



**DIGITAL DATABASE DESCRIPTION FOR SURFICIAL GEOLOGIC  
MAP OF THE LOOP AND DRUID ARCH QUADRANGLES,  
CANYONLANDS NATIONAL PARK, UTAH**

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*Prepared in cooperation with the National Park Service*

Miscellaneous Field Studies Map MF-2411

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**U.S. DEPARTMENT OF THE INTERIOR  
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## INTRODUCTION

This publication includes, in addition to cartographic and text products, geospatial (GIS) databases and other digital files. The database files are particularly useful because they can be combined with any type of other geospatial data for purposes of display and analysis. The other files include digital files that support the databases, and digital plot files that can be used to display and print the cartographic and text products in this publication.

The digital map database, compiled from previously published and unpublished data and new mapping by the author, represents the general distribution of bedrock and surficial deposits in the map area and provides current information on the geologic structure and stratigraphy of the area. The database delineates map units that are identified by age and lithology following the stratigraphic nomenclature of the U.S. Geological Survey. The scale of the source maps limits the spatial resolution (scale) of the database to 1:24,000 or smaller. The content and character of the database, as well as two methods of obtaining the database, are described below.

## FOR THOSE WHO DON'T USE DIGITAL GEOLOGIC MAP DATABASES

Two sets of plot files containing images of much of the information in the database are available to those who do not use an ARC/INFO compatible Geographic Information System. Each set contains an image of the geologic map sheet and explanation, and the database description. There is a set available in PostScript format, and another in Acrobat PDF format (see sections below). Those who have computer capability can access the plot file packages in either of the two ways described below (see the section "Obtaining the Digital Data"); however, these packages do require gzip or WinZip utilities to access the plot files.

Those without computer capability can obtain plots of the map files through U.S. Geological Survey Information Services. Be sure to request Map MF-2411.

U.S. Geological Survey Information Services  
Box 25286  
Denver, CO 80225

1-888-ASK-USGS  
e-mail:ask@usgs.gov

## DATABASE CONTENTS

This report consists of three digital packages. The first is the PostScript Plotfile Package, which consists of PostScript plot files of the geologic map and map explanation. The second is the PDF Plotfile Package, which contains the same plot files as the first package as well as the database description, but in Portable Document Format (PDF). The third is the Digital Database Package, which contains the geologic map database itself and the supporting data.

### **PostScript Plotfile Package**

This package contains the PostScript image described below:

mf2411.eps	A PostScript plotfile containing the complete map composition with geology, base map, correlation chart, and geologic description at a scale of 1:24,000
mf2411.ai	An Adobe Illustrator plotfile containing the complete map composition with geology, base map, correlation chart, and geologic description at a scale of 1:24,000

The PostScript image of the geologic map and map explanation is 52 inches high by 33 inches wide, so it requires a large plotter to produce paper copies at the intended scale. The PostScript plotfile of the geologic map was initially produced by the 'postscript' command with compression set to zero in ARC/INFO version 8.0. The geologic description and correlation chart were created in Adobe Illustrator 9.0.

## PDF Plotfile Package

This package contains the PDF images described below:

mf2411.pdf	A PDF file containing the complete map composition with geology, base map, correlation chart, and geologic description at a scale of 1:24,000
readme.pdf	This document

The PDF image of the geologic map and map explanation was created from a PostScript file using Adobe Acrobat Distiller. The PDF image of the pamphlet was produced in Microsoft Word 2000 using the 'Convert to Adobe PDF' option from the Acrobat pulldown. In test plots we have found that paper maps created from PDF files contain almost all the detail of maps created with PostScript plot files. We would, however, recommend that those users with the capability to print the large PostScript plot files use them in preference to the PDF files.

To use PDF files, the user must get and install a copy of Adobe Acrobat Reader. This software is available **free** from the Adobe website (<http://www.adobe.com/>). Please follow the instructions given at the website to download and install this software. Once installed, the Acrobat Reader software contains an on-line manual and tutorial.

## Digital Database Package

The database package includes geologic map database files for the map area. The digital maps, or coverages, and their associated INFO directories have been converted into ARC/INFO export files. These export files are uncompressed and are easily handled and compatible with some Geographic Information Systems other than ARC/INFO. Please refer to your GIS documentation.

ARC export files are converted to ARC/INFO format using the ARC command 'import'. To ease conversion and preserve naming convention, an AML is enclosed that will convert all the export files in the database to coverages and will also create an associated INFO directory. From the ARC command line type *&r import.aml*. The export files included are

<u>ARC/INFO export file</u>	<u>Resultant Coverage</u>	<u>Description</u>
mf2411_poly.e00	mf2411_poly	Polygon and line coverage showing faults, depositional contacts, and rock units
mf2411_point.e00	mf2411_point	Point coverage containing sinkholes
mf2411_anno.e00	mf2411_anno	Annotation coverage containing unit labels, fault names, and fault separation values

The database package also contains the following files:

import.aml	ASCII text file in ARC Macro Language to convert ARC export files to ARC coverages in ARC/INFO
readme.txt	A text-only file containing an unformatted version of readme.pdf
mf2411.met	A parseable text-only file of publication level FGDC metadata for this report
mf2411.rev	A text-only file describing revisions, if any, to this publication
mf2411.tif	Composite hypsography image
mf2411.tfw	World file accompanying mf2411.tif

The following supporting directory is not included in the database package, but is produced in the process of reconverting the export files into ARC coverages.

info/ INFO directory containing files supporting the database

### Revisions and version numbers

From time to time, new information and mapping, or other improvements, will be integrated into this publication. Rather than releasing an entirely new publication, the USGS has adopted a policy of using version numbers similar to that used in the computer industry. The original version of all publications will be labeled Version 1.0. Subsequent small revisions will be denoted by the increase of the numeral after the decimal, while large changes will be denoted by increasing the numeral before the decimal. Pamphlets and map products will be clearly marked with the appropriate version number. Information about the changes, if any, that have been made since the release of Version 1.0 will be listed in the publication revision file. This file will be available at the publication web site (see below), and will also be included in the digital database package.

### OBTAINING THE DIGITAL DATA

The digital data may be obtained via the web from the Western Region Geologic Information Server. Go to the web page at <http://geopubs.wr.usgs.gov/map-mf/mf-2411> and follow the directions to download the files.

### DATABASE SPECIFICS

#### Digital compilation

A tic file was created in latitude/longitude coordinates and projected into the base map projection (UTM). The geology was digitized on screen over DOQs in ArcView 3.2. The shapefile was converted to a coverage and final editing and attributing was done in ARC/INFO 8.1 using custom pull-down and form menus.

#### Map Projection

<u>Parameter</u>	<u>Description</u>
Projection	UTM
Units	Meters on the ground
Zone	12
Datum	NAD27

#### Database Fields

The content of the geologic database can be described in terms of the lines, points, and areas that compose the map. Each line, point, or area in a map layer or map database (coverage) is associated with a database entry stored in a feature attribute table. Each database entry contains both a number of items generated by ARC/INFO to describe the geometry of the feature and one or more items defined by the authors to describe the geologic information associated with that entry. Each item is defined as to the amount and type of information that can be recorded. Descriptions of the database items use the terms explained below.

<u>Parameter</u>	<u>Description</u>
Item Name	Name of database field
Width	Maximum number of characters or digits stored
Output	Output width
Type	B - binary integer; F- binary floating point number, I - ASCII integer, C - ASCII character string
N.Dec	Number of decimal places maintained for floating point numbers

## LINES

The arcs are recorded as strings of vectors and described in the arc attribute table (AAT). They define the boundaries of the map units, faults, and map boundaries in **mf2411\_poly**. These distinctions and the geologic identities of the boundaries are stored in the LTYPE field according to their line type.

### Arc Attribute Table Definition

<u>Item Name</u>	<u>Width</u>	<u>Output</u>	<u>Type</u>	<u>N.Dec</u>	<u>Description</u>
FNODE#	4	5	B	-	Starting node of the arc
TNODE#	4	5	B	-	Ending node of the arc
LPOLY#	4	5	B	-	Polygon to the left of the arc
RPOLY#	4	5	B	-	Polygon to the right of the arc
LENGTH	8	18	F	5	Length of the arc in meters
<COVERAGE>#	4	5	B	-	Unique internal number
<COVERAGE>-ID	4	5	B	-	Unique identification number
LTYPE	35	35	C	-	Line type
PTTYPE	35	35	C	-	Point type for arcmarkers

### Line Types recorded in the LTYPE field

#### mf2411\_poly

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contact\_certain  
facies\_change  
fault\_certain  
fault\_concealed  
map\_boundary

### Arcmarkers recorded in the PTTYPE field

#### mf2411\_poly

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fault\_ball\_fill  
xx

Arcs with PTTYPE value 'xx' indicate that there is no symbol attached to the arc.

## POLYGONS

Map units (polygons) are described in the polygon attribute table (PAT). This identifies the map units recorded in the PTYPE, PTYPE2, PTYPE3, and PTYPE4 fields by map label. There are multiple deposit labels for some polygons to more fully describe the surficial geology. Surficial geologic units may exist as thin (< 2m) veneers over older units. In areas where this relationship is common the unit designators are shown on the map as being separated by a slash (/). The younger, or overlying, unit is indicated first. Thus, Qed/Qes indicates an area where a veneer of sand dune deposits overlies sand sheet deposits. Not all composite units are shown on the map or in the database. For polygons where an underlying unit either does not exist or is not recorded there is a placeholder 'xx' in the database field.

### Definition of Polygon Attribute Table

<u>Item Name</u>	<u>Width</u>	<u>Output</u>	<u>Type</u>	<u>N.Dec</u>	<u>Description</u>
AREA	8	18	F	5	Area of polygon in square meters

PERIMETER	8	18	F	5	Length of perimeter in meters
<COVERAGE>#	4	5	B	-	Unique internal number
<COVERAGE>-ID	4	5	B	-	Unique identification number
PTYPE	5	5	C	-	Unit label for surface exposure
PTYPE2	5	5	C	-	Unit label. Underlying unit, with thin veneer of PTYPE on top.
PTYPE3	5	5	C	-	Unit label. Underlying unit, with thin veneer of PTYPE and PTYPE2 on top.
PTYPE4	12	12	C	-	Unit label. Composite unit, indicated with slashes between deposits.

### Unit labels recorded in the PTYPE field

#### mf2411\_poly

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PPe	PPh	Pc	Pcu	Po	Qae
Qaf	Qal	Qed	Qes	Qf1	Qf2
Qfp	Qp	Qr	Qrf	Qs	Qt1
Qt2	Qt3	water			

Plain text is substituted for conventional geologic age symbols (PP for Pennsylvanian) shown on map.

### POINTS

Points represent geographic features that have no area or length, or features that are too small for their boundaries to be apparent for the given input scale. A single x, y coordinate describes each point. A point attribute table (PAT) is used to hold the attribute data about points. ARC/INFO coverages cannot hold both point and polygon information.

### Definition of Point Attribute Table

<u>Item Name</u>	<u>Width</u>	<u>Output</u>	<u>Type</u>	<u>N.Dec</u>	<u>Description</u>
AREA	8	18	F	5	Area (degenerative)
PERIMETER	8	18	F	5	Perimeter (degenerative)
<COVERAGE>#	4	5	B	-	Unique internal number
<COVERAGE>-ID	4	5	B	-	Unique identification number
PTTYPE	35	35	C	-	Point type

### Point types recorded in the PTTYPE field

#### mf2411\_point

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sinkhole

### ANNOTATION

The coverage **mf2411\_anno** contains all annotation for the polygon coverage. It is defined somewhat differently from the polygon and dip coverages. The arc attribute table is of negligible importance. Arcs in this coverage are merely leaders from a unit annotation to the related polygon. The coverage contains annotation with unit labels and

fault separation. Annotation directly related to unit labeling is contained in subclass “anno.unit” and annotation including fault separation values is contained in subclass “anno.structure”.

#### BASE MAP PROCEDURE

The base map was prepared from two 1:24,000 DRGs that had been converted to ARC/INFO grids. Any color fill on the grids was deleted, the collars were stripped, and the images were mosaiced before reconvertng to a monochrome TIFF.

#### SPATIAL RESOLUTION

Use of this digital geologic map database should not violate the spatial resolution of the data. Although the digital form of the data removes the constraint imposed by the scale of a paper map, the detail and accuracy inherent in map scale are also present in the digital data. Although this database was created and consistently edited at a scale of 1:4,000 over digital orthophotos it is presented at a scale of 1:24,000 over a topographic base of that scale. Plotting at scales larger than 1:24,000 will not yield greater real detail, but may reveal fine-scale irregularities below the intended resolution.