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

PRELIMINARY GEOLOGIC MAP OF THE SAN FERNANDO 7.5' QUADRANGLE, SOUTHERN CALIFORNIA: A DIGITAL DATABASE

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Open - File Report 97-163

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This database, identified as "Preliminary Geologic Map of the San Fernando 7.5' Quadrangle, southern California: A Digital Database," has been approved for release and publication by the Director of the USGS. Although this database has been reviewed and is substantially complete, the USGS reserves the right to revise the data pursuant to further analysis and review. This database is released on condition that neither the USGS nor the U. S. Government may be held liable for any damages resulting from its use.

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INTRODUCTION

This Open-File report is a digital geologic map database. This pamphlet serves to introduce and describe the digital data. There is no paper map included in the Open-File report.

This digital map database is compiled from previously published sources combined with some new mapping and modifications in nomenclature. The geologic map database delineates map units that are identified by general age and lithology following the stratigraphic nomenclature of the U. S. Geological Survey. For detailed descriptions of the units, their stratigraphic relations, sources of geologic mapping, and data on exploratory wells consult Yerkes (1996), and Yerkes and Showalter (1990). More specific information about the units may be available in the original sources.

The content and character of the database and methods of obtaining it are described herein. The geologic map database itself, consisting of three ARC coverages and one base layer, can be obtained over the Internet or by magnetic tape copy as described below. The processes of extracting the geologic map database from the tar file, and importing the ARC export coverages (procedure described herein), will result in the creation of an ARC workspace (directory) called '**sanfer**.'

The database was compiled using ARC/INFO version 7.0.3, a commercial Geographic Information System (Environmental Systems Research Institute, Redlands, California), with version 3.0 of the menu interface ALACARTE (Fitzgibbon and Wentworth, 1991, Fitzgibbon, 1991, Wentworth and Fitzgibbon, 1991). It is stored in uncompressed ARC export format (ARC/INFO version 7.x) in a compressed UNIX tar (tape archive) file. The tar file was compressed with gzip, and may be uncompressed with gzip, which is available free of charge via the Internet from the gzip Home Page (http://w3.teaser.fr/~jlgailly/gzip). A tar utility is required to extract the database from the tar file. This utility is included in most UNIX systems, and can be obtained free of charge via the Internet from Internet Literacy's Common Internet File Formats Webpage (http://www.matisse.net/files/formats.html). ARC/INFO export files (files with the .e00 extension) can be converted into ARC/INFO coverages in ARC/INFO (see below) and can be read by some other Geographic Information Systems, such as MapInfo via ArcLink and ESRI's ArcView (version 1.0 for Windows 3.1 to 3.11 is available for free from ESRI's web site: http://www.esri.com).

OBTAINING THE DIGITAL DATA

The digital database package can be obtained in any of three ways:

1. Sending a tape with request

A 14 MB compressed tar file of the geologic map database and related files can be obtained by sending a tape with request and return address to:

San Fernando, CA 7.5' Geologic Database
c/o Database Coordinator
U.S. Geological Survey
345 Middlefield Road, M/S 975
Menlo Park, CA 94025

The compressed tar file will be returned on the tape. The acceptable tape types are:

1/4 inch, 150 MB cartridge tape
2.3 or 5.0 GB, 8mm Exabyte tape.

2. Anonymous ftp over the Internet

To obtain the tar file by anonymous ftp do the following:

cd local_directory	• go to a directory to receive the tar file
ftp wrgis.wr.usgs.gov	• make ftp connection with the USGS computer WRGIS
Name: anonymous	• use "anonymous" as your user name
Password: your email address	• use your email address as a password
cd pub/geologic	• go down to the pub/geologic directory
cd ca/of97-163	• go down to the open file directory
type binary	• change transfer type to binary
get sanfer.tar.gz	• copy the compressed tar file across Internet to the receiving directory
quit	• close the ftp connection

3. From the Western Region Geologic Information Web Page.

To obtain the tar file via the World Wide Web:

The U.S. Geological Survey now supports a set of graphical pages on the World Wide Web. Digital geologic publications (including this one) can be accessed via these pages. The web page for digital geologic publications from the Western Region (including this one) is "http://wrgis.wr.usgs.gov". Once at the main page, click on '**Geologic Map Databases**' under the heading '**Data Online**'; next click on '**California**.' Scroll down to get to the listing for this database. Set your web browser to save to a local disk and click on the link labeled 'sanfer.tar.gz' to download the compressed tar file that contains the San Fernando geologic map database.

EXTRACTING THE GEOLOGIC MAP DATABASE FROM THE TAR FILE

If you obtained the database package on tape:

put the tape in your tape drive	
cd local_directory	-go to a directory to receive the tar file
tar xvfb /dev/rstn 20	-/dev/rstn is the tape device with n an integer, this puts the tar file in local_directory; 20 is the block size of the tar file
gzip -d sanfer.tar.gz	-makes a 59 MB uncompressed tar file sanfer.tar
cd local_directory2	-go to the directory that will hold the directory sanfer (if different from local_directory)
tar xvfb {path to tar file}/sanfer.tar 20	-extract the sanfer directory from the tar file; 20 is the block size of the tar file.

If you obtained the database package by anonymous ftp or from the web page:

gzip -d sanfer.tar.gz	-makes a 59 MB uncompressed tar file sanfer.tar
cd local_directory2	-go to the directory that will hold the directory sanfer (if different from local_directory)
tar xvfb {path to tar file}/sanfer.tar 20	-extract the sanfer directory from the tar file.

Each of the processes described above will create a directory "sanfer" that contains the ARC export files and supporting files as described below. The directory structure at this point will look like this:

```
sanfer/
        sf-geol.e00
        sf-strc.e00
        sf-wells.e00
        sf-topo.e00
        sanfer.ps
        sanfer.txt
        import.aml
```

GEOLOGIC MAP DATABASE CONTENTS

The geologic map database consists of three separate layers and one base layer. Each of these layers (coverages) has been converted to uncompressed ARC/INFO export files. The ARC export files and the associated ARC/INFO coverages, as well as the additional digital material included in the database package, are described below:

ARC/INFO export file	Resultant Coverage	Description of Coverage
sf-geol.e00	sf-geol	Depositional contacts, faults, and unit labels
sf-strc.e00	sf-strc	Fold axes, strike and dip information
sf-wells.e00	sf-wells	Exploratory oil wells; supporting data given in Yerkes (1996), and Yerkes and Showalter (1990).
sf-topo.e00	sf-topo	Topographic base map taken from a scan of a composite negative of the San Fernando 7.5 minute quadrangle (contour interval = 40 ft.)

ASCII text files and PostScript plot files:

sanfer.ps	This file.
sanfer.txt	A text-only file containing an unformatted version of sanfer.ps
import.aml	ASCII text file in ARC Macro Language to convert these ARC export files to ARC coverages in ARC/INFO.

The following directory is produced in the process of converting the export files into ARC coverages:

info/	INFO directory containing the database files that accompany each ARC/INFO layer (coverage).

Once the ARC export coverages have been imported (see discussion below), the San Fernando (sanfer) directory, or ARC workspace, will look like this:

```
sanfer/
        info/
        sf-geol/
        sf-strc/
        sf-wells/
        sf-topo/
        sanfer.ps
        sanfer.txt
        import.aml
```

CONVERTING ARC EXPORT FILES

ARC export files are converted to ARC coverages using the ARC command IMPORT with the option COVER. In order to ease conversion and to maintain naming conventions, we have included an ASCII text file in ARC Macro Language that will convert all of the export files in the database into coverages and create the associated INFO directory. Change directories to the sanfer/ directory. From the ARC command line type:

Arc: &run import.aml

ARC export files can also be read by some other Geographic Information Systems. Please consult your GIS documentation to see if you can use ARC export files and the procedure to import them.

DIGITAL COMPILATION

The geologic map information was digitized from stable originals of the geologic maps at 1:24,000 scale. The author manuscripts (pencil on mylar) were scanned using a monochrome scanner with a resolution of 800 dots per inch. The scanned images were vectorized and transformed from scanner coordinates to projection coordinates with digital tics placed by hand at quadrangle corners. The scanned lines were edited interactively by hand using graphical user interface ALACARTE (Fitzgibbon, 1991, Fitzgibbon and Wentworth, 1991, Wentworth and Fitzgibbon, 1991). Scanning artifacts significant for display at a scale of 1:24,000 were corrected.

BASE MAPS

The base map layer (sf-topo) was prepared by scanning a scale-stable composite negative image of the San Fernando 7.5 minute topographic map (1972 edition). The negative was scanned using a monochrome scanner with a resolution of 400 dots per inch. The raster scan was converted to a GRID in ARC/INFO. The GRID was then vectorized and reprojected into State Plane Projection using the four corner tics as reference points. The arcs in the base layer have not been attributed. The base map is provided for reference only.

SPATIAL RESOLUTION

Uses of this digital geologic map 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 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 below the intended resolution of the database. Similarly, where this database is used in combination with other data of higher resolution, the resolution of the combined output will be limited by the lower resolution of these data.

FAULTS AND LANDSLIDES

This database is not sufficiently detailed or comprehensive to identify or characterize site-specific hazards represented by faults or landslides shown; the faults shown do not take the place of fault-rupture hazard zones designated by the California State Geologist (see Hart, 1988).

DATABASE SPECIFICS

The map databases consist of ARC coverages which are stored in State Plane (California coordinate system) projection (Table 1). Digital tics define a 2.5 minute grid of latitude and longitude in the geologic coverages corresponding with quadrangle corners and internal tics. In the base map layers, the tics define a 7.5 minute grid, corresponding with quadrangle corners.

Table 1 - *Map Projection*
The map is stored in State Plane projection

PROJECTION STATE PLANE	
UNITS METERS	-on the ground
ZONE 3426	-Arc/Info State Plane zone corresponding to California coordinate system zone 7
DATUM NAD27	
PARAMETERS	-none

The content of the geologic database can be described in terms of the lines and the areas that compose the map. Descriptions of the database fields use the terms explained in Table 2.

Table 2 - *Field Definition Terms*

ITEM NAME	name of the database field (item)
WIDTH	maximum number of digits or characters 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 lines (arcs) are recorded as strings of vectors and are described in the arc attribute table (Table 3). They define the boundaries of the map units, the boundaries of open bodies of water, and the map boundaries. These distinctions, including the geologic identities of the unit boundaries, are recorded in the LTYPE field according to the line types listed in Tables 4 and 5.

Table 3 - *Content of the Arc Attribute Tables* (SF-GEOL.AAT, SF-STRC.AAT)

ITEM NAME	WIDTH	OUTPUT	TYPE	N. DEC	
FNODE#	4	5	B		starting node of arc (from node)
TNODE#	4	5	B		ending node of arc (to node)
LPOLY#	4	5	B		polygon to the left of the arc
RPOLY#	4	5	B		polygon to the right of the arc
LENGTH	4	12	F	3	length of arc in meters
<coverage>#	4	5	B		unique internal control number
<coverage>-ID	4	5	B		unique identification number
LTYPE	35	35	C		line type (see Tables 4 and 5)
SEL	1	1	I		user defined field used to save a selected set
SYMB	3	3	I		user defined field used to save symbol assignments (such as color)

Table 4 - *Line Types Recorded in the LTYPE Field* (SF-GEOL)

contact, approx. located
contact, inferred
fault, approx. located
fault, certain
fault, concealed
fault, concealed, queried
fault, inferred
fault, inferred, queried
map boundary, certain
photo lineament
reverse fault, approx. located
reverse fault, concealed
s.s. fault, approx. located
s.s. fault, r.l., approx. located
scratch boundary
shoreline, approx. located
thrust fault, approx. located
thrust fault, concealed
thrust fault, inferred

Table 5 - *Line Types Recorded in the LTYPE Field* (SF-STRC)

f.a., anticline, approx. located
f.a., syncline, approx. located
f.a., syncline, concealed

AREAS

Map units (polygons) are described in the polygon attribute table (Table 6) The identities of the map units from compilation sources are recorded in the PTYPE field by map label (Table 7). For a full description of the map units see Yerkes (1996).

Table 6 - *Content of the Polygon Attribute Tables* (SF -GEOL.PAT)

ITEM NAME	WIDTH	OUTPUT	TYPE	N. DEC	
AREA	4	12	F	3	area of polygon in square meters
PERIMETER	4	12	F	3	length of perimeter in meters
<coverage>#	4	5	B		unique internal control number
<coverage>-ID	4	5	B		unique identification number
PTYPE	35	35	C		unit label (see Table 7)
SEL	1	1	I		user defined field used to save a selected set
SYMB	3	3	I		user defined field used to save symbol assignments (such as color)

Table 7 - *Map Units* (SF-GEOL)

QTp	Qp	Tmc1	dgn
Qal	Qp?	Tmc2	gb
Qao	Qpa	Tmc2?	gd
Qay1	Qs	Tmz	gd/gn
Qay2	Qs?	Tsr	pCm
Qco	Qsu	Tsrl	pl
Qf	Qt	Tt?	pm
Qfo	Tb	Tvz	res
Qfp	Tcs	Tw	sp
Qls	Td	Twp	
Qls*	Tm	af	

POINTS

Point information (strikes and dips, well localities) is recorded as coordinate and related information and is described in the Point Attribute Table (Tables 8 and 10). The identities of point types recorded in the PTTYPE field of the SF-STRC.PAT table are shown in Table 9.

Table 8 - *Content of the Point Attribute Tables* (SF-STRC.PAT)

ITEM NAME	WIDTH	OUTPUT	TYPE	N. DEC	
AREA	4	12	F	3	not used
PERIMETER	4	12	F	3	not used
<coverage>#	4	5	B		unique internal control number
<coverage>-ID	4	5	B		unique identification number
PTTYPE	35	35	C		point type (see Table 9)
DIP	3	3	I		dip angle in degrees
STRIKE	3	3	I		strike angle in degrees
SEL	1	1	I		user defined field used to save a selected set
SYMB	3	3	I		user defined field used to save symbol assignments (such as color)

Table 9 - *Point Types* (SF-STRC)

bedding
foliation
ot bedding
vert foliation and bedding

Table 10 - *Content of the Point Attribute Tables* (SF-WELLS.PAT)

ITEM NAME	WIDTH	OUTPUT	TYPE	N. DEC	
AREA	4	12	F	3	not used
PERIMETER	4	12	F	3	not used
<coverage>#	4	5	B		unique internal control number
<coverage>-ID	4	5	B		unique identification number
PTTYPE	35	35	C		point type
SAMNO	35	35	C		sample number
SEL	1	1	I		user defined field used to save a selected set
SYMB	3	3	I		user defined field used to save symbol assignments (such as color)

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