



## **PRELIMINARY GEOLOGIC MAP OF THE FONTANA 7.5' QUADRANGLE, RIVERSIDE AND SAN BERNARDINO COUNTIES, CALIFORNIA**

*By Douglas M. Morton<sup>1</sup>*

*Digital preparation by Kelly R. Bovard<sup>1</sup>*

*Prepared in cooperation with*  
**CALIFORNIA GEOLOGICAL SURVEY**

Open-File Report OF 03-418

2003

Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government. This database, identified as "Preliminary Geologic Map of the Fontana 7.5' Quadrangle, Riverside and San Bernardino Counties, California" has been approved for release and publication by the Director of the USGS.

U.S. DEPARTMENT OF INTERIOR  
U.S. GEOLOGICAL SURVEY

<sup>1</sup>U.S. Geological Survey  
Department of Earth Sciences  
University of California  
Riverside, CA 92521

## TABLE OF CONTENTS

- Introduction
  - General
- How to obtain paper plots
- Database contents
  - Data package
  - Plot package
  - Symbols Package
  - Other files
- Software utilities
- How to obtain the digital files
  - Digital databases
  - Postscript plot files
  - Portable Document Format (.pdf) files
- How to extract the geologic map database from the tar files
  - Digital database
  - Postscript plot files
- How to convert the ARC/INFO interchange (export) files
- Digital geologic map specifications
  - Digital compilation
  - Base map
  - Spatial resolution
  - Map accuracy standards
  - Faults and landslides
  - Database specifics
    - General
    - Lines
    - Polygons
    - Points
- References
- Appendix I
  - Metadata

## INTRODUCTION

Open-File Report 03-418 is a digital geologic data set that maps and describes the geology of the Fontana 7.5' quadrangle, Riverside and San Bernardino Counties, California. The Fontana quadrangle database is one of several 7.5' quadrangle databases that are being produced by the Southern California Areal Mapping Project (SCAMP). These maps and databases are, in turn, part of the nation-wide digital geologic map coverage being developed by the National Cooperative Geologic Map Program of the U.S. Geological Survey (USGS).

### General

Open-File Report 03-418 contains a digital geologic map database of the Fontana 7.5' quadrangle, Riverside and San Bernardino Counties, California that includes:

1. ARC/INFO (Environmental Systems Research Institute, <http://www.esri.com>) version 7.2.1 coverages of the various elements of the geologic map.
2. A Postscript file (fon\_map.ps) to plot the geologic map on a topographic base, and containing a Correlation of Map Units diagram (CMU), a Description of Map Units (DMU), and an index map.

3. An Encapsulated PostScript (EPS) file (fon\_grey.eps) created in Adobe Illustrator 10.0 to plot the geologic map on a grey topographic base, and containing a Correlation of Map Units (CMU), a Description of Map Units (DMU), and an index map.
4. Portable Document Format (.pdf) files of:
  - a. This Readme; includes in Appendix I, data contained in fon\_met.txt
  - b. The same graphics as plotted in 2 and 3 above. Test plots have not produced precise 1:24,000-scale map sheets. Adobe Acrobat page size setting influences map scale.

The Correlation of Map Units and Description of Map Units is in the editorial format of USGS Geologic Investigations Series (I-series) maps but has not been edited to comply with I-map standards. Within the geologic map data package, map units are identified by standard geologic map criteria such as formation-name, age, and lithology. Where known, grain size is indicated on the map by a subscripted letter or letters following the unit symbols as follows: lg, large boulders; b, boulder; g, gravel; a, arenaceous; s, silt; c, clay; e.g. Qyf<sub>a</sub> is a predominantly young alluvial fan deposit that is arenaceous. Multiple letters are used for more specific identification or for mixed units, e.g., Qfy<sub>sa</sub> is a silty sand. In some cases, mixed units are indicated by a compound symbol; e.g., Qyf<sub>2sc</sub>.

Even though this is an Open-File Report and includes the standard USGS Open-File disclaimer, the report closely adheres to the stratigraphic nomenclature of the U.S. Geological Survey. Descriptions of units can be obtained by viewing or plotting the .pdf file (4b above) or plotting the postscript files (2 or 3 above).

This Readme file describes the digital data, such as types and general contents of files making up the database, and includes information on how to extract and plot the map and accompanying graphic file. Metadata information can be accessed at <http://geo-nsdi.er.usgs.gov/metadata/open-file/03-418> and is included in Appendix I of this Readme.

## HOW TO OBTAIN PAPER PLOTS

For those having access to large-format plotters such as HP650C, HP755C, and HP2500C, plots may be made directly from the included plot file.

## DATABASE CONTENTS

The files constituting the geologic map database of this Open-File Report are listed below along with the interchange files from which they were extracted.

### Data Package

All files listed below are in a compressed tar file named fon.tar.gz (2.0 Mb); see section below titled, SOFTWARE UTILITIES.

ARC/INFO <u>interchange files</u>	Fontana <u>Coverages</u>	<u>Contains</u>
fon_geo.e00	fon_geo	Contacts, faults, geologic unit labels
fon_ano.e00	fon_ano	Annotation subclasses: GEO (for plotting unit labels)
fon_str.e00	fon_str	Leaders Attitudes and their dip values. Dip values plotted as annotation.

The directory, info/, is produced in the process of importing interchange files to ARC coverages in ARC/INFO. The fon (Fontana) info/ directory contains:

Feature Attribute Tables

Polygon attribute table	fon_geo.pat
Arc attribute table	fon_geo.aat
	fon_ano.aat
	fon_str.aat
Point attribute table	fon_str.pat
Annotation attribute table	fon_ano.tatgeo

<u>Raster file</u>	<u>Resultant image</u>	<u>Contains</u>
fon.tif	Fontana base map	Topographic base from 500 dpi scan of USGS Fontana 7.5' quadrangle, 1973

**Plot Package**

PostScript plot files of the geologic map and explanation; please see section below titled, SOFTWARE UTILITIES for additional information.

<u>Compressed file</u>	<u>Resultant image</u>	<u>Contains</u>
fon_map.ps.gz	fon_map.ps	PostScript plot file of geologic map on a black topographic base and CMU/DMU
fon_grey.eps.gz	fon_grey.eps	Encapsulated PostScript plot file of geologic map on a grey topographic base and CMU/DMU

The Postscript file is compressed using winzip.

The uncompressed Postscript files fon\_map.ps and fon\_grey.eps will each plot a 1:24,000 scale, full color geologic map of the Fontana quadrangle on the topographic base. A detailed CMU and DMU are included on the sheet. The sheet is in the editorial format of the U.S. Geological Survey's Geologic Investigations (I) map series, and is approximately 44 X 36 inches in size. The map sheet has been successfully plotted on Hewlett-Packard large-format plotters, models HP755C, and HP2500C.

**Symbols Package**

Files in the plot package have been prepared to produce optimum plots using the shade, line, and marker sets listed below; these symbol sets and supporting fonts are included in a compressed tar file named symbols.tar.gz (0.18 Mb); see section below titled SOFTWARE UTILITIES.

geoSCAMP2.lin	Lineset
geoSCAMP2.mrk	Markerset for points
wpgcmykg.shd	Colors
geology2.shd	Pattern fills
fnt026	Font required for geoSCAMP2.lin
fnt037	Font required for geoSCAMP2.mrk
fnt035	Font required for geology2.shd

Special geologic characters used in unit designations are from the Geoage font group and are contained in the geoage folder within the symbols.tar.gz file. The Geoage fonts are used in conjunction with the geofont.txt textset when using ESRI software. The geoage folder contains fonts, the geofont.txt textset, and explanatory files.

### Other files

README.pdf	This document
fon_map.pdf	Pdf plot file of geologic map on a black topographic base and CMU/DMU
fon_grey.pdf	Pdf plot file of geologic map on a grey topographic base and CMU/DMU

### SOFTWARE UTILITIES

Files which have .gz file extension were compressed using gzip. Gzip utilities are available free of charge via the Internet at the gzip home page, <http://www.gzip.org>. Files with a .zip file extension were compressed using WinZip, available at <http://www.winzip.com>.

The data package and symbols package are additionally bundled into a single tar (tape archive) file. The individual files must be extracted using a tar utility, available free of charge via the Internet through links on the Common Internet File Formats page, <http://www.matisse.net/files/format.html>. One such utility is WinZip, available at <http://www.winzip.com>.

### HOW TO OBTAIN THE DIGITAL FILES

The export files, and subsequently the data and plot files, constituting the geologic map database of this Open-File Map may be obtained in two ways, both over the Internet.

1. The files can be obtained via the Web from Western Region Geologic Information Server. Go to the web page at <http://geopubs.wr.usgs.gov/open-file/of03-418> and follow the directions to download the files.
2. The files can also be obtained by anonymous ftp over the Internet from wrgis.wr.usgs.gov. The files are located in the directory /pub/open-file/. Be sure to use binary transfer mode or ASCII mode for individual .e00 (ARC interchange file format) files.

### HOW TO EXTRACT THE GEOLOGIC MAP DATABASE FROM THE TAR FILE

#### Digital database

After downloading the files, they must be uncompressed using a gzip utility such as gzip itself or WinZip. The data files must then be extracted using a tar utility or Winzip.

This process will create a directory, fon/, that will contain the ARC/INFO interchange files and supporting files. The directory should contain the following files:

```
fon/  
  fon_geo.e00  
  fon_str.e00  
  fon_ano.e00  
  fon.tif
```

The symbols.tar.gz file is imported using the same methods as for the fon.tar.gz file. It will create a directory, symbols/ that will contain the following directory and seven files:

```
geoage/  
geoSCAMP2.lin  
geoSCAMP2.mrk  
wpgcmykg.shd  
geology2.shd  
fnt026  
fnt037  
fnt035
```

The following are not included in the database tar file, and are downloaded separately.

```
fon_map.ps.gz  
fon_grey.eps.gz  
README.pdf  
fon_map.pdf  
fon_grey.pdf
```

### **Postscript plot files**

Make an uncompressed file, fon\_map.ps (7.1 Mb) or fon\_grey.eps (7.4 Mb) (plot of complete map), by typing `gzip -d fon_map.ps.gz` or `gzip -d fon_grey.eps.gz` (or use `gzip` utility of choice).

### **Portable Document Format (.pdf) files**

PDF files are not stored as `gzip` files. They are accessed using Adobe Acrobat Reader software, available free from the Adobe website <http://www.adobe.com>. Follow instructions at the website to download and install the software. Acrobat Reader contains an on-line manual and tutorial.

## **HOW TO CONVERT THE ARC/INFO INTERCHANGE (EXPORT) FILES**

The ARC interchange (.e00) files are converted to ARC coverages using the ARC command `IMPORT`.

ARC interchange files can also be read by some other Geographic Information Systems, including ArcView (ESRI) and MapInfo (<http://www.mapinfo.com>), (Environmental Systems Research Institute, Inc., 1998). Please consult your GIS documentation to see if you can use ARC interchange files and the procedure to import them.

## **DIGITAL GEOLOGIC MAP SPECIFICATIONS**

### **Digital compilation**

The geologic map information was hand digitized from a base-stable original (ink on a greenline) of the geologic map at 1:24,000 scale. Digital tics were placed by hand at latitude/longitude intersections. The lines, points, and polygons were edited using standard ARC/INFO commands, and in some places, interactively by hand using graphical user interface `ALACARTE` (Fitzgibbon, 1991, Fitzgibbon and Wentworth, 1991, Wentworth and Fitzgibbon, 1991). Digitization and editing artifacts significant enough to display at a scale of 1:24,000 were corrected.

## Base map

The base map image (fon.tif) was prepared by scanning a scale-stable clear film of the U.S. Geological Survey, 1:24,000 Fontana 7.5' quadrangle (1973) topographic map. Scanning was done using an Anatech Eagle 4080 monochrome 800 dpi scanner; at a resolution of 500 dpi. The raster scan was converted to a monochromatic image in ARC/INFO, and registered and rectified to the Fontana 7.5' quadrangle. No elements of the base layer are attributed. The base map is provided for reference only.

## 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. The fact that this database was edited at a scale of 1:24,000 means that higher resolution information is not generally present in the dataset. Plotting at scales larger than 1:24,000 will not yield greater *real* detail, although it may reveal fine-scale irregularities above the intended resolution of the database. Similarly, although higher resolution data is incorporated at a few places, the resolution of the combined output will be limited by the lower resolution data.

## Map accuracy standards

Until uniform National geologic map standards are developed and adopted, lines and points on SCAMP 1:24,000 scale geologic maps that are located to within 15 meters, relative to accurately located features on the base map, are considered to meet map accuracy standards. Dashed lines, indicated in the database as approximately located or inferred, are generally located within 30 meters, relative to accurately located features on the base map.

## Faults and landslides

This database is sufficiently detailed to identify and characterize many actual and potential geologic hazards represented by faults and landslides, but it is not sufficiently detailed for site-specific determinations. Faults shown do not take the place of fault rupture hazard zones designated by the California State Geologist (see Hart, 1998).

## Database specifics

**General**--The map database consists of ARC/INFO format coverages, which are stored in polyconic projection (Table 1), and a series of data tables. Digital tics define a 2.5-minute grid of latitude and longitude in the geologic coverages corresponding to the 2.5-minute tic grid on the topographic base map.

Table 1 ---	Map Projection
Projection	Polyconic
Datum	NAD27
Zunits	No
Units	Meters
Spheroid	Clark 1866
X shift	0.000000000
Y shift	0.000000000
Parameters	-117 26 15.000 longitude of central meridian 34 00 00.00 latitude of projections origin 0.00000 false easting (meters) 0.00000 false northing (meters)

The content of the geologic database can be described in terms of feature classes that include lines, points, and areas that compose the map. See the metadata text file (Appendix I) for detailed descriptions.

**Lines** – Lines are recorded as strings of arcs and are described in an arc attribute (.aat) table. Complete lists of the line types (LTYPE) used in the quadrangle are available in Appendix I. They represent contacts and faults, which define the boundaries of map units and map boundaries.

**Polygons** --- Geologic map units (polygons) are described in the polygon attribute (.pat) table (details in Appendix I). For traditional descriptions of the map units, see the Portable Document Format file fon\_map.pdf or fon\_grey.pdf or the Postscript map plot, fon\_map.ps or fon\_grey.eps. A list of all map units in the database is given in Appendix I.

**Points** – Point information (attitudes of planar and linear features) is recorded as coordinate and related information. Complete lists of the point types (PTTYPE) used in the point coverage are available in Appendix I.

## REFERENCES

- Environmental Systems Research Institute, Inc, 1991, ARC/INFO command references 6.0: Proprietary software manual
- Fitzgibbon, T.T., 1991, ALACARTE installation and system manual (version 1.0): U.S. Geological Survey, Open-File Report 91-587B
- Fitzgibbon, T.T., and Wentworth, C.M., 1991, ALACARTE user interface – AML code and demonstration Maps (version 1.0): U.S. Geological Survey, Open-File Report 91-587A
- Wentworth, C.M., and Fitzgibbon, T.T., 1991, ALACARTE user manual (version 1.0): U.S. Geological Survey Open-File Report 91-587C

## APPENDIX I (original metadata text)

Identification\_Information:

Citation:

Citation\_Information:

Originator: Douglas M. Morton

Publication\_Date: 2003

Title: Preliminary Geologic Map of the Fontana 7.5' Quadrangle, Riverside and San Bernardino Counties, California

Edition: Version 1.0

Geospatial\_Data\_Presentation\_Form: vector digital data

Series\_Information:

Series\_Name: U.S. Geological Survey Open-File Report

Issue\_Identification: USGS OFR 03-418

Publication\_Information:

Publication\_Place: Menlo Park, California

Publisher: U.S. Geological Survey

Online\_Linkage: Online\_Linkage URL:<http://geopubs.wr.usgs.gov/open-file/of03-418>

Description:

Abstract:



The Fontana 7.5' quadrangle is located in the northern part of the Perris Block (English, 1926, Woodford, and others, 1971), a rectangular shaped and relatively tectonically stable structural block located between the San Jacinto and Elsinore Fault zones at the north end of the Peninsular Ranges Provinces (Jahns, 1954). Included in the southern part of the quadrangle are the Jurupa Mountains, that along with rocks exposed in the San Bernardino South 7.5' quadrangle to the east, are underlain by exposures of the northernmost Peninsular Ranges province basement rocks. The oldest rocks are a sequence of amphibolite grade metamorphic rocks consisting of predominantly biotite-quartz schist and lesser amounts of quartzite, marble, and amphibolite. The marble forms relatively thick layers, most of which have been quarried, mainly for manufacturing of cement. Pyroxene hornfels facies skarn occurs along contact zones between marble and intrusive granitic rocks. Major marble quarries include the Crestmore quarries at the eastern part of the quadrangle and the Jensen quarry at the eastern end of the Jurupa Mountains; smaller quarries are the Henshaw quarry located between the Crestmore quarries and the Jensen Quarry, and the Glen Avon Quarry located in the western part of the Jurupa Mountains. Much of the marble at the Crestmore quarries has a characteristic blue color. The Crestmore quarries are known worldwide for the large number of rare minerals found in the contact metamorphic rocks (about 150 mineral species, e.g., Murdoch and Webb, 1966). Most of the unusual minerals occur in a metasomatic zone between marble and a monzogranite intrusive in the Commercial Quarry (e.g., Burnham, 1959, Woodford and others, 1941). Based upon the abundance of marble in the section, these metasedimentary rocks are considered to be of Paleozoic age.

Intruding the metamorphic rocks are Cretaceous-age granitic rocks, the northern part of the Peninsular Ranges batholith. These batholithic rocks range in composition from gabbro to granitic pegmatite dikes. Biotite-hornblende tonalite is the most abundant granitic rock, but there is a large biotite granodiorite body located near the central part of the Jurupa Mountains. Emplacement age of the tonalite, based on U/Pb analyses of zircon, is 104 +/- 0.4 Ma (W.R. Premo, Written Com., 2003). Sr/Rb isochron whole rock age is 117.6 +/- 6 Ma (R.W. Kistler, Written Com., 2000). Granodiorite (Kgd) gave a zircon U/Pb age of 108 +/- 6 Ma (W.R. Premo, Written Com., 2003).

Tonalite and granodiorite commonly have two planar fabrics, a planar fabric oriented northwest that is typical Peninsular Range Batholith and one that is atypical striking east and northeast; both planar fabrics are produced by oriented hornblende and biotite and ellipsoidal to pancake-shaped mafic inclusions. East and northeast oriented inclusions are generally noticeably more attenuated than the northwest oriented inclusions. Commonly a single outcrop includes both fabric planes; where discernible the northwest striking fabric is older than the east and northeast oriented fabric.

The granitic rocks are some of the closest granitic rocks to the Los Angeles Metropolitan area that can be used for construction purposes. As such, the tonalite and granodiorite have been extensively quarried for the construction of breakwaters and a variety of other engineering projects. A major quarrying operation was located at the north central part of the Jurupa Mountains at Declezville where a rail line spur was constructed for transportation of tonalite. Another large quarry is located in the hills immediately east of the Jurupa Mountains. Currently the only active quarry is the Stringfellow quarries developed in granodiorite and located in the south central part of the Jurupa Mountains.

The northern half of the quadrangle is covered by unconsolidated boulder and cobble-bearing alluvium of the distal part of the Lytle Creek fan that emanates from the San Gabriel Mountains north of the quadrangle. An older alluvial-fan deposit derived from the eastern San Gabriel Mountains once covered the Jurupa Mountains; cobbles of eastern San Gabriel Mountains rocks, remnants of this now vanished fan, occur along ridge tops of the Jurupa Mountains and the hill to the east of the mountains (Morton and Matti, 1989).

Pleistocene alluvial-fan deposits flank the south side of the Jurupa Mountains. Most of these deposits are well indurated, brown, sandy deposits containing cobble deposits near the south side of the mountains; clasts are locally derived from the Jurupa Mountains. The active channel of the Santa Ana River is located in the southeast corner of the quadrangle.

Purpose: The data set for the Fontana 7.5' quadrangle was prepared under the U.S. Geological Survey Southern California Areal Mapping Project (SCAMP) as part of an ongoing effort to develop a regional geologic framework of southern California, and to utilize a Geographic Information System (GIS) format to create regional digital geologic databases. These regional databases are being developed as contributions to the National Geologic Map Database of the National Cooperative Geologic Mapping Program of the USGS.

Supplemental\_Information: none

Time\_Period\_of\_Content:

Time\_Period\_Information:

Single\_Date/Time:

Calendar\_Date: 2003

Currentness\_Reference: New data

Status:

Progress: Complete

Maintenance\_and\_Update\_Frequency: As Needed

Spatial\_Domain:

Bounding\_Coordinates:

West\_Bounding\_Coordinate: -117.50009183

East\_Bounding\_Coordinate: -117.37490817

North\_Bounding\_Coordinate: 34.12499996

South\_Bounding\_Coordinate: 33.99998421

Keywords:

Theme:

Theme\_Keyword\_Thesaurus: None

Theme\_Keyword: geologic map

Theme\_Keyword: bedrock geology

Theme\_Keyword: plutonic rock structure

Place:

Place\_Keyword\_Thesaurus: None

Place\_Keyword: California

Place\_Keyword: San Bernardino County

Place\_Keyword: Riverside County

Place\_Keyword: Fontana quadrangle

Place\_Keyword: marble quarries

Place\_Keyword: Crestmore Quarry

Place\_Keyword: Jensen Quarry

Stratum:

Stratum\_Keyword\_Thesaurus: None

Stratum\_Keyword: granitic rocks

Stratum\_Keyword: tonalite

Stratum\_Keyword: granodiorite

Stratum\_Keyword: metamorphic rocks

Stratum\_Keyword: marble

Stratum\_Keyword: alluvial fan

Temporal:

Temporal\_Keyword\_Thesaurus: None

Temporal\_Keyword: Paleozoic(?) metasedimentary rocks

Temporal\_Keyword: Cretaceous plutonic rocks

Access\_Constraints: None

Use\_Constraints:

The Fontana 7.5' geologic-map database should be used to evaluate and understand the geologic character of the Fontana 7.5' quadrangle as a whole. The data should not be used for purposes of site-specific land-use planning or site-specific geologic evaluations. The database is sufficiently detailed to identify and characterize many actual and potential geologic hazards represented by faults and landslides and posed by ground subsidence and earthquake-generated ground shaking. However, it is not sufficiently detailed for site-specific determinations or evaluations of these features. Faults shown do not take the place of fault-rupture hazard zones designated by the California State Geologist (see Hart, 1988).

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. The fact that this database was compiled

and edited at a scale of 1:24,000 means that higher resolution information may not have been uniformly retained in the dataset. Plotting at scales larger than 1:24,000 will not yield greater real detail, although it may reveal fine-scale irregularities below the intended resolution of the database. Similarly, although higher resolution data is incorporated in most of the map, the resolution of the combined output will be limited by the lower resolution data.

Point\_of\_Contact:

Contact\_Information:

Contact\_Person\_Primary:

Contact\_Person: Douglas M. Morton

Contact\_Organization: U.S. Geological Survey, Western Region, Earth Surface Processes Team

Contact\_Position: Project Geologist

Contact\_Address:

Address\_Type: mailing address

Address: U.S. Geological Survey

Address: Department of Earth Sciences

Address: University of California, Riverside

City: Riverside

State\_or\_Province: California

Postal\_Code: 92521

Country: United States of America

Contact\_Voice\_Telephone: (909) 276-6397

Contact\_Facsimile\_Telephone: (909) 276-6295

Contact\_Electronic\_Mail\_Address: scamp@usgs.gov

Data\_Set\_Credit: Geologic mapping and digital preparation of this report were sponsored by (1) the Southern California Areal Mapping Project (SCAMP).

Native\_Data\_Set\_Environment:

SunOS, 5.8, sun4m UNIX

ARC/INFO version 7.2.1

Cross\_Reference:

Citation\_Information:

Originator: Douglas M. Morton and Fred K. Miller

Publication\_Date: 2003

Title: Preliminary geologic map of the San Bernardino 30'x60' quadrangle, California

Geospatial\_Data\_Presentation\_Form: vector digital data

Series\_Information:

Series\_Name: U.S. Geological Survey Open-File Report

Issue\_Identification: USGS OF 03-293

Publication\_Information:

Publication\_Place: California

Publisher: U.S. Geological Survey

Online\_Linkage: <http://geopubs.wr.usgs.gov/open-file/of03-293>

Data\_Quality\_Information:

Attribute\_Accuracy:

Attribute\_Accuracy\_Report:

Geologic-map units in the Fontana quadrangle database were described using standard field methods. Consistent with these methods, the database author has assigned standard geologic attributes to geologic lines, points, and polygons identified in the database.

Nation-wide geologic-map accuracy standards have not been developed and adopted by the U.S. Geological Survey and other earth-science entities. Until such standards are adopted, the SCAMP project has developed internal map-accuracy standards for 1:24,000-scale geologic maps produced by the project.

Geologic lines and points on 1:24,000 scale geologic maps are judged to meet SCAMP's internal map-accuracy standards if they are located to within +/-15 meters, relative to topographic or cultural features on the base map.

On any derivative geologic-map plot, line data that are judged to meet the SCAMP internal map-accuracy standard are denoted by solid lines; line data that may not meet the SCAMP internal map-accuracy standard are denoted by dashed or dotted lines. There is no cartographic device for denoting the map-accuracy for geologic-point data (e.g., symbols representing bedding, foliation, lineations, etc.).

Logical\_Consistency\_Report: Polygon and chain-node topology present. The areal extent of the map is represented digitally by an appropriately projected (polyconic projection), mathematically generated box. Consequently, polygons intersecting the lines that comprise the map boundary are closed by that boundary. Polygons internal to the map boundary are completely enclosed by line segments which are themselves a set of sequentially numbered coordinate pairs. Point data are represented by coordinate pairs.

Completeness\_Report: The geologic map database of the Fontana 7.5' quadrangle contains new data that have been subjected to rigorous review and are a substantially complete representation of the current state of knowledge concerning the geology of the quadrangle.

Positional\_Accuracy:

Horizontal\_Positional\_Accuracy:

Horizontal\_Positional\_Accuracy\_Report: The maximum transformation RMS error acceptable for a 7.5' quadrangle transformation and data input is 0.003 (1.8 meters). Horizontal positional accuracy was checked by visual comparison of hard-copy plots with base-stable source data.

Lineage:

Process\_Step:

Process\_Description: Field mapping and aerial photograph interpretation; iterative process (D.M. Morton).

Process\_Date: 1978-79; 1990-99

Process\_Step:

Process\_Description: Digitization of geologic linework and point data from a scale-stable cartographic base of quadrangle. ARC/INFO database established; cleanup of artifacts; polygon, arc, and point attribute tables established. Digitizing and editing artifacts significant enough to display at a scale of 1:24,000 were corrected (K.R. Bovard and P.M. Cossett).

Process\_Date: 2000; 2003

Process\_Step:

Process\_Description: Description of map units and correlation of map units (K.R. Bovard).

Process\_Date: 2003

Process\_Step:

Process\_Description: First draft of metadata created by K.R. Bovard using FGDCMETA.AML ver. 1.2 05/14/98 on ARC/INFO data set /scamp31/kbovard/fontana/fon\_geo

Process\_Date: 20030826

Spatial\_Data\_Organization\_Information:

Direct\_Spatial\_Reference\_Method: Vector

Point\_and\_Vector\_Object\_Information:

SDTS\_Terms\_Description:

SDTS\_Point\_and\_Vector\_Object\_Type: Point

Point\_and\_Vector\_Object\_Count: 165

SDTS\_Point\_and\_Vector\_Object\_Type: String

Point\_and\_Vector\_Object\_Count: 619

SDTS\_Point\_and\_Vector\_Object\_Type: GT-polygon composed of chains

Point\_and\_Vector\_Object\_Count: 166

Spatial\_Reference\_Information:

Horizontal\_Coordinate\_System\_Definition:

Planar:

Map\_Projection:

Map\_Projection\_Name: Polyconic

Polyconic:

Latitude\_of\_Projection\_Origin: 34.000

Longitude\_of\_Central\_Meridian: -117.4375

False\_Easting: 0.00000  
 False\_Northing: 0.00000  
 Planar\_Coordinate\_Information:  
 Planar\_Coordinate\_Encoding\_Method: coordinate pair  
 Coordinate\_Representation:  
 Abscissa\_Resolution: 1.0  
 Ordinate\_Resolution: 1.0  
 Planar\_Distance\_Units: Meters  
 Geodetic\_Model:  
 Horizontal\_Datum\_Name: North American Datum of 1927  
 Ellipsoid\_Name: Clarke 1866  
 Semi-major\_Axis: 6378206.4  
 Denominator\_of\_Flattening\_Ratio: 294.98

Entity\_and\_Attribute\_Information:

Overview\_Description:

Entity\_and\_Attribute\_Overview:

Version 1.0 of the Fontana 7.5' quadrangle comprises three ARC/INFO coverages, of which two contain geologic data, and one contains cartographic features: fon\_geo (geology), fon\_str (structural data), and fon\_ano (annotation and leaders).

Geologic data represented by line entities and the polygons they delineate are contained in the coverage FON\_GEO. For display purposes, the annotation coverage contains one annotation subclass: anno\_geo contains unit labels.

Geological point data includes site-specific information describing the types and the orientation of foliation, joints and lineations. Annotation is respective dip and plunge values associated with individual point data.

>

>FON\_GEO.PAT:

>

>COLUMN ITEM NAME WIDTH OUTPUT TYPE N.DEC ALTERNATE NAME

> 1	AREA	4	12	F	3	
> 5	PERIMETER	4	12	F	3	
> 9	FON_GEO#	4	5	B	-	
> 13	FON_GEO-ID	4	5	B	-	
> 17	LABL	35	35	C	-	
> 52	PLABL	35	35	C	-	
> 87	SHD	3	3	I	-	
> 90	SHDFIL	3	3	I	-	
> 93	NAME	200	200	C	-	

>

>

>FON\_GEO.AAT:

>

>COLUMN ITEM NAME WIDTH OUTPUT TYPE N.DEC ALTERNATE NAME

> 1	FNODE#	4	5	B	-	
> 5	TNODE#	4	5	B	-	
> 9	LPOLY#	4	5	B	-	
> 13	RPOLY#	4	5	B	-	
> 17	LENGTH	4	12	F	3	
> 21	FON_GEO#	4	5	B	-	
> 25	FON_GEO-ID	4	5	B	-	
> 29	LTYPE	35	35	C	-	
> 64	L-SYMB	3	3	I	-	

>

>

Entity\_and\_Attribute\_Detail\_Citation: none

Detailed\_Description:

Entity\_Type:

Entity\_Type\_Label: fon\_geo.pat

Entity\_Type\_Definition: Geologic units (LABL) and their corresponding names (NAME) identified in the Fontana 7.5' quadrangle

Attribute:

Attribute\_Label: LABL

Attribute\_Definition: geologic map unit label, in plain text

Attribute\_Domain\_Values:

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qaf

Enumerated\_Domain\_Value\_Definition: Artificial fill

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qa

Enumerated\_Domain\_Value\_Definition: Active alluvial-channel deposits

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qyfe

Enumerated\_Domain\_Value\_Definition: Young alluvial-fan deposits of Etiwanda Creek

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qyfl

Enumerated\_Domain\_Value\_Definition: Young alluvial-fan deposits of Lytle Creek

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qyfl1

Enumerated\_Domain\_Value\_Definition: Young alluvial-fan deposits of Lytle Creek, unit 1

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qya

Enumerated\_Domain\_Value\_Definition: Young alluvial-channel deposits

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qya1

Enumerated\_Domain\_Value\_Definition: Young alluvial-channel deposits, unit 1

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qye

Enumerated\_Domain\_Value\_Definition: Eolian deposits

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qof3

Enumerated\_Domain\_Value\_Definition: Old alluvial-fan deposits, unit 3

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qof2

Enumerated\_Domain\_Value\_Definition: Old alluvial-fan deposits, unit 2

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qof1

Enumerated\_Domain\_Value\_Definition: Old alluvial-fan deposits, unit 1

Enumerated\_Domain:

Enumerated\_Domain\_Value: Qvof

Enumerated\_Domain\_Value\_Definition: Very old alluvial-fan deposits

Enumerated\_Domain:

Enumerated\_Domain\_Value: Kg

Enumerated\_Domain\_Value\_Definition: Granitic dikes, undifferentiated

Enumerated\_Domain:

Enumerated\_Domain\_Value: Kgd

Enumerated\_Domain\_Value\_Definition: Granodiorite

Enumerated\_Domain:

Enumerated\_Domain\_Value: Kgd1

Enumerated\_Domain\_Value\_Definition: Granodiorite, unit 1

Enumerated\_Domain:

Enumerated\_Domain\_Value: Kt  
 Enumerated\_Domain\_Value\_Definition: Tonalite  
 Enumerated\_Domain:  
 Enumerated\_Domain\_Value: Kt1  
 Enumerated\_Domain\_Value\_Definition: Tonalite, unit 1  
 Enumerated\_Domain:  
 Enumerated\_Domain\_Value: Kgd  
 Enumerated\_Domain\_Value\_Definition: Tonalite and granodiorite, undifferentiated  
 Enumerated\_Domain:  
 Enumerated\_Domain\_Value: Kd  
 Enumerated\_Domain\_Value\_Definition: Diorite  
 Enumerated\_Domain:  
 Enumerated\_Domain\_Value: Kdqd  
 Enumerated\_Domain\_Value\_Definition: Diorite and tonalite, undifferentiated  
 Enumerated\_Domain:  
 Enumerated\_Domain\_Value: Kgb  
 Enumerated\_Domain\_Value\_Definition: Gabbro  
 Enumerated\_Domain:  
 Enumerated\_Domain\_Value: Pzs  
 Enumerated\_Domain\_Value\_Definition: Schist  
 Enumerated\_Domain:  
 Enumerated\_Domain\_Value: Pzm  
 Enumerated\_Domain\_Value\_Definition: Marble  
 Enumerated\_Domain:  
 Enumerated\_Domain\_Value: Pza  
 Enumerated\_Domain\_Value\_Definition: Amphibolite  
 Enumerated\_Domain:  
 Enumerated\_Domain\_Value: KtPzs  
 Enumerated\_Domain\_Value\_Definition: Intermixed heterogenous tonalite and schist  
 Enumerated\_Domain:  
 Enumerated\_Domain\_Value: KtPzm  
 Enumerated\_Domain\_Value\_Definition: Intermixed heterogenous tonalite and marble  
 Enumerated\_Domain:  
 Enumerated\_Domain\_Value: KtPzms  
 Enumerated\_Domain\_Value\_Definition: Intermixed tonalite, marble and schist  
 Attribute:  
 Attribute\_Label: LTYPE  
 Attribute\_Definition: Description of types of lines on the geologic map (contact, fault, dike).  
 Attribute\_Domain\_Values:  
 Enumerated\_Domain:  
 Enumerated\_Domain\_Value: contact, certain  
 Enumerated\_Domain\_Value: contact, approx. located  
 Enumerated\_Domain\_Value: map boundary  
 Enumerated\_Domain\_Value: Kg, granitic dike  
 Detailed\_Description:  
 Entity\_Type:  
 Entity\_Type\_Label: fon\_str.pat  
 Entity\_Type\_Definition: Geological point data includes site-specific information describing the types and the orientation of foliation, joints, and lineations. One annotation subclass is included in the geologic points coverage, FON\_STR which displays the respective dip and plunge values associated with individual point data.  
 Attribute:  
 Attribute\_Label: PPTYPE  
 Attribute\_Definition: describes type of point data (foliation, joints, lineations)  
 Attribute\_Domain\_Values:  
 Enumerated\_Domain:

Enumerated\_Domain\_Value: igneous foliation  
Enumerated\_Domain\_Value: vertical igneous foliation  
Enumerated\_Domain\_Value: metamorphic foliation  
Enumerated\_Domain\_Value: vertical metamorphic foliation  
Enumerated\_Domain\_Value: secondary igneous foliation  
Enumerated\_Domain\_Value: vertical secondary igneous foliation  
Enumerated\_Domain\_Value: igneous lineation  
Enumerated\_Domain\_Value: metamorphic lineation

Attribute:

Attribute\_Label: PT-SYMB

Attribute\_Definition: Coded integer value that relates point to cartographic point symbol in markerset geoscamp2.mrk

Attribute:

Attribute\_Label: STRIKE

Attribute\_Definition: Azimuthal strike of planar feature

Attribute:

Attribute\_Label: DIP

Attribute\_Definition: Dip of planar feature

Detailed\_Description:

Entity\_Type:

Entity\_Type\_Label: fon\_ano.aat

Entity\_Type\_Definition: annotation leaders

Attribute:

Attribute\_Label: L-SYMB

Attribute\_Definition: Coded integer value (1) that relates arcs to cartographic line symbol in lineset

Distribution\_Information:

Distributor:

Contact\_Information:

Contact\_Organization\_Primary:

Contact\_Organization: U.S. Geological Survey Information Services

Contact\_Address:

Address\_Type: mailing address

Address: Box 25286 Denver Federal Center

City: Denver

State\_or\_Province: Colorado

Postal\_Code: 80225

Country: USA

Contact\_Voice\_Telephone: (303)202-4700

Contact\_Facsimile\_Telephone: (303)202-4693

Distribution\_Liability:

The U.S. Geological Survey (USGS) provides these geographic data "as is." The USGS makes no guarantee or warranty concerning the accuracy of information contained in the geographic data. The USGS further makes no warranties, either expressed or implied as to any other matter whatsoever, including, without limitation, the condition of the product, or its fitness for use lies entirely with the user. Although these data have been processed successfully on computers at the USGS, no warranty, expressed or implied, is made by the USGS regarding the use of these data on any other system, nor does the fact of distribution constitute or imply any such warranty.

In no event shall the USGS have any liability whatsoever for payment of any consequential, incidental, indirect, special, or tort damages of any kind, including, but not limited to, any loss of profits arising out of use of or reliance on the geographic data or arising out of the delivery, installation, operation, or support by USGS.

This digital geologic map database of the Fontana 7.5' quadrangle, 1:24,000 map-scale, and any derivative maps thereof, is not meant to be used or displayed at any scale larger than 1:24,000 (e.g., 1:12,000).

Metadata\_Reference\_Information:



Metadata\_Date: 20030826  
Metadata\_Review\_Date: INSERT METADATA REVIEW DATE HERE  
Metadata\_Contact:  
Contact\_Information:  
Contact\_Organization\_Primary:  
Contact\_Organization: U.S. Geological Survey  
Contact\_Person: Kelly R. Bovard  
Contact\_Position: Geologist  
Contact\_Address:  
Address\_Type: mailing address  
Address: U.S. Geological Survey  
Address: Department of Earth Sciences  
Address: University of California, Riverside  
City: Riverside  
State\_or\_Province: California  
Postal\_Code: 92521  
Country: USA  
Contact\_Voice\_Telephone: (909) 276-6397  
Contact\_Facsimile\_Telephone: (909) 276-6295  
Contact\_Electronic\_Mail\_Address: kbovard@usgs.gov  
Metadata\_Standard\_Name: FGDC Content Standards for Digital Geospatial Metadata  
Metadata\_Standard\_Version: FGDC-STD-001-1998  
Metadata\_Access\_Constraints: none  
Metadata\_Use\_Constraints: none