README *for*:

DIGITAL GEOLOGIC MAP OF THE BUTLER PEAK 7.5' QUADRANGLE, SAN BERNARDINO COUNTY, CALIFORNIA

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Open-File Report OF 00-145
Version 1.0

2000

Prepared in cooperation with:

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INTRODUCTION

Open-File Report 00-145, is a digital geologic map database of the Butler Peak 7.5′ quadrangle that includes (1) ARC/INFO (Environmental Systems Research Institute, http://www.esri.com) version 7.2.1 Patch 1 coverages, and associated tables, (2) a Portable Document Format (.pdf) file of the Description of Map Units, Correlation of Map Units chart, and an explanation of symbols used on the map, **btlrpk_dcmu.pdf**, (3) a Portable Document Format file of this Readme, **btlrpk_rme.pdf** (the Readme is also included as an ascii file in the data package), and (4) a PostScript plot file of the map, Correlation of Map Units, and Description of Map Units on a single sheet, **btlrpk.ps**. No paper map is included in the Open-File report, but the PostScript plot file (number 4 above) can be used to produce one. The PostScript plot file generates a map, peripheral text, and diagrams in the editorial format of USGS Miscellaneous Investigation Series (Map I-series) maps. This README file describes the digital data, such as types and general contents of files comprising the database. Information is also provided on how to both extract and plot the map. Metadata information can be accessed at http://geo-nsdi.er.usgs.gov/cgi-bin/publication?open-file.

Within the geologic map database, map units are identified by standard geologic map criteria such as formation-name, age, and lithology. Even though this is an author-prepared report, every attempt has been made to closely adhere to the stratigraphic nomenclature of the U. S. Geological Survey. Descriptions of the units and geologic map information are coded into polygon, arc, and point tables (.pat, .aat, and .pat, respectively). Detailed information and descriptions of units can be obtained from the Description of Map Units accessible by plotting either the PostScript file of the geologic map or the .pdf file.

HOW TO OBTAIN PAPER PLOTS

To obtain paper plots of the geologic map and accompanying text, download the plot package listed below.

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 are extracted.

Data Package

All files listed below are in a compressed tar file named **btlrpk.tar.gz** (3 MB); see section below titled, SOFTWARE UTILITIES.

ARC/INFO interchange files	Butler Peak coverages	Contains
btlrpk_geo.e00	btlrpk_geo	Contacts, faults, and geologic unit labels as annotation in annotation subclass, anno.geo
btlrpk_ldr.e00	btlrpk_ldr	Annotation leaders
btlrpk_pts.e00	btlrpk_pts	Attitudes and their dip values. Dip values plotted as annotation.
lines.rel.e00	lines.rel	Line dictionary (Matti and others, 1998b)
points.rel.e00	points.rel	Point dictionary (Matti and others, 1998c)

The directory, info/, is produced in the process of importing interchange files to ARC coverages in ARC/INFO. The Butler Peak info/ directory contains:

Feature Attribute tables

Polygon attribute table	btlrpk_geo.pat
Arc attribute tables	btlrpk_geo.aat, btlrpk_ldr.aat
Point attribute tables	btlrpk_pts.pat

Additional tables*

lines.rel	Dictionary, contains all SCAMP line codes (Matti and others, 1998b)
points.rel	Dictionary, contains all SCAMP point codes (Matti and others, 1998c)

*These tables contain complete dictionary information for both lines and points.

Raster file	Resultant image	Contains
btlrpk.tif	Butler Peak basemap	Topographic base from 500 dpi scan of USGS Butler Peak 7.5′ quadrangle, 1967: registered and rectified to the Butler Peak 7.5′ quadrangle, in Geotiff format.

ASCII text files

Readme.txt	Readme text (this file)

Plot Package

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

Compressed file	Resultant image	Contains
btlrpk.ps.gz	btlrpk.ps	PostScript plot file

The PostScript file is a compressed UNIX file requiring a gzip compatible program to uncompress it. Uncompressed, it will plot a 1:24,000 scale, full color geologic map of the Butler Peak quadrangle on the topographic base, including a Correlation of Map Units diagram, and the Description of Map Units. The plot is in the editorial format of the U.S. Geological Survey's Miscellaneous Investigation (Map I) map series, and is approximately 47 x 33 inches in size. The file has been successfully plotted on Hewlett-Packard large format plotters, models HP650C, HP755CM, and HP2500C.

Other files

Readme.pdf	PDF version of this document
btlrpk _dcmu.pdf	Description of Map Units, Correlation of Map Units, and symbols used

btlrpk_met.txt	Federal Geographic Data Committee (FGDC) compliant metadata file derived from the geologic coverage, btlrpk_geo; plain text file.

The following interchange files of the respective symbol sets used to plot the full geologic map sheet:

geoSCAMP2.lin.e00	Line set
geoSCAMP2.mrk.e00	Points (marker set)
scamp2.shd.e00	Colors (shade set)
geology2.shd.e00	Patterns (shade set)

SOFTWARE UTILITIES

Files which have the .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

The data package is 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/formats.html. One such utility is WinZip, available at http://www.winzip.com (WinZip can also decompress files).

Files in the plot package have been prepared to produce optimum plots using the ARC/INFO compatible, SCAMP derived symbolsets listed below. These shade and marker sets are included in the **btlrpk.ps.gz** file, and are also available from the Southern California Areal Mapping Project (SCAMP) web site at
http://wrgis.wr.usgs.gov/docs/ncgm/scamp/scamp.html
At the above web site, click on 'Scamp GIS Activities'

geoSCAMP2.lin.e00	Lines
geoSCAMP2.mrk.e00	Points
scamp2.shd.e00	Colors
geology2.shd.e00	Patterns

HOW TO OBTAIN THE DIGITAL FILES

The export files, and subsequently the data and plot files, constituting the geologic map database of this Miscellaneous Field Studies report may be obtained in several ways listed below:

1. The files can be obtained via the Web from Western Region Geologic Information Server. Go to the web page at http//wrgis.usgs.gov/openfile/of00-145 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/of00-145. Note: .e00 files are best transferred using ascii mode

3. The U.S.G.S. will download requested data files onto user-submitted tapes/CDs.

HOW TO EXTRACT THE GEOLOGIC MAP DATABASE FROM THE TAR FILE

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 the appropriate tar utility.

Digital database

To do this	Type this at the Unix command prompt
Uncompress btlrpk.tar.gz to btlrpk.tar	gzip -d btlrpk.tar.gz (or use gzip utility of choice)
Go to the directory that will hold the directory Butler Peak (if different from local_directory)	cd local_directory
Extract the Butler Peak directory from the tar file	tar-xvbv {path to tar file}/btlrpk .tar (or use tar utility of choice)

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

Butler Peak/
- btlrpk _geo.e00
- btlrpk _pts.e00
- lines.rel.e00
- points.rel.e00

- btlrpk.tif
- geology2.shd.e00
- geoSCAMP2.lin.e00
- geoSCAMP2.mrk.e00
- SCAMP2.SHD.e00
- Readme.txt

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

- btlrpk.ps.gz
- Readme.pdf

btlrpk_dcmu.pdf
btlrpk_met.txt

PostScript plot file

Uncompress a 17 MB uncompressed file, btlrpk.ps (full map) by typing gzip -d btlrpk.ps.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 EXPORT FILES

The ARC interchange (.e00) files are converted to ARC coverages using the ARC command IMPORT with the appropriate <option>.

Change directories to the btlrpk/ directory. From the ARC command line type:
import <option> <interchange_file> <output>
e.g. import cover btlrpk_geo btlrpk_geo

ARC interchange files can also be read by some other Geographic Information Systems, including ArcView (ESRI) and MapInfo (http://www.mapinfo.com). 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 scanned (initial raster scan in MS-DOS TIF format, 1200 dots per inch) from a base-stable original (scribeguide to clear-film, right-reading, 0.007 mil thickness, blackline positive) of the geologic map at 1:24,000 scale. The auto-vectorized, non-attributed scan was prepared by Optronics Specialty Company, Inc. and converted to an ARC coverage using the ARC command dxfarc <input dxf file> <output map name>. Registration and transformation were subsequently completed. Lines, points, and polygons were edited using standard ARC/INFO commands. Digitizing and editing artifacts significant enough to display at a scale of 1:24,000 were corrected.

Base map

The base map image (btlrpk.tif, Geotiff format) was prepared by scanning a scale-stable clear film of the U.S Geological Survey, 1:24,000 Butler Peak 7. 5′ quadrangle (1967) 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 Butler Peak 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 some places, the resolution of the combined output will be limited by the lower resolution data.

Map accuracy standards

Until uniform National geologic map accuracy 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 coding as not meeting map accuracy standards, are generally located to 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.

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 7.5 minute grid of latitude and longitude in the geologic coverages corresponding to the 7.5 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	0.0000000000
Y shift	0.0000000000
Parameters	-117 3 45.000 longitude of central meridian 34 15 0.000 latitude of projection's 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 (polygons) that compose the map. Definitions of the database items are explained in Table 2.

Table 2 — Item Definition Terms

ITEM NAME	Name of the database field
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—Lines are recorded as strings of arcs and are described in arc attribute (.aat) tables (Table 3). They define the boundaries of the map units, faults, the boundaries of open bodies of water, the map boundaries, and linear elements. These distinctions, including the geologic identities of the unit boundaries, are recorded in the L-TAG field according to the line types listed in Table 4. In addition, **btlrpk_ldr** contains lines that represent annotation leaders for unit labels. Btlrpk_ldr linear elements are attributed with only a single item, l-symb, in addition to the ARC/INFO assigned attributes.

Table 3 — Items Arc Attribute Table (**btlrpk_geo.aat**)

ITEM NAME	WIDTH	OUTPUT	TYPE	N. DEC	
FNODE#	4	5	B		internal node number, identifies the origin of an arc (from-node)
TNODE#	4	5	B		internal node number, identifies the end of an arc (to-node)
LPOLY#	4	5	B		internal number, left polygon
RPOLY#	4	5	B		internal number, right polygon
LENGTH	8	18	F	5	length of arc in meters
BTLRPK_GEO#	4	5	B		internal arc number (value assigned by

				ARC/INFO)
BTLRPK_GEO-ID	4	5	B	user-ID (values assigned by the user)
L-SYMB	3	3	I	Line graphic. Calls line-type from line set geoSCAMP2.lin
L-TAG	25	25	C	Line tag. Links line segments to their definitions (in lines.rel)

Table 4 — Line Types Recorded in the L-TAG field (**btlrpk_geo.aat**) and an abbreviated summary of the corresponding parsed description in L-EXP in lines.rel

L-TAG line tag	Line description
C17	Contact, landslide, location meets map accuracy standard
C19	Contact, landslide, inferred, location may not meet map accuracy standard
C29	Contact, sedimentary, location meets map accuracy standard
C30	Contact, sedimentary, location may not meet map accuracy standard
C31	Contact, sedimentary, inferred, location may not meet map accuracy standard
C49	Contact, igneous, location meets map accuracy standard
C50	Contact, igneous, location may not meet map accuracy standard
C51	Contact, igneous, inferred, location may not meet map accuracy standard
C59	Contact, igneous, gradational, location meets map accuracy standard
C67	Contact, metamorphic, inferred, location may not meet map accuracy standard
C70	Contact, metamorphic, inferred, location may not meet map accuracy standard
C75	Contact, metamorphic, gradational, observable, location meets map accuracy standard
CL1	Cartographic line, map boundary
F1	Fault, high angle, slip unspecified, generic, location meets map accuracy standard
F13	Fault, high angle, slip unspecified, inferred, location may not meet map accuracy standard
F19	Fault, high angle, slip unspecified, inferred beneath mapped covering unit, location may not meet map accuracy standard
F31	Fault, high angle, slip unspecified, generic, inferred, location may not meet map accuracy standard
F37	Fault, high angle, slip unspecified, generic, inferred beneath mapped covering unit, location may not meet map accuracy standard
F220	Fault, intruded, preintrusive existence inferred
FZ3	Fault zone boundary of cataclastic zone
LT2	Lineamant, aligned topographic saddles, located well but may not meet map accuracy standard

Polygons—Geologic map units (polygons) are described in the polygon attribute table (Table 5). Map units are identified by the LABL item (Table 6). SCAMP geologic maps can be encoded with detailed, polygon-specific geologic information on a polygon-by-polygon basis, so that within a quadrangle, lateral variations in a particular map unit can be recorded in the map database. Polygons whose characteristics differ from the unit in general, are identified through the TAG item (Table 7), which allows variations that are unique to specific polygons to be described by adding letters to the map unit designation used in LABL. Polygons of each map unit for which the TAG item ends with the letter 'A' (eg, KbpA), are considered to be most typical of the map unit overall. Detailed encoding of polygons is not available on this version of the Butler Peak quadrangle, but the data-base is here set up so that encoding can be completed on the next version. For traditional descriptions of the map units, see the Portable Document Format file **btlrpk_dmu.pdf**, or a map generated from the PostScript plot file.

Table 5 — Items, Polygon Attribute Table (**btlrpk_geo.pat**)

ITEM NAME	WIDTH	OUTPUT	TYPE	N. DEC	
AREA	8	18	F	5	Area of polygon in square meters
PERIMETER	8	18	F	5	Length of each polygon boundary, in meters
BTLRPK_GEO#	4	5	B		Internal polygon number (assigned by ARC/INFO)
BTLRPK_GEO-ID	4	5	B		User-ID (assigned by user)
TAG	25	25	C		Reference label for subgroups of polygons, not subscripted.
LABL	35	35	C		Map unit label for each polygon. In the polygon attribute table, map units are not subscripted
PLABL	35	35	C		Label used to generate plot label. Unit label is not subscripted. Contains replacement characters that provide age stratigraphic characters.
SHD	3	3	I		Polygon color from shadeset SCAMP2.SHD (for Hewlett-Packard large format plotters such as HP650, HP755CM, and HP2500)
SHDFIL	3	3	I		Polygon fill pattern from shadeset geology2.shd
SHDPS	3	3	I		Polygon color from shadeset SCAMP2.SHD (for PostScript plotting)
NAME	200	200	C		Geologic name of each unit

Table 6 — Map Units (LABL)

Cbk	KJls	Krl	Qa	$Qvof_1$
Cc	KJos	Kwc	Qaf	$Qvof_2$

Cw	KJqd	Mm	Qc	Qvols
Cz	KJsp	Mzu	Qf	Qw
Ds	Kbp	PPbs	Qf_1	Qya
Jc	Kcm	Prcc	Qf_2	Qya_1
Jcr	Kcr	Prgsq	Qls	Qyc
Jd	Kdh	Prlsm	Qof	Qyf
Jrr	Kgm	Prqc	Qof_1	Qyf_1
Jsc	Kh	Prsc	Qols	Qyls
Jwm	Kk	Prscq	Qos	Qys
KJdd	Kl	Prsm	Qs	Qyt
KJdg	Klm	Prsq	Qs_1	Trf
KJgm	Kms	Prsu	Qt	Trfl
KJhs	Kr	QTs	Qvof	Trlm

Mz=Mesozoic (Mz) PP=Pennsylvian (IP) C=Cambrian (Є)
Pr=Proterozoic (P) Tr=Triassic (Tr)

Table 7 — Map Units (TAG)

CbkA	KJlsA	KrlA	QaA	$Qvof_1A$
CcA	KJosA	KwcA	QafA	$Qvof_2A$
CwA	KJqdA	MmA	QcA	QvolsA
CzA	KJspA	MzuA	QfA	QwA
DsA	KbpA	PPbsA	Qf_1A	QyaA
JcA	KcmA	PrccA	Qf_2A	Qya_1A
JcrA	KcrA	PrgsqA	QlsA	QycA
JdA	KdhA	PrlsmA	QofA	QyfA
JrrA	KgmA	PrqcA	Qof_1A	Qyf_1A
JscA	KhA	PrscA	QolsA	QylsA
JwmA	KkA	PrscqA	QosA	QysA
KJddA	KlA	PrsmA	QsA	QytA
KJdgA	KlmA	PrsqA	Qs_1A	TrfA
KJgmA	KmsA	PrsuA	QtA	TrflA
KJhsA	KrA	QTsA	QvofA	TrlmA

Mz=Mesozoic (Mz) PP=Pennsylvian (IP) C=Cambrian (Є)
Pr=Proterozoic (P) Tr=Triassic (Tr)

Points—Point information (structural attitudes) is recorded as coordinate and related information and is described in a point attribute table (.pat) (Table 8). The identities of point types recorded in the P-TAG field of the table are shown in Table 9. The orientation of geologic point data is based upon application of the right-hand rule.

Table 8 — Items, Point Attribute Table (**btlrpk_pts.pat**) (quantitative data)

ITEM NAME	WIDTH	OUTPUT	TYPE	N. DEC	
AREA	8	18	F	3	Not used

PERIMETER	8	18	F	3	Not used
BTLRPK_PTS#	4	5	B		Internal number assigned by ARC/INFO
BTLRPK_PTS-ID	4	5	B		User assigned identification number
P-DIP	3	3	I		Dip of planar and linear structures
P-STRIKE	3	3	I		Azimuth of planar and linear structures
P-SYMB	3	3	I		Calls point-type from marker set geoSCAMP2.mrk
P-TAG	25	25	C		Links points to data table points.rel
P-UNIQUE	200	200	C		Attributes of specific points within a point type
P-AGECON	50	50	C		Confidence of geologic age assignment
P-SOURCE	200	200	C		Source of compiled data
P-AGE	100	100	C		Geologic age of point feature if determined
P-PLUNGE	3	3	I		Plunge of linear elements
P-DIPDIR	3	3	I		Azimuthal direction of dip (assuming the right-hand rule)

Table 9 — Point Types (quantitative) (P-TAG) and a brief summary of the corresponding parsed description in P-EXP in points.rel

FN13	Foliation, primary igneous, inclined
FN31	Foliation, layered cataclastic rock, inclined
FN42	Foliation, metamorphic, inclined
FN43	Foliation, metamorphic, vertical
L14	Lineation, crushed and streaked mineral grains, inclined
L22	Lineation, metamorphic, aligned mineral grains
L37	Lineation, metamorphic, minor fold axes

REFERENCES

Environmental Systems Research Institute, Inc, 1991, ARC/INFO command references 6.0: Proprietary software manual

Matti, J.C., Miller, F.K., Powell, R.E., Kennedy, S.A., and Cossette, P.M., 1998a, Geologic-polygon attributes for digital geologic map databases produced by the Southern California Areal Mapping Project (SCAMP), Version 1.0: U.S.Geological Survey Open-File Report 97-860

Matti, J.C., Powell, R.E., Miller, F.K., Kennedy, S.A., Ruppert, K.R., Morton, G.L., and Cossette, P.M., 1998b, Geologic-line attributes for digital geologic map databases produced by the Southern California Areal Mapping Project (SCAMP), Version 1.0: U.S.Geological Survey Open-File Report 97-861

Matti, J.C., Miller, F.K., Powell, R.E., Kennedy, S.A., Bunyapanasarn, T.P., Koukladas, Catherine, Hauser, R.M., and Cossette, P.M., 1998c, Geologic-point attributes for digital geologic map databases produced by the Southern California Areal Mapping Project (SCAMP), Version 1.0: U.S.Geological Survey Open-File Report 97-859