UNITED STATES DEPARTMENT OF THE INTERIOR
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Methodology, Statistical Summary, and Listing of Analyses of Geochemical Samples, Lower San Francisco River Wilderness Study Area and Contiguous Roadless Areas (RARE II), Catron and Grant Counties, New Mexico, and Greenlee County, Arizona

By

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This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature. Any use of trade names is for descriptive purposes only and does not imply endorsement by the USGS.

STUDIES RELATED TO WILDERNESS

The Wilderness Act (Public Law 88-577, September 3, 1964) and related acts require the U.S. Geological Survey and the U.S. Bureau of Mines to survey certain areas on Federal lands to determine their mineral resource potential. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a geochemical survey of the Lower San Francisco Wilderness Study Area and Contiguous Roadless Areas in the Apache National Forest, Greenlee County, Arizona, and Gila National Forest, Catron and Grant Counties, New Mexico. The Roadless Areas were classified as proposed wilderness and further planning areas during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

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INTRODUCTION

A geochemical reconnaissance investigation was undertaken in the Lower San Francisco River Wilderness Study Area and Contiguous Roadless Areas. The chief purpose of this investigation was to provide a geochemical basis or "framework" for a mineral resource appraisal of the area. This report presents the procedures and rationale of the sampling program; sample preparation and analytical procedures; a statistical summary of the data obtained; and, a complete listing of the data.

The Lower San Francisco River Wilderness Study Area and Contiguous Roadless Areas consist of 25,560 acres (1600 km^2) in a strip between 1 and 6 mi (2–10 km) wide along a 20–30 mi (30–50 km) stretch of the San Francisco River in Catron and Grant Counties, New Mexico and Greenlee County, Arizona (Fig. 1). The proposed wilderness is almost equally divided between the two states, but the Contiguous Roadless Areas are entirely in New Mexico. Thus the survey area essentially encompasses the area of the San Francisco River canyon, from rim to rim, from U.S. Highway 180 in New Mexico to the mouth of the Blue River in Arizona. Clifton, Arizona is the closest town down river, about 10 mi (15 km) from the west edge of the survey area, and Glenwood, New Mexico is about 5 mi (8 km) up river from the area (fig. 1). Elevations along the San Francisco River range from about 4500 ft (1370 m) at the east edge of the survey area to about 3500 ft (1160 m) at the mouth of the Blue River at the west end. Elevations along the rim of the inner gorge of the San Francisco canyon are generally between 5900 (1800 m) and 6000 ft (1830 m), but where the rim breaks back from the river along tributary canyons elevations along the rim are somewhat higher.

GEOLOGY

Within the Lower San Francisco Wilderness Study Area and Contiguous Roadless Areas, the San Francisco River has cut a spectacular steep-walled canyon nearly 2000 ft (600 m) deep in volcanic rocks of middle Tertiary age. The volcanic rocks are mainly andesite and basalt lava flows and subordinate rhyolite flows and pyroclastic rocks. Volcaniclastic sedimentary rocks are interlayered with the volcanic rocks. The rock sequence is capped in some places by fanglomerate and conglomerate of the Gila Conglomerate. Volcanic vents and other centers of volcanic activity are exposed along the San Francisco River canyon within and adjacent to the Wilderness Study Area and Contiguous Roadless Areas.

The area shown in figure 1 lies within the transition zone between the relatively stable Colorado Plateaus and the more tectonically active Basin and Range structural and physiographic provinces. The transition zone was the site of intensive faulting and intrusion during Laramide time (Late Cretaceous to early Tertiary), which was the time when most of the important copper deposits of the southwestern United States were formed. In middle Tertiary time, large volumes of basaltic to rhyolitic volcanic rocks were erupted along the transition zone, and subvolcanic intrusive centers associated with this volcanism commonly have ore deposits of precious metals, base metals, and fluorite, and indications of tin mineralization.

Little mining activity has occurred within the Wilderness Study Area and Contiguous Roadless Areas, however, and at the time of this investigation, there were no active mining claims within the area (Michael Lane, U.S. Bureau of Mines, oral commun., 1979).

METHODS

Sampling and sample-preparation methods

This geochemical sampling program utilized a combination of rock samples and three sample media derived from stream-sediment samples. Rock samples may be considered a local sample representing only the vein, fault, or altered area from which the sample was taken. Stream-sediment samples, however, are composite samples and represent the entire drainage basin or catchment area above the sample site. In addition to the principal sample media, a few water samples were taken. The ground and spring waters may reflect the bedrock conditions to the depth to which these waters circulate.

Samples were taken during helicopter, jeep, and foot traverses intermittently from 1978 through 1982. All of the stream-sediment sampling was done in the fall of 1979.

Rock samples

Rock samples were taken where appearance or structure indicated the possibility of detecting mineralization or suites of elements related to mineralization. Prospects, faults, veins, dikes, and altered-appearing rocks were sampled when found, but no attempt to systematically sample rocks was made. Rock samples consisted of grab and composite chip samples, and were collected within and adjacent to the Wilderness Study Area and Contiguous Roadless Areas. These samples were mechanically crushed and pulverized to <150 mesh (<0.10 mm), then analyzed.

Stream-sediment samples

Most of the alluvial samples were collected from tributaries of the San Francisco River near the junction of the tributary with the river. The majority of these tributaries are small and have catchment areas within the boundaries of the Wilderness Study Area and Contiguous Roadless Areas. A few tributaries, however, extend beyond the survey area. Stream-sediment samples from these tributaries are a composite of alluvium that had its source both inside and outside the boundaries of the survey area. Additionally, some samples were taken from tributaries outside of the proposed boundaries to aid in the evaluation of the area.

At each sample site, two samples were taken. The first sample consisted of about 12 pound (5 kg) of bulk alluvium collected for the purpose of panning a heavy-mineral concentrate. The use of heavy minerals in geochemical exploration, especially the use of magnetically separated heavy-mineral fractions, is particularily suited to bedrock areas of the Southwest (Hassemer and others, 1979; Watts and others, 1978). The second sample consisted of about 1 lb (1/2 kg) of alluvial material collected for the purpose of obtaining a sieved (fine-grained) sediment fraction.

Heavy-mineral concentrate samples — Where possible, the sample of bulk alluvium was collected across the full width of the active drainage channel, and as deep and close to underlying bedrock as practicable. If the active sediment channel was more than 1 foot (0.3 m) wide, the sample was composited from a series of random sites across the full width.

If a choice of channel locations was possible, the sample was taken from the center of a long, flat run; if the stream had a stepped-bed morphology, the sample was taken between the steps. In intermittent high-energy streams, such locations are most likely to be that portion of the alluvial channel where the flat-bed (plane-bed) condition of the upper flow regime would occur. This bed-form configuration has been shown to have the least amount of sorting in the heavy minerals (Brady and Jobson, 1973). Such poorly sorted accumulations should contain the maximum variety (widest range of specific gravities) of heavy minerals that are conveniently obtainable.

Because the sample collection procedure was designed to obtain a maximum variety of heavy minerals, and hence the widest range of mineralization, the procedure may not apply equally well to all metal occurrences. For example, due to the poor spectrographic detection limits for gold and because it is not always feasible to dig deep enough to obtain gold, its presence in certain areas could very well have gone undetected.

Another problem inherent to panned concentrates is the possible loss of the very fine-grained minerals. In an extensive study of 113,000 panned concentrates collected from a 19,000 mi^2 (50,000 km^2) area in the Massif Armoricain, Guiges and Devismes

(1969, p. 76) found that it was impossible to recover conveniently, minerals whose dimensions were less than 0.004 inch (0.1 mm), and they warn that there may be poor detection of those minerals that are smaller than these dimensions. Poor recovery of metallized heavy minerals could result in sporadic values indicating weaker mineralization than may actually be present. Both fine-grained silver mineralization and fine-grained gold mineralization is known to occur in the Steeple Rock district (Griggs and Wagner, 1966) less than 20 mi (30 km) south of the survey area. Evidence that the precious-metal mineralization present in the survey area may be fine-grained is suggested by the detection of precious metals in sediment samples only in the fine-grained media, the <80-mesh sample (described below, this section) and the short-weight nonmagnetic sample (described below, this section and analytical methods section).

The factors that affect the recovery of the fine-grained minerals include the specific gravity of the mineral, the particle shape, the particle size, and the settling time allotted per sample during the heavy-liquid separation process (Tourtelot, 1968). Surprisingly, the experience of the panner beyond the initial learning process has little effect on overall recovery rates of the heavy minerals (Theobald, 1957).

Panning is the first of a number of processing steps and is performed for several reasons: first, panning removes the organic, and fine- to clay-size materials which might otherwise act as a cement to bind the heavy-mineral grains together, or which might act as a coating agent and prevent the identification of the mineral grains. Second, the panning greatly reduces the volume of material that needs to be processed during the heavy-liquid separation step. Finally and most importantly, panning reduces the proportions of barren material relative to the minerals of interest. The minerals of interest are those ore-related ones, which generally have a high specific gravity. By physically concentrating those minerals related to mineralization, the metal values obtained are greatly enhanced. This enhancement is increased even more in several of the following processing steps which further isolate the minerals of interest:

(1) Air and(or) low-heat dried.
(2) Sieved to <14 mesh (<1.2 mm); coarse discarded.
(3) Preliminary removal of magnetite by hand magnet; magnetite discarded.
(4) Bromoform separation; light fraction (specific gravity <2.85) discarded.
(5) Washed with acetone and dried.
(6) Further removal of magnetite by hand magnet; magnetite discarded.
(7) Electromagnetic separation using a Frantz Isodynamic Separator at 0.1 amp and 1.0 amp (forward setting 25°, side setting 15°). The magnetic at 0.1-amp fraction (mainly residual magnetite) is discarded. The final setting at 1.0 amp yielded the two fractions to be analyzed:
   (a) <u>Nonmagnetic at 1.0-amp (NM-1) fraction</u>—The fraction where most of the major rock-forming minerals have been removed leaving such minerals as sphene, apatite, and zircon in unmineralized areas; calc-silicate minerals in skarn zones; and in mineralized zones, most of the common, primary and secondary ore minerals—sulfides, sulfates, sulfosalts, carbonates, and halides. Such minerals as galena, chalcopyrite, smithsonite, cerargyrite, gold, barite, fluorite, and cassiterite, <u>if they are present</u>, will be found in this fraction.
   (b) <u>Magnetic at 1.0 amp-(M-1) fraction</u>—The fraction that contains the heavy mafic rock-forming minerals such as biotite, amphibole, and pyroxene. More importantly, this fraction contains the manganese and iron oxides, including limonite derived from sulfides. Such minerals as pyrolusite, wolframite, specular hematite, columbite, and gossan minerals, <u>if present</u>, will be found in this concentrate fraction.
(8) Microscopic examination for mineralogy (in general, a brief scan) and assessment of processing quality.
(9) Pulverization to <150 mesh (<0.10 mm) using an agate mortar and pestle.

(10) Analysis by semiquantitative emission spectrography.

Sieved-sediment sample — The second stream sediment sample consisted of about 1 lb (1/2 kg) of alluvial material from which the larger pebbles were removed and was collected into a geochemical sample envelope. This sample was subsequently air-dried, sieved to <80 mesh (<0.177 mm) using a mechanical sieve shaker and stainless steel sieves, then analyzed.

Although the fine-grained material is concentrated in the sieving process, the <80-mesh sample lacks the strong enhancement characteristics of the concentrate samples, in general showing either greatly reduced anomalies, both in metal values and in areal extent, or showing no anomalous metal values at all. The reduced anomaly characteristic of the <80-mesh sample seems to apply to this geochemical survey area (Tables 2, 3). For those unfamiliar with these sample media, additional comparisons of <80-mesh samples and magnetically separated, heavy-mineral samples collected in southern New Mexico may be found in Watts and others (1978, Table IV) and in Griffitts and Alminas (1968, Fig. 3).

The <80-mesh sample was taken for several reasons: the possibility of detecting fine-grained mineralization, discussed above; the possibility of detecting adsorbed metals, a process of only local importance in this semi-arid environment; its use as a geochemical census sample; and the possibility of its future use as a comparative sample for environmental studies.

Water samples

Five water samples were collected, principally for subsidary uranium data. Samples BL802 and BL804 were ground waters taken from pumping windmills, samples GL2 and W26 were spring waters, and sample BL852 was a surface water.

At sample sites BL802, BL804 and W26, a portion of the water was filtered through a 0.45-micron filter and collected into an acid-rinsed polyethylene bottle. This sample was immediately acidified to pH<2 with Ultrex nitric acid. Additionally, a portion of untreated water was collected into a polyethylene bottle that had been rinsed with the sample water. Temperature and pH were measured in situ. At sites BL852 and GL2, only an untreated water sample was collected.

Analytical methods

Emission spectrographic analyses

All sediment and rock samples were analyzed by semiquantitative emission spectrography using the field method of Grimes and Marranzino (1968). Results of these spectrographic analyses for all of the sample media were measured within geometric intervals (for example, boundaries at 1,200, 830, 560, 380, 260, 180, 120, and 83 in ppm) but were reported as the approximate geometric midpoints (1,000, 700, 500, 300, 200, 150, and 100 ppm in the example given above). Thus the values are reported as a series of six steps per order of magnitude.

The lower and upper limits of determination for semiquantitative emission spectrographic analyses of rocks and sieved (<80-mesh) stream sediments are as follows:

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

The two fractions of heavy-mineral concentrates are measured and reported two spectrographic intervals higher than those of stream sediments for both the upper and lower limits of determination. These changes in limits are made because the standard weight of 10 mg of sample used in conventional analyses is reduced to 5 mg of heavy-mineral concentrate to allow for the addition of a quartz diluent to the graphite buffer to reduce element interferences (high background) inherent to the analysis of heavy-mineral concentrates and to provide a matrix composition more comparable to that of the standards.

Frequently, other individual variations occur in the determination limits of the nonmagnetic (NM-1) fraction. Increases in both the upper and lower limits are a result of less than 5 mg of sample being analyzed (short-weight). For most elements, these differences are not critical to the data interpretations. However, the short weight samples are flagged (see Explanation of Tables) in the data tables because the short weight resulted from accidental loss (including the complete loss of 13 NM-1 samples) during the analytical step. Only the finest-grained material (<0.1 mm) remained after the accident, presumably held to the sample container by electrostatic forces. These samples cannot be considered as having been split (divided) to a smaller-sized portion, but as having undergone another separation of undefined characteristics. Thus, sample 79BL833X (Table 3) reported as containing 3000 ppm Ag should be considered only as a sample that is silver-bearing, probably having the same importance as a sample containing 0.5 ppm Ag.

For purposes of geochemical exploration, experience has shown that the analytical precision of semiquantitative emission spectrography is well within practical requirements for most of the elements, especially with the enhanced values possible from the analysis of concentrate fractions. The studies of Motooka and Grimes (1976), making use of repeat analyses by a number of analysts and instruments, found that reported values fall within one adjoining reporting interval 83 percent of the time and within two adjoining reporting intervals 96 percent of the time for all of the elements.

Gold analyses

Gold in rock samples was analyzed by atomic absorption spectrophotometry following a hydrobromic acid—bromine digestion of the rock sample and extraction of the dissolved gold into an organic solvent (Ward and others, 1969). The detection limit of this method is 0.05 ppm.

Equivalent uranium analyses

Equivalent uranium (eU) was determined by gamma ray spectroscopy using an Ortec model 6200 multichannel analyzer. Values of eU are reported by attributing all gamma ray emission to uranium. Samples reported as 40- or more- ppm eU were re-analyzed using a linear gate method. Because these samples were found to have 90- or more-percent of their radioactivity due to the presence of potassium, more rigorous methods of uranium analyses were deemed unnecessary. The specific method of eU analysis and the linear gate method of analysis are undocumented, but are modifications of procedures described by the Ortec Co. (1971a, b). The detection limit of the procedure is 20 ppm eU.

Water analyses

Alkalinity, calcium, chloride, fluoride, lithium, magnesium, nitrate, potassium, sodium, sulfate, and specific conductance were determined using untreated water. The remaining analyses were performed using the filtered and acidified sample when possible.The analytical methods used for water analyses are shown in Table 1.

Some elements were determined by both atomic absorption spectrophotometry (AA) and inductively coupled plasma-atomic emission spectroscopy (ICP) methods, including arsenic, calcium, copper, iron, manganese, magnesium, molybdenum, and zinc. Only the AA values for these elements are presented because the AA method usually had the lower detection limit and because of the deterioration of a number of samples resulting from the length of time between the two types of analyses. The methods were, in general, comparable.

Additionally, the ICP method indicates the following elements to be below detection limits (detection limits in micro grams per liter): antimony (391); beryllium (1); bismuth (460); cadmium (10); cerium (52); cobalt (107); chromium (13); germanium 87); gold (50); lanthanum (18); lead (231); nickel (51); niobium (11); phosphorous (345); silver (15); tin (258); titanium (7); tungsten (148); and yttrium (2). These elements are also excluded from the water data listing.

Table 1.—Analytical methods used for water analyses, Lower San Francisco River Wilderness Study Area and Contiguous Roadless Areas, Arizona and New Mexico

Property	Method	Reference
Alkalinity	Gran's plot titration with sulfuric acid	Orion Research, Inc. (1978)
Chloride, Fluoride, Nitrate, and Sulfate	Ion chromatography	Fishman and Pyen (1979)
Calcium, Iron (>200 μg/L), Lithium, Magnesium, Potassium, Sodium, and Zinc (>20 μg/L)	Flame atomic-absorption spectrophotometry	Fishman and Downs (1966)
Silica	Flame atomic-absorption spectrophotometry	Brown and others (1970)
Arsenic, Copper, Iron (<200 μg/L) Manganese, and Zinc (<20 μg/L)	Flameless atomic-absorption spectrophotometry	Perkin-Elmer Corp. (1977)
Molybdenum	Flameless atomic-absorption spectrophotometry	(a)
Uranium	Laser-excitation fluorescence	Ward and Bondar (1979)
Specific conductance	Conductivity bridge	Brown and others (1970)
pH	pH meter	Brown and others (1970)
Temperature	Thermometer	Brown and others (1970)
Aluminum, Antimony, Arsenic, Barium, Beryllium, Bismuth, Boron, Cadmium, Calcium, Cerium, Chromium, Cobalt, Copper, Germanium, Gold, Iron, Lanthanum, Lead, Magnesium, Manganese, Molybdenum Nickel, Niobium, Phosphorus, Silver, Tin, Titanium, Tungsten, Vanadium, Ytrrium, and Zinc	Inductively coupled plasma-atomic emission spectroscopy	(b)

(a) specific method undocumented, but is a modification of procedures as described by the Perkin-Elmer Corp (1977).
(b) specific method undocumented, but is a modification of procedures as described by Church (1981).

Recent work indicates that the precision of the data for some analyses may be less than desired. In general, the more dissolved solids present, the greater the possibility of analytical problems. Roughly, at the given detection limit for either an AA or ICP determination, the relative standard deviation may approach 100 percent. At 5 times detection limit, the relative standard deviation is about 10 percent.

The detection limit for water analyses are as follows:

Constituent (Detection Limit)	Unit of measurement	Comments
Calcium (0.1), Chloride (0.1), Fluoride (0.1), Lithium (.002), Magnesium (0.1), Nitrate (0.1), Potassium (0.1), Sodium (0.1), Strontium (.002), and Sulfate (0.1)	milligrams per liter	
Alkalinity (10)	Do	Reported as bicarbonate (HCO_3)
Silica (1)	Do	Determined as silicon
Charge balance	percent	
pH	pH units	
Specific conductance (10)	micro mhos per centimeter	
Temperature	degrees celsius	
Aluminum (36), Arsenic (1.0), Barium (1), Boron (6), Copper (0.5), Iron (1), Manganese (1), Molybdenum (0.5), Uranium (0.1), Vanadium (8), and Zinc (0.5).	micrograms per liter	

Charge balance calculation were performed to determine if approximate electrical neutrality exists among the major ionic constituents. Using ion concentrations in milliequivalents per liter,

$$\text{charge balance} = \frac{/\text{cations}/ - /\text{anions}/}{/\text{cations}/ + /\text{anions}/} \times 100.$$

Analysts

Principle analyst for the spectrographic analyses was G. W. Day. Analyses of the M-1 concentrate fraction were performed by E. L. Mosier. Additional spectrographic support was provided by B. Adrian, D. E. Detra, and C. L. Forn. Equivalent uranium analyses were performed by J. D. Sharkey, gold analyses by J. R. Hassemer. Water analyses were performed by J. R. Hassemer, J. B. McHugh, J. M. Motooka, and K. C. Watts. Water sample W26, from the San Francisco Hot Spring, was provided courtesy of J. B. McHugh.

Statistical methods

All data listed on table 3 were entered into the U.S. Geological Survey computer data storage system entitled RASS (Rock Analyses Storage System). The data were retrieved from this system and processed using U.S. Geological Survey STATPAC (statistical package) computer programs (VanTrump and Miesch, 1976) for the reduction and statistical analyses of data that can be presented in the form of a two-dimensional matrix. The calculation of univariate frequency distributions as well as the basic statistics (maximum, minimum, mean, and so on) were performed on untransformed analytical data. The statistical summary of the results is presented on table 2.

The data listing on Table 3 is also produced by a STATPAC program.

EXPLANATION OF DATA TABLES

The column listings on table 3 are arranged so that column 1 contains the sample identifiers. The first two numbers of the sample identifier designate the year the sample was collected. The next 1 or 2 letters indicate the 7.5- or 15-minute U.S. Geological Survey topographic quadrangle in which the sample was collected. The letter abbreviation and corresponding quadrangles are as follows: BL, Big Lue Mountains; GL, Glenwood; and W, Wilson Mountain. The locations of these quadrangles are shown in Figure 2.

The three numbers following letter abbreviations are the unique identification of the sample site. Letter suffixes or a blank space at the end of the sample number have the following meanings: N, nonmagnetic (NM-1) heavy-mineral concentrate; X, short-weight nonmagnetic (NM-1) heavy-mineral concentrate; M, magnetic (M-1) heavy-mineral concentrate; R, rock sample; (no suffix), <80-mesh stream sediment; W, water sample.

Rock samples collected by J. C. Ratté have similar designations except the year is indicated by the last two numbers.

The latitude north and longitude west for each sample locality is shown in degrees, minutes, and seconds in columns 2 and 3. The remaining columns list the elements for which data are available.

The following examples illustrate the element column headings: S-Fe%, Semiquantitative spectrographic analyses of iron in percent; S-Mn, Semiquantitative spectrographic analyses of manganese in ppm; AA-Au, atomic-absorption spectrophotometric analysis of gold in ppm.

Data qualified (censoring) codes are used with some reported values. Symbols used are: N, not detected at the lowest level of the spectrographic standard; <, detected, but below the value shown; >, greater than the value shown; —, no data available.

The results given in table 3 should be considered as having only two significant figures. Instrument readouts frequently give three or more digits, especially if the data is internally manipulated before the readout. Additionally, when a number such as "1200" occurs in the same column as a number such as "3.5", the computer printout will be "1200.0", indicating a false precision.

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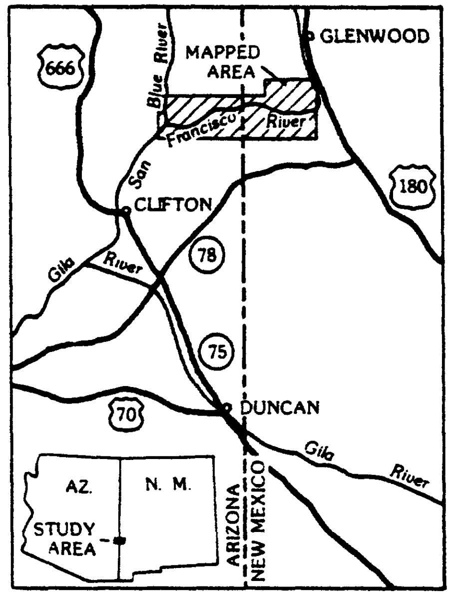

Figure 1.—Index map showing location of the Lower San Francisco Wilderness Study Area and Contiguous Roadless Areas, New Mexico and Arizona (generalized area of investigation hachured).

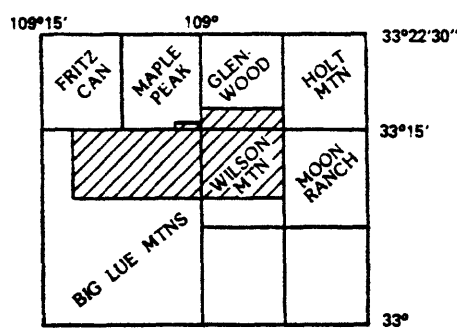

Figure 2.—Index map showing U.S. Geological Survey topographic maps used in this geochemical survey (generalized area of investigation hachured)

Table 2.--Statistical summary of the analytical results for geochemical samples, Lower San Francisco Wilderness Study Area and Contiguous Roadless Areas (RARE II), Catron and Grant Counties, New Mexico, and Greenlee County, Arizona

[Values for Fe, Mg, Ca, and Ti reported in percent; all other values reported in ppm (parts per million). An unqualified value is one in which the element concentration falls within the standards for the analytical method. A qualified value is one in which the element concentrations are designated by symbol: A, analysis not performed; N, not detected at standard's limit of detection; L, detected, but below standard's limit; G, greater than standard's limit. Leaders (--) indicate no data or insufficient data. The percent table for individual variables was constructed by linear interpolation from a frequency table. Sample type is indicated by letters: NM, nonmagnetic (at 1.0 amp) concentrate; M, magnetic (at 1.0 amp) concentrate; S, sieved (<80 mesh) stream sediment; R, rock. Upper and lower limits for semiquantitative emission spectrographic analyses are given in text; principal spectrographic analysts G. W. Day and E. L. Mosier. Lower limit of detection for equivalent uranium (eU), 20 ppm; analyst, J. D. Sharkey. Lower limit of detection for gold determined by atomic absorption spectrophotometry (Au-AA), 0.05 ppm; analyst, J. R. Hassemer.]

Element	Sample type	Data based on qualified values: Number of samples A	N	L	G	Data based on unqualified values: Number of values	Range of values	Geometric mean	Geometric deviation	Percentile distribution based on frequency table of samples analyzed: 25	50	75	90	95	99
Fe	NM	13	0	0	0	35	0.5-10	2.48	2.20	1	1.5	4	5	6	8.5
	M	0	0	0	0	48	10-50	17.5	8.99	10	15	20	30	30	50
	S	2	0	0	0	46	3-7	4.13	1.49	3	3	5	7	7	7
	R	0	0	1	0	69	0.03-10	2.35	2.17	.6	2	3	5	7	10
Mg	NM	13	0	0	0	35	0.1-15	1.79	2.66	.5	1	2	4	5	10
	M	0	0	0	0	48	0.5-10	4.60	2.21	3	5	7	7	7	10
	S	2	0	0	0	46	0.5-2	.95	.27	7	1	1	1	1	2
	R	0	0	2	0	68	.03-3	.52	.63	.07	.3	.7	1.5	2	2.5
Ca	NM	13	0	0	0	35	1-20	5.86	4.12	2.5	5	7	10	12.5	17.5
	M	0	0	0	0	48	0.3-7	2.64	1.39	2	3	3	5	5	6
	S	2	0	0	0	46	0.7-3	1.67	.53	1	2	2	2	2	2.5
	R	0	0	0	0	70	.05-20	3.14	5.57	.2	1	2	12.5	20	20
Ti	NM	13	0	0	0	35	0.07-5	1.03	.92	.5	.7	1.5	2	2	3.5
	M	0	0	0	1	47	0.15-2	.91	.44	.7	.7	1	1.7	2	G(2)
	S	2	0	0	0	46	0.2-0.7	.36	.13	.3	.3	.5	.5	.5	.7
	R	0	0	2	0	68	.007-0.7	.25	.23	.05	.2	.4	.7	.7	.7
Mn	NM	13	0	0	0	35	300-20,000	2050	4460	500	1000	1500	2000	G(10,000)	G(10,000)
	M	0	0	0	3	45	1500-10,000	4410	2690	3000	5000	7000	10,000	G(10,000)	G(10,000)
	S	2	0	0	0	46	500-700	683	56.9	700	700	700	700	700	700
	R	0	0	0	0	70	20-5000	641	897	150	300	700	1250	2000	5000
Ag	NM	13	34	0	0	1	3000-3000	3000	--	--	--	--	--	--	--
	M	0	48	0	0	0	--	--	--	--	--	--	--	--	--
	S	2	44	0	0	2	.5-.5	.5	--	N(.5)	N(.5)	N(.5)	N(.5)	N(.5)	.5
	R	0	65	0	0	5	.5-1	.7	.27	N(.5)	N(.5)	N(.5)	N(.5)	.5	1
As	NM	13	35	0	0	0	--	--	--	--	--	--	--	--	--
	M	0	48	0	0	0	--	--	--	--	--	--	--	--	--
	S	2	46	0	0	0	--	--	--	--	--	--	--	--	--
	R	0	70	0	0	0	--	--	--	--	--	--	--	--	--
Au	NM	13	34	0	1	0	--	--	--	--	--	--	--	--	--
	M	0	48	0	0	0	--	--	--	--	--	--	--	--	--
	S	2	46	0	0	0	--	--	--	--	--	--	--	--	--
	R	0	70	0	0	0	--	--	--	--	--	--	--	--	--

Table 2.--Statistical summary of the analytical results for geochemical samples, Lower San Francisco Wilderness Study Area and Contiguous Roadless Areas (RARE II), Catron and Grant Counties, New Mexico, and Greenlee County, Arizona--Continued

Element	Sample type	Data based on qualified values: Number of samples A	N	L	G	Data based on unqualified values: Number of values	Range of values	Geometric mean	Geometric deviation	Percentile distribution based on frequency table of samples analyzed: 25	50	75	90	95	99
B	NM	13	11	16	0	8	20-50	27.5	13.9	N(20)	N(20)	L(20)	20	35	50
	M	0	0	43	0	5	20-20	20	--	N(20)	N(20)	N(20)	20	20	20
	S	2	0	21	0	25	10-50	12.8	8.43	L(10)	10	10	10	20	35
	R	0	5	33	0	32	10-100	21.1	19.5	L(10)	L(10)	10	30	30	85
Ba	NM	13	0	0	6	29	100-20,000	2950	5120	500	1250	G(10,000)	G(10,000)	G(10,000)	G(10,000)
	M	0	0	0	0	48	50-3000	789	741	200	500	1500	2000	2000	3000
	S	2	0	0	0	46	150-700	310	113	200	300	300	500	500	600
	R	0	1	1	0	68	20-2000	484	477	100	300	700	1250	1500	1750
Be	NM	13	21	3	0	11	5-15	8.10	3.93	N(2)	N(2)	5	8.5	12.5	15
	M	0	37	0	0	11	2-10	4.82	2.68	N(2)	N(2)	N(2)	5	7	8.5
	S	2	25	0	0	21	1-3	1.43	.60	N(1)	N(1)	1	2	2	2.5
	R	0	13	19	0	38	1-15	3.80	3.05	L(1)	1	3	5	8.5	12.5
Bi	NM	13	35	0	0	0	--	--	--	--	--	--	--	--	--
	M	0	48	0	0	0	--	--	--	--	--	--	--	--	--
	S	2	46	0	0	0	--	--	--	--	--	--	--	--	--
	R	0	70	0	0	0	--	--	--	--	--	--	--	--	--
Cd	NM	13	35	0	0	0	--	--	--	--	--	--	--	--	--
	M	0	48	0	0	0	--	--	--	--	--	--	--	--	--
	S	2	46	0	0	0	--	--	--	--	--	--	--	--	--
	R	0	70	0	0	0	--	--	--	--	--	--	--	--	--
Co	NM	13	20	0	0	15	10-30	18.7	9.15	N(10)	N(10)	10	30	30	30
	M	0	0	0	0	48	50-200	93.3	32.7	70	100	100	150	150	175
	S	2	0	0	0	46	10-20	16.0	2.91	15	15	20	20	20	20
	R	1	17	2	0	50	5-150	16.1	21.9	L(5)	7	15	20	30	100
Cr	NM	13	8	0	0	27	20-7000	567	1380	35	50	200	1000	1750	4500
	M	0	0	0	0	48	100-2000	838	587	300	700	1000	1750	2000	2000
	S	2	1	0	0	45	20-300	108	75.0	50	70	150	200	300	300
	R	0	29	14	0	27	10-700	91.5	138	N(10)	L(10)	20	100	200	450
Cu	NM	13	2	4	0	29	10-7000	328	1290	10	20	175	300	300	3650
	M	0	0	0	0	48	15-150	63.4	31.5	50	50	100	100	100	150
	S	2	0	0	0	46	15-70	46.7	18.0	30	50	70	70	70	70
	R	0	0	10	0	60	5-200	39.8	40.4	6	20	50	70	100	200
La	NM	13	0	2	0	33	50-1000	244	274	70	125	250	500	1000	1000
	M	0	25	0	0	23	50-1000	264	245	N(50)	N(50)	150	500	500	850
	S	2	23	0	0	23	20-50	24.3	8.96	N(20)	N(20)	20	30	30	50
	R	0	39	4	0	27	20-50	25.6	8.47	N(20)	N(20)	20	30	30	50
Mo	NM	13	32	0	0	3	10-100	46.7	47.3	N(10)	N(10)	N(10)	N(10)	20	65
	M	0	38	2	0	8	10-15	11.2	2.31	N(10)	N(10)	N(10)	10	10	15
	S	2	46	0	0	0	--	--	--	--	--	--	--	--	--
	R	0	62	3	0	5	5-70	18.4	28.9	N(5)	N(5)	N(5)	L(5)	5	38.5

Table 2.--Statistical summary of the analytical results for geochemical samples, Lower San Francisco Wilderness Study Area and Contiguous Roadless Areas (RARE II), Catron and Grant Counties, New Mexico, and Greenlee County, Arizona--Continued

Element	Sample type	Data based on qualified values: Number of samples A	N	L	G	Data based on unqualified values: Number of values	Range of values	Geometric mean	Geometric deviation	Percentile distribution based on frequency table of samples analyzed: 25	50	75	90	95	99
Nb	NM	13	14	1	0	20	50-300	112	60.2	N(50)	50	100	150	175	250
	M	0	29	8	0	11	50-100	70.9	20.7	N(50)	N(50)	L(50)	70	85	100
	S	2	43	0	0	3	20-20	20	--	N(20)	N(20)	N(20)	N(20)	20	20
	R	0	62	0	0	8	20-70	38.8	18.9	N(20)	N(20)	N(20)	20	40	60
Ni	NM	13	2	1	0	32	10-200	31.4	45.1	10	10	20	85	125	175
	M	0	0	0	0	48	70-1000	278	191	150	200	300	500	600	850
	S	2	0	0	0	46	15-70	41.5	21.2	20	30	70	70	70	70
	R	0	3	12	0	55	5-100	19.6	22.9	5	5	17.5	50	70	85
Pb	NM	13	23	4	0	8	10-1500	230	517	N(20)	N(20)	N(20)	20	125	850
	M	0	10	6	0	32	20-700	66.6	118	L(20)	30	50	70	85	400
	S	2	0	5	0	41	10-30	12.9	5.31	10	10	12.5	20	20	30
	R	0	13	9	0	48	10-100	24.1	19.4	L(10)	10	20	50	50	85
Sb	NM	13	35	0	0	0	--	--	--	--	--	--	--	--	--
	M	0	48	0	0	0	--	--	--	--	--	--	--	--	--
	S	2	46	0	0	0	--	--	--	--	--	--	--	--	--
	R	0	66	0	0	4	100-100	100	--	N(100)	N(100)	N(100)	N(100)	100	100
Sc	NM	13	4	1	0	30	10-150	24.7	27.5	10	10	30	30	60	110
	M	0	0	0	0	48	20-70	45.8	13.8	50	50	50	60	70	70
	S	2	0	0	0	46	5-15	7.41	2.10	7	7	8.5	10	10	12.5
	R	0	29	3	0	38	5-20	10.6	4.32	N(5)	5	10	15	15	20
Sn	NM	13	22	0	0	13	20-1500	688	536	N(20)	N(20)	400	850	1500	1500
	M	0	43	0	0	5	20-50	30	12.2	N(20)	N(20)	N(20)	20	25	40
	S	2	46	0	0	0	--	--	--	--	--	--	--	--	--
	R	0	70	0	0	0	--	--	--	--	--	--	--	--	--
Sr	NM	13	13	0	0	22	200-2000	945	597	N(200)	500	1000	1500	2000	2000
	M	0	15	17	0	16	200-500	287	115	N(200)	L(200)	200	300	500	500
	S	2	0	0	0	46	100-500	341	110	300	300	500	500	500	500
	R	0	16	0	0	54	100-2000	478	370	100	300	500	700	1000	1750
V	NM	13	0	0	0	35	20-500	134	116	60	100	175	250	400	500
	M	0	0	0	0	48	70-500	225	93.2	200	200	300	300	400	500
	S	2	0	0	0	46	50-200	123	42.3	100	100	150	175	200	200
	R	0	0	4	0	66	10-500	89.5	84.7	10	50	150	175	200	350
W	NM	13	34	0	0	1	100-100	100	--	--	--	--	--	--	--
	M	0	46	2	0	0	--	--	--	--	--	--	--	--	--
	S	2	46	0	0	0	--	--	--	--	--	--	--	--	--
	R	0	69	0	0	1	70-70	70	--	--	--	--	--	--	--
Y	NM	13	0	0	0	35	50-1500	413	293	200	400	500	700	850	1250
	M	0	1	1	0	46	20-200	69.1	48.6	30	50	70	150	175	200
	S	2	1	2	0	43	10-30	19.8	7.71	10	20	25	30	30	30
	R	0	20	3	0	47	10-50	19.3	9.03	N(10)	10	20	30	30	40

Table 2.--Statistical summary of the analytical results for geochemical samples, Lower San Francisco Wilderness Study Area and Contiguous Roadless Areas (RARE II), Catron and Grant Counties, New Mexico, and Greenlee County, Arizona--Continued

Element	Sample type	Data based on qualified values: Number of samples A	N	L	G	Data based on unqualified values: Number of values	Range of values	Geometric mean	Geometric deviation	Percentile distribution based on frequency table of samples analyzed: 25	50	75	90	95	99
Zn	NM	13	35	0	0	0	--	--	--	--	--	--	--	--	--
	M	0	39	0	0	9	500-1500	711	341	N(500)	N(500)	N(500)	500	700	1250
	S	2	46	0	0	0	--	--	--	--	--	--	--	--	--
	R	0	68	2	0	0	--	--	--	--	--	--	--	--	--
Zr	NM	13	0	0	31	4	1000-50000	14400	23800	G(2000)	G(2000)	G(2000)	G(2000)	G(2000)	G(2000)
	M	0	0	0	0	48	30-1000	306	268	150	200	500	700	700	1000
	S	2	0	0	0	46	70-300	142	46.4	100	150	150	200	200	250
	R	0	8	1	0	61	10-300	106	64.4	30	100	150	200	200	300
Th	NM	13	25	0	0	10	200-5000	1510	1540	N(200)	N(200)	200	1500	2500	4000
	M	0	48	0	0	0	--	--	--	--	--	--	--	--	--
	S	2	46	0	0	0	--	--	--	--	--	--	--	--	--
	R	0	70	0	0	0	--	--	--	--	--	--	--	--	--
Au-AA	R	1	57	6	0	6	.05-.35	.21	.10	N(.05)	N(.05)	N(.05)	L(.05)	.17	.30
eU	R	15	4	32	0	19	20-70	38.9	20.8	L(20)	L(20)	20	50	70	70

Table 3.—Analytical data for rock samples, nonmagnetic (NM-1) and magnetic (M-1) fractions of heavy-mineral concentrates derived from stream-sediment samples, <80-mesh sieved fraction derived from stream-sediment samples, and water samples, Lower San Francisco Wilderness Study Area and Contiguous Roadless Areas (RARE II), Catron and Grant Counties, New Mexico and Greenlee County, Arizona [Description of sample media, analytical procedures and explanation of tables given in text.]

ROCK DATA

Sample	LATITUDE	LONGITUD	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-AS	S-AU	S-B	S-BA
GL678	33 15 41	108 57 42	3.00	.30	1.00	.500	70	N	N	N	<10	1,500
GL778	33 15 41	108 57 42	1.50	.70	1.00	.300	300	N	N	N	<10	1,000
GL878	33 15 41	108 57 42	2.00	.07	.20	.300	50	N	N	N	30	300
GL978	33 15 41	108 57 42	3.00	.50	2.00	.300	200	N	N	N	10	1,500
GL1678	33 16 1	108 58 1	3.00	1.00	5.00	.700	1,000	N	N	N	<10	1,500
GL1778	33 15 59	108 58 1	5.00	.20	.70	.500	50	N	N	N	<10	700
GL1878	33 15 58	108 58 1	3.00	3.00	7.00	.700	1,500	N	N	N	<10	2,000
GL1978	33 15 58	108 58 0	2.00	.03	.10	.700	150	N	N	N	15	500
GL2078	33 15 56	108 57 59	3.00	1.00	1.00	.500	500	N	N	N	<10	1,500
GL2178	33 15 54	108 58 0	3.00	.70	1.00	.300	2,000	N	N	N	<10	1,500
GL2278	33 15 54	108 58 0	2.00	.70	.50	.300	500	N	N	N	<10	700
GL2378	33 15 52	108 57 57	3.00	.50	1.00	.300	200	N	N	N	<10	1,000
GL2478	33 15 50	108 58 0	3.00	.70	1.50	.500	150	N	N	N	30	700
GL2678	33 15 48	108 58 2	1.50	.15	1.00	.200	70	N	N	N	<10	700
GL2778	33 15 46	108 58 3	2.00	.20	1.50	.300	150	N	N	N	10	700
GL2878	33 15 46	108 58 3	1.50	.20	1.50	.200	2,000	N	N	N	15	1,000
GL3078	33 15 46	108 58 3	3.00	.50	3.00	.700	150	N	N	N	<10	1,000
GL3178	33 15 47	108 57 44	7.00	.15	.07	.500	30	N	N	N	30	200
GL3278	33 15 47	108 57 44	10.00	.03	.05	.300	100	N	N	N	70	300
GL3378	33 15 47	108 57 44	10.00	<.02	.05	.020	150	N	N	N	10	100
GL3478	33 15 47	108 57 44	3.00	.07	.20	.500	100	N	N	N	100	1,500
GL578	33 15 35	108 57 40	5.00	1.50	2.00	.500	300	N	N	N	<10	700
W1479	33 12 48	108 56 31	.30	.50	.20	.050	150	N	N	N	<10	50
W1779	33 12 58	108 55 43	.30	.07	.10	.050	1,000	.5	N	N	<10	100
W3179	33 12 58	108 54 9	1.00	.10	.10	.100	150	N	N	N	10	50
W3279	33 12 59	108 54 12	1.00	.70	10.00	.100	700	N	N	N	<10	200
W3979	33 11 10	108 56 58	.50	.05	2.00	.020	700	N	N	N	10	<20
W4479	33 14 3	108 58 24	.50	.10	.70	.030	300	N	N	N	<10	100
W6079	33 12 52	108 59 4	.50	.20	.70	.030	700	N	N	N	50	100
W7479	33 13 28	108 56 31	3.00	.30	.20	.200	70	1.0	N	N	<10	200
W7579	33 13 28	108 56 31	3.00	1.00	.20	.200	700	N	N	N	<10	500
W7679	33 13 28	108 56 31	3.00	2.00	.50	.500	500	N	N	N	<10	500
W7779	33 13 28	108 56 31	.20	.30	3.00	.020	1,000	N	N	N	10	150
W8379	33 13 28	108 56 31	.70	.30	.10	.100	700	N	N	N	10	300
W8479	33 13 28	108 56 31	.70	1.00	2.00	.050	700	N	N	N	<10	50
W8579	33 13 28	108 56 31	3.00	2.00	.70	.500	700	N	N	N	20	200
W8679	33 13 28	108 56 31	3.00	.30	.05	.150	5,000	N	N	N	<10	1,000
W7879	33 13 27	108 56 35	5.00	.70	.05	.200	5,000	N	N	N	30	700
W7979	33 13 27	108 56 35	3.00	1.00	.70	.300	500	N	N	N	<10	500
W8079	33 13 27	108 56 35	.05	.05	1.50	.010	150	N	N	N	<10	20
W8179	33 13 27	108 56 35	.03	.03	2.00	<.002	200	N	N	N	<10	50
W8279	33 13 27	108 56 35	.30	.10	1.50	.030	200	.5	N	N	<10	70
W9479	33 10 48	108 55 30	2.00	.07	.10	.050	30	N	N	N	10	20
W9579	33 10 48	108 55 30	1.00	.05	.05	.050	150	N	N	N	<10	N
BL22779	33 11 59	109 8 55	.05	.07	15.00	.010	1,000	N	N	N	N	20

ROCK DATA

Sample	S-BE	S-BI	S-CD	S-CO	S-CR	S-CU	S-LA	S-MO	S-NB	S-NI	S-PB	S-SB
GL678	<1.0	N	N	5	<10	70	<20	N	N	<5	20	N
GL778	1.5	N	N	10	<10	50	20	N	N	5	15	N
GL878	<1.0	N	N	<5	<10	50	N	<5	N	5	20	N
GL978	<1.0	N	N	7	<10	15	30	N	N	5	50	N
GL1678	<1.0	N	N	15	30	50	20	<5	N	20	100	N
GL1778	<1.0	N	N	7	<10	70	<20	N	N	<5	<10	N
GL1878	<1.0	N	N	20	100	70	30	5	N	70	50	N
GL1978	<1.0	N	N	5	<10	15	N	70	N	5	10	N
GL2078	<1.0	N	N	15	<10	50	20	N	N	5	50	N
GL2178	1.5	N	N	150	<10	70	<20	N	N	50	20	N
GL2278	<1.0	N	N	15	<10	70	20	N	N	10	10	N
GL2378	<1.0	N	N	5	<10	50	20	N	N	7	15	N
GL2478	<1.0	N	N	20	<10	100	20	N	N	20	20	N
GL2678	<1.0	N	N	7	<10	30	20	N	N	<5	30	N
GL2778	<1.0	N	N	7	<10	30	20	N	N	5	10	N
GL2878	<1.0	N	N	7	<10	30	30	N	N	7	50	N
GL3078	<1.0	N	N	50	70	70	20	N	N	20	10	N
GL3178	N	N	N	5	20	30	<20	N	N	<5	15	N
GL3278	1.5	N	N	20	20	100	N	N	N	20	15	N
GL3378	2.0	N	N	50	20	200	N	N	N	20	<10	N
GL3478	<1.0	N	N	7	20	70	30	N	N	5	20	N
GL578	<1.0	N	N	30	20	50	20	N	N	30	15	N
W1479	N	N	N	5	N	7	N	N	N	10	N	N
W1779	3.0	N	N	5	N	10	N	N	N	5	10	N
W3179	2.0	N	N	5	N	5	20	N	20	5	15	N
W3279	N	N	N	10	N	10	N	N	N	10	N	N
W3979	3.0	N	N	5	N	<5	N	N	20	5	10	N
W4479	N	N	N	5	N	5	N	N	N	5	N	N
W6079	3.0	N	N	5	N	5	N	N	20	5	20	N
W7479	3.0	N	N	10	100	20	N	5	N	30	10	N
W7579	2.0	N	N	20	200	70	N	N	N	70	<10	N
W7679	1.0	N	N	15	200	30	20	N	N	100	<10	N
W7779	10.0	N	N	N	N	<5	N	N	N	5	N	N
W8379	1.0	N	N	N	N	5	20	N	N	<5	<10	N
W8479	N	N	N	15	N	15	N	N	N	10	N	N
W8579	3.0	N	N	15	50	50	30	N	N	30	<10	N
W8679	3.0	N	N	30	10	15	N	5	N	5	50	N
W7879	10.0	N	N	30	70	100	N	<5	N	15	50	N
W7979	1.0	N	N	20	200	50	20	N	N	70	10	N
W8079	5.0	N	N	N	N	<5	N	N	N	5	N	N
W8179	5.0	N	N	N	N	<5	N	N	N	<5	N	N
W8279	5.0	N	N	N	N	5	N	N	N	5	N	N
W9479	7.0	N	N	N	N	7	30	N	30	<5	20	N
W9579	5.0	N	N	N	N	<5	N	N	50	5	20	N
BL22779	N	N	N	N	N	<5	N	N	N	N	10	N

ROCK DATA

Sample	S-SC	S-SN	S-SR	S-V	S-W	S-Y	S-ZN	S-ZR	S-TH	AA-AU-P	EQUIV U
GL678	10	N	700	100	N	10	N	100	N	N	<20
GL778	7	N	300	150	N	15	N	70	N	N	N
GL878	5	N	1,500	50	N	<10	N	70	N	N	<20
GL978	7	N	700	70	N	20	N	200	N	N	<20
GL1678	15	N	1,000	200	N	20	N	150	N	N	<20
GL1778	7	N	500	100	N	10	N	70	N	N	<20
GL1878	20	N	1,000	200	N	30	N	200	N	N	<20
GL1978	5	N	100	10	N	<10	N	100	N	N	N
GL2078	10	N	300	150	N	10	N	150	N	N	<20
GL2178	15	N	500	150	N	20	N	70	N	N	N
GL2278	15	N	500	150	N	15	N	70	N	N	N
GL2378	10	N	500	100	N	15	N	100	N	N	<20
GL2478	20	N	500	150	N	15	N	100	N	N	20
GL2678	5	N	300	20	N	10	N	100	N	N	20
GL2778	10	N	500	100	N	10	N	100	N	N	<20
GL2878	5	N	500	70	N	10	N	100	N	N	20
GL3078	20	N	700	150	N	20	N	100	N	N	20
GL3178	10	N	2,000	100	N	<10	N	100	N	N	<20
GL3278	10	N	700	150	N	15	N	70	N	N	<20
GL3378	5	N	200	500	N	15	N	10	N	<.05	<20
GL3478	15	N	700	150	N	10	N	100	N	N	<20
GL578	15	N	700	150	N	15	N	70	N	N	<20
W1479	N	N	N	10	N	N	N	30	N	N	<20
W1779	N	N	N	20	N	20	N	100	N	N	30
W3179	N	N	N	10	N	20	N	100	N	N	60
W3279	N	N	200	50	N	N	N	50	N	N	<20
W3979	N	N	N	<10	N	30	N	70	N	N	40
W4479	N	N	100	10	N	N	N	20	N	N	<20
W6079	N	N	300	10	N	10	N	70	N	N	40
W7479	7	N	700	200	N	N	N	100	N	.25	--
W7579	7	N	100	150	N	10	N	100	N	N	--
W7679	10	N	100	200	N	20	N	150	N	N	--
W7779	N	N	100	20	N	N	N	10	N	N	--
W8379	N	N	N	30	N	30	N	150	N	<.05	--
W8479	N	N	N	20	N	N	N	10	N	N	--
W8579	10	N	200	150	N	30	<200	200	N	N	--
W8679	<5	N	100	50	N	30	N	100	N	N	--
W7879	10	N	100	200	N	20	<200	70	N	.05	--
W7979	10	N	200	100	N	20	N	150	N	N	--
W8079	N	N	N	10	N	N	N	N	N	.35	--
W8179	N	N	N	10	N	N	N	N	N	<.05	--
W8279	N	N	N	15	N	N	N	N	N	.20	--
W9479	N	N	N	10	N	30	N	100	N	<.05	--
W9579	N	N	N	10	N	20	N	150	N	--	--
BL22779	N	N	300	<10	N	N	N	N	N	N	<20

Sample	LATITUDE	LONGITUD	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-AS	S-AU	S-B	S-BA
BL25579	33 13 1	109 7 33	1.00	.70	15.00	.100	700	N	N	N	N	150
BL25679	33 13 1	109 7 33	3.00	1.50	2.00	.200	700	N	N	N	<10	300
79BL853R	33 15 39	108 57 58	3.00	.70	1.50	.200	200	N	N	N	<10	300
79BL854R	33 15 37	108 58 3	3.00	.70	1.50	.200	700	N	N	N	10	300
BL10A80	33 14 48	109 6 45	3.00	.50	1.00	.200	300	1.0	N	N	<10	500
BL10B80	33 14 48	109 6 45	.05	.07	20.00	.010	700	N	N	N	<10	20
BL10C80	33 14 48	109 6 45	.50	.30	10.00	.100	1,000	N	N	N	10	150
BL1180	33 14 48	109 6 41	.10	.10	20.00	.010	1,000	N	N	N	N	150
BL6080	33 12 20	109 8 32	7.00	2.00	2.00	.500	700	N	N	N	10	500
BL7280	33 10 47	109 8 55	.05	.10	20.00	.020	1,000	N	N	N	N	70
BL8280	33 14 57	109 1 42	5.00	2.00	2.00	.700	700	N	N	N	<10	700
W1380	33 10 58	108 52 30	3.00	2.00	2.00	.700	700	N	N	N	<10	700
W1580	33 10 27	108 54 24	3.00	.05	.10	.100	100	N	N	N	10	50
W1680	33 10 25	108 54 22	1.00	.07	.20	.100	200	N	N	N	10	70
W2080	33 10 44	108 55 18	.70	.07	.10	.050	100	N	N	N	10	20
W4780	33 13 17	108 58 27	1.00	.30	5.00	.150	1,000	N	N	N	30	200
W4880	33 13 17	108 58 30	.70	.07	.20	.100	100	N	N	N	10	100
W5080	33 13 6	108 58 58	7.00	.50	.70	.700	200	N	N	N	10	700
W5180	33 13 6	108 58 58	3.00	.30	1.00	.700	150	N	N	N	10	700
GL1180	33 16 30	108 57 55	3.00	.07	.20	.300	20	N	N	N	30	700
GL1280	33 16 3	108 57 48	2.00	.07	.10	.200	30	N	N	N	30	200
W178A80	33 13 8	108 56 1	.15	.07	20.00	.015	2,000	N	N	N	<10	500
W178B80	33 13 8	108 56 1	.30	.10	.50	.015	1,000	.5	N	N	15	150
BL92A80	33 14 31	109 6 49	.05	<.02	2.00	<.002	70	N	N	N	10	20
BL92B80	33 14 31	109 6 49	<.05	.05	20.00	.007	1,500	N	N	N	N	150

ROCK DATA--continued

Sample	S-BE	S-BI	S-CD	S-CO	S-CR	S-CU	S-LA	S-MO	S-NB	S-NI	S-PB	S-SB
BL25579	N	N	N	5	N	10	N	N	N	5	10	N
BL25679	N	N	N	10	10	50	N	N	N	20	20	N
79BL853R	N	N	N	10	N	20	20	N	N	10	20	N
79BL854R	1.0	N	N	10	N	10	N	N	N	5	10	N
BL10A80	2.0	N	N	10	20	200	N	N	N	15	20	N
BL10B80	15.0	N	N	N	N	5	N	N	N	<5	N	N
BL10C80	3.0	N	N	N	N	10	N	N	N	15	N	N
BL1180	N	N	N	N	N	<5	N	N	N	<5	N	N
BL6080	1.0	N	N	20	50	30	N	N	N	70	10	N
BL7280	N	N	N	N	N	<5	N	N	N	N	N	N
BL8280	2.0	N	N	20	70	50	50	N	N	70	20	N
W1380	2.0	N	N	15	50	50	50	N	N	50	10	N
W1580	3.0	N	N	N	N	5	30	N	70	5	20	N
W1680	5.0	N	N	N	N	<5	30	N	50	5	20	N
W2080	3.0	N	N	N	N	7	N	N	50	<5	20	N
W4780	3.0	N	N	10	30	20	N	N	N	15	20	N
W4880	5.0	N	N	5	20	15	N	N	N	7	N	100
W5080	3.0	N	N	20	150	30	20	N	N	50	70	100
W5180	3.0	N	N	10	200	50	30	N	N	15	70	100
GL1180	N	N	N	N	30	50	N	7	N	5	20	N
GL1280	N	N	N	N	N	10	N	N	N	<5	15	N
W178A80	5.0	N	N	5	10	7	N	N	N	5	<10	N
W178B80	10.0	N	N	5	700	7	N	N	N	7	10	100
BL92A80	<1.0	N	N	--	N	<5	N	N	N	N	<10	N
BL92B80	<1.0	N	N	<5	N	5	N	N	N	<5	<10	N

ROCK DATA--continued

Sample	S-SC	S-SN	S-SR	S-V	S-W	S-Y	S-ZN	S-ZR	S-TH	AA-AU-P	EQUIV U
BL25579	<5	N	500	20	N	N	N	30	N	N	<20
BL25679	15	N	700	50	N	10	N	70	N	N	<20
79BL853R	15	N	700	150	N	10	N	100	N	N	<20
79BL854R	15	N	700	100	N	20	N	150	N	N	<20
BL10A80	5	N	300	150	N	N	N	100	N	.15	20
BL10B80	N	N	1,000	10	N	N	N	N	N	<.05	<20
BL10C80	N	N	500	20	N	N	N	20	N	N	<20
BL1180	N	N	300	10	N	N	N	N	N	N	<20
BL6080	10	N	500	200	N	30	N	200	N	N	20
BL7280	N	N	100	10	N	N	N	N	N	N	<20
BL8280	10	N	500	150	N	30	N	300	N	N	20
W1380	10	N	700	150	N	30	N	300	N	N	40
W1580	N	N	N	20	N	30	N	150	N	N	70
W1680	N	N	N	10	N	30	N	150	N	N	70
W2080	N	N	N	10	N	20	N	150	N	N	70
W4780	N	N	100	50	N	N	N	70	N	N	<20
W4880	N	N	N	30	N	N	N	30	N	.25	<20
W5080	10	N	100	150	N	30	N	200	N	N	60
W5180	10	N	200	150	70	50	N	200	N	N	70
GL1180	7	N	1,000	150	N	N	N	150	N	N	20
GL1280	<5	N	300	30	N	N	N	150	N	N	30
W178A80	N	N	200	20	N	10	N	10	N	N	<20
W178B80	N	N	N	10	N	10	N	10	N	<.05	<20
BL92A80	N	N	200	<10	N	10	N	N	N	N	<20
BL92B80	N	N	300	<10	N	10	N	<10	N	N	<20

NONMAGNETIC (NM-1) CONCENTRATE DATA

Sample	LATITUDE	LONGITUD	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-AS	S-AU	S-B	S-BA
79BL807N	33 10 3	109 2 13	2.0	.15	1.0	.70	500	N	N	N	20	1,500
79BL803N	33 10 42	109 1 54	.7	1.00	1.5	.50	300	N	N	N	20	500
79BL820X	33 11 30	109 12 18	2.0	1.50	2.0	1.00	1,000	N	N	N	<20	200
79BL838N	33 11 54	109 7 30	1.0	.50	10.0	.70	700	N	N	N	<50	1,000
79BL821N	33 12 12	109 11 32	2.0	1.50	3.0	.50	1,000	N	N	N	<20	500
79BL822X	33 13 2	109 11 37	1.5	2.00	5.0	1.00	700	N	N	N	<50	1,500
79BL841X	33 13 12	109 0 17	5.0	3.00	10.0	2.00	2,000	N	N	N	20	500
79BL827X	33 13 17	109 7 34	1.5	1.00	5.0	.50	300	N	N	N	<20	300
79BL840N	33 13 30	109 1 30	5.0	.50	7.0	2.00	1,000	N	N	N	20	150
79BL828X	33 13 45	109 6 48	3.0	3.00	15.0	.70	1,500	N	N	N	50	500
79BL824N	33 14 0	109 9 9	5.0	5.00	7.0	1.00	1,000	N	N	N	<20	500
79BL829X	33 14 12	109 6 18	5.0	3.00	7.0	1.00	1,500	N	N	N	N	15,000
79BL834N	33 14 22	109 3 42	3.0	5.00	10.0	2.00	1,000	N	N	N	N	500
79BL836X	33 14 27	109 3 1	.5	15.00	20.0	2.00	3,000	N	N	N	N	15,000
79BL833X	33 14 27	109 4 30	1.0	.30	5.0	5.00	1,000	3,000	N	>3,000	50	3,000
79W101N	33 10 49	108 52 43	1.0	.50	10.0	1.00	500	N	N	N	<20	1,500
79W102N	33 10 51	108 52 41	.5	.50	10.0	.07	300	N	N	N	N	10,000
79W201N	33 11 46	108 58 8	10.0	1.00	2.0	2.00	2,000	N	N	N	<20	300
79W202N	33 11 48	108 57 57	1.5	1.50	5.0	.70	700	N	N	N	<20	>10,000
79W203N	33 12 16	108 58 25	2.0	2.00	5.0	.70	1,500	N	N	N	N	>10,000
79W204X	33 12 25	108 58 32	.5	1.00	7.0	.50	500	N	N	N	N	20,000
79W205X	33 12 48	108 59 19	1.5	.50	3.0	1.00	700	N	N	N	N	300
79W206N	33 13 2	108 57 32	5.0	5.00	7.0	.50	1,000	N	N	N	<20	2,000
79W207N	33 13 2	108 58 58	5.0	1.50	7.0	.70	1,500	N	N	N	<20	>10,000
79W105N	33 13 5	108 53 38	7.0	.50	1.5	2.00	1,500	N	N	N	20	150
79W106N	33 13 6	108 55 2	1.0	.50	3.0	1.00	300	N	N	N	<20	1,500
79W107N	33 13 9	108 53 46	.7	.50	1.5	1.50	300	N	N	N	<20	100
79W208X	33 13 9	108 55 39	3.0	3.00	10.0	1.50	1,500	N	N	N	N	2,000
79W109N	33 14 32	108 52 50	.5	.15	1.5	1.50	300	N	N	N	<20	500
79GL200X	33 15 0	108 58 9	1.0	.50	2.0	.10	20,000	N	N	N	<50	500
79GL201N	33 15 10	108 57 39	5.0	1.50	7.0	.50	2,000	N	N	N	<20	1,000
79GL202N	33 15 34	108 57 39	.7	.15	5.0	.10	1,500	N	N	N	20	>10,000
79GL203N	33 15 37	108 58 3	2.0	.50	3.0	.50	300	N	N	N	N	>10,000
79GL204N	33 15 37	108 58 6	1.5	.70	5.0	.20	500	N	N	N	N	5,000
79GL205N	33 15 39	108 57 58	.7	.10	5.0	.20	500	N	N	N	N	>10,000

WARNING -- See discussion in text on short weight samples, samples with the suffix **"X"**

NONMAGNETIC (NM-1) CONCENTRATE DATA

Sample	S-BE	S-BI	S-CD	S-CO	S-CR	S-CU	S-LA	S-MO	S-NB	S-NI	S-PB
79BL807N	7	N	N	N	N	<10	100	N	50	10	20
79BL803N	N	N	N	N	200	10	100	100	100	10	200
79BL820X	5	N	N	10	100	15	200	N	300	50	10
79BL838N	15	N	N	N	100	300	200	N	N	20	N
79BL821N	N	N	N	10	20	20	50	N	N	15	<20
79BL822X	N	N	N	N	200	<20	300	N	150	20	<50
79BL841X	<2	N	N	30	1,000	20	200	10	<50	200	N
79BL827X	N	N	N	N	70	200	100	N	50	10	N
79BL840N	7	N	N	N	50	50	300	N	150	10	20
79BL828X	N	N	N	N	150	30	200	N	N	20	N
79BL824N	N	N	N	30	700	200	200	N	150	100	<20
79BL829X	N	N	N	N	1,000	N	<500	N	N	<150	N
79BL834N	<2	N	N	20	2,000	300	1,000	30	100	100	N
79BL836X	N	N	N	N	7,000	N	<1,000	N	N	N	1,500
79BL833X	<5	N	N	N	50	150	300	N	200	N	N
79W101N	N	N	N	N	20	10	1,000	N	70	10	N
79W102N	N	N	N	N	N	10	1,000	N	N	10	N
79W201N	N	N	N	30	200	200	300	N	100	70	N
79W202N	N	N	N	10	200	15	70	N	70	10	<20
79W203N	N	N	N	10	70	20	50	N	N	10	N
79W204X	10	N	N	N	N	20	100	N	N	20	N
79W205X	10	N	N	N	50	300	150	N	100	20	N
79W206N	N	N	N	30	1,500	15	50	N	50	150	N
79W207N	5	N	N	20	150	150	100	N	50	10	N
79W105N	N	N	N	20	50	20	200	N	100	10	20
79W106N	5	N	N	N	20	10	300	N	100	10	50
79W107N	N	N	N	N	50	<10	150	N	100	10	N
79W208X	15	N	N	N	300	7,000	700	N	100	20	N
79W109N	N	N	N	N	N	<10	200	N	150	10	N
79GL200X	5	N	N	N	N	300	100	N	N	20	N
79GL201N	N	N	N	30	50	30	70	N	N	10	20
79GL202N	5	N	N	10	N	50	70	N	N	10	N
79GL203N	N	N	N	N	20	20	70	N	N	10	N
79GL204N	N	N	N	10	N	50	50	N	N	10	N
79GL205N	N	N	N	10	N	20	70	N	N	10	N

WARNING -- See discussion in text on short weight samples, samples with the suffix **"X"**

NONMAGNETIC (NM-1) CONCENTRATE DATA

Sample	S-SB	S-SC	S-SN	S-SR	S-V	S-W	S-Y	S-ZN	S-ZR	S-TH
79BL807N	N	10	20	N	20	N	200	N	>2,000	300
79BL803N	N	10	1,500	N	20	N	300	N	>2,000	200
79BL820X	N	10	30	N	70	N	500	N	>2,000	N
79BL838N	N	30	1,500	500	50	N	500	N	>5,000	N
79BL821N	N	10	N	200	100	N	70	N	1,500	N
79BL822X	N	30	N	500	100	N	500	N	>5,000	N
79BL841X	N	70	N	300	200	N	300	N	>2,000	N
79BL827X	N	10	N	500	70	N	150	N	>2,000	N
79BL840N	N	30	700	N	200	N	1,500	N	>2,000	200
79BL828X	N	20	N	700	100	N	500	N	>5,000	3,000
79BL824N	N	30	N	200	200	N	300	N	>2,000	N
79BL829X	N	N	N	N	300	N	700	N	>30,000	N
79BL834N	N	150	1,500	500	200	N	500	N	>2,000	700
79BL836X	N	N	N	N	500	N	700	N	50,000	N
79BL833X	N	30	500	700	150	N	700	N	>5,000	2,000
79W101N	N	10	300	700	70	N	500	N	>2,000	N
79W102N	N	<10	200	1,000	20	N	300	N	1,000	N
79W201N	N	30	500	N	300	100	500	N	>2,000	N
79W202N	N	10	N	1,500	70	N	200	N	>2,000	N
79W203N	N	10	N	2,000	100	N	200	N	>2,000	N
79W204X	N	N	N	1,500	50	N	100	N	>5,000	N
79W205X	N	50	N	N	50	N	500	N	>5,000	N
79W206N	N	30	N	500	150	N	200	N	>2,000	N
79W207N	N	10	N	1,500	150	N	500	N	>2,000	1,000
79W105N	N	20	N	N	500	N	500	N	>2,000	N
79W106N	N	10	N	1,000	100	N	500	N	>2,000	N
79W107N	N	20	500	N	100	N	500	N	>2,000	N
79W208X	N	20	700	N	150	N	700	N	>5,000	N
79W109N	N	30	1,000	N	100	N	1,000	N	>2,000	N
79GL200X	N	N	N	N	100	N	50	N	5,000	N
79GL201N	N	10	N	500	200	N	200	N	>2,000	5,000
79GL202N	N	10	N	2,000	30	N	200	N	>2,000	2,000
79GL203N	N	10	N	1,500	70	N	150	N	>2,000	N
79GL204N	N	10	N	1,000	50	N	100	N	>2,000	700
79GL205N	N	10	N	2,000	50	N	150	N	>2,000	N

WARNING -- See discussion in text on short weight samples, samples with the suffix "X"

MAGNETIC (M-1) CONCENTRATE DATA

Sample	LATITUDE	LONGITUD	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-AS	S-AU	S-B	S-BA
79BL807M	33 10 3	109 2 13	10	3.0	3.0	1.00	3,000	N	N	N	<20	100
79BL803M	33 10 42	109 1 54	10	5.0	3.0	.70	2,000	N	N	N	<20	100
79BL825M	33 10 48	109 9 41	10	5.0	3.0	.70	3,000	N	N	N	<20	300
79BL518M	33 11 0	109 3 6	10	5.0	3.0	.70	1,500	N	N	N	<20	150
79BL806M	33 11 7	109 2 40	10	2.0	2.0	1.00	1,500	N	N	N	<20	500
79BL820M	33 11 30	109 12 18	15	5.0	2.0	1.00	2,000	N	N	N	<20	200
79BL838M	33 11 54	109 7 3	10	7.0	2.0	.70	3,000	N	N	N	<20	500
79BL821M	33 12 12	109 11 32	15	3.0	3.0	1.00	1,500	N	N	N	<20	300
79BL842M	33 13 1	109 0 12	10	7.0	3.0	.30	5,000	N	N	N	<20	700
79BL822M	33 13 2	109 11 37	10	5.0	3.0	.70	5,000	N	N	N	<20	150
79BL841M	33 13 12	109 0 17	10	5.0	5.0	.70	7,000	N	N	N	<20	2,000
79BL827M	33 13 17	109 7 34	20	3.0	2.0	.50	5,000	N	N	N	20	1,000
79BL840M	33 13 30	109 1 30	50	2.0	2.0	>2.00	5,000	N	N	N	<20	200
79BL828M	33 13 45	109 6 48	20	3.0	2.0	.70	5,000	N	N	N	<20	1,500
79BL839M	33 13 51	109 1 29	10	7.0	5.0	.50	1,500	N	N	N	<20	100
79BL824M	33 14 0	109 9 9	10	7.0	3.0	.70	3,000	N	N	N	<20	700
79BL832M	33 14 2	109 5 1	10	5.0	3.0	1.00	5,000	N	N	N	<20	700
79BL835M	33 14 5	109 3 9	10	7.0	.7	.15	2,000	N	N	N	<20	150
79BL829M	33 14 12	109 6 18	20	7.0	3.0	.70	10,000	N	N	N	<20	1,000
79BL830M	33 14 18	109 6 11	20	7.0	5.0	1.00	5,000	N	N	N	<20	700
79BL834M	33 14 22	109 3 42	10	5.0	5.0	.70	2,000	N	N	N	<20	200
79BL831M	33 14 23	109 5 24	15	10.0	3.0	.70	2,000	N	N	N	<20	300
79BL837M	33 14 24	109 2 3	10	7.0	3.0	.50	1,500	N	N	N	<20	150
79BL836M	33 14 27	109 3 1	15	5.0	3.0	.70	3,000	N	N	N	<20	700
79BL833M	33 14 27	109 4 3	15	10.0	3.0	.70	2,000	N	N	N	<20	150
79W101M	33 10 49	108 52 43	30	3.0	1.5	2.00	>10,000	N	N	N	<20	2,000
79W102M	33 10 51	108 52 41	20	5.0	7.0	.70	10,000	N	N	N	20	2,000
79W201M	33 11 46	108 58 8	20	3.0	2.0	1.00	>10,000	N	N	N	<20	2,000
79W202M	33 11 48	108 57 57	15	5.0	5.0	1.00	10,000	N	N	N	<20	1,500
79W203M	33 12 16	108 58 25	30	2.0	2.0	1.00	7,000	N	N	N	20	1,500
79W204M	33 12 25	108 58 32	15	7.0	5.0	.50	5,000	N	N	N	<20	700
79W205M	33 12 48	108 59 19	10	5.0	3.0	.70	3,000	N	N	N	<20	300
79W103M	33 12 54	108 52 57	15	7.0	.7	.50	3,000	N	N	N	20	500
79W104M	33 13 2	108 54 2	20	5.0	1.0	1.00	10,000	N	N	N	<20	2,000
79W206M	33 13 2	108 57 32	15	3.0	2.0	.70	2,000	N	N	N	20	500
79W207M	33 13 2	108 58 58	15	5.0	3.0	.50	10,000	N	N	N	<20	2,000
79W105M	33 13 5	108 53 38	30	.5	.3	2.00	5,000	N	N	N	<20	500
79W106M	33 13 6	108 55 2	20	3.0	1.5	1.50	5,000	N	N	N	<20	500
79W107M	33 13 9	108 53 46	30	1.0	.7	2.00	3,000	N	N	N	<20	50
79W208M	33 13 9	108 55 39	15	7.0	2.0	.50	3,000	N	N	N	<20	200
79W108M	33 14 27	108 52 42	20	5.0	1.0	1.50	3,000	N	N	N	<20	150
79W109M	33 14 32	108 52 50	50	1.0	.5	2.00	5,000	N	N	N	<20	150
79GL200M	33 15 0	108 58 9	15	3.0	3.0	1.00	>10,000	N	N	N	<20	3,000
79GL201M	33 15 10	108 57 39	20	3.0	3.0	1.00	5,000	N	N	N	<20	1,500
79GL202M	33 15 34	108 57 39	20	1.5	1.0	1.00	3,000	N	N	N	<20	300
79GL203M	33 15 37	108 58 3	20	3.0	2.0	1.50	7,000	N	N	N	<20	1,500
79GL204M	33 15 37	108 58 6	20	3.0	2.0	1.50	3,000	N	N	N	<20	500
79GL205M	33 15 39	108 57 58	20	3.0	3.0	.70	10,000	N	N	N	<20	2,000

MAGNETIC (M-1) CONCENTRATE DATA

Sample	S-BE	S-BI	S-CD	S-CO	S-CR	S-CU	S-LA	S-MO	S-NB	S-NI	S-PB
79BL807M	5	N	N	50	700	20	500	N	50	150	30
79BL803M	N	N	N	50	1,000	50	300	10	70	200	20
79BL825M	N	N	N	70	500	50	N	N	N	300	70
79BL518M	N	N	N	70	1,000	30	N	N	N	200	N
79BL806M	N	N	N	50	300	30	N	N	<50	100	<20
79BL820M	N	N	N	100	500	50	500	N	<50	300	50
79BL838M	N	N	N	100	1,000	50	150	N	<50	500	50
79BL821M	N	N	N	50	200	70	N	N	<50	100	30
79BL842M	N	N	N	70	1,500	20	N	N	N	500	N
79BL822M	N	N	N	70	500	30	70	N	N	200	N
79BL841M	N	N	N	100	1,000	50	N	N	N	300	50
79BL827M	7	N	N	100	700	70	50	N	N	200	70
79BL840M	N	N	N	150	500	100	150	10	70	200	20
79BL828M	3	N	N	70	700	70	200	N	N	200	50
79BL839M	N	N	N	70	2,000	50	N	N	N	300	N
79BL824M	N	N	N	100	1,000	30	N	N	N	300	<20
79BL832M	N	N	N	100	1,000	70	N	10	<50	300	20
79BL835M	N	N	N	100	1,000	15	N	N	N	500	N
79BL829M	2	N	N	100	1,500	100	100	N	N	700	20
79BL830M	N	N	N	100	1,500	70	500	N	50	500	20
79BL834M	N	N	N	70	1,000	50	200	N	N	200	<20
79BL831M	N	N	N	150	2,000	50	N	N	N	1,000	N
79BL837M	N	N	N	70	1,000	30	N	N	N	300	N
79BL836M	N	N	N	100	700	70	N	N	N	500	30
79BL833M	N	N	N	150	2,000	50	N	N	N	700	N
79W101M	5	N	N	100	700	150	500	15	100	200	100
79W102M	10	N	N	100	300	150	50	10	N	150	70
79W201M	2	N	N	100	1,500	50	700	N	<50	300	70
79W202M	N	N	N	70	2,000	50	1,000	N	100	200	50
79W203M	7	N	N	100	2,000	100	200	N	<50	200	70
79W204M	N	N	N	70	1,500	50	N	N	N	300	20
79W205M	N	N	N	70	1,000	30	N	N	N	300	N
79W103M	N	N	N	100	700	30	70	N	N	300	N
79W104M	7	N	N	150	700	50	70	10	100	500	700
79W206M	2	N	N	50	1,000	70	N	N	N	150	<20
79W207M	N	N	N	70	200	100	N	N	N	100	100
79W105M	3	N	N	70	150	50	200	<10	70	100	50
79W106M	N	N	N	100	300	50	150	N	50	150	30
79W107M	N	N	N	100	200	100	50	15	70	100	50
79W208M	N	N	N	70	1,500	30	N	N	N	300	<20
79W108M	N	N	N	150	700	70	70	N	<50	500	20
79W109M	N	N	N	100	200	100	300	<10	50	150	50
79GL200M	N	N	N	100	100	100	N	N	N	70	70
79GL201M	N	N	N	100	100	100	N	N	N	70	30
79GL202M	N	N	N	50	100	70	N	N	N	100	20
79GL203M	N	N	N	150	200	100	N	N	N	150	50
79GL204M	N	N	N	100	100	100	N	N	N	100	<20
79GL205M	N	N	N	200	200	70	N	10	N	150	50

MAGNETIC (M-1) CONCENTRATE DATA

Sample	S-SB	S-SC	S-SN	S-SR	S-V	S-W	S-Y	S-ZN	S-ZR	S-TH
79BL807M	N	50	N	N	200	N	100	N	200	N
79BL803M	N	50	20	<200	150	N	100	N	500	N
79BL825M	N	50	N	<200	200	N	50	N	150	N
79BL518M	N	50	N	<200	150	N	30	N	150	N
79BL806M	N	20	N	500	200	N	30	N	150	N
79BL820M	N	30	N	200	200	N	100	N	200	N
79BL838M	N	50	N	N	150	N	50	N	200	N
79BL821M	N	50	N	300	200	N	50	N	200	N
79BL842M	N	50	N	N	100	N	20	N	70	N
79BL822M	N	50	N	<200	150	N	70	N	150	N
79BL841M	N	50	N	<200	200	N	70	N	150	N
79BL827M	N	50	N	300	500	N	50	N	200	N
79BL840M	N	50	N	N	500	<100	200	700	1,000	N
79BL828M	N	50	N	200	500	N	50	N	150	N
79BL839M	N	70	N	N	150	N	20	N	150	N
79BL824M	N	50	N	300	150	N	50	N	150	N
79BL832M	N	50	N	500	200	<100	150	N	700	N
79BL835M	N	20	N	N	70	N	N	N	30	N
79BL829M	N	50	N	200	300	N	30	N	150	N
79BL830M	N	70	N	200	200	N	150	N	300	N
79BL834M	N	70	N	<200	200	N	70	N	300	N
79BL831M	N	50	N	N	200	N	50	N	200	N
79BL837M	N	50	N	<200	150	N	20	N	700	N
79BL836M	N	50	N	<200	200	N	30	N	200	N
79BL833M	N	50	N	N	150	N	50	N	100	N
79W101M	N	30	30	<200	300	N	100	500	200	N
79W102M	N	70	N	200	300	N	70	N	200	N
79W201M	N	30	N	200	200	N	100	N	700	N
79W202M	N	70	N	<200	200	N	200	N	700	N
79W203M	N	50	N	300	200	N	50	N	500	N
79W204M	N	50	N	<200	200	N	30	N	70	N
79W205M	N	50	N	N	200	N	50	N	150	N
79W103M	N	30	N	<200	100	N	30	N	200	N
79W104M	N	30	N	<200	200	N	70	500	700	N
79W206M	N	50	N	N	200	N	20	N	150	N
79W207M	N	50	N	200	200	N	100	N	100	N
79W105M	N	20	N	N	300	N	200	500	1,000	N
79W106M	N	50	50	<200	200	N	150	700	700	N
79W107M	N	20	20	N	300	N	50	1,000	700	N
79W208M	N	50	N	<200	150	N	30	N	200	N
79W108M	N	30	30	N	200	N	50	500	700	N
79W109M	N	20	N	N	300	N	70	1,500	700	N
79GL200M	N	50	N	500	300	N	70	N	100	N
79GL201M	N	50	N	<200	300	N	20	N	100	N
79GL202M	N	20	N	N	300	N	<20	N	50	N
79GL203M	N	50	N	200	300	N	50	500	100	N
79GL204M	N	50	N	<200	300	N	30	N	100	N
79GL205M	N	50	N	300	200	N	50	N	100	N

<80-MESH STREAM SEDIMENT DATA

Sample	LATITUDE	LONGITUD	S-FE%	S-MG%	S-CA%	S-TI%	S-MN	S-AG	S-AS	S-AU	S-B	S-BA
79BL807	33 10 3	109 2 13	3	.5	.7	.3	700	N	N	N	20	200
79BL825	33 10 48	109 9 41	3	1.0	1.0	.5	700	N	N	N	10	300
79BL518	33 11 0	109 3 6	5	1.0	1.0	.5	700	N	N	N	10	500
79BL806	33 11 7	109 2 40	3	.7	1.0	.3	500	.5	N	N	10	500
79BL820	33 11 30	109 12 18	5	1.0	1.0	.5	700	N	N	N	10	300
79BL838	33 11 54	109 7 30	3	.7	2.0	.3	700	N	N	N	10	300
79BL821	33 12 12	109 11 32	3	1.0	1.0	.5	700	N	N	N	10	300
79BL842	33 13 1	109 0 12	3	1.0	2.0	.3	700	N	N	N	10	300
79BL822	33 13 2	109 11 37	3	1.0	1.0	.3	700	N	N	N	20	200
79BL841	33 13 12	109 0 17	3	.7	2.0	.2	500	N	N	N	<10	200
79BL827	33 13 17	109 7 34	3	1.0	2.0	.3	700	N	N	N	10	300
79BL840	33 13 30	109 1 30	5	.7	2.0	.5	700	N	N	N	<10	200
79BL828	33 13 45	109 6 48	5	1.0	2.0	.5	700	N	N	N	<10	500
79BL839	33 13 51	109 11 29	3	1.0	2.0	.3	700	N	N	N	10	300
79BL824	33 14 0	109 9 9	3	1.0	2.0	.2	700	N	N	N	20	300
79BL832	33 14 2	109 5 1	5	1.0	2.0	.2	700	N	N	N	<10	300
79BL835	33 14 5	109 3 9	3	1.0	2.0	.3	700	N	N	N	50	300
79BL829	33 14 12	109 6 18	7	2.0	3.0	.7	700	N	N	N	10	700
79BL830	33 14 18	109 6 11	5	1.0	2.0	.5	700	N	N	N	10	500
79BL834	33 14 22	109 3 42	3	.7	1.0	.3	700	N	N	N	10	300
79BL831	33 14 23	109 5 24	3	1.0	2.0	.2	700	N	N	N	<10	500
79BL836	33 14 27	109 3 1	5	1.0	2.0	.5	700	N	N	N	<10	500
79BL833	33 14 27	109 4 30	5	1.0	2.0	.5	700	N	N	N	10	300
79W101	33 10 40	108 52 43	3	.7	2.0	.5	700	N	N	N	<10	300
79W102	33 10 51	108 52 41	5	.7	1.0	.7	700	N	N	N	<10	150
79W201	33 11 46	108 58 8	5	1.0	2.0	.3	700	N	N	N	<10	300
79W202	33 11 48	108 55 57	3	2.0	2.0	.3	700	N	N	N	10	300
79W203	33 12 16	108 58 25	3	1.0	2.0	.3	700	N	N	N	<10	300
79W204	33 12 25	108 58 32	3	1.0	2.0	.3	700	N	N	N	10	500
79W205	33 12 48	108 59 19	3	.7	2.0	.5	700	N	N	N	10	300
79W103	33 12 54	108 52 57	3	1.0	2.0	.3	700	N	N	N	<10	300
79W104	33 13 2	108 54 2	3	1.0	1.0	.2	700	N	N	N	<10	200
79W206	33 13 2	108 57 32	3	1.0	2.0	.3	700	.5	N	N	<10	200
79W207	33 13 2	108 58 58	5	1.0	2.0	.5	700	N	N	N	<10	200
79W105	33 13 5	108 53 38	3	.7	1.0	.3	700	N	N	N	10	300
79W106	33 13 6	108 55 2	3	1.0	1.0	.2	700	N	N	N	10	200
79W107	33 13 9	108 53 46	5	.7	1.0	.5	700	N	N	N	<10	200
79W208	33 13 9	108 55 39	3	1.0	2.0	.3	700	N	N	N	<10	300
79W108	33 14 27	108 52 42	3	.7	1.0	.2	500	N	N	N	<10	200
79W109	33 14 32	108 52 50	3	.7	1.0	.3	700	N	N	N	<10	300
79GL200	33 15 0	108 58 9	7	1.0	2.0	.3	700	N	N	N	10	200
79GL201	33 15 10	108 57 39	7	1.0	2.0	.3	700	N	N	N	10	300
79GL202	33 15 34	108 57 39	7	1.0	2.0	.3	700	N	N	N	<10	200
79GL203	33 15 37	108 58 3	7	.7	2.0	.3	700	N	N	N	10	300
79GL204	33 15 37	108 58 6	7	1.0	2.0	.3	700	N	N	N	<10	300
79GL205	33 15 39	108 57 38	7	1.0	1.0	.3	500	N	N	N	<10	300

<80-MESH STREAM SEDIMENT DATA

Sample	S-BE	S-BI	S-CD	S-CO	S-CR	S-CU	S-LA	S-MO	S-NB	S-NI	S-PB
79BL807	3	N	N	15	200	20	30	N	20	20	30
79BL825	N	N	N	15	70	70	N	N	N	30	10
79BL518	1	N	N	15	150	70	20	N	20	50	15
79BL806	2	N	N	15	20	30	30	N	20	20	20
79BL820	N	N	N	20	100	70	N	N	N	50	10
79BL838	1	N	N	15	70	70	20	N	N	30	20
79BL821	1	N	N	20	50	70	N	N	N	20	10
79BL842	N	N	N	15	100	50	20	N	N	70	10
79BL822	1	N	N	10	50	50	N	N	N	20	15
79BL841	N	N	N	10	70	15	N	N	N	20	<10
79BL827	1	N	N	15	70	70	30	N	N	30	10
79BL840	N	N	N	15	100	30	20	N	N	20	10
79BL828	N	N	N	15	100	50	20	N	N	50	10
79BL839	N	N	N	15	200	50	N	N	N	70	10
79BL824	2	N	N	15	70	30	N	N	N	50	10
79BL832	N	N	N	15	100	70	N	N	N	70	10
79BL835	1	N	N	15	70	50	20	N	N	50	20
79BL829	N	N	N	15	300	50	20	N	N	70	10
79BL830	1	N	N	15	100	70	20	N	N	70	10
79BL834	N	N	N	15	100	50	N	N	N	30	10
79BL831	N	N	N	20	150	70	N	N	N	70	10
79BL836	1	N	N	20	150	70	20	N	N	70	10
79BL833	N	N	N	15	150	70	N	N	N	70	10
79W101	1	N	N	15	100	50	20	N	N	50	10
79W102	N	N	N	15	150	50	N	N	N	30	10
79W201	1	N	N	20	300	50	N	N	N	70	10
79W202	2	N	N	15	150	70	N	N	N	70	20
79W203	N	N	N	20	300	30	30	N	N	70	10
79W204	N	N	N	20	300	30	20	N	N	50	10
79W205	2	N	N	15	70	50	20	N	N	50	10
79W103	1	N	N	15	70	30	20	N	N	50	20
79W104	2	N	N	10	50	20	20	N	N	20	30
79W206	2	N	N	20	100	70	20	N	N	70	10
79W207	N	N	N	20	50	30	N	N	N	30	10
79W105	2	N	N	15	50	50	50	N	N	20	15
79W106	N	N	N	15	70	30	N	N	N	30	15
79W107	N	N	N	20	100	50	50	N	N	30	20
79W208	1	N	N	20	150	50	20	N	N	70	10
79W108	N	N	N	10	70	15	N	N	N	15	10
79W109	1	N	N	15	70	30	20	N	N	30	10
79GL200	N	N	N	20	20	30	N	N	N	20	10
79GL201	N	N	N	20	20	30	N	N	N	15	<10
79GL202	N	N	N	15	20	30	N	N	N	15	<10
79GL203	N	N	N	15	50	50	N	N	N	20	10
79GL204	N	N	N	15	N	30	N	N	N	15	<10
79GL205	N	N	N	15	50	30	N	N	N	20	<10

<80-MESH STREAM SEDIMENT DATA

Sample	S-SB	S-SC	S-SN	S-SR	S-V	S-W	S-Y	S-ZN	S-ZR	S-TH
79BL807	N	5	N	100	100	N	30	N	150	N
79BL825	N	7	N	300	100	N	10	N	150	N
79BL518	N	10	N	300	150	N	20	N	200	N
79BL806	N	5	N	150	50	N	30	N	150	N
79BL820	N	10	N	300	150	N	20	N	150	N
79BL838	N	7	N	300	100	N	20	N	100	N
79BL821	N	10	N	300	150	N	20	N	150	N
79BL842	N	7	N	300	100	N	20	N	200	N
79BL822	N	7	N	200	50	N	20	N	150	N
79BL841	N	5	N	300	100	N	10	N	100	N
79BL827	N	10	N	500	150	N	30	N	200	N
79BL840	N	7	N	300	200	N	30	N	150	N
79BL828	N	10	N	500	150	N	20	N	150	N
79BL839	N	7	N	300	150	N	30	N	150	N
79BL824	N	7	N	300	70	N	20	N	150	N
79BL832	N	7	N	300	100	N	10	N	100	N
79BL835	N	7	N	300	70	N	20	N	150	N
79BL829	N	15	N	500	150	N	30	N	150	N
79BL830	N	7	N	500	100	N	30	N	150	N
79BL834	N	7	N	300	100	N	10	N	150	N
79BL831	N	7	N	300	100	N	10	N	100	N
79BL836	N	10	N	300	100	N	30	N	150	N
79BL833	N	7	N	300	150	N	20	N	150	N
79W101	N	5	N	500	100	N	20	N	150	N
79W102	N	7	N	150	200	N	10	N	150	N
79W201	N	10	N	300	150	N	20	N	150	N
79W202	N	7	N	300	100	N	20	N	150	N
79W203	N	7	N	300	100	N	30	N	100	N
79W204	N	7	N	300	150	N	20	N	200	N
79W205	N	7	N	500	150	N	30	N	200	N
79W103	N	5	N	500	70	N	20	N	150	N
79W104	N	5	N	300	50	N	10	N	100	N
79W206	N	10	N	300	100	N	20	N	200	N
79W207	N	10	N	500	200	N	10	N	100	N
79W105	N	7	N	300	100	N	30	N	200	N
79W106	N	5	N	300	100	N	10	N	100	N
79W107	N	10	N	300	200	N	30	N	300	N
79W208	N	10	N	300	150	N	20	N	200	N
79W108	N	5	N	200	70	N	10	N	100	N
79W109	N	7	N	500	70	N	20	N	150	N
79GL200	N	7	N	300	150	N	10	N	70	N
79GL201	N	7	N	500	200	N	10	N	70	N
79GL202	N	5	N	500	150	N	<10	N	70	N
79GL203	N	5	N	500	150	N	10	N	100	N
79GL204	N	7	N	500	150	N	<10	N	70	N
79GL205	N	5	N	300	150	N	N	N	70	N

WATER SAMPLE DATA

Sample	LATITUDE	LONGITUD	AA-CA	CL	F	AA-LI	AA-MG	AA-NA	NO3-	AA-K
79BL802W	33 10 18	109 2 31	37.1	7.9	.33	.019	16.5	18.4	--	8.9
79BL804W	33 11 11	109 0 15	11.8	3.7	.36	.026	1.5	43.1	5.4	7.4
79BL852W	33 12 45	108 58 37	--	--	--	--	--	--	--	--
82GL2W	33 15 32	108 58 2	147.0	10.3	1.20	.005	34.4	49.7	<.1	8.9
82W26W	33 14 41	108 52 52	53.0	470.0	1.70	--	5.0	600.0	<.1	33.0

Sample	SIO2	SO4--	ICP-SR	ALKALINE	CH-BAL	PH	SP COND	TEMP	ICP-AL	AA-AS
79BL802W	75	67.9	.291	156	.42	8.64	410	18.5	47	2.0
79BL804W	36	3.7	.009	137	4.30	8.13	250	16.0	<36	2.5
79BL852W	--	--	.215	--	--	--	--	--	37	--
82GL2W	--	455.0	--	204	-2.20	7.29	1,120	--	--	11.1
82W26W	--	30.0	--	110	--	6.99	1,600	44.0	--	14.0

Sample	ICP-B	ICP-BA	AA-CU	AA-FE	AA-MN	AA-MO	U	ICP-V	AA-ZN
79BL802W	7	26	6.2	16	1	1.0	.40	14	200.0
79BL804W	15	2	1.2	600	3	1.0	1.00	11	210.0
79BL852W	11	9	--	--	--	--	1.10	<8	--
82GL2W	--	--	3.8	7	14	2.1	<.10	--	9.0
82W26W	--	--	1.6	--	--	5.2	.64	--	4.6