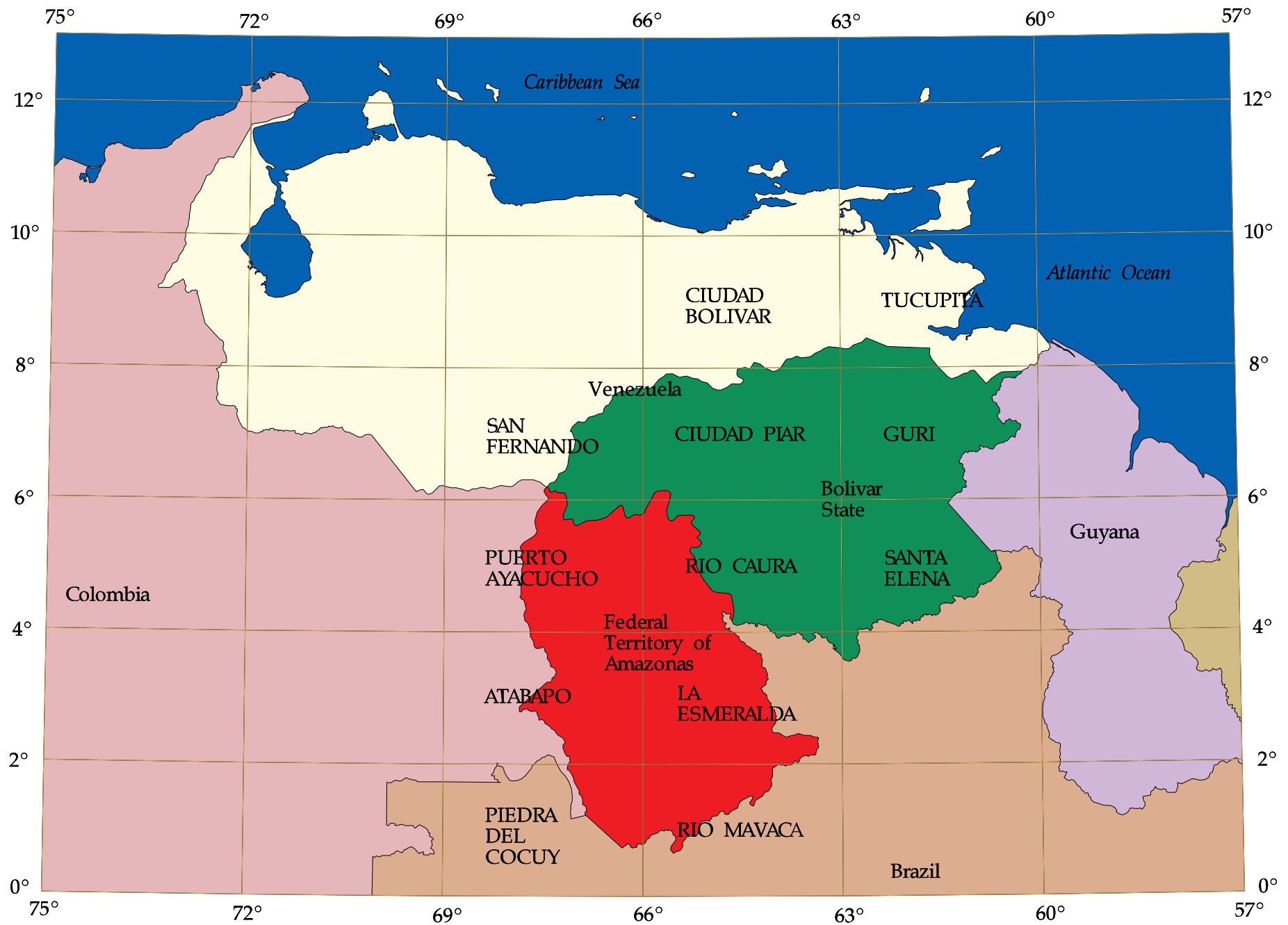
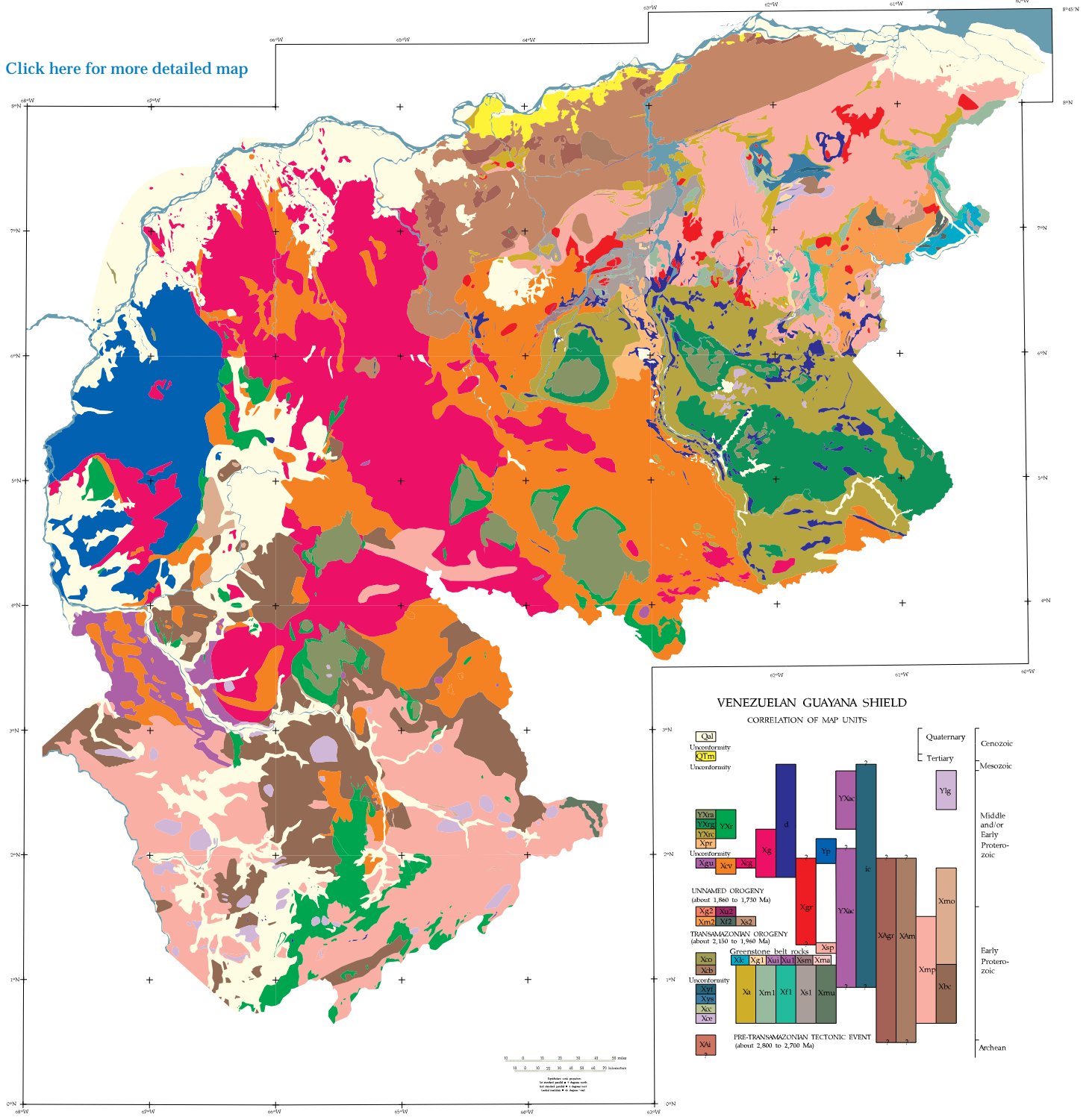


# Study Area



[Click here for more detailed map](#)



**U.S. GEOLOGICAL SURVEY DIGITAL DATA SERIES DDS-46**

**Geology and Resource Assessment of the Venezuelan Guayana Shield at  
1:500,000 scale--A Digital Representation of Maps published by the U.S.  
Geological Survey**

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**U.S. DEPARTMENT OF THE INTERIOR  
BRUCE BABBITT, Secretary**

**U.S. GEOLOGICAL SURVEY  
Gordon P. Eaton, Director**

**For sale by U.S. Geological Survey, Map Distribution  
Box 25286, Building 810, Federal Center  
Denver, CO 80225**

**Prepared in the Eastern Region, Reston, Va.  
Manuscript approved for publication .**

**1997**

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Graphical map depictions on this disc are intended to be used within the map scale limits applicable to the source data. Although software enables the user to show images on the disc at various scales, the user is cautioned to refer to the source documentation for the appropriate map scale limitations.

## SYSTEM REQUIREMENTS

This CD-ROM was produced in accordance with the ISO 9660 standard and thus allows access to the disc files by computers with ISO 9660 software drivers. The disc contains Adobe Acrobat Reader software for DOS, Macintosh, UNIX, and Windows. as well as a graphics display program, ArcView 1, for Windows 3.x.

### ARCVIEW 1 REQUIREMENTS

80386 or better CPU  
Math coprocessor recommended  
Windows 3.0 or higher but not Windows 95  
4 Mb of RAM, 8 Mb strongly recommended  
15 Mb of disk space  
Super VGA graphics system, 256 colors, 640x480 pixels minimum,  
1024x768 pixels strongly recommended  
Microsoft-compatible mouse  
Windows-supported printer

### ARCVIEW 3 REQUIREMENTS

80486 or better CPU  
Windows 3.x, 95, or NT  
12-16 Mb of RAM  
Super VGA graphics system, 256 colors, 640x480 pixels minimum,  
1024x768 pixels strongly recommended  
Microsoft-compatible mouse

or

Power Macintosh or 68040 processor with FPU  
System 7.1 or higher  
16-18 Mb of RAM

## **ADOBE ACROBAT READER REQUIREMENTS:**

A color display monitor is strongly recommended with all platforms.

**Windows 95 - rs32e30.exe**

### **Minimum**

**i386(TM), i486(TM), Pentium(R), or  
Pentium Pro processor-based personal computer  
Microsoft Windows 95, or Windows NT(R) 3.51 or later  
8 MB of RAM (16 MB for Windows NT) for Acrobat Reader  
10 MB of available hard-disk space**

### **Recommended**

**Pentium processor-based personal computer  
Windows 95 or Windows NT  
16 MB of RAM (24 for Windows NT)  
10 MB of available hard-disk space**

**Windows NT - rs32e30.exe**

### **Minimum**

**i386(TM), i486(TM), Pentium(R), or Pentium Pro processor  
Windows NT(R) 3.51 or later  
8 MB of RAM (16 MB for Windows NT) for Acrobat Reader  
10 MB of available hard-disk space**

### **Recommended**

**Pentium processor-based personal  
computer  
Windows 95 or Windows NT  
16 MB of RAM (24 for Windows NT)  
10 MB of available hard-disk space**

## Windows 3.1 and 3.11 for Workgroups - rs16e30.exe

### Minimum

- i386(TM), i486(TM), Pentium(R), or Pentium Pro processor
- Microsoft Windows 3.1 or Windows 3.11 or later
- 8 MB of RAM for Acrobat Reader
- 5 MB of available hard-disk space

### Recommended

- Pentium processor-based personal computer
- Microsoft Windows 3.1 or Windows 3.11 or later
- 12 MB of available hard-disk space

## Macintosh and Power Macintosh - Install Acrobat Reader 3.0, Search Installer

### Minimum

- Macintosh with a 68020 or greater processor, or Power Macintosh
- 3.5 MB of RAM (5 MB for Power Macintosh) available to Acrobat Reader
- Apple(R) System Software version 7.1 or later

### Recommended

- 8 MB of available RAM
- Apple System Software version 7.1.2 or later
- 12.5 MB of available hard-disk space

## UNIX

### UNIX system requirements

- 12 MB of disk space for Acrobat Reader
- System with 32 MB of RAM

## Sun SPARCstation(R) - acroread\_sunos\_30.tar.gz, acroread\_solaris\_30.tar.gz

- SunOS 4.1.3 or 4.1.4 or Solaris 2.3, 2.4, or 2.5
- OpenWindows(TM) (version 3.0 or later),
- Motif(TM) window manager (1.2.3 or later),
- OpenLook version 3.0, or
- Common Desktop Environment (CDE) 1.0 and above

## HP Series 9000 workstation, model 700 or greater - acroread\_hpux\_30.tar.gz

- HP-UX 9.0.3 or later
- X Window System(TM) X11R5 with HP-VUE or CDE 1.0
- 12 megabytes of available hard disk space
- A 32 megabyte machine



IBM(R) RS/6000(TM) workstation - acroread\_aix\_30.tar.gz  
AIX 4.1 or later operating system  
Common Desktop Environment (CDE) or the Motif window manager

Silicon Graphics workstation - acroread\_irix\_30.tar.gz  
IRIX(TM) 5.3 or later operating system software  
12 megabytes of available hard disk space  
A 32 megabyte machine

Linux workstation - acroread\_linux\_30.tar.gz  
LINUX 5.3 or later operating system software  
12 megabytes of available hard disk space  
A 32 megabyte machine

OS/2 - aro2e30.exe

#### Minimum

i386, i486, Pentium, or Pentium Pro processor  
IBM OS/2 Warp or Warp Connect 3.0 or later  
4 MB application RAM available to Acrobat Reader  
8 MB RAM for system  
5 MB hard-disk space, plus 5 MB temporary space for installation

#### Recommended

Pentium processor  
IBM OS/2 Warp 4.0

Adobe Acrobat Reader 1.0 for DOS - rdrdos10.zip

#### Minimum

i386(TM), i486(TM) processor  
Microsoft DOS 3.3 or later  
2 MB of RAM for Acrobat Reader.  
5 MB of available hard-disk space

#### Recommended

486 or Pentium processor  
Microsoft DOS 3.3 or later  
4 MB of application RAM  
5 MB of available hard-disk space

## ACKNOWLEDGEMENTS

Development of the graphics files on this CD-ROM spanned many years and involved the efforts of many organizations and individuals. Most of the digitizing was done in GSMAP by Jeff Wynn (USGS) and others. The northern quadrangles were scanned from tracings created by the geologists. Thanks to the following authors for those materials:

John H. Stewart (USGS)  
Dennis P. Cox (USGS)  
Floyd Gray (USGS)  
W. E. Brooks (USGS)

Thanks to Corporación Venezolana de Guayana, Técnica Minera C.A. and the following authors of Venezuela maps and reports for their help in the preparation of the digital files:

Juan Acosta  
Jesús Arespón  
Yasmin Estanga  
Luis Franco  
Andrés García  
Yolanda Lopez  
Elis Lugo  
Iris Marcano  
Félix Martínez  
Vicente Mendoza-S.  
Stephen D. Olmore  
Inés Rendón  
Haydée Rincón  
Nelson Rivero  
Edixon Salazar  
Gary B. Sidder (formerly USGS, now Golden Star Resources)  
Frank Tovar

Thanks to David K. Traudt, USGS, who assembled the files and directories from tape to master CD-ROM. Thanks to the following personnel in the USGS who provided disk files of Bulletin 2062 text and figures as well as many thoughtful suggestions for improvements to the maps and text on the CD-ROM.

Frederick C. Brunstein  
David A. Emery  
Will Stettner  
Judith W. Stoeser

## CONTACTS

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	FAX	(703) 648-6383
	E-mail	pschrube@usgs.gov

U.S. Geological Survey, 954 National Center, Reston, VA 22092-9998.

Technical help with ArcView 1 is available via CompuServe by typing GO ESRI.

Copies of the original USGS 1993 Bulletin 2062, MF maps cited in the Documentation of Map Units, and this CD-ROM are available from:

U.S. Geological Survey, Map Distribution  
Box 25286, Building 810  
Federal Center  
Denver, CO 80225

Tel: (888) ASK-USGS or for overseas access  
(703) 648-6045.

## DISC CONTENTS

1readme.doc	description of this disc, Microsoft Word 6 file
1readme.mac.text	description of this disc, Macintosh/OS plain text file
1readme.pdf	description of this disc, Adobe Acrobat Reader file
1readmet.dos	description of this disc, MS/DOS plain text file
1readmew.dos	description of this disc, Microsoft Word for Windows 1.0
acrobat	directory containing Acrobat Reader installer programs
arcview1	directory containing ArcView 1 installer program
arcpc	directory containing PC ArcView 1 and ARC/INFO directories. Same as arcunix6 directory below
arcunix6	directory containing ArcView 1 and ARC/INFO 6.1.2 directories
at	directory containing files for Atabapo 2°x3° quadrangle (Venezuela part)
at.aml	ARC/PLOT program for 44" Versatec plotter
at.av	ArcView 1 file
at.gra	ARC/PLOT plot file for 44" Versatec plotter
atanno5	geographic place name annotation
atcor	correlation of map units
atft	faults
atge	geology
atlab	rock unit label annotation
atleg	map legend
atma	buried magnetic bodies
atout	quadrangle outline and lat/long numbers
atpl	political boundaries
atscale	1:500,000 scale bar, title, & citation
atst	single-line tributaries
attc	latitude/longitude tics for this quadrangle
grid	lat/long grid lines for index map
index	index map showing quadrangle names and surrounding countries
vztc	latitude/longitude numbers and tics for index map
ay	directory containing Puerto Ayacucho 2°x3° quadrangle (Venezuela part) files
ay.aml	ARC/PLOT program for 44" Versatec plotter
ay.av	ArcView 1 file
ay.gra	ARC/PLOT plot file for 44" Versatec plotter
ayanno5	geographic place name annotation
aycor	correlation of map units
aycrlbm	crosssection geology rock unit labels
aycrm	crosssection geology polygons
ayft	faults
ayge	geology
aylab	rock unit label annotation
aylabcr	crosssection line and annotation on map
ayleg	map legend
aylegpt	map legend points
ayma	buried magnetic bodies
aymalab	buried magnetic bodies
ayout	quadrangle outline and lat/long numbers
aypl	political boundaries
ayrd	roads

ayscale	1:500,000 scale bar, title, & citation
ayst	single-line tributaries
aytc	latitude/longitude tics for this quadrangle
grid	lat/long grid lines for index map
index	index map showing quadrangle names and surrounding countries
vztc	latitude/longitude numbers and tics for index map
ca	directory containing Río Caura 2° by 3° quadrangle files
ca. aml	ARC/PLOT program for 44" Versatec plotter
ca. av	ArcView 1 file
ca. gra	ARC/PLOT plot file for 44" Versatec plotter
caanno5	geographic place name annotation
cacor	correlation of map units
caft	faults
cage	geology
calab	rock unit label annotation
caleg	map legend
calegpt	map legend points
cama	buried magnetic bodies
caout	quadrangle outline and lat/long numbers
capl	political boundaries
cascale	1:500,000 scale bar, title, & citation
cast	single-line tributaries
catc	latitude/longitude tics for this quadrangle
grid	lat/long grid lines for index map
index	index map showing quadrangle names and surrounding countries
vztc	latitude/longitude numbers and tics for index map
es	directory containing La Esmeralda 2°x3° quadrangle (Venezuela part) files
es. aml	ARC/PLOT program for 44" Versatec plotter
es. av	ArcView 1 file
es. gra	ARC/PLOT plot file for 44" Versatec plotter
esanno5	geographic place name annotation
escor	correlation of map units
esft	faults
esge	geology
eslab	rock unit label annotation
esleg	map legend
eslegpt	map legend points
esma	buried magnetic bodies
esout	quadrangle outline and lat/long numbers
espl	political boundaries
esscale	1:500,000 scale bar, title, & citation
esst	single-line tributaries
estc	latitude/longitude tics for this quadrangle
grid	lat/long grid lines for index map
index	index map showing quadrangle names and surrounding countries
vztc	latitude/longitude numbers and tics for index map
gu	directory containing Guri and southern part of the Tucupita 2°x3° quadrangles files
grid	lat/long grid lines for index map
gu. aml	ARC/PLOT program for 44" Versatec plotter

gu. av	ArcView 1 file
gu. gra	ARC/PLOT plot file for 44" Versatec plotter
guanno5	geographic place name annotation
gucor	correlation of map units
guft	faults
guge	geology
gulab	rock unit label annotation
guleg	map legend
gulegpt	map legend points
guout	quadrangle outline and lat/long numbers
gupl	political boundaries
gurd	roads
guscale	1: 500,000 scale bar, title, & citation
gust	single-line tributaries
gutc	latitude/longitude tics for this quadrangle
index	index map showing quadrangle names and surrounding countries
vztc	latitude/longitude numbers and tics for index map
ma	directory containing Río Mavaca 2°x3° quadrangle (Venezuela part)
grid	lat/long grid lines for index map
index	index map showing quadrangle names and surrounding countries
ma. aml	ARC/PLOT program for 44" Versatec plotter
ma. av	ArcView 1 file
ma. gra	ARC/PLOT plot file for 44" Versatec plotter
maanno5	geographic place name annotation
macor	correlation of map units
maft	faults
mage	geology
malab	rock unit label annotation
maleg	map legend
mama	buried magnetic bodies
maout	quadrangle outline and lat/long numbers
mascale	1: 500,000 scale bar, title, & citation
mast	single-line tributaries
matc	latitude/longitude tics for this quadrangle
vztc	latitude/longitude numbers and tics for index map
pc	directory containing Piedra de Cocuy 2°x3° quadrangle (Venezuela part) files
grid	lat/long grid lines for index map
index	index map showing quadrangle names and surrounding countries
pc. aml	ARC/PLOT program for 44" Versatec plotter
pc. av	ArcView 1 file
pc. gra	ARC/PLOT plot file for 44" Versatec plotter
pcanno5	geographic place name annotation
pccor	correlation of map units
pcft	faults
pcge	geology
pclab	rock unit label annotation
pclcg	map legend
pclcgpt	map legend points
pcma	buried magnetic bodies

pcout	quadrangle outline and lat/long numbers
pcpl	political boundaries
pcscale	1:500,000 scale bar, title, & citation
pcst	single-line tributaries
pctc	latitude/longitude tics for this quadrangle
vztc	latitude/longitude numbers and tics for index map
pi	directory containing Ciudad Piar and part of the Ciudad Bolivar 2°x3° quadrangles files
fnt040	ARC/INFO font file necessary for sag fault line symbol
grid	lat/long grid lines for index map
index	index map showing quadrangle names and surrounding countries
pi.aml	ARC/PLOT program for 44" Versatec plotter
pi.av	ArcView 1 file
pi.gra	ARC/PLOT plot file for 44" Versatec plotter
pi.anno5	geographic place name annotation
picor	correlation of map units
pift	faults
pi.ge	geology
pilab	rock unit label annotation
pileg	map legend
pilegpt	map legend points
pima	kimberlite area
pi.out	quadrangle outline and lat/long numbers
pi.pl	political boundaries
pi.rd	roads
pi.scale	1:500,000 scale bar, title, & citation
pisr	structural lines from SLAR
pist	single-line tributaries
pitc	latitude/longitude tics for this quadrangle
vztc	latitude/longitude numbers and tics for index map
se	directory containing Santa Elena 2°x3° quadrangle (Venezuela part) files
grid	lat/long grid lines for index map
index	index map showing quadrangle names and surrounding countries
se.aml	ARC/PLOT program for 44" Versatec plotter
se.av	ArcView 1 file
se.gra	ARC/PLOT plot file for 44" Versatec plotter
se.anno5	geographic place name annotation
secor	correlation of map units
seft	faults
sege	geology
selab	rock unit label annotation
seleg	map legend
selegpt	map legend points
se.out	quadrangle outline and lat/long numbers
se.pl	political boundaries
se.rd	roads
se.scale	1:500,000 scale bar, title, & citation
se.st	single-line tributaries
setc	latitude/longitude tics for this quadrangle
vztc	latitude/longitude numbers and tics for index map
sf	directory containing San Fernando de Apure 2°x3° quadrangle

(Bolivar part) files

grid	lat/long grid lines for index map
index	index map showing quadrangle names and surrounding countries
sf. aml	ARC/PLOT program for 44" Versatec plotter
sf. av	ArcView 1 file
sf. gra	ARC/PLOT plot file for 44" Versatec plotter
sfanno5	geographic place name annotation
sfcor	correlation of map units
sfft	faults
sfge	geology
sflab	rock unit label annotation
sfleg	map legend
sflegpt	map legend points
sfout	quadrangle outline and lat/long numbers for ArcView
sfpl	political boundaries
sfscale	1:500,000 scale bar, title, & citation
sfst	single-line tributaries
sftc	latitude/longitude tics for this quadrangle
vztc	latitude/longitude numbers and tics for index map
vz	directory containing combined map coverages for Venezuelan Guayana Shield, all quadrangles
av. mrk	ArcView markerset to be copied to the ARCHOME directory
av. txt	ArcView textset to be copied to the ARCHOME directory
deposit	mineral deposits, prospects and occurrences
equi2geo. prj	projection file for converting equidistant conic to decimal degrees
fnt040	ARC/INFO font file necessary for sag fault line symbol
ge. ai	Illustrator 6.0 version of ge. eps
ge. eps	ARC/PLOT Postscript plot file for 44" Versatec plotter
ge. gra	ARC/PLOT plot file for 44" Versatec plotter
geo2equi. prj	projection file for converting decimal degrees to equidistant conic
grid	lat/long grid lines for index map
index	index map showing quadrangle names and surrounding countries
mrkse. mrk	ARC/PLOT markerset for other point symbols
myalgeol. mrk	ARC/PLOT markerset for cities, bedding, joint symbols
myplotter. shd	ARC/PLOT shadeset for geology patterns
myplt. lin	ARC/PLOT lineset for faults, roads, political boundaries
places	geographic place names
ra	mineral resource permissive areas map A
raanno	mineral resource permissive areas map A annotation
rb	mineral resource permissive areas map B
rbanno	mineral resource permissive areas map B annotation
rbstruct	mineral resource permissive areas map B structural features
scale	scalebar and projection information
vz. aml	ARC/PLOT program for 44" Versatec plotter
vz. av	ArcView 1 view file
vz. apr	ArcView 3 project file
vzcor	correlation of map units
vzctry	Northeast South America country borders
vzft	faults, annotation, joints, and bedding



vzge	geology	
vzlab	rock unit annotation and leaders	
vzma	buried magnetic bodies	
vzout	outer edge of combined quadrangles in study area	
vzpl	study area political boundaries	
vzprov	Venezuela province boundaries for index map	
vzrd	roads	
vzst	single-line tributaries and annotation	
vztc	latitude/longitude numbers and tics for index map	
arcunix7	directory containing ArcView 3 and ARC/INFO 7 directory	
vz	directory containing combined map coverages for Venezuelan Guayana Shield, all quadrangles. Same as in arcunix6/vz.	
bull2062	directory containing text and figures from Bulletin 2062	
doc		
tables.doc	Word 5.1	tables 1-2, 4-11
tabside.doc	Word 5.1	table 3
mi f		
b2062con.mi f	framemaker 3.0p1b	table of contents
b2062fnt.mi f	framemaker 3.0p1b	cover 1, cover 2, i, ii, iii
b2062txt.mi f	framemaker 3.0p1b	main body, p. 1-120
rtf		
b2062con.rtf	rich text (RTF)	table of contents
b2062txt.rtf	rich text (RTF)	main body, p. 3-5
tif		
vzget.tif	TIF	Plate 2, geology, key part
vzge.tif	TIF	Plate 2, geologic map part
vzmin.tif	TIF	Plate 6, mineral deposits
txt		
b2062con.txt	text	table of contents
b2062fnt.txt	text	i, ii
b2062txt.txt	text	main body, p. 1-72
dl g	directory containing Digital Line Graph (DLG) Optional files	
cor.dlg	correlation of map units in Equidistant Conic projection	
cordd.dlg	correlation of map units in decimal degrees	
ft.dlg	faults in Equidistant Conic projection	
ftdd.dlg	faults in decimal degrees	
ge.dlg	geology in Equidistant Conic projection	
gedd.dlg	geology in decimal degrees	
ptype.unl	rock unit names, descriptions, colors for Versatec plotter	
scale.dlg	scale bar in Equidistant Conic projection	
scaldd.dlg	scale bar in decimal degrees	
vzline.unl	fault and contact line types	
export	directory containing directories of ARC/INFO export files and programs	
at	directory containing Atabapo quadrangle files	
at.aml	ARC/PLOT program for 44" Versatec plotter	
at.av	ArcView 1 file	
at.gra	ARC/PLOT 1040 plot file for 44" Versatec plotter. This a binary file	
atanno5.e00	geographic place name annotation	
atcor.e00	correlation of map units	
atft.e00	faults	

atge. e00 geology  
atlab. e00 rock unit label annotation  
atleg. e00 map legend  
atma. e00 buried magnetic bodies  
atout. e00 quadrangle outline and lat/long numbers  
atpl. e00 political boundaries  
atscale. e00 1: 500, 000 scale bar, title, & citation  
atst. e00 single-line tributaries  
attc. e00 latitude longitude tics for this quadrangle  
grid. e00 lat/long grid lines for index map  
import. aml ARC program for importing coverage  
index. e0\* index map showing quadrangle names and surrounding  
countries, files 0-1  
vztc. e00 latitude longitude tics for index map  
ay directory containing Puerto Ayacucho quadrangle files  
ay. aml ARC/PLOT program for 44" Versatec plotter  
ay. av ArcView 1 file  
ay. gra ARC/PLOT 1040 plot file for 44" Versatec plotter.  
This a binary file  
ayanno5. e00 geographic place name annotation  
aycor. e00 correlation of map units  
aycrlbm. e00 cross section labels  
aycrm. e00 cross section arcs  
ayft. e00 faults  
ayge. e00 geology  
aylab. e00 rock unit label annotation  
aylabcr. e00 rock unit label annotation for cross section  
ayleg. e00 map legend  
aylegpt. e00 map legend points  
ayma. e00 buried magnetic bodies  
aymalab. e00 buried magnetic bodies labels  
ayout. e00 quadrangle outline and lat/long numbers  
aypl. e00 political boundaries  
ayrd. e00 roads  
ayscale. e00 1: 500, 000 scale bar, title, & citation  
ayst. e00 single-line tributaries  
aytc. e00 latitude longitude tics for this quadrangle  
grid. e00 lat/long grid lines for index map  
import. aml ARC program for importing coverage  
index. e0\* index map showing quadrangle names and surrounding  
countries, files 0-1  
vztc. e00 latitude longitude tics for index map  
ca directory containing Río Caura quadrangle files  
ca. aml ARC/PLOT program for 44" Versatec plotter  
ca. av ArcView 1 file  
ca. gra ARC/PLOT 1040 plot file for 44" Versatec plotter.  
This a binary file  
caanno5. e00 geographic place name annotation  
cacor. e00 correlation of map units  
caft. e00 faults  
cage. e00 geology  
calab. e00 rock unit label annotation  
caleg. e00 map legend  
calegpt. e00 map legend points

cama. e00	buried magnetic bodies
caout. e00	quadrangle outline and lat/long numbers
capl. e00	political boundaries
cascale. e00	1: 500,000 scale bar, title, & citation
cast. e00	single-line tributaries
catc. e00	latitude longitude tics for this quadrangle
grid. e00	lat/long grid lines for index map
import. aml	ARC program for importing coverage
index. e0*	index map showing quadrangle names and surrounding countries, files 0-1
vztc. e00	latitude longitude tics for index map
es	directory containing La Esmeralda quadrangle files
es. aml	ARC/PLOT program for 44" Versatec plotter
es. av	ArcView 1 file
es. gra	ARC/PLOT 1040 plot file for 44" Versatec plotter. This a binary file
esanno5. e00	geographic place name annotation
escor. e00	correlation of map units
esft. e00	faults
esge. e00	geology
eslab. e00	rock unit label annotation
esleg. e00	map legend
eslegpt. e00	map legend points
esma. e00	buried magnetic bodies
esout. e00	quadrangle outline and lat/long numbers
espl. e00	political boundaries
esscale. e00	1: 500,000 scale bar, title, & citation
esst. e00	single-line tributaries
estc. e00	latitude longitude tics for this quadrangle
grid. e00	lat/long grid lines for index map
import. aml	ARC program for importing coverage
index. e0*	index map showing quadrangle names and surrounding countries, files 0-1
vztc. e00	latitude longitude tics for index map
gu	directory containing Guri and Tucupita quadrangle files
grid. e00	lat/long grid lines for index map
gu. aml	ARC/PLOT program for 44" Versatec plotter
gu. av	ArcView 1 file
gu. gra	ARC/PLOT 1040 plot file for 44" Versatec plotter. This a binary file
guanno5. e00	geographic place name annotation
gucor. e00	correlation of map units
guft. e00	faults
guge. e0*	geology files, 0-2
gulab. e00	rock unit label annotation
guleg. e00	map legend
gulegpt. e00	map legend points
guout. e00	quadrangle outline and lat/long numbers
gupl. e00	political boundaries
gurd. e00	roads
guscale. e00	1: 500,000 scale bar, title, & citation
gust. e00	single-line tributaries
gutc. e00	latitude longitude tics for this quadrangle
import. aml	ARC program for importing coverage

index. e0\*      index map showing quadrangle names and surrounding  
                   countries, files 0-1  
 vztc. e00      latitude longitude tics for index map  
 ma              directory containing Río Mavaca quadrangle files  
 grid. e00      lat/long grid lines for index map  
 import. aml    ARC program for importing coverage  
 index. e0\*      index map showing quadrangle names and surrounding  
                   countries, files 0-1  
 ma. aml        ARC/PLOT program for 44" Versatec plotter  
 ma. av         ArcView 1 file  
 ma. gra        ARC/PLOT 1040 plot file for 44" Versatec plotter.  
                   This a binary file  
 maanno5. e00   geographic place name annotation  
 macor. e00     correlation of map units  
 maft. e00      faults  
 mage. e00      geology  
 malab. e00     rock unit label annotation  
 maleg. e00     map legend  
 mama. e00      buried magnetic bodies  
 maout. e00     quadrangle outline and lat/long numbers  
 mascale. e00   1: 500,000 scale bar, title, & citation  
 mast. e00      single-line tributaries  
 matc. e00      latitude longitude tics for this quadrangle  
 vztc. e00      latitude longitude tics for index map  
 pc              directory containing Piedra de Cocuy quadrangle files  
 grid. e00      lat/long grid lines for index map  
 import. aml    ARC program for importing coverage  
 index. e0\*      index map showing quadrangle names and surrounding  
                   countries, files 0-1  
 pc. aml        ARC/PLOT program for 44" Versatec plotter  
 pc. av         ArcView 1 file  
 pc. gra        ARC/PLOT 1040 plot file for 44" Versatec plotter.  
                   This a binary file  
 pcanno5. e00   geographic place name annotation  
 pccor. e00     correlation of map units  
 pcft. e00      faults  
 pcge. e00      geology  
 pclab. e00     rock unit label annotation  
 pcle. e00      map legend  
 pclept. e00    map legend points  
 pcma. e00      buried magnetic bodies  
 pcout. e00     quadrangle outline and lat/long numbers  
 pcpl. e00      political boundaries  
 pcscale. e00   1: 500,000 scale bar, title, & citation  
 pcst. e00      single-line tributaries  
 pctc. e00      latitude longitude tics for this quadrangle  
 vztc. e00      latitude longitude tics for index map  
 pi              directory containing Ciudad Piar and Ciudad Bolivar  
                   quadrangle files  
 fnt040        ARC/INFO font file necessary for sag fault line symbol  
 grid. e00      lat/long grid lines for index map  
 import. aml    ARC program for importing coverage  
 index. e0\*      index map showing quadrangle names and surrounding  
                   countries, files 0-1

pi. aml           ARC/PLOT program for 44" Versatec plotter  
 pi. av            ArcView 1 file  
 pi. gra           ARC/PLOT 1040 plot file for 44" Versatec plotter.  
                   This a binary file.

pianno5. e00     geographic place name annotation  
 picor. e00       correlation of map units  
 pift. e00        faults  
 pige. e0\*        geology, 0-2  
 pilab. e00       rock unit label annotation  
 pileg. e00       map legend  
 pilegpt. e00     map legend points  
 pima. e00        buried magnetic bodies  
 piout. e00       quadrangle outline and lat/long numbers  
 pipl. e00        political boundaries  
 pird. e00        roads  
 piscale. e00     1: 500,000 scale bar, title, & citation  
 pistr. e00       structural lines from SLAR  
 pist. e00        single-line tributaries  
 pitc. e00        latitude longitude tics for this quadrangle  
 vztc. e00        latitude longitude tics for index map

se                directory containing Santa Elena quadrangle files

grid. e00        lat/long grid lines for index map  
 import. aml      ARC program for importing coverage  
 index. e0\*       index map showing quadrangle names and surrounding  
                   countries, files 0-1

se. aml           ARC/PLOT program for 44" Versatec plotter  
 se. av            ArcView 1 file  
 se. gra           ARC/PLOT 1040 plot file for 44" Versatec plotter.  
                   This a binary file

seanno5. e00     geographic place name annotation  
 secur. e00       correlation of map units  
 seft. e00        faults  
 sege. e0\*        geology, 0-1  
 selab. e00       rock unit label annotation  
 seleg. e00       map legend  
 selegpt. e00     map legend points  
 seout. e00       quadrangle outline and lat/long numbers  
 sepl. e00        political boundaries  
 serd. e00        roads  
 sescal. e00     1: 500,000 scale bar, title, & citation  
 sest. e00        single-line tributaries  
 setc. e00        latitude longitude tics for this quadrangle  
 vztc. e00        latitude longitude tics for index map

sf                directory containing San Fernando quadrangle files

grid. e00        lat/long grid lines for index map  
 import. aml      ARC program for importing coverage  
 index. e0\*       index map showing quadrangle names and surrounding  
                   countries, files 0-1

sf. aml           ARC/PLOT program for 44" Versatec plotter  
 sf. av            ArcView 1 file  
 sf. gra           ARC/PLOT 1040 plot file for 44" Versatec plotter.  
                   This a binary file

sfanno5. e00     geographic place name annotation  
 sfcor. e00       correlation of map units

sfft. e00	faults
sfge. e00	geology
sflab. e00	rock unit label annotation
sfleg. e00	map legend
sflegpt. e00	map legend points
sfout. e00	quadrangle outline and lat/long numbers
sfpl. e00	political boundaries
sfscale. e00	1: 500,000 scale bar, title, & citation
sfst. e00	single-line tributaries
sftc. e00	latitude longitude tics for this quadrangle
vztc. e00	latitude longitude tics for index map
vz	directory containing export files for combined coverages
avmrk. e00	ArcView markerset to be copied to the ARC HOME directory
avtxt. e00	ArcView textset to be copied to the ARC HOME directory
deposit. e0*	mineral deposits, prospects and occurrences, files 0-2
equi2geo. prj	projection file for converting equidistant conic to decimal degrees
fnt040	ARC/INFO font file necessary for sag fault line symbol
ge. gra	ARC/PLOT 1040 plot file for 44" Versatec plotter. This a binary file
geo2equi. prj	projection file for converting decimal degrees to equidistant conic
grid. e00	lat/long grid lines for index map
import. aml	ARC script for importing all coverages
index. e0*	index map showing quadrangle names and surrounding countries, files 0-1
mrdsak. e00	ARC/PLOT markerset for other point symbols
myalgeol. e00	ARC/PLOT markerset for cities, bedding, joint symbols
myplotter. e00	ARC/PLOT shadeset for geology patterns
myplt. e00	ARC/PLOT lineset for faults, roads, political boundaries
places. e00	geographic place names
ptpat. e00	geology polygon lookup table, plotter patterns
ptpl. e00	point symbol lookup table
pptype. e00	geology polygon lookup table, Versatec colors
ra. e0*	mineral resource permissive areas map A
raanno. e00	mineral resource permissive areas map A annotation
rb. e0*	mineral resource permissive areas map B files, 0-1
rbanno. e00	mineral resource permissive areas map B annotation
rbstruct. e00	mineral resource permissive areas map B structural features
scale. e00	scalebar and projection information
vz. aml	ARC/PLOT program for 44" Versatec plotter
vz. av	ArcView 1 view file
vz. apr	ArcView 3 project file
vzcor. e00	correlation of map units
vzctry. e0*	Northeast South America country borders, 0-1
vzft. e00	faults, annotation, joints and bedding
vzge. e00	geology files, 0-9
vzlab. e0*	rock unit annotation and leaders files, 0-2
vzline. e00	lineset for Arc/Edit, Arc/Plot, Versatec plots
vzma. e00	buried magnetic bodies
vzout. e00	outer edge of combined quadrangles in study area
vzpl. e00	study area political boundaries
vzprov. e00	Venezuela province boundaries for index map

vzrd. e00  
vzst. e0\*  
vztc. e00

roads  
single-line tributaries and annotation files, 0-2  
latitude/longitude numbers and tics for index map

## PROJECT OVERVIEW

Conversion of the Venezuela maps to a computerized digital format was undertaken for the following reasons:

1) The digital format facilitates the presentation and analysis of earth-science data. Digital maps can be displayed at any scale or projection, whereas a paper map has a fixed scale and projection. However, the maps on this disc are not intended to be used at any scale more detailed than 1:500,000.

A geographic information system (GIS) allows combining and overlaying of layers for analysis of spatial relations not readily apparent in the standard paper publication. Digital data on geology, geophysics, and geochemistry can be combined to create useful derivative products.

2) The digital format was used to facilitate publication in both paper and electronic form. For the Río Caura paper map publication (Brooks and others, 1995), digital images were sent to the Gerber plotter, a vector-to-film processor. The other 1:500,000-scale MF maps were reproduced photographically from electrostatic plotter output on clear mylar. The published digital formats include this CD-ROM and ARC/INFO Export files to be located on the World Wide Web on the Internet.



## HISTORY OF THE MAPS

The data in this CD-ROM are based on a mineral resource assessment of the Venezuelan Guayana Shield, conducted between 1987 and 1991 by the U.S. Geological Survey and Corporación Venezolana de Guayana, Técnica Minera, (USGS, 1993). The Venezuelan Shield occupies about 415,000 sq km in the south and east part of Venezuela. The study area is bounded on the north by the Río Orinoco. It includes all of the Territorio Federal Amazonas, Estado Bolívar, and part of Estado Delta Amacuro. The original resource assessment publication USGS Bulletin 2062 consists of 121 pages of text and figures as well as eight full-color maps:

- Geographic
- Geologic and tectonic
- Bouguer gravity
- Two mineral-occurrence maps
- Side-looking airborne radar image
- Two permissive domain maps

The side-looking airborne radar image and the Bouguer gravity map are not included in this CD-ROM. The geology layer from the 1993 Bulletin was revised and published as a series of MF and I maps:

Quadrangles	Map	Authors
Guri + Tucupita	MF- 2242	Cox and others, 1993
Ciudad Pi ar + Ciudad Bolívar	MF- 2246	Stewart and others, 1994
San Fernando de Apure	MF- 2247	Stewart, 1994
Santa Elena	unpublished data	Floyd Gray and others, 1995
Río Caura	I- 2537	Brooks and others, 1995
Puerto Ayacucho	MF- 2245	Wynn and others, 1994
La Esmeralda	MF- 2244	Wynn and others, 1994
Atabapo	MF- 2240	Wynn and others, 1994
Río Mavaca	MF- 2241	Wynn and others, 1994
Piedra de Cocuy	MF- 2243	Wynn and others, 1994

The digital map files on this CD-ROM were used to create the above publications. They subsequently underwent minor revisions to reconcile conflicting rock unit names and to view correctly in ArcView 1.

## USGS BULLETIN 2062 TEXT AND FIGURES FILES

The text of the 1993 USGS Bulletin 2062 is available in several Framemaker, Rich Text Word, and TIF files on the CD-ROM. The text in the following files may vary slightly from the final publication. Some of the files listed below duplicate parts of each other but in different formats. The tif files were created by scanning the published Plates 2 and 6. Plate 2 is split into two files. The other Plates have not been scanned.

file name	size Kb	format	content
b2062con. mi f	154	framemaker 3.0p1b	table of contents
b2062con. txt	7.6	text	table of contents
b2062con. rtf	16	rich text (RTF)	table of contents
b2062fnt. mi f	134	framemaker 3.0p1b	cover 1, cover 2, i, ii, iii
b2062fnt. txt	3.4	text	i, ii
b2062txt. mi f	1208	framemaker 3.0p1b	main body, p. 1-120
b2062txt. txt	251	text	main body, p. 1-72
b2062txt. rtf	9.6	rich text (RTF)	main body, p. 3-5
tables. doc	113	Word 5.1	tables 1-2, 4-11
tabside. doc	183	Word 5.1	table 3
vzge. tif	93000	TIF	Plate 2, geologic map part
vzget. tif	20000	TIF	Plate 2, geology, key part
vzmin. tif	87000	TIF	Plate 6, mineral deposits

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quadrangle, Amazonas Federal Territory, Venezuela: U.S. Geological Survey  
Miscellaneous Field Studies Map MF-2243, scale 1:500,000.

## DIGITAL PRODUCTION TECHNIQUES

The linework for all the quadrangles was originally digitized by Jeff Wynn with GSMAP (Selner and Taylor, 1987), a USGS-authored map editing and publishing program. Conversion from GSMAP to ARC/INFO was accomplished with GSMARC (Green and Selner, 1988). The three northern quadrangles were later re-scanned on an Tektronix 4991 autovectorizing drum scanner by Paul Schruben from the geologists' revised drawings. The arcs and polygons were tagged in ARC/INFO and the oriented point symbols such as bedding and joint symbols were created with Alacarte (Wentworth and Fitzgibbon, 1991).

## MAP PROJECTION

The map projection is Equidistant Conic with the following parameters for all quadrangles:

Sphere	Clarke 1866 spheroid
1st standard parallel	9 0 0.000
2nd standard parallel	4 0 0.000
central meridian	-66 0 0.000
latitude of projection's origin	0 0 0.000
false easting (meters)	0.00000
false northing (meters)	0.00000

## CAUTIONS RELATING TO USE OF THE MAPS

One of the advantages of digital maps is the ability to change the map scale. However, the users of this disc should respect the intentions of the authors and recognize certain limitations of digital maps. The Venezuelan MF series maps on this disc are intended to be used at a scale of 1:500,000; they are not intended to be used at a more detailed (larger) scale. A Venezuela 2°x3° degree quadrangle measures about 17 inches high by 26 inches wide at 1:500,000 scale.

The "quadrangle" maps in this publication cover somewhat more or less than 2°x3° depending on the specific map. For instance, the Guri map (Cox and others, 1993) contains all of the Guri quadrangle and the southern part of the Tucupita quadrangle. The entire study area in the southeast part of Venezuela, known as the Venezuelan Guayana Shield, is about 36 inches tall at 1:1 million scale, which is the published scale for Bulletin 2062 (USGS and Corporación Venezolana de Guayana, Técnica Minera, C.A., 1993).

Furthermore, the geologic map is primarily a bedrock map, which depicts geologic materials present beneath the soil or relatively thin mantles of surficial deposits, not necessarily the surficial materials themselves. Indeed, the study area contains so much surficial cover and standing water that much of the mapping was accomplished with geophysical methods as opposed to directly examining rock outcrops.



## ONLINE FILES

Some of the files on this CD will be available on the internet at the following internet address:

<http://minerals.er.usgs.gov/vz/dds-46.html>

The page will also list any bugs and errors discovered in the CD-ROM after release.

## GRAPHICS FORMATS AVAILABLE ON THE DISC

### 1) ARC/INFO Export

These coverages are used for spatial analysis, derivative products, and to-scale plots on the Versatec electrostatic plotter. Compatible with Environmental Systems Research Institute's ARC/INFO Version 6.1.2 or later. The files are simple text and should be transmitted in ASCII mode except for the \*.gra plot files, which are binary.

### 2) ARC/INFO Graphics, Adobe Illustrator, Portable Document Format (PDF), and Postscript formats

The geologic map in ARC/INFO Graphics, Adobe Illustrator, PDF, and Postscript formats are located in directory "arcunix7/vz". All are derived from the ARC/INFO ".gra" file using the POSTSCRIPT command.

### 3) ArcView format

ArcView is an easy-to-use graphics display package by the authors of ARC/INFO. This CD-ROM contains ArcView coverages for both UNIX and Microsoft Windows 3.x. It also contains export files that can be copied to other ARC/INFO platforms and imported to ArcView. ArcView 1 keys are in the "arcunix6" directory. The ArcView 3 key for the "vz" directory is in the "arcunix7" directory.

### 4) U.S. Geological Survey Digital Line Graph (DLG) Optional format (U.S. Geological Survey, 1986, 1987, and 1989).

The DLG Optional format is a U.S. Geological Survey standard for storing topologically structured files. It results in a compact ASCII file that is compatible with a variety of graphics software. Only the geology, faults, and correlation chart layers were converted to this format. The polygons and arcs are tagged, but the text annotation is not present because the DLG conversion software does not support annotation.

### 5) Tagged image file format (TIFF)

The geologic map and mineral deposit maps from Bulletin 2062 were scanned on a color scanner and saved as TIFF files. The larger files are compressed under PKZIP.

## ARCVIEW AND ARC/INFO FILES

These files are compatible with ArcView 1 and ARC/INFO Version 6.1.2 or later. The files are contained in 11 directories. Ten of those directories contain coverages for the individual quadrangle publications. The eleventh directory, "vz", contains the same information but in the form of a combined map with all the quadrangles tiled together into a single coverage. ArcView 1 keys are in the "arcunix6" directory. The ArcView 3 key for the "vz" directory is in the "arcunix7" directory. There are no ArcView 3 keys for the individual quadrangles.

The coverages for the individual quadrangles have the same features as the combined coverage. The only differences are in some of the file names. For instance, the place names and city points in the individual quadrangles are stored in files called "\*anno5.e00" as opposed to "places.e00" for the combined coverage.

The 11 directory structure is repeated in each of three formats: export, raw UNIX, and PC ARCVIEW.

### EXPORT FILES

The export files are stored in the "export" directory. The same export files are used for both ARCVIEW and ARC/INFO. Each directory contains an IMPORT.AML program which imports all the coverages, lookup tables, etc. The "vz" directory contains lookup tables and markersets necessary for plotting the individual quadrangles. Before launching ARCVIEW, the "av.mrk" and "av.txt" files should be copied to the ARCVIEW home directory, usually the root or login directory.

The directories containing the export files on the CD are actually ARC/INFO workspaces for UNIX. For other platforms it may be necessary to launch ARC/INFO, create each of the 11 workspaces and import the coverages from those new workspaces. For instance, for the "vz" directory:

```
arc
cw vz
q
cd vz
cp /pdd/dds46/export/vz/* .
arc
&r import
```

The directory structure on the CD is as follows:

```
export  main directory
  at    Atabapo
  ay    Puerto Ayacucho
  ca    Río Caura
  es    La Esmeralda
  gu    Guri, Tucupita
  ma    Río Mavaca
  pc    Piedra de Cocuy
```

pi Ciudad Piar, Ciudad Bolivar  
se Santa Elena  
sf San Fernando de Apure  
vz combined coverages. Also necessary to plot individual quads.

#### RAW UNIX COVERAGES:

The raw coverages are in directory "arcunix6" and "arcunix7". These can be copied to your UNIX machine with the following command:

```
cp -r /pdd/dds46/arcunix
```

#### PC ARCVIEW COVERAGES:

The PC ARCVIEW coverages are stored in directory "arcpc". These files were converted directly from the UNIX version with the C program PCWKSP.

#### RUNNING THE PLOT PROGRAMS

Each of the 11 directories contains a plot program for that area. The plot programs rely on lookup tables in the "vz" combined coverages directory. So the "vz" combined coverages directory should be copied or imported to hard disk before executing the plot program. The resulting .gra file was converted to PostScript .eps with the ARC POSTSCRIPT command. The polygon colors are for a Versatec plotter or display screen.

## INSTALLING ARCVIEW 1

This section contains instructions for installing and launching ArcView 1 for Windows and launching instructions for ArcView 1 for UNIX.

Installation instructions for ArcView 1 for Microsoft Windows:

1) Please observe the following system requirements:

- 80386 or better CPU
- Math coprocessor recommended
- Windows 3.0 or higher but not Windows 95
- 4 Mb of RAM, 8 strongly recommended
- 15 Mb of disk space
- Super VGA graphics system, 256 colors, 640x480 pixels minimum, 1024x768 pixels strongly recommended
- Microsoft compatible mouse
- Windows-supported printer

2) Decide where you are going to put ArcView 1 on your hard drive. You must have 15 Mb of hard disk space.

3) Launch Windows. Launch the File Manager. Use the File Manager to find the CD-ROM drive and the \DDS46\ARCVIEW directory. Double-click on ARCVIEW.EXE. This starts the self-installing procedure. At the licensing agreement document select the File menu, Exit. ARCVIEW asks for a hard disk drive letter designation and a directory name to store the program. The default is \ARCVIEW1.

4) When the install finishes, ArcView will tell you to examine SETUP.TXT and use it to modify AUTOEXEC.BAT and CONFIG.SYS. Exit from Windows and use the following instructions modified from SETUP.TXT.

Add the following environment variables to the C:\AUTOEXEC.BAT file:

```
set AVHOME=c: \arcview1      (or wherever you decide to put it)
set PATH=%PATH%; %AVHOME%\bin (Add Arcview1's bin directory
                             to the path )
set HOME=c: \arcview1      (or wherever you decide to put it)
set TEMP=c: \temp          (Make sure the directory
                           exists. A RAM disk works the
                           best, i. e, TEMP=d: \. This
                           variable should already be
                           present if Windows has been
                           installed.)
```

Add the following line to the C:\CONFIG.SYS file:

```
FILES=65
```

Rename the original lineset. Copy the custom lineset from the DDS-46 CD- ROM.

```
CD C:\ARCVIEW1\SYMBOLS  
REN AV.LIN AV_ORIG.LIN  
COPY D:\DDS46\DATAFILE\AVPCCOV\AV.LIN
```

5) Launch Windows. Launch the File Manager again and copy the DDS46\ARCPC directory to your hard disk. This step is optional but ArcView runs very slowly if the coverages are located on the CD-ROM.

Double-click on the ArcView icon. Navigate the drive and directory menus to D:\DDS46\DATAFILE. Double-click on the COSTA.AV view. ArcView will ask to search for the GEOL coverage. Select "Yes". Navigate to the AVPCCOV folder and double-click on the GEOL file. The ArcView Teacher will automatically find the full path to the rest of the coverages and launch the view. Select the "File" menu, "Save As". Save the view so the next time you launch it, the path will be remembered.

## USING ARCVIEW 1

The CD-ROM includes coverages that can be displayed with ArcView 1 (Environmental Systems Research Institute, Inc., 1992). ArcView is an easy-to-use graphics display package by the authors of ARC/INFO. ArcView displays the same coverages and images as ARC/INFO. ArcView 1 is available for both UNIX and Microsoft Windows 3.x computers. This CD-ROM contains ArcView for Windows 3.x programs but not ArcView for UNIX programs. It does, however, contain coverages and views for both types of computers.

See "Installing ArcView 1" for instructions on installing and launching ArcView 1. After ArcView is launched, the Table of Contents or map key appears on the left and the map on the right. ArcView has a time-saving feature called interruptible re-draw. This means that the tools, menu items and themes in the Table of Contents are selectable even while ArcView is re-drawing the map. A mouse-click or mouse-drag will interrupt the drawing and take effect within a few seconds. There is no need to wait for complicated maps to finish drawing if you already know what you want to do next.

The initial width of the Table of Contents is too narrow to see all the text in the key. The width can be increased by dragging on the edge of the table with the mouse. Increasing the width of the Table of Contents causes it to overlap the map, but the map can be brought to the foreground by clicking on its title bar or edge.

The individual layers (data themes) in the Table of Contents are turned on and off in the display by selecting the checkboxes along the left side of the map key. Legends below individual themes can be turned on and off by dragging on the triangle on the right side of the key. Colors of points, lines, and polygon fill can be changed by double-clicking a theme, selecting the legend checkbox in the Properties dialog, then double-clicking on the color.

Zooming in and out are accomplished in many ways in ArcView. One way is to select a theme or themes by single-clicking on the items in the Table of Contents so they appear slightly raised. Single-click again to de-select them. Choose just the items you want to zoom to, then select the "fit-selected-features-to-window" icon, which is the second icon from the left in the map window. It looks like a down arrow over a stack of paper. For instance, the "Venezuela national boundary" theme will give the widest view, "Index map" the next widest, "Geology, all quadrangles" the next widest, and individual quadrangles the smallest. In each quadrangle, the Scale bar theme zooms out to see all the text and map. This is the default selection as the CD is shipped.

Another way to zoom in is with the "zoom-to-a-box" tool on the tool palette. The tool palette can be brought to the foreground with the "Windows" menu, "Tools..." item. Just select the dashed-line-box tool, which is the second from the bottom on the left, then drag in a diagonal movement across the area you wish to zoom to.

If you view the "Rock unit names" theme, be sure to turn on the "Rock unit name leaders" as well. Otherwise some unit names appear to float in the wrong unit.

The order of layers in the Table of Contents is critical. All layers are opaque, and the color-fill polygons obscure everything beneath them. For this reason, color-fill themes are positioned lowest on the key and duplicated as non-filled versions higher up in the key. For instance, "Geology polygons" is low in the Table of Contents because it obscures everything beneath it. There is also a non-filled version called "Geology arcs" higher up in the key. Should it be necessary to change the order of

items in the Table of Contents, they can be dragged to a new position with the mouse. For instance, "Index map, colored countries" is positioned fairly high in the key for a color-fill theme. To draw geology outlines on top of it, just drag the index map theme to a position below the geology outlines theme.

To create hard copy of the ArcView 1 graphics screen, select the camera icon on the main display screen. This creates an encapsulated PostScript (EPS) file of the display image, which can be printed with standard commercial graphics software.

Use the "File" menu, "Open..." item to select other views:

Area	file name
-----	
Venezuelan Guayana Shield, all quadrangles	vz. av
Guri and southern part of the Tucupita 2°x3° quadrangles	gu. av
Ciudad Piar and part of the Ciudad Bolivar 2°x3° quadrangles	pi. av
San Fernando de Apure 2°x3° quadrangle (Bolivar part)	sf. av
Santa Elena 2°x3° quadrangle (Venezuela part)	se. av
Río Caura 2° by 3° quadrangle	ca. av
Puerto Ayacucho 2°x3° quadrangle (Venezuela part)	ay. av
La Esmeralda 2°x3° quadrangle (Venezuela part)	es. av
Atabapo 2°x3° quadrangle (Venezuela part)	at. av
Río Mavaca 2°x3° quadrangle (Venezuela part)	ma. av
Piedra de Cocuy 2°x3° quadrangle (Venezuela part)	pc. av



## ARCVIEW 1 FILES

The following table shows the ArcView table of contents items and the coverages they are drawn from:

ArcView views and themes	file name
Venezuelan Guayana Shield, all quadrangles	vz. av
Venezuela national boundary	vzctry
Venezuela province boundary	vzprov
Scale bar annotation	scale
Scale bar	scale
Place names	places
Place points	places
Roads	vzrd
Outer quad outline	vzout
Outer quad outline, lat/long numbers	vzout
Latitude/longitude ticks	vztc
Index map annotation	index
Index map lat/long grid only	grid
Index map, colored countries, lat/long grid	index
Streams annotation	vzst
Streams	vzst
Mineral deposits	deposit
Linear features annotation	vzft
Linear features	vzft
A. Permissive domains annotation	raanno
A. Permissive domains leaders	raanno
A. Permissive domains for selected Fe, Au, Sn, Cu deposits	ra
A. Permissive domains poly arcs only	ra
B. Permissive domains structure annotation	rbstruct
B. Permissive domains structure lines	rbstruct
B. Permissive domains annotation	rbanno
B. Permissive domains leaders	rbanno
B. Permissive domains for selected Pb-Zn, Ni-Cu, diamond, kaolin deposits	rb
B. Permissive domains poly arcs only	rb
Correlation of map units annotation	vzcor
Correlation of map units polygons	vzcor
Buried magnetic bodies	vzma
Rock unit labels	vzlab
Rock unit labels leaders	vzlab
Geology arcs	vzge
Geology polygons	vzge
Guri and southern part of the Tucupita 2°x3° quadrangles	gu. av
Index map, latitude/longitude ticks	vztc

Index map, annotation	index
Index map, lat/long grid only	grid
Index map, colored countries, lat/long grid	index
Guri, quadrangle lat/long tics	gutc
Guri, quadrangle lat/long numbers	guout
Guri, quadrangle outline	guout
Guri, place name annotation	guanno5
Guri, city points	guanno5
Guri, roads	gurd
Guri, province boundary	gupl
Guri, streams annotation	gust
Guri, streams	gust
Guri, linear feature annotation	guft
Guri, linear features	guft
Guri, correlation of map units annotation	gucor
Guri, correlation of map units polygons	gucor
Guri, map key annotation	gul eg
Guri, map key points	gul egpt
Guri, map key arcs	gul eg
Guri, map key polygons	gul eg
Guri, scale bar annotation	guscal e
Guri, scale bar	guscal e
Guri, rock unit labels	gul ab
Guri, rock unit labels leaders	gul ab
Guri, geology arcs	guge
Guri, geology polygons	guge

Ciudad Piar and part of the Ciudad Bolivar 2°x3° quadrangles	pi. av
---	--------

Index map, latitude/longitude tics	vztc
Index map, annotation	index
Index map, lat/long grid only	grid
Index map, colored countries, lat/long grid	index
Ciudad Piar, quadrangle lat/long tics	pi tc
Ciudad Piar, quadrangle lat/long numbers	pi out
Ciudad Piar, quadrangle outline	pi out
Ciudad Piar, place name annotation	pi anno5
Ciudad Piar, city points	pi anno5
Ciudad Piar, roads	pi rd
Ciudad Piar, province boundary	pi pl
Ciudad Piar, streams annotation	pi st
Ciudad Piar, streams	pi st
Ciudad Piar, linear feature annotation	pi ft
Ciudad Piar, linear features	pi ft
Ciudad Piar, structural trends from SLAR	pi sr
Ciudad Piar, correlation of map units annotation	pi cor
Ciudad Piar, correlation of map units polygons	pi cor
Ciudad Piar, map key annotation	pi leg
Ciudad Piar, map key points	pi legpt
Ciudad Piar, map key arcs	pi leg
Ciudad Piar, map key polygons	pi leg
Ciudad Piar, scale bar annotation	pi scal e

Ciudad Pi ar, scale bar	pi scale
Ciudad Pi ar, rock unit labels	pi lab
Ciudad Pi ar, rock unit labels leaders	pi lab
Ciudad Pi ar, kimberlite area annotation	pi ma
Ciudad Pi ar, kimberlite area	pi ma
Ciudad Pi ar, geology arcs	pi ge
Ciudad Pi ar, geology polygons	pi ge
San Fernando de Apure 2°x3° quadrangle (Bolivar part)	sf. av
Index map, latitude/longitude tics	vztc
Index map, annotation	index
Index map, lat/long grid only	grid
Index map, colored countries, lat/long grid	index
San Fernando, quadrangle lat/long tics	sftc
San Fernando, quadrangle lat/long numbers	sfout
San Fernando, quadrangle outline	sfout
San Fernando, place name annotation	sfanno5
San Fernando, city points	sfanno5
San Fernando, province boundary	sfpl
San Fernando, streams annotation	sfst
San Fernando, streams	sfst
San Fernando, linear features	sfst
San Fernando, correlation of map units annotation	sfcor
San Fernando, correlation of map units polygons	sfcor
San Fernando, map key annotation	sfleg
San Fernando, map key points	sflegpt
San Fernando, map key arcs	sfleg
San Fernando, map key polygons	sfleg
San Fernando, scale bar annotation	sfscale
San Fernando, scale bar	sfscale
San Fernando, rock unit labels	sflab
San Fernando, rock unit label leaders	sflab
San Fernando, geology arcs	sfge
San Fernando, geology polygons	sfge
Santa Elena 2°x3° quadrangle (Venezuela part)	se. av
Index map, latitude/longitude tics	vztc
Index map, annotation	index
Index map, lat/long grid only	grid
Index map, colored countries, lat/long grid	index
Santa Elena, quadrangle lat/long tics	setc
Santa Elena, quadrangle lat/long numbers	seout
Santa Elena, quadrangle outline	seout
Santa Elena, place name annotation	seanno5
Santa Elena, city points	seanno5
Santa Elena, roads	serd
Santa Elena, province boundary	sepl
Santa Elena, stream annotation	sest
Santa Elena, streams	sest
Santa Elena, linear feature annotation	seft

Santa Elena, linear features	seft
Santa Elena, correlation of map units annotation	secor
Santa Elena, correlation of map units polygons	secor
Santa Elena, map key annotation	sel eg
Santa Elena, map key points	sel egpt
Santa Elena, map key arcs	sel eg
Santa Elena, map key polygons	sel eg
Santa Elena, scale bar annotation	sescal e
Santa Elena, scale bar	sescal e
Santa Elena, rock unit labels	sel ab
Santa Elena, rock unit labels leaders	sel ab
Santa Elena, geology arcs	sege
Santa Elena, geology polygons	sege

Río Caura 2° by 3° quadrangle	ca. av
-------------------------------	--------

Index map, latitude/longitude tics	vztc
Index map, annotation	i ndex
Index map, lat/long grid only	grid
Index map, colored countries, lat/long grid	i ndex
Río Caura, quadrangle lat/long tics	catc
Río Caura, quadrangle lat/long numbers	caout
Río Caura, quadrangle outline	caout
Río Caura, place name annotation	caanno5
Río Caura, city points	caanno5
Río Caura, province boundary	capl
Río Caura, stream annotation	cast
Río Caura, streams	cast
Río Caura, linear features annotation	caft
Río Caura, linear features	caft
Río Caura, correlation of map units annotation	cacor
Río Caura, correlation of map units polygons	cacor
Río Caura, map key annotation	cal eg
Río Caura, map key points	cal egpt
Río Caura, map key arcs	cal eg
Río Caura, map key magnetics	cal eg
Río Caura, map key polygons	cal eg
Río Caura, scale bar annotation	cascal e
Río Caura, scale bar	cascal e
Río Caura, rock unit labels	cal ab
Río Caura, rock unit labels leaders	cal ab
Río Caura, buried magnetic bodies	cama
Río Caura, geology arcs	cage
Río Caura, geology polygons	cage

Puerto Ayacucho 2°x3° quadrangle (Venezuela part)	ay. av
---	--------

Index map, latitude/longitude tics	vztc
Index map, annotation	i ndex
Index map, lat/long grid only	grid
Index map, colored countries, lat/long grid	i ndex
Puerto Ayacucho, quadrangle lat/long tics	aytc

Puerto Ayacucho, quadrangle lat/long numbers	ayout
Puerto Ayacucho, quadrangle outline	ayout
Puerto Ayacucho, place name annotation	ayanno5
Puerto Ayacucho, city points	ayanno5
Puerto Ayacucho, roads	ayrd
Puerto Ayacucho, province boundary	aypl
Puerto Ayacucho, streams annotation	ayst
Puerto Ayacucho, streams	ayst
Puerto Ayacucho, linear features	ayft
Puerto Ayacucho, correlation of map units annotation	aycor
Puerto Ayacucho, correlation of map units polygons	aycor
Puerto Ayacucho, map key annotation	ayleg
Puerto Ayacucho, map key points	aylegpt
Puerto Ayacucho, map key arcs	ayleg
Puerto Ayacucho, map key magnetics	ayleg
Puerto Ayacucho, map key polygons	ayleg
Puerto Ayacucho, scale bar annotation	ayscale
Puerto Ayacucho, scale bar	ayscale
Puerto Ayacucho, rock unit labels	aylab
Puerto Ayacucho, rock unit labels leaders	aylab
Puerto Ayacucho, section line annotation	aylabcr
Puerto Ayacucho, section line on map	aylabcr
Puerto Ayacucho, section annotation	aycrm
Puerto Ayacucho, section leaders	aycrm
Puerto Ayacucho, section geology arcs	aycrm
Puerto Ayacucho, section geology polygons	aycrm
Puerto Ayacucho, buried mag annotation	aymalab
Puerto Ayacucho, buried mag leaders	aymalab
Puerto Ayacucho, buried magnetic bodies	ayma
Puerto Ayacucho, geology arcs	ayge
Puerto Ayacucho, geology polygons	ayge

La Esmeralda 2°x3° quadrangle (Venezuela part)	es. av
--	--------

Index map, latitude/longitude tics	vztc
Index map, annotation	index
Index map, lat/long grid only	grid
Index map, colored countries, lat/long grid	index
La Esmeralda, quadrangle lat/long numbers	esout
La Esmeralda, quadrangle outline	esout
La Esmeralda, place name annotation	esanno5
La Esmeralda, city points	esanno5
La Esmeralda, province boundary	espl
La Esmeralda, streams annotation	esst
La Esmeralda, streams	esst
La Esmeralda, linear features	esft
La Esmeralda, structural trends from SLAR	essr
La Esmeralda, correlation of map units annotation	escor
La Esmeralda, correlation of map units polygons	escor
La Esmeralda, map key annotation	esleg
La Esmeralda, map key points	eslegpt
La Esmeralda, map key arcs	esleg
La Esmeralda, map key polygons	esleg

La Esmeralda, rock unit labels	eslab
La Esmeralda, rock unit labels leaders	eslab
La Esmeralda, buried magnetic bodies	esma
La Esmeralda, geology arcs	esge
La Esmeralda, geology polygons	esge
Atabapo 2°x3° quadrangle (Venezuela part)	at. av
Index map, latitude/longitude tics	vztc
Index map, annotation	index
Index map, lat/long grid only	grid
Index map, colored countries, lat/long grid	index
Atabapo, quadrangle lat/long numbers	atout
Atabapo, quadrangle outline	atout
Atabapo, place name annotation	atanno5
Atabapo, swamp symbols	atanno5
Atabapo, province boundary	atpl
Atabapo, streams annotation	atst
Atabapo, streams	atst
Atabapo, linear features	atft
Atabapo, correlation of map units annotation	atcor
Atabapo, correlation of map units polygons	atcor
Atabapo, map key annotation	atleg
Atabapo, map key arcs	atleg
Atabapo, map key magnetics	atleg
Atabapo, map key polygons	atleg
Atabapo, scale bar annotation	atscale
Atabapo, scale bar	atscale
Atabapo, rock unit labels	atlab
Atabapo, rock unit labels leaders	atlab
Atabapo, buried magnetic bodies	atma
Atabapo, geology arcs	atge
Atabapo, geology polygons	atge
Río Mavaca 2°x3° quadrangle (Venezuela part)	ma. av
Index map, latitude/longitude tics	vztc
Index map, annotation	index
Index map, lat/long grid only	grid
Index map, colored countries, lat/long grid	index
Río Mavaca, quadrangle lat/long numbers	maout
Río Mavaca, quadrangle outline	maout
Río Mavaca, place name annotation	maanno5
Río Mavaca, city points	maanno5
Río Mavaca, streams annotation	mast
Río Mavaca, streams	mast
Río Mavaca, linear features	maft
Río Mavaca, correlation of map units annotation	macor
Río Mavaca, correlation of map units polygons	macor
Río Mavaca, map key annotation	mal eg
Río Mavaca, map key arcs	mal eg
Río Mavaca, map key magnetics	mal eg

Río Mavaca, map key polygons	mal eg
Río Mavaca, scale bar annotation	mascale
Río Mavaca, scale bar	mascale
Río Mavaca, rock unit labels	mal ab
Río Mavaca, rock unit labels leaders	mal ab
Río Mavaca, geology arcs	mage
Río Mavaca, buried magnetic bodies	mama
Río Mavaca, geology polygons	mage
Piedra de Cocuy 2°x3° quadrangle (Venezuela part)	pc. av
Index map, latitude/longitude ticks	vztc
Index map, annotation	index
Index map, lat/long grid only	grid
Index map, colored countries, lat/long grid	index
Piedra de Cocuy, quadrangle lat/long numbers	pcout
Piedra de Cocuy, quadrangle outline	pcout
Piedra de Cocuy, place name annotation	pcanno5
Piedra de Cocuy, city points	pcanno5
Piedra de Cocuy, province boundary	pcpl
Piedra de Cocuy, streams annotation	pcst
Piedra de Cocuy, streams	pcst
Piedra de Cocuy, linear features	pcft
Piedra de Cocuy, structural trends from SLAR	pcsr
Piedra de Cocuy, correlation of map units annotation	pccor
Piedra de Cocuy, correlation of map units polygons	pccor
Piedra de Cocuy, map key annotation	pcl eg
Piedra de Cocuy, map key points	pcl egpt
Piedra de Cocuy, map key arcs	pcl eg
Piedra de Cocuy, map key magnetics	pcl eg
Piedra de Cocuy, map key polygons	pcl eg
Piedra de Cocuy, scale bar annotation	pcscale
Piedra de Cocuy, scale bar	pcscale
Piedra de Cocuy, rock unit labels	pcl ab
Piedra de Cocuy, rock unit labels leaders	pcl ab
Piedra de Cocuy, geology arcs	pcge
Piedra de Cocuy, buried magnetic bodies	pcma
Piedra de Cocuy, geology polygons	pcge

## ARCVIEW 3 FILES

The ArcView 1 view for the entire study area, "vz.av", has been converted to ArcView 3 format, "vz.apr". It is in "arcunix7/vz" directory. The coverages are in ARC/INFO 7 format so are useable on Mac, PC and UNIX platforms.

The first time you launch the vz.apr project on your computer the ArcView Open Project dialog will ask where the first coverage is located. On the Macintosh, Arcview 3 can install the paths for all the coverages if the user locates the first coverage in the Open Project dialog. Just navigate to the arcunix7/vz/info directory.

On Windows and UNIX platforms it is best use a word processor and global substitute the correct path in the vz.apr file. Search for all lines that have the key word "Path:" and replace the long UNIX path with your path. For instance:

```
/home10b/resdgs2/pschruben/arc/vz2/cd/arcview.dat/unix
```

change to:

```
d:/arcunix7
```

Yes, ArcView likes forward slashes in the project file.



## COVERAGE DATA DEFINITION

### GEOLOGY POLYGON ATTRIBUTES:

The ARC/INFO VZGE.PAT file consists of:

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	INDEXED?
1	AREA	4	12	F	
5	PERIMETER	4	12	F	
9	VZGE#	4	5	B	
13	VZGE-ID	4	5	B	
17	FMATN	6	6	C	upper-case rock-unit code
23	PTYPEI	3	3	C	for sorting units into groups
26	LC	6	6	C	mixed-case rock-unit code
32	DESC	60	60	C	
92	PTYPES	69	69	C	

PTYPEI is a two-digit integer that is used to sort the units into groups of related rocks. The third character in PTYPEI is a space for appearance in the legend. PTYPES is composed of PTYPEI, PTYPE, and DESC. It also can be used to sort correctly by unit group. All the short rock descriptions are in the INFO file DESC in alphabetical order (abbreviations: Fm, Formation; gr, grained; Gp Group; E, Early; Prot, Proterozoic; rx, rocks; Plio, Pliocene; qtz, quartz; Sg, Supergroup; congl, conglomerate; qtzite, quartzite; Mid, Middle; terr, terrane; sed, sedimentary rocks; metaseds, metasedimentary rocks):

LC	DESC
blank	Unmapped area
d	Diabase - mafic dikes undivided (Mesozoic to M Proterozoic)
diorit	Fenitized diorite & tonalite at Cerro Impacto
ic	Carbonatite(?) intrusion of Cerro Impacto
Qal	Alluvial deposits of sand, gravel, and silt (Quaternary)
QTm	Mesa Fm. siltstone and sandy siltstone (Pleistocene & Plio)
water	
Xa	Amphibolite schist containing andesine (E Prot)
XAgr	Granitic rx of Imataca Complex (E Prot and/or Archean)
XAi	Imataca Complex orthogneiss and paragneiss (Archean)
XAm	Migmatite & gneiss of Imataca Complex (E Prot or Archean)
Xbc	Basement complex granite to granodiorite gneiss (E Prot)
Xcb	Caballape Fm felsic metatuff and phyllite (E Prot)
Xcc	Cicapra Fm (Carichapo Gp) mafic to intermed metatuff E Prot
Xce	El Callao Fm (Carichapo Gp) greenstone, greenschist (E Prot)
Xcg	Granitic rocks of Cuchivero Group (Early Proterozoic)
Xco	Cinaruco Fm qtzite, sericitic qtzite, schist (E Prot)
Xcv	Caicara Fm (Cuchivero Gp) rhyodacitic-rhyolitic tuff E Prot
Xf1	Felsic metatuff and flows (Early Proterozoic)
Xf2	Felsic metatuff and flows, eugeosynclinal terrane (E Prot)
Xg	Calc-alkaline granite & other silicic plutonic rx (E Prot)
Xg1	Metagabbro (greenstone belts) (Early Proterozoic)
Xg2	Metagabbro (eugeosynclinal terrane) (Early Proterozoic)
Xgr	Granitic rocks, mostly quartz monzonite (Early Proterozoic)

Xgu Granitic silicic to intermediate intrusive rocks (E Prot)  
 Xlc Los Caribes Fm arkose, polymict congl, phyllite (E Prot)  
 Xm1 Meta-mafic to intermediate flow and pyroclastic rx (E Prot)  
 Xm2 Mafic to intermediate metalava and metatuff (E Proterozoic)  
 Xma Maracapa Fm red beds, felsic volcanics (E Proterozoic)  
 Xmo Moriche Fm metasedimentary conglomerates (E Prot)  
 Xmp Intrusive rx of San Carlos metamorphic-plut terrane (E Prot)  
 Xmu Greenstone belt rocks, undivided (Early Proterozoic)  
 Xpr Pre-Roraima Gp sedimentary rx clay-rich sandstone (E Prot)  
 Xs1 Schist, phyllite, metatuffs, and metavolcanic rx (E Prot)  
 Xs2 Muscovite schist and phyllite, eugeosynclinal terr (E Prot)  
 Xsm Seds and metaseds of uncertain affinity qtz arenite (E Prot)  
 Xsp Supamo Complex sodic granitic rx, paragneiss, etc. (E Prot)  
 Xu1 Metaperidotite, metapyroxenite, serp & talc schist (E Prot)  
 Xu2 Ultramafic rx metaperidotite, metapyroxenite, etc. (E Prot)  
 Xui Ultramafic intrusive rx in La Flor-Carapo area (E Prot)  
 Xyf Yuruari Fm (Pastora Sg) felsic metatuff (E Prot)  
 Xys Yuruari Fm Pastora Sg qtz muscovite schist, phyllite E Prot  
 Ylg Late granite intrusive in, and doming Roraima seds (M Prot)  
 Yp Parguaza granite, massive, porphyritic & biotite (M Prot)  
 YXac Alkaline intrusive complexes (Middle to Early Proterozoic)  
 YXr Roraima Group (undivided) qtz arenite, arkose M &/or E Prot  
 YXra Auyantepuy Fm (Roraima Gp) quartz arenite, arkose M, E Prot  
 YXrc Canaima Fm (Roraima Gp) qtz arenite, arkose, etc. M, E Prot  
 YXrg Guaiquinima Fm (Roraima Gp) qtz arenite, arkose M, E Prot

## GEOLOGY ARC TYPES:

The VZGE.AAT items are:

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE
1	FNODE#	4	5	B
5	TNODE#	4	5	B
9	LPOLY#	4	5	B
13	RPOLY#	4	5	B
17	LENGTH	4	12	F
21	VZGE#	4	5	B
25	VZGE-ID	4	5	B
29	CODE	3	3	I
32	P1	3	3	I
35	P2	3	3	I

CODE	DESC
1	international boundary
2	surface water body
30	geological contact
32	geological contact hidden

## FAULT ARCS:

The VZFT.AAT attribute table contains:

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	INDEXED?
1	FNODE#	4	5	B	
5	TNODE#	4	5	B	
9	LPOLY#	4	5	B	
13	RPOLY#	4	5	B	
17	LENGTH	4	12	F	
21	VZFT#	4	5	B	
25	VZFT- ID	4	5	B	
29	CODE	3	3	I	
32	FTYPEI	3	3	C	
35	DESC	60	60	C	
95	FTYPES	63	63	C	

## CODES AND DESCRIPTIONS FOR FAULTS AND OTHER COVERAGES:

The INFO file FTYPE contains:

CODE	FTYPEI	DESC
20	1	fault
6	2	fault - inferred (dashed)
7	3	fault - implied (dotted)
79	4	thrust fault
127	5	sag fault
17	6	fold axis
21	7	graben
26	8	graben - hidden
25	9	shear zone
72	10	U or Th anomaly
81	11	structural trend
70	12	ring structure
103	13	iron formations
18	14	major magnetic gradient
16	15	fault movement and fold arrows
1	16	international boundary
4	17	province boundary
2	18	surface water body
3	18	tributary
5	19	main road
42	20	secondary road
30	21	geological contact
32	22	geological contact hidden

## PERMISSIVE TRACT POLYGONS:

The RA.PAT and RB.PAT polygon attribute files contain:

COL	ITEM NAME	WDTH	OPUT	TYP
1	AREA	4	12	F
5	PERIMETER	4	12	F
9	RA#	4	5	B

13	RA-ID	4	5	B
17	FMATN	6	6	C
23	TRACT	5	5	C
28	DESC	64	64	C
92	KEY	69	69	C

## TRACT MAP A

### KEY

- IIa Low-sulfide gold-quartz vein deposits, permissive
- IIb Low-sulfide gold-quartz vein deposits, low probability
- Ia Algoma iron and sedimentary manganese deposits, permissive
- Ib Algoma iron and sedimentary manganese deposits, low probability
- VI Tin greisen deposits
- VIII Porphyry copper and volcanic-hosted magnetite deposits

## TRACT MAP B

### KEY

- III Kuroko-type massive sulfide deposits
- IV Synorogenic-synvolcanic Ni-Cu & related platinum deposits
- V Carbonatite deposits and diamond-bearing kimberlite pipes
- VII Sedimentary kaolin deposits

## MINERAL DEPOSIT POINTS:

The original list of mineral deposits in Bulletin 2062 (USGS and Corporación Venezolana de Guayana, Técnica Minera, C.A., 1993) was not available in digital form at the time of publication of this CD-ROM. Consequently, a new retrieval was made from the USGS Mineral Resources Data System (Schruben, 1986). This also takes advantage of any updates that may have taken place in the data base. The retrieval netted 2353 deposits in Venezuela, Guayana, Surinam, French Guinea, and Brazil, of which 459 deposits fell in the study area. The following fields are present in the DEPOSIT.PAT file:

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N. DEC	ALTERNATE NAME
1	AREA	4	12	F	3	
5	PERIMETER	4	12	F	3	
9	DEPOSIT#	4	5	B	-	
13	DEPOSIT-ID	4	5	B	-	
17	RECNO	7	7	C	-	
24	SITE	40	40	C	-	
64	CTRY. CODE	2	2	C	-	
66	STATE	13	13	C	-	
79	LATITUDE	9	9	C	-	
88	LONGITUDE	10	10	C	-	
98	COMMOD_GP	11	11	C	-	
109	COMMOD	34	34	C	-	
143	COMMOD1	4	4	C	-	

147	ORE. MAT	60	60	C	-
207	DEP. TYPE	40	40	C	-
247	DEP. COMMENTS	80	80	C	-
327	MODEL	40	40	C	-
367	HOST. RK. NAME	60	60	C	-
427	HOST. RK. TYPE	60	60	C	-
487	HOST. ROCK. AGE	10	10	C	-
497	ASOC. RK. NAME	60	60	C	-
557	ASOC. RK. TYPE	60	60	C	-
617	ASSOC. ROCK. AGE	10	10	C	-
627	ALTERATION	80	80	C	-
707	GEOL. COMMENTS	80	80	C	-
787	GEN. COMMENTS	80	80	C	-
867	REFERENCE	80	80	C	-

COMMOD1 is used to assign symbols to the sites for plotting. Please note that some fields are truncated from the original MRDS information, particularly the REFERENCE field.

## DLG OPTIONAL FORMAT

The DLG format is a U.S. Geological Survey standard for storing topologically structured files. It results in a compact ASCII file that is compatible with a variety of graphics software.

The Venezuelan Guayana Shield geology, faults, and correlation chart have been converted to Digital Line Graph (DLG) Optional format files. The DLG files contain tagged polygons and arcs. Annotation text is not supported in the DLG conversion software and is not present in the DLG files. The DLG file directory follows:

cor. dl g	correlation of map units in Equidistant Conic projection
cordd. dl g	correlation of map units in decimal degrees
ft. dl g	faults in Equidistant Conic projection
ftdd. dl g	faults in decimal degrees
ge. dl g	geology in Equidistant Conic projection
gedd. dl g	geology in decimal degrees
ptype. unl	rock unit names, descriptions, colors for Versatec plotter
scale. dl g	scale bar in Equidistant Conic projection
scaldd. dl g	scale bar in decimal degrees
vzline. unl	fault and contact line types

Although the conversion to ARC/INFO is more easily accomplished with ARC/EXPORT files, which are included elsewhere on this disc, the following instructions for converting DLG files to ARC/INFO may be illustrative for converting DLG files to non-ARC/INFO platforms.

These methods for converting DLG files to ARC/INFO coverages have been adapted from ARC/INFO manuals (Environmental Systems Research Institute, 1990):

1) Copy the .dlg and .unl files from the CD-ROM. For instance, from a UNIX prompt, type:

```
arc
cw vz                create arc/info workspace
q
cd vz
cdrom in
cp /pdd/cdrom/datafiles/dlg/*.unl .
cdrom out
```

2) Launch ARC/INFO and create a lookup table for the rock unit codes:

```
arc
tables
define ptype.lut
Enter Command: define ptype.lut
1
Item Name: major1
Item Width: 6
Item Output Width: 6
Item Type: i
```

7

Item Name: fmatn  
Item Width: 6  
Item Output Width: 6  
Item Type: c  
13

Item Name: ptypei  
Item Width: 3  
Item Output Width: 3  
Item Type: c  
16

Item Name: lc  
Item Width: 6  
Item Output Width: 6  
Item Type: c  
22

Item Name: color  
Item Width: 3  
Item Output Width: 3  
Item Type: i  
25

Item Name: desc  
Item Width: 60  
Item Output Width: 60  
Item Type: c  
85

Item Name:  
Enter Command: alter fmatn

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N. DEC	ALTERNATE NAME
7	FMATN	6	6	C	-	

Item name:  
Item output width:  
Item type:  
Alternate item name: cross

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N. DEC	ALTERNATE NAME
7	FMATN	6	6	C	-	CROSS

Enter Command: alter color

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N. DEC	ALTERNATE NAME
22	COLOR	3	3	I	-	

Item name:  
Item output width:  
Item type:  
Alternate item name: symbol

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N. DEC	ALTERNATE NAME
22	COLOR	3	3	I	-	SYMBOL

Enter Command: get ptype.unl

The geology polygon lookup table should look as follows:

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N. DEC	ALTERNATE NAME	INDEXED?
1	MAJOR1	6	6	I	-		-
7	FMATN	6	6	C	-	CROSS	-

13	PTYPEI	3	3	C	-	-
16	LC	6	6	C	-	-
22	COLOR	3	3	I	-	SYMBOL
25	DESC	60	60	C	-	-

Enter Command: list major1 fmatn ptypei lc color

Record	major1	fmatn	ptypei	lc	color
1	1	DEEP		deep	0
2	2	BLACK		black	1
3	3	POS		pos	0
4	4	NEG		neg	0
5	5	KIMB		Kimb	0
6	6	H2O	1	water	61
7	7	QAL	2	Qal	129
8	8	QTM	3	Qtm	4
9	9	YXAC	5	YXac	213
10	10	YLG	6	Ylg	106
11	11	IC	7	ic	72
12	12	YXR	8	YXr	123
13	13	YXRA	9	YXra	123
14	14	YXRG	10	YXrg	123
15	15	YXRC	11	YXrc	123
16	16	XPR	12	Xpr	123
17	17	AC	13	ac	213
18	18	XGU	14	Xgu	188
19	19	XG	15	Xg	247
20	20	XCG	16	Xcg	187
21	21	DIORIT	17	diorit	187

Continue? n

Enter Command: list desc

Record	desc
1	
2	
3	
4	
5	
6	
7	Alluvial deposits of sand, gravel, and silt (Quaternary)
8	Mesa Fm. siltstone and sandy siltstone (Pleistocene & Plio)
9	Mesa Fm. siltstone and sandy siltstone (Pleistocene & Plio)
10	Alkaline intrusive complexes (Middle to Early Proterozoic)
11	Intrusive rocks in and doming Roraima sed (Mid Prot)
12	Carbonatite intrusion of Cerro Impacto
13	Roraima Group (undivided) qtz arenite, arkose M &/or E Prot
14	Ayantepui Fm (Roraima Gp) quartz arenite, arkose M, E Prot
15	Canaima Fm (Roraima Gp) qtz arenite, arkose, etc. M, E Prot
16	Guaiquinima Fm (Roraima Gp) qtz arenite, arkose M, E Prot
17	Pre-Roraima Gp sedimentary rx clay-rich sandstone (E Prot)
18	Granitic silicic to intermediate intrusive rocks (E Prot)
19	Calc-alkaline granite & other silicic plutonic rx (E Prot)
20	Grantitic rocks of Cuchivero Group (Early Proterozoic)
21	fenitized diorite & tonalite at Cerro Impacto

Continue? n



### 3) Create a lookup table for the faults and contacts.

tables

Enter Command: define vzline.lut

1

Item Name: major1

Item Width: 6

Item Output Width: 6

Item Type: i

7

Item Name: code

Item Width: 3

Item Output Width: 3

Item Type: i

10

Item Name: line

Item Width:

Integer value expected.

Item Width: 3

Item Output Width: 3

Item Type: i

13

Item Name: expl

Item Width: 45

Item Output Width: 45

Item Type: c

58

Item Name:

Enter Command: alter line

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N. DEC	ALTERNATE NAME
10	LINE	3	3	I	-	

Item name:

Item output width:

Item type:

Alternate item name: symbol

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N. DEC	ALTERNATE NAME
10	LINE	3	3	I	-	SYMBOL

Enter Command: it

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N. DEC	ALTERNATE NAME
INDEXED?						
1	MAJOR1	6	6	I	-	-
7	CODE	3	3	I	-	-
10	LINE	3	3	I	-	SYMBOL
13	EXPL	45	45	C	-	-

Enter Command: get vzline.unl

43 Records Selected.

Enter Command: list

Record	MAJOR1	CODE	LINE	EXPL
1	1	0	9	MAP BORDER NEAT LINE
2	2	1	109	INTL BORDER LONG & SHORT DASH
3	3	2	4	SURFACE WATER BODIES
4	4	3	111	NAMED TRIBUTARIES - BLUE
5	5	4	120	PROVINCES (STATE BOUNDARIES) WAS 118
6	6	5	41	MAIN ROADS SOLID/OPEN
7	7	6	106	FAULT - DASHED INFERRED UNDER RX
8	8	7	117	FAULT - DOTTED IMPLIED UNDER H2O-Q
9	9	8	112	THRUST TEETH ON LEFT
10	10	9	1	SECTION LINE
11	11	10	1	BOXES; SCALE
12	12	11	33	DIRT ROAD
13	13	15	5	MAG DERIVED FAULT
14	14	16	1	LEADERS ARROWS
15	15	17	1	FOLD AXIS
16	16	18	101	MAJOR MAG GRADIENT - DOT
17	17	19	106	FAULT - HIDDEN. WAS GSMAP 32
18	18	20	5	LINEAMENT; FAULT
19	19	21	85	GRABEN HATCH ON RIGHT SIDE OF LINE
20	20	23	86	GRABEN HATCH ON LEFT SIDE OF LINE
21	21	25	5	SHEAR ZONE
22	22	26	87	GRABEN HIDDEN HATCH ON RIGHT

Continue? n

Enter Command: q stop

4) The `dlgarc` command creates `.pcode` and `.acode` INFO files which are used to link the `.lut` tables to the coverage. Some of this linking may be automatic in non-ARC/INFO conversions. If not, the technique is to use the common `-id` field to join the `.acode` and `.pcode` files to the coverage, then use `major1` as the common field to link `ptype.lut` and `vzline.lut` to the coverage.

Choose a `dlg` file to convert - Equidistant Conic (`ge.dlg`) or Decimal Degrees (`gedd.dlg`). The following example is for the Equidistant Conic coverages:

```
kill ge all
```

```
dlgarc optional ../dlg/ge.dlg ge
```

```
build ge
```

```
build ge line
```

```
/* join the major1 item from ge.pcode using the -id as key  
joinitem ge.pat ge.pcode ge.pat ge-id ge-id
```

```
/* join the unit names, colors and description from ptype.lut using major1  
joinitem ge.pat ptype.lut ge.pat major1 major1
```

```
/* join major1 which contains the line type from ge.acode  
joinitem ge.aat ge.acode ge.aat ge-id ge-id
```

```
/* join major1 which contains the contact line type from ge. acode
joinitem ge. aat vzline. lut ge. aat major1 major1

kill ft all
dlgarc optional ../dlg/ft. dlg ft
build ft line

/* join the major1 item from ft. acode using the -id as key
joinitem ft. aat ft. acode ft. aat ft-id ft-id

/* join major1 which contains the fault line type from ft. acode
joinitem ft. aat vzline. lut ft. aat major1 major1

kill cor all
dlgarc optional ../dlg/cor. dlg cor
build cor
build cor line

/* join the major1 item from cor. pcode using the -id as key
joinitem cor. pat cor. pcode cor. pat cor-id cor-id

/* join the unit names, colors and description from ptype. lut using major1
joinitem cor. pat ptype. lut cor. pat major1 major1

/* join major1 which contains the line type from cor. acode
joinitem cor. aat cor. acode cor. aat cor-id cor-id

/* join major1 which contains the contact line type from cor. acode
joinitem cor. aat vzline. lut cor. aat major1 major1

kill scale all
dlgarc optional ../dlg/scale. dlg scale
build scale line

/* join the major1 item from scale. acode using the -id as key
joinitem scale. aat scale. acode scale. aat scale-id scale-id

/* join major1 which contains the fault line type from scale. acode
joinitem scale. aat vzline. lut scale. aat major1 major1
```

## DESCRIPTION OF MAP UNITS

### SEDIMENTARY ROCKS

- Qal - Alluvial deposits (Quaternary)--Sand, gravel, and silt
- QTm - Mesa Formation (Pleistocene and Pliocene)--Siltstone and sandy siltstone, generally reddish; massive to laminated. Unconsolidated gravel and sand in upper part. Called Tm on some earlier maps
- YXr - Roraima Group (Middle and (or) Early Proterozoic), undivided--  
Compilation of regional ages indicates an age of 1,900–1,500 Ma (Sidder and Mendoza-S., 1991)
- YXra - Auyantepuy Formation--Mainly quartz arenite and minor arkose; forms steep cliffs and flat-topped mesas. Thickness 300–700 m. Equivalent to Matauí Formation of Reid and Bisque (1975)
- YXrg - Guaiquinima Formation--Fine-grained quartz arenite and arkose that are cross stratified; red, green, and greenish-gray jasper composed of devitrified and silicified ash and small crystals of quartz and feldspar. Weathers to form flat or gently sloping topography. Upper part is mostly covered with debris from overlying Auyantepuy Formation. Several hundreds of meters thick. Equivalent to all but the lowermost part of the Uaimapué Formation of Reid and Bisque (1975)
- YXrc - Canaima Formation--Quartz arenite, arkose, conglomeratic arenite, conglomerate, siltstone, and shale. Abundant crossbeds in arenite and arkose units. Weathers to form cliffs on resistant arenite, arkose, and conglomerate units and slopes on relatively nonresistant siltstone, shale, and silty arenite units. About 1,000–2,000 m thick. Equivalent to Uairén and Kukuenán Formations and lowermost part of Uaimapué Formation of Reid and Bisque (1975)
- Xpr - Pre-Roraima Group sedimentary rocks (Early Proterozoic)--Fine-grained to very fine grained, clay-rich sandstone, locally containing granule-size quartz grains. Interbedded with red shale and sandy shale (Briceño, 1982)
- Xco - Cinaruco Formation (Early Proterozoic)--Quartzite and sericitic quartzite and minor amounts of sericite-quartz schist and phyllite, ferruginous quartzite, and one or more intra-formational quartzite conglomerates (McCandless, 1962)
- Xlc - Los Caribes Formation (Early Proterozoic)--Weakly metamorphosed sequence of reddish arkose, polymineralic conglomerate, and finely laminated phyllite with minor felsic tuff
- Xma - Maracapa Formation (Early Proterozoic)--Weakly metamorphosed red beds and felsic volcanic rocks

### EUGEOSYNCLINAL TERRANE

- Xm2 - Mafic to intermediate metalava and metatuff (Early Proterozoic)--  
Chlorite+epidote±actinolite schist and semischist, and greenstone, commonly with relict pyroxene phenocrysts. Relict textures suggest that protoliths were amygdaloidal flows and lithic- and crystal-rich tuffs

Xf2 - Felsic metatuff and flows (Early Proterozoic)--Quartz+muscovite±chloritoid semischist with relict phenocrysts of partially resorbed quartz and broken plagioclase replaced by albite. Groundmass mainly devitrified glass. Traces of relict lapilli locally abundant

Xs2 - Muscovite schist and phyllite (Early Proterozoic)--Quartz+muscovite±chlorite±chloritoid±ankerite schist and phyllite, and subordinate quartzite or metachert derived from sedimentary and felsic volcanic rocks. Ankeritic rocks weather to ferruginous schist and phyllite

## MAFIC AND ULTRAMAFIC ROCKS OF THE EUGEOSYNCLINAL TERRANE

Xg2 - Metagabbro (Early Proterozoic)

Xu2 - Ultramafic rocks (Early Proterozoic)--Mainly metaperidotite and metapyroxenite, serpentinite, and talc schist. Cumulus texture locally preserved

## VOLCANIC ROCKS

Xcv - Caicara Formation of the Cuchivero Group (Early Proterozoic)--Unmetamorphosed ash-flow tuffs and rhyolitic to dacitic flows and breccias. A U-Pb age of 1,980 Ma was obtained from ash-flow tuff near Icabarú (Brooks and others, in press). Called Xc on some maps

## INTRUSIVE ROCKS

d - Diabase (Mesozoic to Early Proterozoic)--Dark-gray to greenish-gray, fine- to coarse-grained diabase of tholeiitic composition. Forms dikes and sills. K-Ar ages of diabase in region are 210–200 Ma and 1,700–1,600± 0.8 Ma (Teggin and others, 1985; Sidder and Mendoza, 1991). In cases where locations were determined from side looking airborne radar (SLAR) interpretation or from aeromagnetic data, the map symbol is crosshatched

Yp - Parguaza Granite (Middle Proterozoic)--Massive, coarsely crystalline, porphyritic granite and biotite granite commonly with rapakivi texture. These rocks have been dated about 1,545 Ma, (zircon age; 1,531±39Ma (Rb/Sr age) Gaudette and others, 1978). The Parguaza Granite is reported by Mendoza and others (1977) and Ghosh (1985) to be unconformably overlain by the Roraima Group, although isotopic dates on the Parguaza Granite (about 1,545 Ma) are within the possible age span of the Roraima Group (1,900 to 1,545 Ma) (Ghosh, 1985; Sidder and Mendoza-S., 1991). These age relations can be explained if the Roraima Group varies significantly in age within the Guayana Shield; that is, the Roraima Group may be relatively young (<1,545 Ma) where it reportedly (Mendoza and others, 1977; Ghosh, 1985) rests on the Parguaza Granite but may be older than this in the eastern parts of the Guayana Shield

Ylg - Late granite typically penetrating through and doming Roraima Group sediment (Middle Proterozoic)--In Caño Yagua (lat 3°25' N., long 65°40' W.), one body was mapped as coarsely equigranular granodiorite with pronounced rapakivi texture. In the southern part of the Río Negro (lat

1°10' N., long 66°50' W.), a similar body named the Piedra de Cocuy was described as a granodiorite with 20 percent biotite, 30 percent quartz, 40 percent feldspar, and 10 percent hornblende (Marcano and others, written communication, 1991). These rocks are characterized by small, subrounded, and generally strong magnetic anomalies and are commonly visible in SLAR imagery

ic - Carbonatite intrusion of Cerro Impacto (Mesozoic to Early Proterozoic)--Inferred primarily from geochemistry of the laterite (which is enriched in Ta, Nb, Th, Ba, and rare earth elements (REE)) and barite outcrops and from geophysical interpretation that indicates a magnetite-rich core. Carbonatite underlies a north-trending ridge that has a thick lateritic cover in a depression composed of fenitized granodiorite and tonalite. Age may be as young as 80 Ma (Mendoza and others, 1977) or as old as 1,800 Ma as inferred from intrusive relationship with the granitic rocks of the Cuchivero Group (1,900–1,800 Ma; Sidder and Mendoza-S., 1991)

YXac - Alkaline complexes (Middle and Early Proterozoic). Generally small and rounded to subrounded. The structure 2.5 km in diameter at La Churuata (3°20' N, 65°25' W) intruded the base of the eastern flank of Cerro Duida, southeast of Cerro Marahuaca, and has a Rb/Sr date of 1,300 Ma (Soares, 1985). Its composition has been described as a combination of "saturated syenites, quartz-syenites, nepheline syenites, and granites", the latter apparently deriving from assimilation of the sandstones from the surrounding Roraima Formation. Aegirine, riebeckite, biotite, zircon, monazite, and bastnaesite have been identified. This structure has associated U, Th, REE, Zr, and Sn geochemical anomalies. Another example in the northeastern corner of La Esmeralda quadrangle (3°50' N, 63°10' W), is coarsely crystalline, (phenocrysts from 1 to 2.5 cm), alkalic, with apparent flow-banding of the feldspar crystals (Jeff Wynn, U.S. Geological Survey, written communication, 1991). These rocks are generally only very weakly magnetic, yet are often visible in the SLAR imagery.. The examples in Caura quadrangle are inferred to be similar based on interpretation of aeromagnetic data. Called ac on some maps

Xg - Calc-alkaline granite and other silicic plutonic rocks (Early Proterozoic)--Martínez (1991) described these rocks as massive, coarse-grained, gray, equigranular biotite granites with rapakivi texture similar to the Parguaza batholith. These granites are seen west and north of Cerro Duida (lat 4°00' N., long 65°30' W.) in the Amazonas Federal Territory. These rocks are weakly to moderately magnetic, commonly with east-west to west-northwest trends in the magnetic anomalies. Pronounced west-northwest-striking lineaments in the SLAR imagery are characteristic, especially in the Atabapo quadrangle.

XAgr - Granitic rocks intruding the Imataca Complex (Early Proterozoic and (or) Archean)--Mostly quartz monzonite. Age uncertain; may include granitoids as old as Late Archean as well as granitoids of Early Proterozoic age equivalent to the Supamo or Cuchivero Groups

XAm - Migmatite and gneiss associated with the Imataca Complex (Early Proterozoic and (or) Archean)--Quartz monzonite, migmatite, and lineated gneiss

Xcg - Granitic rocks of the Cuchivero Group (Early Proterozoic)--Includes

granites of Guaniamito, San Pedro, and Santa Rosalía intruded into volcanic rocks of the Caicara Formation. Commonly equigranular to porphyritic, medium to coarse grained, and locally foliated. Phenocrysts include orthoclase, microcline, plagioclase, quartz, biotite, muscovite, and accessory sphene, apatite, zircon, and hornblende. Rb-Sr isotopic age range of 1,900 to 1,800 Ma (Sidder and Mendoza-S., 1991)

diorit - Fenitized zone in Xcg at Cerro Impacto--Caused by the underlying carbonatite. Indicated by smooth depression on SLAR imagery

Xgu - Intrusive rocks, undivided (Early Proterozoic)--Underlying water-inundated plains and jungle in the southeastern Amazonas Federal Territory. Where seen south and east of San Fernando de Atabapo (lat 3°45' N., long 67°40' W.), they are described as biotite hornblende granites and granite gneisses (Marcano and others, 1991). These rocks are weakly magnetic and have no apparent trend

Xgr - Granitic rocks (Early Proterozoic)--Mostly quartz monzonite. Porphyritic, medium to coarse grained, some inclusions of granodiorite. May include potassic granitoids as old as the Supamo Complex and (or) granitoids as young as or younger than the Cuchivero Group

Xsp - Supamo Complex (Early Proterozoic)--Sodic granitic rocks, paragneiss, migmatite, granodiorite, and sparse pegmatite. About 2,230 to 2,050 Ma (Sidder and Mendoza-S., 1991)

## GREENSTONE BELT ROCKS OF THE GUASIPATI-EL CALLAO AREAS

Xcb - Caballape Formation (Early Proterozoic)--Mainly felsic metatuff and phyllite derived from laminated volcanoclastic siltstone and graywacke. Metatuff contains plagioclase phenocrysts, resorbed phenocrysts of quartz, wisps of pumice, and minor lithic clasts

Pastora Supergroup (Early Proterozoic)--Divided into:

Yuruari Formation

Xyf - Felsic metatuff--Quartz±muscovite±calcite semischist. Contains relict quartz and feldspar phenocrysts and traces of lapilli and breccia clasts. Minor greenstone

Xys - Muscovite schist and phyllite--Finely laminated quartz±muscovite±chloritoid±biotite±andalusite±sillimanite schist. Locally contains volcanoclastic metasandstone and felsic metatuff and breccia

Carichapo Group

Xcc - Cicapra Formation--Mafic to intermediate metatuff. Mainly albite±epidote±biotite amphibolite. Relict textures suggest interlayering of tuff and volcanoclastic sandstone

Xce - El Callao Formation--Greenstone, greenschist and minor talc schist and amphibolite. Relict pillow structure is common. Flows are commonly intercalated with flow breccias. Fine-grained quartz-hematite rocks in

uppermost part. Minor chert

## GREENSTONE BELT ROCKS ELSEWHERE IN THE GUAYANA SHIELD

- Xsm - Sedimentary and metasedimentary rocks (Early Proterozoic)--Rocks of uncertain affinity along or near Río Oris in southeastern Ciudad Piar quadrangle. Corresponds in part to La Quina Formation of Bellizzia-G. and others (1976). Hematitic quartz arenite; reddish phyllitic siltstone; feldspathic arenite; conglomeratic arenite; quartz-sericite phyllite; red, laminated, fine-grained meta-arenite with graded bedding and erosional channels
- Xma - Maracapa Formation of Bellizzia-G. and others (1976) (Early Proterozoic)--Weakly metamorphosed red beds and felsic volcanic rocks
- Xmu - Greenstone belt rocks, undivided (Early Proterozoic)--Gold-bearing, greenstone belt rocks are reported in the upper Río Orinoco headwaters, La Esmeralda quadrangle. The tremendous magnetic gradients in this area tend to be sinuous and linear. They resemble gradients of the greenstone belt rocks in eastern Bolívar State. This terrane is distinguished by low to moderate relief in the SLAR imagery
- Xa - Amphibolite schist (Early Proterozoic)--Includes local coarse-grained metagabbro
- Xf1 - Felsic metatuff and flows (Early Proterozoic)--  
Quartz+muscovite±chlorite semischist with relict phenocrysts of partially resorbed quartz and broken feldspar
- Xm1 - Mafic to intermediate metalava and metatuff (Early Proterozoic)--  
Chlorite+albite+epidote±actinolite schist, semischist, and greenstone, locally amygdaloidal. Subordinate hornblende hornfels, albite-epidote amphibolite and minor amphibolite. Minor chert
- Xs1 - Schist, phyllite, metatuff, and metavolcanic rocks (Early Proterozoic)--Quartz-mica schist; quartz-sericite-chlorite schist; sericitic meta-arenite; sericitic-chloritic phyllite; rhyolitic, dacitic, andesitic, and basaltic metatuffs; minor metabasalt and meta-andesite
- Xg1 - Metagabbro (Early Proterozoic)--Saussuritized and, locally, amphibolitized metagabbro. Cumulus texture locally preserved
- Xu1 - Ultramafic rocks (Early Proterozoic)--Mainly metaperidotite and metapyroxenite, serpentinite, and talc schist
- Xui - Ultramafic intrusive rocks in La Flor-Carapo area (Early Proterozoic)--Medium- to coarse-grained pyroxenite sills; ophitic or subophitic to cumulate textures; saussuritized plagioclase, clinopyroxene altered to green hornblende, and sparse olivine



## ROCKS OF THE IMATAKA PROVINCE

XAi - Imataca Complex (Early Proterozoic and (or) Archean)--Amphibolite- to granulite-facies quartzofeldspathic orthogneiss and paragneiss, commonly garnet-bearing, and felsic granulite. Minor amounts of intermediate to mafic orthogneiss, granulite, and charnockite. Metamorphosed iron formations and ferruginous quartzite are shown by dotted lines on map. Older than 2,800 Ma, the protolith is probably as old as 3,400 to 3,700 Ma (Sidder and Mendoza-S., 1991)

## METAMORPHIC ROCKS

Xmo - Moriche Formation (Early Proterozoic)--Characterized at its type locality (Cerro Moriche on the middle Río Ventuari, lat 4°40' N., long 66°25' W.) as metasedimentary conglomerates, possible remnants of an ancestral greenstone belt terrane eroded from the protolith (Ghosh, 1985). These rocks are highly magnetic and commonly follow major structural lows along the middle and upper Río Orinoco and Río Mavaca. They generally form long, linear bodies, some of which are folded by regional metamorphic events, and are usually visible in the SLAR imagery

Xmp - Intrusive rocks of the San Carlos metamorphic-plutonic terrane (Early Proterozoic)--Covering large parts of the southern Amazonas Federal Territory. These rocks are named for the type locality at San Carlos de Río Negro (lat 1°50' N., long 67°05' W.) and crop out along most of the Río Guainía and Río Negro. They are described as granite, granite-porphyry, granite-gneiss, and augen-gneiss with relatively abundant pegmatites (Marcano and others, 1991). This terrane is characterized by strong, sinuous, east-west- to N. 70° W.-trending, elongate magnetic anomalies stacked together

Xbc - Basement complex (Early Proterozoic)--Foliated granite to granodiorite gneiss

### Linear features:

Contact, dashed where inferred primarily from magnetic data  
Fault, dashed where inferred, dotted where implied. Includes lineaments recognized on SLAR  
Fault, transverse, arrows show relative movement where known  
Fault, thrust, sawteeth on upper plate  
Fault--Bar and ball on downthrown side; dashed where inferred  
Fold axis, anticline, overturned anticline, syncline  
Graben bounding fault, tics on downthrown side, dashed where inferred  
Major deep penetrating shear zone inferred from geologic mapping and radar imagery  
U or Th anomaly  
Linear, curvilinear, to circular structural features recognized on SLAR  
Ring structure of unknown origin visible in SLAR--In some cases may represent a volcanic caldera  
Banded iron formation and quartzite of the Imataca complex  
Axis of strong pervasive magnetic gradient--May represent major hidden fault or suture; U, upthrown side; D, downthrown side  
Water contact  
Single line tributary  
International boundary

Province boundary  
Paved road

**Point features:**

Outcrop  
Unimproved airstrip  
Settlement  
Bedding  
Foliation  
Joint, vertical joint  
Inclined cleavage  
Sinkhole