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

PRELIMINARY GEOLOGIC MAP OF THE MESQUITE QUADRANGLE, CLARK AND LINCOLN COUNTIES, NEVADA, AND MOHAVE COUNTY, ARIZONA

By

Van S. Williams

Open-file Report 96-676

1996

[1]U.S. Geological Survey, Denver, CO

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This database, identified as Open-file report 96-676, has been approved for release and publication by the Director of the U.S. Geological Survey. Although this database has been subject to rigorous review and is substantially complete, the USGS reserves the right to revise the data pursuant to further analysis and review. Furthermore, it is released on condition that neither the USGS nor the United States Government may be held liable for any damages resulting from it authorized or unauthorized use.

The report can be read and the map viewed on line as WEB page:

http://ncgmp.cr.usgs.gov/ncgmp/lvuc/mesquite/mesquite.htm.

From that site all the database files can be downloaded. The database files can also be downloaded directly via "anonymous ftp" from a USGS system named greenwood.cr.usgs.gov (IP = 136.177.48.5). The files are located in a directory named /pub/open-file-reports/ofr-96-0676. A complete description of the characteristics of the database is given in the metadata document. The author compiled this database from field observations.

The author and database manager is:

Van Williams
U.S. Geological Survey
MS 913, Box 25046
DFC
Lakewood, Colorado
80225-0046

(303) 236-1289 office
(303) 236-7880 secretary
(303) 236-0214 fax

E-mail: vwilliam@usgs.gov

The Mesquite 7 1/2' quadrangle lies on the border of Nevada and Arizona where Interstate Highway 15 and the Virgin River cross the state line. The town of Mesquite is rapidly growing as it is transformed from a small farming and ranching community into a recreation and retirement center. The addition of housing developments, casinos, golf courses, commercial centers, and industrial plants has strained all the infrastructure, and especially the water supply system. This map and report detailing the nature of deformation and stratigraphy in the Muddy Creek Formation Tertiary basin-fill deposits near Mesquite is intended to aid in optimal siting of water-production wells. The information may also have application in siting and designing other facilities and in developing aggregate resources. Mapping was done in cooperation with the Southern Nevada Water Authority and the Virgin Valley water district.

The Mesquite geologic map and report were compiled as digital database using the GSMCAD public domain program (USGS Open-File Report 96-007). It was converted to ARC/INFO coverages using the GSMCAD export function.

The data is supplied in two formats. The first is the microsoft-PC based native GSMCAD format and the second is a UNIX based ARC/INFO format. Also included are a text file of the explanation, a metadata document, and printable files of the map and explanation sheet in HP-RTL format.

PC format:

The of96-676.exe file is a self extracting archive. When executed it will create a directory named mesquite and place the uncompressed and separated components of the database in that directory. The data in these files can be converted into ARC/INFO generate, DXF, and other ASCII formats by using free GSMCAD software that can be downloaded from the internet (http://ncgmp.cr.usgs.gov/gsmcad/gsmcwww.htm).

File in the archive are:

Readme.txt
     A text file describing the files included in the release

Mesquite.exp
     Text file of the description of map units and discussion of deposits, structure, and geologic history. Unit descriptions can be accessed by selecting map unit symbols displayed on screen.

Mesquite.mda
     Text file of the metadata document describing the Mesquite database

Mesquite.lsf, .ndx, and .nod
     The basic database components of line segment file, index file, and node file for the map. Units are degrees of latitude and longitude

Unitlist.lsf, .ndx, and .nod
     The basic database components for the explanation sheet. Units are inches

Mesquite.plt
     File of plotting parameters for the map

Unitlist.plt
     File of plotting parameters for the explanation sheet

Mesquite.prj
     File of projection parameters for the Transverse Mercator projection of the 1:24,000 scale 7 1/2 ' Mesquite topographic quadrangle basemap

UTM11.prj
     File of projection parameters for the Universal Transverse Mercator (zone 11) projection of a 1:100,000 scale 1 degree by 30 minute Overton sheet basemap. This can be used in GSMCAD to export UTM ground meters.

mesquite.ru
     Text file listing all map unit symbols

mesqsym.ru
     Text file listing the explanations of the graphic symbols on the map

comu.ru
     Text file listing all the age names, headers, and other text used on the correlation of map units diagram, except for the map unit symbols

unitname.ru
     Text file listing the names of map units

fieldlog.txt

Text file containing selected field notes that are linked to the observation points in the map database (code 197)

wwell.tab
Table of locations of selected water wells in the map area that can optionally be plotted on the map

Unix format:
The Mesquite.tar.gz file is an archive compressed with the GNU utility gzip, which is available from various GNU source sites.
To uncompress the data in UNIX enter:
gunzip mesquite.tar
To separate the components enter:
tar vxf mesquite.tar

The result should be a directory named ofr96-676 containing all necessary ARC/INFO coverages and info files for the Mesquite (map) and mesqexpl (explanation sheet) databases. Included is the AML program gsmdraw.aml that will extract data from the database to produce a graphics file (.gra) that can be viewed on the screen and converted to printable format (RTL, Postscript, HPGL2). For information on the contents of the various files review the mesquite.mda metadata document.

Printable map image files:
In addition to the data, directly printable files of the map and explanation sheet are provided for direct production of a paper copy. These files are in RTL format, the native language for several types of inkjet plotters such as the Hewlett Packard designjet series. The printer files have been combined and compressed into the file Mesqrtl.tar.gz using tar and gzip as described above.

Identification_Information:
  Citation:
   Citation_Information:
    Originator:
     U.S. Geological Survey

     Cooperating agencies: Southern Nevada Water Authority and Virgin Valley Water District

     Author or compiler: Van S. Williams

     Publication_Date: 1996

     Title: Preliminary geologic map of the Mesquite quadrangle, Clark and Lincoln Counties, Nevada and Mohave County, Arizona

     Series_Information:
      Series_Name: Open-File Report
      Issue_Identification: 96-0676

     Publication_Information:
      Publication_Place: Denver, Colorado

      Publisher: U.S. Geological Survey

      Online_Linkage: http://ncgmp.cr.usgs.gov/ncgmp/lvuc/mesquite.htm

  Description:
   Abstract: Original geologic data mapped by the author in 1995 and 1996 with emphasis on structures in Miocene basin-fill deposits of the Muddy Creek Formation that may control availability and quality of groundwater.

   Purpose: Provides geologic data to support the rapid development and population growth around the town of Mesquite, particularly the siting of municipal water supply wells

   Supplemental_Information:
    Map political location:
    Clark and Lincoln counties, Nevada and Mohave county, Arizona
    Compilation scale: 1:24000
    Geology mapped in 1995 and 1996. Compilation completed 9/96. Review and revision completed 10/96. Archive files prepared 2/97.

  Time_Period_of_Content:
   Time_Period_Information:
    Single_Date/Time:
     Calendar_Date: 19961024

   Currentness_Reference: publication date

  Status:
   Progress: Complete.

   Maintenance_and_Update_Frequency: Irregular. Mapping is continuing in adjacent areas and a more complete final map of this area may eventually be produced. Lacks a cross section.

Spatial_Domain:
  Bounding_Coordinates:
    West_Bounding_Coordinate: -114.125
    East_Bounding_Coordinate: -114.0
    North_Bounding_Coordinate: 36.875
    South_Bounding_Coordinate: 36.750

Keywords:
  Theme:
    Theme_Keyword_Thesaurus: Geology
    Theme_Keyword: Geologic map
    Theme_Keyword: Stratigraphy
    Theme_Keyword: Quaternary alluvium

    Theme_Keyword: Tertiary basin-fill sedimentary rocks
    Theme_Keyword: Tertiary volcanic rocks
    Theme_Keyword: Normal faults

  Place:
    Place_Keyword_Thesaurus: none
    Place_Keyword: Nevada
    Place_Keyword: Arizona
    Place_Keyword: Mohave County, Arizona
    Place_Keyword: Clark County, Nevada
    Place_Keyword:
      Lincoln County, Nevada

Access_Constraints: none

Use_Constraints:
  none. Acknowledgment of the U.S. Geological Survey would be appreciated in products derived from these data.

Data_Quality_Information:
  Attribute_Accuracy:
    Attribute_Accuracy_Report: Data was entered and checked by the geologist who made the observations.

  Logical_Consistency_Report:

    Map elements were visually checked by the author for overshoots, undershoots, duplicate features, and other errors. The report is preliminary and has not been thoroughly reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature. The map was reviewed by another geologist for consistency with basic geologic principles and general conformity to USGS mapping standards.

  Completeness_Report:

    This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature. Data is complete: no features were eliminated or generalized. There is no cross section and the ARC/INFO database lacks a unit properties table, although

unit properties are described in the text explanation. A base map coverage is not included but is available separately.

Positional_Accuracy:
 Horizontal_Positional_Accuracy:
  Horizontal_Positional_Accuracy_Report:

   Lines were primarily positioned by photointerpretation of aerial photographs using a PG-2 photogrammetric plotter that rectified the position and transferred it to a basemap. Lines were digitized from the basemap using a digitizer tablet with resolution of 0.001 inch. Additional lines and point observations were added in the field using positions determined by a PLGR-95 GPS unit with accuracy of about 10 meters. Most positions on the map are estimated to be accurate closer than 30 m horizontally. There is no elevation data in the database.

Lineage:
 Process_Step:
  Process_Description:

   The Mesquite geologic database was compiled using the GSMCAD public domain program (USGS Open-File Report 96-007). It was exported to ARC/INFO using the GSMCAD export function to create ARC generate ASCII files and the gsmarc.aml program in ARC to convert the ASCII files to ARC coverages and build polygons. The gsmdraw.aml program was used in ARC to produce a graphics file of the colored map. In addition an explanation sheet was produced that includes a correlation of map units diagram, a list of map unit names and corresponding symbols, and an explanation of graphical map symbols.

  Process_Date: 1996

Spatial_Data_Organization_Information:
 Direct_Spatial_Reference_Method: Vector

Spatial_Reference_Information:
 Horizontal_Coordinate_System_Definition:
  Planar:
   Map_Projection:
    Map_Projection_Name: TRANSVERSE MERCATOR
    Transverse_Mercator:
     Scale_Factor_at_Central_Meridian: 0.9999
     Longitude_of_Central_Meridian: -115.567
     Latitude_of_Projection_Origin: 0.0
     False_Easting: 0
     False_Northing: 0

   Planar_Coordinate_Information:
    Planar_Coordinate_Encoding_Method: coordinate pair
    Coordinate_Representation:
     Abscissa_Resolution: 0.001
     Ordinate_Resolution: 0.001
    Planar_Distance_Units: METERS

  Geodetic_Model:
   Horizontal_Datum_Name: North American Datum of 1927
   Ellipsoid_Name: Clarke 1866
   Semi-major_Axis: 6378206.4

Denominator_of_Flattening_Ratio: 294.98

Entity_and_Attribute_Information:
 Overview_Description:
  Entity_and_Attribute_Overview:

   The data is supplied in two formats. The first is the Microsoft-PC based native GSMCAD format and the second is a UNIX based ARC/INFO format.

   DATABASE FILES - GSMCAD (DOS) ====================================

   Mesquite.exp

   Text file of the description of map units and discussion of deposits, structure, and geologic history. Unit descriptions can be accessed by selecting map unit symbols displayed on screen.

   Mesquite.lsf, .ndx, and .nod

   The basic database components of line segment file, index file, and node file for the map. Units are degrees of latitude and longitude

   Unitlist.lsf, .ndx, and .nod

   The basic database components for the explanation sheet. Units are inches

   Mesquite.plt

   File of plotting parameters for the map

   Unitlist.plt

   File of plotting parameters for the explanation sheet

   Mesquite.prj

   File of projection parameters for the Transverse Mercator projection of the 1:24,000 scale 7 1/2 ' Mesquite topographic quadrangle basemap

   UTM11.prj

   File of projection parameters for the Universal Transverse Mercator (zone 11) projection of a 1:100,000 scale 1 degree by 30 minute Overton sheet basemap. This can be used in GSMCAD to export UTM ground meters.

   mesquite.ru

   Text file listing all map unit symbols

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   Text file listing the explanations of the graphic symbols on the map

   comu.ru

Text file listing all the age names, headers, and other text used on the correlation of map units diagram, except for the map unit symbols

unitname.ru

Text file listing the names of map units

fieldlog.txt

Text file containing selected field notes that are linked to the observation points in the map database (code 197)

wwell.tab

Table of locations of selected water wells in the map area that can optionally be plotted on the map

DATABASE STRUCTURE - ARC/INFO ======================================

The database of the map consists of four coverages (root name Mesquite) and four additional info files. There are also four parallel coverages (rootname mesqexpl) that make up an explanation sheet with a correlation of map units diagram, list of map unit symbols and names, and an explanation of symbols.

Mesquitepoly coverage: Contains all contact lines and labelpoints for each polygon. The CODE item defines the significance of the lines as listed below and in the gsmcode.lut INFO file. The P1 item defines the category of polygon as listed below and in the gsmunit.lut INFO file.

Mesquiteline coverage: Contains faults, fold axis, and other non-contact lines. Faults that are contacts also appear in the Mesquitepoly coverage. The CODE item defines the significance of the lines as listed below and in the gsmcode.lut INFO file.

Mesquitesym coverage: Contains points recording observations, such as strike and dip of bedding, points for posting of dip or plunge values associated with the observation points, and arcs that draw out the symbols associated with the observation points and the symbols used to decorate certain lines. The CODE item defines the type of observation as listed below and in the gsmcode.lut INFO file. For rotational observations (CODE 200 to 299) the P1 item is the azimuth (strike) and the P2 item is the inclination (dip). The item gsmentity contains a unique number for each observation that ties together the observation point, posting point, and arcs that represent a single observation. That number is negative for the posting point to distinguish it from the observation point.

Mesquitetext coverage: Contains text points that define the position, rotation, and size of text to appear on the face of the map. Also includes arcs that draw leaders from the text to the appropriate polygons. This coverage is for cartographic purposes and does not include data critical to the database information. The P1 item defines rotation of the text, the P2 item the size of text, and the TEXT item the actual text.

Gsmrelate INFO file: Contains the information that relates the gsmcode.lut and gsmunit.lut to the pat and aat INFO files of the coverages

Gsmunit.lut INFO file: Contains the first two columns of the table below that lists the number (P1 item) assigned to each category of polygon and the corresponding text symbol used in the map explanation and on the face of the map. The database can be made more useful by expanding this file to include items listing characteristics, age, etc. of each geologic unit, and that should be done before a final version is released.

Gsmcode.lut INFO file: Contains a text definition of the meaning of the number stored in the CODE item of every entity in all the coverages.

Gsmcolor.lu INFO file: Assigns a color from shadeset CTR269.shd for each category of polygon according to the P1 item.

Auxiliary files:

Gsmdraw.aml and gsmdraw.mnu files are included to constitute an ARC/INFO macro language program that will extract information from the Mesquite coverages to produce a graphics (.gra) file depicting the Mesquite geologic map. The graphics file can be viewed on screen or plotted with appropriate equipment.

The aml program calls shadeset ctr269.shd, font font003, and lineset alcwrg.lin, so these are also included in the archive file. Other files can be substituted, but special geologic characters may not plot properly with a different font.

Entity_and_Attribute_Detail_Citation:

Database root name: MESQUITE

P1 VALUE AND LETTER SYMBOLS FOR GEOLOGIC UNITS MAPPED=======

1,Qfp, Flood-plain alluvium
2,Qrm, Recent mainstream alluvium
3,Qim, Intermediate-age mainstream alluvium
4,Qom, Old mainstream alluvium
5,Trm, Tertiary mainstream alluvium
6,Trs, Tertiary sidestream alluvium
10,Qs, Channel alluvium
35,Qiz, Intermediate-age mainstream alluvium, sand and silt facies
46,af, Artificial fill and other land disturbance
47,Tms, Muddy Creek Formation
48,Tmc, Muddy Creek Formation conglomerate facies
53,Qis, Intermediate-age sidestream alluvium
54,Trs, Tertiary sidestream alluvium
56,Qos, Old sidestream alluvium
148,Trs, Tertiary sidestream alluvium (pediment on Muddy Creek Formation)
150,Qos, Old side-stream alluvium (pediment on Muddy Creek Formation)
152,Tok, Old Tertiary calcrete
153,Qe, Windblown sand
161,Qc, Colluvium
167,Ql, Landslide deposits
173,Qrs, Recent sidestream alluvium
177,Qym, Young mainstream alluvium
179,Qys, Young sidestream alluvium
193,Qok, Old Pleistocene calcrete
200,Tik, Intermediate-age Tertiary calcrete
201,Trk, Young Tertiary calcrete
218,Tb, Tertiary basalt lava flow and ash
219,Tf, Post-Muddy Creek Tertiary basin-fill sediments

FEATURES IN THE DATABASE------------------------

```
CODE | FEATURE
001 | Geologic contacts
008 | Normal fault -certain
009 | Normal fault - approximately located
010 | Normal fault - concealed
011 | Basaltic ash marker bed line
020 | Fold axis lines
054 | Roads
061 | Map boundary
197 | Field observation point symbol
201 | bedding dip symbol
204 | anticline symbol
205 | syncline symbol
207 | ball & bar symbol
208 | fault dip symbol
255 | monocline - anticline symbol
256 | monocline - syncline symbol
313 | gravel pit symbol
375 | water well symbol
501 | geologic unit tag point
555 | geologic unit tag point and text label
599 | Map margin text
```

Distribution_Information:
 Distributor:
  Contact_Information:
   Contact_Organization_Primary:
    Contact_Organization: U.S. Geological Survey, National Cooperative Geologic Mapping Team

   Contact_Address:
    Address_Type: mailing address
    Address: U.S. Geological Survey
    Address: MS 913, Box 25046 DFC
    City: Lakewood
    State_or_Province: CO
    Postal_Code: 80225-0046
   Contact_Voice_Telephone: (303) 236-1289 office
   Contact_Voice_Telephone: (303) 236-7880 secretary

 Distribution_Liability: Although this digital spatial data has been subjected to rigorous review and is substantially complete, it is released on the condition that neither the USGS nor the United States Government may be held liable for any damages resulting from its authorized or unauthorized use.

 Standard_Order_Process:
  Digital_Form:
   Digital_Transfer_Information:
    Format_Name: GSMCAD
    Format_Version_Number: all
    Format_Version_Date: 1993
    File_Decompression_Technique: PKZIP self-extracting archive. MS-DOS or Windows
   Digital_Transfer_Option:
    Online_Option:
     Computer_Contact_Information:
      Network_Address:

Network_Resource_Name: http://ncgmp.cr.usgs.gov/ncgmp/lvuc/mesquite.htm
Network_Resource_Name: http://greenwood.cr.usgs.gov
Fees: none

Metadata_Reference_Information:
 Metadata_Date: 19970218
 Metadata_Review_Date: 19970219
 Metadata_Contact:
  Contact_Information:
   Contact_Person_Primary:
    Contact_Person: Van S. Williams
    Contact_Organization: U.S. Geological Survey, National Cooperative Geologic Mapping Team

   Contact_Address:
    Address_Type: mailing address
    Address: U.S. Geological Survey
    Address: MS 913, Box 25046 DFC
    City: Lakewood
    State_or_Province: CO
    Postal_Code: 80225-0046
   Contact_Voice_Telephone: (303) 236-1289 office
   Contact_Voice_Telephone: (303) 236-7880 secretary

 Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
 Metadata_Standard_Version: 19940608

NOTE FOR THE MONTHLY PUBLICATIONS CATALOG

PRELIMINARY GEOLOGIC MAP OF THE MESQUITE QUADRANGLE, CLARK AND LINCOLN COUNTIES, NEVADA AND MOHAVE COUNTY, ARIZONA
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