MISCELLANEOUS FIELD STUDIES MAP MF-900F Zn, HILLSBORO AND SAN LORENZO QUADS., NEW MEXICO DEPARTMENT OF THE INTERIOR UNITED STATES GEOLOGICAL SURVEY CORRELATION OF MAP UNITS SURFICIAL DEPOSITS SEDIMENTARY AND VOLCANIC ROCKS METAMORPHIC ROCKS Tri | Trs | Tas | TERTIARY  $Tq1 \mid Ta \mid Trsd \mid TERTIARY$ Ka Kqly CRETACEOUS Pzu } PALEOZOIC LIST OF MAP UNITS Qs UNCONSOLIDATED SEDIMENTARY DEPOSITS (QUATERNARY) QTs GILA AND SANTA FE FORMATIONS (QUATERNARY AND TERTIARY) QTb BASALTIC LAVA AND GILA AND SANTA FE FORMATIONS (QUATERNARY AND Tv LAVAS AND ASH-FLOW TUFFS (OLIGOCENE) Tr Tr1 Trn RHYOLITE FLOWS AND DOMES (OLIGOCENE) Tri | Trs | RHYOLITE PLUGS, STOCKS AND SILLS (OLIGOCENE) Tas | ANDESITE SILLS AND DIKES (OLIGOCENE) Tq1 | QUARTZ LATITE DIKE OR SILL (OLIGOCENE?) ANDESITE SILLS (OLIGOCENE?) rsd RHYOLITE SILLS AND DOMES (OLIGOCENE?) ANDESITE DIKES AND SILLS (UPPER CRETACEOUS) QUART MONZONITE, GRANITE, MONZODIORITE AND DIORITE (UPPER CRETACEOUS) QUARTZ LATITE DIKES OF COPPER FLAT (UPPER CRETACEOUS) ANDESITIC FLOWS OF COPPER FLAT (UPPER CRETACEOUS) BEARTOOTH QUARTZITE (UPPER? CRETACEOUS) Pzu UNDIVIDED SEDIMENTARY ROCKS (PALEOZOIC) p€u UNDIVIDED GRANITIC AND HORNBLENDIC ROCKS (PRECAMBRIAN) ----- CONTACT--Dotted where concealed FAULT--Dashed where approximately located; dotted where concealed. Where known, ball and bar on the downthrown side. U, upthrown side; D, downthrown side ANTICLINAL AXIS--Showing crestline. Dashed where approximately GEOCHEMICAL EXPLANATION MAGNETIC (M-1) FRACTION--Isopleths approximately delineate source basins of stream sediments containing anomalous amounts of zinc in the magnetic (M-1) fraction. Hachures indicate low areas within anomalies; queried where control is lacking  $Zinc--\geq 2,000 ppm$ Zinc-->5,000 ppm NONMAGNETIC (NM-1) FRACTION--Patterned areas approximately delineate source basins of stream sediments containing anomalous amounts of zinc in the nonmagnetic (NM-1) fraction. Sample localities indicated by Zinc-->1,000 ppmZinc-->10,000 ppmM-1 FRACTION METAL CONTENT IN PARTS PER MILLION NM-1 FRACTION APR. 6 1978 7 IBRAR METAL CONTENT IN PARTS PER MILLION HISTOGRAMS SHOWING ZINC DISTRIBUTION, Geology mapped by D. C. Hedlund, 1977 Number of samples, 1,102; N, metal value in sample is below spectrographic detection limit; L, metal detected in sample but Base from U.S. Geological Survey value is below the lowest spectrographic standard for this metal. Hillsboro, 1940 and San Lorenzo, 1956, 1:62,500 Watts, K. C., Alminas, H. V., and Kraxberger, V. Grimes, D. J., and Marranzino, A. P., 1968, REFERENCES To the southwest, sporadic anomalous zinc samples collected in this area contain anomalous E., 1977, Map showing areas of detrital andesites adjacent to the quartz monzonite stock Zinc anomaly patterns of the two fractions Direct-current arc and alternating-current The nonmagnetic (NM-1) fraction is composed DISCUSSION concentrations occur in the magnetic (M-1) and amounts of zinc in the magnetic (M-1) fraction. fluorite and cassiterite, and the localexposure on Copper Flat. A few anomalous zinc complement each other spatially. Nonmagnetic spark emission spectrographic field methods dominantly of light-colored rock-forming acces-Alminas, H. V., and Watts, K. C., 1977, nonmagnetic (NM-1) fractions along a northeastities of rock samples, Hillsboro and San The Pierce Canyon fault zone is characterized by (NM-1) fraction zinc anomalies generally occur values in this fraction occur in areas of for the semiquantitative analysis of geosory minerals and primary and secondary ore Interpretive geochemical map, Hillsboro and This map shows the distribution of anomasouthwest trending line just south and and west numerous small rhyolite porphyry intrusives. Lorenzo quadrangles exclusive of the Black along through-going solution pathways and in jasperoid and limestone to the north and south logic materials: U.S. Geol. Survey Circ. San Lorenzo quadrangles exclusive of the lous zinc in the two sample fractions magnetic DECLINATION of the Grandview fault zone and its extension. Talc alteration has been reported at various Range Primitive Area, Sierra and Grant of the randesite area. The main part of the nonareas of predominant Paleozoic rocks. The mag-Black Range Primitive Area, Sierra and 591, 6 p. (M-1) and nonmagnetic (NM-1) plotted on a base Structural control, not visible at the surface, localities along its strike (D. C. Hedlund, oral Counties, New Mexico: U.S. Geol. Survey magnetic (NM-1) fraction anomaly coincides with netic (M-1) fraction anomalies, resulting from Grant Counties, New Mexico: U.S. Geol. Harley, G. T., 1934, The geology and ore Analytical Methods which includes sample localities, topography, is believed to have resulted in the localization commun., 1974), and a number of small mines and Misc. Field Studies Map MF-900 H. the central and northern portions of a more uniform permeation of host rock, are more deposits of Sierra County, New Mexico: New Survey Misc. Field Studies Map MF-900 G. and generalized geology from Hedlund (1975a, b). of the geochemical dispersion patterns. prospects are found on or near this structure. Watts, K. C., Alminas, H. V., Nishi, J. M., and pronounced aeromagnetic high centered some 2 extensive in areas covered by volcanic rocks. Mexico Bur. Mines and Mineral Resources Alminas, H. V., Watts, K. C., Griffits, W. R., Elements were determined by a semiquanita-It is part of a series of maps for several The Rose Mine area (southwestern corner of Crim, W. C., 1977a, Map showing anomalous A north-south trending system of aeromagnetic miles (3.2 km) southwest of the Copper Flat Siems, D. L., Kraxberger, V. E., and Curry, Bull. 10, 220 p. tive spectrographic method described by Grimes metals that accompany this folio. Distribution the map) encompasses the uplifted block on the tungsten and gold distribution in stream lows, presumably resulting from uplifted limestock exposure. Anomalous amounts of zinc in Geochemical implications of sample fractions K. J., 1975, Map showing anomalous distri-Hedlund, D. C., 1975a, Geologic map of Hillsboro and Marranzino (1968). Results of these specof zinc values in each fraction are shown on the southwestern side of the Mimbres fault. Intense stone, occur to the east of and parallel to the sediment concentrates, Hillsboro and San the magnetic (M-1) fraction were found in only quadrangle, Sierra and Grant Counties, New trographic analyses are reported within geobution of tungsten, fluorite and silver accompanying histograms. and extensive magnetic (M-1) fraction zinc two samples collected in Wicks Gulch and Ready Lorenzo quadrangles exclusive of the Black Limonite and manganese oxides containing fault zone. Mexico: U.S. Geol. Survey Open-File Rept. stream-sediment concentrtes from the Sierra metric intervals having boundaries 1,200, 830, anomalies occur in the jasperoidal limestones in The Grandview fault zone and its extension, Range Primitive Area, Sierra and Grant high trace metal values occur in the magnetic 560, 380, 180, 120, and so on in ppm, but are Cuchillo-Animas uplifts and adjacent areas, Sample Type an northwest-southeast-trending belt to the west \_\_\_\_1975b, Geologic map of San Lorenzo, Sierra constituting the western boundary of the anomaly Counties, New Mexico: U.S. Geol. Survey An extensive genetically related and (M-1) fraction and are derived from joint southwestern New Mexico: U.S. Geol. Survey shown in the histograms by approximate geometric of the fault. Nonmagnetic (NM-1) fraction zinc system, is indicated by more intense and Misc. Field Studies Map MF-900 I. structurally controlled lead and molybdenum and Grant Counties, New Mexico: U.S. Geol. surfaces, fractures, and very often, dispersions midpoints such as 1,000, 700, 500, 300, 200, Misc. Inv. Map I-880. This sample material consists of that por-\_\_\_\_1977b, Map showing anomalous lead distrianomalies are much lower than the magnetic (M-1) extensive, nonmagnetic (NM-1) fraction zinc anomaly system in the central portion of the map in volcanic caprock. This material is then Survey Open-File Rept. 75-109. 150, and 100. Precision of a reported value is Alminas, H. V., Watts, K. C., Siems, D. F., and tion of pan-concentrated stream sediment having fraction anomalies and more peripheral. A large anomalies than those along the eastern margin. \_\_\_\_1977a, Geologic map of the Hillsboro and bution in stream sediment concentrates, (T. 16-18 S., R. 8-9 W.) is only partly mechanically transported to the stream bed. The Kraxberger, V. E., 1977a, Map showing approximately plus or minus one interval at 68 a specific gravity greater than bromoform. aeromagnetic high is centered between the main They occur between the Royal John Mine in the San Lorenzo quadrangles, Sierra and Grant trace metal rich limonite and manganese oxides delineated by by anomalous zinc values in the Hillsboro and San Lorenzo quadrangles percent confidence, or plus or minus two anomalous silver distribution in stream Prior to bromoform separation, magnetite was portion of the magnetic (M-1) fraction zinc south and Iron Creek to the north. Only two are believed to result from processes associated magnetic (M-1) and nonmagnetic (NM-1) fractions. Counties, New Mexico: U.S. Geol. Survey exclusive of the Black Range Primitive sediment concentrates, Hillsboro and San intervals at 95 percent confidence. removed from the pan concentrate with a hand anomaly in the northwest and the smaller samples, out of all the samples collected near Area, Sierra and Grant Counties, New The lead-molybdenum anomaly system is roughly Misc. Field Studies Map MF-900 A. with mineralization. Much of the limonite is Lorenzo quadrangles exclusive of the Black Zinc concentrations that are one specmagnet and discarded. The remaining heavy minpatterns to the southeast. Anomalous nonmag-\_\_\_\_\_1977b, Mineral resources map of the the Royal John Mine, contain anomalous zinc in Mexico: U.S. Geol. Survey Misc. Field rectilinear consisting of east-west and trographic reporting interval above the highest pseudomorphic after pyrite. In areas where this Range Primitive Area, Sierra and Grant erals were then separated magnetically into a netic (NM-1) fraction zinc values in the the magnetic (M-1) fraction within this fault trace metal rich limonite is found, it may be Hillsboro and San Lorenzo quadrangles, northwest-southeast trending anomalies that Studies Map MF-900 J. values in the background range, of the various Counties, New Mexico: U.S. Geol. Survey magnetic (M-1) and nonmagnetic (NM-1) fraction. Shingle Canyon area are the result of detrital \_\_\_\_1977c, Map showing anomalous bismuth Sierra and Grant Counties, New Mexico: derived from weathered primary halos of intersect in the vicinities of Noonday Peak, PA lithologies within the map area, are defined as Misc. Field Studies Map 900 C. The magnetic (M-1) fraction is that portion of trains in streams draining the Georgetown mining Mountain, Seven Brothers Mountain, Log Cabin A discontinuous, semicircular nonmagnetic distribution in stream sediment concendisseminated pyrite and accompanying high trace U.S. Geol. Survey Misc. Field Studies Map \_1977b, Map showing anomalous copper distrianomalous. On this basis, detectable (L) zinc such material not magnetic at 0.1 ampere, but district to the west of the map margin. (NM-1) fraction Zn anomaly occurs to the west metals that may indicate buried mineral trates, Hillsboro and San Lorenzo quad-Peak and Ladrone Gulch. in the nonmagnetic (NM-1) fraction and zinc bution in stream sediment concentrates, magnetic at a 1.0 ampere setting on a Frantz A northeast-southwest-trending belt of and northwest of the town of Kingston extending rangles exclusive of the Black Range The most extensive zinc anomaly in the Kuellmer, F. J., 1955, Geology of a disseminated concentrations  $\geq 2,000$  ppm in the magnetic (M-1) Hillsboro and San Lorenzo quadrangles Isodynamic Separator (forward slope 25°, side magnetic (M-1) fraction zinc anomalies occur to from Emory Pass in the west to North Percha magnetic (M-1) fraction occurs in the Noonday Primitive Area, Sierra and Grant Counties, High metal concentrations in the nonmagcopper deposit near Hillsboro, Sierra fraction, are defined as anomalous. In most exclusive of the Black Range Primitive slope 15°). The nonmagnetic (NM-1) fraction is the north of Hendricks Peak and Rabb Park. This Creek in the northwest. The zinc anomaly in the New Mexico: U.S. Geol. Survey Misc. Field netic (NM-1) fraction occur where primary and Peak area, the southernmost of the anomaly County New Mexico: New Mexico Bur. Mines instances, a sample anomalous in zinc is also one that is not magnetic at a 1.0 ampere set-Area, Sierra and Grant Counties, New geochemical pattern can also be seen in bismuth magnetic (M-1) fraction is low and restricted to Studies Map MF-900 K. secondary ore minerals are exposed at the surintersections. Anomalous zinc values in the and Mineral Resources Circ. 34, 46 p. anomalous in at least one of the seven other Mexico: U.S. Geol. Survey Misc. Field and copper and is believed to be controlled by a \_\_\_\_comp., 1956, Geologic map of Hillsboro Peak magnetic (M-1) and nomagnetic (NM-1) fractions Weissenborn, A. E., 1948, A new occurrence of face and mechanically enter the stream bed. the area between the headwaters of Sawpit Canyon elements shown on one of the companion maps. Studies Map 900 D. The major mineral composition of these two buried fault in this area. Less extensive occur intermittently along the northwestand the town of Kingston. The highest zinc helvite [New Mexico]: Am. Mineralogist, v. 1977c, Map showing anomalous molybdenum thirty-minute quadrangle: New Mexico Bur. heavy mineral fractions was determined visually Zinc values range from not detected (N) nonmagnetic (NM-1) fraction zinc anomalies in northeast and east-west trending lead and concentrations occur in the nonmagnetic (NM-1) 33, nos. 9-10, p. 648-649. Description of Anomalies Mines and Mineral Resources Geologic Map 1. through >20,000 ppm in both fractions. Zinc was distribution in stream sediment concenwith a binocular microscope. The magnetic (M-1) the immediate vicinity of Hendricks Peak and fraction from samples collected near the Gray molybdenum anomalies. U.S. Geological Survey, 1974, Aeromagnetic map found in anomalous concentrations in 90 of the trates, Hillsboro and San Lorenzo quadfraction is comprised dominantly of limonite, Rabb Park are believed to be related to a Eagle Mine, Ladrone Gulch, and Sawpit Canyon. The Pierce Canyon fault zone constitutes Anomalous amounts of zinc are found predomof parts of Silver City and Las Cruces 1 magnetic (M-1) concentrates or 3.2 percent from manganese oxide, and mafic rock forming rangles exclusive of the Black Range combination of through-going fractures and An aeromagnetic high-low couple in the area of inantly in the nonmagnetic (NM-1) fraction in the eastern margin of the anomaly system. by 2° quadrangles, southwestern New Mexico: the 1,102 sample sites within the map area. Primitive Area, Sierra and Grant Counties, minerals. High trace metal values occurring in concealed intrusives. Intermittent zinc anomalies in the nonmagnetic the Copper Flat area (northeastern corner of the the Picket Spring Canyon headwaters appears to U.S. Geol. Survey Open-file report. Anomalous zinc concentrations were found in 116 New Mexico: U.S. Geol. Survey Misc. Field the magnetic (M-1) fraction are generally conbe centrally located with respect to the map). The nonmagnetic (NM-1) fraction anomaly (NM-1) fraction occur along the fault zone tained in limonite or in the manganese oxides. of the nonmagnetic (NM-1) concentrates or 10.5 Studies Map MF-900 E. is intermittent and trends northeastward along a between Signal Peak in the south and Tierra geochemical anomaly pattern.

Blanca Mountain to the north. None of the

swarm of quartz latite dikes intruding the

percent from the 1,102 sample sites within the

map area.