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

1:100,000-SCALE TOPOGRAPHIC CONTOURS DERIVED FROM 30-METER DIGITAL ELEVATION MODELS, SAN FRANCISCO BAY REGION, CALIFORNIA: A DIGITAL DATABASE

by

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Open-File Report 01-101
Version 1.0

2001

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This database, identified as “1:100,000-scale topographic contours derived from 30-meter digital elevation models, San Francisco Bay region, 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.

INTRODUCTION

This report presents a consistent set of topographic contours in vector form for all eleven 30x60-minute quadrangles that contain the 9-county San Francisco Bay region (figure 1). These contours were prepared because only three of these quadrangles are covered by 1:100,000-scale hypsographic digital line graphs (DLG's) available from the USGS EROS Data Center (http://edc.usgs.gov/glis/hyper/guide/100kdlgfig/states/CA.html).

The contours were prepared by contouring an areally continuous 30-m altitude grid (the USGS National Elevation Dataset, or NED; see below). They thus differ in source from the standard DLG's, which are prepared from 1:100,000-scale contour drawings. Their spatial detail is similar to 1:100,000-scale contours, however, rather than the 1:24,000-scale contours from which the NED elevations were determined.

The new contour dataset consists of contours at a 50-m vertical interval that are attributed both by elevation and as 250-m index and 50-m intermediate contours, together with 10-m supplemental contours in all the larger low-slope areas (both in valleys and on ridges). This inclusion of consistent 10-m supplemental contours greatly enhances the effectiveness of the contours in low-slope areas.

The report consists of 26 numbered parts, which represent text, spatial data, and 1:100,000-scale map graphics. Most of the files are provided in two or three different digital formats.

Parts 1 and 2 are texts:

1. This pamphlet, which describes the dataset and how to obtain it.
2. Revision list, which lists the digital files as they are available over the Net and records version number and any revisions.

Parts 3 through 13 are digital spatial databases, one for each of the eleven 30x60-minute quadrangles:

3. Bodega Bay
4. Healdsburg
5. Lodi
6. Monterey
7. Napa
8. Palo Alto
9. Point Arena
10. Sacramento
11. San Francisco
12. San Jose
13. Stockton

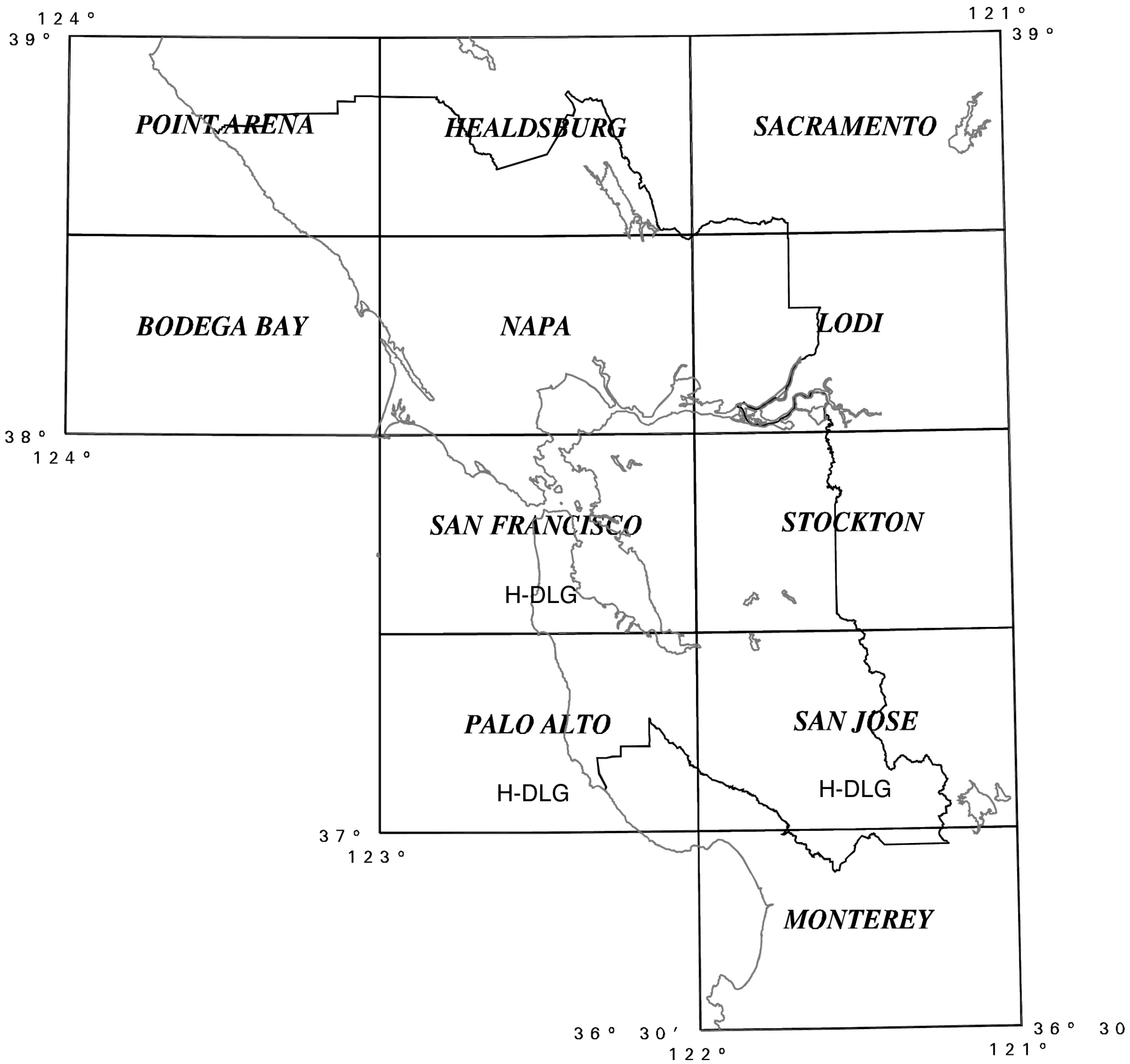

Figure 1. Index map of 30 X 60-minute quadrangles included in this report. H-DLG indicates those quadrangles for which USGS hypsographic DLG's are available.

Similarly, parts 14 through 24 are 1:100,000-scale map graphics of the contours, together with drainage from the hydrographic DLG's, for each of the eleven 30x60-minute quadrangles, designated as map sheets 1 to11 on the face of the maps:

14. Bodega Bay – map sheet 1
15. Healdsburg – map sheet 2
16. Lodi – map sheet 3
17. Monterey – map sheet 4
18. Napa – map sheet 5
19. Palo Alto – map sheet 6
20. Point Arena – map sheet 7
21. Sacramento – map sheet 8
22. San Francisco – map sheet 9
23. San Jose – map sheet 10
24. Stockton – map sheet 11

Parts 25 and 26 are database and plotfile packages that contain material for all eleven 30x60 minute quadrangles.

The vector database is provided both as uncompressed ARC/INFO export files in Version 7 format and as ArcView Shape files. The spatial database can be used in ARC/INFO by importing the ARC export files. Other GIS packages, including MapInfo and ArcView, may use either the ARC export or Shape files.

The maps are presented as digital plot files in PostScript and PDF format (image size 27 x 36 inches each). The PostScript map images (1-31 MB) can be used for viewing or plotting in computer systems with sufficient capacity, and the considerably smaller PDF files (0.6-7.0 MB) can be viewed or plotted in full or in part from Adobe ACROBAT running on Mac, PC, or UNIX platforms. The appearance of the maps in plots (colors and line weights) will depend on file type and the particular plotter that is used.

The contours were prepared in vector form with version 7.2.1 of ARC/INFO, a commercial Geographic Information System (Environmental Systems Research Institute [ESRI], Redlands, California). The map plot files were assembled as graphics files in ARC/INFO from the contours and standard USGS hydrographic DLG's (http://edc.usgs.gov/glis/hyper/guide/100kdlgfig/states/CA.html) and then converted to PostScript and PDF formats.

Acknowledgements

The initial processing of the NED data for the whole of California was done by J. E. Robinson and S. R. Walter for general use in the USGS Earthquake Hazards Program.

COMPARISON WITH DLG'S

The new contours are consistent across the region in method of preparation and fit the NED elevations. Their detail is similar to 1:100,000-scale contours, rather than reproducing the detail of 1:24,000 contours, because of the 30-meter spacing of elevations in the NED. Unpublished USGS work by S. Ellen and R. Mark in the 1980's demonstrated that to reproduce the full detail of 1:24,000 contours, the elevations must be gridded at a spacing of 10 meters.

We examined the relation between the new contours and the available DLG contours as a test of quality and consistency. This comparison revealed inconsistent horizontal offsets between the new contours and the 1:100,000 DLG contours and, unexpectedly, the 1:24,000 contours as well. In the San Jose 1:100,000 quadrangle, for example, equivalent new contours are approximately 60 meters southwest of the DLG contours, whereas in the Palo Alto quadrangle, the new contours are 20-30 meters east to southeast of the DLG contours.

The NED was prepared from digital versions of 1:24,000 contours, and we would thus expect contours prepared directly from it to be more accurate than the smoothed 1:100,000 DLG contours. We find, however, that the new contours also differ from 1:24,000-scale hypsographic DLG's in the same comparison areas, and in inconsistent fashion. In the Mindego Hill 7.5-minute quadrangle (Palo Alto 30X60-minute quadrangle), for example, the new contours are offset less than 5 meters from the 1:24,000-scale DLG contours, whereas in the Gilroy quadrangle (San Jose 30X60-minute quadrangle) the new contours are approximately 30-40 meters southwest of the DLG contours. It is not clear why such disparity exists, unless some of the original gridding used in the NED was done using digital contours other than the present 1:24,000 hypsographic DLG's.

The new 1:100,000-scale contours fit quite well with the 1:100,000 hydrographic DLG's, as can be seen by inspection of the map sheets, except for the 0 contour (see below). Rivers and streams follow the bottoms of valleys as represented by the contours and water bodies lie in topographic depressions.

The new 0-meter contours differ in two ways from shore lines in the corresponding 1:100,000-scale hydrographic DLG's. As with other contours in very low slope areas (see discussion of smoothing below in Preparation of the Contours), the 0 contours were blocky and irregular, and remain irregular even after having been smoothed. Their locations are largely similar to but not precisely along the DLG shore lines, with departures least where slopes are greatest. The DLG shore lines are probably more accurate than these 0-meter contours. In some areas, however, the 0-meter contours depart radically from the DLG water boundaries and delineate areas where the land lies below sea level.

PREPARATION OF THE CONTOURS

The National Elevation Dataset (NED: U.S. Geological Survey, Eros Data Center) in its initial form (January, 1999) provided a consistent and continuous set of elevations of the ground surface at approximately 30-meter spacing (actually one arc second or 27.753 meters) for the whole San Francisco Bay region. The NED represents a compilation of original 7.5-minute blocks of elevations (USGS digital elevation models, or DEM's) that were prepared from 1:24,000-scale topographic contours. Boundary matching and other automated smoothing of artifacts make the NED continuous for the region, and thus an ideal basis for digital preparation of elevation contours of the region.

We worked with a version of that dataset that had been processed in ARC/INFO for other purposes by assembly of 1-degree data blocks into a continuous dataset, reprojection from geographic (decimal degrees) to Transverse Mercator using bilinear interpolation, and conversion of metric elevations from floating point to integer values. We subdivided this continuous grid into the 30x60-minute blocks that cover the 9-county Bay region and contoured those grids at a 10-meter vertical interval. The resulting vector contours were edited and assigned attributes, and then reprojected to UTM to match the projection of the DLG's and our other datasets for the region.

The contouring was accomplished using the ARC command LATTICECONTOUR with the following arguments:

Interval	- 10	(meters)
Base contour	- 0	(meters)
Contour item	- ELEV	(the database field in which contour elevation was recorded.)
Weed tolerance	- 1	(meter – the minimum ground distance between data points along individual contours)
Z factor	- 1	(the number of ground x,y units in 1 z unit)

The raw 10-meter contours were separated into a 50-meter dataset and a supplemental 10-meter dataset, and attributes were assigned to distinguish 250-meter index contours, 50-meter intermediates, and 10-meter supplementals (Table 3). The 10-meter contours were edited to eliminate all but those that (1) lie in low-slope areas (both in valleys and on ridges), such that they help define otherwise unrepresented shapes but are not too closely spaced for graphic presentation at 1:100,000, and (2) permit display of all four supplementals between adjacent intermediate contours. Some lines were then edited to eliminate artifacts and smooth meaningless detail.

Short isolated lines that appeared as 'dust' in the dataset were deleted. Most of this 'dust' occurred in organized rows as short (< 10 meters) lines in the 0-50 meter elevation range. The dust lines were produced upslope of longer, continuous contour lines where grid elevations decline to lower elevation values for a short distance and then rise again. For example, a line of elevation cells is located at an elevation of 10 meters and directly uphill the elevation values are 11 meters. But a few cells uphill of the 11-meter cells have interspersed 10-meter elevation values. These interspersed 10-meter cells produce the small, scattered lines we refer to as dust.

Some contour lines at low elevations (0-50 meters) were smoothed to remove an angular and blocky appearance on a grid-cell scale. This blockiness is produced where integer grid values fall exactly on a contour value. This is not an artifact, but rather an exact contouring of the grid data. The smoothing was accomplished in ARCEDIT by splining, first at a spacing (GRAIN) larger than the irregularities and then at a smaller spacing to round angular corners, and finally by weeding out unneeded vertices. Typical GRAIN settings for the SPLINE's were 75 and 25, and the weeding was accomplished using GENERALIZE with a tolerance of 4.

The vector contours were then reprojected from Transverse Mercator to Universal Transverse Mercator (table 1).

SPATIAL RESOLUTION

The digital database should not be used in ways that violate the spatial resolution of the data. Although the digital form of the data removes the physical constraint imposed by the scale of a paper map, the detail and accuracy inherent in map scale are also present in the digital data. Use of the database at scales larger than 1:100,000 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 this database.

DATABASE CONTENTS

The report consists of digital files representing the twenty-four separate parts of the report and two data packages. Most of the files are presented in more than one digital format. The names of the files are unique designators based on the report identifier, of01-101, followed by part numbers and an extension indicating file type. Some of the files have been bundled in tape archive files (tar files; .tar extension) and the larger ones have been compressed with gzip, yielding a final .gz extension (see Presentation, below). The files and their identities are as follows:

1. Open-File Pamphlet: The text of the open-file pamphlet (this text), which describes the database and how to obtain it.

   1a. of01-101_1a.txt 30 Kb ASCII file,

   1b. of01-101_1b.ps   PostScript file, 1 MB

   1c. of01-101_1c.pdf   PDF file, 0.3 MB

2. Revision List: A list of the parts of the report (including bundled packages of parts) and at what version number of the report each was last revised (if at all), followed by a chronologic list that describes any revisions (see REVISIONS, below).

   2a. of01-101_2a.txt   ASCII file.

3 to 13: The line databases representing the contour lines for each of the 30x60-minute quadrangles in both (a) ARC export and (b) ARCVIEW Shape formats. The ARC export coverages are compressed and the ARCVIEW Shape files for each quadrangle are bundled in a compressed tar file. When opened, these tar files yield three line files named [prefix]conts.dbf, [prefix]conts.shp, and [prefix]conts.shx (where prefix is the two-character quadrangle designator).

   3a. of01-nnn_3a.e00.gz – Bodega Bay quadrangle: compressed ARC export coverage containing lines (0.3 MB, uncompresses to 1.4 MB). Import.aml will name this coverage bo-conts.
   3b. of01-101_3b.tar.gz -- Bodega Bay quadrangle: ARCVIEW Shape line files bundled as one compressed tar file (0.2 MB, uncompresses to 0.8 MB). When opened, the tar file yields line files boconts.dbf, boconts.shp, and boconts.shx.
   4a. of01-101_4a.e00.gz – Healdsburg quadrangle: compressed ARC export coverage containing lines (6.4 MB, uncompresses to 28 MB). Import.aml will name this coverage hb-conts.
   4b. of01-101_4b.tar.gz -- Healdsburg quadrangle: ARCVIEW Shape line files bundled as one compressed tar file (5 MB, uncompresses to 24 MB). When opened, the tar file yields line files hbconts.dbf, hbconts.shp, and hbconts.shx.
   5a. of01-101_5a.e00.gz – Lodi quadrangle: compressed ARC export coverage containing lines (0.9 MB, uncompresses to 4 MB). Import.aml will name this coverage lo-conts.
   5b. of01-101_5b.tar.gz -- Lodi quadrangle: ARCVIEW Shape line files bundled as one compressed tar file (0.7 MB, uncompresses to 24 MB). When opened, the tar file yields line files loconts.dbf, loconts.shp, and loconts.shx.
   6a. of01-101_6a.e00.gz – Monterey quadrangle: compressed ARC export coverage containing lines (5 MB, uncompresses to 21 MB). Import.aml will name this coverage mo-conts.
   6b. of01-101_6b.tar.gz -- Monterey quadrangle: ARCVIEW Shape line files bundled as one compressed tar file (4 MB, uncompresses to 17 MB). When opened, the tar file yields line files moconts.dbf, moconts.shp, and moconts.shx.
   7a. of01-101_7a.e00.gz – Napa quadrangle: compressed ARC export coverage containing lines (4.4 MB, uncompresses to 19 MB). Import.aml will name this coverage na-conts.
   7b. of01-101_7b.tar.gz -- Napa quadrangle: ARCVIEW Shape line files bundled as one compressed tar file (3 MB, uncompresses to 17 MB). When opened, the tar file yields line files naconts.dbf, naconts.shp, and naconts.shx.

8a. of01-101_8a.e00.gz – Palo Alto quadrangle: compressed ARC export coverage containing lines (2.5 MB, uncompresses to 11 MB). Import.aml will name this coverage pa-conts.
8b. of01-101_8b.tar.gz -- Palo Alto quadrangle: ARCVIEW Shape line files bundled as one compressed tar file (2 MB, uncompresses to 6 MB). When opened, the tar file yields line files paconts.dbf, paconts.shp, and paconts.shx.
9a. of01-101_9a.e00.gz – Point Arena quadrangle: compressed ARC export coverage containing lines (4.4 MB, uncompresses to 19 MB). Import.aml will name this coverage pt-conts.
9b. of01-101_9b.tar.gz -- Point Arena quadrangle: ARCVIEW Shape line files bundled as one compressed tar file (3 MB, uncompresses to 16 MB). When opened, the tar file yields line files ptconts.dbf, ptconts.shp, and ptconts.shx.
10a. of01-101_10a.e00.gz – Sacramento quadrangle: compressed ARC export coverage containing lines (1.3 MB, uncompresses to 5.5 MB). Import.aml will name this coverage sa-conts.
10b. of01-101_10b.tar.gz -- Sacramento quadrangle: ARCVIEW Shape line files bundled as one compressed tar file (1 MB, uncompresses to 3 MB). When opened, the tar file yields line files saconts.dbf, saconts.shp, and saconts.shx.
11a. of01-101_11a.e00.gz – San Francisco quadrangle: compressed ARC export coverage containing lines (2.3MB, uncompresses to 10 MB). Import.aml will name this coverage sf-conts.
11b. of01-101_11b.tar.gz -- San Francisco quadrangle: ARCVIEW Shape line files bundled as one compressed tar file (2 MB, uncompresses to 5 MB). When opened, the tar file yields line files sfconts.dbf, sfconts.shp, and sfconts.shx.
12a. of01-101_12a.e00.gz – San Jose quadrangle: compressed ARC export coverage containing lines (6.6 MB, uncompresses to 29 MB). Import.aml will name this coverage sj-conts.
12b. of01-101_12b.tar.gz -- San Jose quadrangle: ARCVIEW Shape line files bundled as one compressed tar file (5 MB, uncompresses to 21 MB). When opened, the tar file yields line files sjconts.dbf, sjconts.shp, and sjconts.shx.
13a. of01-101_13a.e00.gz – Stockton quadrangle: compressed ARC export coverage containing lines (3.2 MB, uncompresses to 14 MB). Import.aml will name this coverage sk-conts.
13b. of01-101_13b.tar.gz -- Stockton quadrangle: ARCVIEW Shape line files bundled as one compressed tar file (2 MB, uncompresses to 8 MB). When opened, the tar file yields line files skconts.dbf, skconts.shp, and skconts.shx.

14 to 24: The plot files for the map graphics for each of the 30x60-minute quadrangles, representing map sheets 1 to 11, in both PostScript and PDF formats. The PostScript images are rotated so that the long axis plots in the Y direction.

14a. of01-101_14a.ps – Bodega Bay quadrangle: PostScript plot file (2.6 MB) for map sheet 1.
14b. of01-101_14b.pdf– Bodega Bay quadrangle: PDF plot file (0.7 MB) for map sheet 1.

15a. of01-101_15a.ps – Healdsburg quadrangle: PostScript plot file (31MB) for map sheet 2.
15b. of01-101_15b.pdf– Healdsburg quadrangle: PDF plot file (7 MB) for map sheet 2.
16a. of01-101_16a.ps – Lodi quadrangle: PostScript plot file (7.8 MB) for map sheet 3.
16b. of01-101_16b.pdf– Lodi quadrangle: PDF plot file (2 MB) for map sheet 3.
17a. of01-101_17a.ps – Monterey quadrangle: PostScript plot file (24 MB) for map sheet 4.
17b. of01-101_17b.pdf– Monterey quadrangle: PDF plot file (5 MB) for map sheet 4.
18a. of01-101_18a.ps – Napa quadrangle: PostScript plot file (19 MB) for map sheet 5.
18b. of01-101_18b.pdf– Napa quadrangle: PDF plot file (4 MB) for map sheet 5.
19a. of01-101_19a.ps – Palo Alto quadrangle: PostScript plot file (13 MB) for map sheet 6.
19b. of01-101_19b.pdf– Palo Alto quadrangle: PDF plot file (3 MB) for map sheet 6.
20a. of01-101_20a.ps – Point Arena quadrangle: PostScript plot file (1 MB) for map sheet 7.
20b. of01-101_20b.pdf– Point Arena quadrangle: PDF plot file (0.6 MB) for map sheet 7.
21a. of01-101_21a.ps – Sacramento quadrangle: PostScript plot file (7 MB) for map sheet 8.
21b. of01-101_21b.pdf– Sacramento quadrangle: PDF plot file (2 MB) for map sheet 8.
22a. of01-101_22a.ps – San Francisco quadrangle: PostScript plot file (12 MB) for map sheet 9.
22b. of01-101_22b.pdf– San Francisco quadrangle: PDF plot file (3 MB) for map sheet 9.
23a. of01-101_23a.ps – San Jose quadrangle: PostScript plot file (30 MB) for map sheet 10.
23b. of01-101_23b.pdf– San Jose quadrangle: PDF plot file (7 MB) for map sheet 10.
24a. of01-101_24a.ps – Stockton quadrangle: PostScript plot file (17 MB) for map sheet 11.
24b. of01-101_24b.pdf– Stockton quadrangle: PDF plot file (4 MB) for map sheet 11.

Presentation

The digital files representing the many parts of the report are presented on the Web both individually (by quadrangle for the spatial data and plot files, with the Shape data files for each quadrangle packaged together in tape archive (.tar) files), as well as being packaged together for the region. The larger files have been compressed with gzip (.gz).

Separate Text Files: The revision list (of01-101_2a.txt) and the three formats of the open-file text (of01-101_1) are provided separately, together with an abbreviated version of the ASCII text as a README. These text files in all three formats are also bundled in the database package.

Separate Database Files: Each of the quadrangle databases (of01-101_3 through 13) is provided separately in both ARC export (.e00) and ARCVIEW shape (.tar) formats, as well as being bundled in the database package files (see below).

Separate Plot Files: Plot files for each of the quadrangle map sheets are provided separately in both PostScript and PDF format, as well as being bundled together in the plotfile package (see below).

Database Package: All eleven quadrangle databases (of01-101_3 through 13) are packaged together in a single gzip-compressed tar file in both ARC (a) and ARCVIEW shape (b) format. Each database package also includes all the text files in all formats.

of01-101_25a.tar.gz	ARC database package. 38 MB, uncompresses to 163 MB
of01-101_25b.tar.gz	Shape file database package. 29 MB, uncompresses to 95 MB

Plotfile Package: Plotfiles for all eleven map sheets (of01-101_14 through 24) are packaged together in a single gzip-compressed tar file in both PostScript (a) and PDF (b) format.

of01-101_26a.tar.gz	PostScript plotfile package. 36 MB, uncompresses to 165 MB
of01-101_26b.tar	PDF plotfile package. 38 MB

REVISIONS

Changes to any part of this report may be made in the future if needed. Changes could involve, for example, fixing files that don't work properly, revising contour details, adding new file formats, or adding other components to the report.

The report begins at version 1.0. Any revisions will be specified in the revision list and will result in the recording of a new version number for the report. Small changes will be indicated by decimal increments and larger changes by integer increments in the version number. Revisions will be announced and maintained on the Web page for this report on the Western Region Geologic Publications Web Server. Consult the revision list there to determine if a revision is significant for your purposes.

OBTAINING THE DIGITAL FILES

The database and plot files can be downloaded from the Western Region Geologic Information Web Server or by anonymous ftp over the Internet.

1. Anonymous ftp over the Internet

    The files for this report are stored on the Western Region publication server of the U.S. Geological Survey. The Internet address of this server is:

        geopubs.wr.usgs.gov

    Connect to this address directly using ftp or through a browser, log in with the user name 'anonymous', and enter your e-mail address as the password. This will give you access to all the publications available from the server. The files for this report are stored in the subdirectory:

        pub/open-file/of01-101

2. From the Western Region Geologic Publications Web Server

    The U.S. Geological Survey supports a set of graphical pages on the World Wide Web from which digital publications such as this one can be obtained. The Web server for digital publications from the Western Region is:

        http://geopubs.wr.usgs.gov

    This report can be reached by number (of01-101) through either the California or Open-File Reports 2001 options.

PROCESSING THE FILES

The database files require initial processing before they are usable, both to open bundled and/or compressed files and to import ARC export files.

Opening Tar and Gzip Files

Some of the files are assembled as tape archive files (tar files), and the larger files containing the databases and images have been compressed with gzip. Thus, a tar utility is required to open the tar files and gzip or an equivalent is required to uncompress the compressed files. Once extracted from the compressed tar files, the ARC export files can be imported into ARC/INFO using the utility import.aml that is included in the database package, or directly using the ARC import command.

The necessary utilities for uncompressing and extracting from tar format are available on-line:

gzip - This utility is available free of charge over the Internet from the gzip Home Page:

http://w3.teaser.fr/~jlgailly/gzip

or via links from the USGS Public Domain Software page:

http://edcwww.cr.usgs.gov/doc/edchome/ndcdb/public.html

tar - This utility is included in most UNIX systems. Tar utilities for PC and Macintosh can be obtained free of charge via the Internet from Internet Literacy's Common Internet File Formats Web Page:

http://www.matisse.net/files/formats.html

Winzip - This commercial package runs on PCs and can deal with both gzip and tar files. An evaluation copy of WinZip can be downloaded from:

http://www.winzip.com/winzip/

Importing the ARC Export Files

The ARC export files (.e00) can be converted to ARC/INFO vector databases (coverages) and associated INFO files by running the import.aml that is included in the database package. This will import the .e00 files, assign standard names (see below), and delete the export files once used (if desired). The 'import' and 'delete' options are enabled by answering YES to the questions posed by import.aml, and individual 30x60-minute quadrangles can be specified if desired. Running the aml again permits enabling options previously rejected, but will not interfere with the results of earlier runs. The import routine checks for the presence of needed export files, for previously imported files, and offers the option to import all or specified 30x60-minute blocks of contours. Run import.aml from the ARC prompt in the directory containing the export files:

ARC: &run import.aml	- run import.aml, answer YES/NO to the questions posed in the dialog area to choose options to import the export files and to keep or delete the export files, and pick ALL or specific 30x60-minute quadrangles from the scroll list to operate on.

Note that the ARC coverages will be given standard names with the 30x60-minute quadrangles distinguished by two-character prefixes:

of01-101_3.e00	bo-conts	(Bodega Bay)
of01-101_4.e00	hb-conts	(Healdsburg)
of01-101_5.e00	lo-conts	(Lodi)
of01-101_6.e00	mo-conts	(Monterey)
of01-101_7.e00	na-conts	(Napa)
of01-101_8.e00	pa-conts	(Palo Alto)
of01-101_9.e00	pt-conts	(Point Arena)
of01-101_10.e00	sa-conts	(Sacramento)
of01-101_11.e00	sf-conts	(San Francisco)
of01-101_12.e00	sj-conts	(San Jose)
of01-101_13.e00	sk-conts	(Stockton)

DESCRIPTION OF THE SPATIAL DATABASE

The ARC layers (coverages) are stored in UTM projection (table 1), whereas the Shape files are in decimal degrees of longitude and latitude, prepared by projecting and converting the primary UTM coverages.

Table 1. Map Projection

Projection	UTM	(Universal Transverse Mercator)
Units	METERS	
Zone	10	
Datum	NAD27	
Spheroid	CLARKE1866	
Xshift	0	
Yshift	0	

The contents of the database are described in terms of the lines that compose them. Descriptions of the database fields (items) use the terms of 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, C- ASCII character string
N.DEC	number of decimal places maintained for floating point numbers

The contour lines have two custom attributes, elevation in meters (ELEV field) and type of contour (CONTYP field), as described in tables 3 and 4. Line directions have no topographic meaning.

Table 3. Contour attribute database ([cover].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
PF-CONTS#	4	5	B	-	unique internal control number
PF-CONTS -ID	4	5	B	-	unique identification number
ELEV	4	5	B	-	contour elevation, in meters
CONTYP	10	10	C	-	contour type

Table 4. Types of contours. Values of the CONTYP database item.

index	Index contour at 250-meter interval.
inter	Intermediate contour at 50-meter interval.
sup-low	Supplemental contour at 10-meter interval, low in the topography.
sup-high	Supplemental contour at 10-meter interval, high in the topography.