

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Preliminary digital Quaternary geologic map data for Indiana

by

David R. Soller¹ and Wai-See Moy¹

Open-file Report 93-268-A

1993

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards. Any use of trade, product, or firm names in this publication is for descriptive purposes only and does not imply endorsement by the U.S. Government. Although the program to read and write the contents of the diskettes has been used by the U.S. Geological Survey, no warranty, expressed or implied, is made by the USGS as to the accuracy and functioning of the program and related program material, nor shall the fact of distribution constitute any such warranty, and no responsibility is assumed by the USGS in connection therewith.

¹Reston, Virginia

CONTENTS

	<u>page</u>
Introduction	1
Computer requirements	1
Diskette contents	2
Accessing the map data	2
Map information	2
Map projection	4
Acknowledgments	5
References cited	5

Introduction

A USGS map has been compiled that shows the thickness and character of Quaternary sediments in the glaciated United States east of the Rocky Mountains (Soller, in press a,b,c,d). The map was compiled at 1:1,000,000 scale from about 850 sources of information. A discussion of the map's scope and format is given in Soller (1992).

The map is in preparation for printing with digitally-produced color separates. It is divided into more than 20 parts to facilitate digital editing and production of separates. Upon completion of digital files for each part of the map area, all files will be edge-joined and the data will be given a final inspection prior to assembling into a Geographic Information System (GIS) data base for public release.

A previous release of digital map data (Soller, 1991b) contained preliminary geologic data for a five-state area that included the northern half of Indiana. Those data were released according to an agreement with the U.S. Environmental Protection Agency, Office of Ground Water, to provide them with digital surficial geologic map data. Subsequently, an agreement with the Indiana Department of Environmental Management was established to provide a digital map of Quaternary sediments for the state. This report is the product of that agreement.

The area of this report includes the State of Indiana and a 5-kilometer-wide buffer around the state. This report contains a preliminary version of digital Quaternary geologic map data and a preliminary version of base map data. A somewhat more information-rich version of the base map will accompany the Quaternary geologic map in the final version of the GIS data base. In order to visualize the intended format for map display, a full-color image of the map data in northern Indiana is shown in Soller (1991a).

These digital map data have not been thoroughly checked according to USGS editorial standards, but will be given rigorous editorial scrutiny prior to more formal USGS publication. Because of the regional map scale and the wide variability of data quality and reliability, the digital map data should not be used for any local or site-specific analysis or map display. It is recommended that the data be used at the map publication scale of 1:1,000,000.

Computer requirements

To use these map data, the following equipment must be available:

- a computer with DOS (version 2.01 or higher) operating system, a 3.5" high-density disk drive, and a hard disk drive with at least 5 MB of unused storage space;
- a computer with ARC/INFO GIS software;
- a method of file transfer between these computers, unless the DOS computer also supports ARC/INFO.

Diskette contents

The 4 accompanying 3.5" high density (about 1.44MB) diskettes are formatted for the DOS operating system. Map data are contained in 7 files which are in ARC/INFO export format. Diskette #1 contains: 5 ARC/INFO export files; a program that reassembles the largest export file and writes all files to the hard disk; an ASCII version of this text; and an ASCII file ("READ.ME") containing a brief overview of computer requirements and instructions for reading the diskettes. The largest of the files, about 3.4 MB, has been subdivided to fit on Diskettes #2, #3, and #4. Diskette #4 also contains a small ARC/INFO export file.

Accessing the map data

To use these map data, they must be read from the diskettes, written to a hard disk where the largest file is reassembled, and imported into ARC/INFO. To begin this procedure, insert Diskette #1 into the disk drive and view the ASCII file named "READ.ME." This file contains all necessary instructions to read and write the data. To write all files to the hard drive, type the following command and press the Enter or Return key:

```
system prompt> a:\combine a c \directory
```

where **a** = source disk (the floppy disk drive), **c** = target disk (the hard disk drive), and **\directory** = target directory on drive "c." In this command, the colon after the drive designation ("a:", for example), required by DOS, need not be entered.

The "combine" command automatically writes itself to the designated directory on the target drive and begins reading the ASCII text and ARC/INFO export files on Diskette #1. When these data have been read, the program will prompt the user for Diskettes #2, #3 and #4. The subdivided file will be read onto disk and reassembled. Finally, the program deletes itself from the target disk. Upon completion of the program, the target directory will contain seven ARC/INFO export files (UNION.E00, DRAINAGE.E00, SUBSURF.E00, ROADS.E00, STATE.E00, MISCLN.E00, and CITIES.E00) and an ASCII version of this text (EXPLAN.TXT).

To use the map data, transfer the export files to a computer that has ARC/INFO software. Using the IMPORT command, create ARC/INFO map coverages named "UNION", "DRAINAGE", "SUBSURF", "ROADS", "STATE", "MISCLN", and "CITIES" as follows:

```
Arc: IMPORT COVER UNION.E00 UNION
Arc: .....etc.....
```

Map information

The ARC/INFO coverage named "UNION" contains information on the character of surface sediments and the total thickness of Quaternary sediments. This information is contained in items "GEOL" and "THICK" respectively in the polygon attribute table, as follows:

Character of surface sediments

GEOL

<u>values</u>	<u>Explanation</u>
101	– coarse grained, stratified Quaternary sediment occurs at land surface
102	– fine grained, stratified Quaternary sediment occurs at land surface
103	– glacial till occurs at land surface
104	– bedrock is exposed in places, and glacial sediment is patchy
105	– exposed bedrock
106	– organic-rich sediment (peat, for example) occurs at land surface
107	– open water, where subbottom Quaternary sediments are not mapped
0	– no data

NOTE: values 106 and 107 do not occur in the Indiana data set.

Total thickness of Quaternary sediments

THICK

<u>values</u>	<u>Explanation</u>
201	– Quaternary sediment between 0 and 50 ft thick
202	– Quaternary sediment between 50 and 100 ft thick
203	– Quaternary sediment between 100 and 200 ft thick
204	– Quaternary sediment between 200 and 400 ft thick
205	– Quaternary sediment between 400 and 600 ft thick
206	– Quaternary sediment between 600 and 800 ft thick
207	– Quaternary sediment greater than 800 ft thick
0	– no data

NOTE: values 206 and 207 do not occur in the Indiana data set.

The "SUBSURF" coverage contains information on the areal extent of certain widespread buried glacial units (aquifers, for example) and certain thin, patchy surface units (described below as "veneers"). Thicknesses of these units and depths to the buried units are not given. Data in this file are based on limited regional subsurface information; they are, therefore, considerably less reliable than data in the coverage described above ("UNION"). Information is contained in the item "CODE" in the polygon attribute table, as follows:

CODE

<u>values</u>	<u>Explanation</u>
301	– buried coarse grained, stratified sediment
302	– veneer of coarse grained, stratified sediment
305	– buried glacial till
307	– loess greater than 20 ft thick occurs at land surface
0	– no data

The "MISCLN" coverage contains information on the extent of glaciation, in the item "CODE" in the arc attribute table as follows:

CODE		
<u>values</u>		<u>Explanation</u>
404	-	maximum extent of glaciation
405	-	maximum extent of late Wisconsinan glaciation
0	-	edge of map

The "ROADS" coverage contains the major roads in Indiana. It was adapted from the Digital Chart of the World (DCW), a 1:1,000,000-scale base map compilation by the Defense Mapping Agency and the U.S. Geological Survey. DCW files were projected and registered to the geologic map information. Road information was simplified and retained in the item "TYPE" in the arc attribute table, as follows:

TYPE		
<u>values</u>		<u>Explanation</u>
1	-	major highways
2	-	secondary roads
8	-	connector roads, mostly in urban areas

The "DRAINAGE" coverage was obtained by scanning the drainage plate of the International Map of the World (IMW) series 1:1,000,000-scale maps and registering it to the geologic map. The geologic information had been compiled onto IMW-series base maps and, therefore, more precisely matches the drainage depicted on the IMW maps than on the DCW base maps. No attribute data are provided.

The "CITIES" coverage was adapted from DCW files by selecting only a few major cities for geographic reference. The coverage was projected and registered to the geologic information. City names are contained in the item "NAME" in the point attribute table.

The "STATE" coverage was derived from USGS 1:2,000,000-scale Digital Line Graph (DLG) files. Resolution is, therefore, less than the geologic information or other base map information, and no attempt was made to precisely register it to those data. This coverage was used only to generate the 5-kilometer buffer outside the State boundary, to which all other coverages extend.

Map projection

Map data were derived from two IMW map sheets, with different map projections. For these files, the Lambert Conformal Conic projection was used, and the following projection parameters were selected: standard parallels at 37° 20' and 42° 40' North Latitude; central meridian at 87° West Longitude; and latitude of the projection's origin at 40° North Latitude. Map coordinates are in meters.

Acknowledgments

This work was supported by the Indiana Department of Environmental Management, the Environmental Protection Agency (Office of Ground Water Protection), and the USGS National Geologic Mapping Program.

References cited

- Soller, D.R., 1991a, Applying GIS to resource management: *Geotimes*, July, 1991, p. 16-18 and cover illustration.
- Soller, D.R., 1991b, Preliminary digital data for part of a regional, three-dimensional map of Quaternary sediments: southern Lake Michigan area: U.S. Geological Survey Open-file Report 91-356-A (8 p.) and 91-356-B (6 diskettes).
- Soller, D.R., 1992, Text and references to accompany "Map showing the thickness and character of Quaternary sediments in the glaciated United States east of the Rocky Mountains": U.S. Geological Survey Bulletin 1921, 54 p.
- Soller, D.R., in press a, Map showing the thickness and character of Quaternary sediments in the glaciated United States east of the Rocky Mountains: Northeastern States, the Great Lakes, and parts of southern Ontario and Atlantic offshore area (east of 80°31' West Longitude): U.S. Geological Survey Miscellaneous Investigations Series, Map I-1970 A, scale 1:1,000,000.
- Soller, D.R., in press b, Map showing the thickness and character of Quaternary sediments in the glaciated United States east of the Rocky Mountains: Northern Great Lakes States and Central Mississippi Valley States, the Great Lakes, and southern Ontario (80°31' to 93° West Longitude): U.S. Geological Survey Miscellaneous Investigations Series, Map I-1970 B, scale 1:1,000,000.
- Soller, D.R., in press c, Map showing the thickness and character of Quaternary sediments in the glaciated United States east of the Rocky Mountains: Northern and Central Plains States (90° to 103° West Longitude): U.S. Geological Survey Miscellaneous Investigations Series, Map I-1970 C, scale 1:1,000,000.
- Soller, D.R., in press d, Map showing the thickness and character of Quaternary sediments in the glaciated United States east of the Rocky Mountains: Northern Plains States (west of 103° West Longitude): U.S. Geological Survey Miscellaneous Investigations Series, Map I-1970 D, scale 1:1,000,000.