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A COMPILATION OF TRACE METAL VALUES IN WATER AND SEDIMENTS COLLECTED ALONG THE RIO GRANDE AND ITS TRIBUTARIES IN NEW MEXICO. DATA FROM SELECTED PUBLISHED AND UNPUBLISHED SOURCES

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INTRODUCTION

The Rio Grande watershed comprising an area of about 128,150 km^2 is New Mexico's most significant source of surface and subsurface water. Flow is derived primarily from snowmelt in the mountains of northern New Mexico and southern Colorado and from intermittent but locally heavy thunderstorms during July and August. Storage and flood control reservoirs utilized for irrigation and recreation are located along the Rio Grande and are potential sediment and pollutant traps.

Prior to 1975, heavy metal concentrations in the Rio Grande had been determined by the U.S. Geological Survey on filtered samples at only a few sites. Since that time, studies have been done on many sites not only for dissolved metals but for metals in suspended, bottom, and bank sediment. This report is a compilation of data from all the studies available through 1986, with the exception of the USGS Water Resources Data, which is readily available but contains very little trace metal data. Four of the studies from which data are included here are M.S. theses available only from the library at New Mexico Institute of Mining and Technology. Another study is a report to the Interstate Stream Commission, another is a study done for EPA, and still another is a report for the Office of Surface Mining. The data from these studies are difficult to obtain and then difficult to use because the values are not reported in the same form. This report gathers the data together in the same form in order to make it more readily useable and available.

Data are included here from the following studies: Faith (1974), Dauchy (1976), Popp et al. (1979), Laquer (1981), Brandvold et al. (1980), Brandvold et al. (1981), Novo-Gradec (1983), Popp, Hawley, and Love (1983), and Popp, et al. (1983). Not all the metals listed in this compilation were determined in each study and not all the same sampling sites were utilized. Values for sample sites located close together were combined for the tables and bar graphs. For instance, data from sample sites at San Acacia, Escondida, and Socorro were combined. All samples were handled by the researchers in a similar manner. Similar methods of analysis were used in all cases with the exception of those for arsenic and selenium. In the Dauchy study, colorimetric methods were used for these elements. In the Popp (1979) and Laquer (1981) studies, electrothermal atomic absorption was used. In the Brandvold, et al. (1981) and Popp, et al. (1983) (Rio Grande) studies, arsenic and selenium were done by hydride generation atomic absorption. The electrothermal atomic absorption values were so much higher than the other values they are thought to be in error and are not included here.

Values in the tables represent simple averages of data from individual reports. If several sampling trips were reported for each source, all values were averaged. If values were reported as "less than" a certain value, then a number of half the "less than" value was used for averaging. A listed average one half the detection limit indicates values were given in the source(s)

as "less than" the detection limit. A mean of 0 indicates that samples were not analyzed for this element.

Trace metal data is listed in different forms: "dissolved" (analyses were done on water samples filtered through 0.45 μm paper), "total" (analyses were done on unfiltered samples mixed before an aliquot was taken) and "sediment" (analyses were either on suspended sediment, bottom sediment, or sediment from the stream bed). Samples were treated slightly differently in the different studies (See Table 1). In some cases, suspended sediment was analyzed separately. In others, the sediment was analyzed together with the water as a "total" analysis. This was particularly true where there was little suspended sediment. In reports where sediment was analyzed separately and the sediment concentration was given, it was possible to calculate a "total" value for the tables. In reports where a "total" value was determined and sediment was not analyzed, it was possible to calculate a sediment value if the sediment concentration was given. In this context, sediment concentration is the same as USGS usage and is given in g/l. Sediment load, on the other hand, is in tons/day.

The sources, sites, sampling dates, sampling frequency, metals determined, and an assigned "color code" are given in Table 1. A color code was assigned each source because several sources numbered their sites identically. Master sample sites are identified in Table 3. The location of these sites along the

Rio Grande, Red River, and Rio San Juan - Rio Puerco systems is shown in Figures 1 and 2. Sample sites begin at the Colorado border and follow the Rio Grande to the Texas border.

Sediment concentrations when given in the source were averaged and are listed in Table 2. Average concentrations of metals in filtered water samples (dissolved metals) are listed alphabetically by element in Tables 4A - 4P. Average concentrations of metals in whole water (total metals) are listed alphabetically by element in Tables 5A - 5P. The sediment data are given alphabetically by element in Tables 6A - 6P.

The selected elements listed in Table 7 are displayed in bar graphs in Figure 3A to 3J, and 4A to 4J. Bar graph site identification is given in Table 8.

TABLE 1

IDENTIFICATION OF SOURCES, SITES, SAMPLE HANDLING, SAMPLES DATES, FREQUENCY, AND METALS DETERMINED

SOURCE: "A Selected Trace Metal Profile of the Rio Grande in New Mexico" J. Dauchey, Thesis (1976).

COLOR CODE: Brown

SITES:
1. Cerro
2. Arroyo Hondo
3. Espanola
4. Bernalillo
5. Isleta
6. Bernardo
7. Escondida
8. San Antonio
9. San Marcial
10. Caballo
11. Radium Springs
12. Anthony

FREQUENCY: Samples taken three times over one-year period in 5/75, 7/75, 1/76.

SAMPLE HANDLING: Samples were filtered through 0.45μ paper, then acidified in the field. Filtered sample and sediment were analyzed for metals.

METALS ANALYZED: As, Ba, B, Cd, Cr, Cu, Pb, Mn, Hg, Mo, Se, and Zn.

SOURCE: "An Equilibium Distribution of Trace Elements in a Natural Stream Environment" S. Faith, Thesis (1974).

COLOR CODE: Purple

SITES: Site A--Red River--1/2 mile upstream from molybdenum mine and mill
Site B--Red River--1/2 mile downstream from molybdenum mine and mill

FREQUENCY: Samples were taken once in 6/74.

SAMPLE HANDLING: Samples were filtered through 0.45μ paper and acidified in the field. Filtered samples were analyzed for metals.

METALS ANALYZED: Na, K, Ca, Mg, Fe, Mn, Al, Cu, Ni, Sn, and Mo.

SOURCE: "Heavy Metals and Pesticides in Water, Sediments, and Selected Tissue Samples of Aquatic Life in the Middle Rio Grande Valley in New Mexico" C. Popp, D. Brandvold, J. Brierley, N. Scott, and S. Gloss, EPA Report (1979)

COLOR CODE: Green

SITES:
1. Corrales (Bridge) - 4 Km upstream from Oxbow
2. Albuquerque Oxbow - 6 Km upstream from I-40 bridge
3. Isleta - 16 Km below Albuquerque sewage treatment plant
4. Bernardo - US-60 bridge
5. Socorro - Bureau of Reclamation Channel
6. Bosque - 20 Km downstream from Socorro
7. San Marcial - railroad bridge - 4 Km east of San Marcial
8. Monticello Point - headwaters of Elephant Butte Lake
9. La Joya Game Refuge - 24 Km north of Socorro
10. Elephant Butte Marsh - 10 Km upstream from Reservoir headwaters
11. Elephant Butte Dam
12. Rio Salado - at I-25 bridge
13. Rio Puerco - at I-25 bridge

FREQUENCY: Six sampling trips were taken between 1/77 and 8/78.

SAMPLE HANDLING: Samples for dissolved metal analysis were filtered and/or centrifuged and acidified as soon as possible. Whole water samples were digested with suspended sediment and suspended sediment was also analyzed.

METALS ANALYZED: As, B, Be, Ba, Cd, Co, Cr, Cu, Pb, Mn, Hg, Mo, Ni, Se, U, V, and Zn.

SOURCE: "A Survey of Trace Metal Distribution in Water and Suspended Sediment in the in the Rio Grande, Rio Puerco, and Rio Salado in Central New Mexico" F. Laquer, Thesis (1981).

COLOR CODE: Blue

SITES: 1. Alameda Bridge -- below NM-44 at Corrales
2. Isleta below NM-147
3. US-60 bridge at Bernardo
4. Rio Puerco at I-25 bridge
5. Rio Salado at I-25 bridge
6. San ACacia - above dam
7. Socorro
8. Ottowi - NM-4
9. Cochiti Dam
10. Cochiti Spillway -- 160 Km below dam
11. Bernalillo
12. San Lorenzo Arroyo - 20 Km north of Socorro
13. Arroyo 6 Km north of Socorro
14. San Marcial

FREQUENCY: Samples were taken 11 times over a one-year period (1978-1979).

SAMPLE HANDLING: Samples for dissolved metal analysis were filtered through 0.45μ paper and acidified in the field. Samples for total metal analysis were not filtered or acidified.

METAL ANALYZED: As, Ba, Be, Cd, Cr, Co, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Se, V, and Zn. (As and Se values believed to be incorrect -- not used ir this report).

SOURCE: "Heavy Metal and Nutrient Load of Rio San Jose-Rio Puerco System" D. Brandvold, and L. Brandvold, Interstate System Commission Report (1980).

COLOR CODE: Pink

SITES: 1A. Bluewater Lake
1B. San Mateo Creek
1C. Upstream San Mateo Creek
1D. Arroyo del Puerto
1. Rio Jose at Milan
2. Rest Stop on I-40 at Lava Beds
3. Rio San Jose after confluence with Rio Paguate
4. Rio San Jose before confluence with Rio Puerco
5. Rio Puerco at I-40
6. Rio Puerco 16 Km downstream from confluence with Rio San Jose

FREQUENCY: Six sampling trips were taken between 3/78 and 6/79.

SAMPLE HANDLING: Samples for dissolved metal analysis were filtered through 0.45μ paper and acidified as soon as possible. Whole water samples were mixed and analyzed for total metals.

METALS ANALYZED: Cd, Cr, Cu, Hg, Mo, Sr, Se, U, V, and Zn.

SOURCE: "Transport Mechanism in Sediment Rich Streams--Heavy Metal and Nutrient Load of the Rio San Jose-Rio Puerco Systems" D. Brandvold, C. Popp, and L. Brandvold, WRRI Report (1981).

COLOR CODE: Red

SITES:
1. San Mateo Creek
2. Lava Beds Rest Stop on I-40
3. Rio San Jose after confluence with Rio Paguate
4. Rio San Jose just before confluence with Rio Puerco
5. Rio Puerco just before confluence with Rio San Jose
6. Rio Puerco just after confluence with Rio San Jose
7. Rio Puerco just before confluence with Rio Grande
8. Rio San Jose at Milan
9. Upstream on San Mateo Creek
10. Arroyo del Puerto

FREQUENCY: Nine sampling trips were taken between 1/79 and 9/80.

SAMPLE HANDLING: Samples for dissolved metal analyses were filtered through 0.45μ paper and acidified as soon as possible. Suspended sediment and bed sediment were also analyzed for total metals.

METALS ANALYZED: As, Ba, Cd, Cs, Cr, Cu, Pb, Mn, Hg, Mo, Ni, Se, U, V, and Zn.

SOURCE: "An Evolution of Sediments in Middle Rio Grande, Elephant Butte Reservoir and Caballo Reservoir as Potential Sources for Toxic Materials" C. Popp, D. Brandvold, T. Lynch, and L. Brandvold, WRRI Report (1983).

COLOR CODE: Yellow

SITES:
1. Rio Grande at Socorro
2. Rio Grande at San Marcial

A. Elephant Butte - north end of reservoir
B. Elephant Butte - upper middle
C. Elephant Butte - lower middle
D. Elephant Butte - south end of reservoir

3. Caballo

FREQUENCY: Four sampling trips were taken between 10/81 and 5/82.

SAMPLE HANDLING: Samples for dissolved meals analysis were filtered and acidified. Whole water samples and bed sediments were also collected.

METALS ANALYZED: As, Cd, Cr, Cu, Pb, Hg, Mo, Se, U, and V.

SOURCE: "Radionuclide and Heavy Metal Distribution in Recent Sediments of Major Streams in Grants Mineral Belt, NM" C. Popp, J. Hawley, and D. Love (1983).

COLOR CODE: Orange

SITES: 2. Rio Puerco near Popalitito Windmill
3. Rio Puerco below confluence of Rio San Jose and Rio Puerco
SJ-1. San Jose before confluence with Rio Puerco
7. Rio Puerco upstream from Rio San Jose
Pag-1. Paguate Reservoir
9. Chico Arroyo

FREQUENCY: Samples were taken once at each site during 1982.

SAMPLE HANDLING: No water samples were collected. Sediment samples are from cores taken along stream bed. Metal analysis was done only on <63 micror fraction. Values are listed in tables in parentheses.

METALS ANALYZED: As, Cd, Cr, Cu, Hg, Mo, Ni, Se, U, and V.

SOURCE: "Trace Metal and Radionuclide Distributions in Recent Sediments of the Rio Puerco, Rio San Jose, and Paguate Reservoir in the Grants Mineral Belt" K. Novo-Gradec, Thesis (1983).

COLOR CODE: Black

SITES: 1,2. Rio Puerco - west of Belen
3,4,5. Rio Puerco below confluence with Rio San Jose
6,7. Rio Puerco above confluence with Rio San Jose
8,9. Rio Puerco above Chico Arroyo
10,11. Chico Arroyo
Pag. Paguate Reservoir
SJ-1. Rio San Jose before confluence with Rio Puerco
Pag-1. Rio San Jose after confluence with Rio Paguate

FREQUENCY: Each site sampled once during 1981-1983.

SAMPLE HANDLING: Cored sediment cas collected. Metal analysis was done only on <63 micron and clay fraction. Values reported here are for surface sediment only and are in parentheses because they represent only a fraction of sediment.

METALS ANALYZED: As, Ba, Cd, Cr, Co, Cu, Hg, Mo, Pb, Se, V, and U.

TABLE 2

SITE vs AVERAGE SEDIMENT CONCENTRATION

Site	Sedimentation concentrations (g/l)
Cerro	1.1
Arroyo Hondo	0.43
Espanola, Ottowi	0.74
Bernalillo, Corrales	1.07
Isleta	0.64
Bernardo	0.96
Puerco	320.0
Salado	26.0
San Acacia, Escondida, and Socorro	2.13
San Antonio, San Marcial	1.12
Elephant Butte -- narrows to dam	0.96
Caballo	0.31
Radium Springs, Anthony	0.9

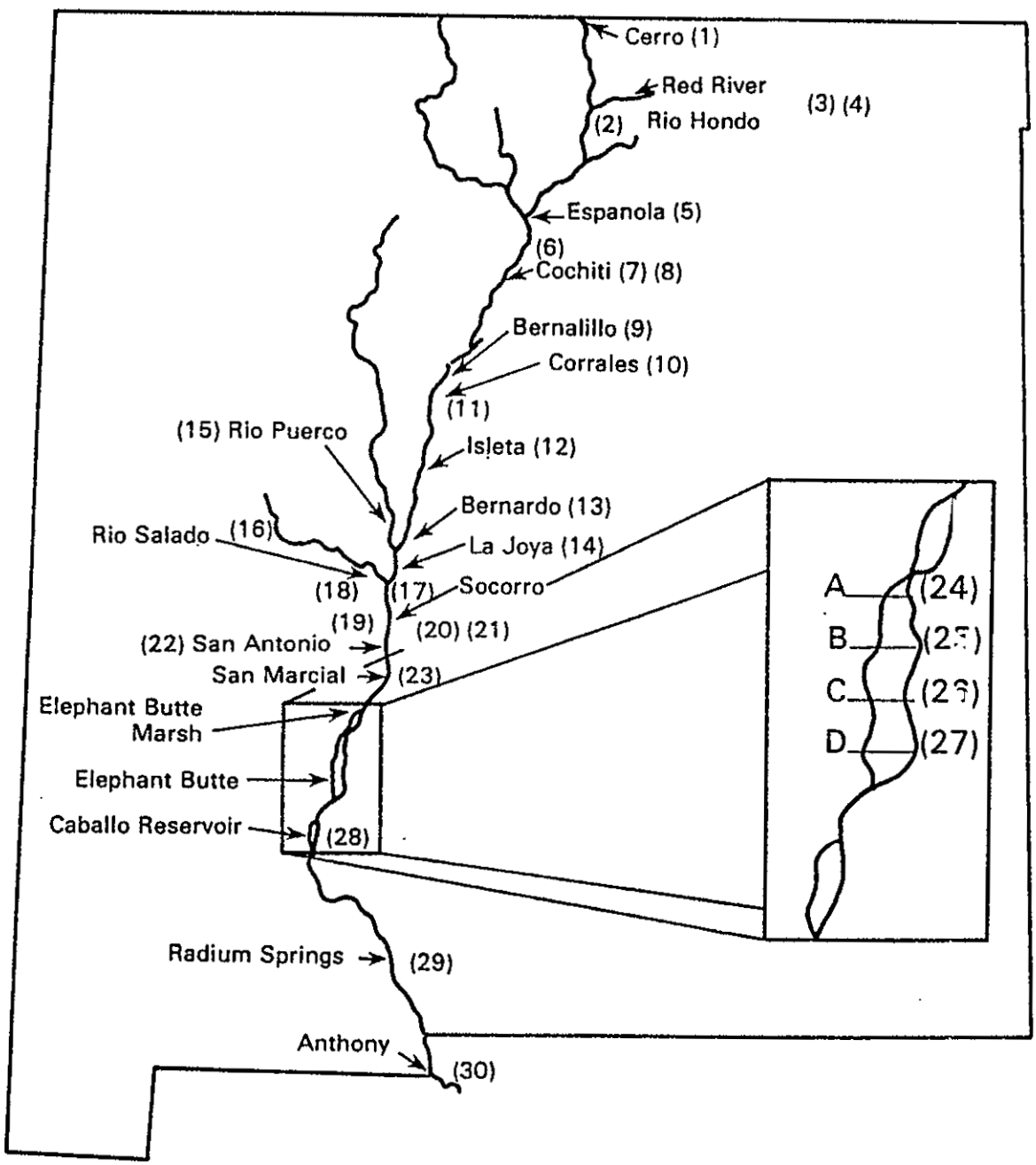


Figure 1. Location of sites along Rio Grande

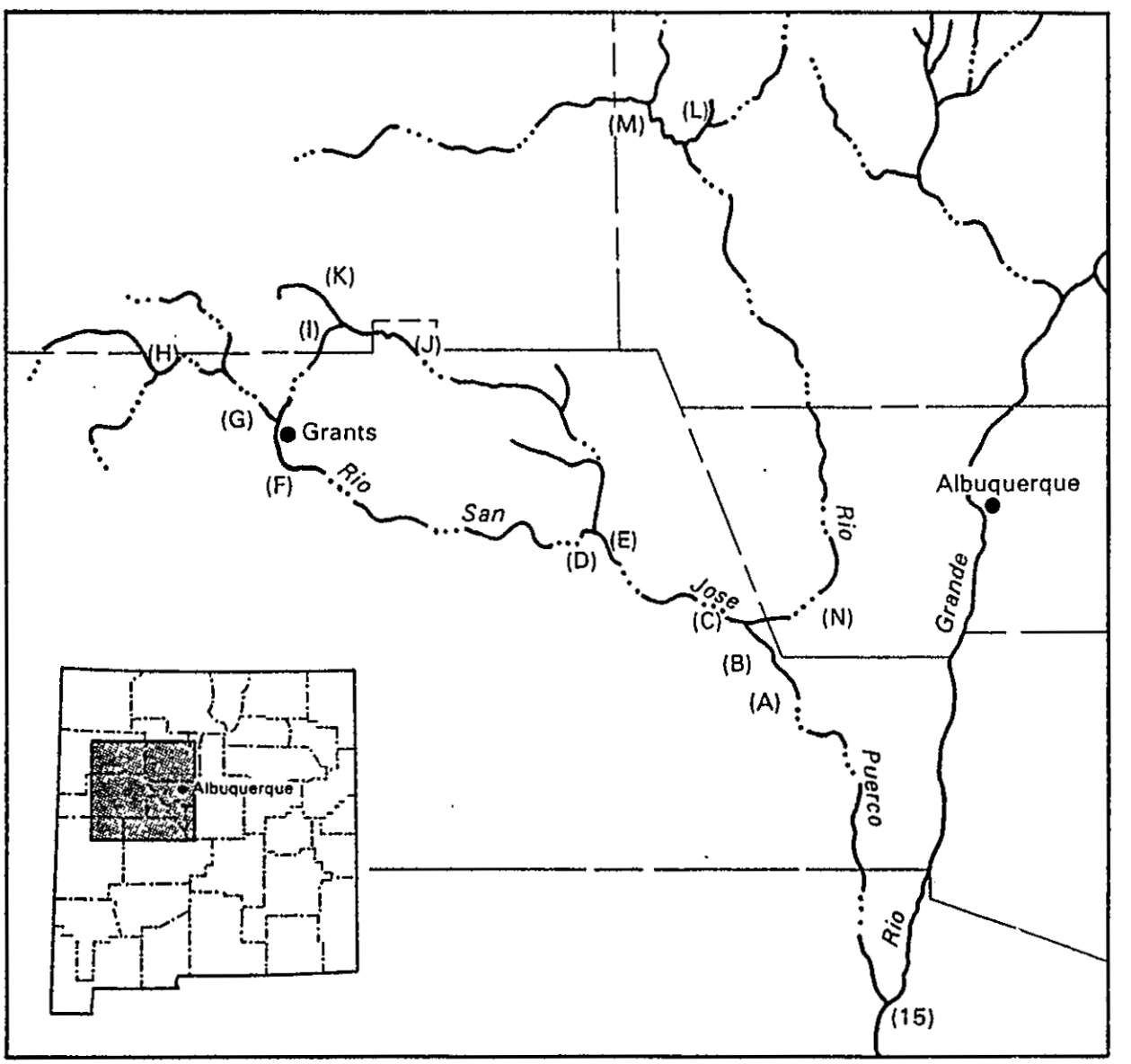


Figure 2. Location of sites along Rio San Jose–Rio Puerco.

Table 3

KEY TO MASTER SAMPLE SITES

Rio Grande Sites

Master Site	Description
1.	Brown-1 (Cerro)
2.	Brown-2 (Arroyo Hondo)
3.	Purple-A (Red River)
4.	Purple-B (Red River)
5.	Brown-3 (Espanola)
6.	Blue-8 (Ottowi)
7.	Blue-9 (Cochiti Dam)
8.	Blue-10 (Cochiti Spwy)
9.	Blue-11, Brown-4 (Bernalillo)
10.	Blue-1, Green-1 (Corrales)
11.	Green-2 (Oxbow)
12.	Blue-2, Green-3, Brown-5 (Isleta)
13.	Blue-3, Green-4, Brown-6 (Bernardo)
14.	Green-9, (La Joya)
15.	Blue-4, Green-13, Red-7, (Puerco)
16.	Blue-5, Green-12 (Salado)
17.	Blue-6 (San Acacia)
18.	Blue-12 (San Lorenzo)
19.	Blue-13 (arroyo, Socorro)
20.	Brown-7 (Escondida)
21.	Blue-7, Green-5, Yellow-1 (Socorro)
22.	Brown-8, Green-6 (San Antonio)
23.	Green-7, Yellow-2, Brown-9, Blue-14 (San Marcial)
24.	Green-8, Yellow-A (Monticello Point)
25.	Green-10, Yellow-B (Elephant Butte Marsh)
26.	Yellow-C (Mid-Elephant Butte)
27.	Yellow-D, Green-11 (Dam)
28.	Brown-10, Yellow-3 (Caballo)
29.	Brown-11 (Radium Springs)
30.	Brown-12 (Anthony)

Rio San Jose - Puerco Sites

A.	Orange-2, Black-1,2 (Puerco near Popalitito Windmill)
B.	Red-6, Orange-3, Black-3,4,5, Pink-6 (Puerco below San Jose)
C.	Red-4, Orange-SJ-1, Black-SJ-1, Pink-4 (San Jose)
D.	Red-3, Pink-3, Black-PAG-1 (San Jose-Paguate)
E.	Orange-PAG-1, Black-PAG (Paguate Resevoir)
F.	Red-2, Pink-2 (San Jose-lava beds)
G.	Red-8, Pink-1 (San Jose-Milan)
H.	Pink-1A, Red-BW (Bluewater)
I.	Red-1, Pink-1B (San Mateo Creek)
J.	Red-9, Pink-1C (upstream-San Mateo Creek)
K.	Red-10, Pink-1D (Arroyo del Puerto)
L.	Black-8,9 (above Chico Arroyo on Puerco)
M.	Orange-9, Black-10,11 (Chico Arroyo)
N.	Orange-7, Black-6,7, Red-5, Pink-5 (Puerco above I-40)

Table 4-A

ARSENIC
Sample type: dissolved
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	3	5	0	5	5
2	3	5	0	5	5
3	0	0	0	0	0
4	0	0	0	0	0
5	3	5	0	5	5
6	3	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	4	13	9.7	5	27
10	1	10	0	10	10
11	1	18	0	18	18
12	5	18	20	5	55
13	4	45	74	5	156
14	0	0	0	0	0
15	3	111	86.5	21	193
16	2	346	221	190	503
17	1	102	0	102	102
18	0	0	0	0	0
19	0	0	0	0	0
20	3	8	2.9	5	10
21	1	80	0	80	80
22	4	16	16	5	131
23	6	36	48	5	131
24	2	14	3.5	11	16
25	2	33	34	8	57
26	1	9	0	9	9
27	2	18	12	9	26
28	4	9	3	5	12
29	3	8	3	5	10
30	4	7	3	5	10
A	0	0	0	0	0
B	1	5	0	5	5
C	1	4	0	4	4
D	1	5	0	5	5
E	0	0	0	0	0
F	1	7	0	7	7
G	1	2	0	2	2
H	0	0	0	0	0
I	1	3	0	3	3
J	1	39	0	39	39
K	1	30	0	30	30
L	0	0	0	0	0
M	0	0	0	0	0
N	1	3	0	3	3

Sea Water = 3 ppb
NMEID Drinking water Standard = 50 ppb

Table 4-B

BARIUM
Sample type: dissolved
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	3	47	19	30	67
2	3	42	2	40	44
3	0	0	0	0	0
4	0	0	0	0	0
5	3	63	42	30	110
6	3	91	16	78	109
7	0	0	0	0	0
8	0	0	0	0	0
9	4	60	17	35	70
10	1	170	0	170	170
11	1	130	0	130	130
12	5	77	49	40	160
13	5	73	27	50	120
14	0	0	0	0	0
15	3	100	71	44	180
16	2	200	126	111	290
17	1	37	0	37	37
18	0	0	0	0	0
19	0	0	0	0	0
20	3	75	23	50	95
21	1	39	0	39	39
22	4	90	42	60	150
23	5	101	45	65	180
24	1	200	0	200	200
25	1	100	0	100	100
26	0	0	0	0	0
27	1	100	0	100	100
28	3	84	4	80	88
29	3	75	1.5	74	77
30	4	93	22	75	125
A	0	0	0	0	0
B	1	82	0	82	82
C	1	80	0	82	82
D	1	65	0	65	65
E	0	0	0	0	0
F	1	64	0	64	64
G	1	69	0	69	69
H	0	0	0	0	0
I	1	117	0	117	117
J	1	91	0	91	91
K	1	160	0	160	160
L	0	0	0	0	0
M	0	0	0	0	0
N	1	59	0	59	59

Sea Water = 30 ppb
NMEID Drinking Water Standard = 1000 ppb

Table 4-C

BERYLIUM
Sample type: dissolved
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	3	0.03	0.016	0.015	0.05
7	1	0.015	0	0.015	0.015
8	1	0.015	0	0.015	0.015
9	1	0.03	0	0.03	0.03
10	4	0.07	0.08	0.005	0.2
11	1	0.51	0	0.51	0.51
12	4	0.08	0.13	0.05	0.28
13	7	0.3	0.63	0.05	1.0
14	0	0	0	0	0
15	6	1.1	2.4	.05	3.8
16	6	1.9	2.7	1.0	4.9
17	5	0.1	0.05	0.005	0.13
18	0	0	0	0	0
19	0	0	0	0	0
20	0	0	0	0	0
21	6	0.1	0.1	0.005	0.005
22	1	1.7	0	1.7	1.7
23	2	1.6	1.5	.5	2.7
24	1	1.9	0	1.9	1.9
25	1	0.98	9	0.98	0.98
26	0	0	0	0	0
27	1	0.4	0	0.4	0.4
28	0	0	0	0	0
29	0	0	0	0	0
30	0	0	0	0	0
A	0	0	0	0	0
B	0	0	0	0	0
C	0	0	0	0	0
D	0	0	0	0	0
E	0	0	0	0	0
F	0	0	0	0	0
G	0	0	0	0	0
H	0	0	0	0	0
I	0	0	0	0	0
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0	0	0	0
M	0	0	0	0	0
N	0	0	0	0	0

Sea Water = 0.0006 ppb

Table 4-D

BORON
Sample type: dissolved
values in ppm

Site	No.	Mean	S.D.	Min.	Max.
1	3	4.3	6.9	0.05	12.2
2	3	2.2	3.3	0.05	6
3	0	0	0	0	0
4	0	0	0	0	0
5	3	4.6	7.5	0.05	13.2
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	3	1.9	2.7	0.05	5
10	3	0.5	0.2	0.1	0.8
11	2	0.3	0.2	0.26	0.3
12	6	1.4	4.5	0.05	7.9
13	6	2.2	6.9	0.05	12.2
14	0	0	0	0	0
15	0	0	0	0	0
16	0	0	0	0	0
17	0	0	0	0	0
18	0	0	0	0	0
19	0	0	0	0	0
20	3	2.1	3.3	0.05	6.5
21	3	0.1	0.0	0.05	0.2
22	5	1.4	1.6	0.05	3.1
23	6	3.3	8.3	0.05	15.8
24	3	0	0	0	0
25	3	0.41	0.3	0.1	0.6
26	0	0	0	0	0
27	0	0	0	0	0
28	3	0.17	0.10	0.05	0.25
29	3	1.2	1.8	0.05	3.3
30	3	2.3	3.5	0.05	6.5
A	0	0	0	0	0
B	0	0	0	0	0
C	0	0	0	0	0
D	0	0	0	0	0
E	0	0	0	0	0
F	0	0	0	0	0
G	0	0	0	0	0
H	0	0	0	0	0
I	0	0	0	0	0
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0	0	0	0
M	0	0	0	0	0
N	0	0	0	0	0

Table 4-E

CADMIUM
Sample type: dissolved
values in ppm

Site	No.	Mean	S.D.	Min.	Max.
1	3	8.7	12.5	0.3	23
2	3	8.7	10.9	0.2	0.21
3	0	0	0	0	0
4	0	0	0	0	0
5	3	9.3	15.3	0.3	27
6	3	0.47	0.2	0.4	0.76
7	1	0.41	0	0.41	0.41
8	1	0.52	0	0.52	0.52
9	4	5.8	10.1	0.3	21
10	4	5.3	8.6	0.34	18.2
11	1	0.3	0	0.3	0.3
12	5	3.9	7.3	0.2	17
13	10	3.3	5.5	0.24	10
14	0	0	0	0	0
15	8	3.2	3.1	0.24	8
16	6	3.5	4.8	0.06	11.9
17	6	1.8	3.5	0.16	9.0
18	0	0	0	0	0
19	0	0	0	0	0
20	3	2.2	1.7	0.07	10.0
21	7	3.0	4.5	0.2	03.2
22	4	1.9	1.27	0.7	3
23	6	2.8	4.2	0.05	11
24	2	0.74	0.50	0.39	1.1
25	2	1.25	1.48	0.2	2.3
26	1	1.1	0	1.1	1.1
27	2	0.27	0.10	0.65	0.8
28	4	4.5	7.1	0.05	15
29	3	8.1	8.9	0.8	18
30	4	14	15.3	0.3	33
A	0	0	0	0	0
B	3	14	22	15	39
C	2	6.3	0.42	6	6.6
D	2	5.6	3.7	3	8.2
E	0	0	0	0	0
F	3	2.3	2.8	0.5	5.6
G	1	0.36	0	0.36	0.36
H	0	0	0	0	0
I	1	1.6	0	1.6	1.6
J	1	1.4	0	1.4	1.4
K	1	3.8	0	3.8	3.8
L	0	0	0	0	0
M	0	0	0	0	0
N	2	8.9	1.5	7.8	10

Table 4-F

CHROMIUM
Stample type: dissolved
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	3	1.2	1.2	0.2	2.5
2	3	4.9	6	1.3	12
3	0	0	0	0	0
4	0	0	0	0	0
5	3	1.9	2.1	0.2	4.3
6	4	0.7	0.55	0.2	1.18
7	1	0.3	0	0.3	0.3
8	1	0.2	0	0.2	0.2
9	4	0.98	0.55	0.5	1.5
10	5	2.3	2.2	0.3	5.4
11	1	2.3	0	2.3	2.3
12	5	1.2	0.87	0.2	2.5
13	12	1.7	1	0.2	3.2
14	0	0	0	0	0
15	8	2.8	3.8	0.3	7.7
16	7	5.3	4.5	0.3	12
17	6	0.6	0.75	0.1	2.1
18	0	0	0	0	0
19	0	0	0	0	0
20	3	4	4.6	0.2	9.1
21	7	71	99	0.2	141
22	4	2.8	2.3	0.2	5
23	6	2.5	2.2	0.5	5.9
24	2	4.3	5.8	0.2	8.4
25	2	2.3	0.21	2.1	2.4
26	1	0.95	0	0.95	0.95
27	2	4.0	4.0	1.2	6.9
28	4	2.1	3.3	0.2	7.1
29	3	2.4	2.9	0.5	5.8
30	4	2.0	3.2	0.1	6.8
A	0	0	0	0	0
B	5	0.62	0.86	0.1	2.1
C	3	4.8	7.9	0.1	14
D	3	1.5	2.3	0.1	4.19
E	0	0	0	0	0
F	5	0.68	0.99	0.1	2.4
G	1	0.9	0	0.9	0.9
H	0	0	0	0	0
I	2	6.5	9.2	1	14
J	2	1.1	0.85	0.5	1.7
K	2	2	2.1	0.5	3.5
L	0	0	0	0	0
M	0	0	0	0	0
N	3	1.37	1.5	0.5	3.1

NMEID Drinking Water Standards = 50 ppb

Table 4-G

COBALT
Sample type: dissolved
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	3	3.3	0.74	2.7	4.2
7	1	3.2	0	3.2	3.2
8	1	2.7	0	2.7	2.7
9	1	5.5	0	5.5	5.5
10	1	3.6	0	3.6	3.6
11	1	3.4	0	3.4	3.4
12	6	11	35	0.25	41
13	9	7	20	0.25	28
14	0	0	0	0	0
15	8	34	82	0.25	140
16	7	33	80	0.25	130
17	5	5.11	2.7	0.25	6.8
18	0	0	0	0	0
19	0	0	0	0	0
20	0	0	0	0	0
21	6	5.5	2.6	0.25	7.0
22	1	0	0	24	24
23	2	24	14	15	34
24	1	30	0	30	30
25	1	21	0	21	21
26	0	0	0	0	0
27	1	7.9	0	7.9	7.9
28	0	0	0	0	0
29	0	0	0	0	0
30	0	0	0	0	0
A	0	0	0	0	0
B	1	220	0	200	220
C	1	19	0	19	19
D	1	30	0	30	30
E	0	0	0	0	0
F	2	8	11	1	16
G	0	0	0	0	0
H	0	0	0	0	0
I	1	19	0	19	19
J	1	35	0	35	35
K	1	10	0	10	10
L	0	0	0	0	0
M	0	0	0	0	0
N	1	26	0	26	26

Sea Water = 0.1 ppb

Table 4-H

COPPER
Sample type: dissolved
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	3	222	370	1	670
2	3	10	8.7	4	20
3	1	4	0	4	4
4	1	2	0	2	2
5	3	8.7	6.0	3	15
6	4	5.0	3.5	1.8	8.5
7	1	1.8	0	1.8	1.8
8	1	2.3	0	2.3	2.3
9	4	12	11.8	5	30
10	4	7.8	4.3	4.2	13.5
11	1	11	0	11	11
12	8	12	11.8	4.8	35
13	11	7.5	8	2.2	25
14	0	0	0	0	0
15	8	16	18	4.4	47
16	7	15	17	3.7	39
17	6	5.3	1.7	2.1	6.9
18	0	0	0	0	0
19	0	0	0	0	0
20	3	13	7	6	20
21	6	5.4	1.07	4.4	7.3
22	4	20	11	8	30
23	6	21	19	5.4	55
24	2	42	9.2	6	49
25	2	14	2.8	12	16
26	1	18	0	18	18
27	2	14	8.6	7.9	20
28	4	11	4.1	6	16
29	3	8.3	7.0	1	15
30	4	55	75	5	166
A	0	0	0	0	0
B	3	12	13	2	27
C	2	86	104	13	160
D	2	77	89	14	140
E	0	0	0	0	0
F	3	5.8	3.6	2	9.3
G	1	25	0	25	25
H	0	0	0	0	0
I	1	11	0	11	11
J	1	7.6	0	7.6	7.6
K	1	5.2	0	5.2	5.2
L	0	0	0	0	0
M	0	0	0	0	0
N	2	38	31	16	60

Sea Water = 3 ppb
NMEID Drinking Water Standards = 1000 ppb

Table 4-I

IRON
Sample type: dissolved
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	0	0	0	0	0
2	0	0	0	0	0
3	1	450	0	450	450
4	1	270	0	270	270
5	0	0	0	0	0
6	2	91	57	50	131
7	1	114	0	114	114
8	1	80	0	80	80
9	1	563	0	563	563
10	4	272	275	28	585
11	0	0	0	0	0
12	4	355	558	34	1190
13	7	109	97	30	270
14	0	0	0	0	0
15	6	270	319	40	900
16	6	1228	2828	15	7000
17	5	88	84	22	230
18	0	0	0	0	0
19	0	0	0	0	0
20	0	0	0	0	0
21	6	96	71	8	190
22	0	0	0	0	0
23	1	14	0	14	14
24	0	0	0	0	0
25	0	0	0	0	0
26	0	0	0	0	0
27	0	0	0	0	0
28	0	0	0	0	0
29	0	0	0	0	0
30	0	0	0	0	0
A	0	0	0	0	0
B	0	0	0	0	0
C	0	0	0	0	0
D	0	0	0	0	0
E	0	0	0	0	0
F	0	0	0	0	0
G	0	0	0	0	0
H	0	0	0	0	0
I	0	0	0	0	0
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0	0	0	0
M	0	0	0	0	0
N	0	0	0	0	0

Sea Water = 10 ppb
NMEID Drinking Water Standards = 300 ppb

Table 4-J

LEAD
Sample type: dissolved
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	3	17	13.6	1	25
2	3	16	14	1	29
3	0	0	0	0	0
4	0	0	0	0	0
5	3	10.8	10	0.5	21
6	4	1.0	0.75	0.5	1.8
7	1	0.05	0	0.05	0.05
8	1	0.28	0	0.28	0.28
9	4	4.85	4.5	0.44	11
10	4	3.4	3.5	0.21	8.1
11	1	6.9	0	6.9	6.9
12	8	4.2	7.2	0.21	17
13	10	4.2	7.2	0.21	17
14	0	0	0	0	0
15	7	4.5	19	0.03	26
16	6	11	12	0.32	28
17	5	0.33	0.22	0.025	0.62
18	0	0	0	0	0
19	0	0	0	0	0
20	3	10.7	12	3	25
21	7	2.4	4.2	0.4	11.1
22	4	0.15	0.2	0.03	0.45
23	6	7.2	3.3	4	12
24	2	3.7	3.1	1.5	5.9
25	2	11	10	3.9	18
26	1	4.7	0	4.7	4.7
27	2	5.7	0.21	5.5	5.8
28	4	6.6	5.5	2	5.8
29	3	5.8	7.2	0.5	14
30	4	21	30	0.5	66
A	0	0	0	0	0
B	4	15	11	5	30
C	2	5.1	0.14	5.0	5.2
D	2	5.4	0.56	5.0	5.8
E	0	0	0	0	0
F	4	11.5	7.50	5	18
G	1	2.8	0	2.8	2.8
H	0	0	0	0	0
I	1	5.3	0	5.3	5.3
J	2	23	4.2	20	26
K	2	25	7.1	20	30
L	0	0	0	0	0
M	0	0	0	0	0
N	3	8.6	2.4	5.9	10

Sea Water = .03 ppb
NMEID Drinking Water Standards = 50 ppb

Table 4-K

MANGANESE
Sample type: dissolved
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	3	12	7.5	5	20
2	3	13	11	5	25
3	1	90	0	90	90
4	1	83	0	83	83
5	3	48	48	10	94
6	3	30	25	24	50
7	1	31	0	31	31
8	1	24	0	24	24
9	4	20.6	14	5	38
10	5	70	118	2.5	280
11	1	280	0	280	280
12	5	81	113	16	280
13	8	123	250	5	570
14	0	0	0	0	0
15	8	1115	1892	6.8	3300
16	8	2775	3853	51	5500
17	5	12.8	7	3.8	22.6
18	0	0	0	0	0
19	0	0	0	0	0
20	3	15	7	8	22
21	6	4.5	1.3	2.7	6.1
22	3	202	378	5	710
23	5	134	266	5	610
24	1	610	0	610	610
25	1	430	0	430	430
26	0	0	0	0	0
27	1	14	0	14	14
28	3	8	3	5	11
29	3	6.7	2.9	5	10
30	4	36	42	6	96
A	0	0	0	0	0
B	1	90	0	90	90
C	1	2.3	0	2.3	2.3
D	1	107	0	107	107
E	0	0	0	0	0
F	1	58	0	58	58
G	0	0	0	0	0
H	0	0	0	0	0
I	1	15	0	15	15
J	1	25	0	25	25
K	1	230	0	230	230
L	0	0	0	0	0
M	0	0	0	0	0
N	1	63	0	63	63

Sea Water = 2 ppb
NMEID Drinking Water Standards = 50 ppb

Table 4-L

MERCURY
Sample type: dissolved
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	3	0.05	0	0.05	0.05
2	3	0.05	0	0.05	0.05
3	0	0	0	0	0
4	0	0	0	0	0
5	3	0.05	0	0.05	0.05
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	3	1.1	1.3	0.1	2.6
10	0	0	0	0	0
11	1	1.2	0	1.2	1.2
12	4	0.5	0.6	0.05	1.4
13	4	0.4	0.7	0.05	0.05
14	0	0	0	0	0
15	2	2.3	2.3	0.68	3.9
16	1	3.3	0	3.3	3.3
17	0	0	0	0	0
18	0	0	0	0	0
19	0	0	0	0	0
20	3	0.05	0	0.05	0.05
21	0	0	0	0	0
22	4	0.15	0.2	0.05	0.45
23	5	1.02	0.89	0.05	1.8
24	2	1.1	0.8	0.51	1.7
25	2	0.81	0.5	0.42	1.2
26	1	0.44	0	0.44	0.44
27	2	0.92	0.68	0.44	1.4
28	4	0.19	0.29	0.05	0.61
29	3	0.05	0	0.05	0.05
30	4	0.05	0.04	0.05	0.05
A	0	0	0	0	0
B	1	0.71	0	0.71	0.71
C	1	0.18	0	0.18	0.18
D	1	0.49	0	0.49	0.49
E	0	0	0	0	0
F	2	0.69	0.44	0.38	1
G	1	0.1	0	0.1	0.1
H	1	0.1	0	0.1	0.1
I	1	0.17	0	0.17	0.17
J	1	0.17	0	0.17	0.17
K	1	0.3	0	0.3	0.3
L	0	0	0	0	0
M	0	0	0	0	0
N	1	0.48	0	0.48	0.48

Detection limit is 0.1 ppb; Sea Water = 0.03 ppb
NMEID Drinking Water Standards = 2 ppb

Table 4-M

MOLYBDENUM
Sample type: dissolved
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	3	20	25	10	50
2	3	42	14	26	50
3	1	7	0	7	7
4	1	124	0	124	124
5	3	37	23	10	50
6	3	5.5	0.6	5	6.2
7	1	6.2	0	6.2	6.2
8	1	5.2	0	5.2	5.2
9	4	29	24	50	6.2
10	2	6.9	0.65	6.2	7.5
11	1	9.3	0	9.3	9.3
12	5	29	19	4	50
13	7	17.8	29	9.2	50
14	0	0	0	0	0
15	6	36	128	4.6	180
16	6	14	16	8.2	31
17	6	8	2.7	4.8	12.6
18	0	0	0	0	0
19	0	0	0	0	0
20	3	37	23	10	50
21	6	6.7	3.3	3.2	12.1
22	4	32	21	10	50
23	6	25	20	5	50
24	2	9.3	3.7	6.7	12
25	2	9	5.7	5	13
26	1	4.6	0	4.6	4.6
27	2	7.8	2.8	5.8	9.8
28	4	28	25	3.7	50
29	3	37	23	10	50
30	4	36	16	20	50
A	0	0	0	0	0
B	7	56	87	10	250
C	5	19	8.9	10	250
D	4	26	8.5	13	30
E	0	0	0	0	0
F	8	19	16	10	57
G	1	61	0	61	61
H	1	10	0	10	10
I	2	525	163	410	640
J	2	525	488	180	870
K	2	425	148	320	530
L	0	0	0	0	0
M	0	0	0	0	0
N	4	31	33	10	79

Sea Water = 10 ppb

Table 4-N

NICKEL
Sample type: dissolved
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	0	0	0	0	0
2	0	0	0	0	0
3	1	9	0	9	9
4	1	24	0	24	24
5	0	0	0	0	0
6	2	7.2	5.9	3	11.3
7	1	0.6	0	0.6	0.6
8	1	0.25	0	0.25	0.25
9	1	3.7	0	0.25	0.25
10	4	7.6	8.2	1.0	18.9
11	1	28	0	28	28
12	6	24	48	1.4	80
13	8	14	25	0.25	40
14	0	0	0	0	0
15	8	22	62	0.25	120
16	7	37	56	1.4	102
17	5	2.3	2.1	1.0	6.1
18	0	0	0	0	0
19	0	0	0	0	0
20	0	0	0	0	0
21	6	6.4	4.5	1.0	12.3
22	1	49	0	49	49
23	2	51	31.7	74	29.2
24	1	74	0	74	74
25	1	36	0	36	36
26	0	0	0	0	0
27	1	26	0	26	26
28	0	0	0	0	0
29	0	0	0	0	0
30	0	0	0	0	0
A	0	0	0	0	0
B	1	58	0	58	58
C	2	24.5	34.6	0	49
D	1	0	0	62	62
E	0	0	0	0	0
F	1	45	0	45	45
G	1	41	0	41	41
H	0	0	0	0	0
I	1	44	0	44	44
J	1	47	0	47	47
K	1	29	0	29	29
L	0	0	0	0	0
M	0	0	0	0	0
N	1	56	0	56	56

Sea Water = 2 ppb

Table 4-O

SELENIUM
Sample type: dissolved
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	3	6	3	2.5	8
2	3	6	3	2.5	8
3	0	0	0	0	0
4	0	0	0	0	0
5	3	6	3	2.5	8
6	3	3	3.4	1.2	7.1
7	0	0	0	0	0
8	0	0	0	0	0
9	4	4.9	3.7	0.9	8
10	1	5.3	0	5.3	5.3
11	1	18	0	18	18
12	5	8.7	4.5	2.5	15
13	5	10	9.7	2.5	27
14	0	0	0	0	0
15	3	85	134	8	240
16	2	120	99	49.6	190
17	1	1.2	0	1.2	1.2
18	0	0	0	0	0
19	0	0	0	0	0
20	3	6	3	2.5	8
21	2	3.8	5.3	0.05	7.5
22	4	12	13	2.5	31
23	6	22.6	16	1	46
24	2	8.7	10	1.3	16
25	2	30	41	0.9	59
26	1	0.4	0	0.4	0.4
27	2	4.6	3.4	2.2	7
28	4	8.9	9.8	2.1	23
29	3	6.2	3.2	2.5	8
30	4	5.6	2.8	2.5	8
A	0	0	0	0	0
B	7	3.1	4.3	1.5	13
C	5	2.2	1.6	1.5	5
D	4	2.6	2.2	1.5	6
E	0	0	0	0	0
F	8	4.1	5.1	1.5	16
G	1	4	0	4	4
H	2	5.8	4.6	2.5	9
I	2	61	74	8	113
J	2	84	107	8	160
K	2	40	7.1	35	45
L	0	0	0	0	0
M	0	0	0	0	0
N	4	2.9	2.8	1.5	7

Sea Water = 0.4 ppb
NMEID Drinking Water Standards = 10 ppb

Table 4-P

URANIUM
Sample type: dissolved
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	0	0	0	0	0
10	0	0	0	0	0
11	1	22	0	22	22
12	1	15	0	15	15
13	1	33	0	33	33
14	0	0	0	0	0
15	2	48	1.4	47	49
16	1	22	0	22	22
17	0	0	0	0	0
18	0	0	0	0	0
19	0	0	0	0	0
20	0	0	0	0	0
21	0	0	0	0	0
22	0	0	0	0	0
23	1	19	0	19	19
24	1	19	0	19	19
25	1	19	0	19	19
26	0	0	0	0	0
27	1	37	0	37	37
28	0	0	0	0	0
29	0	0	0	0	0
30	0	0	0	0	0
A	0	0	0	0	0
B	7	26	27	10	80
C	5	20	22	10	59
D	4	32	26	10	60
E	0	0	0	0	0
F	8	32	29	10	80
G	1	68	0	68	68
H	2	35	35	10	60
I	2	669	280	470	867
J	1	1400	0	1400	1400
K	2	885	445	570	1200
L	0	0	0	0	0
M	0	0	0	0	0
N	4	21	23	10	55

Sea Water = 3 ppb

Table 4-Q

VANADIUM
Sample type: dissolved
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	3	4.6	3.8	1.3	8.4
7	1	8.4	0	8.4	8.4
8	1	1.3	0	1.3	1.3
9	1	1.8	0	1.8	1.8
10	4	7.3	4.3	1.3	10.9
11	1	18	0	18	18
12	4	41.5	70	1.3	147
13	7	15	166	15	256
14	0	0	0	0	0
15	6	28	146	7	320
16	6	55	103	8	200
17	5	10.5	6.6	4.6	20.6
18	0	0	0	0	0
19	0	0	0	0	0
20	0	0	0	0	0
21	5	16.7	6.4	7.0	24.6
22	1	150	0	150	150
23	3	52	40	27	98
24	2	51	66	4	98
25	2	26	22	11	42
26	1	12	0	12	12
27	2	19	9.9	12	26
28	1	14	0	14	14
29	0	0	0	0	0
30	0	0	0	0	0
A	0	0	0	0	0
B	7	100	72	25	240
C	5	56	33	25	100
D	4	105	41	60	160
E	0	0	0	0	0
F	8	24	12	0	43
G	2	150	0	150	150
H	2	25	0	25	25
I	2	86	20	71	100
J	2	63	53	25	100
K	2	48	32	25	71
L	0	0	0	0	0
M	0	0	0	0	0
N	4	124	101	25	230

Sea Water = 2 ppb

Table 4-R

ZINC
Sample type: dissolved
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	3	31	24	11	58
2	3	17	7	12	25
3	0	0	0	0	0
4	0	0	0	0	0
5	3	23	4.3	18	26
6	3	28	28	10	60
7	1	10	0	10	10
8	1	60	0	60	60
9	4	18	9.2	9	26
10	5	286	567	286.2	286.2
11	4	325	138	200	500
12	5	33	28	3	73
13	8	30	32	5	87
14	0	0	0	0	0
15	6	28	17	10	79
16	6	10	20	5	50
17	1	99	0	99	99
18	0	0	0	0	0
19	0	0	0	0	0
20	3	17	7.5	10	25
21	1	12	0	12	12
22	4	38	14	10	43
23	5	25	10	15	42
24	1	42	0	42	42
25	1	48	0	48	48
26	0	0	0	0	0
27	1	25	0	25	25
28	3	21	6.4	14	25
29	3	16	7.8	10	25
30	4	47	41	14	106
A	0	0	0	0	0
B	4	88	33	57	130
C	3	65	49	10	105
D	3	45	14	30	58
E	0	0	0	0	0
F	4	32	17	10	47
G	1	80	0	80	80
H	1	90	0	90	90
I	2	46	4.9	43	50
J	2	60	42	30	90
K	2	56	34	32	80
L	0	0	0	0	0
M	0	0	0	0	0
N	3	61	26	40	90

Sea Water = 10 ppb
NMEID Drinking Water Standard = 5 ppm

Table 5-A

ARSENIC
Sample type: total
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	3	5	0	5	5
2	3	5	0	5	5
3	0	0	0	0	0
4	0	0	0	0	0
5	3	5	0	5	5
6	1	15	0	15	15
7	1	9	0	9	9
8	1	7	0	7	7
9	4	18	25	5	56
10	3	125	0	15	180
11	1	53	0	53	53
12	5	55	69	5	140
13	5	77	100	5	210
14	1	760	0	760	760
15	3	1955	1146	1050	3245
16	2	6284	6624	1600	10968
17	1	623	0	623	623
18	0	0	0	0	0
19	0	0	0	0	0
20	4	119	227	5	460
21	3	171	171	11	351
22	3	5	0	5	5
23	6	200	301	5	640
24	2	175	233	10	340
25	2	559	765	18	1100
26	1	110	0	110	110
27	2	61	83	3	120
28	4	6	3	5	12
29	3	5	0	5	5
30	2	5	0	5	5
A	0	0	0	0	0
B	1	335	0	335	335
C	2	28	0	28	28
D	1	63	0	63	63
E	0	0	0	0	0
F	1	19	0	19	19
G	0	0	0	0	0
H	0	0	0	0	0
I	0	0	0	0	0
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0	0	0	0
M	0	0	0	0	0
N	1	1457	0	1457	1457

Table 5-B

BARIUM
Sample Type: total
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	3	137	65	61	182
2	3	86	38	50	125
3	0	0	0	0	0
4	0	0	0	0	0
5	3	155	71	86	228
6	2	21	4.7	18	25
7	1	23	0	23	23
8	1	19	0	19	19
9	4	101	83	28	220
10	8	173	106	38	320
11	1	860	0	860	860
12	5	174	193	14	463
13	14	851	1367	42	4280
14	1	1700	0	1700	1700
15	11	6380	9028	145	26000
16	8	6980	7064	600	20700
17	6	1927	2199	63	5300
18	0	0	0	0	0
19	0	0	0	0	0
20	4	2455	4166	143	8700
21	9	1550	2120	87	5500
22	3	154	69	77	208
23	6	244	318	36	487
24	1	1300	0	1300	1300
25	1	120	0	120	120
26	0	0	0	0	0
27	1	430	0	430	430
28	3	193	117	114	328
29	3	260	202	131	493
30	2	197	117	114	280
A	0	0	0	0	0
B	1	10112	0	10112	10112
C	1	243	0	243	243
D	1	81	0	81	81
E	0	0	0	0	0
F	1	82	0	82	82
G	0	0	0	0	0
H	0	0	0	0	0
I	1	500	0	500	500
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0	0	0	0
M	0	0	0	0	0
N	1	6828	0	6828	6828

Table 5-C

BERYLIUM
Sample type: total
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	2	0.3	0.08	0.3	0.39
7	1	0.2	0	0.2	0.2
8	1	0.3	0	0.3	0.3
9	1	0.9	0	0.9	0.9
10	6	0.6	0.71	0.06	1.6
11	1	0.13	0	0.13	0.13
12	6	0.77	1.1	0.12	2.9
13	11	1.55	1.3	0.11	1.8
14	1	1.55	0	1.4	1.4
15	9	102	76	14	190
16	8	106	83	6.7	230
17	6	23	27	1.8	65
18	0	0	0	0	0
19	0	0	0	0	0
20	1	1	0	1	1
21	8	23	30	0.5	70
22	0	0	0	0	0
23	1	1	0	1	1
24	1	1.2	0	1.2	1.2
25	1	1.2	0	1.2	1.2
26	0	0	0	0	0
27	1	0.37	0	0.37	0.37
28	0	0	0	0	0
29	0	0	0	0	0
30	0	0	0	0	0
A	0	0	0	0	0
B	0	0	0	0	0
C	0	0	0	0	0
D	0	0	0	0	0
E	0	0	0	0	0
F	0	0	0	0	0
G	0	0	0	0	0
H	0	0	0	0	0
I	0	0	0	0	0
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0	0	0	0
M	0	0	0	0	0
N	0	0	0	0	0

Table 5-D

BORON
Sample type: total
values in ppm

Site	No.	Mean	S.D.	Min.	Max.
1	3	6	8.9	0.05	16.3
2	3	2	3.4	0.05	6
3	0	0	0	0	0
4	0	0	0	0	0
5	3	5	7.5	0.05	13.2
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	3	1.8	2.8	0.05	5
10	0	0	0	0	0
11	0	0	0	0	0
12	3	4.5	7.5	0.05	13.2
13	3	4.2	6.9	0.05	12.2
14	0	0	0	0	0
15	0	0	0	0	0
16	0	0	0	0	0
17	0	0	0	0	0
18	0	0	0	0	0
19	0	0	0	0	0
20	3	2.1	3.3	0.05	6
21	0	0	0	0	0
22	3	1.9	1.6	0.05	1.3
23	3	6.4	8.3	0.05	15.8
24	0	0	0	0	0
25	0	0	0	0	0
26	0	0	0	0	0
27	0	0	0	0	0
28	3	0.17	0.10	0.05	0.25
29	3	1.2	1.8	0.05	3.3
30	3	2.3	3.5	0.05	6.6
A	0	0	0	0	0
B	0	0	0	0	0
C	0	0	0	0	0
D	0	0	0	0	0
E	0	0	0	0	0
F	0	0	0	0	0
G	0	0	0	0	0
H	0	0	0	0	0
I	0	0	0	0	0
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0	0	0	0
M	0	0	0	0	0
N	0	0	0	0	0

Table 5-E

CADMIUM
Sample type: total
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	3	15	11	2.3	23
2	3	17	14	1.2	31
3	0	0	0	0	0
4	0	0	0	0	0
5	3	23	21	2.3	45
6	1	2.8	0	2.8	2.8
7	1	3.4	0	3.4	3.4
8	1	2	0	2	2
9	4	27	24	0.9	49
10	7	2.5	3.4	0.47	7.1
11	1	8	0	8	8
12	10	22	42	0.2	74
13	14	8.8	25	1.2	39
14	1	15	0	15	15
15	10	45	55	2.0	160
16	8	69	47	8	136
17	6	12	15	0.8	33
18	0	0	0	0	0
19	0	0	0	0	0
20	4	60	90	8.2	194
21	10	10.6	16	1.0	41
22	3	23	11	10.7	31
23	7	17.2	26	1	65
24	2	6.4	4.2	3.4	9.4
25	2	9.4	5.1	5.8	13
26	1	0.71	0	0.71	0.71
27	2	4.2	4.5	1.1	7.4
28	4	13	12	1.5	7.5
29	3	20	9.9	8.8	26
30	2	20	27	0.3	39
A	0	0	0	0	0
B	2	131	112	52	210
C	2	39	30	18	60
D	2	48	45	16	80
E	0	0	0	0	0
F	2	29	30	7.6	50
G	1	0.36	0	0.36	0.36
H	0	0	0	0	0
I	1	2	0	2	2
J	1	1.4	0	1.4	1.4
K	1	3.8	0	3.8	3.8
L	0	0	0	0	0
M	0	0	0	0	0
N	2	77	89	14	140

Table 5-F

CHROMIUM
Sample type: total
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	3	7.1	9.9	0.1	18.5
2	3	9.3	12.7	1.5	24
3	0	0	0	0	0
4	0	0	0	0	0
5	3	17	16	0.1	32
6	2	68	89	4.7	131
7	1	2.9	0	2.9	2.9
8	1	0.6	0	0.6	0.6
9	4	23	26	5.1	61
10	8	48	48	6.8	100
11	1	93	0	93	93
12	10	45	51	3	130
13	14	36	28	4.2	79
14	1	102	0	102	102
15	10	960	370	117	1950
16	8	1668	1164	125	3621
17	6	221	264	20	685
18	0	0	0	0	0
19	0	0	0	0	0
20	4	149	206	14	451
21	9	280	351	10	885
22	3	45	72	0.2	129
23	6	38	30	0.5	70
24	2	80	99	10	150
25	2	51	36	26	77
26	1	9	0	9	9
27	2	58	21	44	73
28	4	47	83	0.1	171
29	3	28	45	0.5	79
30	2	31	40	3.1	59
A	0	0	0	0	0
B	5	710	765	4	1600
C	4	210	316	6	680
D	4	137	181	6	400
E	0	0	0	0	0
F	5	73	91	6	200
G	0	0	0	0	0
H	0	0	0	0	0
I	2	51	63	7	96
J	1	10	0	10	10
K	1	10	0	10	10
L	0	0	0	0	0
M	0	0	0	0	0
N	4	1130	455	710	1737

Table 5-G

COBALT
Sample type: total
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	2	7	6.6	2.3	11.7
7	1	1.2	0	1.2	1.2
8	1	0.7	0	0.7	0.7
9	1	3.9	0	3.9	3.9
10	8	11	12	3.0	28
11	1	2.8	0	2.8	2.8
12	6	6	6.3	1.5	17.9
13	11	16	8.9	2.0	31
14	1	47	0	47	47
15	10	1050	170	29	2190
16	8	1151	837	15	2370
17	6	145	200	4.4	493
18	0	0	0	0	0
19	0	0	0	0	0
20	1	23	0	23	23
21	9	175	256	4.9	599
22	0	0	0	0	0
23	2	16	5.2	12.6	20
24	1	27	0	27	27
25	1	31	0	31	31
26	0	0	0	0	0
27	1	14	0	14	14
28	0	0	0	0	0
29	0	0	0	0	0
30	0	0	0	0	0
A	0	0	0	0	0
B	1	982	0	982	982
C	1	89	0	89	89
D	1	80	0	80	80
E	0	0	0	0	0
F	2	8	11	1	16
G	0	0	0	0	0
H	0	0	0	0	0
I	1	19	0	19	19
J	1	35	0	35	35
K	1	10	0	10	10
L	0	0	0	0	0
M	0	0	0	0	0
N	1	669	0	669	669

Table 5-H

COPPER
Sample type: total
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	3	321	523	12	926
2	3	86	121	11	226
3	0	0	0	0	0
4	0	0	0	0	0
5	3	136	185	27	349
6	2	10.5	0.7	10	11
7	1	5.8	0	5.8	5.8
8	1	4.3	0	4.3	4.3
9	4	164	291	4.8	600
10	6	25	20	5	62
11	1	45	0	45	45
12	6	51	120	10	291
13	10	62	127	11	317
14	1	84	0	84	84
15	8	1912	2160	182	5093
16	7	1497	1193	90	3408
17	6	229	312	16	831
18	0	0	0	0	0
19	0	0	0	0	0
20	4	157	208	29	466
21	8	247	347	14	840
22	3	134	154	41	840
23	6	89	141	19	376
24	2	90	84	31	150
25	2	42	12	33	51
26	1	12	0	12	12
27	2	26	5.7	22	30
28	4	38	41	9	100
29	3	77	98	17	191
30	2	18	2.8	16	20
A	0	0	0	0	0
B	2	3293	3371	910	5677
C	2	293	349	46	540
D	2	222	194	85	360
E	0	0	0	0	0
F	2	41	2.1	40	43
G	0	25	0	25	25
H	0	0	0	0	0
I	1	54	0	54	54
J	0	7.6	0	7.6	7.6
K	0	5.2	0	5.2	5.2
L	0	0	0	0	0
M	0	0	0	0	0
N	2	2852	3030	710	4995

Table 5-I

IRON
Sample type: total
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	2	2000	495	1650	2350
7	1	550	0	550	550
8	1	350	0	350	350
9	1	6250	0	6250	6250
10	4	6900	4276	2400	12700
11	0	0	0	0	0
12	6	7480	8270	500	23000
13	10	21400	14770	7750	60000
14	0	0	0	0	0
15	8	1276000	92910	12500	2400000
16	7	1741000	115100	8400	5250000
17	6	243000	28720	16500	7600000
18	0	0	0	0	0
19	0	0	0	0	0
20	0	0	0	0	0
21	8	274000	0	274	37100
22	0	0	0	0	0
23	0	0	0	0	0
24	0	0	0	0	0
25	0	0	0	0	0
26	0	0	0	0	0
27	0	0	0	0	0
28	0	0	0	0	0
29	0	0	0	0	0
30	0	0	0	0	0
A	0	0	0	0	0
B	0	0	0	0	0
C	0	0	0	0	0
D	0	0	0	0	0
E	0	0	0	0	0
F	0	0	0	0	0
G	0	0	0	0	0
H	0	0	0	0	0
I	0	0	0	0	0
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0	0	0	0
M	0	0	0	0	0
N	0	0	0	0	0

Table 5-J

LEAD
Sample type: total
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	3	73	50	19	117
2	3	150	197	7	375
3	0	0	0	0	0
4	0	0	0	0	0
5	3	47	18	32	67
6	2	10	12	1.8	18.1
7	1	2.2	0	2.2	2.2
8	1	0.8	0	0.8	0.8
9	4	44	41	1.9	98
10	8	7.8	9	0.005	23
11	1	27	0	27	27
12	10	36	52	5	138
13	14	17	70	2.1	138
14	1	33	0	33	33
15	10	874	1888	20	4016
16	8	1228	947	30.4	2500
17	6	150	280	7	720
18	0	0	0	0	0
19	0	0	0	0	0
20	4	90	64	25	156
21	10	230	360	2.5	860
22	3	70	41	23	100
23	6	87	106	15	295
24	2	24	18	11	37
25	2	18	20	4.1	32
26	1	30	0	30	30
27	2	31	16	20	42
28	4	32	37	2	86
29	3	78	96	21	189
30	2	22	4.2	19	19
A	0	0	0	0	0
B	3	1187	1006	40	1920
C	2	320	395	41	600
D	2	242	181	114	370
E	0	0	0	0	0
F	3	13	19	12.5	50
G	0	0	0	0	0
H	0	0	0	0	0
I	1	59	0	59	59
J	1	30	0	30	30
K	1	20	0	20	20
L	0	0	0	0	0
M	0	0	0	0	0
N	3	1158	1263	30	2523

Table 5-K

MANGANESE
Sample type: total
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	3	71	29	41	100
2	3	48	28	30	81
3	0	0	0	0	0
4	0	0	0	0	0
5	3	166	158	58	347
6	2	123	74	70	175
7	1	40	0	40	40
8	1	50	0	50	50
9	4	102	41	66	160
10	6	265	144	160	430
11	1	140	0	140	140
12	6	252	186	55	580
13	9	414	480	53	1500
14	1	910	0	910	910
15	8	18450	14710	1600	40800
16	7	65366	90204	1230	261000
17	1	3710	0	3710	3710
18	0	0	0	0	0
19	0	0	0	0	0
20	4	180	123	98	360
21	8	3336	4158	100	10700
22	3	238	210	58	470
23	5	300	140	58	500
24	1	590	0	590	590
25	1	400	0	400	400
26	0	0	0	0	0
27	1	7.5	0	7.5	7.5
28	0	0	0	0	0
29	3	273	214	26	409
30	2	183	75	130	236
A	0	0	0	0	0
B	1	8596	0	8596	8596
C	1	485	0	485	485
D	1	374	0	374	374
E	0	0	0	0	0
F	1	101	0	101	101
G	0	0	0	0	0
H	0	0	0	0	0
I	1	1196	0	1196	1196
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0	0	0	0
M	0	0	0	0	0
N	1	8062	0	8062	8062

Table 5-L

MERCURY
Sample type: total
Values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	3	0.05	0	0.05	0.05
2	3	0.05	0	0.05	0.05
3	0	0	0	0	0
4	0	0	0	0	0
5	3	2.7	4.6	0.05	8
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	3	3.8	4.4	0.05	8.6
10	2	1.8	0	1.8	1.8
11	1	1.2	0	1.2	1.2
12	4	4	7	0.05	14.6
13	4	0.44	0.78	0.05	1.6
14	1	2.5	0	2.5	2.5
15	2	4.5	0.85	3.9	5.1
16	1	3.2	0	3.2	3.2
17	0	0	0	0	0
18	0	0	0	0	0
19	0	0	0	0	0
20	4	3.4	6.4	0.05	13
21	1	4.9	0	4.9	4.9
22	3	4	6.9	0.05	12
23	5	3.5	6.4	0.05	14.8
24	2	1	0.99	0.3	1.7
25	2	0.27	0.22	0.11	0.42
26	1	0.3	0	0.3	0.3
27	2	0.27	0.19	0.13	0.44
28	4	0.34	0.58	0.05	1.2
29	3	0.05	0	0.05	0.05
30	2	0.05	0	0.05	0.05
A	0	0	0	0	0
B	6	2.9	1.02	2	4
C	5	1.3	0.7	0.5	2.09
D	4	1.1	0.58	0.5	1.9
E	0	0	0	0	0
F	5	1.1	1	0.5	2.9
G	0	0	0	0	0
H	1	0.5	0	0.5	0.5
I	2	6.3	8.1	0.5	12
J	1	3	0	3	3
K	1	3	0	3	3
L	0	0	0	0	0
M	0	0	0	0	0
N	4	2.2	0.45	2	2.9

Table 5-M

MOLYBDENUM
Sample type: total
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	3	149	215	25	398
2	3	100	128	25	248
3	0	0	0	0	0
4	0	0	0	0	0
5	3	129	193	10	352
6	2	153	208	6	300
7	1	6.3	0	6.3	6.3
8	1	7.2	0	7.2	7.2
9	4	16	10	4.3	25
10	6	26	17	2	85
11	1	25	0	25	25
12	6	15	9.4	1.9	25
13	10	75	125	1	400
14	1	280	0	280	280
15	3	325	173	191	520
16	8	223	400	1.4	1180
17	6	15	21	2.1	56
18	0	0	0	0	0
19	0	0	0	0	0
20	4	27	15	10	46
21	8	7.4	1.8	4.5	9
22	3	20	8.7	10	25
23	6	19	18	4.19	50
24	2	24	26	5.6	42
25	2	100	86	39	160
26	1	7	0	7	7
27	2	23	11	15	31
28	28	4	18	8.7	25
29	3	20	8.7	10	25
30	2	18	11	10	25
A	0	0	0	0	0
B	6	77	107	10	284
C	5	155	281	10	657
D	4	170	274	10	579
E	0	0	0	0	0
F	5	29	31	10	60
G	1	61	0	61	61
H	1	10	0	10	10
I	2	550	156	440	660
J	1	370	0	370	370
K	1	820	0	820	820
L	0	0	0	0	0
M	0	0	0	0	0
N	4	67	55	10	117

Table 5-N

NICKEL
Sample type: total
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	2	11	2.9	8.9	13.0
7	1	1.7	0	1.78	1.7
8	1	5.1	0	5.1	5.1
9	1	8.4	0	8.4	8.4
10	6	26	22	9	59
11	1	18	0	18	18
12	7	37	9.2	20	66
13	11	57	41	22	160
14	1	260	0	260	260
15	10	2091	3527	120	7734
16	8	3555	2566	135	7140
17	6	256	239	26	650
18	0	0	0	0	0
19	0	0	0	0	0
20	1	80	0	80	80
21	7	305	272	5	680
22	0	0	0	0	0
23	2	57	55	18.5	96
24	1	120	0	120	120
25	1	54	0	54	54
26	0	0	0	0	0
27	1	48	0	48	48
28	0	0	0	0	0
29	0	0	0	0	0
30	0	0	0	0	0
A	0	0	0	0	0
B	1	4629	9	4629	4629
C	1	120	0	120	120
D	1	67	0	67	67
E	0	0	0	0	0
F	1	91	0	91	91
G	0	0	0	0	0
H	0	0	0	0	0
I	1	126	0	126	126
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0	0	0	0
M	0	0	0	0	0
N	1	4196	0	4916	4916

Table 5-O

SELENIUM
Sample type: total
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	3	10	0	10	10
2	3	10	0	10	10
3	0	0	0	0	0
4	0	0	0	0	0
5	3	10	0	10	10
6	1	0	0	0	0
7	1	0	0	0	0
8	1	0	0	0	0
9	4	7.9	2	0.95	12
10	3	39	23	12	52
11	1	56	0	56	56
12	5	45	56	4	106
13	5	65	84	4	163
14	1	225	0	225	225
15	2	5512	1006	4800	6223
16	2	5190	297	4980	5400
17	1	500	0	500	500
18	0	0	0	0	0
19	0	0	0	0	0
20	4	38	67	4	138
21	2	107	13	98	117
22	3	5	0	4	4
23	5	72	51	25	127
24	2	96	136	0.05	193
25	2	119	168	0.6	238
26	1	0.45	0	0.45	0.45
27	2	24	33	0.05	47
28	4	8.9	10	0.05	23
29	3	10	0	10	10.4
30	2	9.6	0	9.4	9.8
A	0	0	0	0	0
B	5	5.5	3.1	1	8
C	5	3.4	3.1	1	8
D	3	3.6	0	1	1
E	0	0	0	0	0
F	4	5.1	0	1	1
G	0	0	0	0	0
H	1	17	0	17	17
I	2	64	69	15	113
J	1	1	0	1	1
K	1	47	0	47	47
L	0	0	0	0	0
M	0	0	0	0	0
N	4	5.3	4	1	9.2

Table 5-P

URANIUM
Sample type: total
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	0	0	0	0	0
10	1	14	0	14	14
11	0	0	0	0	0
12	0	0	0	0	0
13	0	0	0	0	0
14	0	0	0	0	0
15	1	3210	0	3210	3210
16	0	0	0	0	0
17	0	0	0	0	0
18	0	0	0	0	0
19	0	0	0	0	0
20	0	0	0	0	0
21	0	0	0	0	0
22	0	0	0	0	0
23	0	0	0	0	0
24	0	0	0	0	0
25	0	0	0	0	0
26	0	0	0	0	0
27	0	0	0	0	0
28	0	0	0	0	0
29	0	0	0	0	0
30	0	0	0	0	0
A	0	0	0	0	0
B	6	1409	2039	10	4675
C	5	87	118	10	286
D	4	102	93	10	229
E	0	0	0	0	0
F	5	65	61	10	170
G	0	0	0	0	0
H	1	10	0	10	10
I	2	907	547	520	1293
J	1	1810	0	1810	1810
K	1	1615	0	1615	1615
L	0	0	0	0	0
M	0	0	0	0	0
N	5	1263	1368	10	2550

Table 5-Q

VANADIUM
Sample type: total
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	2	0.8	0.64	0.35	1.25
7	1	1.3	0	1.3	1.3
8	1	1.3	0	1.3	1.3
9	1	4.1	0	4.1	4.1
10	6	17	41	3.2	92
11	1	35	0	35	35
12	6	19	2.1	7	43
13	10	34	28	6.2	100
14	1	410	0	410	410
15	8	2376	2519	104	7738
16	8	3290	2754	65	7938
17	6	367	433	185	1040
18	0	0	0	0	0
19	0	0	0	0	0
20	1	58	0	58	58
21	8	448	596	23	1530
22	0	0	0	0	0
23	3	23	10	11	30
24	2	27	38	0	53
25	2	30	27	13	49
26	1	12	0	12	12
27	2	111	140	12	210
28	1	15	0	15	15
29	0	0	0	0	0
30	0	0	0	0	0
A	0	0	0	0	0
B	6	532	437	25	1050
C	5	126	65	25	190
D	4	145	58	100	220
E	0	0	0	0	0
F	5	52	60	25	159
G	0	0	0	0	0
H	1	25	0	25	25
I	2	154	76	100	207
J	1	25	0	25	25
K	1	25	0	25	25
L	0	0	0	0	0
M	0	0	0	0	0
N	4	838	488	190	1350

Table 5-R

ZINC
Sample type: total
values in ppb

Site	No.	Mean	S.D.	Min.	Max.
1	3	264	247	101	548
2	3	128	108	40	248
3	0	0	0	0	0
4	0	0	0	0	0
5	3	195	96	120	304
6	2	48	11	40	55
7	1	10	0	10	10
8	1	5	0	5	5
9	4	230	232	10	498
10	8	68	99	10	230
11	1	80	0	8	80
12	10	133	281	20	720
13	14	143	144	40	397
14	1	100	0	100	100
15	10	4143	10740	500	22142
16	7	3572	2277	270	6959
17	6	620	845	50	2170
18	0	0	0	0	0
19	0	0	0	0	0
20	4	415	313	30	775
21	9	765	1027	70	2440
22	3	303	76	216	354
23	5	124	82	23	234
24	1	35	0	35	35
25	1	93	0	93	93
26	0	0	0	0	0
27	1	57	0	57	57
28	3	107	68	55	184
29	3	119	42	72	154
30	2	147	259	234	600
A	0	0	0	0	0
B	4	3729	3406	180	6786
C	3	386	245	130	568
D	3	227	177	120	432
E	0	0	0	0	0
F	4	224	182	70	487
G	0	0	0	0	0
H	0	0	0	0	0
I	2	72	11	64	80
J	1	100	0	100	100
K	1	100	0	100	100
L	0	0	0	0	0
M	0	0	0	0	0
N	3	3334	990	2190	3912

Table 6-A

ARSENIC
Sediment type: suspended
values in ppm

Site	No.	Mean	S.D.	Min.	Max.
1	3	5	0	5	5
2	3	5	0	5	5
3	0	0	0	0	0
4	0	0	0	0	0
5	3	5	0	5	5
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	3	5	0	5	5
10	2	189	46	157	222
11	1	111	0	111	111
12	5	79	107	5	238
13	5	96	126	5	256
14	0	0	0	0	0
15	3	63 (1.3)	38	22	98
16	2	119	100	48	190
17	0	0	0	0	0
18	0	0	0	0	0
19	0	0	0	0	0
20	3	5	0	5	5
21	3	81 (5.6)	78	6	139
22	3	5	0	5	5
23	5	11 (6.6)	13	5	35
24	2	28 (9.1)	27	9	47
25	2	265 (5)	367	5	524
26	1	4 (4)	0	4	4
27	1	3 (3.1)	0	3	3
28	3	6 (8.3)	2	5	8
29	3	5	0	5	5
30	3	5	0	5	5
A	0	0 (10)	0	0	0
B	1	5 (9)	0	5	5
C	1	19 (22)	0	19	19
D	1	71	0	71	71
E	0	0 (7)	0	0	0
F	1	33	0	33	33
G	0	0	0	0	0
H	0	0	0	0	0
I	0	0 (16)	0	0	0
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0 (12)	0	0	0
M	0	0 (8)	0	0	0
N	1	26 (30)	0	26	26

Crustal Abundance = 1.8 ppm
Values in parenthesis are for bottom sediment

Table 6-B

BARIUM
Sediment type: suspended
values in ppm

Site	No.	Mean	S.D.	Min.	Max.
1	3	256	187	50	417
2	3	363	116	230	444
3	0	0	0	0	0
4	0	0	0	0	0
5	3	212	289	28	545
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	3	127	132	30	278
10	2	348	9.9	341	355
11	1	2400	0	2400	2400
12	8	190	288	52	774
13	12	223	159	35	540
14	0	0	0	0	0
15	9	130	118	25	266
16	7	123	83	15	222
17	5	124	48	78	192
18	0	0	0	0	0
19	0	0	0	0	0
20	3	178	44	136	224
21	6	200	115	68	378
22	3	94	62	25	143
23	4	698	908	79	2048
24	1	13	0	13	13
25	1	411	0	411	411
26	0	0	0	0	0
27	0	0	0	0	0
28	2	528	610	97	960
29	3	252	244	63	528
30	3	208	240	42	484
A	0	0	0	0	0
B	0	0	0	0	0
C	1	130	0	130	130
D	1	19	0	19	19
E	0	0	0	0	0
F	1	49	0	49	49
G	0	0	0	0	0
H	0	0	0	0	0
I	1	107	0	107	107
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0	0	0	0
M	0	0	0	0	0
N	1	121	0	121	121

Crustal Abundance = 425 ppm

Table 6-C

BERYLIUM
Sediment type: suspended
values in ppm

Site	No.	Mean	S.D.	Min.	Max.
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	0	0	0	0	0
10	3	1.1	1.3	0.32	2.5
11	1	1.6	0	1.6	1.6
12	4	1.8	1.5	0.4	3.5
13	8	2.0	2.2	0.2	6.1
14	0	0	0	0	0
15	7	2.1	0.9	0.83	3.0
16	6	2.1	1.1	0.09	3.2
17	5	2.5	1.04	1.3	4.2
18	0	0	0	0	0
19	0	0	0	0	0
20	0	0	0	0	0
21	5	2.7	0.8	1.96	4.13
22	0	0	0	0	0
23	1	1.12	0	1.12	1.12
24	1	1	0	1	1
25	1	1	0	1	1
26	0	0	0	0	0
27	0	0	0	0	0
28	0	0	0	0	0
29	0	0	0	0	0
30	0	0	0	0	0
A	0	0	0	0	0
B	0	0	0	0	0
C	0	0	0	0	0
D	0	0	0	0	0
E	0	0	0	0	0
F	0	0	0	0	0
G	0	0	0	0	0
H	0	0	0	0	0
I	0	0	0	0	0
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0	0	0	0
M	0	0	0	0	0
N	0	0	0	0	0

Crustal Abundance = 2.8 ppm

Table 6-D

BORON
Sediment type: suspended
values in ppm

Site	No.	Mean	S.D.	Min.	Max.
1	3	3.3	4.4	0.25	8.3
2	3	0.25	0	0.25	0.25
3	0	0	0	0	0
4	0	0	0	0	0
5	3	0.25	0	0.25	0.25
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	3	0.25	0	0.25	0.25
10	0	0	0	0	0
11	0	0	0	0	0
12	3	2.4	2.0	0.25	3.8
13	3	2.4	2.0	0.25	0.25
14	0	0	0	0	0
15	0	0	0	0	0
16	0	0	0	0	0
17	0	0	0	0	0
18	0	0	0	0	0
19	0	0	0	0	0
20	3	2.1	3.1	0.25	5.7
21	0	0	0	0	0
22	3	0.25	0	0.25	0.25
23	3	1.7	2.6	0.25	4.8
24	0	0	0	0	0
25	0	0	0	0	0
26	0	0	0	0	0
27	0	0	0	0	0
28	2	1.1	1.2	0.25	0.25
29	3	0.25	0	0.25	0.25
30	3	0.25	0	0.25	0.25
A	0	0	0	0	0
B	0	0	0	0	0
C	0	0	0	0	0
D	0	0	0	0	0
E	0	0	0	0	0
F	0	0	0	0	0
G	0	0	0	0	0
H	0	0	0	0	0
I	0	0	0	0	0
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0	0	0	0
M	0	0	0	0	0
N	0	0	0	0	0

Crustal Abundance = 10 ppm

Table 6-E

CADMIUM
Sediment type: suspended
values in ppm

Site	No.	Mean	S.D.	Min.	Max.
1	3	18	16	0.5	33
2	3	24	14	9.3	38
3	0	0	0	0	0
4	0	0	0	0	0
5	3	16	17	3	35
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	3	51	32	20	83
10	4	2.5	2.8	0.51	4.5
11	1	0.83	0	0.83	0.83
12	8	23	30	0.5	65
13	12	19	19	1.25	85
14	0	0	0	0	0
15	9	0.69	0.48	0.16	1.11
16	6	1.7	1.2	0.06	3.3
17	5	1.4	0.8	0.5	2.6
18	0	0	0	0	0
19	0	0	0	0	0
20	3	13	3.8	10	17
21	7	4.9 (2.3)	4.9	0.44	10.5
22	3	12	3.2	10	16
23	5	14 (.66)	9.0	0.66	25
24	2	1.6 (2.5)	1.3	0.61	2.5
25	2	2.5 (4.0)	2.1	1	4
26	1	2.7 (2.7)	0	2.7	2.7
27	1	2 (2)	0	2	2
28	3	19 (3.6)	14	3.6	32
29	3	15	8.1	9	24
30	3	12	13	0.5	27
A	0	0 (.49)	0	0	0
B	1	0.2 (.25)	0	0.2	0.2
C	1	9	0	9	9
D	1	10	0	10	10
E	0	0 (.39)	0	0	0
F	1	5	0	5	5
G	0	0	0	0	0
H	0	0	0	0	0
I	1	0.1 (.07)	0	0.1	0.1
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0 (.4)	0	0	0
M	0	0 (.3)	0	0	0
N	1	0.12 (.06)	0	0.12	0.12

Crustal Abundance = 0.2 ppm
Values in parenthesis are for bottom sediment

Table 6-F

CHROMIUM
Sediment type: suspended
values in ppm

Site	No.	Mean	S.D.	Min.	Max.
1	3	33	33	0.1	66
2	3	49	56	0.1	110
3	0	0	0	0	0
4	0	0	0	0	0
5	3	37	43	0.1	85
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	3	59	43	28	108
10	3	38	0.6	47.1	48.2
11	0	0	0	0	0
12	8	14	12	0.1	38
13	12	54	91	0.1	215
14	0	0	0	0	0
15	9	30	25	15	62
16	7	31	16	9.5	41
17	5	24	6.0	17.9	33.9
18	0	0	0	0	0
19	0	0	0	0	0
20	3	8	14	0	24
21	7	80 (44)	203	21	391
22	3	41	64	0.1	115
23	5	14 (28)	13	0.1	28
24	2	26 (40)	21	11	40
25	2	14 (28)	20	0	28
26	1	53 (53)	0	53	53
27	1	42 (42)	0	42	42
28	3	31 (42)	28	0.1	52
29	3	0.73	1.1	0.1	2
30	3	20	18	0.1	33
A	0	0	0	0	0
B	1	23	0	23	23
C	1	31	0	31	31
D	1	33	0	33	33
E	0	0	0	0	0
F	1	22	0	22	22
G	0	0	0	0	0
H	0	0	0	0	0
I	1	21	0	21	21
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0	0	0	0
M	0	0	0	0	0
N	1	31	0	31	31

Crustal Abundance = 100 ppm
Values in parenthesis are for bottom sediment

Table 6-G

COBALT
Sediment type: suspended
values in ppm

Site	No.	Mean	S.D.	Min.	Max.
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	0	0	0	0	0
10	2	37	38	17	57
11	1	21	0	21	21
12	5	16	12	5	29.5
13	7	21	11	7.3	37.8
14	0	0	0	0	0
15	9	14	4.9	4.8	21
16	7	15	7.8	5	26
17	5	13	8.5	5.3	24.6
18	0	0	0	0	0
19	0	0	0	0	0
20	0	0	0	0	0
21	6	14	41	7	71
22	0	0	0	0	0
23	1	23	0	23	23
24	1	12	0	12	12
25	1	14	0	14	14
26	0	0	0	0	0
27	0	0	0	0	0
28	0	0	0	0	0
29	0	0	0	0	0
30	0	0	0	0	0
A	0	0	0	0	0
B	1	12	0	12	12
C	1	56	0	56	56
D	1	61	0	61	61
E	0	0	0	0	0
F	0	0	0	0	0
G	0	0	0	0	0
H	0	0	0	0	0
I	0	0	0	0	0
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0	0	0	0
M	0	0	0	0	0
N	1	11	0	11	11

Crustal Abundance = 25 ppm

Table 6-H

COPPER
Sediment type: suspended
values in ppm

Site	No.	Mean	S.D.	Min.	Max.
1	3	333	342	91	724
2	3	197	9	191	207
3	0	0	0	0	0
4	0	0	0	0	0
5	3	128	78	38	179
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	3	30	7.8	23	35
10	3	30	7.8	23	35
11	1	35	0	35	35
12	5	190	288	32	702
13	8	175	315	16	740
14	0	0	0	0	0
15	3	42	24	26	71
16	6	25	5	18	30
17	5	23	5	18	30
18	0	0	0	0	0
19	0	0	0	0	0
20	3	97	93	29	203
21	5	36 (19)	25	16	65
22	3	73	50	16	128
23	5	84 (20)	68	16	175
24	2	19 (23)	5.7	15	23
25	2	43 (35)	11	35	50
26	1	19 (19)	0	19	19
27	1	20 (20)	0	20	20
28	3	110 (37)	85	12	167
29	3	88	115	17	220
30	3	98	89	5	183
A	0	0 (31)	0	0	0
B	1	89 (39)	0	89	89
C	1	87 (19)	0	87	87
D	1	87	0	87	87
E	0	0	0	0	0
F	1	93	0	93	93
G	0	0	0	0	0
H	0	0	0	0	0
I	1	12	0	12	12
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0	0	0	0
M	0	0 (20)	0	0	0
N	1	89 (23)	0	89	89

Crustal Abundance = 55 ppm
Values in parenthesis are for bottom sediment

Table 6-I

IRON
Sediment type: suspended
values in percent

Site	No.	Mean	S.D.	Min.	Max.
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	0	0	0	0	0
10	3	2.80	0.39	2.30	3.00
11	0	0	0	0	0
12	4	2.80	0.69	1.90	3.40
13	8	3.00	0.58	2.30	4.20
14	0	0	0	0	0
15	7	2.04	0.85	0.23	2.83
16	6	2.95	0.28	2.60	3.40
17	5	2.55	0.54	2.06	3.39
18	0	0	0	0	0
19	0	0	0	0	0
20	0	0	0	0	0
21	5	2.95 (2.37)	0.63	2.14	3.81
22	0	0	0	0	0
23	0	0 (1.96)	0	0	0
24	0	0 (2.67)	0	0	0
25	0	0 (2.96)	0	0	0
26	0	0 (3.84)	0	0	0
27	0	0 (3.16)	0	0	0
28	0	0 (3.18)	0	0	0
29	0	0	0	0	0
30	0	0	0	0	0
A	0	0	0	0	0
B	0	0	0	0	0
C	0	0	0	0	0
D	0	0	0	0	0
E	0	0	0	0	0
F	0	0	0	0	0
G	0	0	0	0	0
H	0	0	0	0	0
I	0	0	0	0	0
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0	0	0	0
M	0	0	0	0	0
N	0	0	0	0	0

Crystal Abundance = 5.6×10^4 ppm
Values in parenthesis are for bottom sediment

Table 6-J

LEAD
Sediment type: suspended
values in ppm

Site	No.	Mean	S.D.	Min.	Max.
1	3	120	156	30	300
2	3	250	73	190	331
3	0	0	0	0	0
4	0	0	0	0	0
5	3	46	17	28	61
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	3	88	78	5	161
10	3	25.5	2.1	24	27
11	1	114	0	114	114
12	8	123	332	3.8	684
13	12	54	260	6.8	434
14	0	0	0	0	0
15	9	18	24	3.4	56
16	7	17.4	8.1	6	26
17	5	12.9	8.8	3.6	26
18	0	0	0	0	0
19	0	0	0	0	0
20	3	59	29	35	91
21	7	31 (49)	46	5	109
22	3	44	21	32	69
23	5	527 (33)	978.8	33	2275
24	2	30 (48)	26	11	48
25	2	26 (41)	22	10	41
26	1	55 (55)	0	55	55
27	1	57 (57)	0	57	57
28	3	32 (55)	20	20	55
29	3	88	113	23	218
30	3	122	160	18	306
A	0	0 (22)	0	0	0
B	1	25 (13)	0	25	25
C	1	29 (10)	0	29	29
D	1	132	0	132	132
E	0	0 (21)	0	0	0
F	1	27	0	27	27
G	0	0	0	0	0
H	0	0	0	0	0
I	1	15	0	15	15
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0 (27)	0	0	0
M	0	0 (42)	0	0	0
N	1	46 (16)	0	45	45

Crustal Abundance = 12.5 ppm
Values in parenthesis are for bottom sediments

Table 6-K

MANGANESE
Sediment type: suspended
values in ppm

Site	No.	Mean	S.D.	Min.	Max.
1	3	262	212	20	417
2	3	231	195	20	405
3	0	0	0	0	0
4	0	0	0	0	0
5	3	217	195	9	395
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	3	138	103	20	206
10	3	785	250	636	1035
11	1	713	0	713	713
12	5	438	475	29	1096
13	8	550	523	75	1438
14	0	0	0	0	0
15	7	268	158	107	385
16	6	1039	1026	235	5386
17	5	476	133	338	656
18	0	0	0	0	0
19	0	0	0	0	0
20	3	85	78	39	176
21	5	467 (400)	266	267	913
22	3	231	192	22	400
23	5	889 (230)	1495	20	3550
24	2	359 (280)	112	280	438
25	2	4130 (300)	5416	300	7960
26	1	410 (410)	0	410	410
27	1	450 (450)	0	450	450
28	3	400 (1070)	583	10	1070
29	3	424	393	20	804
30	3	230	280	22	548
A	0	0	0	0	0
B	1	134	0	134	134
C	1	386	0	386	386
D	1	326	0	326	326
E	0	0	0	0	0
F	1	119	0	119	119
G	0	0	0	0	0
H	0	0	0	0	0
I	1	330	0	330	330
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0	0	0	0
M	0	0	0	0	0
N	1	143	0	143	143

Crustal Abundance = 950 ppm
Values in parentheses are for bottom sediment

Table 6-L

MERCURY
Sediment type: suspended
values in ppm

Site	No.	Mean	S.D.	Min.	Max.
1	3	0.05	0	0.05	0.05
2	3	0.05	0	0.05	0.05
3	0	0	0	0	0
4	0	0	0	0	0
5	3	1.4	2.3	0.05	4
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	3	2	3.4	0.05	5.9
10	0	0	0	0	0
11	0	0	0	0	0
12	3	3.4	5.7	0.05	10
13	3	0.05	0	0.05	0.05
14	0	0	0	0	0
15	1	0.06	0	0.06	0.06
16	0	0	0	0	0
17	0	0	0	0	0
18	0	0	0	0	0
19	0	0	0	0	0
20	3	2	3.4	0.05	5.9
21	1	0.68 (68)	8	0.68	0.68
22	3	2.7	4.6	0.05	8.1
23	4	1.5 (98)	2.3	0.05	4.8
24	1	3.3 (3.3)	0	3.3	3.3
25	1	8.1 (8.1)	0	8.1	8.1
26	1	3 (3)	0	3	3
27	1	2.9 (2.9)	9	2.9	2.9
28	3	0.87 (2.5)	1.4	0.05	2.5
29	3	0.05	0	0.05	0.05
30	3	0.03	0.03	0.01	0.05
A	0	0 (.42)	0	0	0
B	1	0.04 (.67)	0	0.04	0.04
C	1	1.5 (.93)	0	1.5	1.5
D	1	1.7 (.98)	0	1.7	1.7
E	0	0 (.12)	0	0	0
F	1	7.1	0	7.1	7.1
G	0	0	0	0	0
H	0	0	0	0	0
I	1	3.4	0	3.4	3.4
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0	0	0	0
M	0	0	0	0	0
N	1	0.04	0	0.04	0.04

Crustal Abundance = 0.08 ppm; Detection limit = .01 ppm
Values in parenthesis are for bottom sediment

Table 6-M

MOLYBDENUM
Sediment type: suspended
values in ppm

Site	No.	Mean	S.D.	Min.	Max.
1	3	186	208	10	416
2	3	83	127	10	230
3	0	0	0	0	0
4	0	0	0	0	0
5	3	65	96	10	176
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	3	10	0	10	10
10	3	14	7.5	9	22
11	0	0	0	0	0
12	4	10.6	5.8	6	18
13	8	28	57	0.2	167
14	0	0	0	0	0
15	7	1.7	3.5	0.16	9.6
16	6	1.7	2.0	0.01	5
17	5	1.6	1.8	0.4	5
18	0	0	0	0	0
19	0	0	0	0	0
20	3	10	0	10	10
21	5	3.7 (2.7)	4.3	0.2	10
22	3	10	0	10	10
23	5	6.8 (1.4)	4.4	1.4	10
24	2	2.5 (0.8)	2.5	0.76	4.3
25	2	1.9 (1.0)	1.4	0.98	2.9
26	1	1.5 (1.5)	0	1.5	1.5
27	1	1.5 (1.5)	0	1.5	1.5
28	3	7.2 (1.7)	4.8	1.7	10
29	3	30	35	10	10
30	3	47	64	10	120
A	0	0 (2.6)	0	0	0
B	1	0.54 (1.0)	0	0.54	0.54
C	1	500 (5.8)	0	500	500
D	1	690 (2.3)	0	690	690
E	0	0	0	0	0
F	1	74	0	74	74
G	0	0	0	0	0
H	0	0	0	0	0
I	1	8.4	0	8.4	8.4
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0	0	0	0
M	0	0 (1.8)	0	0	0
N	1	0.68 (1.5)	0	0.68	0.68

Crustal Abundance = 1.5 ppm
Values in parenthesis are for bottom sediment

Table 6-N

NICKEL
Sediment type: suspended
values in ppm

Site	No.	Mean	S.D.	Min.	Max.
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	0	0	0	0	0
10	3	51	30	16.4	68.8
11	1	43	0	43	43
12	5	69	45	17	126
13	9	96	61	26	164
14	0	0	0	0	0
15	9	34	47	19	107
16	7	50	32	24	109
17	5	29	3.9	23	33
18	0	0	0	0	0
19	0	0	0	0	0
20	0	0	0	0	0
21	5	28	14	15	53
22	0	0	0	0	0
23	1	25	0	25	25
24	1	25	0	25	25
25	1	51	0	51	51
26	0	0	0	0	0
27	0	0	0	0	0
28	0	0	0	0	0
29	0	0	0	0	0
30	0	0	0	0	0
A	0	0	0	0	0
B	1	72	0	72	72
C	1	63	0	63	63
D	1	6.2	0	6.2	6.2
E	0	0	0	0	0
F	1	129	0	129	129
G	0	0	0	0	0
H	0	0	0	0	0
I	1	23	0	23	23
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0	0	0	0
M	0	0	0	0	0
N	1	74	0	74	74

Crustal Abundance = 75 ppm

Table 6-O

SELENIUM
Sediment type: suspended
values in ppm

Site	No.	Mean	S.D.	Min.	Max.
1	3	4	0	4	4
2	3	4	0	4	4
3	0	0	0	0	0
4	0	0	0	0	0
5	3	4	0	4	4
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	3	4	0	4	4
10	2	19	27	9	38
11	1	103	0	103	103
12	5	11	18	0	43
13	5	12	19	0	46
14	0	0	0	0	0
15	2	72	39	44	99
16	2	77	0.7	76	77
17	0	0	0	0	0
18	0	0	0	0	0
19	0	0	0	0	0
20	3	4	0	4	4
21	3	121 (.04)	209	0	362
22	3	4	0	4	4
23	5	34 (1.8)	47	0.18	110
24	2	34 (.9)	47	0.09	67
25	2	34 (.12)	47	0.12	67
26	1	0.34 (.34)	0	0.34	0.34
27	1	0.16 (.16)	0	0.16	0.16
28	3	4 (.16)	3.9	0.16	8
29	3	21	30	4	4
30	2	4	0	4	4
A	0	0 (.3)	0	0	0
B	0	0 (.2)	0	0	0
C	1	0.12	0	0.12	0.12
D	0	0 (.15)	0	0	0
E	0	0 (2.0)	0	0	0
F	0	0	0	0	0
G	0	0	0	0	0
H	0	0	0	0	0
I	1	1.9	0	1.9	1.9
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0 (.2)	0	0	0
M	0	0 (.14)	0	0	0
N	1	0.04	0	0.04	0.04

Crustal Abundance = 0.05 ppm
Values in parenthesis are for bottom sediment

Table 6-P

URANIUM
Sediment type: suspended
values in ppm

Site	No.	Mean	S.D.	Min.	Max.
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	0	0	0	0	0
10	0	0	0	0	0
11	0	0	0	0	0
12	0	0	0	0	0
13	0	0	0	0	0
14	0	0	0	0	0
15	1	44	0	44	44
16	0	0	0	0	0
17	0	0	0	0	0
18	0	0	0	0	0
19	0	0	0	0	0
20	0	0	0	0	0
21	1	200 (200)	0	200	200
22	0	0	0	0	0
23	1	180 (180)	0	180	180
24	1	180 (180)	0	180	180
25	1	200 (200)	0	200	200
26	1	230 (230)	0	230	230
27	1	250 (250)	0	250	250
28	1	280 (280)	0	280	280
29	0	0	0	0	0
30	0	0	0	0	0
A	0	0 (390)	0	0	0
B	1	51	0	51	51
C	1	181 (340)	0	181	181
D	1	213 (400)	0	213	213
E	0	0 (459)	0	0	0
F	1	262	0	262	262
G	0	0	0	0	0
H	0	0	0	0	0
I	1	115	0	115	115
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0	0	0	0
M	0	0	0	0	0
N	1	39 (550)	0	39	39

Crustal Abundance = 2.7 ppm
Values in parenthesis are for bottom sediment

Table 6-Q

VANADIUM
Sediment type: suspended
values in ppm

Site	No.	Mean	S.D.	Min.	Max.
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	0	0	0	0	0
10	3	39	17	23	51
11	1	166	0	166	166
12	4	40	10.6	29	47
13	8	42	3.5	23	80
14	0	0	0	0	0
15	7	31	39	18	106
16	6	46	24	21	82
17	5	32	21	15.4	66
18	0	0	0	0	0
19	0	0	0	0	0
20	0	0	0	0	0
21	5	45 (87)	8.4	32	87
22	0	0	0	0	0
23	2	95 (83)	17	83	107
24	2	50 (80)	17	19	80
25	2	207 (40)	236	40	374
26	1	110 (110)	0	110	110
27	1	67 (67)	0	67	67
28	1	83 (83)	0	83	83
29	0	0	0	0	0
30	0	0	0	0	0
A	0	0 (91)	0	0	0
B	1	11	0	11	11
C	1	90 (94)	0	90	90
D	1	195 (110)	0	195	195
E	0	0 (110)	0	0	0
F	1	323	0	323	323
G	0	0	0	0	0
H	0	0	0	0	0
I	1	38	0	38	38
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0 (140)	0	0	0
M	0	0 (70)	0	0	0
N	1	14	0	14	14

Crustal Abundance = 135 ppm
Values in parenthesis are for bottom sediment

Table 6-R

ZINC
Sediment type: suspended
values in ppm

Site	No.	Mean	S.D.	Min.	Max.
1	3	716	698	161	1500
2	3	548	463	217	1077
3	0	0	0	0	0
4	0	0	0	0	0
5	3	217	75	139	288
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	3	561	630	74	1273
10	3	139	37	76	160
11	1	0	0	0	0
12	5	115	42	64	166
13	8	318	368	53	950
14	0	0	0	0	0
15	9	100	629	100	1390
16	7	70	21	34	90
17	5	72	12	63	90
18	0	0	0	0	0
19	0	0	0	0	0
20	3	383	280	210	706
21	2	484	560	88	880
22	3	253	80	161	301
23	4	340	220	79	600
24	1	49	0	49	49
25	1	183	0	183	183
26	0	0	0	0	0
27	0	0	0	0	0
28	2	153	47	120	187
29	3	225	179	52	3667
30	3	225	179	52	3667
A	0	0	0	0	0
B	1	63	0	63	63
C	1	390	0	390	390
D	1	456	0	456	456
E	0	0	0	0	0
F	1	1230	0	1230	1230
G	0	0	0	0	0
H	0	0	0	0	0
I	1	4	0	4	4
J	0	0	0	0	0
K	0	0	0	0	0
L	0	0	0	0	0
M	0	0	0	0	0
N	1	69	0	69	69

Crustal Abundance = 70 ppm

Table 7

BAR GRAPH SITE IDENTIFICATION
Rio Grande Sites

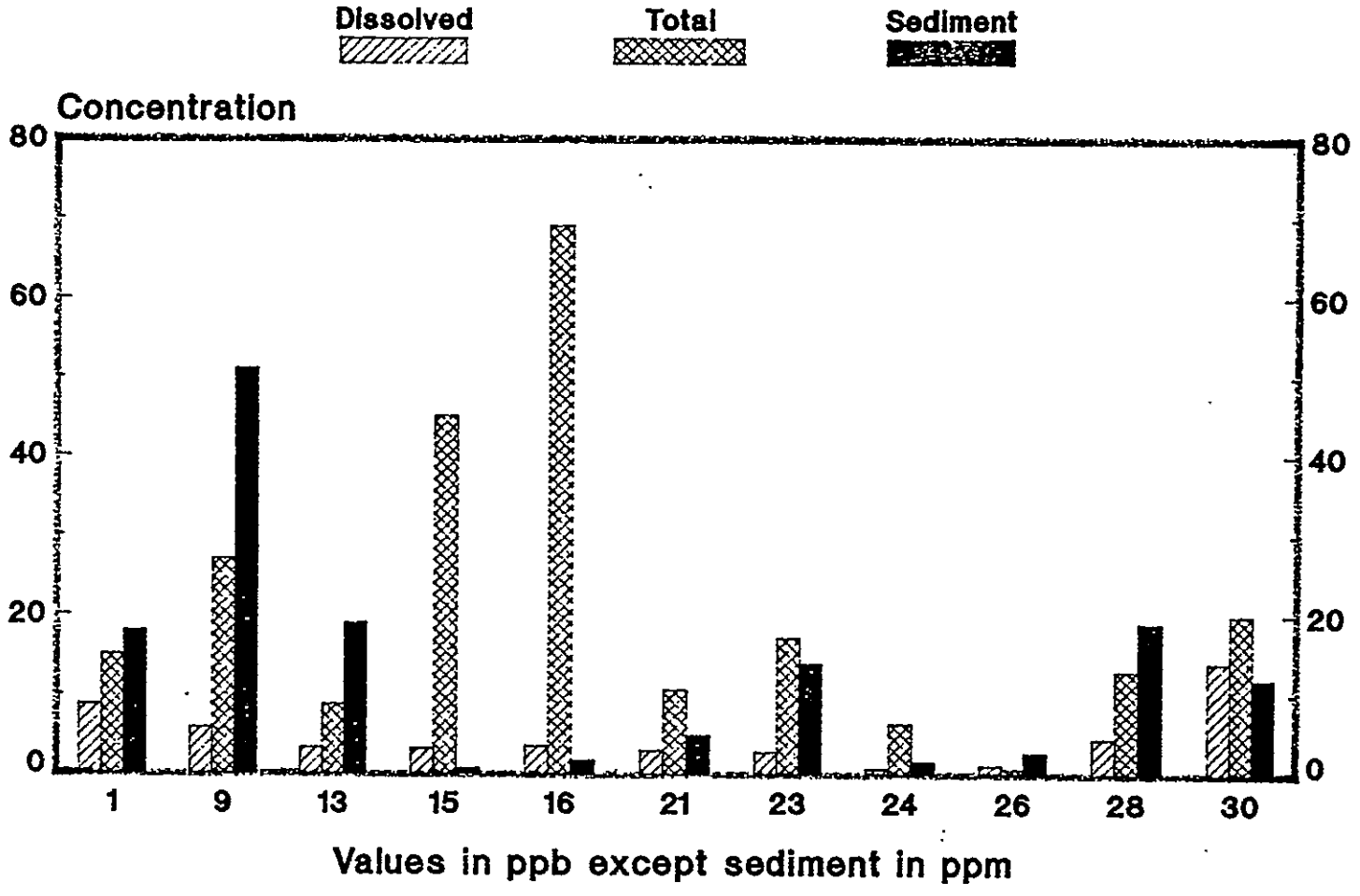
Site Number	Identification
1	Colorado border (Cerro)
9	Bernalillo
13	Bernardo
15	Confluence of Puerco
16	Confluence of Salado
21	Socorro
23	San Marcial
24	Monticello Point
26	Mid-Elephant Butte
28	Caballo
30	Texas-New Mexico border (Anthony)
	Rio San Jose-Puerco Sites
H	Bluewater
K	Arroyo de Puerco
J	upstream San Mateo Creek
I	San Mateo Creek
G	San Jose at Milan (dry most of the time)
F	San Jose at lava beds
D	San Jose at Paguate
C	San Jose
N	Puerco above I-40
B	Puerco below confluence with San Jose
15	Puerco at confluence of Rio Grande

Table 8

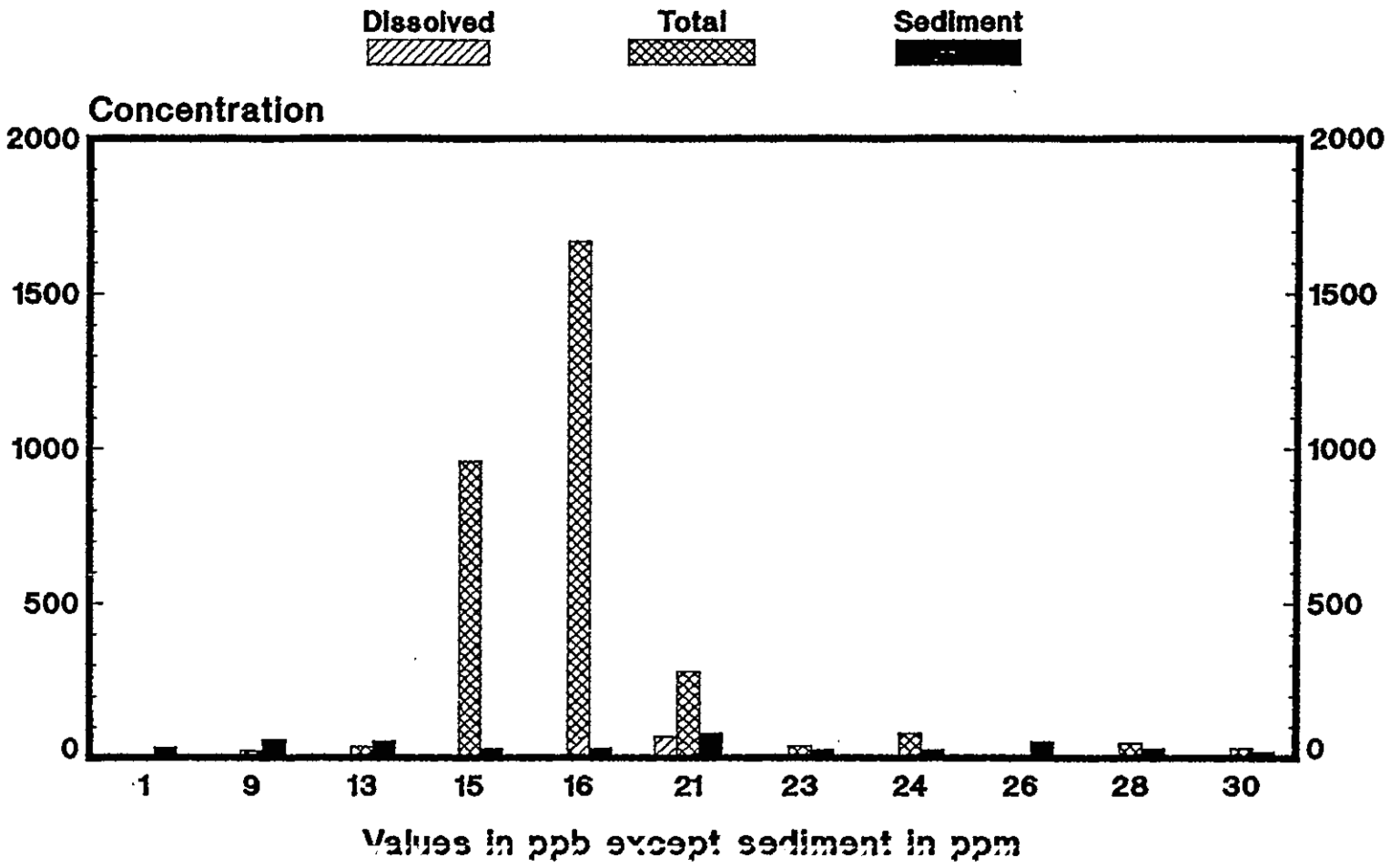
ELEMENTAL VALUES DISPLAYED AS BAR GRAPHS
AT SELECTED SITES

Cadmium
Chromium
Cobalt
Copper
Lead
Mercury
Molybdenum
Selenium
Uranium
Zinc

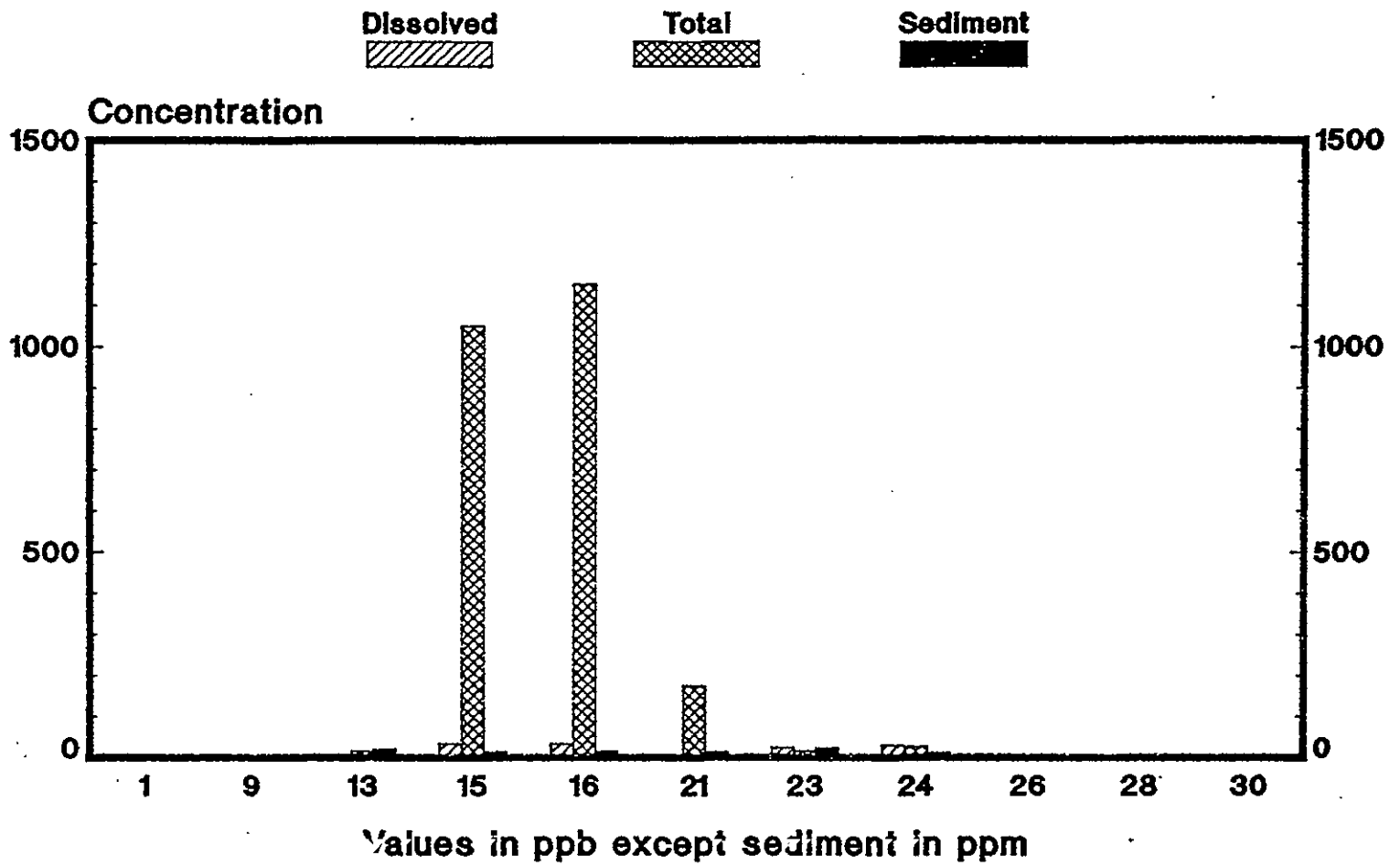
Cadmium Along the Rio Grande



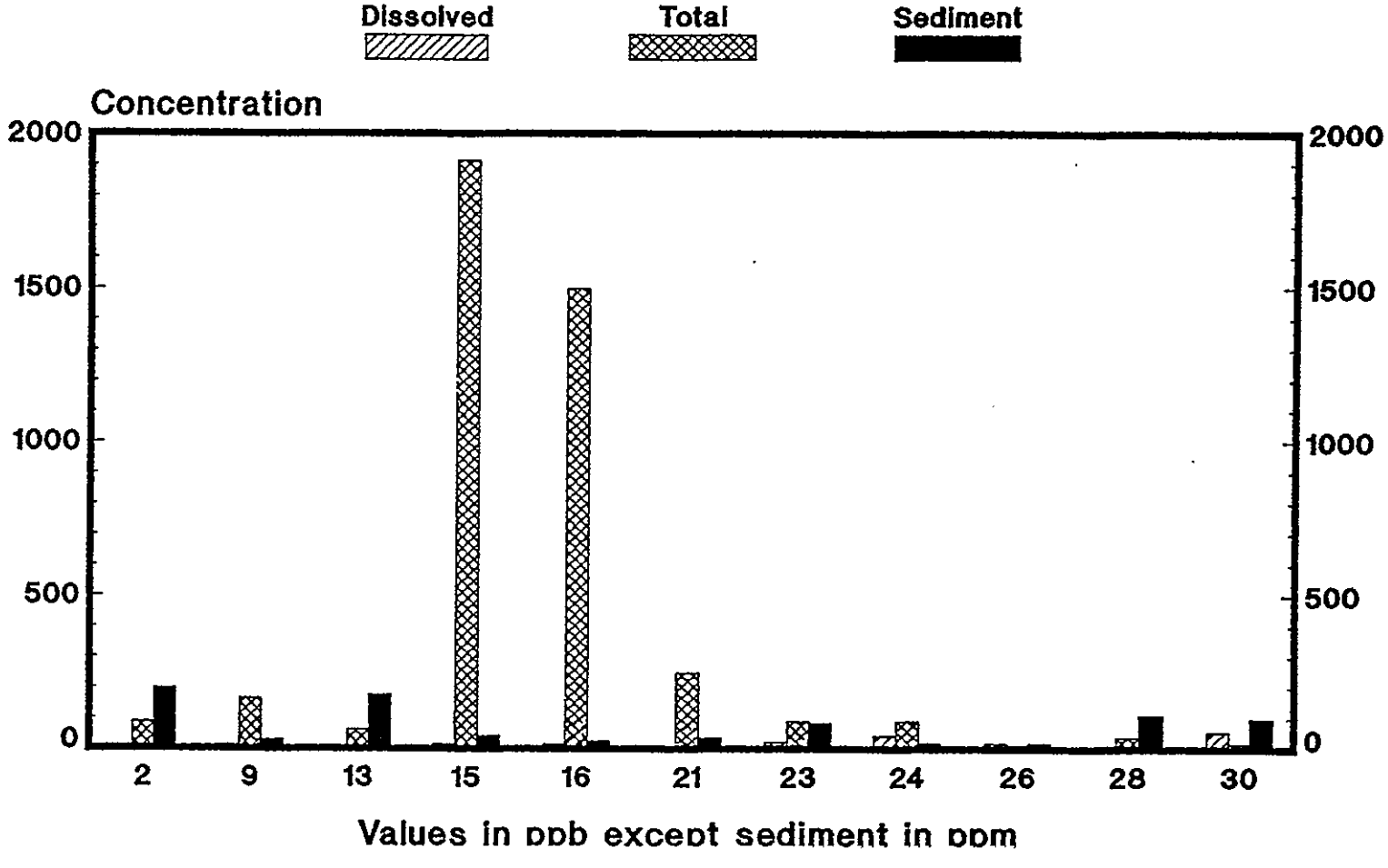
Chromium Along the Rio Grande



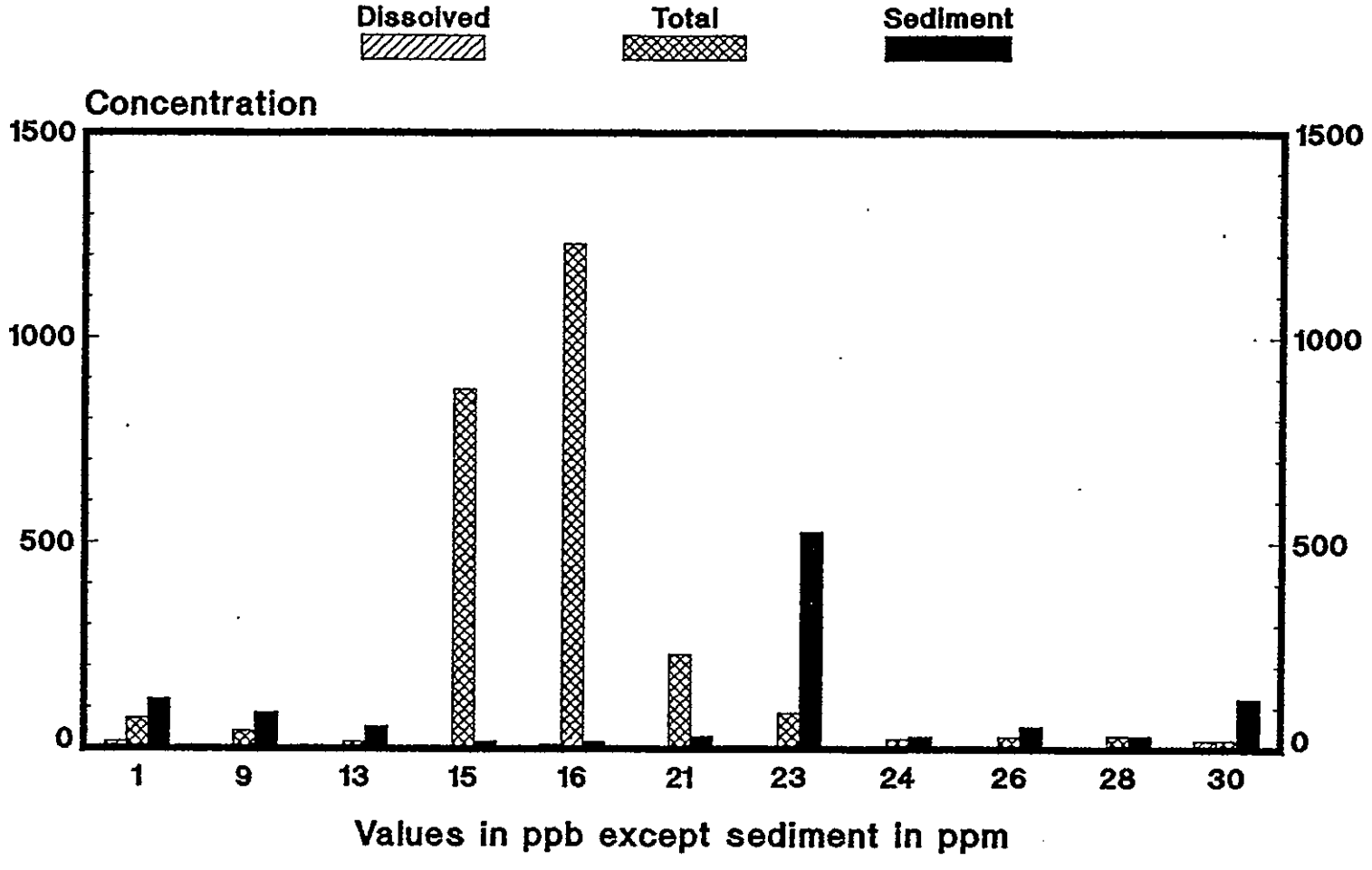
Cobalt Along the Rio Grande



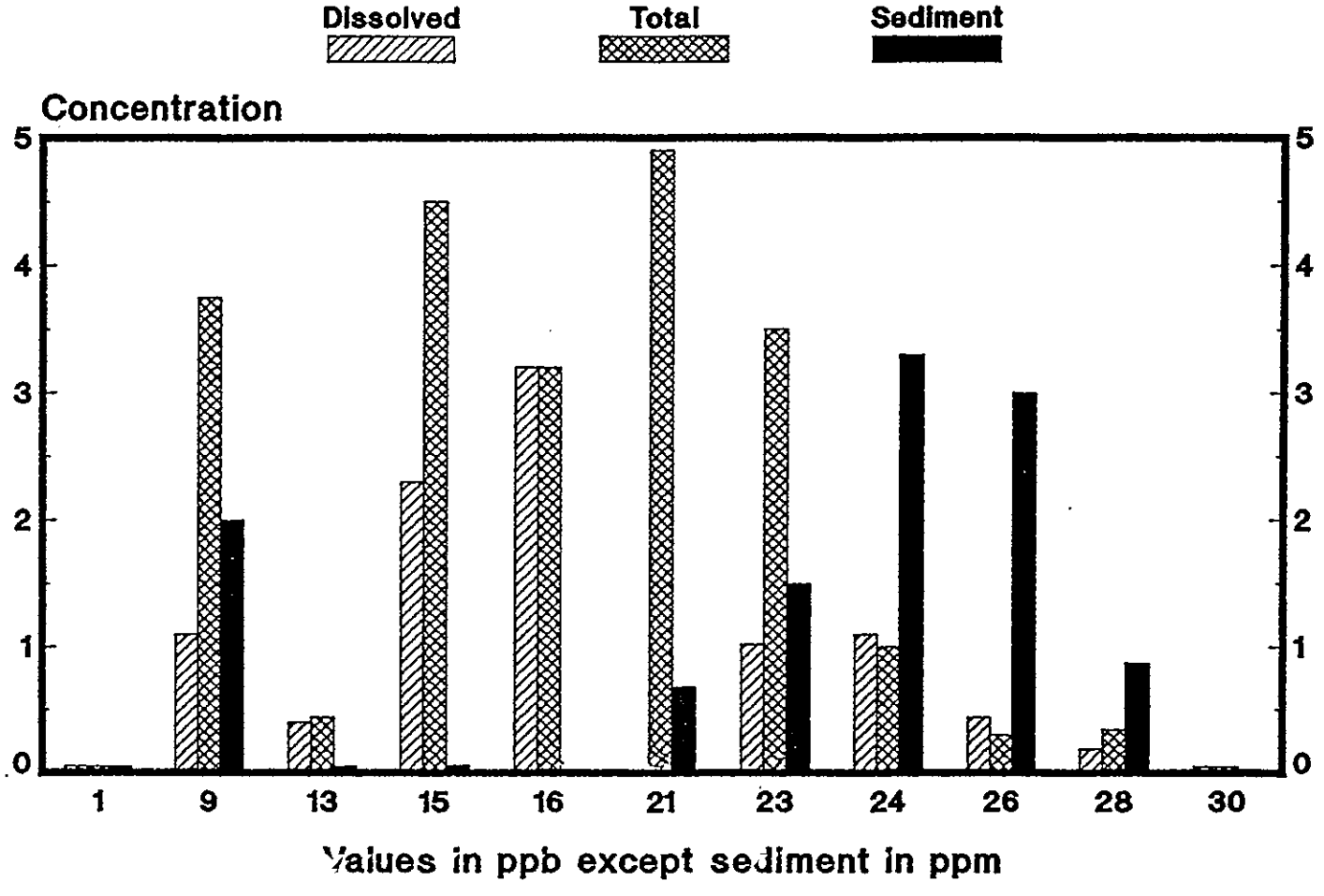
Copper Along the Rio Grande



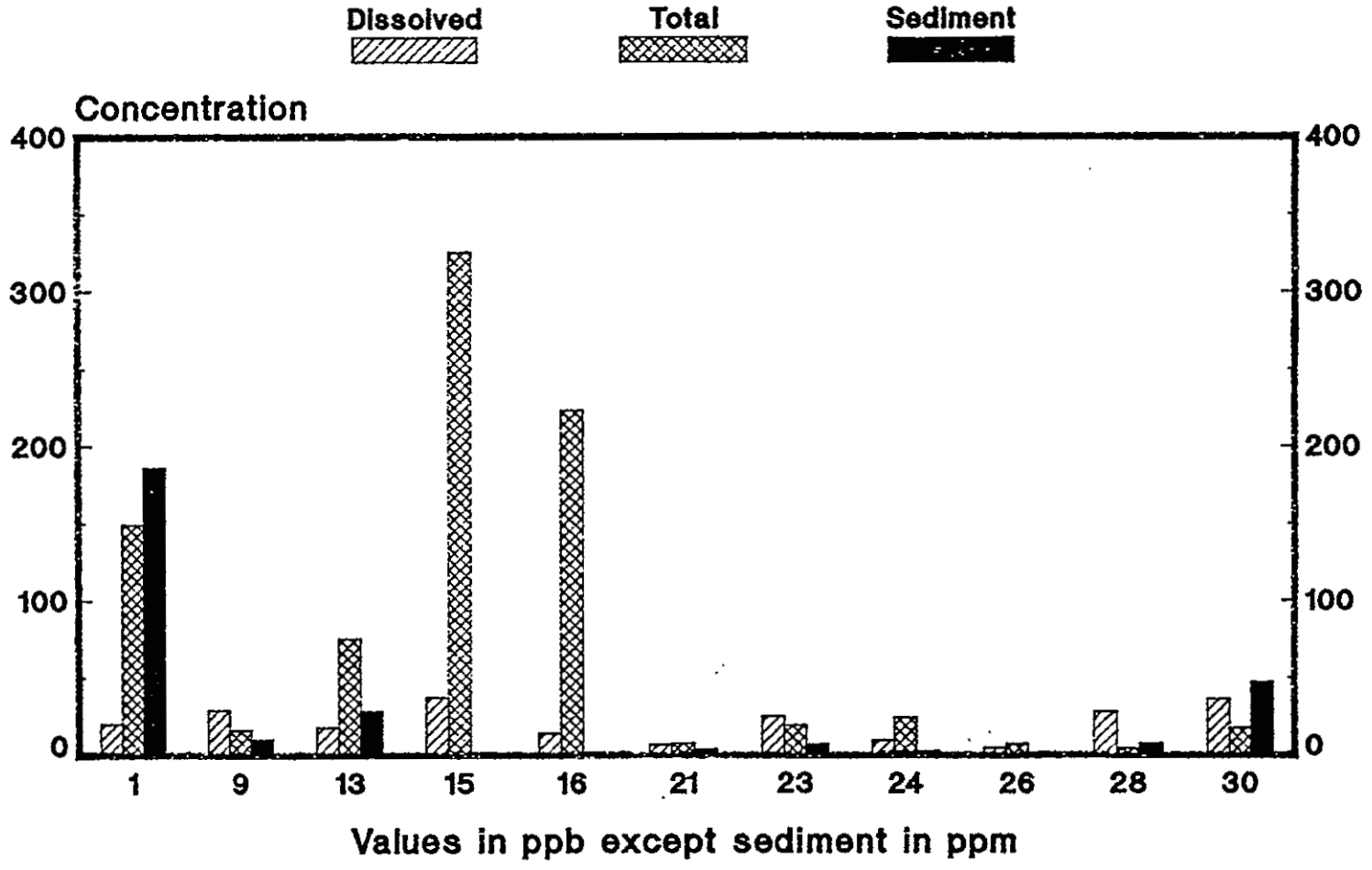
Lead Along the Rio Grande



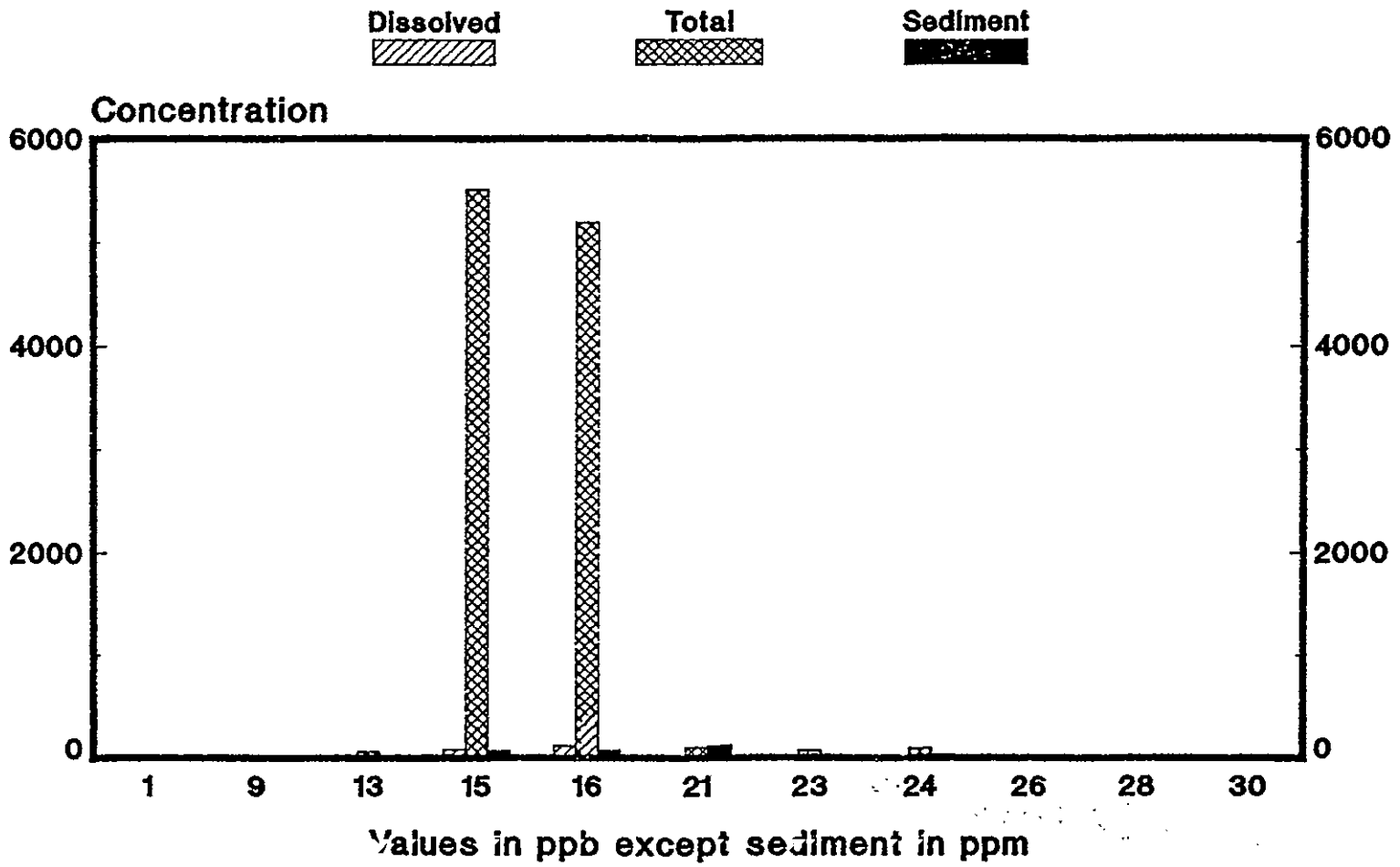
Mercury Along the Rio Grande



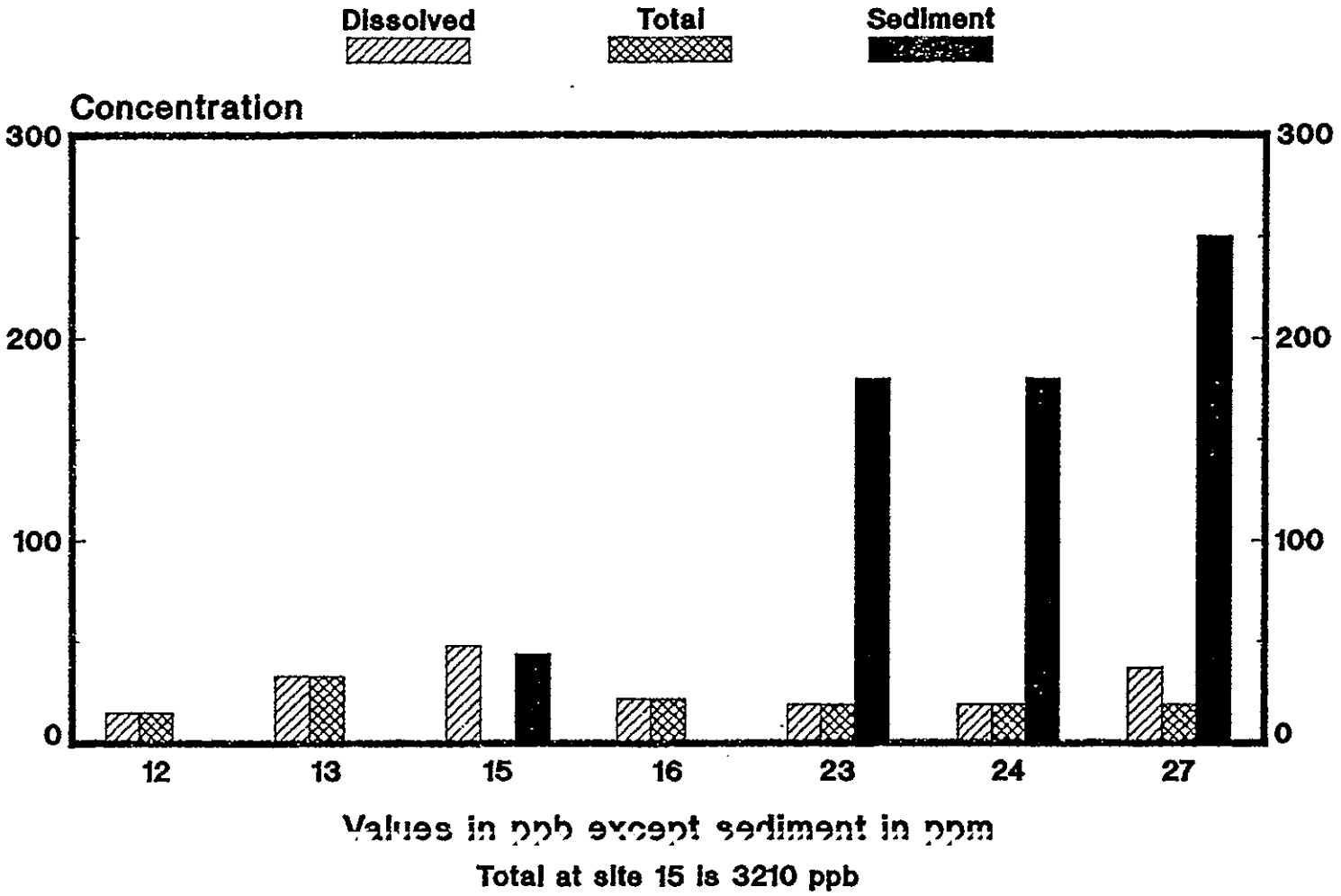
Molybdenum Along the Rio Grande



Selenium Along the Rio Grande



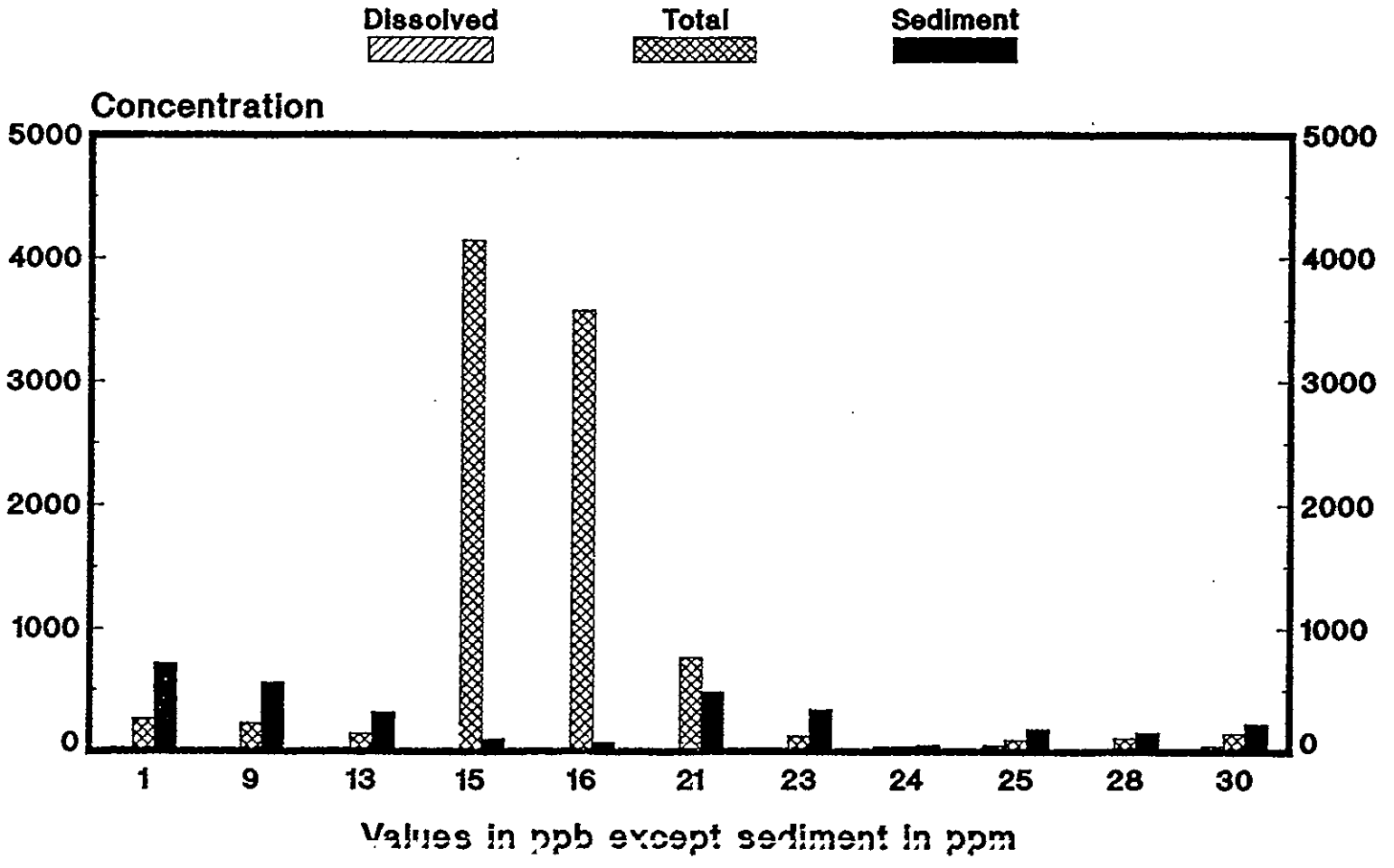
Uranium Along the Rio Grande



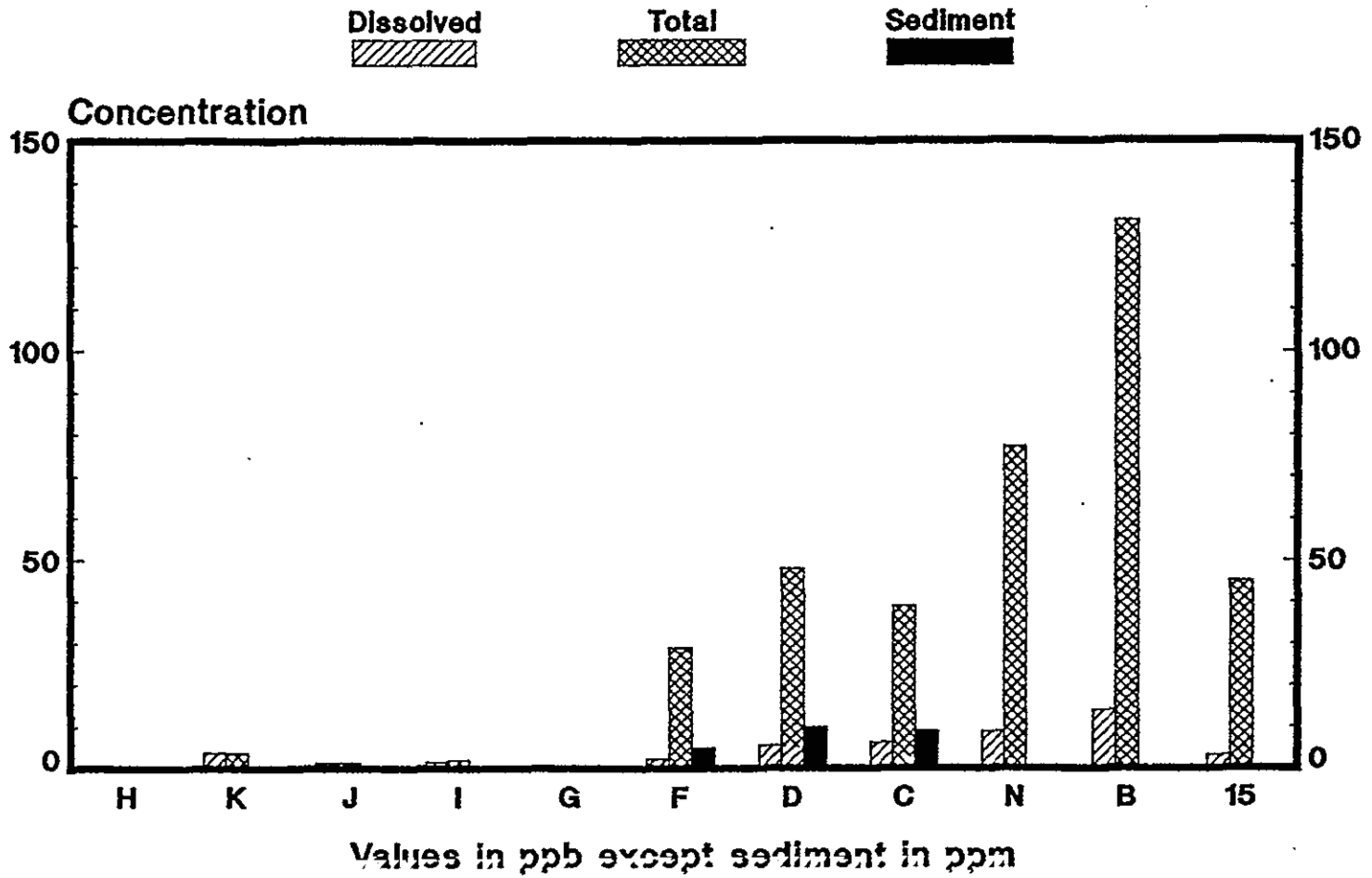
Values in ppb except sediment in ppm

Total at site 15 is 3210 ppb

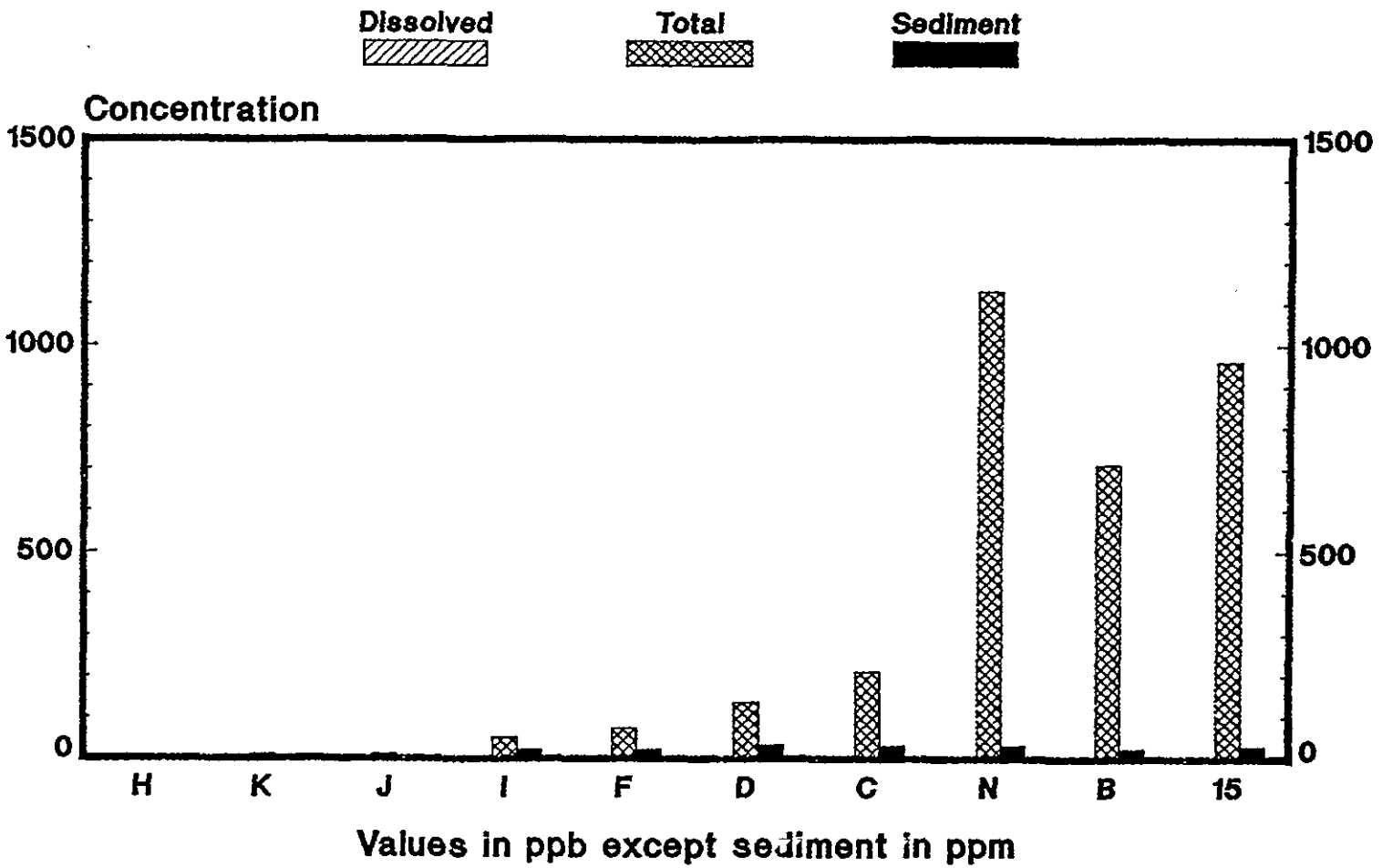
Zinc Along the Rio Grande



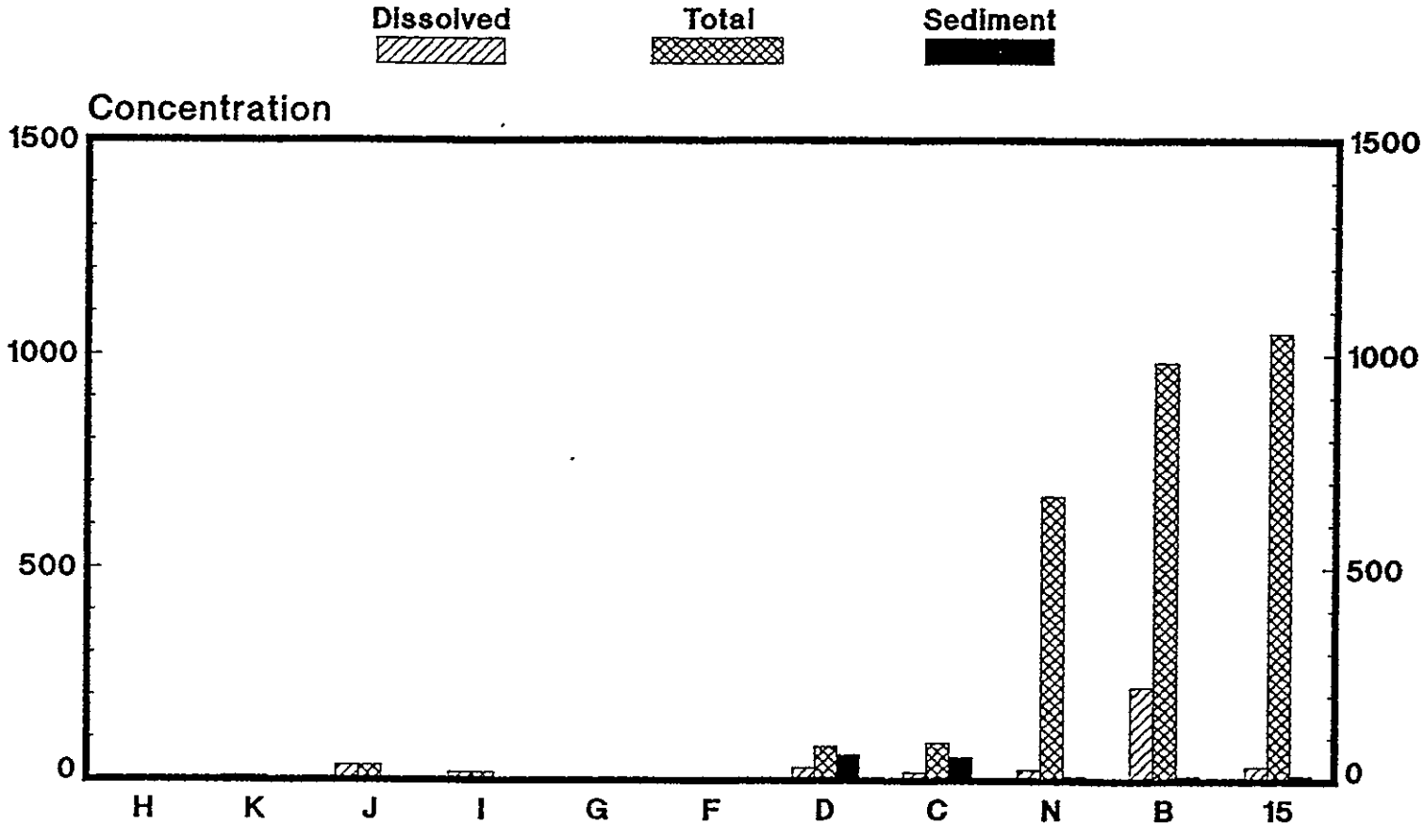
Cadmium Along the San Jose–Puerco



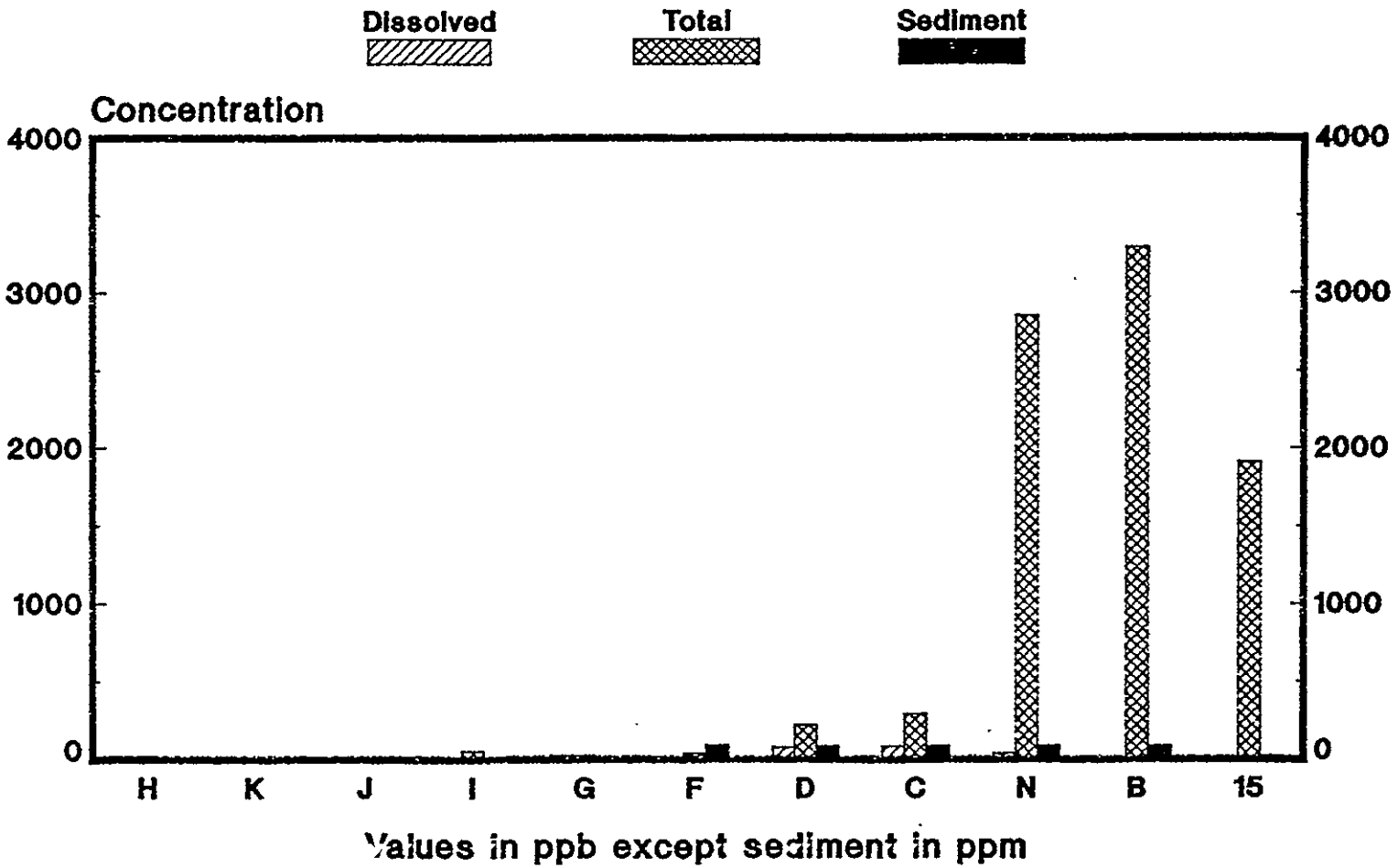
Chromium Along the San Jose–Puerco



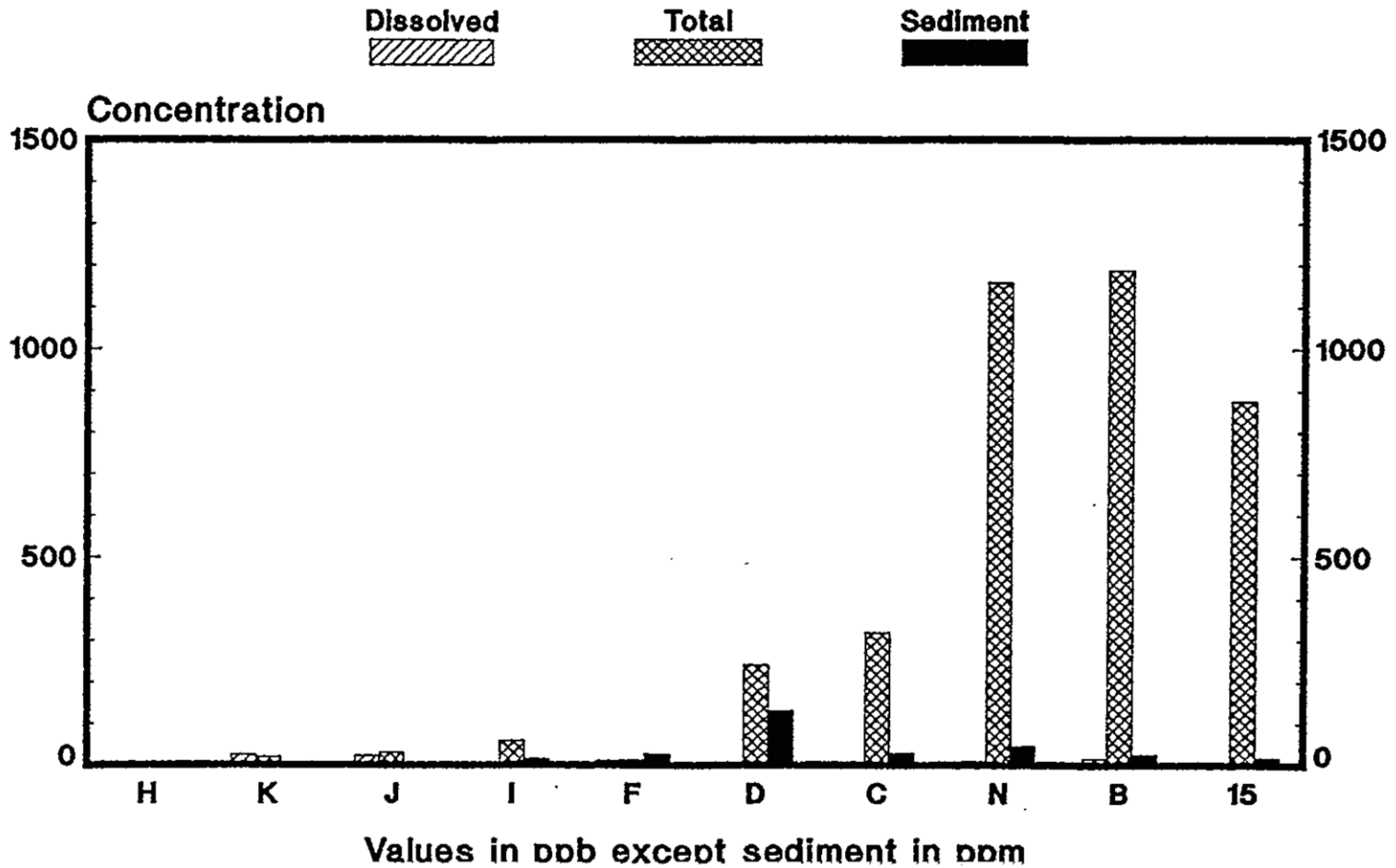
Cobalt Along the San Jose–Puerco



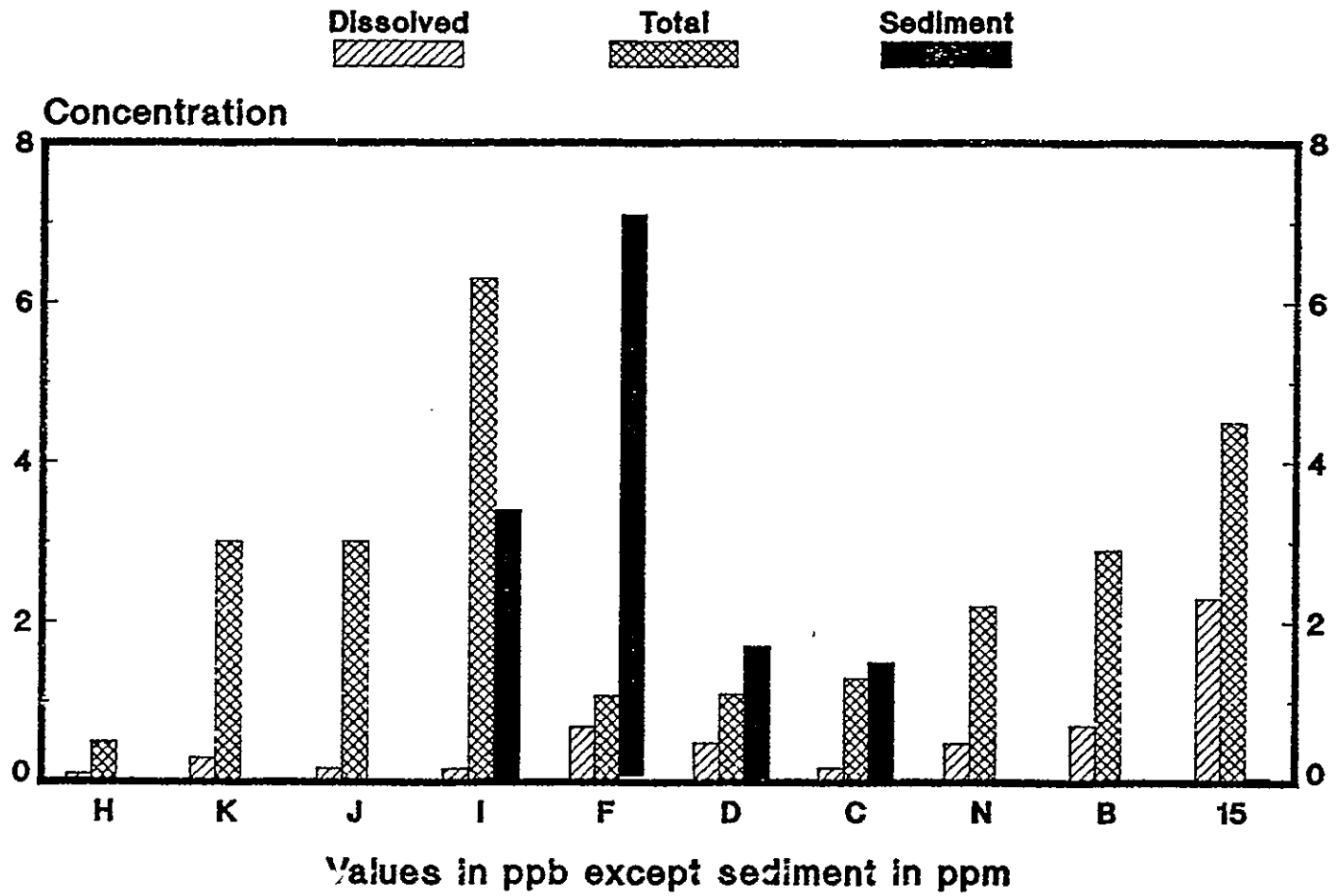
Copper Along the San Jose–Puerco



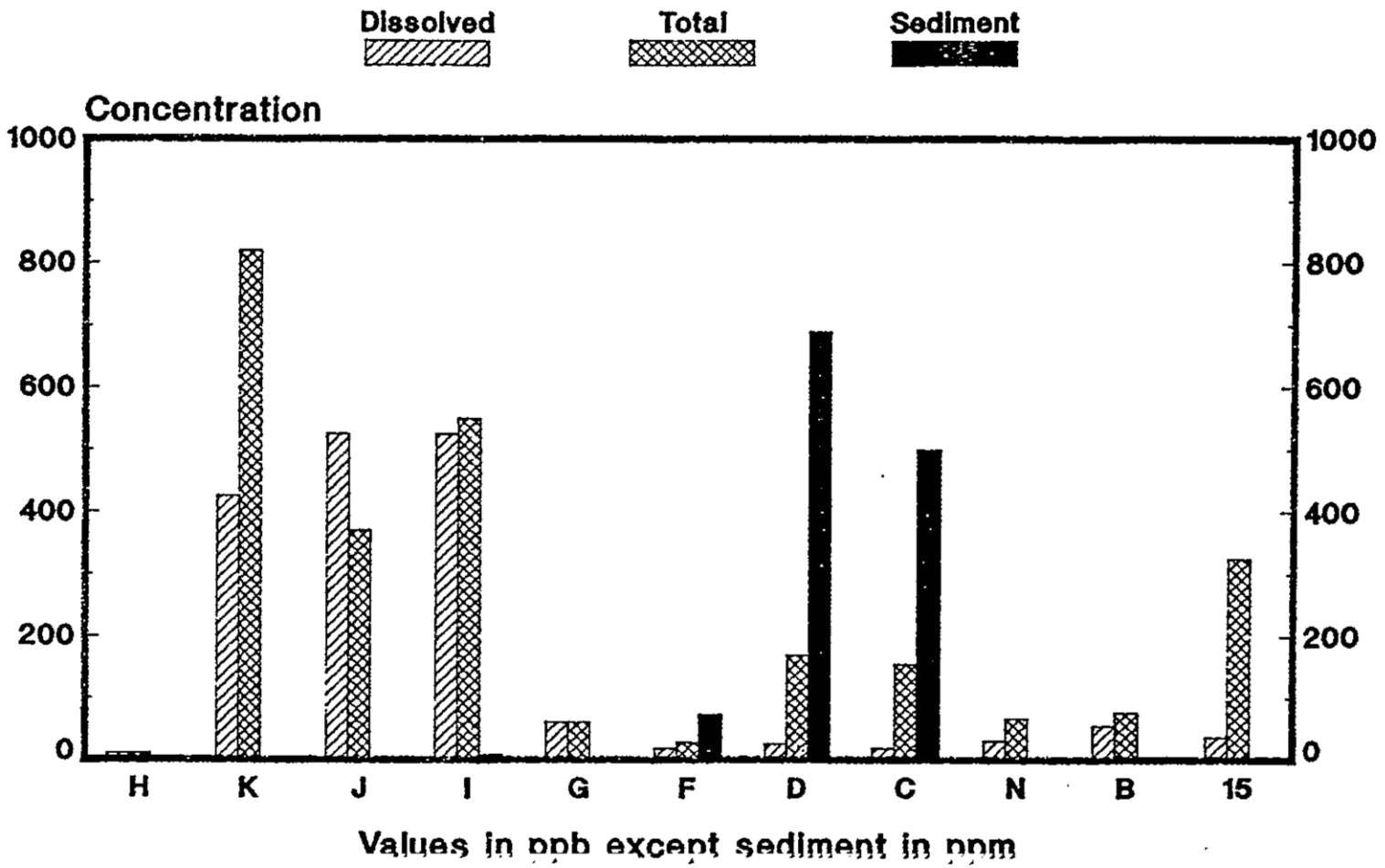
Lead Along the San Jose–Puerco



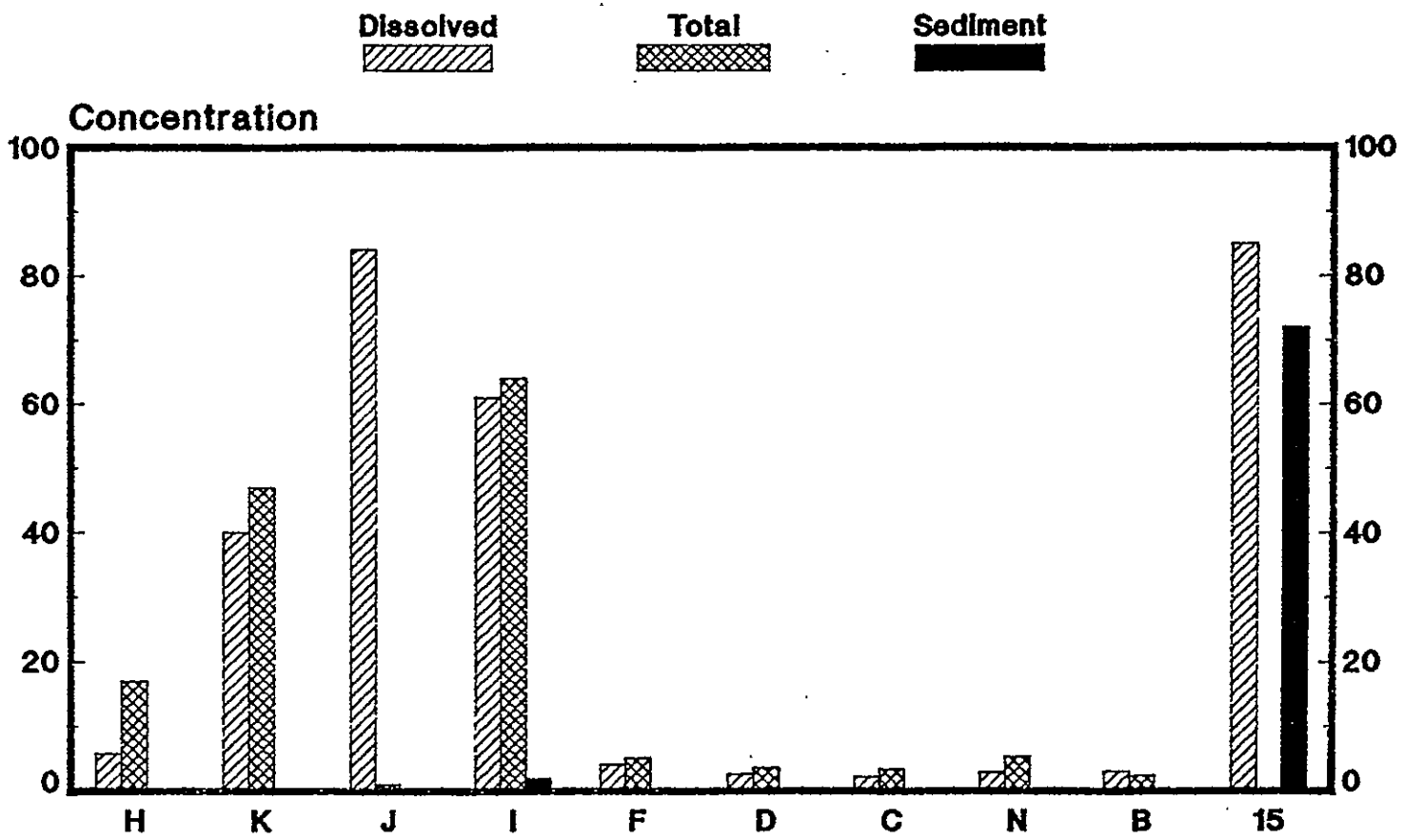
Mercury Along the San Jose–Puerco



Molybdenum Along the San Jose–Puerco



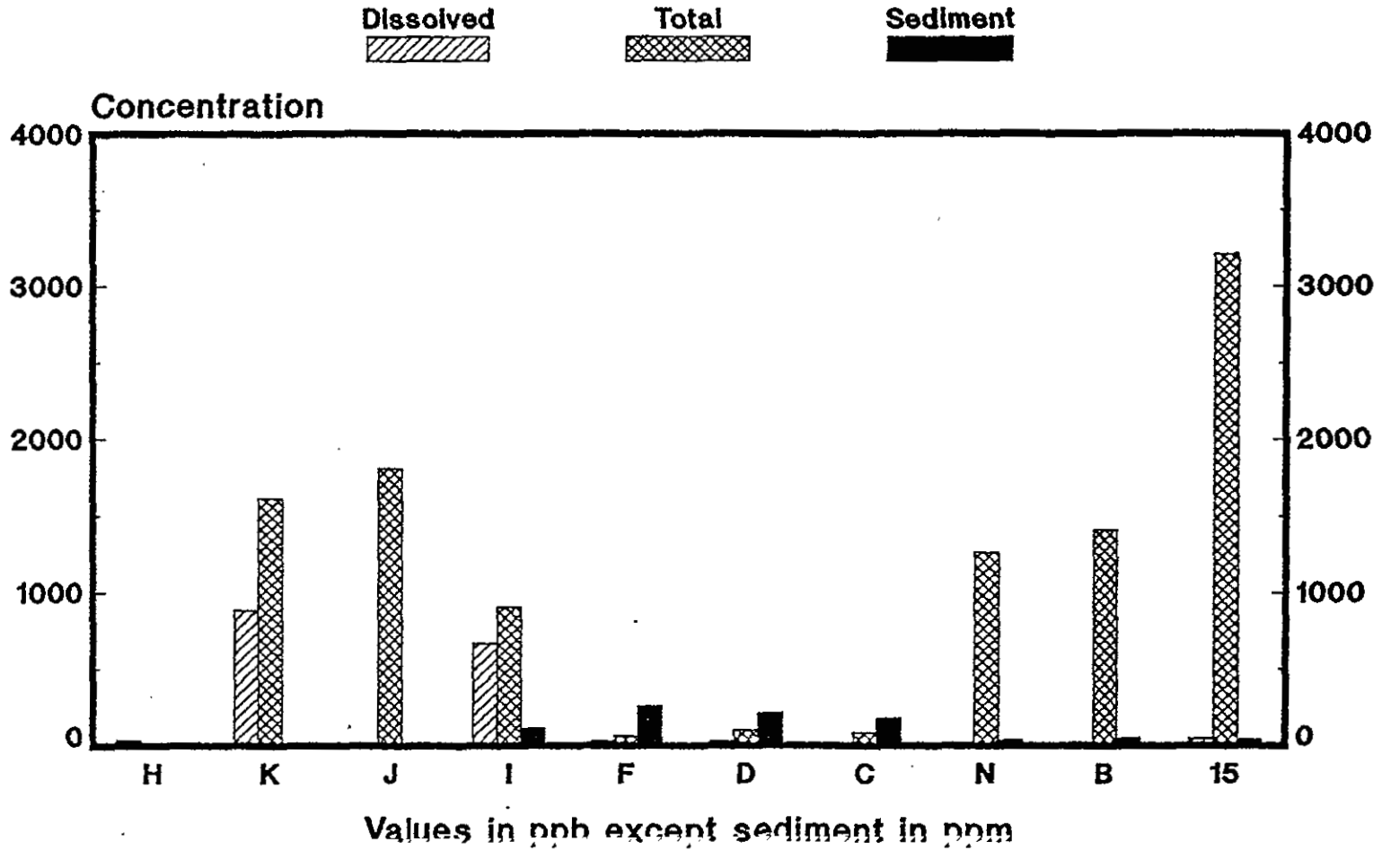
Selenium Along the San Jose–Puerco



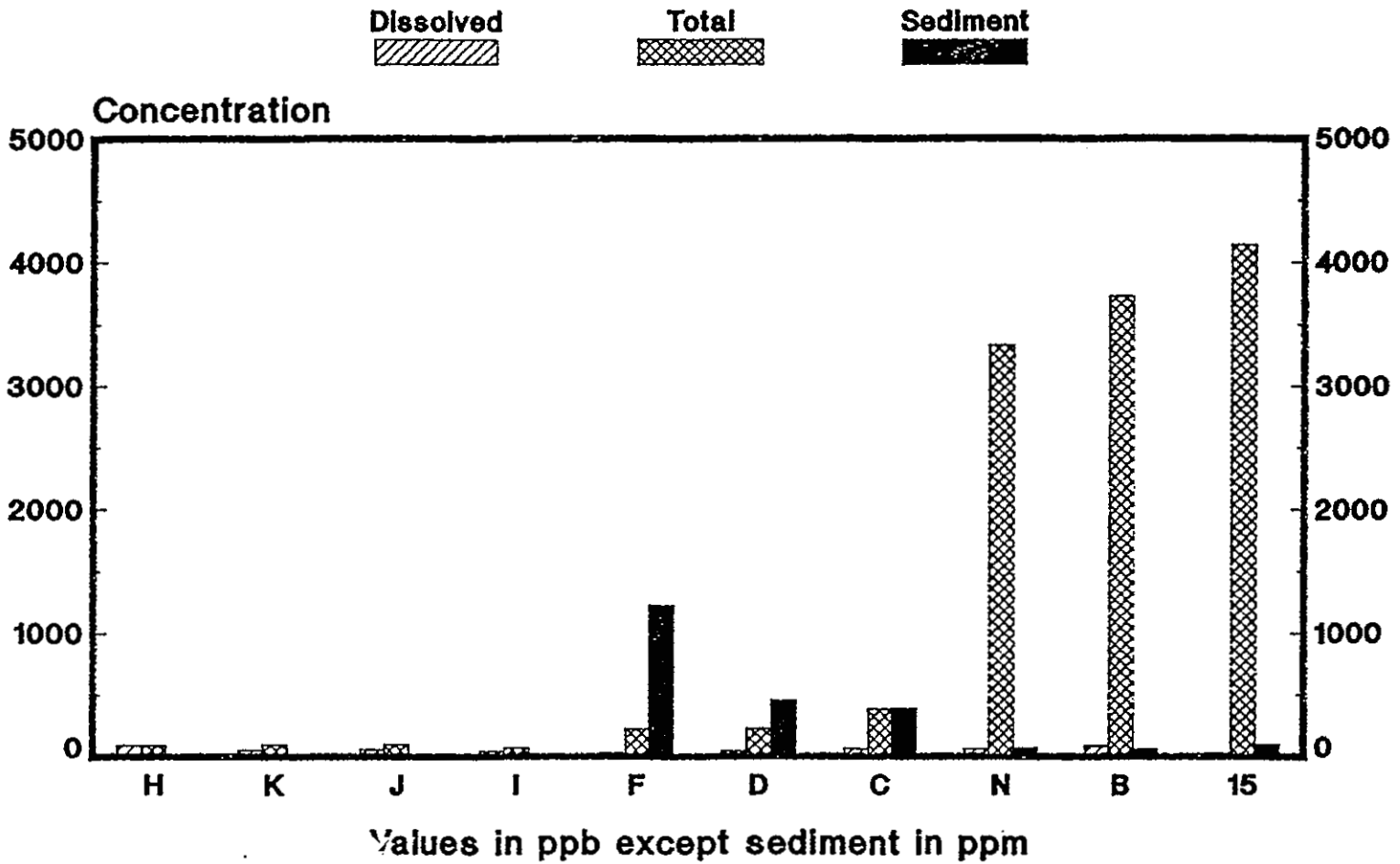
Values in ppb except sediment in ppm

Total at site 15 is 5512 ppb

Uranium Along the San Jose–Puerco



Zinc Along the San Jose–Puerco



ELEMENT BY ELEMENT COMMENTS

Mean values for dissolved heavy metals at Isleta from 3 sources and mean values for dissolved heavy metals for all sites on Rio Grande, except at sites where Rio Puerco and Rio Salado enter system, are compared to those tabulated by Kopp and Kroner for the Colorado River Basin (Table 9). Isleta (downstream from Albuquerque) was chosen as a representative site because it was upstream from the influence of the Rio Puerco and Rio Salado and the site was common to three studies. Water from the Colorado River drainage is probably closer in overall water chemistry to the Rio Grande than other major U.S. river systems due to the high dissolved solids content and sediment load.

ARSENIC

The arsenic data from Laquer's report were high, probably because of interferences in the electro-thermal atomic abscrption method. Sulfate is a known interferent in this method and New Mexico's waters are often high in sulfate. Arsenic data from Popp, et al. (1979), obtained by the same method, were also high but were included in the tables in this report inadvertently. This has the effect of producing a high bias on the mean at sites containing arsenic values from this report (Sites 11, 12, 13, 14, 15, 16, 21, 22, 23, 24, 25, and 27). Rio Puerco and Rio Salado show high arsenic in unfiltered samples because of their high sediment concentrations.

BARIUM

Dissolved barium concentrations are greater than that in seawater, but about the same as in the Colorado River. Barium in sediments averages less than crustal abundance. Barium minerals are rather insoluble and thus barium is found associated with the sediments.

BERYLIUM

Berylium was only determined on samples from the middle Rio Grande reported in Laquer, (1979). It is higher in the dissolved form than that in seawater by a factor of a thousand, but still very low, less than 2 ppb. The berylium in sediment averages less than crustal abundance.

Table 9

COMPARISON OF RIO GRANDE TRACE METALS TO COLORADO RIVER TRACE METALS. VALUES IN PPB AS DISSOLVED SPECIES.

Metal	Kopp & Kroner[1]	This report[2]	Popp[3]	Dauchy[4]	Laquer[5]
As	53	22	10	<10	55
B	179	331	130	2500	
Ba	60	90	160	50	73
Be		0.5			
Cd	2	3.2	.39	6	.08
Co	11	7.4	41		5
Cr	16	2.1	2.5	0.6	1.4
Cu	10	13	18	17	7
Fe		209			355
Hg		0.6	1.4		
Pb	32	6.4	13	11	4.2
Mn	12	61	400	25	81
Mo	130	19	19	20	16
Ni	12	21	80		13
Se	30	8.5	15	<8	4
U		23			
V	105	26	150		41
Zn	51	36	28	21	33

(1) Kopp, J. F. and Kroner, R. D., 1969, Trace Metals in Waters of the U.S., Div. of Pollution Surveillance, F.W.P.C.A. Cincinnati.

(2) Values are averages for all sites on Rio Grande from Colorado to Texas except at Rio Puerco and Rio Salado confluences. Boron values from Dauchy (1976) are not included.

(3) (4) (5) Averages at Isleta site.

BORON

Boron was determined only by Dauchy (1976) and Popp, et al. (1979). In the Popp et al. (1979) study, it was only determined on the filtered water samples. Dauchy's values were much higher than those from Popp's study. Dauchy used the curcumin color method while Popp used the carmine color method. Comparing the values from these two studies with boron from the Colorado River system indicate that Dauchy's are probably in error (Table 9).

CADMIUM

The amount of dissolved cadmium at several sites exceeds NMEID drinking water standards, but the average value is comparable with the Colorado River (Table 9). Cadmium in the sediments is higher than crustal abundance by an order of magnitude.

CHROMIUM

Dissolved chromium is higher than that in seawater, in fact, one site, #21 (Socorro), is higher than the NMEID drinking water standard of 50 ppb. However, the high average is due to one sample from the Popp et al. (1983) data which was a single value of 141 ppb chromium. The rest of the data for that site average about 1 ppb, which is similar to the other sites. The amount in sediments is lower than crustal abundance. Chromium appears to be associated with the sediments.

COBALT

Amount of dissolved cobalt is much higher than that in seawater but similar to that in the Colorado River (Table 9). The amount in sediments is about the same as crustal abundance.

COPPER

Amount of dissolved copper is about an order of magnitude greater than that in seawater but similar to that in the Colorado River (Table 9). The amount in sediments is about the same as crustal abundance.

IRON

Dissolved iron is about 10-fold greater than that in seawater. The amount in sediments is slightly less that in crustal abundance. Iron is associated with the sediments.

LEAD

Lead is several orders of magnitude higher in dissolved form than that in seawater but lower than that in the Colorado River (Table 9). Lead is also higher in sediments than crustal abundance.

MANGANESE

Manganese is several orders of magnitude higher in dissolved form than that in seawater.

MERCURY

Mercury in dissolved form is higher than that in seawater. Mercury is an order of magnitude higher in sediments than crustal abundance. It is present mostly in dissolved form.

MOLYBDENUM

Dissolved molybdenum is higher than that in seawater but lower than that in the Colorado River (Table 9). Dissolved molybdenum is high in stretches of Red River and San Mateo Creek, both most likely related to mining activities. Sediment contains higher molybdenum than crustal abundance. Element appears to travel in dissolved form.

NICKEL

Dissolved nickel is higher than that in seawater but similar that that in the Colorado River (Table 9). Sediments contain about the same amount as crustal abundance.

SELENIUM

Selenium in dissolved form is higher than amount in seawater and is also higher at many sites than drinking water standards but average value is lower than that in the Colorado River (Table 9). Selenium is also much higher in sediments than crustal abundance. Selenium travels in dissolved form but also increases with increases in sediment load.

URANIUM

Dissolved uranium is higher than that in seawater. Uranium is much higher in sediments that crustal abundance. There is not much data on upper Rio Grande on which to base the following statement but uranium appears to be coming into the system from Rio San Jose & Rio Puerco. Uranium appears to travel with the sediments

VANADIUM

Vanadium in dissolved form is higher than that in seawater but average value is lower than that in the Colorado River (Table 9). Amount of vanadium in sediments is about the same as crustal abundance.

ZINC

Zinc is higher in dissolved form than that in seawater but lower than that in the Colorado River (Table 9). It is higher in sediments than that in crustal abundance. Zinc travels with sediment. In Laquer's (1981) work, total values are sometimes reported as less than dissolved. Also, his values are lower than other reported values.

GENERAL COMMENTS

Only two elements, mercury and selenium, exceeded the NMEID's Criteria for Public Drinking Water. Concentrations of both elements increased at Corrales and were further increased by flow from the Rio Puerco and Rio Salado. The increase ir these elements in filtered water is mirrored by that in whole water samples to an even greater degree. Increases in the sediment concentration (Table 2) in the Rio Puerco and Rio Salado are felt to be responsible for these increases. Concentrations of most elements increase when flow from the Rio Puerco is reached except for boron, mercury, and molybdenum. These elements travel to a large extent in the dissolved state.

The following elements were present in sediments in amounts greater than crustal abundance; Pb (3x), Hg (100x), Mo (3x), Se (10x), U (100x), and Zn (3x).

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