Digital spatial data for the Geologic Map of Arizona

Edited by

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BACKGROUND

The data presented here were compiled and edited during the production of a revision of the geologic map of Arizona [Richard et al., 2000]. The compilation and development of the databases accompanying the geographic datasets occurred during a transition in database structure for geologic datasets at the Arizona Geological Survey. The data structure here is logically equivalent to that described by Richard and Orr [2001], and the user should study that document to understand the Microsoft Access databases included in this dataset. This report summarizes the differences between the data included here and the data structure described in Richard and Orr [2001].

SPATIAL DATA

Geologic Spatial Data

Geologic Coverages

Geologic contacts, faults, and polygon identification are all contained in one Arc/Info coverage named 'geology'. This coverage is included as an Arc/Info export file (.e00 format) and as a coverage. The geology coverage is located in an Arc/Info workspace named 'coverages'. This is a Windows directory with an info subdirectory managed by Arc/Info. On Windows NT workstations, the coverage should be accessible on the CDROM from Arc/Info. If the entire directory 'DI8v3_0', with all its sub directories is copied from the CD to the root directory of a disk volume (e.g. d:/Di8v3_0), the coverage should also be readable. To relocate the coverage to directories not at the root of the volume, import the coverage from the e00 file to the desired workspace. The structure of the geology coverage is the same as that described in Richard & Orr [2000].

There is no point coverage (pnt.pat of Richard and Orr [2000]) with this dataset.

Geologic Shapefiles

This database includes a polygon shape file (geopolys.shp) that is derived from the polygons in the geology coverage. Attributes are identical to those in geology.pat. The shape file geolines.shp is derived from the arcs in the geology coverage. Attributes are identical to those in geology.aat.

This publication includes two other shapefiles that contain geologic data. These are 'depthToBedrock.shp' and RockSurfPolys.shp.

Depth to bedrock.

This shapefile contains contours for estimated depth to bedrock. The contours are based on the map of Oppenheimer and Sumner [1980], edited based on additional data from Saltus and Jachens [1995], and several other sources. The feature-level tracking records for the contours contain citations for the source of each contour.

Compilation method

Production of this data set began with a digitized version of Oppenheimer and Sumner's [1980] depth to bedrock map. Only the location of contours for depths greater than or equal to 400 feet was used. The well locations and depths shown on Oppenheimer and Sumner [1980] were correlated with the Arizona Oil and Gas commission database of oil and gas wells, using location and total depth of the wells (the value that is posted on Oppenheimer and Sumner [1980]). Other unidentified wells are from data posted on the Oppenheimer and Sumner [1980] map. Oppenheimer [1980] reports that data for these wells is

from well logs in U.S. Geological Survey files. Data from additional wells not included in the Oppenheimer and Sumner [1980] data set were added. Data for these wells are from the Oil and Gas well database and files of the Arizona Oil and Gas Commission, from various hydrologic reports, and from the compilation by Peirce and Scurlock [1972].

The basin depth map from Saltus and Jachens [1995] (Map C) was scanned at 150 dpi, and georeferenced to overlay with the other data sets. The color scheme in this scanned image was simplified by selecting five ranges of similar color (yellow, green, blue, dark blue, magenta) and assigning all pixels within each range to a single color. The colors on the resulting image are only qualitatively indicative of calculated basin depth, approximately correlating with the 400, 800, 1600, 3200 contours of Oppenheimer and Sumner [1980].

These data were superimposed on a digital version of Reynolds [1988] Geologic Map of Arizona, and the contours from Oppenheimer and Sumner [1980] were revised or, in places, replaced with new interpretations based on all the available information. In most cases, the depths interpreted along the gravity profiles of Oppenheimer and Sumner were not modified. The greatest changes are in the interpretation of basin geometry away from the gravity profiles, where the Saltus and Jachens [1995] data set was considered the best indication of subsurface geometry. Other modifications were made where bedrock outcrops were intersected by contours showing significant basin depth. Interpretation of the basin geometry for the Mesquite basin and Chino Valley were taken from published maps by Bohannon et al. [1993] and Ostenaa et al. [1993] respectively.

Discussion

A clear definition of bedrock is necessary in order to make a depth to bedrock map. Oppenheimer and Sumner [1980] defined bedrock as "rock having a density of greater than 2.67 g/cc underlying material having a density less than 2.67 g/cc" [Oppenheimer, 1980]. Oppenheimer [1980] argues that although the density of basin fill increases with depth, it "does not approach" the average density of bedrock (2.67 g/cc), and thus the density definition of bedrock does not differ greatly from the geologic definition of bedrock.

The Saltus and Jachens [1995] basin depth map was developed as part of an effort to develop a map showing gravity variations caused by density variations in pre-Cenozoic "basement". The bottom of the basins depicted on their map (i.e. 'bedrock') is apparently defined as pre-Cenozoic rock. Thus, basins depicted on the Saltus and Jachens [1995] map include accumulations of volcanic rock that are considered bedrock on the Oppenheimer and Sumner [1980] map. This difference in interpretation produces the obvious discrepancies between the maps in the Castle Dome Mountains, Ajo area, Superstition Mountains, and Peloncillo Mountains (among others). The basins shown by Saltus and Jachens [1995] in the Mohon Mountains, San Francisco Peaks area, and White Mountains are also thought to be due to Tertiary volcanic rocks.

Many basins contain interbedded volcanic rocks, and these present one of the greatest challenges for defining bedrock. In some cases, such as the San Bernardino and Sentinel volcanic fields, young basalt lavas apparently cover older basins that are similar in other respects to basins without the young volcanic cover. In these cases, geologic bedrock is the indurated and denser rock that underlies sedimentary rock of the basin fill. The Tertiary geologic history of the basin and range includes a major pulse of volcanism in late Oligocene and Miocene time that preceded or accompanied a major crustal extension event [Spencer and Reynolds, 1989]. Formation of many of the present basins is due to faulting subsequent to this volcanism and extension [Eberly and Stanley, 1978; Shafiqullah et al., 1980], but in some cases volcanic rocks are interbedded in the basin fill sequence.

In the Basin and Range province, the pre-basin fill geologic sequence typically consists of pre-Tertiary rocks, overlain by interbedded Oligocene and Miocene volcanic and sedimentary rocks that were intricately faulted and tilted during early Miocene extension. Erosion and sedimentation during the extensional deformation result in rapid changes in the thickness of Tertiary units [e.g. Dickinson, 1991]. In some parts of a basin, the Late Miocene and younger basin fill may be stratigraphically conformable with Early Miocene sedimentary and volcanic rocks, while on near by buried horst blocks, the Late Miocene and younger sequence may be considerably thinner and overlie Pre-Tertiary rocks directly.

In some basins (e.g. lower Gila River area, San Pedro Valley, Cienega Gap area), relatively thick, well indurated Oligocene-Early Miocene sedimentary sequences are present, and interpretation of these deposits as basin fill or bedrock is ambiguous. From a hydrologic point of view, such strata are more akin to bedrock. The density of these strata may also be quite close to that of the bedrock. However, in well log descriptions, it is quite difficult to distinguish these older, deformed strata from flat lying basin fill. The map presented in this report combines depth-to-bedrock interpretations based on density contrast and on interpretation of the contact between Tertiary sandstone and conglomerate and mostly Tertiary volcanic rocks or Pre-Tertiary rocks base on well log information.

Further refinement of this map will require a basin by basin analysis (see Ostenaa et al., 1993 for an example). Production of digital data sets would allow definition of the bedrock criteria used in different areas to be associated with the data. More refined modeling could be done using seismic and aeromagnetic data, as well as more sophisticated gravity modeling.

In basins close to the Transition zone, which are undergoing deep dissection, definition of depth to bedrock is further complicated by the fact that the thickness of basin fill may vary dramatically in different parts of the basin depending on the depth of dissection.

Table 1. Fields in geologic shape files

Shapefile Name	Type	Field Name	Data Type	Width	Lookup Tables
DepthtoBedrock.shp	Line	ObjectID	Integer	16	
		DataSetID	Integer	16	DataSetAZ
		TrackingID	Integer	16	DITrackingRecord
		TrackingDS	Integer	16	DataSetAZ
		ConceptID	Integer	16	GeoClassificationConcept
		ConceptDS	Integer	16	DataSetAZ
		CartoObjID	Integer	16	SysCartographicObject
		CartoObjDS	Integer	16	DataSetAZ
		Contour	Long Integer	8	
RockSurfPolys.shp	Polygon	Rock_surf	Character	8	

Bedrock shapefile

In order to simplify production of a simple bedrock vs. basin fill map, a shape file is included with only two map units, attributed in a single field in the data table associated with the shape file. This shape file is derived from the geology polygons shape file by reclassifying the polygons using the label field, joined with the mapunitgeneralizations.dbf table (using 'label' as the join field), and dissolving the contacts between polygons with the same label. The mapunitGeneralizations.dbf table is included in the 'Database' directory in the distribution directory, and is discussed in more detail below. This shapefile is included for convenience to construct a bedrock map view.

Cartographic Spatial Objects

Cartographic Lines Shapefile

The DI8CartoLines.shp shape file contains lines that locate decorations along thrust, detachment, and low-angle normal faults. This file is equivalent to the CartoLines shape file o f Richard and Orr [2001].

Cultural Spatial Data

In order to provide location reference information, several shape files containing political and cultural features are included in the database. These have all been obtained from the Arizona State Land Departments ALRIS system (http://www.land.state.az.us/alris/index.html), unprojected from UTM to decimal degrees. See the equivalent ALRIS coverage for metadata.

County boundaries

These are represented in a line ArcView shape file. The lines are derived from the ALRIS 'Counties' coverage, generalized with a grain of 100 m and unprojected to decimal degree coordinates. The shape file is named 'countyboundaries.dbf'.

Latitude-Longitude grid

A simple latitude-longitude grids was generated by selecting the 7.5' quadrangle boundaries that are located along 1 by 1 degree grid lines for latitude and longitude. The 7.5' quadrangle boundaries were extracted from the ALRIS coverage 'Quadgrid' to a line shape file. The lines so generated were unsplit, then generalized with a grain of 100 m to remove excess vertices along the paths to produce the shape file 'latlonggrid.shp'.

Shaded Relief map

The 'grids' directory contains 2 Arc/Info grid raster images of the shaded relief map of Arizona. The original version of this image was obtained from the USGS in Flagstaff, Arizona, georeferenced against the geologic map in Lambert Conformal Conic projection, converted from a TIFF file to an Arc/Info Grid, and adjusted to match the geologic map more precisely. The final grid ('shadedrelief') was adjusted for brightness and contrast to produce the grid 'shdreldmtltd', which was merged with the polygon colors to generate the image used for Map 35 [Richard et al., 2000]. These grids were unprojected to decimal degree coordinated for inclusion with this publication.

THEMATIC GEOLOGY DATABASE TABLES-MS ACCESS DATABASES

The included Microsoft Access2000 databases contain additional data pertaining the geology of Arizona and associated metadata. The included database is the current implementation of an evolving geologic information system at the Arizona Geological Survey [Richard and Orr, 2000]. The following section discusses the contents of the database included with the current version of DI-8. The data system is set up with several 'back-end' databases connected to a single 'front-end' database. The back-end databases tables populated with data, and nothing else. The front-end database contains no data, but includes all the queries, forms, and code modules that form the user interface. Table 2 lists the backend databases.

Table 2. Microsoft Access Database files included with this publication

Database Name	Content
DI8V3.mdb	Data tables for data specific to this publication
DI8V30FrontEnd.mdb	This database file contains forms and queries for the user interface to the data tables.
MetadataInfrastructure.mdb	Contains metadata tables
GeoscienceInfrastructure.mdb	Contains basic geoscience tables
CartographyInfrastructure.mdb	Contains tables for defining map symbolization

AzRockUnitLexicon.mdb	Contains rock unit definitions.
AzDataCatalog.mdb	Contains the DataSetAz table

Note that the DI8v3.mdb and DI8V30FrontEnd.mdb are the only database files that are specific to this publication. The infrastructure and lexicon databases are common to all AZGS geologic map database publications, and the most recent version of these databases may be shared with all other local database datasets at a single site.

Using the databases

Before using the system, the databases the AZ_NADMmirror directory and all the databases in it should be copied to a local hard drive. Although the database will work if the back-end databases are on a remote (network) hard drive, performance is severely degraded in this situation. The DI8database.mdb and the AzFrontEnd.mdb files can be copied to this same directory, or to any directory. The AzFrontEnd.mdb database should be opened, and the Switchboard form will be activated. Follow this procedure to update the links to the back-end tables:

1. Click on the 'update table links' button.
2. Click the button labeled 'Yes' when the dialog box appears asking "Are you sure you want to reconnect all Access tables?"
3. Click the button labeled 'Yes' when the dialog box appears asking "Do you wish to specify a different path for the Access Tables?"
4. An open-file dialog will appear with the title "Please select a new data source". Navigate to the AzNADMmirror directory and select any one of the databases in the directory.
5. If a dialog box titled "Table not found" appears, note the name of the table, and click the button labeled 'OK'.
6. Click the button labeled 'Yes' when the dialog box appears asking, "Do you wish to delete existing DI-specific table links and link to a new DI database?"
7. A dialog box titled "Alternate source for DI database..." should appear, with the message "Next, select the new source DI database". Click the button labeled "Yes". If you click the button labeled "No" at this point, only the infrastructure back-end database tables will be linked, but no local geologic database.
8. An open-file dialog will appear with the title "Please select a new DI data source". Navigate to the directory that contains the DI8v3.mdb and select 'DI8v3.mdb', and click the button labeled 'OK'.
9. A dialog with the title "Success" should appear. Click the only button, which is labeled "OK".

If there is a problem executing the update link routine, the table links may be updated using Microsoft Access's 'Linked Table Manager', available through the 'Tools/Database Utilities/Linked Table manager' menu item. In some Access installations, the Linked Table Manager is not installed, and Access will ask if you wish to install the component. You will need to do this in order to update the table links manually. Installation of the Linked Table Manager will require the original MS Access installation disk.

Once the Linked table manager is started, a dialog box appears with the names of all linked tables in the database. Choose one of the back-end databases to start with. Click in the check box next to each table whose source is in that database, then click the button labeled 'OK', and Access should present a dialog box announcing "All selected tables were successfully updated". Work through this process with each back-end database. Check to make sure that the connection paths that appear for the tables are correct for your machine.

Before starting to use the database, check that all the necessary component references are connected so that visual Basic code runs correctly. See the notes below in the module section.

Note: in the following sections, the variable %DI8Root% should be replaced with the full path for the location of the 'DI8v3_0' directory from the CDROM. The variable %Az_NADMRoot% should be replaced with the full path for the location of the 'AZ_NADMMirror' directory from the CDROM.

Tables local to this database

Table: DI8ClassificationConcept

This is a linked table connected to the local classification concept table in the local database (DI8ClasificationConcept in this case). The structure of the table is identical to that described for classification concepts in Richard and Orr [2001]. The table currently contains definition of the map legends, map views, and data processing method for DI-8.

Properties
Attributes: Linked
Connect: ;DATABASE=%DI8Root%\Databases\DI8V3.mdb
Source Table Name: DI8ClassificationConcept

Table: DI8HierarchyRelationship

This table contains links between object in the DI8ClassificationConcept table and the transitive closure of all records it is linked to by parent of relationships. The structure is identical to that described for HierarchyRelationship table in Richard and Orr [2001] except the relationship type identifier link is named 'HierarchyTypeID/HierarchyTypeDS' in that publication and 'RelTypeID/RelTypeDS' in this database.

Table: DI8MapLegend

The database map legend table is part of the map view definition scheme described in Richard and Orr [2001]. A MapLegend table is a relationship table that correlates symbols with concepts the symbols represent on the map. The MapLegend table also provides information to structure the presentation of the legend in the collar of the map view—the order to display the symbols, and the text to associate with the symbols to explain their meaning to the user viewing the map. The legend table in this publication is identical to that described in Richard and Orr [2001]

Properties
Attributes: Linked
Connect: ;DATABASE=%DI8Root%\Databases\DI8V3.mdb
Source Table Name: DI8MapLegend

Table: DI8MapUnit

This table defines local rock classification units used to classify polygons in the Geology coverage in this database. Table structure is based on that described in Richard and Orr [2001]. An additional pair of fields named TypeID & TypeDS is the foreign key to the GeoscienceClassificationConcept table, and specify the kind of map unit represented. Values in this field are taken from the geoscienceClassification-Concept table. Some additional field name differences are noted in the table below.

Properties
Attributes: Linked
Connect: ;DATABASE=%DI8Root%\Databases\DI8V3.mdb
Source Table Name: DI8GeologicUnit

Table 3. Fields in DI8GeologicUnit table.

Name	Type	Size	Description
AzGeoUnitID	Long Integer	4	Field is named MapUnitID in Richard and Orr [2001]
DataSetID	Long Integer	4	
MapLabel	Text	50	
Name	Text	128	
Definition	Memo	-	Field is named Description in Richard and Orr [2001]. This is the explanatory text that appears in the map collar. The default value is the concept definition for the concept associated with the symbol.
TypeID	Long Integer	4	Map unit type; currently this is 2406 for rock volume unit. Addition of a RankID/RankDS field is under consideration
TypeDS	Long Integer	4	
TrackingID	Long Integer	4	
TrackingDS	Long Integer	4	
OriginDate	Date/Time	8	Date map unit definition was entered in database.

Table: DI8SimpleRelationship

This table contains semantic links between data objects in that are local to this database. Table 3 lists the relationship types that are instantiated in the current version of this database. Most of the relationships included are links between tracking records and bibliographic citation. Other relationships present include ordered aggregation of data processing steps, and topological links between an arc and the polygons on its right and left side. Fields in the table are the same as in the SimpleRelationship table described in Richard and Orr [2001].

Properties
Attributes: Linked
Connect: ;DATABASE=%DI8Root%\Databases\DI8V3.mdb
Source Table Name: DI8SimpleRelationship

Table 4. Values for DI8SimpleRelationship relation-
ship types.

RelTypeID	RelTypeDS	Concept Name
6	519	Bedrock Distribution Map Direct Symbolization Relationship
2535	435	Tracking record - citation link
2748	519	MS Access Database Construction
2764	519	No processing
2800	519	Construct tracking records for DI8 v3 arcs and polygons
2818	519	Polygon identification used to attribute digital data
2820	519	Direct on screen generalization and digitization, 100K DRG
2827	519	Direct generalization of digital geologic map
2831	519	On screen edit, DRG base, reference to published map
2834	519	Reconcile sources at boundaries of update areas
2838	519	Digitize from scanned & georeferenced published map
2846	519	Original Digital Version of AZGS Map 26
2854	519	Compilation of 100K digital geology
2860	519	Convert Graphics File to Arc coverage and use for update
3423	435	Arc- right-side polygon link relationship
3424	435	Arc- left-side polygon link relationship

Table: DI8TrackingRecord

This table contains feature-level metadata link for data objects in this database. Structure is identical to the TrackingRecord table described in Richard and Orr [2001].

Infrastructure tables

Table: _azGeoBibCite

This table is imported from the Arizona Geological Survey bibliographic database [Trapp et al., 1996], and includes compound key fields and a citation field. The text string in the citation field is that is concatenation of the author, date, title, and citation fields from AzGeoBib. The key field (RefNum) is identical to AzGeoBib for values <22000. Records with RefNum >22000 have been added to this table, but may not have been added to AzGeoBib.

Table 5. Fields in _azGeoBibCite table.

Name	Type	Size	Description
REFNUM	Long Integer	8	Key, first part
DataSetID	Long Integer	4	Key, second part; constant = 4, Dataset ID for AZgeoBib
cite	Text	255	Citation (Author, data, title, citation)

Table: Activities

Table in MetaDataInfrastructure, links a person, an organization, and a project with a name, comment, start and end date. Name is used to label the record in pick lists. Convention is to put person's initials in capital letters as beginning of name. The start date is the earliest date the Activity is considered valid, and the EndDate is the latest date the Activity is valid. These are used for integrity checking, and to filter the pick lists on forms such that only active activities are available as choices. One integrity constraint is that the PersonOrg, Project must both be active during the duration represented by the Activity.

Table 6. Fields in Activities Table

Name	Type	Size	Description
ActivityID	Long Integer	4	Compound Key, part 1, unique to this table
DataSetID	Long Integer	4	Compound Key, part 2, unique to this dataset
Name	Text	255	
Comment	Memo	-	Any text pertinent to activity.
PersonOrgID	Long Integer	4	Link to Person-Organization link; represents a person under the auspices of an organization
PersonOrgDS	Long Integer	4	Link second part
ProjectID	Long Integer	4	Link to a project that provided funding an motivation for the activity
ProjectDS	Long Integer	4	Link, second part
StartDate	Date/Time	8	
EndDate	Date/Time	8	

Table: Color

This table is linked from the cartographyInfrastructure.mdb database. It associated a Color key (ID and DS) with a name for the color, and RGB values for its representation.

<u>Properties</u>
Attributes: Linked
Connect: ;DATABASE=%AZ_NADMROOT%\cartographyInfrastructure.mdb
Source Table Name: Color

Table 7. Fields in Color table

Name	Type	Size	Description
ColorID	Long Integer	4	First part of primary key, unique identifier in this table
DataSetID	Long Integer	4	
Name	Text	255	
CMYK	Text	25	
RGB	Text	25	String "R G B" where R, G, and B are the numeric values at text
R	Integer	2	Red value, between 0 & 255
G	Integer	2	Green value, between 0 & 255
B	Integer	2	Blue value, between 0 & 255.

Table: DataSetAZ

This is the catalog of data files for the Arizona Geological Survey. Any new dataset must have an entry in this table. The identifier from this table, 'DatasetID' becomes the second part of the compound key for records in that dataset. This table is identical to the DataSetAz table described in Richard and Orr [2001], except for the addition of a field named CurrentMaxID. This field stores the current maximum value for unique identifier field (Primary key, part 1) for the dataset. This value is used to ensure that the primary key for each table is unique, even when multiple copies of the front-end database are accessing the backend tables. One copy of the DataSetAz table is maintained in a public directory. The forms interface implementation for all front-end instances looks up the current maximum ID value and increments the value when new records are inserted.

Table: Extents

This table is a metadata table that stores information about spatial dataset extents.

<u>Properties</u>
Attributes: Linked
Connect: ;DATABASE=%AZ_NADMROOT%\MetaDataInfrastructure.mdb
Source Table Name: Extents

Table 8. Fields in Extent table

Name	Type	Size	Description
ExtentID	Long Integer	4	Primary Key, part 1
DataSetID	Long Integer	4	Primary Key, part 2
ExtentTypeID	Long Integer	4	Link to MetaDataClassificationConcept that specifies kinds of map extents. Currently not populated
ExtentTypeDS	Long Integer	4	
Name	Text	50	Name of map extend
Description	Memo	-	
LatMin	Single	4	Lat and long for bounding box
LatMax	Single	4	
LongMin	Single	4	
LongMax	Single	4	
ExtSpaObjID	Long Integer	4	Link to spatial object that delineates the extend. Typically should link to AZGS map index dataset.
ExtSpObjDS	Long Integer	4	

Table: geoClassificationConcept

Classification concept table for geoscience concepts used in all AZGS databases. Structure identical to ClassificationConcept table documented in Richard and Orr [2001]. The ParentID field is used to establish a single-inheritance hierarchy of concepts.

Table: GeographicDataSetInfo

This table specifies the extent, map projection, and numerical precision for a spatial dataset. The extent and projection are specified via links (ID/DatasetID) to the Extent and Projection tables.

<u>Properties</u>
Attributes: Linked
Connect: ;DATABASE=%AZ_NADMROOT%\MetaDataInfrastructure.mdb
Source Table Name: GeographicDataSetInfo

Table 9. Fields in GeographicDataSetInfo table.

Name	Type	Size	Description
GDataSetID	Long Integer	4	Primary Key, first part, is DataSetID link to DataSetID in DataSetAz table. Only spatial datasets have an associated GeographicDataSetInfo table
Namespace	Text	50	The name of the NameSpace that manages the geographic dataset. See discussion of universal identifier scheme in Richard and Orr [2001]
ExtentID	Long Integer	4	Link to Extent table. Specifies extent that contains data represented in dataset.
ExtentDS	Long Integer	4	
ProjectionID	Long Integer	4	Link to Projection table, specifies projection for dataset
ProjectionDS	Long Integer	4	
Comment	Memo	-	
Resolution	Single	4	Spatial resolution of dataset; smallest allowed distance between points in dataset (in meters)
NumericalPrecision	Long Integer	4	Number of significant digits in numerical representation of coordinates in dataset.

Table: geoHierarchyRelationship

This is a hierarchy type relationship table [Richard and Orr, 2001] that specifies the parent-child links for geoscience concept instances. At present, the only hierarchy represented is the GeoscienceClassificationConcept hierarchy. This hierarchy table is constructed based on the ParentID links in the geoscienceClassificationConcept table. The procedure 'RebuildHierarchyTable' in the AZNADM utilities module included with the database must be run to update the hierarchy table when the parent-child links in the ClassificationConcept table are edited. This procedure should not be run on the infrastructure tables because the database will then be different from the authoritative copy at the Arizona Geological Survey. Carefully study and understand the code **before** attempting to use it to construct other hierarchies! Structure of this table is identical to that described in Richard and Orr [2001]

<u>Properties</u>
Attributes: Linked
Connect: ;DATABASE=%AZ_NADMROOT%\GeoscienceInfrastructure.mdb
Source Table Name: geoHierarchyRelationship

Table: GraphicLine

The **GraphicLine** table contains descriptions of the graphical elements used to symbolize lines. This description is implementation dependent, and is based on attributes used to define line symbols in ArcView 3.2 and Adobe Illustrator. Structure of the table is identical to that described in Richard and Orr [2001].

<u>Properties</u>
Attributes: Linked

Connect: ;DATABASE=%AZ_NADMROOT%\cartographyInfrastructure.mdb
Source Table Name: GraphicLine

Table: GraphicLineOrnamented

The **GraphicLineOrnamented** table contains descriptions of symbols used to create ornamented lines (e.g. queries dashed lines, thrust faults). This description is implementation dependent, and is based on attributes used to define line symbols in ArcView 3.2 running in a Microsoft Windows environment. Structure of the table is identical to that described in Richard and Orr [2001].

<u>Properties</u>
Attributes: Linked
Connect: ;DATABASE=%AZ_NADMROOT%\cartographyInfrastructure.mdb
Source Table Name: GraphicLineOrnamented

Table: GraphicPattern

The **GraphicPattern** table defines the graphical specifications for polygon fills in the default symbolization. Structure of the table is identical to that described in Richard and Orr [2001].

<u>Properties</u>
Attributes: Linked
Connect: ;DATABASE=%AZ_NADMROOT%\cartographyInfrastructure.mdb
Source Table Name: GraphicPattern

Table: GraphicPatternDefinition

The **GraphicPatternDefinition** table defines graphical building blocks for constructing pattern fill symbols. Structure of the table is identical to the PatternDefinition table described in Richard and Orr [2001]. The name of the table has been changed to group all the implementation-dependent graphical object definition tables.

Table: localDataSetAZ

This is a read-only copy of the DataSetAZ table that is made as part of the OpenForm procedure for the Switchboard form. It is used for lookup functions from other procedures in order to speed up form performance by avoiding network lookups to the archival DataSetAz table. The Unload procedure for the Switchboard form will delete this table, so if the Swicthboard form is not open, the table should not be present.

Table: MapViewDefinition

The **MapViewDefinition** table defines a Title, Description, Extent, Projection, DesignScale, MapHorizon, and MapLegend to use for a particular MapView. A MapView is a collection of symbolized Spatial Objects within a bounded area (the Extent). The MapViewDefinition defines the mechanism for selecting spatial objects to display through a SpObjSelectType, and the mechanism for assigning symbols (CartographicObjects) to spatial features through a ViewSchemeType. This table may also specify a ClassificationScheme that assigns a geologic classification to spatial features, and a SymbolizationScheme that assigns CartographicObjects to spatial features if these are required. A SimpleRelationship dataset identified by CatalogLinksDatasetID contains links between the MapViewID and DataSetID's that specify where to find the MapLegend, ClassificationScheme, SymbolizationScheme, and SpatialObject datasets to be used in constructing the MapView. Each of these links has a type that is a subtype of 'MapView-ComponentLink'; the type determines the kind of dataset link being specified. Structure of this table is identical to that described in Richard and Orr [2001]

Table: MetaDataClassificationConcept

Classification concept table for metadata concepts used in all AZGS databases. Structure identical to ClassificationConcept table documented in Richard and Orr [2001]. The ParentID field is used to establish a single-inheritance hierarchy of concepts.

Table: MetaDataHierarchyRelationship

This is a hierarchy type relationship table [Richard and Orr, 2001] that specifies the parent-child links for metadata data instances. At present the only hierarchy represented is the metadataClassificationConcept hierarchy. This hierarchy table is constructed based on the ParentID links in the metadataClassificationConcept table. The procedure 'RebuildHierarchyTable' in the AZNADM utilities module included with the database must be run to update the hierarchy table when the parent-child links in the ClassificationConcept table are edited. This procedure should not be run on the infrastructure tables because the database will then be different from the authoritative copy at the Arizona Geological Survey. Carefully study and understand the code before attempting to use it to construct other hierarchies! Structure of this table is identical to that described in Richard and Orr [2001]

Table: MetaDataSimpleRelationship

This table is an instance of the SimpleRelationship type table documented in Richard and Orr [2001]. Table 9 lists the relationship types that are used in this version of DI8. Note that the processing method metadata classification concepts act as a relationship for ordered, simple aggregations of processing steps to define the actual sequence of actions that constitute the processing method. Field definitions are identical to those for SimpleRelationship table defined in Richard and Orr [2001]

Table 10. Relationship Types implemented in DI8v3.0 metadata simple relationship table.

RelTypeID	RelTypeDS	Name
2535	435	Tracking record - citation link
2537	435	Subject Tree Relationship
2733	435	Standard Compilation and Table Digitizing
2734	435	Standard Compilation, Scan, Heads up Digitize ArcEdit
2740	435	Tracking Log Entry - Entity Link
2763	435	Comment only
2768	435	AZ CordLink 5.2 implementation
2770	435	Citation and Note Only
2807	435	Import ALRIS to AZ Lambert
2836	435	Locate geologic contact based on hypsography
2842	435	Get Quaternary faults into Million-scale geologic map database

RelTypeID	RelTypeDS	Name
2859	435	Reconcile source conflicts during manual compilation
2864	435	Translate arcs
2898	435	GetUSGSDD14Lookups
3194	435	Use TreeViewHierarchy Tool to revise Hierarchy
3202	435	Convert AZGEOBIB keywords to dbf table
3262	435	TheoRoosDigitalCompilationV2
3264	435	FergusonReconcileSpencerGeneralization
3266	435	Digitize on Screen, From scanned Mylar
3268	435	SpencerReconcileSpencerGeneralization
3278	435	SpencerPhotoInterp
3280	435	SpencerGeneralization
3282	435	SpencerUnitCorrelation
3283	435	SpencerUnitPhotoInterp
3284	435	KnealeReconcileSpencerGeneralization
3285	435	Extrapolation
3289	435	Generalization
3290	435	OrrReconcileSpencerGeneralization
3292	435	MapUnitCorrelationAndDefinition
3293	435	RichardUnitCorrelation
3295	435	Copy digital data from existing data set
3297	435	AirPhotoInterpretation
3298	435	PearthreeUnitPhotoInterp
3299	435	RichardGeneralization
3300	435	RichardReconcileSpencerGeneralization
3301	435	SMRRoskrugeAttributeArcsInArcView
3308	435	Convert database to AZ NADM data structure
3373	435	PersonOrg-Activity link

Table: MetaDataTrackingRecord

The **metaDataTrackingRecord** table provides metadata to record the intellectual and physical sources for objects and data in the infrastructure databases, including GeoscienceInfrasrurcture.mdb, MetadataInfrastructure.mdb, and CartographyInfrastructure.mdb. The tracking record table defines links to tables that describe the processes and activities through which data was created, and through the associated SimpleRelationship table, a one-to-many link with citations in the _azGeoBibCite table. Structure of this table is identical to that described for TrackingRecord tables in Richard and Orr [2001].

Table: Name AutoCorrect Log

This is an internal table maintained by Microsoft Access to assist database maintenance.

Table: Organizations

This table contains definitions of corporate entities that have a name, some time interval of existence, and a location or contact point for the entity. Many individuals may be associated with a single organization. The organization may change names and maintain its identity. Links between different names for an organization are maintained through metadata simple relationships.

<u>Properties</u>
Attributes: Linked
Connect: ;DATABASE=%AZ_NADMROOT%\MetaDataInfrastructure.mdb

Source Table Name: Organizations

Table 11. Fields in Organization table.

Name	Type	Size	Description
OrganizationID	Long Integer	4	Primary key, first part
DataSetID	Long Integer	4	Primary key, second part
Name	Text	255	Name of organization
AddressID	Long Integer	4	Link to address data object for contact information
AddressDS	Long Integer	4	
Description	Memo	-	Description of the organization
OriginDate	Date/Time	8	Date of origination for organization
TerminationDate	Date/Time	8	Date on which organization ceased to exist.

Table: People

This table is a list of recognized persons who may be referred to in an AZGS database.

<u>Properties</u>
Attributes: Linked
Connect: ;DATABASE=%AZ_NADMROOT%\MetaDataInfrastructure.mdb
Source Table Name: People

Table 12. Fields in People table.

Name	Type	Size	Description
PersonID	Long Integer	4	Primary key, first part
DataSetID	Long Integer	4	Primary key, second part
Title	Text	32	Title for addressing person
FirstName	Text	64	
Initials	Text	32	
LastName	Text	128	
BioInfo	Memo	-	Biographical information describing person

Table: PersonOrg

This table is a relationship table that associates People with Organizations. An affiliation between a person and an organization has some original start date, before which the two entities were never affiliated. A person may terminate and reestablish affiliation with an organization many times. Termination of affiliation and re-establishment of affiliation are documented using metadataSimpleRelationship links (there are no instances of such relationships in this database).

<u>Properties</u>
Attributes: Linked
Connect: ;DATABASE=%AZ_NADMROOT%\MetaDataInfrastructure.mdb
Source Table Name: PersonOrg

Table 13. Fields in PersonOrg table.

Name	Type	Size	Description
PersonOrgID	Long Integer	4	Primary Key, first part
DataSetID	Long Integer	4	Primary Key, second part
PersonID	Long Integer	4	Link to Person (in People table)
PersonDS	Long Integer	4	
OrganizationID	Long Integer	4	Link to organization
OrganizationDS	Long Integer	4	
OriginalStart-Date	Date/Time	8	Date of first affiliation between person and organization
ContactInfoID	Long Integer	4	Link to contactInfo data object that specifies e-mail, telephone, and other means of contacting person. (not currently implemented)

Name	Type	Size	Description
ContactInfoDS	Long Integer	4	
AddressID	Long Integer	4	Mailing address for person at organization in this affiliation.
AddressDS	Long Integer	4	
Active	Yes/No	1	Yes if person is currently involved with activities associated with this organization. This is used to filter pick lists in the TrackingRecord form.

Table: Projection

This table defines map projections used for AZGS spatial data.

<u>Properties</u>
Attributes: Linked
Connect: ;DATABASE=%AZ_NADMROOT%\MetaDataInfrastructure.mdb
Source Table Name: Projection

Table 14. Fields in Projection table.

Name	Type	Size	Description
ProjectionID	Long Integer	4	Primary Key, first part
DataSetID	Long Integer	4	Primary key, second part
ProjectionName	Text	50	Name of projection
ellipsoid	Text	50	Name of ellipsoid used for projection
scale_factor	Double	8	
units	Text	50	
origin_lat	Double	8	
origin_long	Double	8	
false_east	Double	8	
false_north	Double	8	
parallel_1	Double	8	
parallel_2	Double	8	
radius	Double	8	
zone	Integer	2	
comment	Memo	-	

Table: Projects

This table lists projects that may sponsor 'Activities' (in the sense of the Activity table in this database). Projects may be linked to organizations that provide funding for the project. A project has a time interval during which it is active. Projects may have a link to an associated key word to classify the project.

<u>Properties</u>
Attributes: Linked
Connect: ;DATABASE=%AZ_NADMROOT%\MetaDataInfrastructure.mdb
Source Table Name: Projects

Table 15. Fields in Projects table

Name	Type	Size	Description
ProjectID	Long Integer	4	Primary key, first part
DataSetID	Long Integer	4	Primary key, second part
Project_title	Text	255	Name of project
FundingOrgID	Long Integer	4	Link to organization that is funding the project
FundingOrgDS	Long Integer	4	
StartDate	Date/Time	8	Date project was initiated
EndDate	Date/Time	8	Date after which project ceases to exist
Prj_comment	Memo	-	
Prj_subjectID	Long Integer	4	Link to subject keyword to classify project

Name	Type	Size	Description
Prj_subjectDS	Long Integer	4	
AbstractID	Long Integer	4	Link to text object that summarizes the project
AbstractDS	Long Integer	4	
TrackingID	Long Integer	4	
TrackingDS	Long Integer	4	

Table: sysCartoAttributedRelationship

This table is an instance of the AttributedRelationship type of relationship table described by Richard and Orr [2001]. In this database, it contains one kind of relationship-- CartographicObject-Graphic object aggregation (RelTypeID 3421, RelTypeDS 435). Instances of this relationship are links between a CartographicObject (implementation-independent representation of a graphical symbol) and the implementation-dependent graphical elements that are combined to form the symbol. For instance, a pattern fill has a background color (which may be transparent), and one or more superimposed patterns, which may be defined using a bitmap tile definition, or a vector tile definition. The CartographicObject-Graphic object aggregation orders the stacking of the graphical elements, starting with sequence = 0 at the bottom, and the attribute of the relationship is a link to a color instance (typically in the Color table) that is assigned to the graphical element. The classification confidence (Cconf), Classification basis (CBasis), and Number-Value are not populated for this relationship. The StringValue attribute of the relationship is populated with the name given to the graphical element in the link, but this is not required. Fields in the sysCartoAttributedRelationship table are the same as those described for the AttributedRelationship table in Richard and Orr [2001].

Properties
Attributes: Linked
Connect: ;DATABASE=%AZ_NADMROOT%\cartographyInfrastructure.mdb
Source Table Name: sysCartoAttributedRelationship

Table: sysCartoClassificationConcept

Classification concept table for cartography concepts used in all AZGS databases. Structure identical to ClassificationConcept table documented in Richard and Orr [2001]. The ParentID field is used to establish a single-inheritance hierarchy of concepts.

Properties
Attributes: Linked
Connect: ;DATABASE=%AZ_NADMROOT%\cartographyInfrastructure.mdb
Source Table Name: sysCartoClassificationConcept

Table: sysCartographicObject

This table specifies symbols used to represent occurrences on geologic maps. The cartographicObject definitions are meant to be implementation-independent. Different implementation-dependent graphicalObjects may be linked to cartographic objects to explicitly describe how the symbol is implemented in various environments, but these links are not necessary to identify the appropriate symbol.

Properties
Attributes: Linked
Connect: ;DATABASE=%AZ_NADMROOT%\cartographyInfrastructure.mdb
Source Table Name: sysCartographicObject

Table 16. Fields in sysCartographicObject table.

Name	Type	Size	Description
CartoObjID	Long Integer	4	Primary key, first part

Name	Type	Size	Description
DataSetID	Long Integer	4	Primary key, second part
Name	Text	255	Name of symbol
CartoObjTypeID	Long Integer	4	Link to sysCartoClassificationConcept that specifies the type of the symbol
CartoObjTypeDS	Long Integer	4	
GraObjID	Long Integer	4	If Null, then symbol is composite, and ordered aggregation of graphicalObjects describing the symbol is contained in sysCartoAttributedRelationship links for which the first role is the CartoObjID, second role is the GraObjID, and the Attribute object is a link to a color. If the symbol is simple, then GraObjID is link to graphical object in dataset specified by GraObjDS
GraObjDS	Long Integer	4	
ColorID	Long Integer	4	Null if GraObjID is null, otherwise is link to a color specification in table specified by ColorDS
ColorDS	Long Integer	4	
Comment	Memo	-	
TrackingID	Long Integer	4	
TrackingDS	Long Integer	4	
OriginDate	Date/Time	8	

Table: sysCartoHierarchyRelationship

This is a hierarchy type relationship table [Richard and Orr, 2001] that specifies the parent-child links for cartographic data instances. At present the only hierarchy represented is the cartographic ClassificationConcept hierarchy. This hierarchy table is constructed based on the ParentID links in the sysCartoClassificationConcept table. The procedure 'RebuildHierarchyTable' in the AZNADM utilities module included with the database must be run to update the hierarchy table when the parent-child links in the ClassificationConcept table are edited. This procedure should not be run on the infrastructure tables because the database will then be different from the authoritative copy at the Arizona Geological Survey. Carefully study and understand the code before attempting to use it to construct other hierarchies! Structure of this table is identical to that described in Richard and Orr [2001]

<u>Properties</u>
Attributes: Linked
Connect: ;DATABASE=%AZ_NADMROOT%\cartographyInfrastructure.mdb
Source Table Name: sysCartoHierarchyRelationship

Database Queries

Query: _GetAllParents

This is an example query that uses the geoHierarchyRelationship table, linked to the geoClassificationConcept table to list all the parent concepts linked to each concept. The SQL included here returns all the parent concepts of the concept with name like '*contact*'.

<u>SQL</u>
```
SELECT DISTINCT geoClassificationConcept.ConceptID, geoClassificationConcept.DataSetID,
geoClassificationConcept.Name, geoClassificationConcept.ParentID AS TypeID,
geoHierarchyRelationship.ParentID, geoClassificationConcept_1.Name AS ParentName
FROM geoClassificationConcept INNER JOIN (geoHierarchyRelationship INNER JOIN geoClassificationConcept AS
geoClassificationConcept_1 ON (geoHierarchyRelationship.ParentID = geoClassificationConcept_1.ConceptID) AND
 (geoHierarchyRelationship.ParentDS = geoClassificationConcept_1.DataSetID)) ON
(geoClassificationConcept.ConceptID = geoHierarchyRelationship.ChildID) AND
(geoClassificationConcept.DataSetID = geoHierarchyRelationship.ChildDS)
```

WHERE ((geoClassificationConcept.Name) Like "*contact*");

Table 17. Fields returned by GetAllParents Query.

Name	Type	Size	Description
ConceptID	Long Integer	4	Identifier for Concept
DataSetID	Long Integer	4	
Name	Text	255	Name of Concept
TypeID	Long Integer	4	Identifier for parent concept link in Concept record
ParentID	Long Integer	4	Identifier for concept that has Concept as a direct or indirect child.
ParentName	Text	255	Name of concept that has Concept as a direct or indirect child.

Query: _PersonOrg-ActivityQuery

Many PersonOrg instances may participate in a single activity, and a PresonOrg instance may participate in more than one activity. Therefore a correlation table is required to represent this many to many relationship. The MetaDataSimpleRelationship table is the correlation table, and RelTypeID 3373 identifies relationship instances in this table that are PersonOrg-Activity links. This query produces a simple correlation table that includes all PersonOrg-Activity links. This is the source for the [PersonOrg-ActivitySubform] on the Activity form.

SQL
SELECT [MetaDataSimpleRelationships].[MetaDataRelationshipID], [MetaDataSimpleRelationships].[DataSetID],
[MetaDataSimpleRelationships].[RelTypeID], [MetaDataSimpleRelationships].[RelTypeDS],
[MetaDataSimpleRelationships].[sequence], [MetaDataSimpleRelationships].[FirstRoleID] AS ActivityID,
[MetaDataSimpleRelationships].[FirstRoleDS] AS ActivityDS, [People]![LastName] & ", " & [People]![FirstName] & " "
 & [People]![Initials] & "; " & [Organizations]![Name] AS [Person-Org],
[MetaDataSimpleRelationships].[SecondRoleID] AS PersonOrgID, [MetaDataSimpleRelationships].[SecondRoleDS]
AS PersonOrgDS, [MetaDataSimpleRelationships].[Comment], [MetaDataSimpleRelationships].[TrackingID],
[MetaDataSimpleRelationships].[TrackingDS]
FROM ((MetaDataSimpleRelationships INNER JOIN PersonOrg ON
([MetaDataSimpleRelationships].[SecondRoleDS]=[PersonOrg].[DataSetID]) AND
([MetaDataSimpleRelationships].[SecondRoleID]=[PersonOrg].[PersonOrgID])) INNER JOIN People ON
([PersonOrg].[PersonDS]=[People].[DataSetID]) AND ([PersonOrg].[PersonID]=[People].[PersonID])) INNER JOIN
 Organizations ON ([PersonOrg].[OrganizationDS]=[Organizations].[DataSetID]) AND
([PersonOrg].[OrganizationID]=[Organizations].[OrganizationID])
WHERE ((([MetaDataSimpleRelationships].[RelTypeID])=3373));

Table 18. Fields returned by PersonOrg-Activity Query

Name	Type	Size	Description
MetaDataRelationshipID	Long Integer	4	Relationship identifier, first part
DataSetID	Long Integer	4	
RelTypeID	Long Integer	4	Link to metadataClassificationConcept table that specifies the kind of relationship
RelTypeDS	Long Integer	4	
sequence	Long Integer	4	Integer to order instances in a single relationship link
ActivityID	Long Integer	4	Link to Activities table
ActivityDS	Long Integer	4	
Person-Org	Text	0	Name of PersonOrg instance that participates in this relationship instance
PersonOrgID	Long Integer	4	Link to PersonOrg table
PersonOrgDS	Long Integer	4	
Comment	Memo	N/A	Free text, additional information for link
TrackingID	Long Integer	4	Link to MetaDataTrackingRecord that records metadata for this relationship instance.
TrackingDS	Long Integer	4	

Query: DataProcessingMethods

This query filters the local ClassificationConcept table to list all the data processing methods defined there. The data processing methods are identified by having a parentID = 2731, which is the conceptID for 'DI8 Data Processing Method Step Aggregation'. The query aliases ConceptID to MethodID

Table 19. Fields returned by DataProcessingMethods query.

Name	Type	Size	Description
MethodID	Long Integer	4	Primary key, first part, alias for ConceptID
DataSetID	Long Integer	4	Primary key, second part
Name	Text	255	
Definition	Memo	N/A	
ParentID	Long Integer	4	Parent concept for this concept; query designed so this is the conceptID that represents data processing method step aggregation definitions.
ParentDS	Long Integer	4	
TrackingRecordID	Long Integer	4	
TrackingRecordDS	Long Integer	4	

SQL
SELECT [DI8ClassificationConcept].[ConceptID] AS MethodID, [DI8ClassificationConcept].[DataSetID],
[DI8ClassificationConcept].[Name], [DI8ClassificationConcept].[Definition], [DI8ClassificationConcept].[ParentID],
[DI8ClassificationConcept].[ParentDS], [DI8ClassificationConcept].[TrackingRecordID],
[DI8ClassificationConcept].[TrackingRecordDS]
FROM DI8ClassificationConcept
WHERE ((([DI8ClassificationConcept].[ParentID])=2731) And (([DI8ClassificationConcept].[ParentDS])=519));

Query: DataProcessStepInfo

This query returns a list of all data processing steps defined in the metadataClassificationConcept Table. The local (DI8) simple relationship table is a correlation table that links data processing method aggregation definition concepts (as RelType) with data processing steps with the activity responsible for that processing step. This allows representation of a process with many steps completed by different people/organizations/projects.

Table 20. Fields returned by DataProcessStepInfo query.

Name	Type	Size	Description
RelationshipID	Long Integer	4	Primary key for this relationship instance
DataSetID	Long Integer	4	
ParentID	Long Integer	4	Parent of data processing method in local ClassificationConcept table (= 2731); used to filter concept table for data processing step aggregation definitions.
ParentDS	Long Integer	4	
MethodID	Long Integer	4	DataProcessingMethod step aggregation definition identifier
MethodDS	Long Integer	4	
sequence	Integer	2	Ordering sequence for processing steps
ProcessStepID	Long Integer	4	Link to DataProcessingStep definition in metadataClassificationConcept table.
ProcessStepDS	Long Integer	4	
OpActivityID	Long Integer	4	Link to activity responsible for this data processing step
OpActivityDS	Long Integer	4	
Name	Text	255	Name for data processing step; display on forms to identify the stem
Description	Memo	N/A	Description of processing step procedure
OriginDate	Date/Time	8	Date relationship link was created
Notes	Memo	N/A	Comments on this link.

SQL
SELECT [DI8SimpleRelationship].[RelationshipID], [DI8SimpleRelationship].[DataSetID],
[DI8ClassificationConcept].[ParentID], [DI8ClassificationConcept].[ParentDS],
[DI8ClassificationConcept].[ConceptID] AS MethodID, [DI8ClassificationConcept].[DataSetID] AS MethodDS,
[DI8SimpleRelationship].[sequence], [DI8SimpleRelationship].[FirstRoleID] AS ProcessStepID,
[DI8SimpleRelationship].[FirstRoleDS] AS ProcessStepDS, [DI8SimpleRelationship].[SecondRoleID] AS OpActivityID,
 [DI8SimpleRelationship].[SecondRoleDS] AS OpActivityDS, ProcessStepDefinitions.Name,
ProcessStepDefinitions.Definition AS Description, [DI8SimpleRelationship].[OriginDate],
[DI8SimpleRelationship].[Comment] AS Notes
FROM (DI8SimpleRelationship INNER JOIN DI8ClassificationConcept ON
([DI8SimpleRelationship].[RelTypeID]=[DI8ClassificationConcept].[ConceptID]) AND
([DI8SimpleRelationship].[RelTypeDS]=[DI8ClassificationConcept].[DataSetID])) INNER JOIN
MetaDataClassificationConcept AS ProcessStepDefinitions ON

([DI8SimpleRelationship].[FirstRoleID]=ProcessStepDefinitions.ConceptID) AND
([DI8SimpleRelationship].[FirstRoleDS]=ProcessStepDefinitions.DataSetID)
WHERE ((([DI8ClassificationConcept].[ParentID])=2731) And (([DI8ClassificationConcept].[ParentDS])=519))
ORDER BY [DI8ClassificationConcept].[ConceptID], [DI8SimpleRelationship].[sequence];

Query: geoCountParents

This query returns the number of parent concepts linked to each geoscience concept through the geoHierarchyRelationship relationship table.

SQL
SELECT DISTINCTROW geoHierarchyRelationship.ChildID, Count(geoHierarchyRelationship.ParentID) AS
CountOfParentID, geoClassificationConcept.Name
FROM geoHierarchyRelationship INNER JOIN geoClassificationConcept ON (geoHierarchyRelationship.ChildDS =
geoClassificationConcept.DataSetID) AND (geoHierarchyRelationship.ChildID =
geoClassificationConcept.ConceptID)
GROUP BY geoHierarchyRelationship.ChildID, geoClassificationConcept.Name
ORDER BY geoHierarchyRelationship.ChildID;

Table 21. Fields returned by geoCountParents query.

Name	Type	Size	Description
ChildID	Long Integer	4	ConceptID
CountOfParentID	Long Integer	4	Number of parent concepts
Name	Text	255	Name of concept

Query: LocalTrackingCitationLink

This query filters the local (DI8) simple relationship table for tracking record-bibliographic citation links (relationship type 2535). The query is the source for

Table 22. Fields returned by LocalTrackingCitationLink query.

Name	Type	Size	Description
RelTypeID	Long Integer	4	Relationship type, link to metaDataClassificationConcept table; query selects for RelTypeID = 2535, corresponding to 'Tracking record - citation link'
RelTypeDS	Long Integer	4	
CitationID	Long Integer	4	Link to citation in _AzGeoBibCite
CitationDS	Long Integer	4	
Citation	Text	255	Text for citation from _AzGeoBibCite
TrackingID	Long Integer	4	Link to Tracking record
TrackingDS	Long Integer	4	
RelationshipID	Long Integer	4	Primary key for relationship; must include in this query so that form can add new records; the new relationshipID is calculated by lookup in the DataSetAZ table 'currentMaxID' field by the function 'IncrementMaxID' in the [Az NADM Utilities] module.
DataSetID	Long Integer	4	Primary key for relationship, second part
RelTrackingID	Long Integer	4	Tracking ID for relationship; necessary to allow form to insert records; form defaults value to CurrentActive TrackingID from Switchboard form.
RelTrackingDS	Long Integer	4	
OriginDate	Date/Time	8	Date of record insertion, for bookkeeping, debugging.

SQL
SELECT [DI8SimpleRelationship].[RelTypeID], [DI8SimpleRelationship].[RelTypeDS],
[DI8SimpleRelationship].[SecondRoleID] AS CitationID, [DI8SimpleRelationship].[SecondRoleDS] AS CitationDS,
[_azGeoBibCite].[cite] AS Citation, [DI8SimpleRelationship].[FirstRoleID] AS TrackingID,
[DI8SimpleRelationship].[FirstRoleDS] AS TrackingDS, [DI8SimpleRelationship].[RelationshipID],
[DI8SimpleRelationship].[DataSetID], [DI8SimpleRelationship].[TrackingID] AS RelTrackingID,
[DI8SimpleRelationship].[TrackingDS] AS RelTrackingDS, [DI8SimpleRelationship].[OriginDate]
FROM _azGeoBibCite INNER JOIN DI8SimpleRelationship ON
[_azGeoBibCite].[REFNUM]=[DI8SimpleRelationship].[SecondRoleID]
WHERE ((([DI8SimpleRelationship].[RelTypeID])=2535));

Query: TrackingCitationLink

This query is analogous to LocalTrackingCitationLink, but is not designed to allow record insertions from the TrackingRecordForm. The query is the source for the TrackingCitationSubForm, with is used on the metadataTrackingRecordForm.

Table 23. Fields returned by TrackingCitationLink query.

Name	Type	Size	Description
RelTypeID	Long Integer	4	Relationship Type identifier, link to metadataClassificationConcepts. Value of 2535 selects TrackingRecord-_AzGeoBibCite citation links
RelTypeDS	Long Integer	4	
CitationID	Long Integer	4	Link to _azGeoBibCite table of citations from AZGeoBib [Trapp et al., 1995]
CitationDS	Long Integer	4	
Citation	Text	255	
TrackingID	Long Integer	4	Link to trackingRecord in MetaDataTrackingRecord table
TrackingDS	Long Integer	4	

SQL

SELECT [MetaDataSimpleRelationships].[RelTypeID], [MetaDataSimpleRelationships].[RelTypeDS], [MetaDataSimpleRelationships].[SecondRoleID] AS CitationID, [MetaDataSimpleRelationships].[SecondRoleDS] AS CitationDS, [_azGeoBibCite].[cite] AS Citation, [MetaDataSimpleRelationships].[FirstRoleDS] AS TrackingDS, [MetaDataSimpleRelationships].[FirstRoleID] AS TrackingID
FROM metadataTrackingRecord INNER JOIN (_azGeoBibCite INNER JOIN MetaDataSimpleRelationships ON [_azGeoBibCite].[REFNUM]=[MetaDataSimpleRelationships].[SecondRoleID]) ON ([metadataTrackingRecord].[TrackingRecordID]=[MetaDataSimpleRelationships].[FirstRoleID]) AND ([metadataTrackingRecord].[DataSetID]=[MetaDataSimpleRelationships].[FirstRoleDS])
WHERE ((([MetaDataSimpleRelationships].[RelTypeID])=2535));

Interface Forms

This section briefly describes the visible forms in the interface. A number of other forms used as sub-forms are hidden, and are not described here. The basic objective of the forms interface is to insulate the user from the wide variety of relational joins that are necessary to display complete information on many of the basic data topics of interest, and to allow users to browse the data displayed with text values instead of the numeric links that appear in many of the tables. Interface development is ongoing, and the forms will be updated regularly. Contact the Arizona Geological Survey if you are interested in obtaining recent versions of the front-end database.

Form: CartographicObject Form

This form is for view Cartographic object definitions.

Form: ClassificationConcepts Form

This form is for browsing the geoClassificationConcept and metadataClassificationConcept tables. The radio buttons in the upper left of the form determines which concept table is the data source for the form.

Form: DataProcessingMethodForm

This form displays a data processing method definition, and in a subform, all the associated data processing steps in their correct order.

Form: DataSet Form

This form displays information about AZGS datasets. The DataSetAZ table includes a list of all AZGS datasets. Only a subset of those will be present in any give database publication.

Form: DIClassificationConcepts

This form is for browsing classification concepts associated with the local database.

Form: DIMapLegendForm

This form displays information about the geologic meaning of cartographic object displayed on a map view. A classification concept from the local (DIxx) map unit table, or from any other classification concept table present in the database, may be associated with any cartographic object, along with text to display in a map collar legend. A sequence number is used to order the display of legend items in the map collar layout. A yes/no 'display in legend' check box allows multiple classifications to be associated with a single symbol, with the symbol appearing only once in the legend display (this is not be implemented at present in ArcView). Use this form to view all the entries in a particular map legend by filtering the form on the legend name in the MapLegendID combo box, and sorting on sequence.

Form: DIMapUnitForm

This form displays information from the local map unit definition table, and allows the user to associate map units with symbols to construct one or more legends. Two combo boxes control what map legend is active at any particular time.

Form: DITrackingRecordForm

This form displays information from the local database tracking record table. A subform at the bottom displays a list of all citations from _AzGeoBibCite that are associated with the tracking record. The DataProcessingMethod form can be opened using the detail button next to the Data Processing method combo control. When the DataProcessingMethod form opens, it will display the details for the data processing method for the current tracking record.

Form: MapViewDefinitionForm

This form summarizes the information necessary to define a map view from the database. The discussion of Map View in Richard and Orr [2001] for an explanation of the relationships involved. At present this form is implemented for information purposes, as the full map view scheme is not implemented.

Form: MetaDataTrackingRecordForm

This form displays tracking record information for system tables, from the metaDataTrackingRecord table in the metaDataInfrastructure.mdb database. A subform at the bottom displays a list of all citations from _AzGeoBibCite that are associated with the tracking record. The DataProcessingMethod form can be opened using the detail button next to the Data Processing method combo control. When the DataProcessingMethod form opens, it will display the details for the data processing method for the current tracking record.

Form: OrganizationForm

This form displays information from the Organization table, with text names substituted for the numeric link values that actually appear in the table.

Form: ProjectionForm

This form displays information from the Projection table, with text names substituted for linked attribute values.

Form: Switchboard

This is the form that opens when the front-end database is opened. The open routine for the form runs the 'InitializeSystem' subroutine in the [Az NADM utilities] module, which initializes global public variables that contain the names of data tables in the local database. The 'update links' button on this form allows the user to connect the front-end database to back end databases in a new location. The routine assumes that all system backend databases (geoscienceInfrastructure.mdb, AzRockUnitLexicon.mdb, metadataInfrastructure.mdb, cartographicInfrastructure.mdb, bibliography.mdb) are all in one directory, and the local database (DIxx.mdb) may be in a different directory.

The Switchboard form requires the user to select a default activity and default tracking record before any of the other action buttons are enabled. These default metadata records are used as default values when new records are added during the subsequent editing session.

Code Modules

The code in these modules makes reference to some system components. In order to make sure everything works, open the visual basic editor from Access menu bar--Tools/Macro/Visual Basic Editor, and then access the 'References' dialog from Tools/References on the Microsoft Visual Basic tool bar. The dialog shows the active references for the current module. The front end code was built and tested with these references available:

- o Visual Basic for Applications
- o Microsoft Access 9.0 Object Library
- o OLE Automation
- o Microsoft DAO 3.6 Object Library
- o Microsoft ActiveX Data Objects 2.6 Library

If things don't work, please check that these references are available, and add them by checking their associated boxes in this dialog. Currently active references appear at the top of the list when the References dialog is opened; other available references are in alphabetical order. It may be necessary to obtain Mircosoft Access service packs or DAO updates from the Microsoft web site.

Module: AZ NADM utilities

This module contains Microsoft Visual Basic for Applications functions and subroutines used by the forms interface. At present the only documentation is the commenting in the visual basic code.

Module: AzGeolSysGlobalVariables

This module defines a number of public variables used by other modules. These contain standard names for database files, and system constants.

ARCVIEW FILES

Project file

The Geology project

An ESRI ArcView 3.2 project file geology.apr is included with this database to provide examples for constructing maps based on the datasets. Three map layouts may be constructed based on the 'Geology, Lambert' view included with the project. The view has its projection set to the Lambert Conformal Conic projection used for the state of Arizona. Table 24 lists the parameters used for this projection. Since all

the datasets are in decimal degrees (not projected), ArcView allows the user to select the projection for the view, so if a different projection is desired, the user can modify the projection using the projection button in the ArcView View Properties dialog. This dialog is accessed through the Properties item on the View menu.

The different map views available in the project provide examples of some of the methods of representing the link between geologic data and map symbolization that are discussed in Richard and Orr [2001].

In order for the decorations on faults in the map views to display correctly, install the two fonts in the %DI8root%\support\fonts directory (see Fonts, below) into the system fonts directory on the machine that will run the ArcView Project. After opening the project file, open the palette window, clear all symbols in the existing palette, and load the Azgs_geopalette.avp palette found in the %DI8root%\support\palettes directory on the CDROM.

Table 24. Parameters for Standard AZGS Lambert
Conformal Conic Projection.

Parameter	Value
Projection	Lambert Conformal Conic
Spheroid	Clarke 1866
Central Meridian	-111
Reference Latitude	23
Standard Parallel 1	33
Standard Parallel 2	45
False Easting	0 (some older AZGS coverages use 5000000 for this value)
False Northing	0

Table 25. Sources for ArcView themes in Geology.apr 'Geology-Lambert' view. %DI8Root% represents the path that contains the DI8v3_0 directory and its subdirectories.

Theme Name	Theme Source
Depth to bedrock	%DI8Root%\shapefiles\depthtobedrock.shp
Line Ornamentation	%DI8Root%\shapefiles\di8cartolines.shp
Geology Lines	%DI8Root%\coverages\geology
Geology Polygons	%DI8Root%\coverages\geology
Generalized Geology Lines	%DI8Root%\coverages\geology
Generalized Geology Polygons	%DI8Root%\coverages\geology
Bedrock contacts & Quaternary faults	%DI8Root%\shapefiles\geolines.shp
Bedrock polygons	%DI8Root%\shapefiles\rocksurfpolys.shp

Bedrock-Surficial map view

This view displays bedrock in light gray, and basin-fill deposits in white. A subset of the Quaternary faults is shown in dark red. To view this map, make only the themes 'Bedrock contacts & Quaternary faults' and 'bedrock polygons' active. The contacts and faults theme is based on the geolines.shp shape file, which is equivalent to the arcs in the 'geology' coverage. The theme VTab

(%DI8Root%/shapefiles/geolines.dbf) is joined with the table rocksurflines.dbf on the field ObjectID, which is the unique identifier for each arc in the shapefile. The table rockSurfLines.dbf is a correlation table that assigns a cartographic object (symbol) to each arc that is to be displayed in the view. It is essentially a 'symbolization scheme' in the terminology of Richard and Orr [2001, page 8-9]. This correlation table is also included in the DI8SimpleRelationships table with RelTypeID/DS = 6/519. The bedrock polygons theme is based on the rockSurfPoly.shp shape file.

Generalized geology view

This map view presents a generalized geologic map of Arizona obtained by reclassifying the polygons of the geology coverage into one of 13 units, and symbolizing on the reclassified units. The view is obtained by making the 'Generalized Geology Lines' theme and the 'Generalized Geology Polygons' theme active. These themes are both based on the geology coverage. The VTab for 'generalized Geology lines' is geology.aat. This table is joined with the table gengeollines.dbf on ObjectID. The table gengeollines.dbf is a correlation table that assigns a cartographic object (symbol) to each arc that is to be displayed in the view. It is essentially a 'symbolization scheme' in the terminology of Richard and Orr [2001, page 8-9]. This correlation table is also included in the DI8SimpleRelationships table with RelTypeID/DS = 3378/519. The VTab for 'generalized geology polygons' is geology.pat. It is joined with the table mapunitgeneralizations.dbf on the field 'label', which is a proxy for RockUnitID classification in geology.pat. The table mapunitgeneralizations.dbf correlates rock units in the default visualization, corresponding to symbolization on the 'label' field, with generalized rock units. The reclassified rock units are then the basis for symbolizing the map.

Geologic map of Arizona view.

This map depicts the geology of Arizona as depicted on Arizona Geological Survey Map 35 [Richard et al., 2000], and is the default visualization for the dataset. That is, the cartographic objects for symbolization to produce this map view are included as attributes in the feature tables with the geology coverage (geology.aat and geology.pat). This view uses three themes: Geology Polygons, Geology Lines, and Line Ornamentation. Symbolization is based on the CartoObjID field in the tables linked directly with the spatial data.

Depth to bedrock contours.

The 'Depth to Bedrock' theme displays depth-to-bedrock contours for 800, 4800, and 9600 feet as shown on AZGS Map 35 [Richard et al., 2000]. This theme can be used with any of the views described above.

Support Files

Legends

A number of ArcView 3.2 legend files are included for standard symbolization.

GeneralizedGeoPolysScheme2.avl: This legend symbolizes the theme 'Generalized Geology Polygons' in the Geology-Lambert View. The classification field is "Genunitlab", a text field that classifies polygons to the generalized map unit. This legend is an alternate color scheme, otherwise equivalent to GeneralizedGeopolys.avl.

GeneralizedGeopolys.avl: This legend symbolizes the theme 'Generalized Geology Polygons' in the Geology-Lambert View. The classification field is "Genunitlab", a text field that classifies polygons to the generalized map unit.

Depth2Bedrock.avl: This legend symbolizes the 'Depth to Bedrock' theme based on CartoObjID in the depthtobedrock.dbf file.

Depth2Bedrockcoutour.avl: This legend symbolizes the 'Depth to Bedrock' theme based on 'Contour' in the depthtobedrock.dbf file.

FaultCartoObj.avl: This legend symbolizes the 'Line Ornamentation' theme, to show fault decorations.

DI8GeoPoly.avl: This legend symbolizes the 'Geology Polygon' theme based on CartoObjID to display the rock units for the 'Geology of Arizona' view.

DI8GeoLineCartoObj.avl: This legend symbolizes the 'Geology Lines' theme based on CartoObjID to display the faults and contacts for the 'Geology of Arizona' view. Fault decorations for thrust and low-angle normal faults are obtained by making the 'Line Ornamentation' theme visible.

Palettes

Azgs_geopalette.avp: This is an ArcView palette file that defines symbols used to portray structure data and decorated geologic lines. Use of the palette requires that the Azgs_geo.ttf font is installed in the system being used. If strange symbols show up on the map, make sure that this palette is loaded in the %ArcViewRoot%/Symbols directory, open the palette window, clear all symbols in the existing palette, load this palette, and make it the default. Also, verify that the Azgs_geo.ttf font is loaded (see below).

Fonts

Azgs_geo.ttf: This is a true type font developed at the Arizona Geological Survey based on the ESRI geology font included with ArcView 3.2. It includes standard geologic symbols used on Arizona Geological Survey geologic map. The symbols are positioned in the font definition coordinates so that the center of rotation is correctly located on the symbol, and so the same rotation convention will work for all planar and all linear symbols. This font appears on font menus as 'AZGSgeology'

Azgsa____.ttf: This is a true type font modified from standard Arial to include special symbols used on geologic maps. These include abbreviations for stratigraphic ages (Triassic, Pennsylvanian, Precambrian, Cambrian, Paleozoic, Mesozoic), and subscripts for map unit labels. This font appears on font menus as AZGSArial.

Table 26. Special symbols in AZGSArial font.

Symbol	Key-sequence	Use
$\overline{R}$	Alt-0178	Triassic
P	Alt-0179	Pennsylvanian
pC	Alt-0185	Precambrian
C	Alt-0186	Cambrian
Pz	Alt-0188	Paleozoic
M_z	Alt-0190	Mesozoic
o	Alt-0161	subscript 0
1	Alt-0162	subscript 1
2	Alt-0163	subscript 2
3	Alt-0164	subscript 3
a	Alt-0198	subscript a
b	Alt-0199	subscript b
c	Alt-0200	subscript c
d	Alt-0201	subscript d
e	Alt-0202	subscript e
f	Alt-0203	subscript f

Symbol	Key-sequence	Use
g	Alt-0204	subscript g
h	Alt-0205	subscript h
i	Alt-0206	subscript i
j	Alt-0207	subscript j
k	Alt-0208	subscript k
l	Alt-0209	subscript l
m	Alt-0210	subscript m
n	Alt-0211	subscript n
o	Alt-0212	subscript o
p	Alt-0213	subscript p
q	Alt-0214	subscript q
r	Alt-0215	subscript r
s	Alt-0216	subscript s
t	Alt-0217	subscript t
u	Alt-0218	subscript u
v	Alt-0219	subscript v
w	Alt-0220	subscript w
x	Alt-0221	subscript x
y	Alt-0222	subscript y
z	Alt-0223	subscript z

Connecting tables to ArcView

In order to use tables from the Microsoft Access databases, ODBC data sources must first be created based on the database. This must be done before opening the ArcView project file. ODBC data sources are added using the ODBC (or Data Sources) control panel from Windows. Open the ODBC control panel, and a dialog box titled "ODBC data Source Administrator" (or something like that...) will open listing the currently available data sources. Click the add button, and select "Microsoft Access Driver (*.mdb)" by clicking on that text. This has been tested using Access 2000, with ODBC driver version 4.00.4403.02. The ODBC select driver dialog displays the driver versions. If there is a problem with connecting to the Access tables from Arcview, check that this driver is the one being used. After selecting "Microsoft Access Driver (*.mdb)", click the button labeled "Finish". Another dialog labeled "ODBC Microsoft Access Setup" will appear. In the middle of the form, in the 'Database' section, click on the button labeled "Select". A standard file selection dialog will appear. Navigate to the DI8v3.mdb file and select it. Back in the ODBC Microsoft Access Setup dialog, that database name, with the full path name, should appear in the 'Database' section of the form. At the top of the form, enter the text "DI8 V3" in the text box labeled "Data Source Name". Finish by clicking the button labeled "OK". None of the advanced settings should be necessary. Close the "ODBC Data Source Administrator" dialog by clicking the button labeled "OK". Things should now be set up to connect to Microsoft Access tables in the DI8v3.mdb database from Arcview, and the project file can be opened.

When the ArcView project is opened, connect to the Access tables by selecting 'Project/SQL connect' from the menus when the project window is active.

1. The SQL connect dialog box open, and using the drop-down selection (Connection combo control) box at the top of the form, select the OBDC data source for the Access database that contains the table that is to be made visible in ArcView.

2. Click on the button labeled 'Connect', and in the 'Tables' list beneath the Connection Combo Control a list of the accessible tables in database will appear.

3. Select a table by double clicking its name. A list of fields should appear in the 'Columns' list, and the name of the table should appear in the control labeled 'from'. If the name of the table does not appear in the control, type the name there, enclosed in single quotes.
4. Double click on '<All Columns>' at the top of the field list in the 'Columns' control, and the string '*' should appear in the control labeled 'Select'.
5. Type the name of the table as you wish it to appear in ArcView in the control labeled 'Output Table:'. At this point the button labeled 'Query' should become active (not greyed out)
6. Click that button labeled 'Query' to make the table accessible in ArcView.
7. At this point, another table can be connected using the same procedure from Step 3 above, or the 'SQL Connect' dialog box can be closed.

For users who understand SQL, this box can be used to construct an SQL query against one or more tables in the connected Access database. Note that Access tables connected in this fashion are not editable.

Summary of Table Documents in *Geology.apr* for DI8.

Table: Attributes of Bedrock contacts & Quaternary faults

Table Source: %DI8Root%\shapefiles\geolines.dbf

This is the attribute table for the geologic lines in the 'Bedrock contacts & Quaternary faults' theme. This table is a join between Geolines.dbf and rockSurf.dbf on ObjectID. Records for which there is no matching ObjectID will contain a NULL value in the CartoObjID field. Since the value in this field determines the symbolization, those lines will be invisible.

Table 27. Arcview VTab Field Properties for Bedrock contacts & Quaternary faults theme

Alias	Type	Width	Visible	Notes
Shape	FIELD_SHAPELINE	9	No	ESRI field
Fnode_	FIELD_DECIMAL	11	No	ESRI field
Tnode_	FIELD_DECIMAL	11	No	ESRI field
Lpoly_	FIELD_DECIMAL	11	No	ESRI field
Rpoly_	FIELD_DECIMAL	11	No	ESRI field
Length	FIELD_DECIMAL	19	No	ESRI field
Geology_	FIELD_DECIMAL	11	No	ESRI field
Geology_id	FIELD_DECIMAL	11	No	ESRI field
Objectid	FIELD_DECIMAL	11	Yes	
Datasetid	FIELD_DECIMAL	11	Yes	
Accuracy	FIELD_DECIMAL	19	Yes	
Trackingid	FIELD_DECIMAL	11	Yes	
Trackingds	FIELD_DECIMAL	11	Yes	
ConceptID	FIELD_DECIMAL	11	Yes	
ConceptDS	FIELD_DECIMAL	11	Yes	
Cconf	FIELD_CHAR	16	Yes	
DontUseCartoOb-jID	FIELD_DECIMAL	11	No	Renamed field alias to avoid conflict with CartoObjID in joined table
CartoObjDS	FIELD_DECIMAL	11	No	
Label	FIELD_CHAR	50	No	
Name	FIELD_CHAR	254	No	
Join key	FIELD_CHAR	32	No	
Objectid	FIELD_DECIMAL	16	No	This is key for join to rocksurflines.dbf table.
Datasetid	FIELD_DECIMAL	16	No	
CartoObjID	FIELD_DECIMAL	16	Yes	This is the CartoObjID actually used for Symbolization

Alias	Type	Width	Visible	Notes
CartoObjDS	FIELD_DECIMAL	16	Yes	
Recno	FIELD_DECIMAL	16	No	Record number counter in table rocksurflines.dbf

Table: Bedrock boundary symbolization links

Table Source: %DI8Root%\databases\rocksurflines.dbf

This correlation table selects spatial objects from the Geology lines coverage that are to be displayed in the Bedrock-Surficial map view, and assigns a symbol for each of these lines using the CartoObjID.

Table 28. Table Field Properties for RockSurfLines.dbf

Alias	Type	Width	Visible	Notes
Objectid	FIELD_DECIMAL	16	Yes	
Datasetid	FIELD_DECIMAL	16	Yes	
CartoObjID	FIELD_DECIMAL	16	Yes	Used to symbol-ize lines
CartoObjDS	FIELD_DECIMAL	16	Yes	
Recno	FIELD_DECIMAL	16	Yes	

Table: Attributes of bedrock polygons

Table Source: %DI8Root%\shapefiles\rocksurfpolys.dbf

This table simply identifies if a polygon in the rockSurfPolys shapefile represents bedrock or surficial geologic unit outcrop. It is produced by a dissolve operation on the Geology polygon theme joined with mapunitgeneralizations.dbf on the field 'label', with the dissolve field being 'rock_surfl'.

Table 29 . Fields in RockSurfPolys.dbf table

Alias	Type	Width	Visible	Notes
Shape	FIELD_SHAPEPOLY	8	Yes	ESRI field
Rock_surfl_	FIELD_CHAR	8	Yes	String containing either 'rock' or 'surf' to indicate whether the polygon is bed-rock or a surficial unit. This is the field used for symbolization.

Table: Attributes of Generalized Geology Polygons

Table Source: %DI8Root%\coverages\info\geology.pat

This table is the VTab associated with the polygon theme for the generalized geology map view. The polygon reclassification is done through mapunitgeneralizations.dbf, which is a table that correlates Map 35 geologic unit labels with unit labels for generalized map units. This construction is not fully consistent with the AZGS data model, which would use a correlation through an AttributedRelationship table, based on the AZGeoUnitID for the Map 35 geologic unit and the AZGeoUnitID for the corresponding general-ized map unit. Look for this in the next version.

Table 30 VTab field properties for generalized geology polygon theme

Alias	Type	Width	Visible	Notes
Shape	FIELD_SHAPEPOLY	8	Yes	ESRI field
Area	FIELD_DOUBLE	18	Yes	ESRI field
Perimeter	FIELD_DOUBLE	18	Yes	ESRI field
Geology#	FIELD_LONG	5	Yes	ESRI field
Geology-id	FIELD_LONG	5	Yes	ESRI field
Objectid	FIELD_DECIMAL	16	Yes	

Alias	Type	Width	Visible	Notes
Datasetid	FIELD_DECIMAL	16	Yes	
Trackingid	FIELD_DECIMAL	16	Yes	
Trackingds	FIELD_DECIMAL	16	Yes	
ConceptID	FIELD_DECIMAL	16	Yes	
ConceptDS	FIELD_DECIMAL	16	Yes	
Cconf	FIELD_CHAR	16	Yes	
CartoObjID	FIELD_DECIMAL	16	Yes	
CartoObjDS	FIELD_DECIMAL	16	Yes	
AZGeoUnitID	FIELD_DECIMAL	16	Yes	
AzGeoUnitDS	FIELD_DECIMAL	16	Yes	
cMConf	FIELD_CHAR	16	No	
Label	FIELD_CHAR	50	No	This is the key for the join with mapunit-generalizations.dbf; used in lieu of AZGeoUnitID.
Label	FIELD_CHAR	50	Yes	The geologic unit label for Map 35.
Count	FIELD_DECIMAL	11	No	
Sequence	FIELD_DECIMAL	8	No	
Genunitlab	FIELD_CHAR	8	Yes	Label to identify generalized geologic map unit. This is the field used to symbolize the polygons.
Rock_surfl	FIELD_CHAR	8	Yes	

Table: Attributes of Generalized Geology Lines

Table Source: %DI8Root%\coverages\info\geology.aat

This table is sourced on the geology.aat info table, joined with the genGeoLines.dbf correlation table to identify the lines to symbolize and the symbols to use for symbolization on the generalized geology map view.

Table 31 . VTab field properties for Generalized Geology Lines theme

Alias	Type	Width	Visible	Notes
Shape	FIELD_SHAPELINE	9	Yes	ESRI field
Fnode#	FIELD_LONG	5	No	ESRI field
Tnode#	FIELD_LONG	5	No	ESRI field
Lpoly#	FIELD_LONG	5	No	ESRI field
Rpoly#	FIELD_LONG	5	No	ESRI field
Length	FIELD_DOUBLE	18	Yes	ESRI field
Geology#	FIELD_LONG	5	No	ESRI field
Geology-id	FIELD_LONG	5	Yes	ESRI field
Objectid	FIELD_DECIMAL	16	Yes	
Datasetid	FIELD_DECIMAL	16	Yes	
Accuracy	FIELD_DOUBLE	8	Yes	
Trackingid	FIELD_DECIMAL	16	Yes	
Trackingds	FIELD_DECIMAL	16	Yes	
ConceptID	FIELD_DECIMAL	16	Yes	
ConceptDS	FIELD_DECIMAL	16	Yes	
Cconf	FIELD_CHAR	16	Yes	
dontUseID	FIELD_DECIMAL	16	No	Alias changed on CartoObjID in geology.aat to avoid confusion with CartoObjID from join with genGeoLines.dbf
dontUseDS	FIELD_DECIMAL	16	No	Alias changed on CartoObjDS in geology.aat to avoid confusion with CartoObjDS from join with genGeoLines.dbf
Label	FIELD_CHAR	50	No	
Name	FIELD_CHAR	255	No	

Alias	Type	Width	Visible	Notes
Objectid	FIELD_DECIMAL	16	No	This is the join key for joining genGeoLines.dbf with geology.aat
Datasetid	FIELD_DECIMAL	16	No	
ConceptID	FIELD_DECIMAL	16	No	
ConceptDS	FIELD_DECIMAL	16	No	
CartoObjID	FIELD_DECIMAL	16	Yes	This is the field used to symbolize the generalized geology lines
CartoObjDS	FIELD_DECIMAL	16	Yes	
Recno	FIELD_DECIMAL	16	No	

Table: gengeollines.dbf

Table Source: %DI8Root%\databases\gengeollines.dbf

This correlation table selects spatial objects from the Geology lines coverage that are to be displayed in the Generalized Geology map view, and assigns a symbol for each of these lines using the CartoObjID.

Table 32 . Field properties for gengeolines correlation table.

Alias	Type	Width	Visible	Notes
Objectid	FIELD_DECIMAL	16	Yes	
Dataset	FIELD_DECIMAL	16	Yes	
ConceptID	FIELD_DECIMAL	16	Yes	
ConceptDS	FIELD_DECIMAL	16	Yes	
CartoObjID	FIELD_DECIMAL	16	Yes	Used to symbolize lines
CartoObjDS	FIELD_DECIMAL	16	Yes	

Table: geopolyl.dbf

Table Source: %DI8Root%\databases\geopolyl.dbf

This table identifies the geologic unit labels for polygons on the left side of each arc in the Geology lines coverage. Because it was generated early in the database development process, geologic unit identification is based on the text labels for the units rather than their AZGeoUnitID, and the arcs are identified by the Arc/Info internal ID (geology_) rather than the AZGS ObjectID/DataSetID.

Table 33. Field properties for geopolyl.dbf table

Alias	Type	Width	Notes
Geology_	FIELD_DECIMAL	11	ESRI field; this is the unique internal ID generated by Arc/Info for each arc in the geology line coverage. It is used as the join key with this table to associate arc with the geologic unit classification for the polygon on the left side of the arc.
LpolyObjID	FIELD_DECIMAL	16	AZGS ObjectID for the polygon on the left side of the arc identified by Geology_
LpolyDSID	FIELD_DECIMAL	16	AZGS datasetID for polygon on left side of the arc identified by Geology_
Lrockunitl	FIELD_CHAR	50	Label for polygon on left side of arc
Lpolygenun	FIELD_CHAR	8	Label for generalized geologic map unit for polygon on left side of arc
Lpolyrocks	FIELD_CHAR	8	Rock or 'surf' classification for polygon on left side of arc.

Table Name: geopolyr.dbf

Table Source: %DI8Root%\databases\geopolyr.dbf

This table serves the same function as geopolyl.dbf, but identifies polygons on the right side of each arc in geology line coverage.

Table 34 . Field properties for geopolyr.dbf table.

Alias	Type	Width	Notes
Geology_	FIELD_DECIMAL	11	ESRI field; this is the unique internal ID generated by Arc/Info for each arc in the geology line coverage. It is used as the join key with this table to associate arc with the geologic unit classification for the polygon on the right side of the arc.
RpolyObjID	FIELD_DECIMAL	16	AZGS ObjectID for the polygon on the right side of the arc identified by Geology_
RpolyDSID	FIELD_DECIMAL	16	AZGS datasetID for polygon on right side of the arc identified by Geology_
Rrockunitl	FIELD_CHAR	50	Label for polygon on right side of arc
Rpolygenun	FIELD_CHAR	8	Label for generalized geologic map unit for polygon on right side of arc
Rpolyrocks	FIELD_CHAR	8	Rock or 'surf' classification for polygon on right side of arc.

Table: mapunitgeneralizations.dbf

Table Source: %DI8Root%\databases\mapunitgeneralizations.dbf

This table is a correlation table for reclassifying the Map 35 geologic units to generate the generalized geologic map view and the bedrock-surficial map view. This implementation is based on the map unit label strings. This will be converted in future versions to use the AZGeoUnitID/DS identifiers to specify the geologic units, and the correlation table will reside in the DI8 AttributedRelationship table in the DI8.mdb database.

Table 35 . Field properties for MapUnitGeneralizations.dbf table.

Alias	Type	Width	Notes
Label	FIELD_CHAR	50	Label string that identifies a Map 35 geologic unit.
Count	FIELD_DECIMAL	11	Not Used
Sequence	FIELD_DECIMAL	8	Not Used
Genunitlab	FIELD_CHAR	8	Label string that identifies the generalized geologic unit that the specified Map 35 unit is reclassified to for the generalized geologic map view.
Rock_surfl	FIELD_CHAR	8	Label string that specifies whether the Map 35 geologic unit is a bedrock unit ('rock') or a surficial geologic unit ('surf').

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