DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH
THE U.S. BUREAU OF LAND MANAGEMENT

MISCELLANEOUS FIELD STUDIES
MAP MF-1375-B

Mineral Surveys

Wilderness Studies Related to
Bureau of Land Management

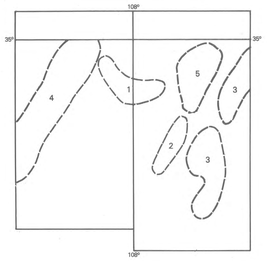
The Federal Land Policy and Management Act (Public Law 94-579, October 21, 1976), requires the U.S. Geological Survey and the U.S. Bureau of Mines to conduct mineral surveys on certain areas to determine their mineral resource potential. Results must be made available to the public and be submitted to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

CORRELATION OF MAP UNITS

Qae, Qal, Qc, Qbm, Qam, Qbb, Qcb, Qvb, Qbw, Qvw, Qbo, Qvo, Qbt, Qct, Qvt, Qbj, Qcj, Qvj, Qc, Qv, Qbu, Qb	Holocene and Pleistocene	QUATERNARY	
Tb	Pliocene	TERTIARY	
UNCONFORMITY			
Kcc, Kg, Kmd, Klh, Kmv, Kdt, Kmw, Kdp, Kdo	Upper Cretaceous	CRETACEOUS	
UNCONFORMITY			
Jm, Jz	Upper Jurassic	JURASSIC	
UNCONFORMITY			
Je	Middle Jurassic		
UNCONFORMITY			
Tr cm		TRIASSIC	
UNCONFORMITY			
Pso, Pg, Py, Po	Lower Permian	PERMIAN	
UNCONFORMITY			
po, qp, pg, gg, mg, ig, sc		PRECAMBRIAN	

LIST OF MAP UNITS

Qe	EOLIAN DEPOSITS (HOLOCENE)
Qal	ALLUVIUM (HOLOCENE AND PLEISTOCENE)
Ql	LANDSLIDE DEPOSITS (HOLOCENE AND PLEISTOCENE)
Qac	ALLUVIUM, COLLUVIUM, AND SOIL (HOLOCENE AND PLEISTOCENE)
	PYROCLASTIC DEBRIS AND BASALT FLOWS (HOLOCENE AND PLEISTOCENE)
	Basalt flows in the area divided into an older group and the younger Malpais with pyroclastic debris (Qv) and cinder cones (Qc)
Qbm	McCartys flow
Qbb	Bandera flows
Qbw	Noya de Cibola flows
Qbp	Paxton Springs flow
Qbt	Flows from Twin Craters
Qbc	Flows from El Calderon
Qbo	Flows from Geo Ridge
Qc	Cinder cones
Qv	Volcanic debris
Qbu	Basalt flows
Qb	Old basalt flows
Tb	BASALT FLOWS ON CEBOLLITA MESA AND MESA NEGRA (PLIOCENE)
Kcc	CREVASSE CANYON FORMATION (UPPER CRETACEOUS)--Nonmarine sandstone, siltstone, carbonaceous shale, and coal beds
Kg	GALLUP SANDSTONE (UPPER CRETACEOUS)
Kmd	MANCOS SHALE (UPPER CRETACEOUS)
Kmt	D-Cross Tongue
Kmw	Tongue near Rio Salado
Klh	Whitewater Arroyo Tongue
Kdt	Tres Hermanos Sandstone Member
Kdp	TWOWELLS TONGUE OF DAKOTA SANDSTONE (UPPER CRETACEOUS)
Kdo	PACOATE TONGUE OF DAKOTA SANDSTONE (UPPER CRETACEOUS)
	CLAY MESA TONGUE OF MANCOS SHALE AND LOWER PART, DAKOTA SANDSTONE (UPPER CRETACEOUS)
Jm	MORRISON FORMATION (UPPER JURASSIC)
Jz	ZUNI SANDSTONE (UPPER JURASSIC) AND SUMMERVILLE FORMATION (MIDDLE JURASSIC)
Je	ENTRADA SANDSTONE (MIDDLE JURASSIC)
Tr cm	CHINLE (UPPER TRIASSIC) AND MOENKOPI(?) (MIDDLE(?) AND LOWER TRIASSIC) FORMATIONS--Red sandstone, claystone, and siltstone
Pwa	SAN ANDRES LIMESTONE (LOWER PERMIAN)
Pg	GLORIETA SANDSTONE (LOWER PERMIAN)
Py	YESO FORMATION (LOWER PERMIAN)
Pa	ABO FORMATION (LOWER PERMIAN)
	PRECAMBRIAN ROCKS
pa	Porphyritic aplite
ap	Gneissic aplite
pg	Porphyritic granite
gg	Gneissic granite
mg	Quartz monzonite gneiss
ig	Injection gneiss
sc	Biotite schist



Index showing location of anomalies discussed in text.

CONTACT--Dashed where inferred; dotted where concealed

FAULT--Dashed where approximately located; dotted where concealed. Bar and ball on downthrown side

INFERRED FAULT--Right lateral strike slip, movement shown by arrows; U, upthrown side, D, downthrown side

FAULT--Recent en echelon fault traces in basalt flows; D, downthrown side, U, upthrown side

STRIKE AND DIP OF BEDS

SILICIFIED BRECCIA ZONES

FLUORITE VEIN

MINE

DRILL HOLES--Sample locality and number

Oil test, dry hole

Coal test

Geothermal test

CINDER CONE--Line along crest of cone, hachures point to throat of volcano

COLLAPSE STRUCTURES--Volcanic vent areas that collapsed after withdrawal of lava

LAVA CONE--Volcanic vent area on shield volcanoes, predominantly lava and scoria, includes some small cinder cones

Small volcanic vents

LAVA TUBES--Approximate trace of known lava tube

BOUNDARY OF EL MALPAIS INSTANT STUDY AREA

EXPLANATION

20 GAMMA.....
100 GAMMA.....
FLIGHT LINE DIRECTION.....EAST-WEST
FLIGHT LINE SPACING.....1 MILE
FLIGHT LINE ALTITUDE.....8500'T.C. NORTH, 9500'T.C. SOUTH OF 34°22.5'
CONSTANT ADDED TO DATA....52000 GAMMA
GRID INTERVAL.....175 METERS E-W, 400 METERS N-S

OBSERVED TOTAL FIELD READING.....X
REGIONAL FIELD REMOVED-IGRF 1975 UPDATED TO MONTH FLOWN

INTERPRETATION OF AEROMAGNETIC DATA

Geologic setting

The lava flows that comprise most of the El Malpais Instant Study Area (Maxwell, 1981) are composed of tholeiitic basalt ranging from about 1 m.y. to 1,200 years old or less. Steptoes in the basalt field include Permian Yeso Formation, Glorieta Sandstone, and San Andres Limestone in the northern part, and Cretaceous Dakota Sandstone in the southern part.

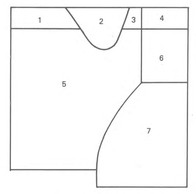
Cebollita Mesa, along the eastern side of the study area, is composed of relatively flat-lying Cretaceous Dakota Sandstone, Mancos Shale, Gallup Sandstone, and the coal-bearing Crevasse Canyon Formation, capped at the top by Tertiary basalt flows.

Precambrian rocks in the core of the Zuni Mountains are exposed on the northern border of the study area and are flanked by outward-dipping Permian Abo Sandstone and Yeso Formation.

The aeromagnetic map shows total field contours in gammas with the regional field removed. The broad high to the east and low to the west are probably largely due to topographic effect. Extrapolated removal of these effects to a common level leaves several prominent anomalies, all but one of which closely match known geologic features. Anomalies 1 and 2 are magnetic lows corresponding to outcrops of sedimentary rocks at Cerritos de Jaspe and the Narrows. The small, sharply defined highs and lows of anomalous area 3 correspond well with lava cones and vent areas on Cebollita Mesa, some as lows, others as highs, and Cebollita Peak as a sharp high and shallow low. The north-south elongation of the highs and lows matches the observed and postulated N-S faults and the alinement of vents on the mesa. Anomalous area 4 corresponds to the clusters of cinder cones on map (Maxwell, 1981); several cones coincide with sharp highs and several with the lows, but an equal number of highs and lows have no corresponding surface expression. Anomaly 5 is not easily explained by the surface geology; part of the high is over the same sedimentary rocks as anomaly 2, and the remainder is over the same sequence of lava flows that continues to the south and west of the anomaly. The anomaly may be the expression of a heretofore unsuspected intrusive or lava flows (Qbwf) whose vent or source area has been covered by subsequent flows.

REFERENCE

Maxwell, C. H., 1981, Geologic map of the El Malpais Instant Study Area and adjacent areas, Valencia County, New Mexico: U.S. Geological Survey Miscellaneous Field Studies Map MF-1375-A, scale 1:62,000.



SOURCES OF GEOLOGIC DATA

1. Beckman and Olson, 1977
2. Goddard, 1966
3. D. G. Wyant and A. B. Olson unpublished manuscript
4. Thaden and others, 1967
5. Maxwell, mapped 1979
6. Maxwell, 1977
7. Moore, S. L., mapped 1978, and Maxwell, mapped 1975-78

Base mosaic by U.S. Geological Survey using 7 1/2 minute series maps below.

VALLE LARGO 1952	PAXTON SPRINGS 1952	SAN RAFAEL 1957	GRANTS SE 1957(7.1'PR)
CERRO HUECO 1967	ICE CAVES 1967	ARROSA RANCH 1961	LOS PILARES 1961
CERRO BRILLANTE 1967	ICE CAVES SE 1967	NORTH PASTURE 1961	LAGUNA NONDA 1961
LA RENDIJA 1967	YORK RANCH 1967	SAND CANYON 1964	CEBOLLITA PEAK 1964

SCALE 1:62 500

1 ½ 0 1 2 3 4 MILES
1 .5 0 1 2 3 4 KILOMETERS

INDEX MAP SHOWING LOCATION OF STUDY AREA

Geology from Maxwell (1981)

AEROMAGNETIC MAP OF THE EL MALPAIS INSTANT STUDY AREA AND ADJACENT AREAS, VALENCIA COUNTY, NEW MEXICO

By
Charles H. Maxwell
1981

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1982

For sale by Branch of Distribution, U.S. Geological Survey, Box 25286, Federal Center, Denver, CO 80225