hornfels, pyroxene
	Deltaic			Hornfels, sanidine
	Dome			Zeolitic (prehnite-pumpellyite)
	Glauconitic		Tectonite	
	Lens			Mélange, blocks
	Mélange			Mélange, matrix
	Olistrostrome		Water	
	Reef			Lake, stream, or ocean
	Tuffaceous		Ice	
				Mass

APPENDIX 3. ANCILLARY TABLES: SETLIST, AKREFS, ALASKAQUADS, REGION_CODES

Briefly described here are several ancillary FileMaker Pro databases or tables that are linked behind the scenes to some of the derivative databases. SETLIST provides the data dictionary for the SETTING database in table 12.

Table A3-1 Setlist data dictionary

Setval	Setting	Subset1	Comment
20	Sedimentary, continental		Mostly nonmarine/terrigenous clastic sediments with varying amounts of conglomerate; redbeds; evaporites
30	Sedimentary, deltaic-and-nearshore		Mostly nonmarine/terrigenous or marginal marine clastic sediments with varying amounts of coal; conglomerate
50	Sedimentary, shallow-marine-siliciclastic		Mostly siliciclastic marine sediments with minor carbonates
40	Sedimentary, carbonate		Mostly shallow marine carbonates with varying amounts of clastic sediment; evaporites
60	Sedimentary, slope-and-deep-water		Shale, graywacke, bedded chert; slope carbonates, clastic- or carbonate-sediment gravity flow deposits (turbiditic rocks)
0	Undivided		Combinations of any of the above
30	Sedimentary, deltaic-and-nearshore	Fluvial	
30	Sedimentary, deltaic-and-nearshore	Deltaic with coal	
20	Sedimentary, continental	Redbeds with evaporites	Redbeds, quartz arenite, conglomerate, evaporites; Quartzite, metaconglomerate
20	Sedimentary, continental	Evaporites with redbeds	
40	Sedimentary, carbonate	Reef	
40	Sedimentary, carbonate	Carbonate shelf	
60	Sedimentary, slope-and-deep-water	Trench-fill	
60	Sedimentary, slope-and-deep-water	Abyssal-plain	
70	Sedimentary, marine, shallow to deep association, undivided		Limestone, dolostone, shale, evaporites, chalk, carbonate reefs, shale, chert, iron formation, greywacke, turbidites, argillaceous limestone; marble, dolomitic marble, calcsilicate, aluminosilicate schist and gneiss, paragneiss, anhydrite, sulphidic and graphitic paragneiss, argillite, meta-greywacke
210	Intrusive, undivided		Plutonic rocks, intrusive complex, batholith
110	Extrusive, undivided		Most hypabyssal rocks are here
400	Metamorphic, undivided		Schist, gneiss, migmatite, diatexite, tectonite, mylonite, granulite
300	Mélange		Tectonic assemblages, mélange, polymict breccia in accretionary wedge complex
350	Impact structure		Impact breccia, lacustrine crater fill, impact melt rocks

Table A3-1 Setlist data dictionary (cont.)

Setval	Setting	Subset1	Comment
10	Sedimentary, undivided		Sandstone, siltstone, shale, limestone; undivided; Psammo-pelitic rocks, paragneiss, semi-pelite, marble, undivided
100	Igneous, undivided		Igneous complex; undivided volcanic and subvolcanic rocks
120	Extrusive, alkalic		Trachyte, phonolite, carbonatite lavas, leucocratic volcanic rocks, extrusive kimberlite
130	Extrusive, felsic		Rhyolite flows; felsic tuff, and related volcaniclastic or pyroclastic rocks
140	Extrusive, intermediate		Dacite, latite, andesite, rhyolite flows and related volcaniclastic or pyroclastic rocks
150	Extrusive, mafic		Basalt, olivine basalt, tholeiitic basalt, alkali basalt, basanite, pillow basalt, flood basalt
160	Extrusive, ultramafic		Komatiite, nephelinite, picrite, basalt
220	Intrusive, granite		Granite; monzogranite, quartz monzonite; leucogranite
230	Intrusive, tonalite-granodiorite		Monzonite, quartz monzonite, granodiorite, diorite, tonalite
240	Intrusive, gabbro		Gabbro, diabase, norite, diorite, tonalite
250	Intrusive, peridotite		Pyroxenite, peridotite, dunite, harzburgite, wherlite, gabbro
260	Intrusive, anorthosite		Anorthosite, gabbroic anorthosite, anorthosite suite
270	Intrusive, syenite		Syenite, lamprophyre, minette, foid syenite, carbonatite, intrusive kimberlite
80	Sedimentary, evaporite association		Salt, anhydrite, gypsum, dolostone
90	Unconsolidated		Surficial deposits of all types
280	Intrusive, kimberlite		Kimberlite, lamproite
290	Intrusive, carbonatite		Carbonatite
1	Undetermined		Poorly or undescribed units
105	Mixed volcanic and sedimentary rocks		Generally sedimentary and subordinate volcanic rocks
410	Metasedimentary, low-grade		Argillite, phyllite
420	Metasedimentary, high-grade		Schist, gneiss
430	Metaigneous, low-grade		Greenstone
440	Metaigneous, high-grade		Amphibolite
460	Metaigneous and metasedimentary, high-grade		Schist, gneiss, amphibolite
450	Metaigneous and metasedimentary, low-grade		Argillite, phyllite, greenstone

AKrefs

The table contains reference citations tied to NSAREFS, RADIOMETRIC, and U-PB tables.

Table A3-2. AKrefs field definitions

	Field name	Information type	Field type	Links
1	*AKrefs_ID*	Unique number assigned upon database entry	Number	
2	*Author*	Authors of the report	Text	
3	*Year*	Year of publication	Text	
4	*Title*	Title of publication	Text	
5	*Publisher*	Publisher or journal and pages	Text	

Alaskaquads

This table can be used to facilitate area searches of the database through a link to the NSAUNITS data table. Because the .dbf 8.3 convention, the dbf version is named AKquads.dbf

Table A3-3. Alaskaquads field definitions

	Field name	Information type	Field type	Links
1	*State*	Indicates Alaska, Hawaii, Yukon and some Northwest Territory of Canada (NWT) or	Text	
2	*Quad*	1:250,000-scale quadrangle name	Text	
3	*UTM*	UTM zone of quadrangle	Number	
4	*Quadcode*	Two or three letter code for quadrangle; Alaska and Hawaii are 2 letters, Yukon and NWT have Y and N added, respectively	Text	
5	*N_Latitude*	Northern latitude of quadrangle	Number	
6	*S_Latitude*	Southern latitude of quadrangle	Number	
7	*W_Long*	Western longitude of quadrangle	Number	
8	*E-Long*	Eastern longitude of quadrangle	Number	

Region_codes

The table contains is used in GEN_STATE_LINK to indicate the region or regions in which a map unit appears. Export versions are named region.csv and region.dbf.

Table A3-4. AKrefs field definitions

	Field name	Information type	Field type	Links
1	*Region*	A two-letter code defining the region	Text	
2	*Name*	Name given to loosely defined region	Text	
3	*Region_ID*	Numeric and letter code that defines a region hierarchy (for example region 3A has subsets of 3B and 3C)	Text	GEN_STATE_LINK