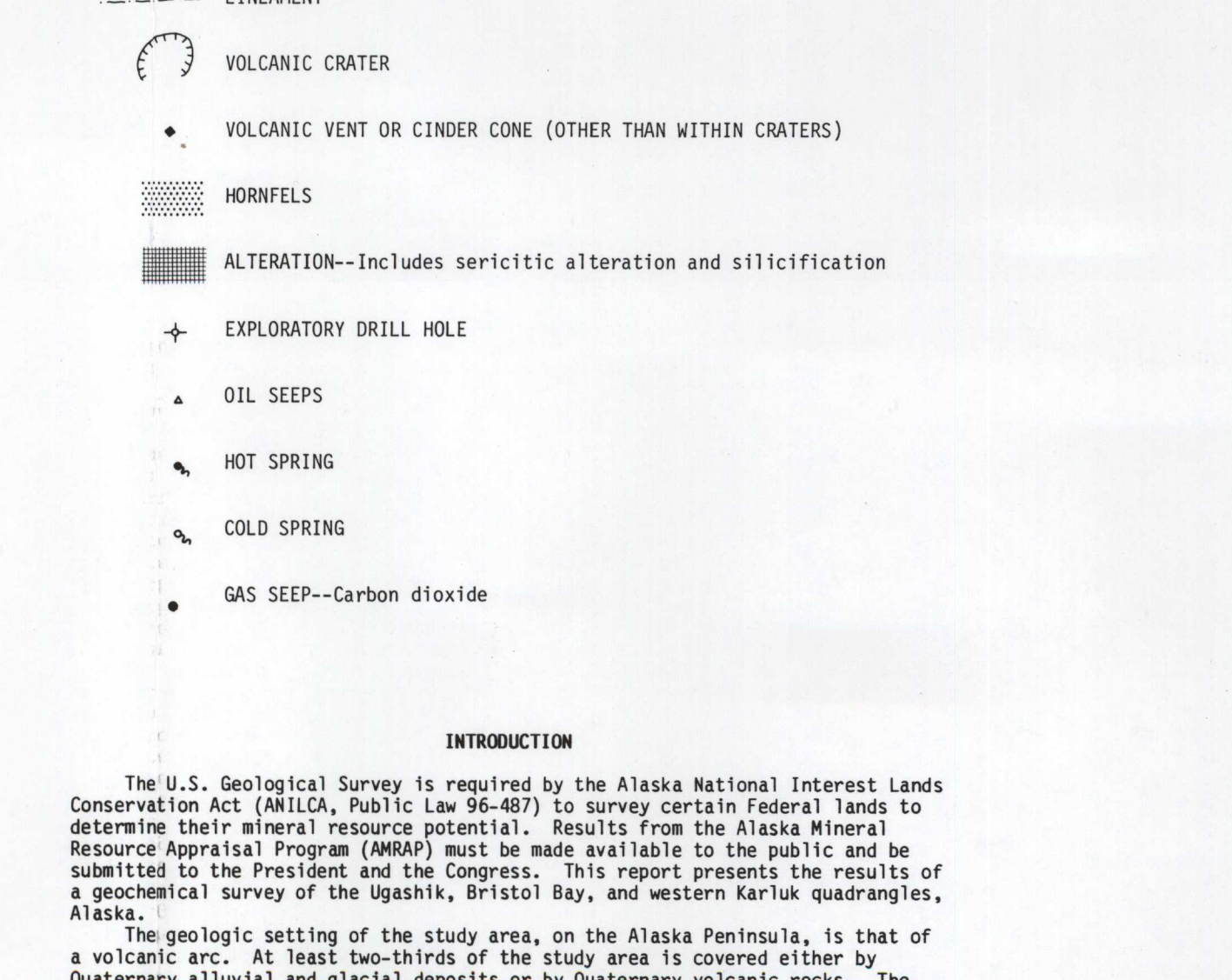
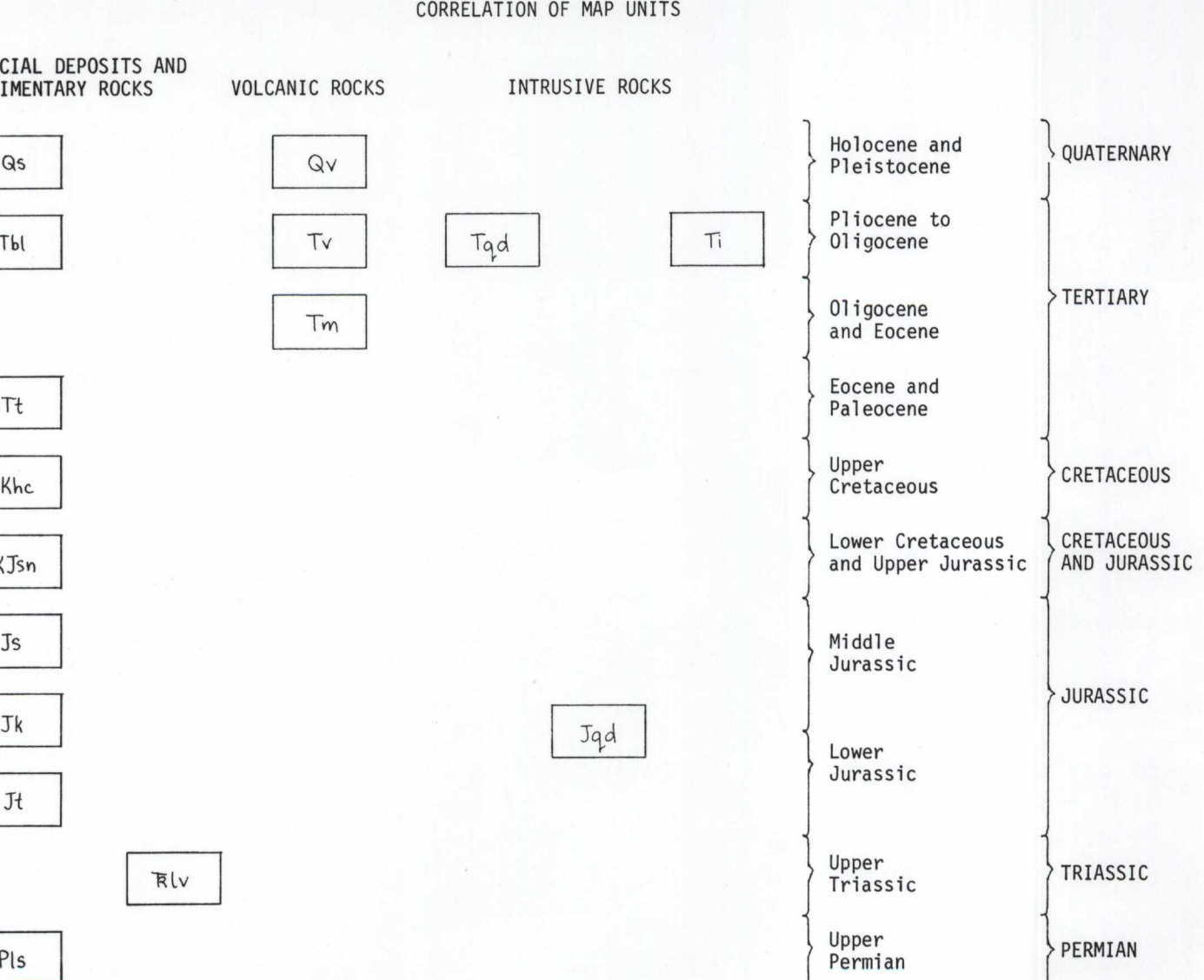
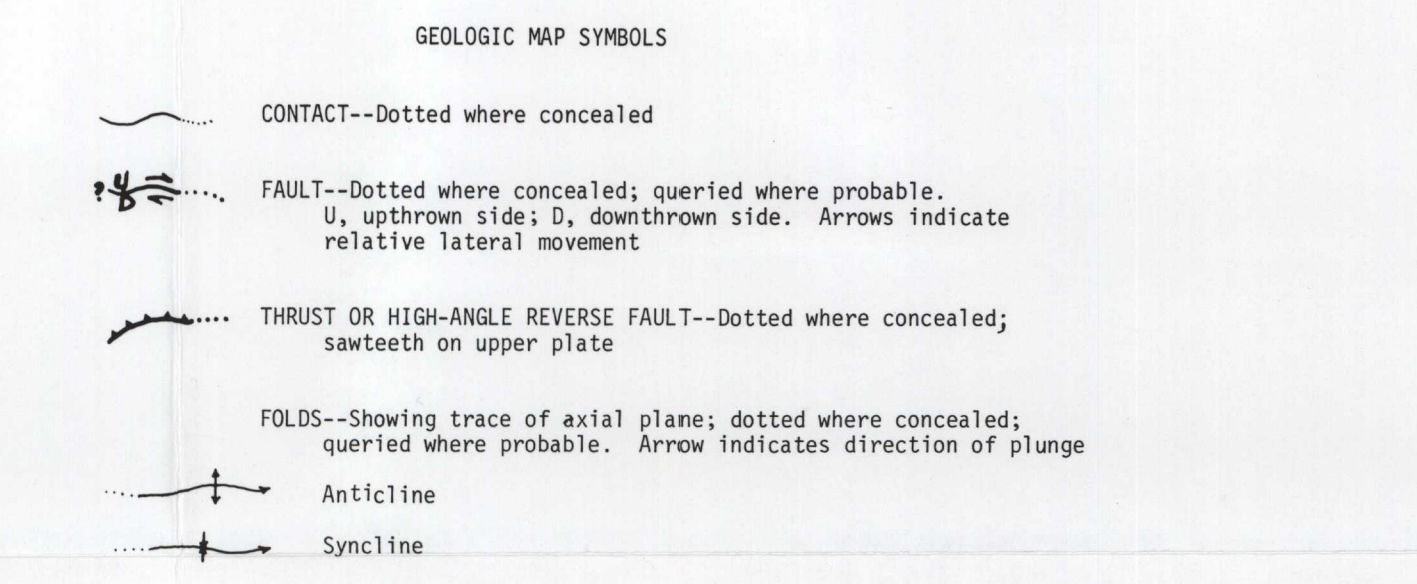
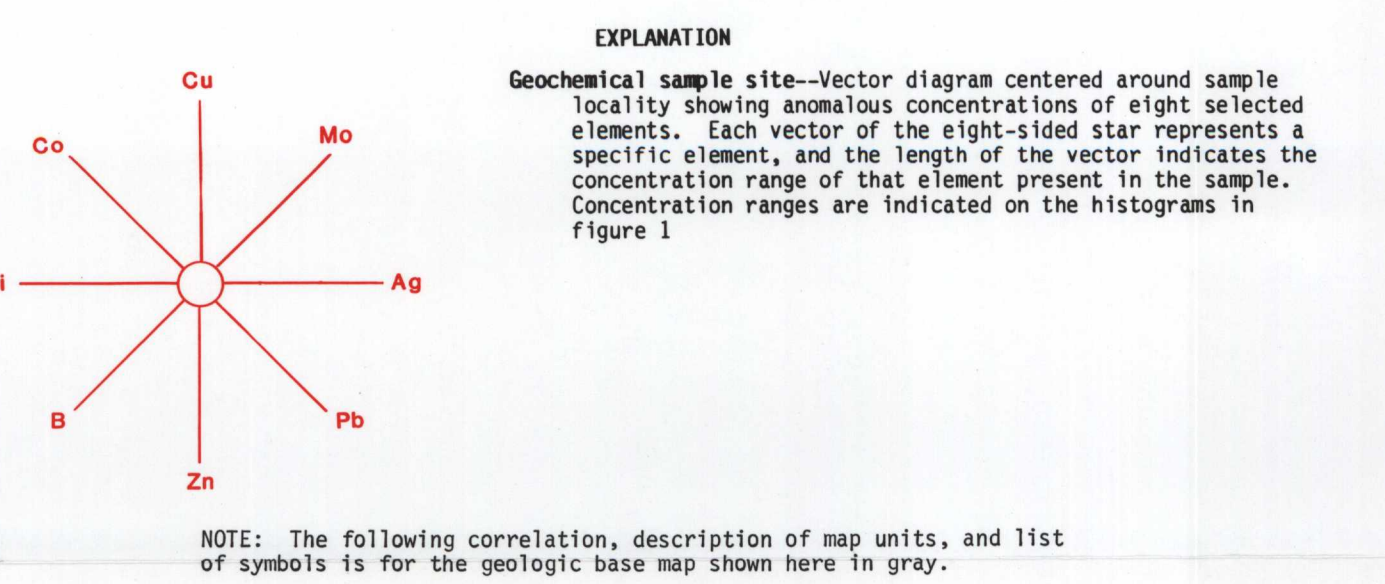


Base from U.S. Geological Survey Ugashik, Bristol Bay, Karluk, 1983

Geologic base from Detterman and others (1983)



DESCRIPTION OF MAP UNITS  
SURFICIAL DEPOSITS AND SEDIMENTARY ROCKS  
Quaternary: Qa, Qb, Qc, Qd, Qe, Qf, Qg, Qh, Qi, Qj, Qk, Ql, Qm, Qn, Qo, Qp, Qq, Qr, Qs, Qt, Qu, Qv, Qw, Qx, Qy, Qz  
Tertiary: T1, T2, T3, T4, T5, T6, T7, T8, T9, T10  
Cretaceous: K1, K2, K3, K4, K5, K6, K7, K8, K9, K10  
Jurassic: J1, J2, J3, J4, J5, J6, J7, J8, J9, J10  
Triassic: Tr1, Tr2, Tr3, Tr4, Tr5, Tr6, Tr7, Tr8, Tr9, Tr10  
Permian: P1, P2, P3, P4, P5, P6, P7, P8, P9, P10

INTRUSIVE ROCKS  
Qv: Volcanic rocks (Holocene and Pleistocene) - Black and ash flows, debris flow, volcanic mud flows, cinder cones, and andesitic and dacitic lava flows; includes minor hyabysal rocks  
Tv: Volcanic rocks (Pliocene to Oligocene) - Basalt, andesite, and dacite lava flows, volcanic breccia, and rhyolite flows; locally includes hyabysal rocks  
Tn: Mesozoic (Oligocene and Eocene) - Basalt flows, volcanic rubble flows, and lahars; locally minor volcanogenic sedimentary rocks

element concentrations are shown by vectors that radiate from the sample localities shown as small circles. The vectors are subdivided into three lengths that approximate the 90th, 50th, and 20th percentile distributions of the log-normalized data. Three elements, silver, arsenic, and molybdenum, are strongly correlated. That is, the shape of the distribution of these elements is artificially limited by the sensitivity of the analytical method. The rest of the selected elements approximate a log-normal distribution that is positively skewed. The resulting star diagrams not only show the presence of anomalous concentrations of these elements, but can also be used to indicate the geochemical signature of particular types of mineral deposits. These signatures are indicated by patterns in the individual stars representing suites of elements characteristic of particular types of mineral deposits. Clusters of similar stars on the geochemical map may represent one or more deposits having large areal exposure.

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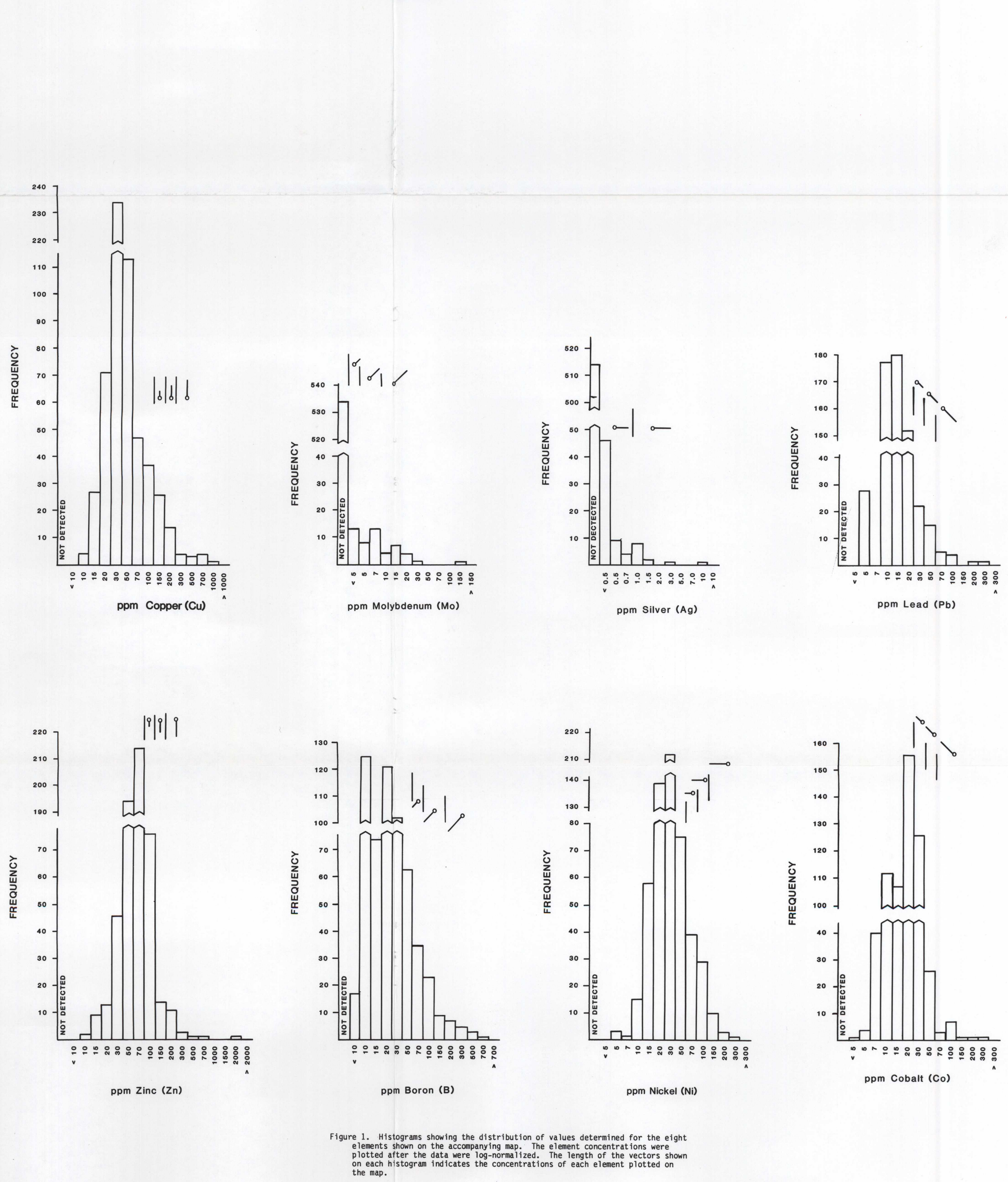


TABLE 1.--Statistical summary of stream-sediment data, Ugashik, Bristol Bay, and western Karluk quadrangles, Alaska  
[Method of analysis: semiquantitative emission spectroscopy; "-" denotes no data.]

| Element | No. of Samples | Data based on the unmodified population |                    |        |          | Percentile distribution based on samples |      |       |      |       |       |       |
|---------|----------------|-----------------------------------------|--------------------|--------|----------|------------------------------------------|------|-------|------|-------|-------|-------|
|         |                | Mean                                    | Standard deviation | 90th   | 95th     | 90th                                     | 95th | 98th  |      |       |       |       |
| Mg      | 1,000          | 0                                       | 0                  | 885    | 0.3-10   | 1.4                                      | 1.6  | 1.6   | 0.93 | 2.9   | 3.5   | 3.9   |
| Ca      | 1,000          | 0                                       | 0                  | 12,473 | 1.20     | 5.8                                      | 11   | 7.4   | 4.9  | 16    | 17    | 17    |
| Fe      | 979            | 0                                       | 0                  | 158    | 47       | 0.15-1                                   | 0.58 | 1.8   | 0.66 | 0.30  | 1.0   | 1.0   |
| B       | 971            | 0                                       | 0                  | 168    | 100-700  | 25                                       | 1.2  | 39    | 60   | 73    | 110   | 220   |
| Ba      | 952            | 5                                       | 256                | 0      | 324      | 1.0-1.5                                  | 1.2  | 1.1   | 1    | 0.09  | ---   | ---   |
| K       | 993            | 0                                       | 0                  | 585    | 80-1,000 | 372                                      | 1.7  | 4.0   | 450  | 1,100 | 2,300 | 4,200 |
| Na      | 1,000          | 0                                       | 0                  | 885    | 10-1,000 | 470                                      | 1.9  | 1.9   | 100  | 760   | 820   | 1,000 |
| Al      | 1,000          | 0                                       | 0                  | 188    | 10-100   | 75                                       | 1.4  | 1.6   | 1.4  | 56    | 36    | 12    |
| Y       | 1,000          | 0                                       | 0                  | 885    | 10-70    | 28                                       | 1.4  | 3.0   | 11   | 46    | 52    | 56    |
| Zr      | 993            | 0                                       | 0                  | 885    | 10-100   | 120                                      | 1.7  | 1.60  | 320  | 270   | 360   | 500   |
| Sc      | 1,000          | 0                                       | 0                  | 885    | 10-150   | 33                                       | 1.5  | 35    | 16   | 47    | 54    | 64    |
| Mn      | 995            | 0                                       | 0                  | 882    | 80-1,000 | 950                                      | 1.9  | 1,200 | 780  | 2,300 | 2,800 | 3,700 |
| Co      | 1,000          | 0                                       | 0                  | 585    | 80-1,000 | 320                                      | 2.0  | 450   | 360  | 1,100 | 1,200 | 1,300 |
| Cr      | 998            | 0                                       | 0                  | 188    | 10-1,000 | 79                                       | 1.9  | 1.9   | 100  | 170   | 240   | 360   |
| Ni      | 1,000          | 0                                       | 0                  | 685    | 10-100   | 42                                       | 2.0  | 29    | 86   | 110   | 170   | 270   |
| Cu      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Pb      | 1,000          | 0                                       | 0                  | 685    | 10-100   | 42                                       | 2.0  | 29    | 86   | 110   | 170   | 270   |
| Mo      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Ag      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| As      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Bi      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Zn      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Pb      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Bi      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Co      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Ni      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Zn      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Pb      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Bi      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Co      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Ni      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Zn      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Pb      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Bi      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Co      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Ni      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Zn      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Pb      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Bi      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Co      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Ni      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Zn      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Pb      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Bi      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Co      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Ni      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Zn      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Pb      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Bi      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Co      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Ni      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Zn      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Pb      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Bi      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Co      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Ni      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Zn      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Pb      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Bi      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Co      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Ni      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Zn      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Pb      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Bi      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Co      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Ni      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Zn      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Pb      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Bi      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Co      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Ni      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Zn      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Pb      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Bi      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Co      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Ni      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Zn      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Pb      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Bi      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Co      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Ni      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Zn      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Pb      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Bi      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Co      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Ni      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Zn      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
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| Co      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Ni      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Zn      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Pb      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Bi      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Co      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    | 44    | 56    |
| Ni      | 998            | 0                                       | 0                  | 584    | 5-700    | 18                                       | 1.8  | 27    | 20   | 36    |       |       |