CIRCULAR 128

Geoscience Research Projects For New Mexico , 1972

by

Roy W. Foster
and
Jean A. Meyer

1972

NEW MEXICO STATE BUREAU OF MINES AND MINERAL RESOURCES

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New Mexico State Bureau of Mines and Mineral Resources

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A Division of

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Stirling A. Colgate, *President*

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P RE FACE

This circular lists currently active projects in the fields of geology and geophysics. Also noted are some projects in engineering and hydrology of interest to earth scientists. The purpose of this compilation is to disseminate information regarding the many research projects underway and to minimize duplication of effort.

The report includes annotated listings of 326 projects supported by 134 organizations. Topographic mapping and research by industry are not included. Projects are listed under a dozen topical categories, each with a separate map indexed with project numbers.

Each project number designates the principal field of research, e.g., AD4 is project 4 under Age Dating. Other possible fields of research are indicated by the category abbreviations following many of the project numbers, e.g., in the foregoing instance, "GC" and "M" indicate project AD4 also involves geochemistry and mineralogy. The upper case letters following the author's name indicate the organizations supporting the work, e.g., "UP" is University of Pennsylvania (see separate list of organizations).

In those instances where projects were not plotted, the letters "NP" are added to the category abbreviation.

The authors will welcome any comment regarding the organization and content of this circular inasmuch as the Bureau hopes to continue this series, perhaps at regular intervals.

Roy W. Foster, petroleum geologist
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New Mexico State Bureau of Mines
and Mineral Resources

Socorro, New Mexico
August 1, 1972

CONTENTS

Organizations

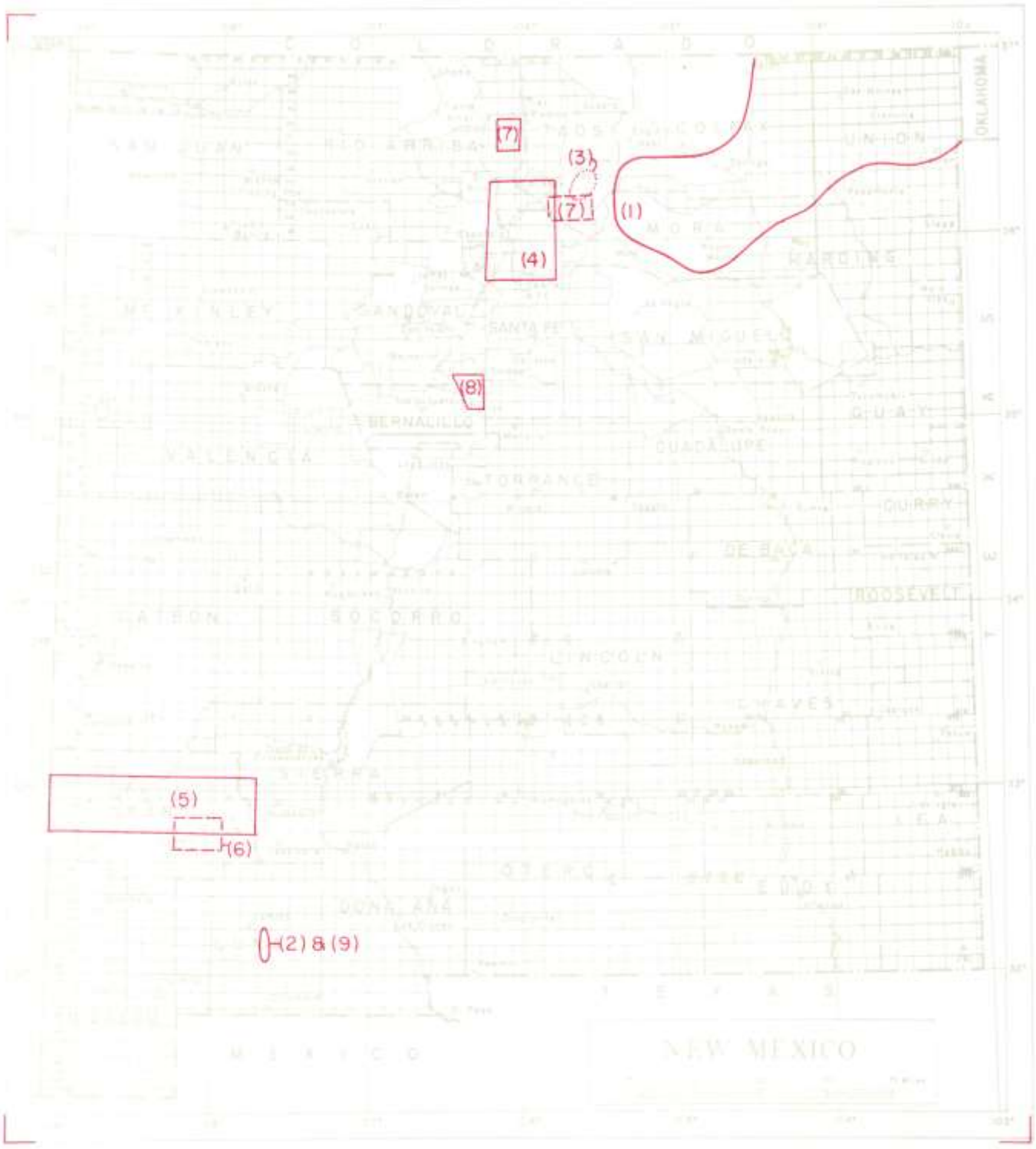
The following organizations are actively engaged in geologic and related research projects, or are giving support to these projects. The abbreviations correspond with those used in both the Subject Index as well as the list of Projects.

AF	Department of the Air Force: HNP2
AC	Albion College: GM1
AMNH	American Museum of Natural History: ST1
AR	Department of the Army: H 19-21
AUG	Augustana College: G1
BIA	Bureau of Indian Affairs: E1;H3,13;MR2
BLM	Bureau of Land Management: E2,4;H2,3,5
BMNH	British Museum of Natural History: STNP2
BOR	Bureau of Outdoor Recreation: E2-4;H2, 3,5
BR	Bureau of Reclamation: E1-4,8;GP14; H1-5;HNP2,5
BSA	Boy Scouts of America: GM40
BSFW	Bureau of Sport Fisheries and Wildlife: E2-4;H2,3,5
BU	Baylor University: GNP1
BYU	Brigham Young University: STNP1
CC	Catawba College: GM2
CCCC	Costilla Creek Compact Commission: HNP5
CE	Corps of Engineers, Department of the Army: E4-9;H2;HNP2,5
CG	Council of Governments: E3
CGS	Colorado Geological Survey: MR2
CU	Columbia University: ST1
CON	Conoco: MR11
EBID	Elephant Butte Irrigation District: H2
ENMU	Eastern New Mexico University: AD2,9; G2,5;GM3-6;MP6;ST2-5
ENP	Eight Northern Indian Pueblos: MRNP2
EPA	Environmental Protection Agency: E4; HNP12;MR3,4
EPCWI	El Paso County Water Improvement District No. 1: H2
EPNG	El Paso Natural Gas Company: EG4
FS	United States Forest Service: E3
FSU	Florida State University: ST6
FWQA	Federal Water Quality Administration: HNP2
FWS	Fish and Wildlife Service: HNP5
G	City of Gallup: H3
GCS	Guadalupe Cave Survey: G6
GSA	Geological Society of America: AD1;MP1; MR3
GSC	Geological Survey of Canada: STNP2
GS GB	Geological Survey of Great Britain: STNP2
IGS	Institute of Geological Sciences, England: ST7
ISC	Interstate Stream Commission: E2;GP14; H2,4,5;HNP2,5,11;MISC11
ISU	Iowa State University: G1,3
KR	Kennecott Research: AD6
LC	City of Las Cruces: H18
LTC	Laguna Tribal Councils: MRNP2
MC	Middlebury College: GM7
MRC	Mississippi River Commission: E4
MRDC	Mobil Research and Development Corporation: AD2
NASA	National Aeronautics and Space Administration: GC6;GM7,83,86,88,89,93; GMNP1;GP3;H2
NASA(MSC)	Manned Spacecraft Center: GP5
NASA	
NAU	Northern Arizona University: GM40 State
NM	of New Mexico: E3,4;H2,4,5 New Mexico
NMGS	Geological Society: MR7;ST13 New Mexico
NMHU	Highlands University: GM8; HNP14;MISC1;ST14,15
NMIMT	New Mexico Institute of Mining and Technology: EG4;EGNP2;GC4,5,11;GM9,14, 100;GP1,2,14;GPNP1;H27-30,32;HNP17; MISC2,12,13;MP7;MR8;ST16-18
NMRMCSGA	New Mexico Ready Mix Concrete and Sand and Gravel Association: MRNP3
NMSBMMR	New Mexico State Bureau of Mines and Mineral Resources: AD1,5;ADNP1,2;EG1, 2,4,6;EGNP1,2;G4,5;GC2-5;GM8,9,11,16, 35,37,38,42-44,75,92,97,99,100;GMNP1; GP14;H10,14;HNP2,8;MISC1-6;MP1,4,5,7, 9;MPNP2;MR1-8,10,12-14;MRNP1-6;ST7-18, 21,27,30,31;STNP2
NMSU	New Mexico State University: E4;EGNP2; GM35-39,98;GP14;H2,26;HNP12,13,15,16; MISC4;ST19
NMSU(AES)	New Mexico State University, Agricultural Experiment Station: HNP13,15
NPS	National Park Service: E4;G6
NSF	National Science Foundation: AD1,7; GC10;GP2,3,14;MP1,11;MPNP1
NWS	National Weather Service: HNP5
OCC	New Mexico Oil Conservation Commission: MISC9,10
OGEC	New Mexico Oil and Gas Engineering Committee: MISC3,10
OSU	Oklahoma State University: GM41;GP4
OSURF	Oklahoma State University Research Foundation: GM41;GP4
OSW	Office of Saline Waters: GP14
PASU	Pennsylvania State University: GM42
PRC	Pecos River Commission: H15,24;HNP2,5
PSU	Portland State University: GM43 Rio
RGCC	Grande Compact Commission: HNP3 Rice
RU	University: ST20-22
RSU	Rutgers, the State University: EG5; MRNP7
SCS	Soil Conservation Service: E4;H2;HNP1,5
SE	New Mexico State Engineer: E1,2,4;GP14; H1,6-11,14,16-18,22,23;HNP2,5-7,9,10, 15;MISC11
SGFC	New Mexico State Game and Fish Commission: HNP5
SHD(GS)	New Mexico State Highway Department, Geologic Section: EG3;GM17-34;HNP4,5
SIM	New Mexico State Inspector of Mines: MISC8
SLO	New Mexico State Land Office: MISC7
SMU	Southern Methodist University: MP10 New
SPRC	Mexico State Park and Recreation Commission: MISC4
SRS	New Mexico Statistical Reporting Service: HNP15
SRSU	Sul Ross State University: EG7;G6

SU Stanford University: EG6;GM44;MP9;MR12, 13
SX Society of Sigma Xi: GM13
SWNMRCD Southwestern New Mexico Resource Conservation and Development, District 5: E3
TAM Texas A & M University: H2;ST23
TTU Texas Tech University: E4;H2
TWDB Texas Water Development Board: E4
TX State of Texas: E4;H2
UA University of Arizona: AD5,7;GM75
UC University of Colorado: G8;GC12;MPNP1; ST34
UCMC Utah Construction and Mining Company: EG2
UG University of Georgia: AD1;MP1,2
UH University of Houston: GC1;GM76;H2;MP3
UHGF University of Houston Geology Foundation: GC1;GM76
UM University of Michigan: ST27
UMR University of Missouri at Rolla: GC2; MR1
UNC University of North Carolina: AD3;GC6; GM91
UNM University of New Mexico: AD8;EG10;G7; GC11;GCNP1,2;GM77-90;GP3,14;H25,31; HNP18;MP8;MR9-11;ST28,33
UNM(TAC) UNM - Technical Application Center: EGNP2
UO University of Oklahoma: GM92
UP University of Pennsylvania: AD4
UPITT University of Pittsburg: AD5
USBM United States Bureau of Mines: GP14;H2
USBM(DMRC) USBM- Denver Mining Research Center: GP6
USBM(IFOCD) United States Bureau of Mines - Intermountain Field Operations Center - Denver: MR17
USBM(IFOCS) United States Bureau of Mines - Intermountain Field Operations Center - Socorro: MR15,16
USDA United States Department of Agriculture: HNP15
USDT(FHA) United States Department of Transportation, Federal Highway Administration: GM17-34;EG2,3
USGS United States Geological Survey: E1-4; GP3,14;ST9,11;STNP2
USGS(BAS) United States Geological Survey-Branch of Astrogeologic Studies: MP16
USGS(BER) United States Geological Survey-Branch of Exploration Research: GC7;GCNP4
USGS(BFGP) United States Geological Survey-Branch of Field Geochemistry and Petrology: GC9;MP14,15
USGS(BOFCR) United States Geological Survey-Branch of Organic Fuel and Chemical Resources: GCNP5;GM45;MP13;MR19;ST24,25
USGS(BPS) United States Geological Survey-Branch of Paleontology and Stratigraphy: ST26;STNP3-5
USGS(BRMEG) United States Geological Survey-Branch of Rocky Mountain Environmental Geology: EG8;GM65-72
USGS(BRMMR) United States Geological Survey-Branch of Rocky Mountain Mineral Resources: GC8;GCNP3;GM46,51-64,73,74;MP12;MR18, 21-24;MRNP8,9
USGS(BSP) United States Geological Survey-Branch of Special Projects: EG9
USGS(CDBMC) United States Geological Survey-Conservation Division, Branch of Mineral Classification: GM47-50
USGS(RGB) United States Geological Survey-Regional Geophysics Branch: GP7,12
USGS(WRD) United States Geological Survey-Water Resources Division: H1-24;HNP1-11
USNM United States National Museum: ST9,11; STNP2
UT University of Toronto: GP5
UTA University of Texas at Austin: AD6; GM44;H2;MP11;ST29
UTEP University of Texas at El Paso: GM93, 94;H2;MR14;ST30
UWA University of Washington, AD7;GC10
UWI University of Wisconsin: ST31
UWY University of Wyoming: GP13
WATER Water Association to Expand Resources: E4
WMU Western Michigan University: GM95
WNMU Western New Mexico University: GM96,97
WRC Water Resources Council: H2
WRRI New Mexico Water Resources Research Institute: H25-32;HNP12-18;MISC12,13
WSC Weber State College: ST32
WSMR White Sands Missile Range: H20;HNP5
ZP Zuni Pueblo: MRNP2

Topic Index

(see Contents for abbreviations)



MAP I - AGE DATING

Projects

AGE DATING (AD)

Project

1 Age dating of volcanic rocks of the southern High Plains, Colorado and New Mexico: J. C. Stormer; UG, NSF, GSA, NMSBMMR.

K-Ar isotopic age dating of rocks from the Spanish Peaks complex, Colorado, and volcanic rocks from Mora, Colfax, and Union counties, New Mexico.

2 (IMP,SG) Age dating the igneous rocks in the Florida Mountains: R. E. Denison and L. J. Corbitt; ENMU, MRDC.

Critical areas will be sampled and dated in an effort to understand the igneous rocks in the Florida Mountains.

3 (IMP,GC) Age of the Embudo Granite, New Mexico: W. Shiver and P. D. Fullagar; UNC. *Determination of Rb-Sr whole-rock age of Embudo Granite. Study includes major element and petrographic analyses.*

4 (GC,M) Age study of the Santa Fe Group: H. Faul; UP.

Precision K-Ar dating of stratigraphically controlled ash beds.

5 Radiometric dating, southern Mogollon Plateau: M. Bikerman and P. E. Damon; UPITT and UA, NMSBMMR.

6 (M,MRM) Potassium-Argon dating related to intrusive and hydrothermal activity in the central mining district, southwestern New Mexico: F. W. McDowell, D. Norton; UTA, KR.

Ages will be determined for unaltered intrusives, intrusives affected by the hydrothermal event, and new minerals formed during the event in an attempt to define the duration of intrusive and hydrothermal activity in the region. Sample collecting and mineral separation have been completed. K and Ar analytical work will begin shortly.

7 Radiometric dating of Precambrian rocks in northern New Mexico: R. L. Gresens; UWA, NSF, UA.

K-Ar and *Rb-Sr dates are being obtained on metarhyolites and other metamorphic and igneous rocks in the Precambrian terranes of the Las Tablas - La Madera quadrangles and the Picuris Range.*

8 (SH,ST) Rb-Sr geochronology of Phanerozoic sedimentary rocks: D. G. Brookins with B. Mukhopadhyay; UNM.

Absolute age of Mississippian and Pennsylvanian sedimentary rocks.

9 (SH,SG) Age determination of the Andesite Agglomerate overlying the Lobo Formation in the Florida Mountains: L. J. Corbitt; ENMU.

It is believed that a radiometric date on the basal andesites which are interbedded with typical Lobo red beds will give the approximate age of the Lobo Formation in the Florida Mountains.

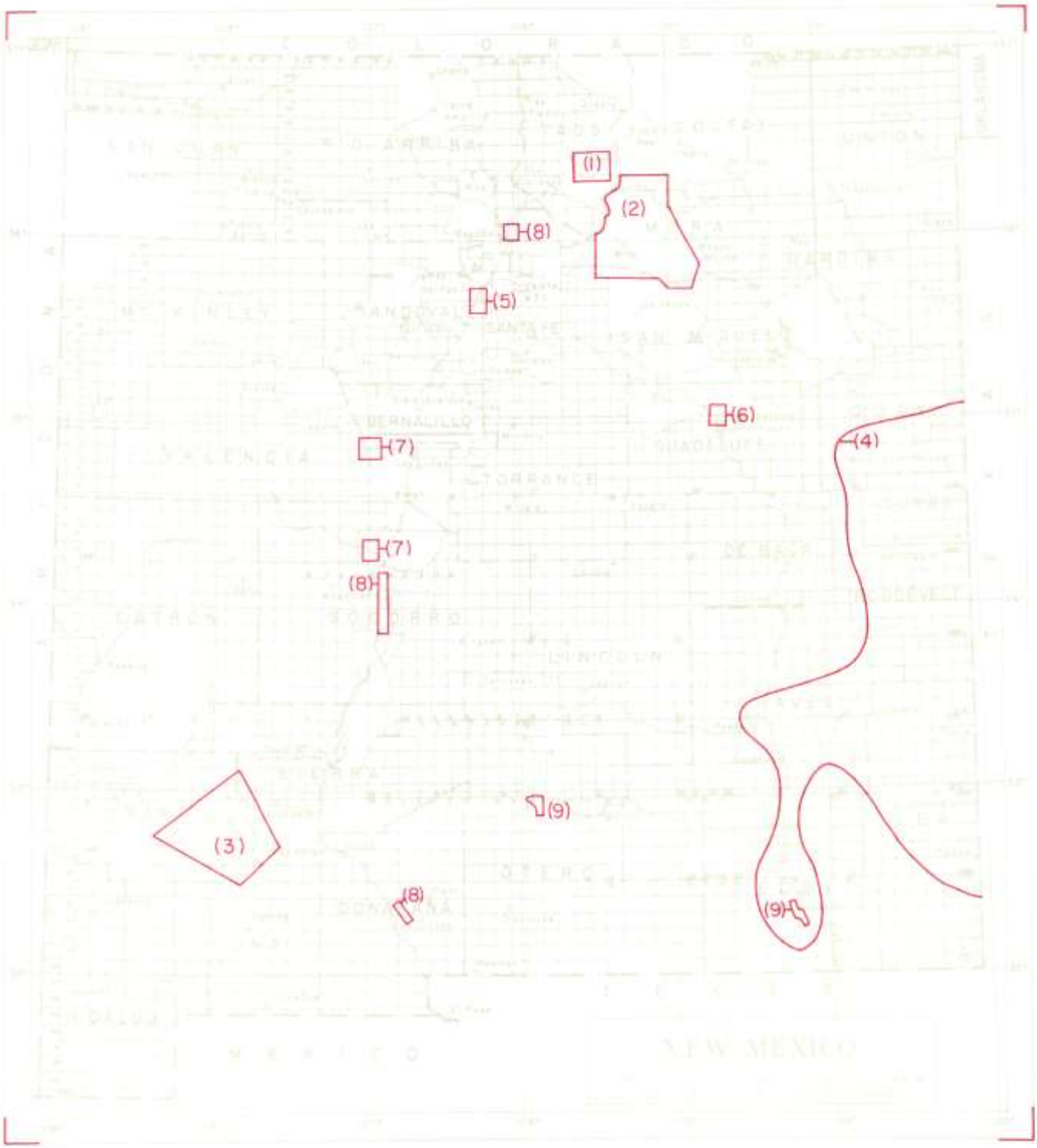
Not Plotted (ADNP)

1 (GC,IMP,MR,SH,SG) Isotope dating: F. E. Kottlowski, R. H. Weber, M. E. Willard; NMSBMMR.

Dating of key igneous rock units by isotope methods (mainly K-Ar) to establish chronology in Cenozoic and relationships to mineralization and tectonism.

2 (SH) Age dating of igneous rocks in south-central New Mexico: F. E. Kottlowski; NMSBMMR.

Collection, dating, and tracing regional relations of igneous rock units in the general Doña Ana County and adjoining areas. Preliminary results being compiled for Isochron West.



MAP 2-ENGINEERING

ENGINEERING (E)

Project

1 (EG,EVG,GM,HS,HG) San Juan-Chama Project, Taos Unit Pumping System, New Mexico: BR, USGS, BIA, SE.

At the time of authorization, it was contemplated that the Taos Unit would furnish irrigation water to 20,550 acres through regulation of surface flows of the Rio Grande del Rancho and Rio Hondo by construction of the Valdez Dam and the Indian Camp Dam. It was determined during preconstruction studies that the Valdez site was geologically unfavorable and no alternative site could be found. Negotiations are underway for constructing the Indian Camp Dam to serve as much of the original acreage as possible. Investigations of the possibility of using ground water to serve irrigation water to more of the original area are being made. These investigations include drilling and testing to determine the location and availability of the ground water supply and development of a plan complementing the Indian Camp System.

2 (HS,EG,EVG,GM,G,S) More Project, New Mexico: BR, USGS, BLM, BSFW, BOR, SE, ISC. *Located on the Mora River and tributaries in Mora, San Miguel, and Colfax counties, the project will consist of construction of two or more dams and reservoirs for water regulation and rehabilitation of existing irrigation systems serving some 1,000 acres of presently irrigated land. Damsites that will be investigated include Black Lake, Loma Parda,* and *Rociada, as alternatives. The areas which experience extreme shortages are Coyote Creek, Mora River below Coyote Creek, Cebolla River, and Sapello River.*

3 (HS,HG,EG,EVG,GM) Mimbres Project, New Mexico: BR, FS, BSFW, BOR, USGS, NM, SWNMRCD, CG.

The project is Located on the upper reach of the Mimbres River within the Mimbres Closed Basin in the general vicinity of the mining communities of Silver City, Santa Rita, Central, and Hurley, New Mexico. The report will include recommendations for construction of a 14,300 acre-foot Mimbres Dam and Reservoir on the Mimbres River about 11 miles upstream from San Lorenzo for fish and wildlife and recreational purposes; for investigating the feasibility of furnishing municipal and industrial water to Silver City, Bayard, Central, and Hurley via a pipeline and pumping plant system from a well collection system on the Mimbres River near Faywood gage to a central reservoir terminal storage point near Silver City; as well as investigating the feasibility of constructing a 1,540 acre-foot-capacity Cooney Dam and Reservoir on the Mimbres River about 7 miles upstream from Mimbres Dam and a 2,200 acre-foot Noonday Dam and Reservoir on Noonday Canyon, a tributary to Mimbres Rivers, about 5 miles north of San Lorenzo. These two reservoirs would provide unique recreational and wildlife opportunities. The Mimbres, Cooney, and Noonday Reservoirs are all located within national forests. Purchase of water rights to replace additional depletions would be required to implement the project plan. Engineering geology investigations of feasibility grade have been completed on the Mimbres Dam and Reservoir site, but only cursory geologic inspections of the Cooney and Noonday sites have been made.

4 (EG,HS,HG,EVG,GM,G,GP) West Texas and eastern New Mexico Import Project, New Mexico Portion: BR, CE, MRC, USGS, BSFW, BOR, NPS, BLM, SCS, EPA, TTU, NMSU, NM, TX, WATER, TWDB, SE.

The project water use area embraces that part of eastern New Mexico which lies south of the Canadian River and east of the Pecos River, and lands along the Pecos River in the Roswell and Carlsbad areas. Facilities are to be constructed for the conveyance of water from the Mississippi River system. The investigation consists of studies for importing water from the Mississippi River system to satisfy water requirements in West Texas and eastern New Mexico. Water requirements for New Mexico to the point of delivery for the year 2020 are estimated to be 963,000 acre-feet for irrigation, 232,000 for municipal and industrial use, and 53,000 for recreation, or a total of 1,248,000 acre-feet. Allowing for distribution losses that would occur from point of delivery at Salt-Coyote Lake results in an estimated New Mexico demand at Salt-Coyote Lake of 1,418,000 acre-feet for the year 2020.

5 (EG,EVG,GM,GP,H,SG) Cochiti Lake Project: CE(Albuquerque).

Zoned earthfill embankment, outlet works, off channel spillway and irrigation works. Constructed on alluvial fill, basalt, and sandstone foundation. Dam is approximately 50 miles north of Albuquerque, New Mexico, on Rio Grande. Constructed for multiple use, i.e. flood control, irrigation and recreation.

6 (EG,G,GP,H,SG,SH) Los Esteros Lake Project: CE(Albuquerque).

Combination rolled earth and rockfill embankment, to be constructed for flood control and irrigation purposes, on the Pecos River at river mile 766.4 approximately 7 miles north of Santa Rosa, New Mexico. Embankment foundation will be on the Santa Rosa Formation.

7 (EG,G) Rio Puerco-Rio Salado: CE(Albuquerque).

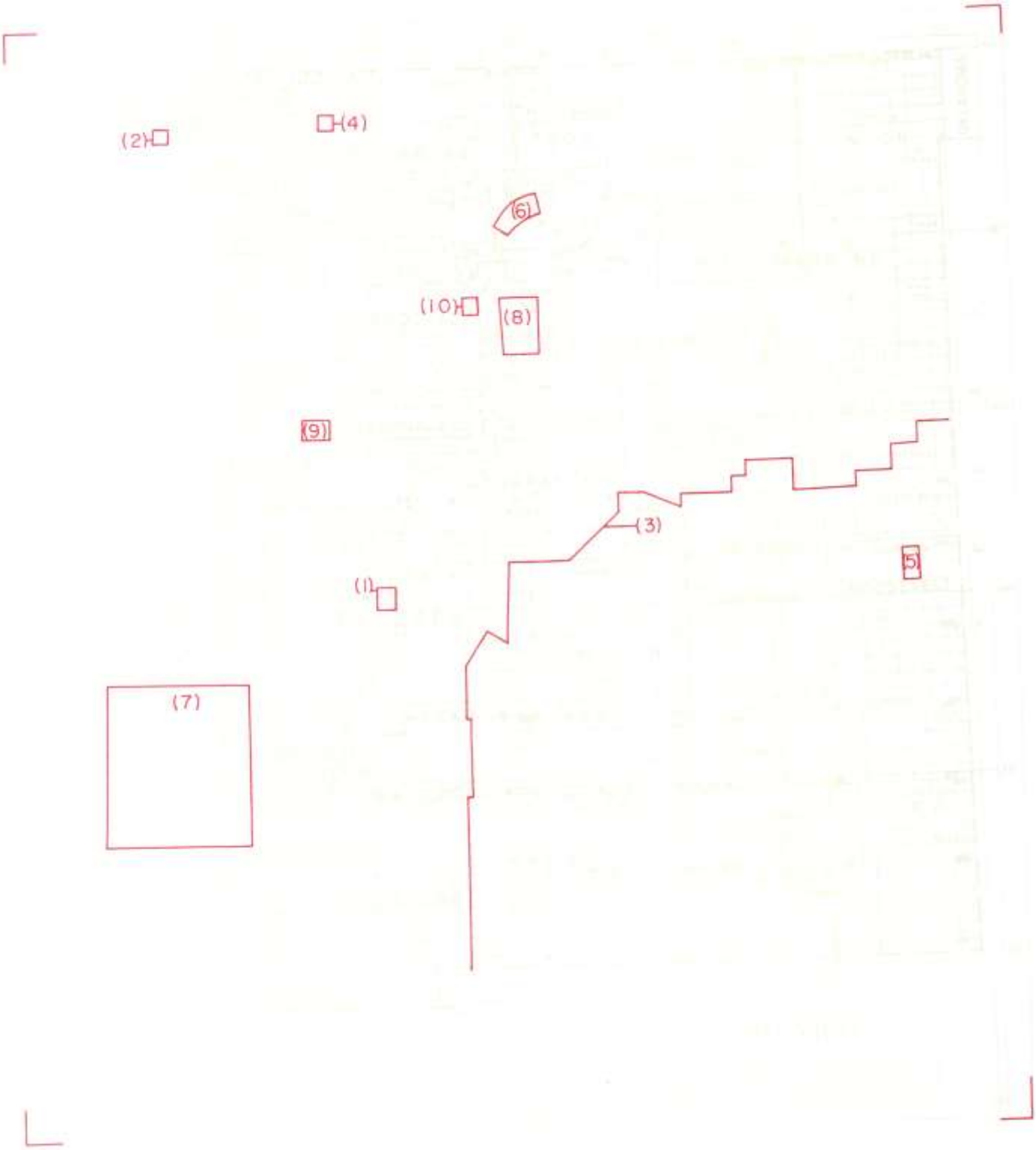
Hidden Mountain on the Rio Puerco and one site on the Rio Salado. Survey reports have been written describing the general geology and a few borings made by the Soil Conservation Service.

8 Rio Grande Floodway: CE(Albuquerque) and BR.

Levee construction in Espanola, Socorro and Truth or Consequences areas and *diversion channel in Las Cruces.*

9 Dark Canyon and Alamogordo flood control projects: CE(Albuquerque).

Construction of diversion channels at Carlsbad and Alamogordo.



MAP 3- ENGINEERING GEOLOGY

ENGINEERING GEOLOGY (EG)

Environmental Geology (EVG), Land-use Planning (EL)

Project

1 (EVG,GM,G) Engineering geology of Socorro, New Mexico: K. Vonder Linden; NMSBMMR.
Study the geology of Socorro to define and evaluate geologic factors influencing the suitability of this area for development.

2 (EVG,GC,MRC,S,SP) Trace element analysis of potentially hazardous materials in New Mexico mineral resource products: K. onder Linden and J. Shomaker; NMSBMMR, UCMC.
To quantitatively determine the presence of potentially hazardous materials in mineral products produced in the state. Emphasis to date has been on determining trace element levels of mercury in coal.

3 (GM,G,MRI) District II: Geology and aggregate resources; southeastern New Mexico: SHD(GS), USDT(FHA).
Report includes discussion of geology and aggregate resources, 30' geologic quadrangle maps of area, and physiographic maps of Curry, Roosevelt, Chavez, De Baca, Lea, Eddy, Lincoln, and Otero counties, New Mexico.

4 (GC,MRP,S,SP,SG) A geologic investigation of the Gasbuggy Event: R. M. Pawlowicz; NMIMT, EPNG, NMSBMMR.
This investigation will be concerned with the changes in physical properties of rock, caused by an underground nuclear explosion.

5 (EVG,S,SP) The wind blown dust of Portales, New Mexico: J. H. Puffer; RSU.
Mineralogical and grain size variations are being correlated with wind speed and elevation.

6 (GM,G,SG) Landslides in the Black Mesa, Rio Grande Canyon area, northern New Mexico: D. Oberste-Lehn; SU, NMSBMMR.
Detailed study of landslide complexes aimed at tracing sequence and mechanisms of gross failure.

7 (EVG,GM,G,SH,S) Late Cenozoic sedimentational and erosional history of the upper Gila River and upper Mimbres River drainages, southwestern New Mexico: D. Deal; SRSU.
Post-volcanic sedimentation (stratigraphy of the Gila Conglomerate) and later erosional history of the Gila River drainage upstream of the Big Burro Mountains, and of the Mimbres River drainage north of the Deming basin.

8 (EVG,GM) Geology of urban development; northern Rio Grande basin: H. E. Malde; USGS(BRMEG).
Geologic mapping and specialized maps of environmental factors related to physical environmental and resource features.

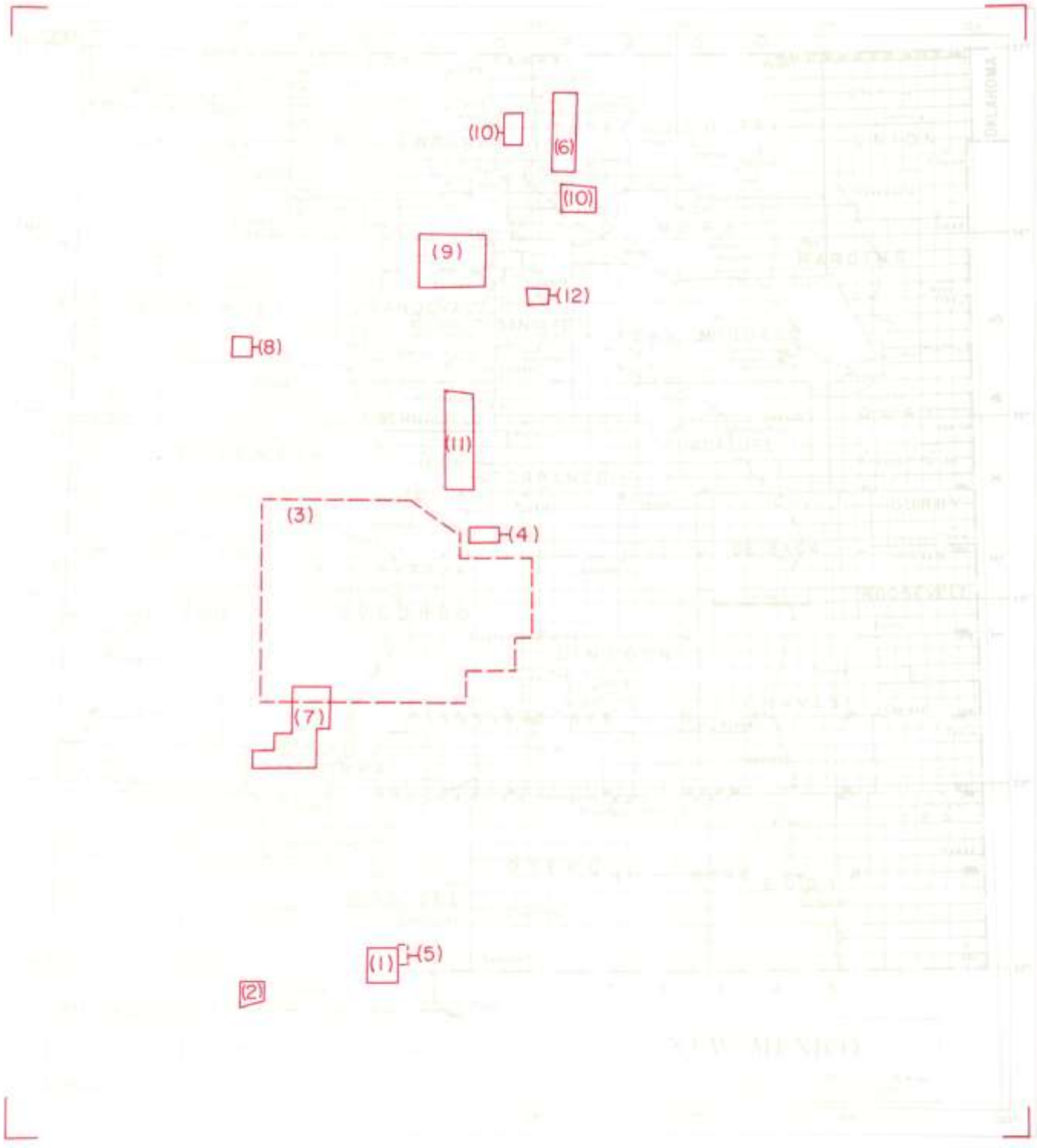
9 (GM,SG) Mechanism of collapse over nuclear explosions: F. N. Houser; USGS(BSP).
Examination and detailed mapping of selected natural and man-made collapses. Includes sandstone pipes of Laguna area.

10 (GC) Geochemical investigation of allogenic and authigenic clays and water chemistry as factors in studying the permanency of Cochiti Dam: D. G. Brookins; UNM.
Determine stability of clay minerals being used in construction of Cochiti Dam.

Not Plotted (EGNP)

1 (EVG,HC) Mercury concentration in natural waters in New Mexico: L. Brandvold; NMSBMMR.
An investigation of mercury content of water in New Mexico.

2 (EVG,EL,G,GP,H,MR,S,SP,SG) New Mexico Remote Sensing Council: K. onder Linden and R. H. Weber; NMSBMMR, UNM(TAC), NMSU, and NMIMT.
To establish a multi-institutional group for effecting the development and efficient interrelationship of programs of research, education, utilization and information distribution in the application of remote sensing technology to the natural resource and *environmental quality management problems of New Mexico and the adjacent region.*



MAP 4 - GEOCHEMISTRY

GEOCHEMISTRY (GC)

Project

1 (M,IMP,GP,GM,SG) Investigation of mafic and ultramafic rock inclusions in maar rocks in and around Kilbourne Hole, New Mexico: J. C. Butler and D. McGee; UH, UHGF.

A further thrust in the direction of Carter's classic work. Emphasis is placed on garnet-rich nodules and other rock types that were not previously recognized or described. Goal: to try to reconstruct the composition of the lower crust and upper mantle under southeastern New Mexico, and to compare with material from a similar locality in San Luis Potosi, Mexico. Geophysical surveys are also involved to determine more about the structure of the maar.

2 (IMP,M,MRM,MG) Trace base metal -petrography-rock alteration of the productive Tres Hermanas stock, Luna County, New Mexico: P. Doraibabu and P. D. Proctor; UMR, NMSBMMR.

To confirm or deny the existence of spatial and possible genetic relationships be the trace metals Zn, Pb, and Cu and the known mineral deposits and surrounding rock types, and to determine if the relationships established might be used as exploration tools in locating areas favourable to mineralization in unexposed areas of stocks of similar type.

3 (GM,M,MRM,S,SP) Geochemical prospecting; C. W. Walker and C. E. Chapin; NMSBMMR.

The use of trace elements in the mineral barite as indicators of base metal mineralization. A successful attainment of this project will represent a contribution to the advancement of knowledge in the general field of geochemical exploration.

4 (AD,GPM,MRM,GM) Geologic relations and depositional environment of the Chupadera iron deposits, Torrance County, New Mexico: S. Sampattavanija, R. E. Beane, C. W. Walker, G. K. Billings; NMIMT, NMSBMMR.

Study of massive magnetite bodies adjacent to granodiorite dikes in gypsum member of Yeso Formation. Work will include analysis and investigation of alteration zones, mineral assemblages and possible sedimentary source for the iron. Several short magnetometer surveys will be made. Results will be applied to a model based on equilibrium mineral assemblages under hydrothermal conditions.

5 (IMP,M) Basalt weathering: H. Roffman (NMIMT) , J. Renault (NMSBMMR) , G. K. Billings (NMIMT).

Geochemistry and petrology of basalt weathering in arid environment. Study of basalts near Las Cruces (Black Mt. volcanic field).

6 (IMP) Geochemistry of Taos basalts, New Mexico: D. E. Dunn and P. C. Ragland; UNC, NASA.

Detailed chemical analysis focusing on the vertical and lateral variation of continental basalts from a single province, with emphasis on the variation within single flow units.

7 (MRM) Basin Range exploration: H. V. Alminas; USGS(BER).

Geochemical mapping of the southern San Mateo Mountains, including the Monticello and Sierra Fijardo 7-1/2' quadrangles, the Sierra Cuchillo, and the Hermosa district.

8 Ambrosia Lake: H. C. Granger; USGS(BRMMR).

A laboratory study of ion exchange and its effect on the stability and Leaching of synthetic natural glass, and an artificial ore roll model experiment, using pyrite.

9 (AD,M) Petrogenesis of the Polvadera Group, Jemez Mountains: R. A. Bailey; USGS(BFGP). *Electron microprobe, chemical analysis, K-Ar dating, and Sr-Rb isotope studies.*

10 (AD,GM,IMP,M) Study of trace elements in muscovite: R. L. Gresens and H. L. Stensrud; UWA, NSF.

Precambrian metamorphic terranes in the Picuris Range and the Las Tablas quadrangle were investigated. 234 mica samples (mostly muscovite) and 66 whole rock samples were partially analyzed for 12 elements, including a number of minor and trace elements. 30 muscovite samples were analyzed by electron microprobe. The study includes (a) possible use of trace elements in mica as a guide to pre-metamorphic stratigraphy, (b) partitioning of trace and minor elements between biotite and muscovite, (c) chemical changes during progressive growth of muscovite, (d) occurrence of phlogopite in low Mg quartzofeldspathic gneisses, and (e) occurrence and geochemistry of red muscovite from piedmontite-bearing schists. Some remapping and reinterpretation of Precambrian geology and stratigraphy are involved.

11 (AD,GM,IMP) Geochemistry and geochronology of the Precambrian rocks in New Mexico: D. G. Brookins, A. M. Kudo (UNM), and K. C. Condie; (NMIMT).

Major and trace element studies of Precambrian volcanic and plutonic rocks; Rb-Sr studies; some mapping (Ladron Precambrian); some petrography. Initial emphasis will be on Manzano-Sandia Precambrian.

12 (HG,HC) Geochemical investigation of composition of shallow groundwaters in Santa Fe region: M. Hocker; UC.

Not Plotted (GCNP)

1 (IMP,V) Pliocene-Holocene basalts of New Mexico: A. M. Kudo and K. Aoki; UNM. *Chemistry and petrology of basalts of New Mexico.*

2 Sr isotopy of Tertiary and younger volcanics: D. G. Brookins, with A. M. Kudo; UNM.

3 (MRM) Regional variation in heavy metals of Colorado Plateau stratified rocks: R. A. Cadigan; USGS(BRMMR).

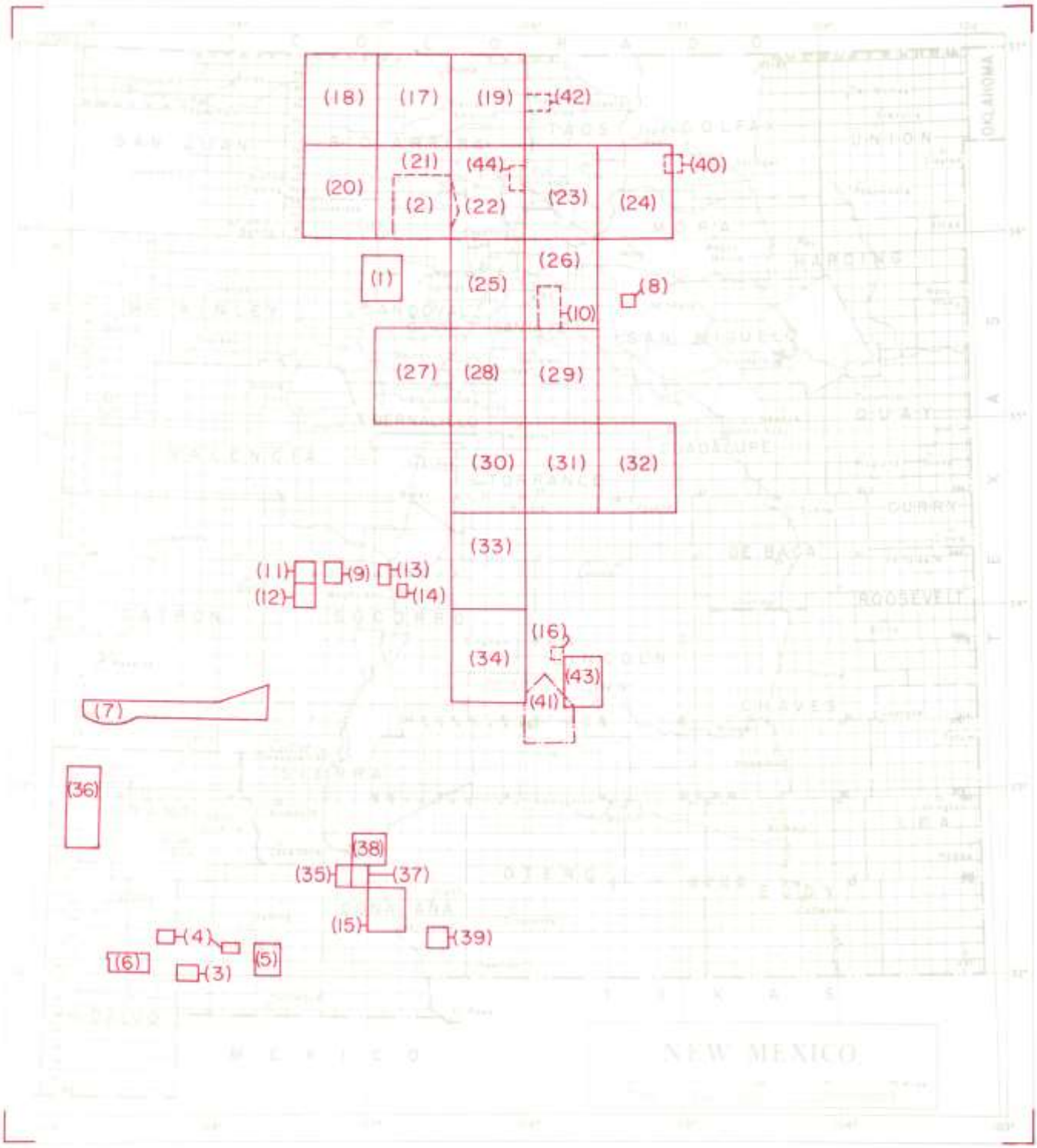
Geochemical statistical studies of the distribution and covariance of metallic elements in rock samples.

4 (MRM) Economic significance of jasperoid: T. G. Lovering; USGS(BER).

Compilation of data on the distribution, genesis, geochemistry, and economic significance of jasperoid from selected mineralized areas in New Mexico.

5 (M) Geology and geochemistry of humates: V. E. Swanson; USGS(BOFCR).

Solubility and metal-sorption studies of leonardite samples collected in New Mexico.



MAP 5 – GEOLOGIC MAPPING (PROJECTS 1-44)

(Projects 45-100 indexed on map 6, page 15)

GEOLOGIC MAPPING (GM)

Structural Geology (SG) , Astrogeology (AG)

Project

1 (P,SH,S,SP,SG) Stratigraphy of the La Ventana area: J. W. Parker; AC.

Stratigraphy of what is assumed to be a delta of upper Cretaceous age in La Ventana area.

2 (G,P,SP,S,SH,SG) Geology of San Pedro Mountains, New Mexico: G. G. Gibson; CC.

3 (SG,SH) Geologic mapping of the southern portion of the Klondike Hills, Luna County, New Mexico: L. J. Corbitt; ENMU.

The structure of this area is much more complicated than reconnaissance geologic maps indicate.

4 (SH,SG) Geologic mapping of the Snake Hills and Paleozoic outcrops northwest of the Victorio Mountains, Luna and Grant counties, New Mexico: L. J. Corbitt, R. Arnold, and R. Varnell; ENMU.

These two areas exhibit tectonically mixed rocks. The structural complexity is interpreted to be the result of Laramide thrusting.

5 (IMP,SH,SG,AD) Geology of Florida Mountain area: Brockman Hills and other nearby mountain areas: L. J. Corbitt and R. Arnold, R. Varnell, W. Riggesbee; ENMU.

6 (AD,SH,SG) Geologic mapping of the Brockman and Coyote Peak 7-1/2' quadrangles: L. J. Corbitt and F. L. Nials; ENMU, NSF.

The Brockman Hills appear to be a series of northwest trending synclines and anticlines in the Cretaceous Mojado Formation, overturned to the northeast in front of the large northwest trending thrust faults in the Little Hatchet Mountains.

7 (V,GPG,SG,SH) Geology of strip across Mogollon Plateau (near Mogollon to north of Winston): P. J. Coney; MC, NASA.

General geology, especially volcanic stratigraphy and structure. Gravity survey.

8 (SG,SH,H,MRG) Geology and structure of the Montezuma, New Mexico area: W. Bejnar; NMHU, NMSBMMR.

Geologic description of the Montezuma area, including geologic structures, stratigraphy, and speculation about the hot springs.

9 (SH,S,SG,AD,G,IMP,MRM,MG) Geology of the southern Bear Mountains, Socorro County, New Mexico: D. M. Brown; NMIMT, NMSBMMR.

Cenozoic stratigraphy and structure of the southern Bear Mountains and an evaluation of its mineral potential.

10 (SG,IMP) Geology of southwestern Sangre de Cristo Mountains: A. J. Budding; NMIMT.

Structural and petrologic studies of the Precambrian in the southwestern Sangre de Cristo Mountains. Effect of Laramide and younger deformations on Precambrian basement and Phanerozoic sedimentary cover. Continuation of Picuris-Pecos fault zone south of N35°45'.

11 (SH,S,SG,MG,AD,IMP,MRM) Geology of the Tres Montosas-Council Rock area, Socorro County, New Mexico: R. Chamberlin; NMIMT, NMSBMMR.

Cenozoic stratigraphy and structure of the Tres Montosas-Council Rock area and an evaluation of its mineral potential.

12 (SH,S,MG,SG,AD,IMP,MRM) Geology of the Tres Montosas-Grey Hill area, Socorro County, New Mexico: W. H. Wilkinson; NMIMT, NMSBMMR.

Cenozoic stratigraphy and structure of the Tres Montosas-Grey Hill area and an evaluation of its mineral potential.

13 (IMP,SG) Geology of the Lemitar Mountains, New Mexico: T. M. Woodward; NMIMT, SX, NMSBMMR.

Geologic field mapping of the Lemitar Mountains north from Corkscrew Canyon (Canyoncito del Puertocito del Lemitar) about 5 miles. East-west extent from the pediment gravels on the east slope of the range in the Rio Grande Valley west to the pediment gravels bordering the La Jencia Basin (Snake Ranch flats) on the east side. Work will be concentrated on mapping and describing the igneous and metamorphic history along with the complex structural development dating back to Precambrian time.

14 (MRM,M,MG,S,SP,SH,SG,GC,G,H) Origin cf copper mineralization in Pennsylvanian sandstones, Chupadera Mines area, Socorro County, New Mexico: M. J. Jaworski (NMIMT) and K. Vonder Linden (NMSBMMR).

Investigating the origin of local zones of malachite and azurite in the upper Pennsylvanian rocks east of Socorro. Project involves mapping and petrographic study.

15 (MRI,MRM,SG,SH) Geology of the Las Cruces quadrangle: F. E. Kottlowski; NMSBMMR.

General geology, stratigraphy, and economic geology of the Las Cruces 15-minute quadrangle.

16 (AD,IMP,M,SG,MRM,MG,SH) Geology of the White Oaks Gold District, Lincoln County, New Mexico: M. E. Willard; NMSBMMR.

Sedimentary stratigraphy, tectonic structure, igneous history, ore mineralization.

17 (MRI,EG) Geology and aggregate resources of El Vado 30' quadrangle: SHD(GS), USDT(FHA).

Map showing geology and location of aggregate resources including test pits. Separate data sheets on laboratory studies of aggregates.

18 (MRI,EG) Geology and aggregate resources of Gobernador 30' quadrangle: SHD(GS), USDT (FHA).

See El Vado quadrangle.

19 (MRI,EG) Geology and aggregate resources of Brazos 30' quadrangle: SHD(GS), USDT(FHA).

See El Vado quadrangle.

20 (MRI,EG) Geology and aggregate resources of Lindrith 30' quadrangle: SHD(GS), USDT(FHA).

See El Vado quadrangle.

21 (MRI,EG) Geology and aggregate resources of Cuba 30' quadrangle: SHD(GS), USDT(FHA).

See El Vado quadrangle.

22 (MRI,EG) Geology and aggregate resources of Abiquiu 30' quadrangle; SHD(GS), USDT(FHA).

See El Vado quadrangle.

23 (MRI,EG) Geology and aggregate resources of Taos 30' quadrangle: SHD(GS), USDT(FHA).

See El Vado quadrangle.

24 (MRI,EG) Geology and aggregate resources of Black Lake 30' quadrangle: SHD(GS), USDT (FHA).

See El Vado quadrangle.

25 (MRI,EG) Geology and aggregate resources of Espanola 30' quadrangle: SHD(GS) , USDT(FHA). *See El Vado quadrangle.*

26 (MRI,EG) Geology and aggregate resources of Santa Fe 30' quadrangle: SHD(GS), USDT(FHA). *See El Vado quadrangle.*

27 (MRI,EG) Geology and aggregate resources of Albuquerque 30' quadrangle: SHD(GS), USDT (FHA).

See El Vado quadrangle.

28 (MRI,EG) Geology and aggregate resources of Sandia Mountain 30' quadrangle: SHD(GS), USDT(FHA).

See El Vado quadrangle.

29 (MRI,EG) Geology and aggregate resources of Lamy 30' quadrangle: SHD(GS), USDT(FHA). *See El Vado quadrangle.*

30 (MRI,EG) Geology and aggregate resources of Manzano Mountains 30' quadrangle: SHD(GS), USDT(FHA).

See El Vado quadrangle.

31 (MRI,EG) Geology and aggregate resources of Laguna del Perro 30' quadrangle: SHD(GS), USDT(FHA).

See El Vado quadrangle.

32 (MRI,EG) Geology and aggregate resources of Vaughn 30' quadrangle: SHD(GS), USDT(FHA). *See El Vado quadrangle.*

33 (MRI,EG) Geology and aggregate resources of Gran Quivira 30' quadrangle: SHD(GS), USDT (FHA).

See El Vado quadrangle.

34 (MRI,EG) Geology and aggregate resources of Sierra Oscura 30' quadrangle: SHD(GS), USDT (FHA).

See El Vado quadrangle.

35 (IMP,SH,SG,V) Geology of Souse Springs 7-1/2' quadrangle, Dona Ana County, New Mexico: R. E. Clemons and W. R. Seager; NMSU, NMSBMMR.

Detailed field mapping and description of volcanic stratigraphy and structure.

36 (IMP,V,SG) Geology of Blue Creek Basin, New Mexico: W. R. Seager and R. E. Clemons; NMSU.

Geologic mapping, volcanology, structure and petrography of the area from Mule Creek, Arizona, to Red Rock, New Mexico.

37 (IMP,MRM,SH,SG,V) Geology of Sierra Alta 7-1/2' quadrangle, Doñª Ana County, New Mexico: W. R. Seager and R. E. Clemons; NMSU, NMSBMMR.

Detailed field mapping and description of volcanic stratigraphy and structure. Also possible mineralization associated with the volcanic activity.

38 (MRI,MRM,SH,SG) Geology of the Rincón and northeastern Hatch quadrangles, Doña Ana County, New Mexico: W. R. Seager and J. W. Hawley; NMSU, NMSBMMR.

Geologic map and text of 7-1/2' quadrangle including account of barite, fluorite, manganese, sand and gravel, and clay deposits.

39 (MRC,SH,SG) Geology of the Bishop Cap and southwestern Organ Mountain area, Doña Ana County, New Mexico: W. R. Seager and W. V. Kramer; NMSU.

General geology of area including map, sections, and an account of barite, fluorite deposits.

40 (IMP,AD,SG) Geology of the Rayado Creek area, Philmont Ranch area, Cimarron, New Mexico: C. W. Barnes; NAU, BSA.

Geologic mapping and structural analysis of Precambrian igneous of metamorphic terrane in southwestern corner of Philmont Boy Scout Ranch.

41 (AD,GC,GPM,M,MRM,SG,SH) Geology of the Sierra Blanca igneous complex, New Mexico: T. B. Thompson; OSU, OSURF.

Detailed geologic mapping, geochemical studies for metals, hydrothermal alteration associated with the hypabyssal stocks of the area, volcanic stratigraphy and geochronology, ore mineral genesis by microscopy and sulfur isotopes, magnetic susceptibility of hydrothermally-altered rocks.

42 (V,IMP,GC,M) Investigation of No Agua Perlite deposits, Taos County, New Mexico: K. Naert and L. A. Wright; PASU, NMSBMMR.

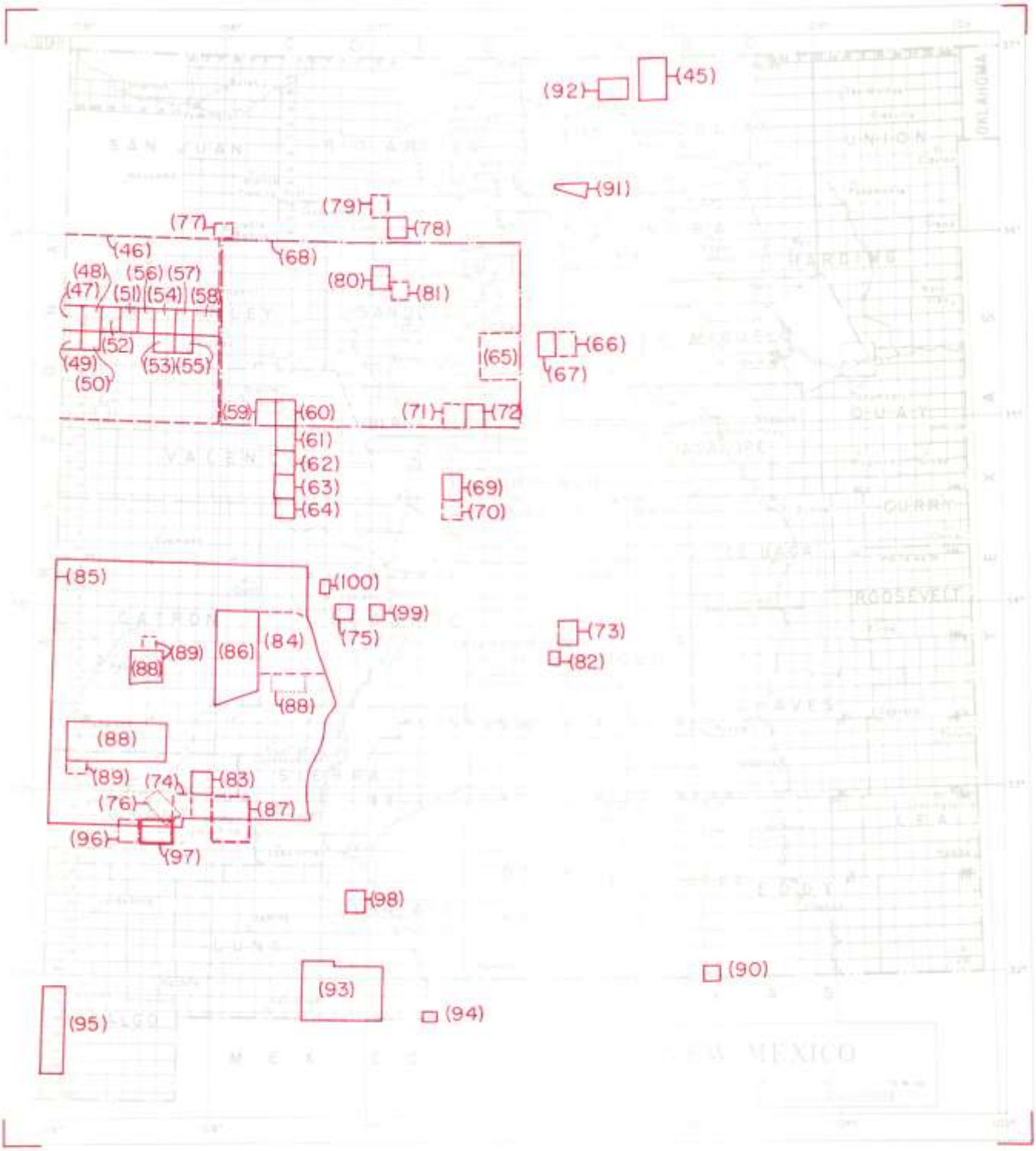
To study the perlite deposits of volcanic domes near No Agua. Geologic mapping with special emphasis on the distribution of bodies of commercially expansible perlite and the relationship of these bodies to presently noncommercial parts of the dome. Chemical and physical characteristics of the volcanic units.

43 (MRC,SH,SG) Geology of Capitan 15' quadrangle, New Mexico: J. E. Allen; PSU, NMSBMMR.

Geology and coal deposits of the Capitan area.

44 (IMP,MRI,SH,SG) Geology of the Ojo Caliente quadrangle, New Mexico: R. H. Jahns (SU) and W. R. Muehlberger (UTA), NMSBMMR.

Investigation of an area featured by Precambrian igneous and metamorphic rocks, a thick section of Tertiary strata, and complex structure.



MAP 6 – GEOLOGIC MAPPING
(PROJECTS 45-100)

Project

45 (MRC) Western Raton coal field: C. L. Pillmore; USGS(BOFCR).
Geologic mapping of east-half and coal-bearing part of west-half of Ash Mountain 15' quadrangle.

46 (MRU,SG) Geologic map, Colorado Plateau, Gallup 2° quadrangle: R. J. Hackman; USGS (BRMEG).
Geology, structure, and uranium deposits of the Gallup 2° quadrangle.

47 (MRC) Sampson Lake 7-1/2' quadrangle: J. E. Fassett; USGS(CDBMC).
Quadrangle geologic mapping of the Gallup-West area, New Mexico. Detailed geologic mapping of lands currently in outstanding coal Land withdrawals to determine the occurrence of leasable minerals meeting standards of classification to avoid alienation of Public lands available for such minerals. Includes measuring and mapping of coal beds and collecting coal samples for analysis. Prime object in mapping this area is to obtain sufficient data on coal occurrence to justify formal reclassification of those lands now in Public Land withdrawals.

48 (MRC) Gallup West 7-1/2' quadrangle: J. E. Fassett; USGS(CDBMC).
See Sampson Lake quadrangle.

4/ (MRC) Manuelito 7-1/2' quadrangle: J. E. Fassett; USGS(CDBMC).
See Sampson Lake quadrangle.

50 (MRC) Twin Buttes 7-1/2' quadrangle: J. E. Fassett; USGS(CDBMC).
See Sampson Lake quadrangle.

51 (MRU,MRI,MRC,SP,SH,M,SG) Church Rock 7-1/2' quadrangle: M. W. Green; USGS(BRMMR).
Wingate project. To provide background information as an aid to exploration and development of uranium resources and other commodities such as coal and limestone within the southern part of the Gallup mining district, New Mexico, by the following means: (1) completion of geologic mapping within the designated area, and (2) study of the stratigraphic relationships within the district and the adjacent region.

52 (MRU,MRI,MRC,SP,SH,M,SG) Gallup East 7-1/2' quadrangle: M. W. Green; USGS(BRMMR). *See Church Rock quadrangle.*

53 (MRU,MRI,MRC,SP,SH,M,SG) Continental Divide 7-1/2' quadrangle: M. W. Green; USGS(BRMMR).
See Church Rock quadrangle.

54 (MRU,MRI,MRC,SP,SH,M,SG) Mariano Lake 7-1/2' quadrangle: M. W. Green; USGS(BRMMR).
See Church Rock quadrangle.

55 (MRU,SP,M,SH,SG) Thoreau 7-1/2' quadrangle: J. F. Robertson; USGS(BRMMR).
Thoreau area project. Determine by detai led mapping of four 7-1/2' quadrangles the stratigraphy and structure in the Gallup-Thoreau area, McKinley County, New Mexico, that will provide important geologic information in the exploration for and development of uranium and other actual and potential mineral and fuel commodities. Studies of sedimentary and tectonic structures particularly within the Morrison Formation and the overlying Dakota Sandstone that might provide clues with respect to the favorable environment of deposition for uranium.

56 (MRU,SP,M,SH,SG) Pinedale 7-1/2' quadrangle: J. F. Robertson; USGS(BRMMR).
See Thoreau quadrangle.

57 (MRU,SP,M,SH,SG) Hosta Butte 7-1/2' quadrangle: J. F. Robertson; USGS(BRMMR).
See Thoreau quadrangle.

58 (MRU,SP,M,SH,SG) Casamero Lake 7-1/2' quadrangle: J. F. Robertson; USGS(BRMMR). *See Thoreau quadrangle.*

59 (MRU,GC,SH,M,SP) McCartys 7-1/2' quadrangle: C. H. Maxwell; USGS(BRMMR).
The project includes detailed mapping of six 7-1/2' quadrangles across the Jurassic overlap south and updip from the Laguna district, southern San Juan Mineral Belt, and correlation of stratigraphy and lithofacies with adjacent areas; petrographic, chemical, and mineralogic studies of uranium bearing formations and of alteration zones in sandstones across the overlap, and a search for evidence of source and movement of uranium and of conditions during deposition of uranium in the deposits to the north.

60 (MRU,GC,SH,M,SP) Cubero 7-1/2' quadrangle: C. H. Maxwell; USGS(BRMMR). *See McCartys quadrangle.*

61 (MRU,GC,SH,M,SP) Acoma Pueblo 7-1/2' quadrangle: C. H. Maxwell; USGS(BRMMR). *See McCartys quadrangle.*

62 (MRU,GC,SH,M,SP) East Mesa 7-1/2' quadrangle: C. H. Maxwell; USGS(BRMMR). *See McCartys quadrangle.*

63 (MRU,GC,SH,M,SP) Broom Mountain 7-1/2' quadrangle: C. H. Maxwell; USGS(BRMMR).
See McCartys quadrangle.

64 (MRU,GC,SH,M,SP) Pueblo Viejo Mesa 7-1/2' quadrangle: C. H. Maxwell; USGS(BRMMR).
See McCartys quadrangle.

65 (SH,SG) Madrid 15' quadrangle: G. 0. Bachman; USGS(BRMEG).
Geologic mapping and stratigraphic studies.

66 (SH,SG) Rowe 7-1/2' quadrangle: R. B. Johnson; USGS(BRMEG).
Geology, structure, mechanics of deformation, and sedimentary history of area.

67 (SH,SG) Bull Canyon 7-1/2' quadrangle: R. B. Johnson; USGS(BRMEG). *See Rowe quadrangle.*

68 (MRU,SG) Geologic map, Colorado Plateau, Albuquerque 2° quadrangle: D. G. Wyant; USGS(BRMEG).
Geology, structure, and uranium deposits of the Albuquerque 2° quadrangle.

69 (SH,S) Capilla Peak 7-1/2' quadrangle: D. A. Myers; USGS(BRMEG), and E. J. McKay; USGS (BOFCR).
West Manzano Mountains. Geologic mapping and facies relationships.

70 (SH,S) Torreon SW 7-1/2' quadrangle: D. A. Myers; USGS(BRMEG).
See Capilla Peak quadrangle.

71 (SH,S) Tijeras 7-1/2' quadrangle: D. A. Myers; USGS(BRMEG).
See Capilla Peak quadrangle.

72 (SH,S) Sedillo 7-1/2' quadrangle: D. A. Myers; USGS(BRMEG).
See Capilla Peak quadrangle.

73 (MRM,GC) Genesis placer gold deposits: K. Segerstrom; USGS(BRMMR).
Geologic mapping of the Ancho-Jicarilla mining district.

74 (MRM,SH,IMP,SG) Twin Sisters 7-1/2' quadrangle: T. L. Finnell; USGS(BRMMR).
Geologic mapping to determine relations of stratigraphy, petrology, and tectonics of Tertiary volcanics to hydrothermal mineral deposits in Pinos Altos Mountains.

75 (SH,SP,SG,AD,GC,G,MG,IMP,MRM) Geology of the Magdalena Mountains, North Baldy to South Baldy: D. A. Krewedl; UA, NMSBMMR. *Stratigraphy, structure, and magmatism in the central Magdalena Mountains with emphasis on mineral exploration.*

76 (G,IMP,SH,S,SP,SG) Systematic mapping of sedimentary and volcanic rocks northwest of Silver City, New Mexico: C. Norman, D. Van Siclen, J. Solliday, J. Blankenship, and others; UH, UHGF.
Systematic mapping and field technique training of undergraduate and graduate students. Sedimentological and petrological studies and interpretations of sedimentary units.

77 (SH) Geology of the Chaco Canyon Area: C. T. Siemers; UNM.
Stratigraphy of Chaco Canyon area, including bedrock (Mesozoic) and Quaternary deposits.

78 (SH,SG) Geology of Nacimiento Peak 7-1/2' quadrangle: L. Woodward; UNM.

79 (SH,SG) Geology of Regina 7-1/2' quadrangle: L. Woodward; UNM.

80 (SH,SG) Geology of Holy Ghost Spring 7-1/2' quadrangle: L. Woodward; UNM.

81 (MRM,SG) Geology and ore deposits of central Nacimiento Range: 0. Schumacher; UNM. *Detailed study of ore deposits in area near La Ventana.*

82 (MRM,SG,SH) Geology of Baxter Mountain, Lincoln County, New Mexico: J. R. Grainger; UNM.
Ore deposits, structure, and stratigraphy.

83 (SG) Geology of North Star Mesa 7-1/2' quadrangle; structure of Santa Rita-Hanover axis: M. J. Aldrich; UNM, NASA.
Structure of Santa Rita-Hanover axis, fractures and fracture mechanics, northward extension of buried structural high; general geology of North Star Mesa quadrangle.

84 (IMP,AG,GC,MRM,SG) Geology of northern San Mateo Mountains: E. Deal; UNM, NASA.
Geology of a major rhyolite ash-flow tuff cauldron. Petrology, chemical analyses, some mineralization.

85 (AG,IMP,MR,SH,SG,V) Mogollon Plateau: W. E. Elston; UNM, NASA.
Evolution of Mogollon Plateau; mainly volcanic and structural history; regional geologic mapping.

86 (M,V,IMP) Geology of northern part of Black Range: R. V. Fodor; UNM, NASA.
Reconnaissance geology mapping; mineralogy of basalts and andesites.

87 Geology of San Lorenzo SW 7-1/2' quadrangle: R. C. Lambert; UNM.

88 (IMP,SG,AG,V) Volcanologic studies including regional mapping, petrology, and structural interpretation of areas in Grant, Catron, and Socorro counties (Mogollon, Tularosa, San Mateo Mountains, Mule Creek area): R. C. Rhodes; UNM, NASA.
Geology of volcanic centers, especially cauldrons. Petrology, volcanic stratigraphy, regional structure, regional geologic mapping.

89 (IMP,AG,V) Volcanic geology of selected areas in Catron and Grant counties, New Mexico: E. I. Smith; UNM, NASA.
Volcanic centers, especially domes and cauldrons; Lunar analogs, petrology.

90 (G,SG) Structural and speleological analysis of the McKittrick Hill area, Eddy County, New Mexico: D. Jagnow; UNM.

91 (AD,SG) Polyphase deformation of the Picuris Range, New Mexico: D. E. Dunn and K. C. Nielsen; UNC.
Decipher the structural history of an area (Picuris Range) that has experienced 3 and possibly 4 discrete folding events.

92 (IMP,M,GC) Precambrian history of the Sangre de Cristo Mountains, northern New Mexico: H. W. Day and P. D. Noland; UO, NMSBMMR.
Detailed study of Precambrian rocks in vicinity of Comanche Point. Includes mapping of Comanche Point 7-1/2' quadrangle.

93 (IMP,M,MRI,SG) Geology of the Potrillo Volcanics: J. M. Hoffer; UTEP, NASA, NMSBMMR.

94 (G,MRI,SH,SG) Structural geology of the Cristo Rey uplift: E. M. P. Lovejoy; UTEP, NMSBMMR.

95 (IMP,MR,SH,SG) Geology of southern Peloncillo Range and adjacent areas: R. V. McGehee, J. Yellick, D. Gebben; WMU, NMSBMMR.
Mainly volcanic geology-geologic mapping and interpretation of stratigraphy, structure and geologic history.

96 (SG,SH,S) Circle Mesa 7-1/2' quadrangle: J. E. Cunningham; WNMU, NMSBMMR.
Study nature of northern extensions of Paleozoic and Mesozoic sedimentary rocks, distribution of Cretaceous-Tertiary volcanics, and structure and distribution of post-volcanic sediments.

97 (IMP,MRM,S,SH,SP,SG) Geology of the Silver City 7-1/2' quadrangle: J. E. Cunningham; WNMU, NMSBMMR.

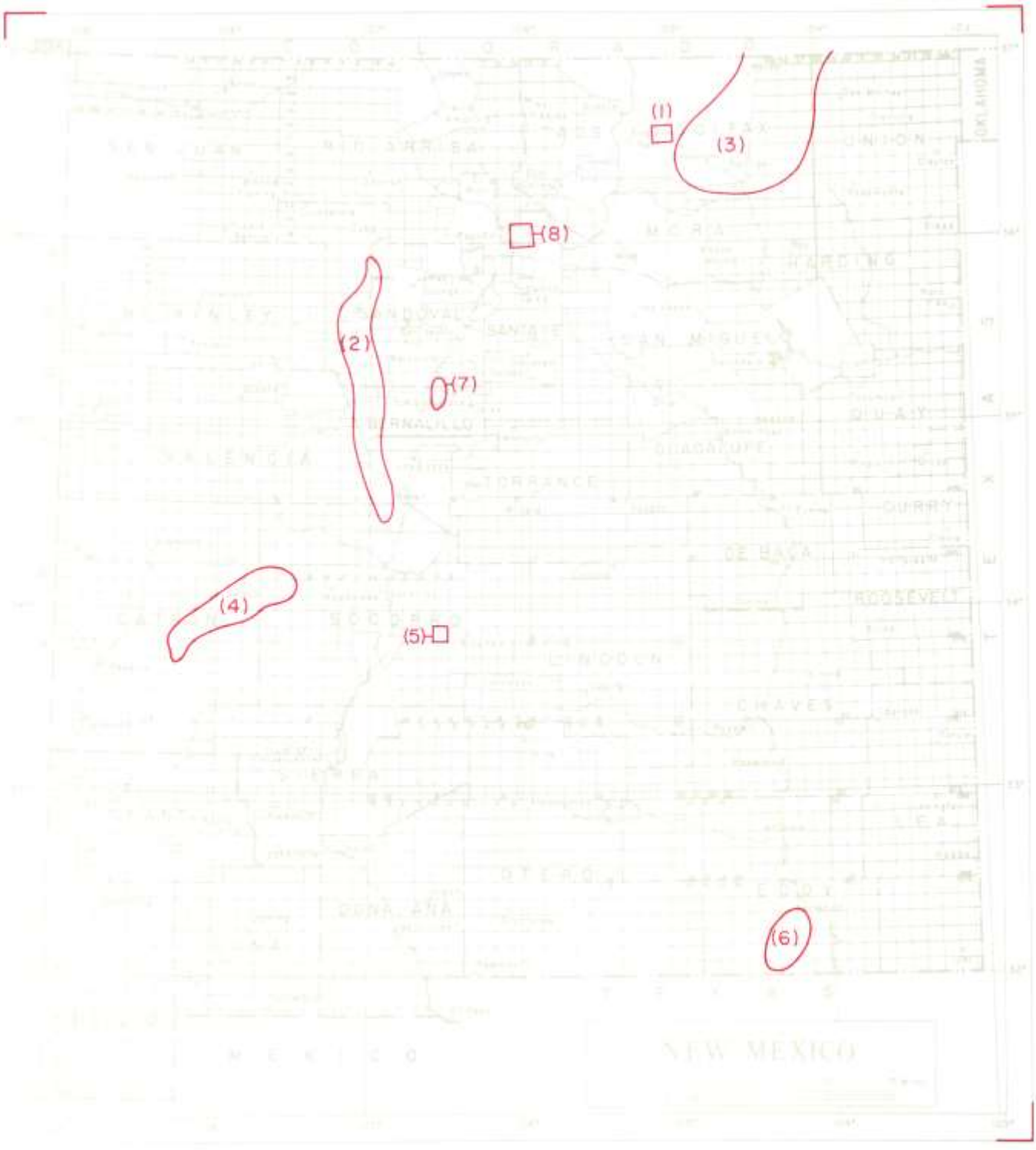
98 (IMP,V,SG) Geology of the Cedar Hills quadrangle, New Mexico: W. R. Seager and R. E. Clemons; NMSU.
Geologic mapping, volcanology, structure and petrography.

99 (AD,IMP,MRM,M,MG,SH,SG) Geology and ore deposits of the Luis Lopez District, Socorro County, New Mexico: M. E. Willard; NMSBMMR.
Volcanic stratigraphy, tectonic structure, manganese mineralization.

100 (SH,S,SG,MG,AD,G,IMP,MRM) Geology of the Silver Hill area, Socorro County, New Mexico: D. B. Simon; NMIMT, NMSBMMR.
Cenozoic stratigraphy and structure of the Silver Hill area and an evaluation of its mineral potential.

Not Plotted (GMNP)

1 (G,GP,H,IMP,MRM,SG,S,SP) Geologic analysis and evaluation of ERTS-A imagery for the State of New Mexico: F. E. Kottlowski, C. E. Chapin, A. R. Sanford, F. B. Titus, K. Vonder Linden, M. E. Willard, NMSBMMR, NMIMT, NASA.
To study ERTS-A satellite imagery to increase our understanding of the geology of New Mexico and to evaluate telemetered satellite imagery as a geologic tool.



MAP 7 - GEOMORPHOLOGY

GEOMORPHOLOGY (G)

Project

1 (EVG,EG,GM,H) Large-scale mass-movement in Cimarron Canyon, Colfax County, New Mexico: R. C. Anderson; AUG, ISU.

This is an investigation of the mechanics, topographic expression, and chronology of a series of large slumps (torevablocks of Reiche, 1937) on the north side of Deer Lake Mesa, in Cimarron Canyon, Colfax County. The area is of particular interest because the slumping was accompanied, perhaps dependent upon, extensive piping of the mesa-capping Poison Canyon conglomerate. As a result, two large, closed depressions formed on the top of the mesa: depressions whose origin has hitherto been tentatively ascribed to wind action (Robinson and others, 1964). Backward rotation of the slump blocks has produced numerous closed depressions below the mesa along the sides of Cimarron Canyon. A significant late Quaternary pollen record from this climatically sensitive area is probably preserved in the sediments of these ponds.

2 (AD,SH) Geology (geomorphology) of Rio Puerco: F. L. Nials; ENMU.

Study by series of cross sections, C14 dating, description of lithology, and relation to anthropology sites.

3 Pediments: A regional overview and interpretation: K. M. Hussey; ISU.

Pediments have been observed, east of the southern Rockies and in the Big Horn Basin of Wyoming (from north-central New Mexico to north-central Wyoming), certain similarities suggest a common regional process. It is hoped that data gathered in the near future will allow for further substantiation of a reasonable interpretation.

4 (AD,EVG,GM,P,S,SP,SH,SG) Geomorphology of Plains of San Agustin: R. H. Weber; NMSBMMR.

Mapping of Pleistocene shoreline features and investigation of sedimentation, soil morphology, paleontology, and archeological adaptations in White Lakes and C bar N basins and correlations with related features in Lake Agustin basin.

5 (EVG,AD,S,SP,SH) Geology and archeology of Mockingbird Gap site: R. H. Weber (NMSBMMR) and G. A. Agogino (ENMU).

Geology, soils morphology, archeology of large Early Man camp site in Jornada del Muerto.

6 (SH) Solutional processes and Quaternary history of the Guadalupe Escarpment, southeastern New Mexico: D. Deal; SRSU, NPS, GCS.

A long-term series of small investigations aimed at understanding the cave-forming erosional and depositional history of the Guadalupe Escarpment, with special attention to those details that reflect on the Quaternary climatic fluxuations and erosional history of the area. Work concentrated mainly in Carlsbad Caverns National Park and the Lincoln National Forest southwest of the park.

7 (GC,S,SP) Evolution of arkosic sediments in an arid climate: C. T. Siemers and J. R. Dickson; UNM.

Weathering of Sandia Granite near Albuquerque and textural and mineralogical changes of arkosic sediments during transport from source area (up to 10 miles transport on pediment).

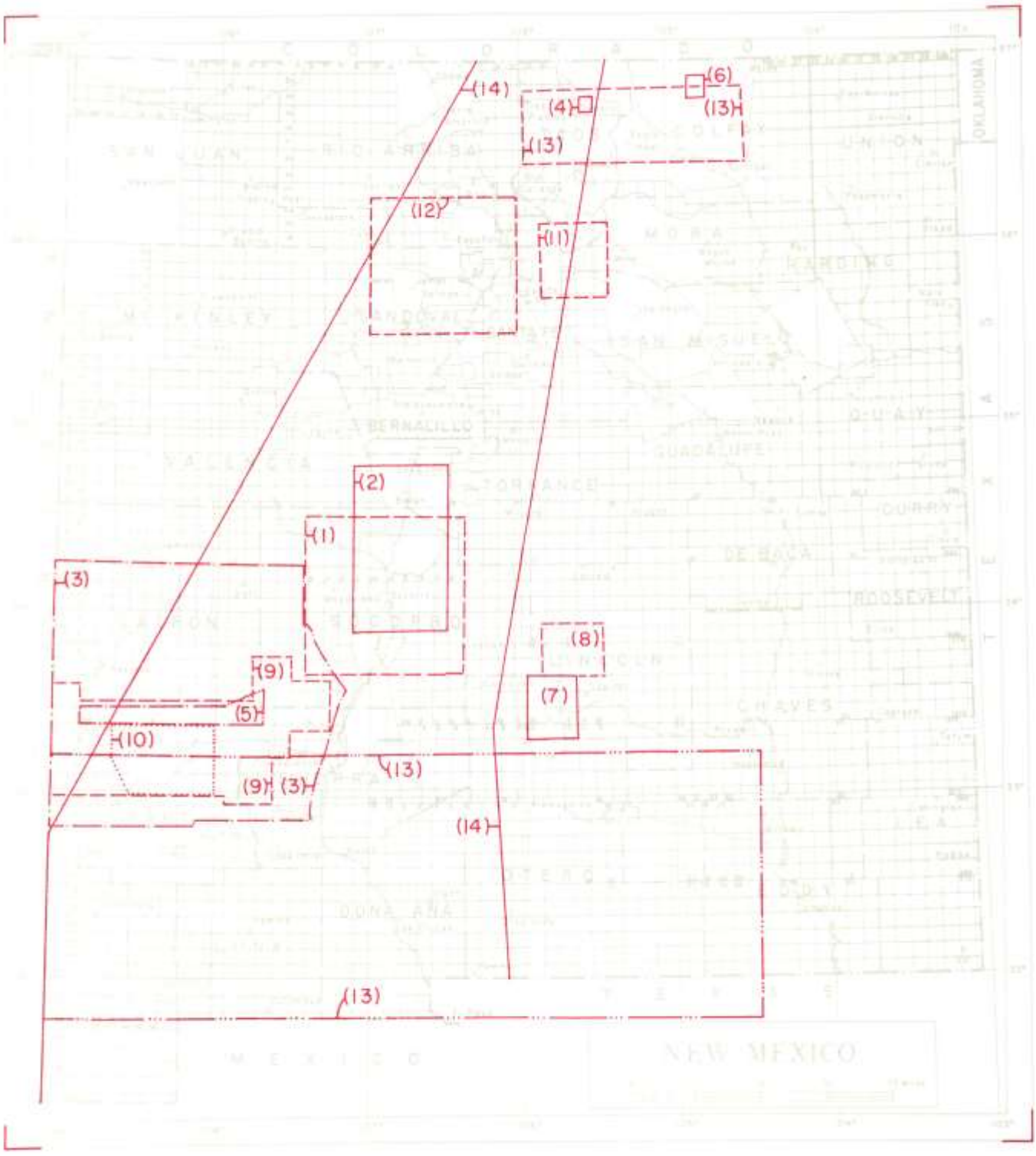
8 Correlation of Quaternary surfaces in Espanola region: K. Manley; UC.

Relationships between Ancha and Servilleta formations and surfaces cut on Ancha Formation.

Not Plotted (GNP)

1 The geomorphic evolution of the Pecos River: R. G. Thomas; BU.

The geomorphic evolution of the Pecos River was controlled by a sequence of tectonic events of both regional and local extent. The events are recorded in the Pecos Valley by alluvial *deposits, cave systems, and anomalous valleys.*



MAP 8 – GEOPHYSICS

GEOPHYSICS (GP)

Gravity (GPG) , Magnetic (GPM) , Heat Flow (GPH), Earthquake Seismology (GPS), Infrared (GPI) Project

1 (GPG) Gravity survey of the Rio Grande rift zone, Socorro County, New Mexico: A. R. Sanford and students; NMIMT.

The gravity survey is a continuation of work reported in New Mexico Bureau of Mines Circular 91. The purpose is to determine (1) the near-surface structure of the Rio Grande rift zone (in particular, positions and character of faults, and thickness of Santa Fe Formation), and (2) the variation in thickness of the crust across the rift. Eventually we hope to relate the structural characteristics of the rift to seismicity, heat flow, etc.

2 (GPS,SG) Determination of crustal structure in the Rio Grande rift zone: A. R. Sanford; NMIMT, NSF.

The purpose of the proposed research is to determine crustal structure in the Socorro to Albuquerque segment of the Rio Grande rift zone. The primary data for this study is arrival times of prominent phases other than direct P and S that appear on seismograms with epicenters near Socorro. Other information on crustal structure will come from Socorro Station records of earthquakes near Albuquerque.

3 (GPG) Gravity survey of Mogollon Plateau: D. H. Krohn; UNM, NASA, NSF, USGS.

Gravity survey (reconnaissance) of Mogollon Plateau. Modeling study of observed anomalies.

4 (GPM,GC,MG) Hydrothermal alteration, geochemistry and magnetic susceptibility of the Molybdenum Corporation of America mine area: T. B. Thompson; OSU, OSURF.

5 Paleomagnetism, southern Mogollon Plateau: D. Strangway; UT, NASA(MSC).

6 (EG,GPI) Infrared investigation, York Canyon Mine, Colfax County, New Mexico: R. M. Stateham; USBM(DMRC).

Determination of loose slab thickness or failure rates by infrared techniques.

7 (GPM,MR) White Mountains magnetic study: USGS(RGB).

Aeromagnetic survey flown in 1970 in support of wilderness area mineral resource evaluation. Flown at 12,500 ft. barometric: scale 1:62,500. Contour interval 20 gammas.

8 (GPM,MR) Jicarilla Mountains magnetic study: USGS(RGB).

Aeromagnetic survey flown in 1970 in support of mineral resources study. Flown at 9,000 ft. barometric: scale 1:62,500. Contour interval 20 gammas.

9 (GPM,MR) Aeromagnetic map of the Gila Wilderness Area: USGS(RGB).

Aeromagnetic survey flown in 1968 in support of wilderness area mineral resource evaluation. Flown at 10,500 ft'. barometric: scale 1:250,000. Contour interval 20 gammas.

10 (GPG,MR) Gila Wilderness gravity study: G. P. Eaton and D. L. Peterson; USGS(RGB), TC.

Reconnaissance survey made in support of mineral resources evaluation. Average station density 1/10 sq. miles. Contour interval 5 mgals. Scale 1:250,000.

11 (GPM,MR) Pecos magnetic study: USGS(RGB).

Aeromagnetic survey flown in 1970 in support of wilderness area mineral resource evaluation. Flown at 13,500 ft. barometric: scale 1:62,500. Contour interval 20 gammas.

12 (GPG,GPM) Jemez Mountains magnetic and gravity studies: L. Cordell and H. R. Joesting (deceased); USGS(RGB).

Detailed gravity and aeromagnetic coverage of the Jemez Mountains and adjoining parts of the Rio Grande graben. Gravity data contoured at 2 mgals. Average station density 1 per 5 sq. miles. Magnetics flown at 9,000 and 11,000 ft. barometric. Contour interval is 20 gammas for both sets of data. Compiled at 1:250,000 scale.

13 (GPH,GPG,GPM,GC) Heat flow, gravity, and magnetic studies over the Rio Grande rift in southern New Mexico: E. R. Decker and S. B. Smithson; UWY.

Gravity and magnetic studies are being combined with heat flow data for interpretation of crustal and upper mantle structure associated with the Rio Grande rift. K, U, and Th are being, determined for intrusive rocks by gamma ray spectrometry.

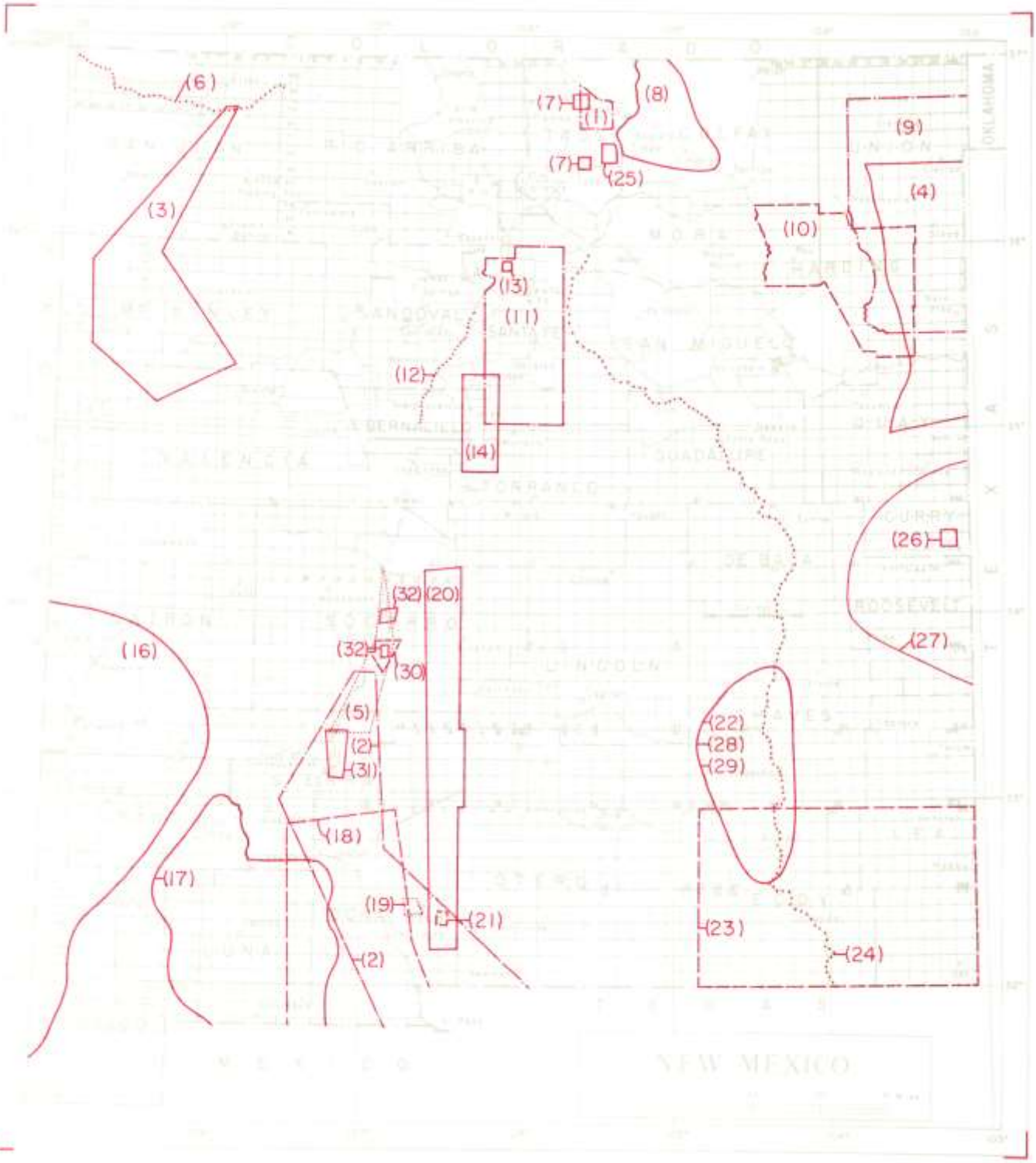
14 (MRG,H,GPH,SH,IMP,EVG) Geothermal investigations of the Rio Grande rift, New Mexico and Colorado: M. A. Reiter; NMIMT, BR, USBM, USGS, NSF, OSW, SE, ISC, NMSBMMR, MNSU, UNM.

The Rio Grande rift is one of the more prominent geological features in the western U.S. It extends from the San Luis Valley in Colorado in approximately a south-southwest direction through New Mexico. The Rio Grande follows this rift from Alamosa, Colorado, to El Paso, Texas. Results of previous heat flow measurements include various geothermal anomalies along the rift. Investigations are now underway by the New Mexico Institute of Mining and Technology under contract with the Bureau of Reclamation and National Science Foundation. This investigation includes a preliminary examination of the thermal region of the Rio Grande rift system and its potential as a large geothermal water reservoir. The investigation consists primarily of collecting heatflow data in existing drill holes and a comprehensive literature search. Appropriate conclusions and recommendations will be made for more detailed investigations of potential areas for developing water supplies through utilization of geothermal potential.

Not Plotted (GPNP)

1 (GPS) Instrumental study of New Mexico earthquakes: A. R. Sanford and T. Toppozada; NMIMT.

The research involves the location and determination of strength of earthquakes in New Mexico. This is a continuation of research that has been reported in New Mexico Bureau of Mines Circulars 78 and 102. Ultimately we hope to correlate seismic activity with geologic and geophysical characteristics of the crust and upper mantle.



MAP 9 – HYDROLOGY

HYDROLOGY (H)

Water Resources (HR) , Surface Water (HS) , Ground Water (HG) , Water Chemistry (HC) , Hydrodynamics (HH) Project

(HG,EG,EVG,GM,GP) San Juan-Chama Project, Cerro Unit, New Mexico: BR, USGS(WRD), SE.

Located in Taos County north of the community of Cerro in the Sunshine Valley area. In the authorizing report it was contemplated to provide a firm irrigation supply through regulation of surface flows of the Red River at the Zwergle damsite, but it was determined in preconstruction studies that the site was geologically unfavorable. No favorable alternative site could be found. The possibility of using ground water in place of surface storage is now under study. The investigation includes drilling and testing to determine the availability of ground water and development of a plan to serve irrigation water to as much as possible of the original acreage proposed for service in the Cerro Unit.

2 (HS,EG,EVG,GC,G,GP) Elephant Butte Reservoir, Fort Quitman Project, New Mexico-Texas: BR, USGS(WRD), BLM, USBM, CE, BSFW, BOR, NASA, SCS, WRC, TTU, UTA, UTEP, TAM, UH, NMSU, TX, NM, EBID, EPCWI, ISC.

Project is located in the Rio Grande Valley between the upper end of Elephant Butte Reservoir in New Mexico and *Fort Quitman in Texas and the surrounding region of southern New Mexico and far west Texas. The investigation will provide a reconnaissance investigation for the development of a regional plan for orderly, rational, long-term development of available natural and human resources to achieve the regional economic potential within an environmental and ecological setting of the highest possible quality. All of the surface water resources of the area have been committed. Ground water for municipal use is being withdrawn faster than it is being reproduced. Due to phreatic infestation of the upper channels and river valleys, aggradation of the channels by silt, and drought conditions, the yield of surface water delivered to Elephant Butte Reservoir has in recent years been only 65 percent of the long-term average inflow to the reservoir. This situation has caused tremendous economic losses to both the New Mexico and Texas portion of the area. The investigation is needed to develop new water supply sources and determine means to provide for better utilization of existing water supplies. The investigation is needed also to develop new recreation and fish and wildlife areas.*

3 (HG,HS,E,EG,EVG) Gallup Project, New Mexico: BR, BIA, BLM, BOR, BSFW, USGS(WRD), G. *In McKinley, Valencia,* and *San Juan counties in northwest and west-central New Mexico. The reconnaissance investigations are directed toward providing an additional municipal and industrial water supply for the city of Gallup and other possible customers in the general area. Gallup is located in a basin with Limited water resources of poor quality. The existing and planned development of the Yah-Ta-Hey well field will meet the projected needs for the city for only about 10 to 20 years. At that time an additional supply will be required to meet the future needs.*

A supply of water of excellent quality is available from the Navajo Reservoir on the San Juan River, and 7,500 acre feet of New Mexico's entitlement under the Upper Colorado River Compact has been reserved for Gallup. The water reservation is tentative at this time, and assurance of its availability in perpetuity is necessary before a plan for delivery of the surface supply can be recommended. Also, ground water of acceptable quality may be available from potential well field areas nearer to Gallup than the surface supply.

4 (HS,HG,GC) Lake Meredith Salinity Study, New Mexico-Texas: BR, USGS(WRD), ISC, NM.

The area being studied is the Canadian River drainage area from Ute Dam, New Mexico, to Lake Meredith, Texas. Lake Meredith is the storage facility for the Canadian River project which supplied municipal and industrial water to 11 cities. The investigation is expected to identify the sources contributing water highly concentrated with sulfates and chlorides to Lake Meredith and determine methods to alleviate the contamination of the water supply.

5 (HR,HS,E) Rio Grande Water Salvage Project, New Mexico Division: BR, USGS(WRD), BLM, BOR, NPS, BSFW, NM, ISC.

Located on the Rio Grande between the Colorado-New Mexico State line and Caballo Reservoir. The feasibility-grade report of a plan to restore to the Rio Grande a substantial portion of the water now consumed by noncommercial vegetation by vegetative management of about 20,600 acres of phreatophyte growth. Drains would be included as necessary to maintain a lower water table to recover salvaged water and discourage regrowth. The feasibility study is essentially complete.

6 (HS) Hydrology of the San Juan River Valley, New Mexico: F. P. Lyford and Kim Ong; USGS(WRD), SE.

Determine the interrelation of surface and ground water in the valley, and the chemical quality of the water.

7 (HG,HR) Ground water investigation in the Taos and Cerro irrigation units: F. C. Koopman, Project Chief; USGS(WRD), SE.

Determine availability of ground water in Taos and Cerro irrigation units where supplemental water is needed for irrigation. Most of the area is irrigated with surface water.

8 (HS) Quantitative analysis of principal river basins: E. D. Cobb; USGS(WRD), SE.

Development of a model of the surface water system on the Cimarron River above Springer.

9 (HG,HR) Irrigation potential of the Ogallala Formation and associated Cretaceous and Jurassic sediments, northern High Plains, New Mexico: E. G. Lappala; USGS(WRD), SE.
Assess ground-water conditions in northern High Plains including parts of Union, Quay, and Harding counties, New Mexico, Cimarron County, Oklahoma, and Dallum, Hartley, and Oldham counties, Texas. Determine potential from Ogallala, Dakota, Purgatoire, Morrison and Entrada formations for irrigation development.

10 (HR,HG,GM) Ground-water resources and geology of Harding County, New Mexico: F. D. Trauger and R. W. Clement; USGS(WRD), NMSBMMR, SE.
Determine general availability and quality of ground water, areal extent and areas of recharge and discharge of principal aquifers. Geologic map included.

11 (HG,HR,GM,HS) Water resources of Santa Fe County, New Mexico: W. A. Mourant; USGS (WRD), SE.
Obtain basic and quantitative geohydrologic data *for evaluation of aquifer yields, chemical quality, relationship between surface and ground water, and ef fects of water-use developments. Includes geologic mapping.*

12 (HS,S) Channel adjustments downstream from Cochiti Dam on the Rio Grande, New Mexico: J. D. Dewey, Project Chief; USGS(WRD).
To define time and space changes in cross sections and changes in size and distribution of bed material from Cochiti Dam to Isleta Diversion Dam.

13 (HS,HG) Estimated volume of surface and ground water in the Pojoaque River drainage basin, New Mexico: F. C. Koopman and L. J. Reiland; USGS(WRD), BIA.
Obtain data on volume of surface and ground water on and beneath Indian lands, and relation of this volume of water to Rio Grande.

14 (EVG,HG) Geology and ground-water resources of the Sandia, Manzanita, and Manzano Mountains: F. B. Titus; NMIMT, USGS(WRD), NMSBMMR, SE.
Hydrogeology of a rapidly developing mountain-residential area, with particular attention to availability of domestic water supplies and the probable effects of that development on availability and potability of ground water.

15 (EG,HS,HG,HH) Miscellaneous reach studies, Pecos River: G. E. Welder; USGS(WRD), PRC.
Special studies of the relation of surface and ground waters for inflow-outflow computations for use in apportioning waters of the Pecos River equitably among users.

16 (HR,HS,HG) Water resources of the Gila River and tributaries in New Mexico: J. D. Hudson; USGS(WRD), SE.
Determine total surface-water and ground-water diversions in the Gila-San Francisco river basins.

17 (GP,GM,HG,HR) Water resources of the Mimbres basin, New Mexico: J. S. McLean; USGS (WRD), SE.
Collect and analyze quantitative data on extent and hydrologic properties of aquifers in Mimbres basin to determine long-term effects of ground-water withdrawals. Includes geological and geophysical mapping.

18 (HR,HG) Water resource plan-Las Cruces area: C. A. Wilson, Project Chief; USGS (WRD), SE, LC.
Study of fresh water resources of Las Cruces area for municipal, industrial, irrigation use. At depth movement of inferior quality water in relation to pumping.

19 (HR,HG) Hydrology of Jornada Experimental Range: J. P. Borland, Project Chief; USGS (WRD) , AR.
Collect flood-hydrograph records, rainfall data, water-level data, and soil--moisture data. The project will establish background information on the local hydrologic regime for reference in WSMR meterologic research, as well as ground truth for satellite studies of arid lands.

20 (HR,HG) Continuing reconnaissance and evaluation of water resources on the White Sands Missile Range, New Mexico: J. A. Basler, Project Chief; USGS(WRD), AR, WSMR.
Evaluation of total water resources of area and effect of withdrawals on potable and saline waters.

21 (HG,HH) Long-term availability of water in the Post Headquarters area, White Sands Missile Range: T. E. Kelley; USGS(WRD), AR, WSMR.
Provide reasonable guidelines for long-term operation of wells, and optimum withdrawal of fresh water in relation to water-level declines and migration of saline water.

22 (HG,SH) Quantitative analysis of the ground-water system in the Roswell basin, Chavez and Eddy counties, New Mexico: G. E. Welder and F. P. Lyford; USGS(WRD), SE.
Determine aquifer boundaries and lithologic characteristics by study of electric and litho logic logs of wells, well sample cuttings and surface geology. Aquifer tests made of key wells.

23 (HR,HS,HG) Stratigraphy and ground-water hydrology of the Capitan Limestone and associated formations in southeastern New Mexico and western Texas: W. L. Hiss, Project Chief; USGS(WRD), SE.
Study of the total water resources available in the Capitan aquifer and ef= fects of withdrawals as a by-product of oil production and use for secondary recovery projects.

24 (HS,HC) Evaluation of pumping effects in the Malaga Bend area, Eddy County, New Mexico: C. C. Cranston; USGS(WRD), PRC.
To evaluate the effectiveness of an experimental project to improve the quality of water in the Pecos River by diverting prime inflow in a short reach of the river.

25 (HC) Hydrologic-nutrient cycle interaction in undisturbed and man-manipulated ecosystems (watersheds): J. R. Gosz; UNM, WRRI.
Mineral cycling and stream water

chemistry as influenced by vegetation, climate, weathering, and man.

26 (HR) Utilization of water in a semi-arid region: H. D. Fuehring; NMSU, WRRI. *Develop a system of water concentration whereby normal rainfall of the High Plains area would be sufficient for dependable dry Land cropping.*

27 (HG,HS,HR) An interdisciplinary analysis of the water resources of the High Plains of New Mexico: R. R. Lansford, B. J. Creel (NMSU), and W. Brutsaert, F. B. Titus (NMIMT); WRRI.

To estimate availabilities and interchanges of ground water and surface water in the High Plains by mathematical model analysis and to simulate current and future water use for irrigated agriculture using parametric programming.

28 (HC,HG) Irrigation returns and residence time of recharge by a tracer technique: D. D. Rabinowitz and G. W. Gross; NMIMT, WRRI. *Tritium profiles will be examined with known hydrologic data of the aquifers in the Roswell Basin to determine the residence time of the replenished water.*

29 (HC,HG) Aquifer parameters by a chemical tracer technique: A. Mercade, G. K. Billings, and G. W. Gross; NMIMT, WRRI.

To develop mathematical model capable of reproducing more faithfully aquifer conditions; investigate the effects of physical and chemical variables on the dissolution process, and to investigate the usefulness of this method as a tracer technique by applying it to the Roswell Basin in southeastern New Mexico.

30 (HC) Study of the effects of contaminants from birds on the chemical and biological character of Rio Grande water: D. K. Brandvold, J. A. Brierley, and C. J. Popp; NMIMT, WRRI.

Present baseline condition of ecosystem, changes in water as it passes through system, and results that can be expected by continued use of system at present level.

31 (HC) Analysis of mercurials in Elephant Butte Reservoir: J. Garcia, D. Kidd, G. Johnson; UNM, WRRI.

Determine concentration in water, sediments, and trophic Levels and extent to which primary productivity may be inhibited.

32 (HC,HG) Environmental controls on ground water chemistry: I. the effect of phreatophytes: F. B. Titus; NMIMT, WRRI.

The objectives of the project are: (1) to determine the distribution and concentration of soluble salts in ground water beneath a shallow water table under conditions of consumptive use by phreatophytes, (2) to investigate the hypothesis of seasonal, cyclic variation of this concentration, (3) to investigate the relative influence of dispersion/diffusion versus Lateral ground-water flow in removing the concentrated water from the water-table zone, and (4) to determine whether monitoring of water levels and water chemistry in a single piezometer nest, or a group of nests, will allow calculation of transpiration rates.

Not Plotted (HNP)

1 (HS,EG) Reservoir trap efficiency studies at selected sites: J. D. Dewey, Project Chief; USGS(WRD), SCS.

Determine efficiency of reservoirs in trapping sediment through measurement of quantity and size of sediment leaving reservoir.

2 (HC,HG,HS) Collection of basic records-quality of water: J. C. Dewey and Kim Ong, Project Chiefs; USGS(WRD), SE, ISC, PRC, CE, FWQA, BR, AF, NMSBMMR.

Collect and analyze samples from selected sites. Collection frequencies scheduled to detect any changes in water quality and/or to compute annual loads. Chemical data from 100 surface water stations, biochemical data from 20 stations, suspended sediment data from 37 stations. Also data from 250 ground water sites. Published annually.

3 (HS,HR) Duties for the Rio Grande Compact Commission: E. D. Cobb, Project Chief; USGS (WRD), RGCC.

Compilation of stream flow and storage data for publication in annual reports of the Commission.

4 (HS,EG) Investigation and analysis of floods for small drainage areas in New Mexico: A. G. Scott, Project Chief; USGS(WRD), SHD.

Obtain and analyze hydrologic data for use in design of highway drainage structures. Magnitude, volume, and frequency of floods for drainage areas of less than 15 square miles.

5 (HS) Collection of basic records; stream flow: L. J. Reiland, Project Chief; USGS (WRD), BIA, BR, CE, AR, WSMR, FWS, SCS, NWS, CCCC, ISC, SE, SHD, PRC, SGFC.

Collect records of flow of all important streams and storage of all major reservoirs. About 200 stream gaging stations and 15 reservoir stage stations. Published annually.

6 Miscellaneous activities under the State Engineer Program: J. B. Cooper, Project Chief; USGS(WRD), SE.

Spot reconnaissance studies, reports on inquiries, compilation of specific data, and revision of reports for publication.

7 (HG,EG) Water levels in observation wells: J. D. Hudson, Project Chief; USGS(WRD), SE. *Monitoring fluctuation of ground-water levels in approximately 1,500 observation wells. Most wells Located in irrigation areas. Aerial photographic surveys made to determine irrigated acreage. Water-level change maps and tabulations of water-level measurements published annually.*

8 Miscellaneous activities under the School of Mines program: W. A. Mourant; USGS(WRD), NMSBMMR.

Fulfill requests for data and make spot geologic and hydrologic studies as requested.

9 (HR) New Mexico District Data Bank: J. B. Peterson, J. Sparks, and W. L. Hiss; USGS (WRD), SE.

Processing all types of past records relating to water resources of the state for inclusion in a data bank.

10 (HG) Investigation of special ground-water problems: J. B. Cooper; USGS(WRD), SE. *Investigate sites, or small areas, in the state where unusual or special ground-water problems exist.*

11 (HR,EG,EVG,GM,G,GP) New Mexico State Water Plan: BR, J. B. Cooper, Project Chief; USGS (WRD) , ISC.

A reconnaissance-grade study of the State of New Mexico which will cover a generalized analysis of water and related resources as well as problems and needs. It is a comprehensive study considering all types of water uses, including existing and anticipated. The plan will include economic, social, and environmental considerations in an effort to provide for the best use of the State's water and related land resources for the general well-being of all the people.

12 (HS,HC) Quality and quantity of return flow as influenced by trickle and surface irrigation: P. J. Wierenga; NMSU, WRRI, EPA.

To determine the effect of amount and frequency of irrigation water applied on water and solute movement within the soil profile under surface irrigation; to determine the effects of treatments on composition and quality of percolating water from field plots under trickle irrigation and to determine the feasibility of minimizing percolation losses by trickle irrigation; to compare the results of this study with the quality of water in the Del Rio Drain, and relate this to the quality of irrigation water applied.

13 (HC) Predicting the quality of irrigation return flow: P. J. Wierenga; NMSU, WRRI, NMSU(AES).

Develop a computer simulation model under field conditions in conjunction with an existing project on measurement of the quality and quantity of return flow.

14 (HS,HG,HC) The determination of content and origin of lead in surface and ground waters in northeastern New Mexico: S. Maestas; NMHU, WRRI.

To determine the content, origin, and ultimate fate of lead in surface and ground water systems of northeastern New Mexico. The effect on aquatic systems will be assessed and an attempt will be made to determine the rate of which contamination of waters in the area is increasing.

15 (HR) Cropland uses and agricultural water depletions in New Mexico: R. R. Lansford; NMSU, WRRI, NMSU(AES), SE, SRS, USDA.

To develop procedures for obtaining reliable county estimates of cropland acreage and depletions and diversions of irrigation water.

16 (HR) Water resource problems and research needs of New Mexico: B. J. Creel; NMSU, WRRI.

Inventory federal, state, and local agencies, institutions, and organizations interested in water resources research; to collect information on agency history, responsibilities, jurisdictions, programs, and water research needs; and to analyze and rank the needed water resources research in New Mexico.

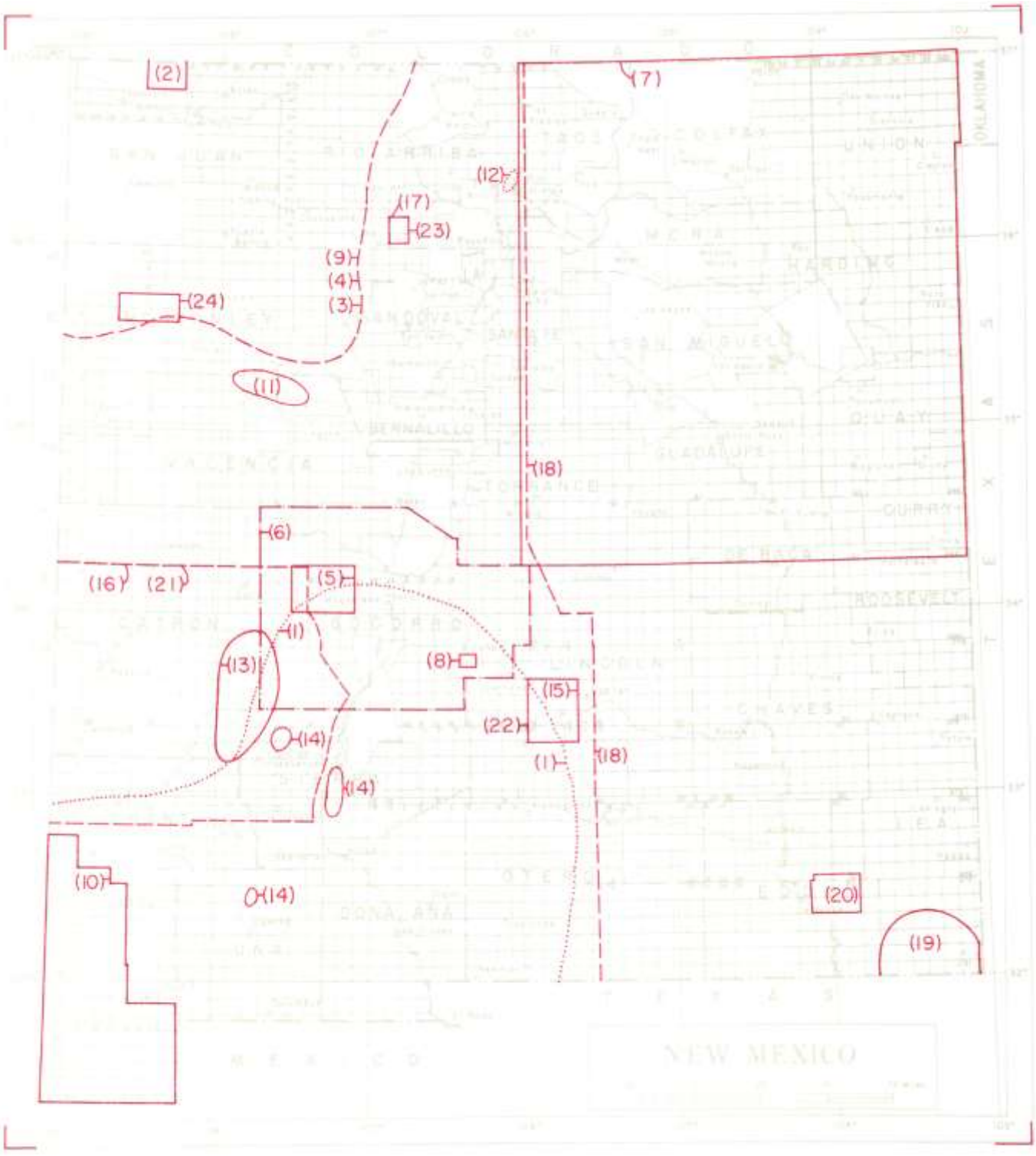
17 (HG,GPH) Measurement of groundwater flow using an in-situ thermal probe: M. A. Reiter; NMIMT, WRRI.

In-situ thermal probes can be used to determine rate of groundwater flow more quickly and at less expense than conventional techniques (e.g. pumping tests). The objective of the present research is to construct a thermal probe for in-situ measurement of rate of groundwater flow, and to test the probe in areas where the rate of flow has been determined by pumping tests.

18 (HR) Analysis of water characteristics of manufacturing industries and their adaptability to semi-arid regions: S. Ben-David, UNM, and H. G. Folster, NMSU; WRRI.

Make operational judgements about the relative abilities of various industries to adjust to water use conditions in semi-arid region. Study interaction among effluent withdrawal, and consumptive use.

Map 10—Mineral Resources, follows



MAP 10 — MINERAL RESOURCES

MINERAL RESOURCES (MR)

Mining Geology (MG), Industrial Rocks and Minerals (MRI), Metallic Deposits (MRM), Oil and Gas (MRP), Coal (MRC) , Uranium (MRU) , Geothermal (MRG)

Project

1 (MRM,MG,SH,SP) Paleozoic stratigraphy as an ore control for lead, zinc, and copper in New Mexico: J. Sullivan and P. D. Proctor; UMR, NMSBMMR.

The study is an attempt to find possible relationships between stratigraphy and hydrothermal deposits of lead, zinc and copper. Literature, field and laboratory studies are being made on the Paleozoic stratigraphy related to hydrothermal deposits in marine carbonates and shales in thirteen New Mexico mining districts. Also non-mineralized Paleozoic sections in the Caballo and Sacramento mountains are being studied for contrasts between mineralized and *non-mineralized rocks. The laboratory study is primarily on the carbonate petrology of the ore-bearing horizons.*

2 (MRC,H,EL) Water Requirement Availability and Coal Deposit Study (project UTECOAL): J. W. Shomaker (NMSBMMR), R. D. Holt (CGS); BIA.

Determine reserves, chemical and physical characteristics, and present and future uses of coal deposits on Ute Mountain, Ute and Southern Ute Indian reservations, New Mexico and Colorado, together with amount and quality of water that will be required for development.

3 (MRC,GC,M) Sulfur in San Juan Basin coals in New Mexico and Colorado: F. E. Kottlowski, E. C. Beaumont, and J. W. Shomaker with help from R. H. Weber and C. W. Walker; NMSBMMR, EPA, GSA.

Occurrence, mineralogy, and geologic relations of sulfur in the Dakota, Mesaverde, and Fruitland coal beds in the San Juan Basin.

4 (MRC,EVG) Quality and reserves of coal in the San Juan Basin, New Mexico and Colorado: F. E. Kottlowski and J. W. Shomaker; NMSBMMR, EPA.

Summary of up-to-date knowledge recoal quality and coal resources in Cretaceous units of the San Juan Basin.

5 (MRM,GM,MG,IMP,G,GC,AD,ST,SG) Geology of the Magdalena - Tres Montosas area, Socorro County, New Mexico: C. E. Chapin; NMSBMMR.

Geology and mineral resources of the Magdalena-Tres Montosas area.

6 (GM,IMP,ST,SG,MG,AD,MRI,MRM,MRC,MRU) Mineral resources of Socorro County, New Mexico: C. E. Chapin; NMSBMMR.

Compilation of the geology of Socorro County with an evaluation of its mineral resources.

7 (MRP,SH) Occurrence of carbon dioxide in northeastern New Mexico: R. W. Foster and J. G. Jensen; NMSBMMR, NMGS.

Geology, occurrence, origin, and processing of carbon dioxide in northeastern New Mexico.

8 (GC,GM,M,MRI,MRM,MG,SG) Economic geology of the Mex-Tex Mine, Hansonburg District, Bingham, New Mexico: C. Lewchalermvong; NMIMT, NMSBMMR.

A field and laboratory study to determine the origin of barite and galena mineralization at the Mex-Tex and the Royal Flush mines.

9 (MRP,S,SP,SH) Deep Pennsylvanian petroleum potential of the San Juan Basin: S. A. Wengerd; UNM.

10 (MRI,MRM,MG,GM) Mineral resources of Hidalgo County, New Mexico: W. E. Elston; UNM, NMSBMMR.

Mineral resources, description of mining districts, some geologic mapping.

11 (MRU,GC) Geochemical investigation of uranium deposits near Grants, New Mexico: S. Hafenfeld and D. G. Brookins; UNM, CON.

Eh-pH study of uranium deposits; authigenesis and allogenesis.

12 (MRI,GM,IMP,M,SG) Pegmatites of the Ojo Caliente District, New Mexico: R. H. Jahns; SU, NMSBMMR.

Detailed study of developed and undeveloped fledspar - mica - beryl pegmatites, with economic appraisals.

13 GM,IMP,M,MRM,SG) Tin deposits of the Black Range District, southwestern New Mexico: R. H. Jahns and J. R. Lufkin; SU, NMSBMMR.

Detailed investigation and economic appraisal of placer and lode deposits of cassiterite associated with Tertiary rhyolites.

14 (MRI,GM,M) Study of fluorspar deposits at Chise, the Caballo Mountains and Cook's Peak: W. N. McAnulty; UTEP, NMSBMMR.

15 (MRM,MRI,MRC,MRU) Mineral resources of the White Mountain Wilderness Area: R. B. Stotelmeyer; USBM(IFOCS).

Sampling and evaluation of mineral resources.

16 (MRM,MRI,MRC,MRU) Mineral resources of Gila Wilderness Area: R. B. Stotelmeyer; USBM (IFOCS).

Sampling and evaluation of mineral resources.

17 (MRM,MRI,MRC,MRU) Mineral resources of San Pedro Parks Wilderness Area: R. C. Weisner; USBM(IFOCD).

Sampling and evaluation of mineral resources.

18 (MRU,SH) Southern High Plains uranium studies: W. I. Finch; USGS(BRMMR).

Study of samples from various conglomerate beds in the Dockum Group. E-W and N-S geologic sections across the southwest Triassic basin showing correlation of various formations of the Dockum Group.

19 (MRI,M,SP) Geology of sulfur deposits, New Mexico and Texas: A. J. Bodenlos; USGS (BOFCR).

Reconnaissance field work in mineralized areas of the Delaware Basin and Central Basin Platform. Logging of drill cores of sulfur ore and detailed mineralogic and petrologic studies.

20 (MRI,M) New Mexico potash: C. L. Jones; USGS(BOFCR).

A report on potassium-rich deposits of the McNutt potash zone in southeastern New Mexico.

21 (GC,GM,MRI,MRM,GPM,GPG) Gila Primitive and Wilderness areas: J. C. Ratté; USGS(BRMMR)
Appraisal of mineral resources of area including geologic mapping, geochemical reconnaissance survey, aeromagnetic mapping, and reconnaissance gravity survey.

22 (MRI,MRM,GM,GC,MG,GPM) White Mountain Wilderness Area: K. Segerstrom; USGS(BRMMR).
Evaluation of mineral potential through geologic mapping, geochemical exploration, aeromagnetic survey, and examination of mines, prospects, and other mineralized areas.

23 (MRM,GC,GM,SH) San Pedro Parks Wilderness Area: E. S. Santos; USGS(BRMMR).
Reconnaissance mapping of the Paleozoic and Tertiary strata of a 64 square mile wilderness area. Analysis of trace elements to determine if geochemical anomalies are present.

24 (MRU,M,GM,MG,SP,SG,SH) Church Rock-Smith Lake area, New Mexico: C. T. Pierson; USGS (BRMMR).
To determine by selected mine mapping, sampling of uranium ore and country rock, lithofacies study of the Morrison Formation, and various laboratory studies the habits and controls of the uranium deposits around and between Church Rock and Smith Lake--the principal mining areas in the southeastern part of the Gallup and the western part of the Ambrosia Lake mining districts, McKinley County, New Mexico.

Not Plotted (MRNP)

1 (MRI) Raw materials for the glass industry:
W. L. Hawks; NMSBMMR.
Determine the availability of raw materials for the glass container industry. These include silica sand, soda ash, feldspar, limestone and salt cake.

2 (MRI) Clays of New Mexico: W. L. Hawks; NMSBMMR, ZP, ENP, LTC.
Compiling, reviewing, interpreting and publishing available data on clays in the State. Sampling, testing and evaluating clays from new areas and cooperating Indian reservations.

3 (MRI) Aggregate resources and utilization survey: W. L. Hawks; NMSBMMR, NMRMCSGA.
Develop information on the sources and current uses of aggregates for the construction industries.

4 (MRP) Petroleum developments in New Mexico for years 1963 and 1964: R. A. Bieberman; NMSBMMR.
Yearly oil and gas well data reports.

5 (MRP) Computerization of well sample library index: R. A. Bieberman; NMSBMMR.

6 (MRP) Petroleum exploration maps: R. A. Bieberman; NMSBMMR.
Maintenance of up-to-date county petroleum exploration maps. Data used in revision of oil and gas fields map of New Mexico.

7 (MRI,GC,HC,EG) Correlation of the sulfate ion concentration of surface water with the gypsum deposits of New Mexico: J. H. Puffer; RSU.
It has been demonstrated that the sulfate ion concentration of the surface waters of New Mexico can be directly correlated with the distribution of gypsum deposits throughout the state.

8 (MRU) Colorado Plateau summary report: R. P. Fischer; USGS(BRMMR).
Compilation of a summary report on the geology and uranium-vanadium deposits of the Colorado Plateau.

9 Mineral resources, West: L. S. Hilpert; USGS (BRMMR) .
Compilation of mineral resource data for Utah and parts of adjacent states.

Map 11—Mineralogy & Petrology, follows

Igneous and Metamorphic Petrology (IMP), Volcanology (V)

Project

1 (GC,IMP,M) Mineralogy and petrology of the volcanic rocks of the Raton-Clayton region, northeastern New Mexico: J. C. Stormer; UG, NSF, GSA, NMSBMMR.

A study of the chemistry and mineralogy of the volcanic rocks in Colfax and Union counties, including the Raton Basalt, Red Mountain Dacite, Sierra Grande Andesite, Clayton Basalt, and Capulin Basalt.

2 (IMP,M) Mineralogy of the Tertiary phonolite sills of Colfax County, New Mexico: J. C. Stormer; UG.

Microprobe and crystallographic studies of the rare mineral assemblage found in the phonolite sills exposed near Farley, Colfax County, New Mexico. Interpretation of the origin.

3 (M,GC,G) Mineralogy of natrolite occurrence in lamprophyre dikes, Philmont Ranch, New Mexico: E. A. King, Jr.; UH.

Systematic mineralogy and crystallography of large single crystals of natrolite and the genesis of the occurrence.

4 (IMP,GC) Relationship of basalts to Rio Grande rift tectonics: J. Renault, C. Chapin; NMSBMMR.

Petrology and geochemistry of Rio Grande basalts.

5 (M) Mineralogy of copper concentrates of New Mexico: R. Roman; NMSBMMR.

Quantitative mineralogy of flotation concentrates to assist in developing hydrometallurgical process for treating concentrates.

6 (AD,GM,S,SP,SH) Precambrian diamictite and its regional significance, Florida Mountains, New Mexico: L. J. Corbitt; ENMU.

A red to green unmetamorphosed shale containing large exotic clasts, some striated and faceted, of ironstone, limestone, chert, cherty ironstone, lithic sandstone, hematite breccia, granite and diabase appears to be similar to strata extending from southeastern California to Alaska and represents the products of Late Precambrian glaciation.

7 (GC,GP,MRM) Reconnaissance geology of mineral deposits associated with upper Paleozoic sedimentary rocks in Socorro and Torrance counties, New Mexico: G. K. Billings and R. E. Beane and graduate students; NMIMT, NMSBMMR.

8 (GC,IMP,V) Ultramafic nodules in Puerco necks, New Mexico: A. M. Kudo and D. G. Brookins; UNM.

Petrology and geochemistry of nodules to determine their origin.

9 (IMP,M,GM,MRI,SG) Granitic rocks of the Pinos Altos area, northern New Mexico: P. E. Long; SU, NMSBMMR.

Field and laboratory study aimed at determining relationships among Dixon granite and associated igneous rocks, and at tracing late-stage behavior of granitic magmas (and accompanying fluids).

10 (IMP,GM) Metamorphic petrology of the Picuris Range, Taos County, New Mexico: H. Dailey; SMU.

11 (AD,GC,GM,IMP,M) Petrology and geochronology of Cenozoic intrusive rocks, Trans-Pecos Texas and New Mexico: D. S. Barker and L. E. Long; UTA, NSF.

The Cornudas Mountains (Otero County) are included as the extreme northern portion of a tract, extending to Big Bend National Park, being studied by field, mineralogical, chemical, isotopic and experimental methods. The aim is to explain the origin of roughly contemporaneous igneous rocks within a 450-kilometer long segment of crust.

12 (GC,M,MRI,GM) Epithermal zoning: R. G. Worl; USGS(BRMMR).

Geologic mapping and laboratory investigations of the Bishop's Cap fluorspar deposits.

13 (M,MRI) Mineralogy of nonmetallic deposits: B. M. Madsen; USGS(BOFCR).

Study of a core of the Castile Formation from southeastern New Mexico.

14 (IMP,GC) Metamorphism in the southern Rocky Mountains: F. Barker; USGS(BFGP).

Study of Precambrian metabasalt and metarhyolite of northern New Mexico.

15 (IMP,GC,V,SH) Valles Mountains: R. L. Smith; USGS(BFGP).

Examination of road cuts along new logging roads in the Valles caldera and study of cuttings from a 5000 foot drill hole in the caldera. Laboratory studies of the Bandelier Tuff.

16 (GC,IMP,AG) Inclusions of deep-seated origin: H. G. Wilshire; USGS(BAS).

Detailed modal, structural, and textural analyses of mafic and ultramafic xenoliths at Kilbourne and Hunts Hole maar craters in southeastern New Mexico.

Not Plotted (MPNP)

1 (GC,M,SP,HC) Diagenetic alterations in the valley-fill deposits of the Santa Fe and Gila groups: T. R. Walker and graduate students; UC, NSF.

The research will be divided into 3 parts: (1) a study of the geochemical relationships between the ground waters and authigenic minerals (e.g. clays, feldspars, zeolites, etc.) from selected basins. (2) a study of the distribution and textural characteristics of "primary" matrix clay (i.e. mechanically deposited detrital clay) in modern fluvial sands which are likely counterparts of the Late Cenozoic deposits. This part of the investigation will try to establish criteria by which this type of clay matrix can be distinguished in older rocks from authigenic clay matrix that has formed by intrastratal alteration of framework silicate grains. (3) The third phase will involve regional petrographic studies of successively older sequences (recent to late Cenozoic age) of sediments that have been derived from different lithologic types of source areas (i.e. plutonic, votcanic, and sedimentary rocks) to determine the effect of both time and lithology on diagenetic alterations.

2 (M,IMP,MRI,S,SP) Zeolites of New Mexico: R. H. Weber; NMSBMMR.

Distribution, mode of occurrence, genesis, economic potential of zeolite group minerals throughout New Mexico.

STRATIGRAPHY (ST)

Historical Geology (SH), Sedimentation (S), Sedimentary Petrology (SP), Paleontology (P)

Project

1 (SH,S,SP,P,GM) Fauna and sediments of the Zia Sand Formation: C. E. Gawne; CU, AMNH.
A description of the late Arikareean and Hemingfordian faunas collected by Galusha from the Zia Sand Formation (Amer. Museum Novitates No. 2271, 1966), and of the sediments, with paleogeographic and paleoecologic interpretation.

2 (SH,SG,MRP) Pennsylvanian geology of Roosevelt County, New Mexico: W. D. Pitt; ENMU.
Stratigraphic study of buried Pennsylvanian rocks. Isopach and structural contour maps.

3 (SH,SG,MRP) San Andres Limestone of Roosevelt County, New Mexico: W. D. Pitt; ENMU.
Stratigraphic study of buried San Andres limestone. Isopach and structural contour maps.

4 (SH,SG,MRP) Pre-Pennsylvanian geology of Roosevelt County, New Mexico: W. D. Pitt; ENMU.
Stratigraphic study of buried pre-Pennsylvanian rocks. Isopach and structural contour maps.

5 (S,SP,SH,SG) Study of the Lobo-Abo strata in the Fluorite Ridge, Cook's Range area, Luna County, New Mexico: L. J. Corbitt; ENMU.
This investigation is an attempt to understand the relationship between the Lobo-Abo conglomerates in the Cook's Range area and the Hueco Limestone in the Florida Mountains.

6 (SH,S,SP,SG,GM) Paleogeography of parts of New Mexico: W. F. Tanner; FSU.
Paleogeography and geological history of parts of New Mexico (especially the northern half, largely in the areas centered around Las Vegas, El Rito, Cuba, Navajo, Gallup, Thoreau, Grants, Laguna and San Ysidro) (primarily for late Paleozoic and Mesozoic time).

7 (S,SP,SH,P) Reef and backreef beds of Capitan and Magnesian Limestone reefs, New Mexico and County Durham, England: D. B. Smith; IGS, NMSBMMR.
A comparison of these reef and reef-related beds in southeast New Mexico and northeast England.

8 (SH,S,GM,SG,AD,GC,G,GP,IMP,MRI,MRM) Origin of the Rio Grande rift: C. E. Chapin; NMSBMMR.
Compilation and synthesis of geological, geochemical and geophysical data on the Rio Grande rift to derive a model for its origin and evolution.

9 (P) Stratigraphic sections and faunal succession of the El Paso Limestone: R. H. Flower; NMSBMMR, USGS, USNM.
The El Paso embraces all but the very sandy base of the Canadian system. The study of sections, the collecting, preparation and description of fossils has been a work involving some years - roughly from 1951 - but necessarily sporadic. Cephalopods proved significant in the zonation, and on the basis of these forms correlations have been possible with Texas, Colorado, Utah and Nevada, and in a broader sense throughout the world. Problems of collecting, preparing, and final description have been partially dealt with. Materials of special groups have been submitted to various specialists for the conodonts, gastropods, brachiopods, where such help can be obtained. The El Paso consists of a series of discrete faunas; work on them is advanced, but it will be many years before the faunas are completely known. Sparsity of good specimens, and occurrence of specimens where they cannot be extracted are complications. Faunas have thus far been found to be composed largely of undescribed species, though belonging to genera and species groups within genera known elsewhere.

10 (P) Fauna of the Bliss Sandstone: R. H. Flower; NMSBMMR.
The Bliss Sandstone has been studied as to its various faunas. Large collections have been made; specimens are largely photographed. It is evident that the Bliss represents a series of sandy beds, with significant breaks in some places. We can recognize (1) Elvinia zone (2) Billings area zone (3) Franconian deposition, (4) Trempealeauan deposition - present only west of the Black Range front (5) widespread early Canadian deposition.
Completion of the work requires assembly of descriptions and plates, with possibly a revisit to some localities to check previous measurements. Significant sections are described in manuscript.

11 (P) Faunal succession of the Montoya Dolomite: R. H. Flower; NMSBMMR, USGS, USNM.
The Montoya has proved to represent three discrete periods of deposition (1) limited residual beds of possibly Harding equivalence, (2) the Second Value comprising the Cable Canyon Sandstone and Upham Dolomite containing a fauna of Red River age, (3) the Aleman or Par Value of early Richmond age (possibly beginning in the late Maysville), (4) a minor break separates the Cutter of late Richmond age.
Main sections measured and collected; need to collect more for some specific material, and more work is needed on the sections at El Paso and in the Hueco Mountains. Corals have been completed-only a few have turned up since. Illustrations (photographs) advanced on other groups. Conodonts are being submitted to specialists elsewhere. Cephalopod work advanced; brachiopod work has been done elsewhere and so badly that it will have to be done again. Stromatoporids described. The Aleman and most of the Cutter faunas are dominated by silicified brachiopods; extensive etching has been done. A few more sections need to be collected.

12 (SH,SP,MRP,SG,GM) Stratigraphy of northeastern New Mexico: R. W. Foster; NMSBMMR.
Correlation, facies, depositional

environment, and petroleum potential of Mesozoic and Paleozoic rocks.

13 (SH,SG,MRP) Subsurface stratigraphy of east-central New Mexico: R. W. Foster, R. M. Frentress and W. C. Riese; NMSBMMR, NMGS.
Stratigraphic summary of potential petroleum province.

14 (SH) Stratigraphy of the Las Vegas, New Mexico area: W. Bejnar and F. E. Kottlowski; NMHU and NMSBMMR.
Detailed stratigraphy of Paleozoic, Mesozoic, and Cenozoic rocks.

15 (P,SH,S) Microfauna of Upper Cretaceous strata in southwest San Juan Basin: R. H. Lessard; NMHU, NMSBMMR.
Marine micro fauna, mainly foraminifera and ostracods, will be used to help date marine transgressions and regressions.

16 (SH,S,SG,GM) Origin of the Popotosa Formation, Socorro County, New Mexico: J. Bruning; NMIMT, NMSBMMR.
Stratigraphy, areal extent, and litho-Logic characteristics of the Popotosa Formation (Miocene-Pliocene) and its relationship to the Late Tertiary structural history of central New Mexico.

17 (S,SP,SH) Petrographic correlation of the Ordovician El Paso Group: S. Lanphere; NMIMT, NMSBMMR.
A petrographic study to determine if the EL Paso Group can be recognized on a petrographic basis and if correlations can be made by using petrographic zonations. The primary goal being a method of recognizing and correlating the El Paso from well cuttings. The principal study area includes the San Andrei Mountains and the Jornada del Muerto in south-central New Mexico and the Franklin Mountains in Texas.

18 (SH,S,P,MRM,MG) Stratigraphy and sedimentary petrology of Paleozoic formations in the Magdalena Mining District, Socorro County, New Mexico: W. T. Siemers; NMIMT, NMSBMMR.
A stratigraphic and petrologic investigation of Paleozoic formations in the Magdalena area with emphasis on their control of base-metal replacement deposits.

19 (P) Morrowan fusulinids of the type Derryan (Derry Hills, New Mexico) and the type Marble Falls (Texas): W. E. King; NMSU.

20 (S,SP,GM) Origin of chert in Mississippian Lake Valley Formation, Sacramento Mountains, New Mexico: W. A. Myers; RU.

21 (S,SP,P,SH) Reef facies in Big Hatchet Mountains: M. Schüpbach and J. L. Wilson; RU, NMSBMMR.
Study of Late Paleozoic basinal and slope facies and organic composition of shelf margin bioherms.

22 (S,SP,GM) Deposition and diagenesis of cyclic carbonates in Lower Permian Laborcita Formation, Sacramento Mountains, New Mexico: P. Winchester; RU.

23 (SP,SH,S) Sedimentary petrography and depositional environments of the Bell Canyon Formation in the Delaware Basin: M. W. Payne; TAM.
Information obtained primarily from well cores will be integrated and compared to recent depositional models. Petrography will be studied qualitatively and also with discriminant function analysis to evaluate it as an environmental indicator.

24 (S,SP,SH) Cretaceous stratigraphy; western New Mexico and adjacent areas: E. R. Landis ; USGS(BOFCR).
Study of the Lower part of the Cretaceous sequence in west-central New Mexico, adjacent Arizona, and southwestern Colorado to determine the geometry, lithology, depositional environment, and shore-line trends.

25 (SH,SP,MRP) Fuels potential of Lower Paleozoic of southern Arizona and New Mexico: P. T. Hayes; USGS(BOFCR).
Petrographic study of surface sections in southern Arizona and New Mexico and examination of cuttings and electric logs of selected drill holes. Isopach and facies maps.

26 (P,SH,GM) Mississippian biostratigraphic studies: A. K. Armstrong; USGS(BPS).
Geologic mapping and detailed biostratigraphic studies of the Carboniferous carbonates of southeast Arizona and southwest New Mexico.

27 (P,SH) Investigation of Lake Valley (Mississippian) crinoids at Lake Valley and in the Sacramento Mountains: D. B. Macurda, Jr.; UM, NMSBMMR.

28 (S,SP,P) The use of daily growth lines in Aviculopecten in the study of fossil population dynamics and paleoecological reconstruction of a Pennsylvanian lagoonal sequence: J. F. Dillon; UNM.

29 (P) Dark Canyon Cave, Guadalupe Mountains, New Mexico: E. L. Lundelius, Jr.; UTA.
Description of a rich assemblage of Pleistocene mammals.

30 (SH,S,SP,P) Florida Mountains Formation: D. V. LeMone and R. H. Flower; UTEP and NMSBMMR.
Stratigraphy, depositional environments, sedimentary petrology and paleontology of a part of the El Paso Group.

31 (SP,S,SH,P) Genesis of the Rancheria and Las Cruces (?) formations (Mississippian) of south-central New Mexico and adjacent parts of West Texas: D. A. Yurewicz; UWI, NMSBMMR.
Depositional environment and diagenesis, Franklin, Hueco, and Sacramento mountains area.

32 (P,SH) Evolution of land plants found in the Late Triassic Chinle Formation of southwestern United States: S. R. Ash; WSC.
This project centers on a study of land plants found in the Late Triassic Chinle Formation of southwestern U.S. It seeks to obtain new data on the evolution of land plants for a geologic time period notable for its paucity of fossil floras. However, the development of new techniques to study cuticles of Leaves permits a new look at known fossils and opens the door to new insights into Triassic Land plant history. This study of cuticular and epidermal structures is expected to add significantly to our meager knowledge of

Triassic flora and of plant evolution during a very critical time in plant history.

33 (P,S,SP,SH) Sedimentology and trace fossils of Dakota Formation, north-central New Mexico: C. T. Siemers, with G. Flesch and R. Ruetschilling; UNM.

Detailed study of sedimentary facies of Dakota Formation and overlying and underlying formations. Emphasis on stratigraphy, sedimentology, and paleontology (mainly trace fossils) with conclusions on environment of deposition.

34 (S,GC) Origin of clay matrix in arid region; Recent and Quaternary alluvial sediments: A. Crone; UC.

Not Plotted (STNP)

1 (P) Fossil Perifera from the Permian and Ordovician: J. K. Rigby; BYU.

Systematic and paleoecologic investigations are being conducted on a recently collected Capitanian fauna near Carlsbad. Ordovician sponges and sponge-like forms occur in several outcrops of the El Paso Group and are being described and evaluated from a paleoecologic viewpoint.

2 (P) Regional correlation of cephalopod faunas: R. H. Flower; NMSBMMR, USNM, GSC, USGS, BMNH, GSGB, and others.

This involves collecting, preparing and describing large amounts of material, with other specimens submitted for study by various institutions and individuals; parallel with this is correlation of cephalopod faunas and ranges of genera and species. Results indicate a combination of (1) cephalopod types of widespread stratigraphic value (2) cephalopods confined to or extending beyond limits of faunal provinces determined largely on the basis of other fossils.

3 (P) Permian floras, southwestern United States: S. H. Mamay; USGS(BPS).

Collection and study of Permian plants and associated organisms from known fossiliferous localities and reconnaissance for new localities in New Mexico.

4 (P,SP,SH) Cretaceous faunas and stratigraphy; Western Interior: W. A. Cobban; USGS(BPS).

Study of sandstones in the lower part of the Mancos Shale in western New Mexico and northeastern Arizona.

5 (P,SH) Mesozoic palynology; western United States: B. D. Tschudy; USGS(BPS).

Study of Late Cretaceous palynomorph assemblages from the Gasbuggy cores from the San Juan Basin.

MISCELLANEOUS (MISC)

Not Plotted

Project

1 Scenic trips to the geologic past: Las Vegas, New Mexico area: W. Bejnar; NMHU, NMSBMMR.
Road logs with geologic notations on all paved highways leading out of Las Vegas, New Mexico.

2 A History of Mining in New Mexico: P. W. Christiansen; NMIMT, NMSBMMR.
Historical review of mining activity during Indian, Spanish, and American periods. The people, companies, towns, and development of the mining districts.

3 Bibliography of New Mexico Geology and Mineral Technology, 1966-1970: M. Koehn and H. Koehn; NMSBMMR.

4 Bibliography of Solid Waste Stabilization: J. E. Lease; NMSU, NMSBMMR.

5 State Park Brochures: Staff; NMSBMMR, SPRC.
Preparation of guides to the geology and other features of New Mexico's state parks.

6 Annual Report: New Mexico State Bureau of Mines and Mineral Resources: Director; NMSBMMR.
Summary of current activities and publications of the past fiscal year.

7 Annual Report of Commissioner of Public Lands: State Land Commissioner; SLO.
Summary with statistical data *on land income and revenue distribution.*

8 Annual Report by the State Inspector of Mines: SIM.
Mineral statistics for metals, nonmetallics, sand, gravel, clay, caliche, and coal. Directory of mines and number of employees.

9 Monthly statistical report: OCC, OGEC.
Monthly allowables, production and disposition, pool creations and bottom hole pressures.

10 Annual report of the New Mexico Oil and Gas Engineering Committee: OCC.
Statistical monthly, annual, *and cumulative oil, gas, and water production by county, pool, and operator.*

11 Biennial report of the State Engineer: SE, ISC.
Summary of administration of water rights, water-resource investigations, resource conservation and development, saline water resources, etc.

12 The impact of water technology on the history of New Mexico: P. W. Christiansen; NMIMT, WRRI.
Determining the level of technology applied to the quest for the development of water. Evolution of scientific ideas in geology and hydrology.

13 (HR) Preliminary evaluation of Professor C. E. Jacob's contributions in the field of water resources in New Mexico: W. Brutsaert; NMIMT, WRRI.

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