

File: **README.TXT**

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INTRODUCTION

This file contains the following information about the Digital Raster Graphic (DRG) products contained on this CD-ROM:

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PRODUCT LIABILITY

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DESCRIPTION OF A DRG

A DRG is a raster image of a published map. DRG's are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM)

projection. Colors are standardized to remove scanner limitations and artifacts. The average data set size is about 8 megabytes in Tagged Image File Format (TIFF) with PackBits compression. DRG's can be easily combined with other digital cartographic products such as digital elevation models (DEM) and digital orthophoto quadrangles (DOQ).

DISPLAYING A DRG

Storage, retrieval, and display of large raster data sets such as DRG's poses one of the principal design challenges for the USGS DRG program; that is, data files must remain as small as possible while preserving image quality in a public domain file format that is common to imaging and GIS software. TIFF with PackBits compression is a widely used raster file format that is very general and flexible, and many different types of files meet the standard. The extent to which the format used on this disc meets these objectives is still under evaluation.

The TIFF files on this disc can be read by the viewing software packages included. The image viewers require the coexistence of a world (.TFW) file and a data (.TIF) file in the \DATA directory to display a georeferenced DRG image. All resident files on this disc, including files in the \DATA directory are designed to be used by a DOS-based system, having the standard DOS naming convention of eight plus three (8.3) characters. If the image and world files are used on a UNIX platform, they must be renamed to adhere to the UNIX naming convention. Users operating in the UNIX environment must copy the desired image file and the associated world file to a local drive and rename them with the proper UNIX extension, as show below.

File Extension Conversion Table

File Type

Image file: rename .TIF to .TIFF
World file: rename .TFW to .TIFW

GEOREFERENCING INFORMATION

The current DRG data model contains three separate types of file specific georeferencing data to provide a wide range of choices for GIS applications. These data are identified by a three-character code

indicating the type of information stored in each file. File type extensions are

TIF = TIFF files with GeoTIFF tags
TFW = World file
FDG = Federal Geographic Data (Metadata)

TIFF FILES - An industry-wide standard for specifying cartographic information in TIFF tags, referred to as "GeoTIFF," has been developed by several organizations in the GIS community. These organizations include SPOT Image Corporation, NASA's Jet Propulsion Laboratory, Intergraph Corporation, Environmental Systems Research Institute (ESRI), and the USGS, among others. Geographic information is embedded in the TIFF data file in the form of descriptive tags. For detailed information about TIFF, GeoTIFF, and PackBits compression, refer to TIFF_60.TXT and GEOTIFF.TXT from the \DOCUMENT directory. The most recent versions of TIFF and GeoTIFF specifications are available via World Wide Web at

<http://mcmcweb.er.usgs.gov/>

WORLD FILES - These files reside in the \DATA directory with their associated image files. World files, required for image georeferencing by the viewing software applications on this disc, contain the following information:

x resolution
amount of translation
amount of rotation
negative of the y resolution
x ground coordinate of pixel 1,1 (upper left)
y ground coordinate of pixel 1,1 (upper left)

An ARC world file is ASCII text and can be built with any text editor. ARC requires that the world file be named the same as the image file with a "W" appended. For example, if the image file is named O38077A8.TIF, the corresponding world file should be named O38077A8.TFW.

Following are the contents of the world file for the data set O38077A8.TIF (Washington West, D.C., 1:24:000 scale):

2.4
0
0
-2.4
314724.486281

4319320.265670

Ground resolution is 2.4 meters/pixel. Translation and rotation are both 0. The last two lines are the UTM values of the upper left pixel of the data set. These data are from the following locations of the metadata file:

- 1.2.3 SUPPLEMENTAL INFORMATION
- 4.1.2.4.2.1 ABSCISSA RESOLUTION (x)
- 4.1.2.4.2.2 ORDINATE RESOLUTION (y)
- 4.1.2.4.4 PLANAR DISTANCE UNITS

Many software packages are capable of displaying TIFF files without georeferencing the data. For example, when displayed using graphics arts software, the DRG is a simple picture on a computer screen.

The viewing software packages included on this CD-ROM will display DRG image files (.TIF) without the use of the world files, although, for the image file to be georeferenced, the associated world file (.TFW) must be in the same directory as the image file. If both files are located in the same directory, the image file will be displayed in UTM units.

METADATA FILES - Individual DRG data files are accompanied by metadata (data about the image) containing a wide range of information about the image data to assist the user in determining the availability, fitness, means of accessing, and transfer of the data. Metadata are also important for establishing quality control. Specific information can be extracted from metadata files and used to georeference the DRG depending on the requirements of individual raster viewing applications. Generic information about the content and composition of the metadata files on this disc can be referenced in the Metadata Template, Appendix 2-A of the "Standards for Digital Raster Graphics." A soft copy version of this Standard, DRG_STD.TXT, can be accessed and referenced from the \DOCUMENT directory. File specific metadata for each image on this disc can be found in the \METADATA directory.

PRODUCT SPECIFICATIONS

Source materials -

Standard series USGS paper maps or other materials that are suitable for scanning.

Georeferencing -

The DRG's scanned raster image file is transformed to the theoretical UTM coordinate positions of the published map's grid ticks:

- 16 - 2.5-minute tick marks for the 1:24,000-scale series
- 16 - 2.5-minute tick marks for the 1:25,000-scale series
(7.5 minute x 7.5 minute series)
- 28 - 2.5-minute tick marks for the 1:25,000-scale series
(7.5-minute x 15-minute series)
- 15 - 15-minute ticks in the 1:100,000-scale series
- 45 - 15-minute ticks in the 1:250,000-scale series
- * - 1:63,360-scale Alaska series quadrangles

* The number and spacing of ticks on the 1:63,360-scale Alaska series quadrangles vary depending on the position of the quadrangle along the longitudinal axis.

Scan resolution -

Scanned at a minimum 500 dots-per-inch (dpi), resampled to 250 dpi during final processing.

Map projection -

To be consistent with other USGS digital data, the image is cast on the UTM projection. Therefore, the projection of the DRG will not always be consistent with the credit note on the image collar.

Accuracy -

The DRG maintains the horizontal positional accuracy of the 7.5-minute source map that meets National Map Accuracy Standards (NMAS). Because it is fit to the theoretical quadrangle corners based on the UTM projection, the DRG may have distortions outside the map projection lines.

Color standardization -

Standard DRG's have a maximum of 13 indexed colors.

File format -

TIFF 6.0 with GeoTIFF 0.2, PackBits compressed. For detailed information about TIFF, GeoTIFF, and PackBits compression, refer to TIFF_60.TXT and GEOTIFF.TXT from the \DOCUMENT directory.

Metadata -

DRG metadata contain information about the content, quality, condition, and other data characteristics necessary for determining data availability, access, and fitness for use. Metadata are compliant to the Federal Geographic Data Committee, 1994, Content Standards for Digital Geospatial Metadata (June 8, 1994).

Distribution media -

DRG images of USGS quadrangles at 1:20,000-, 1:24,000-, 1:25,000-, 1:30,000-, 1:63,360-, and 1:100,000-scale are stored on CD-ROM as 1- by 1-degree cells. The associated 1:250,000-scale quadrangle comprising the cell is also included on each disc. Multiple discs may be required throughout this series to contain data within a single cell. Additional variations to the standard packaging scheme are addressed in DRG_PKG.TXT, accessible from the \DOCUMENT directory. Distribution on tape and by means of network connection may be an option in the future.
