QUATERNARY (SURFICIAL) GEOLOGIC MAPPING OF THE MESABI IRON RANGE
November 2005

Minnesota Geological Survey—University of Minnesota Project #523-6141
Funded September 2, 2003 through September 30, 2005

The published bedrock geologic map is referenced as follows:

An image of the map is provided as a PDF document--M164.pdf

All GIS shapefiles or coverages are NAD83, UTM Zone 15.

Files below and pictures linked from the ArcView project are in the zip file m164.zip

Index of GIS files:
1) buried_drumlins -- line shapefile showing buried, streamlined features interpreted as drumlins.
2) dnrhs.tif -- registered tiff formatted, grey-scale image, showing hillshade relief of the Mesabi region. Original gridded data from the Minnesota Department of Natural Resources, Minerals Division and published in 1999, as part of the Mesabi Elevation Project
3) dnrhs_sg.tif -- registered tiff formatted, grey-scale image, showing hillshade relief of the Mesabi region with a view of the surface geology shown as a transparent overlay. Source of hillshade same as above.
4) icemargins -- line shapefile showing approximate locations of mapped ice margins.
5) maparea -- polygon shapefile of study area.
6) pitlakes -- polygon shapefile showing locations and outlines of pitlakes, modified from the Dept. of Natural Resources file pitlakes98.
7) pot_aquifer_loc -- point file indicating sand and gravel features located in outcrops that could potentially be or become aquifers. Pictures of outcrop is indicated where available.
8) scarp_obscure -- line shapefile indicating area mapped as obscure scarp. Corresponding parallel line may indicate channel.
9) scarps -- line shapefile indicating area mapped as scarp.
10) sgpg -- polygon shapefile of the surface geology map units.
11) Tacmines.shp=Approximate outline of taconite mining; modified
locally from DNR Mine Lands Database using air photography.
12) waypoint_locations -- point shapefile of waypoints. Where noted the theme point is linked to a jpg image.

Additional files and folder:

legend.rtf -- map unit legends from the printed map.

msb_fsa.img-- Imagine image format (Imagine extension is standard with ArcView). This image has been made smaller than the original county data files, but has not been clipped to the map area. It has not been included on the Quaternery cd, but can be obtained from the M-163 Bedrock geology CD.

Basemap datasets=Compiled and modified from 1990 TIGER/line digital files maintained by the U.S. Bureau of the Census.
Subdivided into east and west halves of the study area. East is in folder eastbase, West in folder westbase. Within the m164 folder.

InterpretedPhotos -- jpg images of outcrops with some added lines and text as geologic interpretations.

Photocatalogs -- Excel files containing information about photo locations.

Mesabi textures.xls -- Microsoft Excel file containing textural data from surficial samples collected for the project.

keyphotos Photographs are linked to the APR theme waypoint_locations so that users can select a location using the “Hotlink” icon and view the image. Image resolution is generally quite low—if higher resolution is needed, please contact the authors. Photos can also be viewed directly with the ifanviewer provided, although there will be no link to location other than the folder name indicating the mine.

Legends—folder containing ArcView legend files for shapefiles (.avl)
Iview—folder containing the jpeg viewer used for the hotlinks in the ArcView project.
Metadata--metadataMSB.doc. Word file of metadata about the map project. Also in the folder are metadata about standard MGS formats.

MesabiSurf.ppt--Powerpoint display that describes the project, explains the mapping methods and provides a summary interpretation of the results.

m164sg.apr—the ArcView project file.

For questions about the digital data contact Carrie Jennings (carrie@umn.edu) or Richard Lively (lively@umn.edu)
INTRODUCTION

Two main ice lobes advanced westward across northeastern Minnesota, one advancing from the southwest and the other from the west. The former, the Koochiching lobe, is represented by the till north of the Giants Range. The latter, the Rainy lobe, is represented by the till south of the Giants Range. Both lobes left a complex till deposited in a region called the Palisade area.

The Palisade area is characterized by a depositional surface that is highly variable in elevation. This surface is caused by the Palisade ice stream, which carried material from the Koochiching lobe to the north and the Rainy lobe to the south. The surface is termed a "drumlin-forming till," and it is composed of sand, gravel, and silt.

The deposits from the Palisade ice stream are covered by deposits from the Koochiching lobe to the north and the Rainy lobe to the south. These deposits are spatially variable and are draped over the landforms created by the Palisade ice stream.

Sheets and beds of sand, gravelly sand, and gravel are characteristic of the Palisade ice stream. These deposits are typically interbedded with fine-grained sand, fine-grained sandy loam, and silt loam. They are typically deposited within a broad, planar area, the erosional margin of a channel. The deposits are typically interpreted as having been deposited by braided streams flowing from melting ice.

The deposits are often buried by the Koochiching lobe to the north and the Rainy lobe to the south. These lobes left deposits of till, which are typically complexly mixed with lake sediment, stream sediment, and sand. The till is typically deposited as a sheet, and it is often covered by deposits from the Palisade ice stream.

The deposits of the Palisade ice stream are typically characterized by thin sheets and beds of sand, gravelly sand, and gravel. These deposits are typically interbedded with fine-grained sand, fine-grained sandy loam, and silt loam. They are typically deposited within a broad, planar area, the erosional margin of a channel. The deposits are typically interpreted as having been deposited by braided streams flowing from melting ice.