



**Databases and Spatial Data Model
for Mineralized Areas, Mines, and Prospects in the
Grand Mesa, Uncompahgre, and Gunnison (GMUG) National Forests, Colorado**

Part A: Mineralized Areas
Part B: Files and Formats
Part C: ArcExplorer
Part D: Metadata

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

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FIGURES

1. Location of GMUG National Forests, Colorado, showing location of mineralized areas, major towns, rivers, and highways (gmug_index.pdf). (Highways and rivers data files are shown on this figure, but are not included in this report.)
2. Map showing mine localities and outlines of mineralized areas in GMUG National Forests, Colorado, and vicinity (mnrlareas&mines.pdf).
3. Simplified geologic map of GMUG National Forests and vicinity (geology.pdf).
4. Maps showing claim activity in GMUG National Forests, and vicinity (claimact.pdf). Current claims shown in shades of blue, historic activity in shades of orange.
5. Map of Grand Junction quadrangle showing mine and prospect localities (GrandJct.pdf).
6. Map of Delta quadrangle showing mine and prospect localities (Delta.pdf).
7. Map of Nucla quadrangle showing mine and prospect localities (Nucla.pdf).
8. Map of Dove Creek quadrangle showing mine and prospect localities (DoveCk.pdf).
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12. Map of Silverton quadrangle showing mine and prospect localities (Silverton.pdf), including detail maps of the Handies Peak (inset_handies.pdf), Ironton (inset_ironon.pdf), Telluride (inset_telluride.pdf), and a portion of Ophir (inset_ophir.pdf) 7 1/2-minute quadrangles.

13. Map of Leadville quadrangle showing mine and prospect localities (Leadville.pdf).
14. Map of Gunnison quadrangle showing mine and prospect localities (Gunnison.pdf), including detail maps of portions of the Cumberland Pass (inset_cumberland.pdf), Pitkin (inset_pitkin.pdf), and Whitepine (inset_whitepine.pdf) 7 1/2-minute quadrangles.
15. Map of Saguache quadrangle showing mine and prospect localities (Saguache.pdf).
16. Map of Del Norte quadrangle showing mine and prospect localities (DelNorte.pdf).

FILES ON CD-ROM

Root Directory:

Introduction (text)	MA_intro.wpd
Geology ArcExplorer Project file	Geology.aep
Mines and Prospects ArcExplorer Project file	Mines.aep

Part A:

Mines and Mineralized Areas Data (text)	MA_partA.wpd
Information Sources Listed in Mines and Mineralized Areas Databases	mines_refs.wpd

Part B:

Files and Formats (text)	MA-partB.wpd
Adobe Acrobat (installation file)	ar405eng.exe
Data	
Mine and Prospect Database	Mines.xls
Arc/Info (.e00 format)	
Mines and prospects	mines
Mineralized areas	mnrlarea
Forest boundary	GMUG-FB
County boundaries	Counties
Quadrangle grid	QuadGrid
Claim density	claims
Study area mask	GMUGmask
Geology	
Precambrian Rocks	XYcombo
Cambrian to Mississippian Rocks	MDOCseds
Pennsylvanian and Permian Rocks	P&seds
Triassic to Jurassic Rocks	JTRseds
Cretaceous Sedimentary Rocks	Kseds
Tertiary Sedimentary Rocks	Tseds
Tertiary Plutonic Rocks	Tplutons
Tertiary Volcanic Rocks	Tvolc
Tertiary Basaltic Rocks	Tbasalt
Quaternary Deposits	Qseds

ArcView (.shp, .shx, and .dbf files)

Mines and prospects	mines
Mineralized areas	mnrarea
Forest boundary	GMUG-FB
County boundaries	Counties
Quadrangle grid	QuadGrid
Claim density	claims
Study area mask	GMUGmask
Geology	
Precambrian Rocks	XYcombo
Cambrian to Mississippian Rocks	MDOCseds
Pennsylvanian and Permian Rocks	P&seds
Triassic to Jurassic Rocks	JTRseds
Cretaceous Sedimentary Rocks	Kseds
Tertiary Sedimentary Rocks	Tseds
Tertiary Plutonic Rocks	Tplutons
Tertiary Volcanic Rocks	Tvolc
Tertiary Basaltic Rocks	Tbasalt
Quaternary Deposits	Qseds

MapInfo (.tab, .dat, .id, .map, and .ind. [if applicable] files)

Mines and prospects	mines
Mineralized areas	mnrarea
Forest boundary	GMUG-FB
County boundaries	Counties
Quadrangle grid	QuadGrid
Claim density	claims
Study area mask	GMUGmask
Geology	
Precambrian Rocks	XYcombo
Cambrian to Mississippian Rocks	MDOCseds
Pennsylvanian and Permian Rocks	P&seds
Triassic to Jurassic Rocks	JTRseds
Cretaceous Sedimentary Rocks	Kseds
Tertiary Sedimentary Rocks	Tseds
Tertiary Plutonic Rocks	Tplutons
Tertiary Volcanic Rocks	Tvolc
Tertiary Basaltic Rocks	Tbasalt
Quaternary Deposits	Qseds

Topographic Maps (1:100,000 Digital Raster Graphic files in .TIF, and .TFW formats)

Grand Junction	F39108A1
Delta	F38108E1
Nucla	F38108A1
Dove Creek	F37108E1
Carbondale	F39107A1
Paonia	F38107E1
Montrose	F38107A1
Silverton	F37107E1
Leadville	F39106A1
Gunnison	F38106E1
Saguache	F38106A1
Del Norte	F37106E1

PDFimage (Figures 1-16, all in .pdf format)

Figure 1. GMUG Index Map	Gmug_index
Figure 2. Mines and Mineralized Areas	Mnrlareas&mines
Figure 3. Simplified Geologic Map	Geology
Figure 4. Claim Activity Map	Claimact
Mines by Quadrangle (Mines and Prospects by 1:100,000 Quadrangle)	
Figure 5. Grand Junction	GrandJct
Figure 6. Delta	Delta
Figure 7. Nucla	Nucla
Figure 8. Dove Creek	DoveCk
Figure 9. Carbondale	Carbondale
Figure 10. Paonia	Paonia
Irwin area, shown on a portion of the 7 1/2-minute Mount Axtell quadrangle	
Figure 11. Montrose	Montrose
Gateview 7 1/2-minute quadrangle	Inset_Gate
Ouray 7 1/2-minute quadrangle	Inset_Ouray
Powderhorn 7 1/2-minute quadrangle	Inset_Powder
Figure 12. Silverton	Silverton
Handies Peak 7 1/2-minute quadrangle	Inset_Handies
Ironton 7 1/2-minute quadrangle	Inset_Ironton
Ophir 7 1/2-minute quadrangle (part)	Inset_Ophir
Telluride 7 1/2-minute quadrangle	Inset_Telluride
Figure 13. Leadville	Leadville
Figure 14. Gunnison	Gunnison
Cumberland Pass 7 1/2-minute quadrangle (part)	Inset_Cumberland
Pitkin 7 1/2-minute quadrangle (part)	Inset_Pitkin
Whitepine 7 1/2-minute quadrangle (part)	Inset_Whitepine
Figure 15. Saguache	Saguache
Figure 16. Del Norte	DelNorte

Part C:

ArcExplorer (text) MA_partC.wpd
ArcExplorer (Program installation file) aeclient.exe

Part D:

Metadata (text) MA_partD
Metadata (all are ASCII text files, .txt)
 Mines and prospects mines
 Mineralized areas mnrlarea
 Forest boundary GMUG-FB
 County boundaries Counties
 Quadrangle grid QuadGrid
 Claims claims
 Gmugmask GMUGmask
 Geology Geology
 Topos (1:100,000 quadrangles)
 Delta F38108E1
 Nucla F38108A1
 Dove Creek F37108E1
 Carbondale F39107A1
 Paonia F38107E1
 Montrose F38107A1
 Silverton F37107E1
 Leadville F39106A1
 Gunnison F38106E1
 Saguache F38106A1
 Del Norte F37106E1

INTRODUCTION

The data on the enclosed diskette were used by the USGS for a mineral resource assessment of the GMUG National Forests and adjacent areas of southwestern Colorado (Bankey and others, in press). This data release is in three parts: **A.** Description of mineralized areas, **B.** data files in various formats for viewing and plotting, or for importing into other applications (table 1), **C.** ArcExplorer¹ (ArcExplorer Project [.aep] files are in the root directory) to display the data in “map” views and query the various datasets without requiring the user to purchase a GIS program such as Arc/Info¹, ArcView¹, or MapInfo² (table 2), .PDF images of an index map, mines and mineralized areas, a simplified geologic map, a claim activity map, and mine location maps by quadrangle (table 3), and **D.** metadata files for each dataset. File extensions are explained in table 1.

Methodology

In order to assess the mineral resource potential of the GMUG study area (figure 1, PartB\PDFimage\gmug_index.pdf), Wilson, Crane, and Woodard located mines and prospects (PartB\Data\mines.xls), and in combination with digital geologic maps, geochemistry, and geophysics, and advice from coworkers, Wilson and Spanski outlined 37 mineralized areas (figure 2, PartB\PDFimage\mnrlareas&mines.pdf; PartB\Data\...\mnrlarea.*). A mineralized area (MA) encloses a geographic area that is defined by the presence of mines, prospects, and/or mineralized occurrences that belong to one deposit-type or a group of genetically related deposit-types in a distinct geologic setting. A MA may include an entire district or portions of several mining districts. Twenty-five of the areas are based on the occurrence of a single mineral deposit-type and eleven on multiple deposit-types.

Much of the mine and prospect data for the GMUG study area was extracted from site records for mines, prospects, and occurrences contained in U.S. Geological Survey (USGS) and U.S. Bureau of Mines (USBM) data files. A.B. Wilson, M.J. Crane, and M.D. Woodard (U.S. Geological Survey) verified as many of these data records as possible and added many more sites from information extracted from references and maps during the verification process. Locations of approximately 1,300 sites (solid red squares on fig. 2, PartB\PDFimage\mnrlareas&mines.pdf; figs. 5-16, PartB\PDFimage\Mines by Quadrangle\...) are believed to be accurate to within about 1/2 mi (750 m, or 2,500 ft) of their actual ground position. About 1,000 sites could not be verified from references but could be generally located using data (such as Township and Range or descriptive information) in the database records: these sites (red diamonds on figures 2; 5-16) are believed to be accurate to within about 1 mi (2 km, 5,000 ft). A few sites plot in one quadrangle but list a different quadrangle in the database—these are shown as green diamonds and labeled “wrong quad” in the symbol field. Placers are indicated by orange (reasonably located) or yellow (location not unverified) crosses, but none of the placer records was checked for this project. There was insufficient location data

¹ Registered trademark of Environmental Systems Research Institute (ESRI)

² Registered trademark of MapInfo Corporation

to plot about 200 of the sites in the MRDS and MAS/MILS databases: these sites are included in mines.* files but are not shown on figures 2 and 5-16.

Table 1. Data files showing file names, formats, and projections.

[Three character file extensions throughout this report are as follows: .e00, Arc/Info export file; .shp, ArcView shape file; .tab, MapInfo table file; .xls, Microsoft Excel spreadsheet; .tif, tagged image file, raster based, for use in many different programs; tfw, a file to accurately georeference a .tif image; .met, metadata in text format; .aep, ArcExplorer Project file; pdf, Adobe Acrobat Reader portable document file; *, refers to any extension. UTM13, Universal Transverse Mercator Projection, zone 13; lcc108, Lambert Conformal Conic projection, 108° West Longitude central meridian.]

DATA TYPE	FILE	.e00	.shp	.tab	.xls	.tif and .tfw	.met	projection
mines	mines	X	X	X	X		X	lcc108
mineral areas	mnrlarea	X	X	X			X	lcc108
forest boundary	GMUG-FB	X	X	X			X	lcc108
county boundaries	counties	X	X	X			X	lcc108
quadrangle grid	quadgrid	X	X	X			X	lcc108
claim density	claims	X	X	X			X	lcc108
study area boundary	GMUGmask	X	X	X			X	lcc108
topographic quadrangle maps								
	Grand Junction					X	X	UTM13
	Delta					X	X	UTM13
	Nucla					X	X	UTM13
	Dove Creek					X	X	UTM13
	Carbondale					X	X	UTM13
	Paonia					X	X	UTM13
	Montrose					X	X	UTM13
	Silverton					X	X	UTM13
	Leadville					X	X	UTM13
	Gunnison					X	X	UTM13
	Saguache					X	X	UTM13
	Del Norte					X	X	UTM13
Geology							X	
	Qseds	X	X	X				lcc108
	Tseds	X	X	X				lcc108
	Tplutons	X	X	X				lcc108
	Tvolc	X	X	X				lcc108
	Tbasalt	X	X	X				lcc108
	Kseds	X	X	X				lcc108
	JTRseds	X	X	X				lcc108
	P&seds	X	X	X				lcc108
	MDOCseds	X	X	X				lcc108
	XYcombo	X	X	X				lcc108

Table 2. ArcView shape (.shp) files used to construct ArcExplorer project (aep) files.

PROJECT (.AEP)	FILE (.SHP)
mines	mines
	mnrarea
	FB-GMUG
	counties
	quadgrid
	claims
Geology	XYcombo
	MDOCseds
	P&seds
	JTRseds
	Kseds
	Tseds
	Tplutons
	Tvolc
	Tbasalt
	Qseds
	mines
	mnrarea
	FB-GMUG
	counties
	quadgrid

Table 3. List of files included in Figures 1-4 (PartB\PDFimage\...) and Figures 5-16 (PartB\PDFimage\Mines by Quadrangle).

FIGURE	CONTENT (.pdf filename)	FILES USED
1	Index map (gmug_index.pdf)	Gmugmask FB-GMUG counties quadgrid
2	Mines and Mineralized areas (mnrlareas&mines.pdf)	Gmugmask FB-GMUG mines mnrlarea
3	Geologic map (geology.pdf)	XYcombo MDOCseds P&seds JTRseds Kseds Tseds Tplutons Tvolc Tbasalt Qseds FB-GMUG
4	Claim Activity (claimact.pdf)	claims FB-GMUG mnrlarea Gmugmask
5	Grand Junction	F10839A1.tif, .tfw mines (subset)
6	Delta	F10838E1.tif, .tfw mines (subset)
7	Nucla	F10838A1.tif, .tfw mines (subset)
8	Dove Creek	F10837E1.tif, .tfw mines (subset)

9	Carbondale	F10739A1.tif, .tfw
		mines (subset)
10	Paonia	F10738E1.tif, .tfw
		mines (subset)
	Inset_Irwin	
11	Montrose	F10738A1.tif, .tfw
		mines (subset)
	Inset_Gate	
	Inset_Ouray	
	Inset_Powder	
12	Silverton	F10737E1.tif, .tfw
		mines (subset)
	Inset_Handies	
	Inset_Ironton	
	Inset_Ophir	
	Inset_Telluride	
13	Leadville	F10839A1.tif, .tfw
		mines (subset)
14	Gunnison	F10838E1.tif, .tfw
		mines (subset)
	Inset_Cumberland	
	Inset_Pitkin	
	Inset_Whitepine	
15	Saguache	F10838A1.tif, .tfw
		mines (subset)
16	Del Norte	F10837E1.tif, .tfw
		mines (subset)