DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

The Digital Geologic Map of Colorado in ARC/INFO Format

By

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Open-File Report

OF-92-0507-A Documentation (paper copy)
OF-92-0507-B Command Files (1 diskette)
OF-92-0507-C Explanation Sheet Database (1 diskette)
OF-92-0507-D,O Geologic Map Database (12 diskettes)

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This geologic map was prepared as a part of a study of digital methods and techniques as applied to complex geologic maps. The geologic map was digitized from the original scribe sheets used to prepare the published Geologic Map of Colorado (Tweto 1979). Consequently the digital version is at 1:500,000 scale using the Lambert Conformal Conic map projection parameters of the state base map. Stable base contact prints of the scribe sheets were scanned on a Tektronix 4991 digital scanner. The scanner automatically converts the scanned image to an ASCII vector format. These vectors were transferred to a VAX minicomputer, where they were then loaded into ARC/INFO. Each vector and polygon was given attributes derived from the original 1979 geologic map.

This database was developed on a MicroVAX computer system using VMS 5.4 and ARC/INFO 5.0 software. The ASCII files were then copied to the DOS diskettes for distribution. To use these diskettes, the user must have the capability of transferring the contents to an ARC/INFO system. The ASCII files included in the enclosed diskettes can be used to print color versions of the Colorado geologic map using the ARC/INFO software.

This data base is also available on the Internet via "anonymous ftp" from gdsvr1.cr.usgs.gov (136.177.23.40).

DISKETTE CONTENTS:

Digital geologic map information on the (USGS "Commands" diskette, USGS Open File 92-0507-B) is contained on one diskette in the following ASCII or ARC/INFO export .E00 files:

AAAREAD.1ST	Text file that contains this Open-File 92-0507-A document.
LOAD.AML	ARC/INFO commands that can be used to automatically rebuild the database from ASCII.
COLORADO.AML	ARCPLOT commands that create a plot file of the Geologic Map from the data bases.
LAMBERT.PRJ	A file of the projection parameters used.
SETUP.AML	The ARCEDIT AML with the edit tolerances used.
CCALIN.E00	ARC/INFO lineset file A, The palette of line types for an electrostatic plotter.
CCBLIN.E00	ARC/INFO lineset file B, The palette of line types for an electrostatic plotter.
CCASHD.E00	ARC/INFO shadeset file A, The palette of colors for an electrostatic plotter.
CCBSHD.E00	ARC/INFO shadeset file B, The palette of colors for an electrostatic plotter.
DOTSHD.E00	ARC/INFO shadeset patterns, a palette of patterns.
FNT003.E00	ARC/INFO geologic symbols font file.

Digital geologic map information on the (USGS "Index" diskette, USGS Open File 92-0507-C) is contained on one diskette in the following ASCII or ARC/INFO export .E00 files:

AAAREAD.1ST	Text file that contains this Open-File 92-0507-A document.
INDEX.AML	ARCPLOT commands that create a plot file of the Geologic Map Explanation sheet.
INDEX.E00	The Geologic Map Explanation sheet (no projection).
EXPL-01.TXT thru EXPL-22.TXT	ARCPLOT text files for Colorado Explanation Sheet.
BORDER.AML	ARCPLOT commands that create a plot file of the title and scale portion of the sheet.
BORDER.E00	The title and scale bars of the sheet (Lambert projection).

Digital geologic map information on the (USGS "Database" diskettes, USGS Open File 92-0507-D, thru USGS Open File 92-0507-O) is contained on 13 ARC/INFO export volumes, CONTACT.E00 thru CONTACT.E09, DECO.E00 thru DECO.E01 and LINE.E00.

AAAREAD.1ST	Text file that contains this Open-File 92-0507-A document.
CONTACT.E00 thru CONTACT.E09	The Geologic Map of Colorado contacts and faults file.
DECO.E00 thru DECO.E01	The Geologic Map of Colorado decorations file.
LINE.E00	The Geologic Map of Colorado single line outcrop file.

Copy the contents of of the 14 diskettes to the ARC/INFO platform, and run the AML LOAD.AML.

WATER, ROADS, CONTOURS AND TOWNS:

Published geologic maps are prepared using a USGS topographic base map that contains the hydrology, hypsography and political features. Because this digital version of the Geologic Map of Colorado started with the original geologic scribe sheets, these features were not present. Only those water bodies that were required to close polygons were added by hand. The digital hydrology is not complete nor as accurate as the original USGS 1:500,000 topographic base. A few water bodies in the Fort Collins and Grand Mesa area were added for visual effect. No roads, contours or towns were present on the geologic scribe sheets and none were added to this digital version.

CHANGES:

Three intentional changes were made from the published Geologic Map of Colorado. In the extreme south-east corner of the La Junta quadrangle, one outcrop of the Triassic Dockum Group is incorrectly labeled Trdg on the published map. In the south-east corner of the Moab quadrangle, the

contact between the Morrison Formation, Summerville Formation (shale and siltstone), and Entrada Formation, labeled Jmse and the Morrison, Wanakah, and Entrada Formations, labeled Jmwe was omitted from the published map. A non-printing contact was inserted between the two to preserve the topology of the digital data base. The arbitrary line between the Middle Park Formation, labeled Tm, and the Coalmont Formation, Tc, on the published Geologic Map of Colorado follows the Continental Divide. These Formations are not divided on the digital map and both Formations are labeled Tc.

Each vector and polygon was given attributes derived from the original 1979 geologic map, in cases of ambiguity, the Preliminary Geologic Map of Colorado (Tweto, 1976) was used as a guide to attribute polygons and arcs. Every polygon on the Preliminary map is labeled.

LINESETS, SHADESET AND FONTS:

The plot program COLORADO.AML uses two linesets, CARTO.LIN and CCA.LIN. As the COLORADO.AML runs, black lines are produced from the INFO item BW which calls the ARC/INFO CARTO.LIN line set, to generate color lines the INFO item CCA calls the electrostatic 1024 color line set file, included as lineset CCALIN.E00.

To produce polygons three shadesets are used, color polygons are produced from the INFO items CCA and CCB which calls the electrostatic 1024 color shadeset files, included as shadeset CCASHD.E00 and CCBSHD.E00 To generate polygons patterns the INFO item PATT calls the shadeset file DOT, included as DOTSHD.E00.

The text fonts for the 3 special geologic symbols are included as font FNT003.FNT. The ASCII code for @ has been redefined to the symbol for Triassic, the ASCII code for & has been redefined to the symbol for Pennsylvanian and the ASCII code for _ has been redefined to the symbol for Cambrian.

CONTACTS, DECORATIONS, SINGLE LINE OUTCROPS, BORDER and INDEX coverages:

The Digital Colorado Geologic Map is made of five spatial datasets. The Explanation Sheet (no projection), the Border-Title Sheet (Lambert projection) and three datasets (Lambert projection) for the body of the Map. The Map coverages are 1) Contacts and Faults, 2) Decorations and 3) Single Line Outcrops. The attributed vector portion of the Contact coverage is CONTACT.AAT. The attributed closed polygons of the Contact coverage is CONTACT.PAT. DECO.AAT is an attributed vector graphic overlay of the Decoration coverage. This datasets contains such items as the teeth of thrust faults, sheer zones, fold axis and other structural symbols. The polygon portion of the Decoration coverage, DECO.PAT is an attributed closed polygon graphic overlay. In order to fill the teeth and the balls with black paint, these had to be topologically structured. LINE.AAT is the attributed vectors of the Single Line Outcrops. These are the dikes and veins. Single Line Outcrops are the rocks that at a scale of 1:500,000 are best represented by a thin single line. The LINE.PAT file is present but blank. Single Line Outcrops at 1:500,000 have no area.

CODING SCHEME FOR ATTRIBUTES:

NAME	FEATURE
P1,P2	Shorthand attributes
BW	Line pattern from CARTO.LIN
CCA	Line pattern or shade color from CCA.LIN or CCA.SHD
CCB	Shade color from CCB.SHD
PATT	Shade pattern from DOT.SHD
MAJOR1	DLG-3 (Optional) style MAJOR1 attribute
MINOR1	DLG-3 (Optional) style MINOR1 attribute

MAJOR2 DLG-3 (Optional) style MAJOR2 attribute
MINOR2 DLG-3 (Optional) style MINOR2 attribute

CONTACT.AAT

NAME	P1	P2	BW	CCA	MAJOR1	MINOR1	MAJOR2	MINOR2
CONTACT	1	-	0	1	500	201	-	-
WATER, SHORELINE	2	-	0	1	40	200	-	-
STATE OUTLINE	3	-	127	0	91	8	-	-
FAULT	-	1	0	4	-	-	501	203
FAULT, THRUST	-	2	0	4	-	-	501	204
FAULT, DOTTED	-	3	106	0	-	-	501	205
FAULT, DASHED	-	4	114	0	-	-	501	206
BAR	-	5	0	0	-	-	501	218
DIATREME	-	8	0	0	-	-	501	215
VOL. CONE	-	9	0	212	-	-	501	216
PC SHEAR ZONE	-	22	0	0	-	-	501	213
SINGLE LINE OUTCROP	-	24	0	0	-		501	226
NON-PRINTING CONTACT	-	25	0	0	500	202	-	-

Some vectors can have both a P1 and P2 code. Such as a fault that is also a contact.

DECO.AAT

NAME	P1	P2	BW	CCA	MAJOR1	MINOR1
BALL	6	-	0	1	501	219
TEETH	7	-	0	1	501	220
DIATREME	8	-	0	2	501	215
VOL. NECK	10	-	0	212	501	217
MONOCLINE	11	-	0	212	501	207
MONOCLINE, DOTTED	12	-	0	353	501	208
SYNCLINE	13	-	0	212	501	209
SYNCLINE, DOTTED	14	-	0	353	501	210
ANTICLINE	15	-	0	212	501	211
ANTICLINE, DOTTED	16	-	0	353	501	212
MONOCLINE ARROW	17	-	0	212	501	221
SYNCLINE ARROW	18	-	0	212	501	222
ANTICLINE ARROW	19	-	0	212	501	223
FOLD ARROWHEAD	20	-	0	212	501	224
OVERTURNED SYMBOL	21	-	0	212	501	225
PC SHEAR ZONE	22	-	0	1	501	213
JURASSIC LIMIT	23	-	5	0	501	214

LINE.AAT

NAME	P1	BW	CCA	MAJOR1	MINOR1
Tbbi,	49	0	384	510	49
Tbr,	50	0	386	510	50

Tui,	58	0	512	510	58
Tmi,	59	0	505	510	59
TKi,	66	0	441	510	66
Kmj,	99	0	335	510	99
_am,	172	0	331	510	172
Yam,	181	0	449	510	181
Tmi,inferred	185	0	500	510	185

CONTACT.PAT

NAME	P1	CCA	CCB	PATT	MAJOR1	MINOR1
Qa,	1	16	0	0	520	1
Qg,	2	24	0	0	520	2
Qgo,	3	31	0	0	520	3
Qe,	4	19	0	0	520	4
Qeo,	5	19	0	55	520	5
Qd,	6	25	0	0	520	6
Qdo,	7	25	0	55	520	7
Ql,	8	25	0	71	520	8
Qb,	9	61	0	0	520	9
QTsa,	10	19	0	71	520	10
QTa,	11	31	0	55	520	11
To,	12	50	0	0	520	12
Tgv,	13	50	0	71	520	13
Ta,	14	50	0	55	520	14
Twr,	15	64	0	0	520	15
Th,	16	75	0	71	520	16
Tcu,	17	47	0	0	520	17
Tpc,	18	303	0	0	520	18
Tdu,	19	303	0	0	520	19
Tbp,	20	50	0	0	520	20
Tt,	21	50	0	0	520	21
Tnp,	22	50	0	0	520	22
Tos,	23	64	0	0	520	23
Tu,	25	75	0	71	520	25
Tb,	26	75	0	71	520	26
Tg,	27	81	0	7	520	27
Tgp,	28	103	0	0	520	28
Tgl,	29	81	0	0	520	29
Tglm,	30	103	0	0	520	30
Tgt,	31	88	0	103	520	31
Tglu,	32	81	0	0	520	32
Tglw,	33	81	0	71	520	33
Tw,	34	47	0	0	520	34
Twc,	35	45	0	0	520	35
Twn,	36	46	0	0	520	36
Two,	37	47	0	71	520	37
Tf,	38	303	0	0	520	38
Tc,	39	303	0	0	520	39
Tm,	40	303	0	0	520	40

Td,	41	50	0	0	520	41
Ts,	42	50	0	0	520	42
Tsp,	43	303	0	0	520	43
Tlp,	44	50	0	0	520	44
Tsj,	45	47	0	0	520	45
Te,	46	47	0	0	520	46
Tn,	47	303	0	0	520	47
Tbb,	48	118	0	7	520	48
Tbbi,	49	152	0	0	520	49
Tbr,	50	186	0	0	520	50
Tbrt,	51	96	0	0	520	51
Taf,	52	152	0	0	520	52
Tial,	53	64	0	0	520	53
Tiql,	54	64	0	127	520	54
Tpl,	55	348	0	0	520	55
Twm,	56	155	0	0	520	56
Tv,	57	79	0	0	520	57
Tui,	58	358	0	0	520	58
Tmi,	59	124	0	0	520	59
TKda,	60	35	0	0	520	60
Tdv,	61	35	0	71	520	61
TKdl,	62	35	0	0	520	62
TKr,	63	35	0	0	520	63
TKa,	64	35	0	0	520	64
TKec,	65	32	0	103	520	65
TKi,	66	387	0	0	520	66
Kl,	67	723	0	0	520	67
Kf,	68	718	0	0	520	68
Klf,	69	718	0	7	520	69
Kvt,	70	723	0	7	520	70
Kp,	71	716	0	0	520	71
Kpu,	72	712	0	0	520	72
Kpm,	73	767	0	0	520	73
Kpl,	74	720	0	0	520	74
Kn,	75	761	0	0	520	75
Kcg,	76	736	0	0	520	76
Kc,	77	761	0	0	520	77
Kpg,	78	709	0	71	520	78
Kdp,	79	785	0	0	520	79
Kd,	80	785	0	0	520	80
Kmw,	81	723	0	0	520	81
Kls,	82	712	0	0	520	82
Kmv,	83	717	0	0	520	83
Kmvu,	84	737	0	0	520	84
Kmvl,	85	751	0	95	520	85
Kw,	86	767	0	0	520	86
Ki,	87	751	0	95	520	87
Kh,	88	737	0	0	520	88
Ksc,	89	767	0	55	520	89
Kmgs,	90	751	0	95	520	90

Km,	91	736	0	0	520	91
Kmfm,	92	709	0	103	520	92
Kfd,	93	785	0	95	520	93
Kdb,	94	785	0	0	520	94
Kkf,	95	723	0	0	520	95
Kpcl,	96	767	0	0	520	96
Kch,	97	720	0	0	520	97
Kmp,	98	761	0	0	520	98
Kmj,	99	736	0	71	520	99
KJdm,	100	755	0	103	520	100
KJdj,	101	755	0	103	520	101
KJdw,	102	755	0	103	520	102
KJdr,	103	755	0	103	520	103
KJde,	104	755	0	103	520	104
KJds,	105	755	0	103	520	105
Jm,	106	746	0	0	520	106
Jmj,	107	746	0	0	520	107
Jmc,	108	746	0	0	520	108
Jmw,	109	746	0	0	520	109
Jmr,	110	746	0	0	520	110
Jme,	111	746	0	0	520	111
Jms,	112	746	0	0	520	112
Jmse,	113	746	0	0	520	113
Jmce,	114	746	0	0	520	114
Jmre,	115	746	0	0	520	115
Jmwe,	116	746	0	0	520	116
J@g,	117	782	0	0	520	117
J@gc,	118	782	0	71	520	118
J@mg,	119	782	0	95	520	119
J@mc,	120	800	0	0	520	120
@kc,	121	790	0	0	520	121
@wc,	122	790	0	0	520	122
@m,	123	741	0	0	520	123
@ch,	124	741	0	0	520	124
@cc,	125	776	0	103	520	125
@c,	126	776	0	0	520	126
@d,	127	776	0	0	520	127
@dg,	128	776	0	0	520	128
@Pl,	129	788	0	103	520	129
@Ps,	130	788	0	0	520	130
@Pll,	131	788	0	0	520	131
@Pjs,	132	788	0	95	520	132
@Pcs,	133	788	0	95	520	133
@Pcp,	134	788	0	95	520	134
@Pr,	135	788	0	71	520	135
@Pdc,	136	788	0	71	520	136
@Pmc,	137	788	0	0	520	137
@&lf,	138	805	0	0	520	138
Pp,	139	682	0	0	520	139
Pu,	140	682	0	0	520	140

Pc,	141	681	0	0	520	141
Mz,	142	0	0	71	520	142
MzPz,	143	0	0	71	520	143
P&f,	144	408	0	95	520	144
P&cf,	145	408	0	0	520	145
P&if,	146	408	0	0	520	146
P&s,	147	408	0	0	520	147
P&m,	148	408	0	0	520	148
P&w,	149	440	0	95	520	149
P&wm,	150	440	0	95	520	150
&m,	151	0	14	0	520	151
&b,	152	0	0	103	520	152
&mb,	153	0	14	0	520	153
&e,	154	0	12	95	520	154
&ee,	155	0	12	0	520	155
&mbe,	156	0	12	0	520	156
&h,	157	0	16	0	520	157
&rh,	158	0	15	0	520	158
&mr,	159	0	15	0	520	159
M_,	160	378	0	0	520	160
MDO,	161	448	0	0	520	161
DO_,	162	448	0	0	520	162
O_,	163	352	0	0	520	163
Or,	164	352	0	0	520	164
MD,	165	448	0	0	520	165
MD_,	166	435	0	0	520	166
DO,	167	448	0	0	520	167
_s,	168	171	0	0	520	168
Mm,	169	448	0	0	520	169
_l,	170	171	0	0	520	170
M_ml,	171	378	0	0	520	171
_am,	172	814	0	0	520	172
Yu,	173	32	0	135	520	173
YXu,	174	32	0	119	520	174
Xb,	175	0	18	0	520	175
Xfh,	176	44	0	7	520	176
Xq,	177	0	18	71	520	177
Wr,	178	319	0	0	520	178
Yp,	179	107	0	7	520	179
Yg,	180	169	0	7	520	180
Yam,	181	689	0	0	520	181
Xg,	182	91	0	71	520	182
Xm,	183	385	0	0	520	183
YXg,	184	348	0	71	520	184
H_2O,	200	680	0	0	40	100

DECO.PAT

NAME	P1	CCA	CCB	PATT	MAJOR1	MINOR1
Pipe,	186	0	0	0	530	186
, (BLANK)	187	0	0	0	530	187
Ball,	190	1	0	0	530	190
Cog, (TEETH)	191	1	0	0	530	191

INDEX.PAT

NAME	P1	CCA	CCB	PATT	MAJOR1	MINOR1
Index map color,	199	47	0	0	530	199
Index map color,	199	31	0	0	530	199
Index map color,	199	79	0	0	530	199
Index map color,	199	723	0	0	530	199

LINE.PAT

NAME	P1	MAJOR1	MINOR1
none	0	0	0

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References cited

Tweto, Ogden, 1976, Preliminary Geologic Map of Colorado: U.S. Geological Survey Miscellaneous Field Studies Map MF-788, 2 sheets.

Tweto, Ogden, 1979, Geologic Map of Colorado: U.S. Geological Survey Special Geologic Map.