

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Analytical results and sample locality map of
rock samples from the Cowboy Spring Wilderness Study Area,
Hidalgo County, New Mexico

By

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This report is preliminary and has not been reviewed for
conformity with U.S. Geological Survey editorial standards
and stratigraphic nomenclature.

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STUDIES RELATED TO WILDERNESS

Bureau of Land Management Wilderness Study Areas

The Federal Land Policy and Management Act (Public Law 94-579, October 21, 1976) requires the U.S. Geological Survey and the U.S. Bureau of Mines to conduct mineral surveys on certain areas to determine their mineral resource potential. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a mineral survey of part of the Cowboy Spring (NM-030-007) Wilderness Study Area, Hidalgo County, New Mexico.

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SUMMARY

In March and April 1987, the U.S. Geological Survey conducted a geologic and geochemical survey of the Cowboy Spring Wilderness Study Area (NM-030-007), Hidalgo County, New Mexico. At the request of the U.S. Bureau of Land Management, we studied 6,699 acres of the wilderness study area which is about 15 mi north of the international border between the United States and Mexico (fig. 1). Elevations range from 4,920 ft to 6,601 ft. Access to the study area is provided by light-duty roads and 4-wheel drive trails.

Cretaceous and Tertiary sedimentary rocks and Tertiary volcanic rocks are found in the study area. The study area was included in the area mapped by Zeller and Alper (1965) and in a study of volcanic centers in southwestern New Mexico by Erb (1979). A survey of mining activity is given in Scott (1987) and a mineral resource potential study is in progress.

Analyses of unaltered and unmineralized rock samples provide background geochemical data for the individual rock units. Analyses of altered rocks, on the other hand, provide geochemical information on the alteration that has affected the rocks along a faulted zone in the eastern part of the study area (fig. 2). A correlation and list of map units are given on figure 3.

Rock-chip samples were collected from outcrops at the 14 localities shown on figure 2 and were analyzed using a semiquantitative, direct-current arc emission spectrographic method (Grimes and Marranzino, 1968). The elements analyzed and their limits of determination are listed in table 1.

DESCRIPTION OF DATA TABLES

Analyses for rock-chip samples from the Cowboy Spring Wilderness Study Area are listed in table 2. The data are arranged so that the USGS-assigned sample numbers correspond to the numbers shown on the site location map (fig. 2). A letter "N" in the table indicates that a given element was analyzed for, but was not detected at the lower limit of determination. A letter "L" in the table indicates that a given element was detected, but was below the limit of determination.

In addition, rock type, alteration, and location for each sample site are given in table 3.

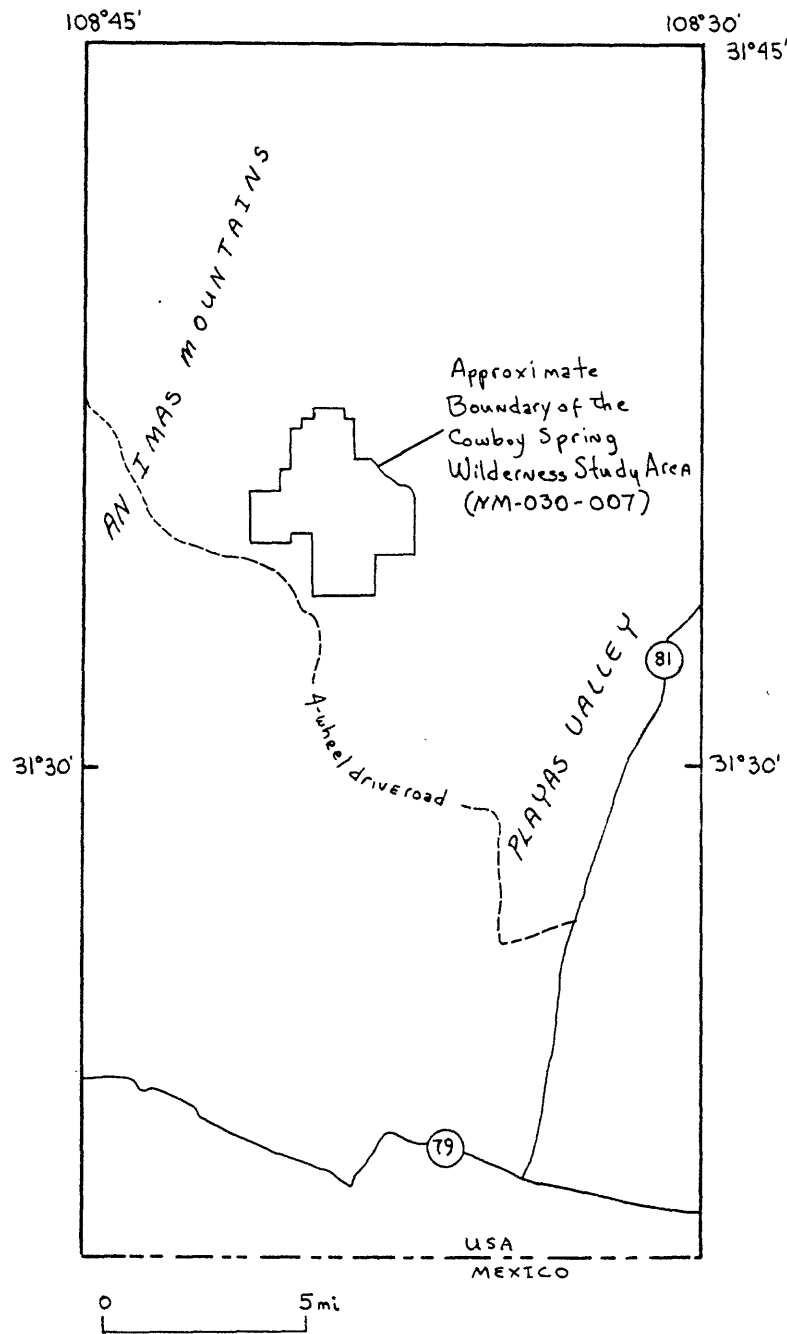
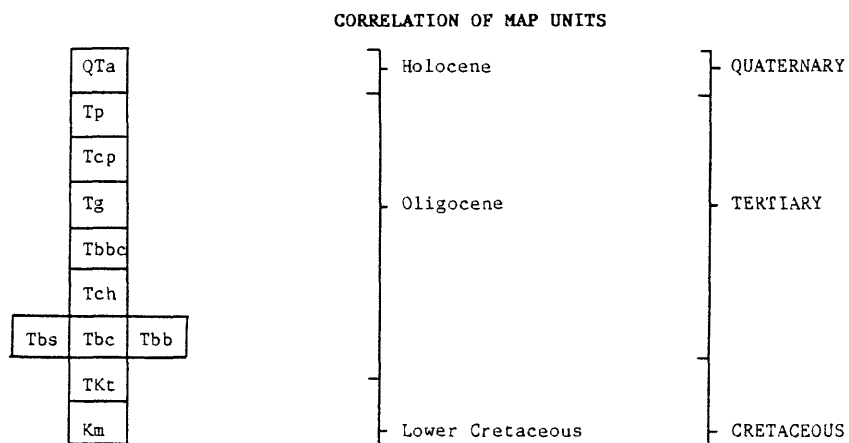


Figure 1.--Index map showing location of Cowboy Spring Wilderness Study Area, Hidalgo County, New Mexico.



LIST OF MAP UNITS

QTa	Alluvium, undivided
Tp	Park Tuff
Tcp	Andesite of Center Peak
Tg	Gillespie Tuff
Tbba	Tuff of Black Bill Canyon
Tch	Cedar Hill Andesite
Tbs	Tuff of Bennett Spring
Tbc	Tuff of Bluff Creek
Tbb	Bennett Creek Breccia
TKt	Cowboy Spring-Timberlake Conglomerate
Km	Mojado Formation

- CONTACT--Dashed where approximately located or inferred
- FAULT--Dashed where inferred, dotted where concealed; ball and bar on downthrown side
- Strike and dip of compaction foliation
- v - Vitrophyre
- Pyroclastic sand
- Geochemical sample locality and number

Detailed descriptions of map units may be found in Zeller and Alper (1965) and Erb (1979).

Figure 3.--Correlation and list of map units for the Cowboy Spring Wilderness Study Area, Hidalgo County, New Mexico.

Table 1.--Limits of determination for the spectrographic analysis of rocks,
based on 10-mg sample

Element	Lower determination limit	Upper determination limit
Percent		
Iron (Fe)	0.05	20
Magnesium (Mg)	.02	10
Calcium (Ca)	.05	20
Titanium (Ti)	.002	1
Parts per million		
Manganese (Mn)	10	5,000
Silver (Ag)	0.5	5,000
Arsenic (As)	200	10,000
Gold (Au)	10	500
Boron (B)	10	2,000
Barium (Ba)	20	5,000
Beryllium (Be)	1	1,000
Bismuth (Bi)	10	1,000
Cadmium (Cd)	20	500
Cobalt (Co)	5	2,000
Chromium (Cr)	10	5,000
Copper (Cu)	5	20,000
Lanthanum (La)	20	1,000
Molybdenum (Mo)	5	2,000
Niobium (Nb)	20	2,000
Nickel (Ni)	5	5,000
Lead (Pb)	10	20,000
Antimony (Sb)	100	10,000
Scandium (Sc)	5	100
Tin (Sn)	10	1,000
Strontium (Sr)	100	5,000
Vanadium (V)	10	10,000
Tungsten (W)	50	10,000
Yttrium (Y)	10	2,000
Zinc (Zn)	200	10,000
Zirconium (Zr)	10	1,000
Thorium (Th)	100	2,000

Table 2.--Analytical results of rock samples from the Cowboy Spring
Wilderness Study Area, Hidalgo County, New Mexico

Field No.-----	227	228	229	230	231	232	233	234	235	236	237	238	239	240
Fe %	1.	1.5	.7	2.	1.5	1.5	1.	2.	.5	.3	3.	3.	2.	5.
Mg %	.2	.7	.1	.5	.2	.2	.07	.2	.07	.2	.5	1.5	.3	.2
Ca %	.3	2.	.1	2.	.5	.2	L	.07	.05	.2	1.	2.	.2	.15
Ti %	.07	.2	.1	.2	.15	.1	.1	.2	.07	.05	.3	.5	.2	.2
Mn ppm	200.	1000.	700.	500.	1000.	200.	10.	100.	30.	50.	300.	1000.	100.	300.
Ag ppm	N	N	N	N	N	N	.5	N	.5	N	N	N	N	N
As ppm	N	N	N	N	N	N	N	N	N	N	N	N	N	300.
Au ppm	N	N	N	N	N	N	N	N	N	N	N	N	N	N
B ppm	15.	10.	15.	15.	20.	15.	10.	20.	10.	50.	15.	10.	70.	L
Ba ppm	500.	700.	100.	500.	500.	300.	500.	700.	300.	150.	700.	700.	700.	1000.
Be ppm	1.5	1.	3.	L	1.5	L	1.	1.5	L	1.	1.5	1.5	1.5	1.5
Bi ppm	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Cd ppm	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Co ppm	5.	7.	L	7.	10.	L	N	L	N	N	10.	15.	N	5.
Cr ppm	N	N	N	L	L	N	N	N	N	N	N	20.	N	N
Cu ppm	5.	7.	L	10.	5.	L	L	5.	L	L	7.	7.	L	5.
La ppm	30.	100.	70.	50.	70.	50.	70.	70.	30.	30.	70.	70.	70.	100.
Mo ppm	N	N	N	N	N	N	N	N	N	N	N	N	N	10.
Nb ppm	N	N	30.	N	L	N	L	L	L	N	L	L	L	20.
Ni ppm	L	N	N	5.	5.	L	L	L	L	L	5.	7.	N	5.
Pb ppm	15.	70.	50.	15.	30.	30.	20.	30.	15.	15.	30.	30.	30.	30.
Sb ppm	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Sc ppm	5.	7.	L	7.	5.	L	L	7.	L	L	10.	15.	7.	7.
Sn ppm	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Sr ppm	200.	300.	N	1000.	150.	L	N	150.	L	500.	200.	300.	500.	200.
V ppm	15.	50.	10.	50.	30.	20.	20.	50.	15.	L	70.	70.	20.	50.
W ppm	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Y ppm	15.	30.	50.	15.	30.	20.	20.	50.	20.	15.	30.	50.	30.	50.
Zn ppm	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Zr ppm	150.	200.	200.	150.	100.	100.	100.	150.	70.	50.	200.	200.	300.	500.
Th ppm	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Table 3.--Alteration, rock type, and location of rock samples from the
Cowboy Spring Wilderness Study Area,
Hidalgo County, New Mexico

Field No.	Alteration	Rock Type	Latitude	Longitude
227	H	X	31°35'58"	108°39'54"
228	-	S	31°36'	108°39'54"
229	-	S	31°35'05"	108°41'18"
230	C	T	31°34'37"	108°40'39"
231	H	S	31°35'14"	108°38'50"
232	H	S	31°33'53"	108°38'23"
233	-	S	31°37'33"	108°38'49"
234	C	S	31°37'09"	108°38'57"
235	C	S	31°37'37"	108°39'31"
236	C	S	31°36'23"	118°38'30"
237	H	T	31°36'08"	108°38'26"
238	-	T	31°36'55"	108°38'56"
239	H	S	31°36'01"	108°28'04"
240	H	S	31°35'59"	108°38'20"

Alteration

- unaltered
H iron/manganese
C siliceous

Rock Type

S felsic igneous
T intermediate igneous
X chert or jasperoid

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