DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Geochemical survey of the Sauk sequence of the western United States

By

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Open-File Report 90-0617

1990

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Abstract

A geochemical survey of the Sauk sequence (late Precambrian to early Ordovician) over the western U.S. was conducted to accumulate some fundamental and systematic background geochemical data and to determine the feasibility of making geochemical maps of its major lithologic units. These units are (1) the basal upper Precambrian to Cambrian sandstones (unit A), (2) the overlying Cambrian shales and siltstones (unit B), and (3) the still higher Cambro-Ordovician carbonate rocks (unit C). Each of these units was sampled according to a hierarchical design that provided estimates of the components of geographic variance at scales of (1) greater than 50 miles, (2) 10 to 50 miles, (3) 2 to 10 miles, and (4) less than 2 miles. Two additional estimated variance components were (5) between samples within stratigraphic sections and (6) between analyses of individual samples. Analysis of the estimated variance components suggests that additional sampling within localities spaced at 50 miles could lead to statistically stable geochemical maps of most constituents in the basal sandstones and some constituents in the overlying shales and siltstones. In contrast, appreciable parts of the variance in most constituents in the carbonate rocks could be mapped only by sampling at intervals of 10 miles or less, which is probably impractical. The variance components also indicate that sampling the sandstone and shale units at intervals of less than 50 miles, or the carbonates at intervals of less than 10 miles, would yield little or no more information than would sampling at the wider intervals, unless the intervals were reduced to less than 10 miles and 2 miles respectively.

The systematic replication in sampling and laboratory analysis was useful in identifying a number of possible geochemical anomalies with, perhaps, more than ordinary reliability.

Introduction

This report summarizes geochemical data on the sandstones, shales and carbonate rocks of the Sauk sequence (late Precambrian to early Ordovician) in the western U.S. The data were gathered in an experimental phase of what was to be a formal systematic geochemical "census" of the entire country. The census, as planned, was to include systematic sampling of a number of major rock units which included lithologic entities within the six major stratigraphic sequences defined by Sloss (1963). For a number of reasons, the geochemical census as a formal Geological Survey objective was never realized, even though a number of broad-scale studies of large areas and major rock groups were completed. These include a study of the Tippecanoe sequence (middle Ordovician to early Devonian) which immediately overlies the Sauk, by Schultz (1985).

Although the raw data and data summaries included here may be helpful in establishing background values for those engaged in geochemical exploration, environmental geochemistry, pollution investigations, as well as academic studies of geochemical cycling, the authors feel that the major contribution here is the illustration of the use of some principles of experimental design in geochemical surveys - at least an earnest attempt to use such principles. Although some of the principles could not be adhered to strictly, we feel that the departures will not seriously invalidate our results, and therefore the data are if not superior to then at least more objective than most geochemical data. The sampling program was conducted according to a formal design that was adhered to as closely as the distribution of outcrop allowed. Also, the selection of specific sampling points in the field involved formal randomization procedures even though talus and soil cover commonly prevented us from giving absolutely every potential sample an equal chance of being selected. However, even our rather crude randomization required careful field examination to determine all the possible samples available to us; the randomization procedures required a great deal more field examination than would have been required by simply picking out a "good representative sample". In addition, the samples were not analyzed in the order that they were collected as is common in so many geochemical projects. Rather, they were all collected, over a period of several years, and then each was split into two parts. Then, all splits were analyzed in a randomized sequence. The completely independent duplicate analyses of each and every sample provide a basis for data interpretation that is seldom available in searches for geochemical variation, especially geochemical anomalies. They also allow the only truly sound basis for estimates of analytical precision.

One initial objective of the project was to derive some small-scale geochemical maps of the three major lithologic units within the Sauk sequence. However, it was realized that such maps would be meaningful only if it were possible to demonstrate statistically significant geochemical variability among the major outcrop regions where samples could be obtained. To obtain statistically significant data it would be necessary to sample enough within each region to overcome the effects of not only local areal variation, but especially stratigraphic variability. But, to sample with sufficient intensity to overcome this local variability we would have to know how great the variability was with respect to the regional variability we wanted to map. In other words, it was recognized that no rock unit can be sampled efficiently and meaningfully unless some at least preliminary estimates of the magnitude of geographic and stratigraphic variability it contains are available.

The different geographic scales at which geochemical variation may manifest itself in any rock unit, for example, can be described by a list of variance components, each component associated with a range of distance. The components can be summarized graphically in a "cumulative-variance curve". The cumulative variance curves given nelow for the three lithic units of the Sauk sequence show proportions of the total geochemical variability in these units that can be described by spacing the sampling localities at selected intervals. The variance components associated with local scales can be used to estimate the amount of sampling that would have to be done within each sampling locality. The data so far in hand for the Sauk sequence are useful for this purpose, but for most constituents they are not adequate to construct geochemical maps with any satisfactory degree of reliability (see "Conclusions", below).

Lithologic subdivisions of the Sauk sequence

The Sauk sequence is a major sedimentary rock succession, defined by Sloss (1963), that extends across the entire North American craton. It ranges in age from late Precambrian to early Ordovician and is bounded by continent-wide unconformities. The lower unconformity cuts igneous and metamorphic rocks of Precambrian age in most regions, although sedimentary rocks occur beneath it in western Montana, Idaho, Nevada and much of Utah. In some places where Precambrian sediments are present, the existance or location of the unconformity is problematical. The major stratigraphic units found beneath the Sauk sequence in the western U.S. are identified in figure 1. The unconformity that bounds the top of the sequence is overlain by rocks of Devonian or Carboniferous age in most regions of the western U.S., but by sandstones of middle Ordovician age in large regions (fig. 2).

The lower part of the Sauk sequence consists of a sandstone- and quartzite-rich interval that ranges in thickness from less than 10 feet near the transcontinental arch in western South Dakota, central Colorado, and southern New Mexico to more than 5,000 feet in parts of eastern Nevada. These sandstones and quartzites, referred to here as unit A of the Sauk sequence, are known by various names, most of which are given in figure A1 of Appendix A.

Unit A of the Sauk sequence is overlain by fine-grained sediments (shales and siltstones) almost everywhere in the area of study except in parts of southern New Mexico and central Colorado. In some areas the shales and siltstones are sufficiently prominent to comprise a stratigraphic formation, whereas in other areas they are thin and discontinuous. Some of the common names used to refer to these rocks are given in figure B1 of Appendix B. Although the shales and siltstones may not be contiguous from one region to another, they collectively represent a transition in the Sauk from predominantly sandstone below to predominantly carbonate above and are referred to as unit B for the purpose of this report.

Unit B is overlain by limestones and dolomites referred to here as unit C, the uppermost of the three lithologic units of the Sauk sequence. The carbonate rocks of unit C have been subdivided both vertically and geographically into a great many formations. As a whole, unit C ranges in thickness from a few tens of feet in parts of western South Dakota to more than 5,000 feet in parts of eastern Nevada. A highly generalized isopach map of unit C is given in figure C1 of Appendix C.

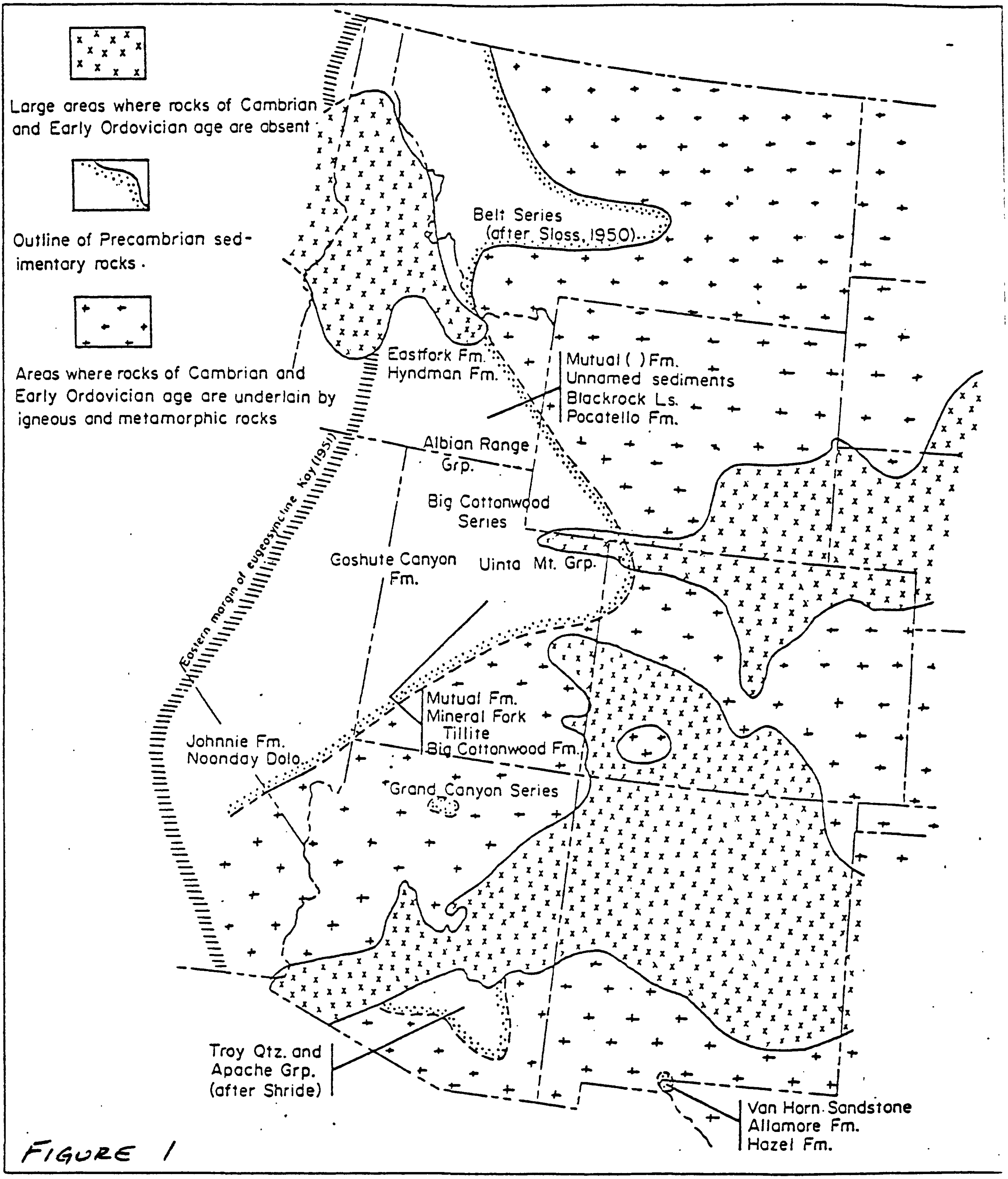
Large areas where rocks of Cambrian and Early Ordovician age are absent
Outline of Precambrian sedimentary rocks.
Areas where rocks of Cambrian and Early Ordovician age are underlain by igneous and metamorphic rocks
Belt Series (after Sloss, 1950)
Eastfork Fm.
Hyndman Fm.
Mutual ( ) Fm.
Unnamed sediments
Blackrock Ls.
Pocatello Fm.
Albian Range Grp.
Big Cottonwood Series
Goshute Canyon Fm.
Uinta Mt. Grp.
Eastern margin of eugeosyncline Kay (1951)
Mutual Fm.
Mineral Fork Tillite
Big Cottonwood Fm.
Johnnie Fm.
Noonday Dolo.
Grand Canyon Series
Troy Qtz. and Apache Grp. (after Shride)
Van Horn Sandstone
Allamore Fm.
Hazel Fm.

FIGURE 1

GENERALIZED MAP SHOWING THE DISTRIBUTION OF PRECAMBRIAN SEDIMENTARY ROCKS

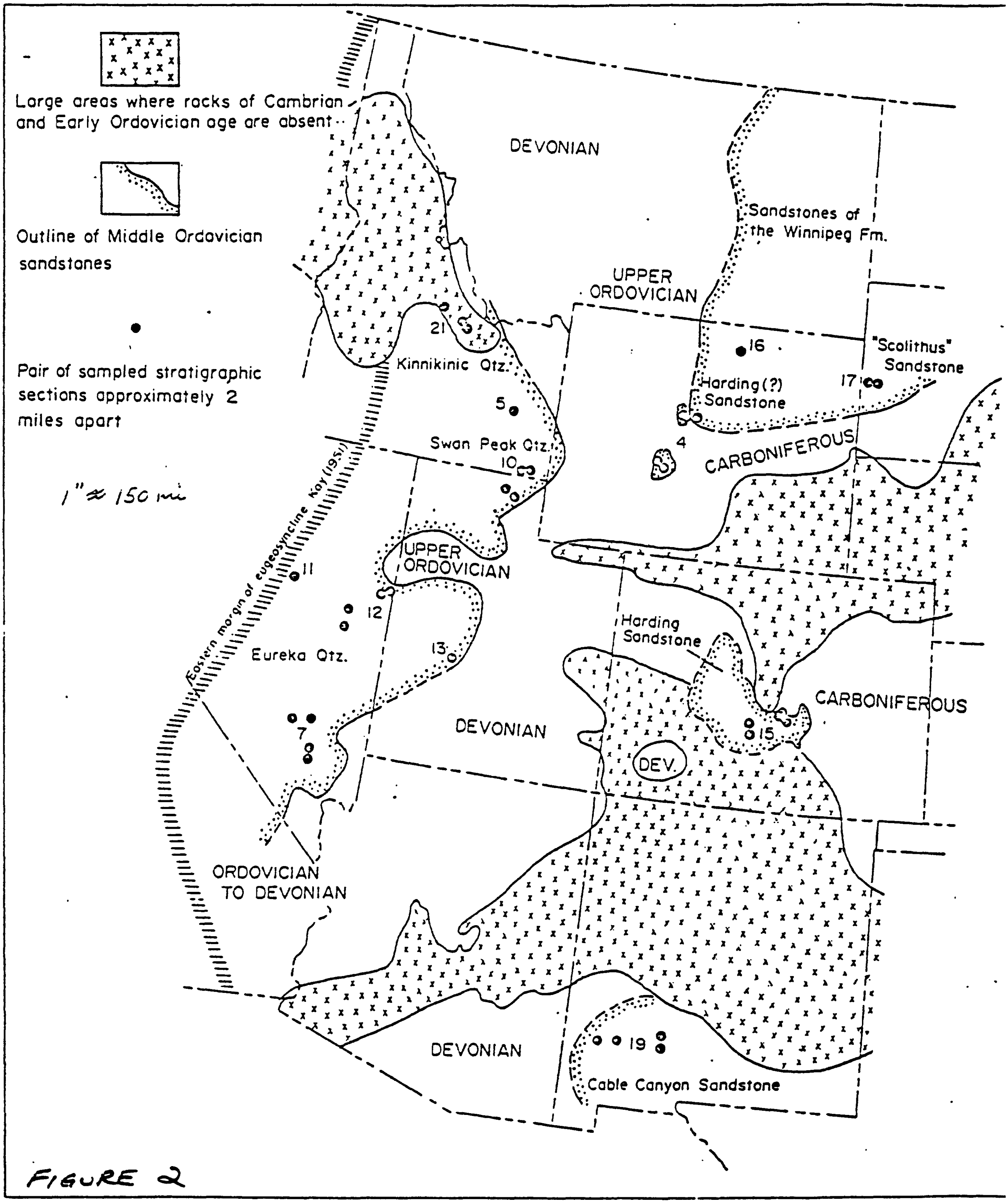
Large areas where rocks of Cambrian and Early Ordovician age are absent
Outline of Middle Ordovician sandstones
Pair of sampled stratigraphic sections approximately 2 miles apart
1" ≈ 150 mi
DEVONIAN
Sandstones of the Winnipeg Fm.
UPPER ORDOVICIAN
21
Kinnikinic Qtz.
16
"Scolithus" Sandstone
17
Harding(?) Sandstone
5
4
Swan Peak Qtz.
10
CARBONIFEROUS
Eastern margin of eugeosyncline Kay (1951)
UPPER ORDOVICIAN
11
12
Eureka Qtz.
13
Harding Sandstone
CARBONIFEROUS
7
DEVONIAN
15
DEV.
ORDOVICIAN TO DEVONIAN
DEVONIAN
19
Cable Canyon Sandstone

FIGURE 2

GENERALIZED MAP SHOWING THE DISTRIBUTION OF MIDDLE ORDOVICIAN SANDSTONES AND SYSTEMS OVERLYING UNITS OF CAMBRIAN AND EARLY ORDOVICIAN AGE

Units A, B, and C comprised three separate and distinct sampling targets, although each was sampled within the same selected regions of the western U.S.

Sampling design

The problem of determining the best sampling design for studying the geochemistry in any stratigraphic unit is two-fold. Because stratigraphic units are known to vary vertically much more intensely than geographically, we can be sure that the best sampling plan involves sampling of stratigraphic sections separated by some selected distance that is generally much greater than the separation of samples within sections. The problem is two-fold because it requires selection of (1) the optinum number of samples to take from each section and (2) the most efficient spacing between sections. Because no a-priori basis was available for either of these selections, only two samples were taken from each lithologic unit (A, B and C) in each stratigraphic section and the sections were spaced at intervals of about 2 miles up to about 250 miles.

The decision to take only two samples from each lithologic unit within each stratigraphic section regardless of thickness is justified by the fact that the proper number of samples is a function of geochemical variability within the section, not thickness. It has been noted both in the field and from the results of this study that section thickness and variability are related inversely so that if some sections were to be sampled more heavily than others, they should be those that are thin. Thus, for example, more samples should be taken from the basal sandstone of the highly variable Deadwood Formation in western South Dakota, which is only 40 to 50 feet thick, than from the Prospect Mountain Quartzite in eastern Nevada, which is more than 5,000 feet thick but relatively homogeneous. However, when the within-section variability is measured on a logarithmic scale, no correlation between variability and thickness is found, and sampling without regard to section thickness is appropriate. The two samples taken from each lithologic unit within each section provided ample data for estimating within-section variability.

Search for an optimum spacing between stratigraphic sections was undertaken by spacing sections 2 miles apart, pairs of sections 10 miles apart, areas (groups of 4 sections) 50 miles apart, and regions (2 areas) 250 miles apart. At least those distances were used as closely as the distribution of suitable outcrop allowed. The clusters of sections distributed in this manner are referred to as the major regions. In addition to the major regions, other (minor) regions were sampled by collecting two samples from only two sections 2 miles apart. The distribution of section pairs in both the major and minor sampling localities is shown in figures A1, B1, and C1 in the appendices.

The sampling design for lithologic unit A (sandstone) included 10 major and 10 minor sampling regions. That for unit B (shale and siltstone) included only 8 of the major regions and 10 minor regions. The design for unit C (carbonate) included all 10 major regions and 9 minor regions. In most regions units A, B, and C were sampled within the same stratigraphic section, although some sections were significantly offset to obtain the best possible outcrop, just as sections are commonly offset when they are measured.

The general sampling design described above was patterned after one used by Youden and Melich (1937) in sampling soils in parts of the State of New York. All of the sampling was done by the authors intermittently during the period 1962-1967.

Randomization procedures in the field and laboratory.--Formal randomization procedures were used in the selection of the two sampling points for each lithologic unit within each stratigraphic section. After at least an approximate measurement of the thickness of the lithologic unit was obtained from either the literature or measurement in the field, the points were selected from a table of uniform random numbers. The random number was taken as the stratigraphic distance, in feet, below the top or above the base of the unit. Whether the top or base was used as the reference horizon depended on exposure of the unit and convenience in the field, but the decision was made before the random numbers were drawn from the table. Stratigraphic distances below the top or above the base were not actually measured with tape or surveying equipment unless the unit was less than a few hundred feet in thickness. In most situations crude measurements were made on geologic maps or by pacing.

On arrival at the general vicinity of the stratigraphic horizon to be sampled, several different procedures were used to select the specific point from which to take the sample. If the lithologic unit was well exposed and if the outcrop surface was such that the sample could be taken anywhere in the general vicinity, a 10 to 20 foot section of tape was laid out across the strike of the bedding and a random number was drawn to identify the point along the tape at which the sample was to be taken. If a sample could not be taken at that point using an ordinary geologic pick and hammer with a heavy steel cold chisel, then we moved along strike up to 30 or 40 feet until a suitable sampling point was found. If this failed, then another random number was drawn, but this situation occurred only rarely.

If the lithologic unit was poorly exposed at the general horizon chosen to be sampled, then about a dozen or so points within an area 10 to 20 feet across where samples could be taken were identified and numbered. The point to be sampled was then chosen by means of the random number table.

No formal randomization procedures were used in the selection of stratigraphic sections to be sampled. Rather, this selection was governed by compromise in satisfying the requirements of distance between sections and the need for the best possible exposure of the three lithologic units. Only rarely was it necessary to choose between two or more sections that met these conditions equally, and in these cases ease of access provided the determining factor. In no case did lithic peculiarities of any of the units serve directly as the basis for selection.

Following completion of sampling the entire western craton, there were 200 samples from lithologic unit A, 168 from unit B, and 196 from unit C. Each of these samples was crushed to minus one-forth inch and split into two parts with an aluminum Jones-type splitter. This produced 400 samples of unit A, 336 of unit B, and 392 of unit C. The samples from each unit were then assigned numbers from tables of permuted random numbers and physically reordered in the randomized sequence. Each randomized group was then submitted to the analytical laboratory in that order so that the two splits of any one sample might have been analyzed at about the same time, or at widely separated times, or at any time in between. Thus, the two analyses of each sample are truly independent and unbiased, as are the resulting estimates of analytical precision (reproducibility).

Analysis of variance.--The analysis of variance of the laboratory data was based on the following model:

$$X_{ijklmn} = \mu + a_i + b_{ij} + c_{ijk} + d_{ijkl} + e_{ijklm} + f_{ijklmn} \quad (1)$$

where X_{ijklmn} is the $\underline{n}$th analysis of the $\underline{m}$th sample from the $\underline{l}$th section from the $\underline{k}$th pair of sections from the jth area within the $\underline{i}$th region. The term μ is the grand mean of X_{ijklmn} in the entire lithologic unit throughout the western part of the craton and the subscripted terms a_i through f_{ijklmn} represent, respectively, the regions, areas, section pairs, sections, samples, and analyses. The total variance in X_{ijklmn} is partitioned among these six sources according to:

$$\sigma_X = \sigma_a^2 + \sigma_b^2 + \sigma_c^2 + \sigma_d^2 + \sigma_e^2 + \sigma_f^2 \quad (2)$$

Because the data from both the major and minor sampling regions were used, the analysis of variance computation followed that for an unbalanced design (Anderson and Bancroft, 1952). The mean squares for testing the statistical significance of the estimated variance components (eq. 2) were:

Between regions $\rho_1\sigma_f^2 + \rho_2\sigma_e^2 + \rho_3\sigma_d^2 + \rho_4\sigma_c^2 + \rho_5\sigma_b^2 + \rho_6\sigma_a^2$ (3)

Between areas $\rho_1\sigma_f^2 + \rho_2\sigma_e^2 + \rho_3\sigma_d^2 + \rho_4\sigma_c^2 + \rho_5'\sigma_b^2$ (4)

Between section pairs $\rho_1\sigma_f^2 + \rho_2\sigma_e^2 + \rho_3\sigma_d^2 + \rho_4\sigma_c^2$ (5)

Between sections $\rho_1\sigma_f^2 + \rho_2\sigma_e^2 + \rho_3\sigma_d^2$ (6)

Between samples $\rho_1\sigma_f^2 + \rho_2\sigma_e^2$ (7)

Between analyses $\rho_1\sigma_f^2$ (8)

Because the coefficients ρ_1 , ρ_2 , ρ_3 and ρ_4 are the same for each of the mean square estimates (and equal to 1, 2, 4, and 8, respectively), the tests for the significance of σ_e^2 , σ_d^2 , σ_c^2 and σ_b^2 are all exact. However, because ρ_5 for the between regions mean square differs from ρ'_5 for the between areas mean square, the test of significance for σ_a^2 is only approximate. For unit A (10 major and 10 minor localities), ρ'_5 = 11.87 and ρ_5 = 16.00; for unit B (8 major and 10 minor localities) ρ'_5 = 11.41 and ρ_5 = 16.00; for unit C (9 major and 10 minor localities), ρ'_5 = 12.08 and ρ_5 = 16.00.

The 20 regions in which unit A was sampled (18 for unit B and 19 for unit C) are more or less equally spaced over the cratonic part of the western U.S. and could serve as localities for constructing very low resolution geochemical maps. The areas (the next lower level of the design) are very unequally spaced (as close as 50 miles and as far apart as several hundred miles) and could not be used in this way, nor could still lower elements of the sampling design such as section pairs or sections.

However, even low-resolution maps based on region means would be meaningless if the variance among regions is small compared to the variance within them. The variance among regions for any oxide or element is estimated by σ_a^2 and the variance of the region mean (for a major region) is estimated by:

$$D_m = \frac{\sigma_b^2}{2} + \frac{\sigma_c^2}{4} + \frac{\sigma_d^2}{8} + \frac{\sigma_e^2}{16} + \frac{\sigma_f^2}{32} \tag{9}$$

And for a minor region by:

$$D_m = \sigma_b^2 + \sigma_c^2 + \frac{\sigma_d^2}{2} + \frac{\sigma_e^2}{4} + \frac{\sigma_f^2}{8} \tag{10}$$

Thus, the variance mean ratio, V_m (Connor and others, 1972; Miesch, 1976a,b), which is the between-regions variance, σ_a^2, for any oxide or element divided by D_m depends on whether we refer to the major or the minor regions. Both estimates of V_m are given in tables A6, B6, and C6 in the appendices, where the maximum value represents the major regions and the minimum value represents the minor regions.

Sample numbering scheme

Each sample number (see tables A1, B1 and C1 in the appendices) consists of a one or two digit integer followed by 3 alpha characters and then the digit "1" or "2". A few of the sample numbers end with a lower case "a" which indicates that it was recollected after laboratory examination indicated that the original sample was not of the correct lithology. The beginning integer in each sample number is the region number; see figures A1, B1 and C1. The first alpha character (A through H) indicates the stratigraphic section within the locality. The second alpha character specifies the lithologic unit (A, B or C), and the third character is "R" (for rock) for all samples referred to in this report. The final integer (1 or 2) refers to the sample within the stratigraphic section, but does not indicate its relative stratigraphic position. Thus, sample 15BAR2, for example, is the second rock sample collected from lithologic unit A (sandstone) from stratigraphic section B in region 15 (central Colorado).

Methods of laboratory analysis

Constituents reported as oxides were determined by the "rapid" methods described by Shapiro (1967). Those reported as elements were determined by the emission spectrometry methods described by Havens and Myers (1973).

Summary of results

The locations of the stratigraphic sections in which the sandstones (unit A), the shales and siltstones (unit B), and the carbonates (unit C) were sampled are shown in figures A1, B1 and C1 of appendices A, B and C, respectively. More precise sampling locations are listed in tables A1, B1 and C1 which also give the general lithologies of the units at each locality, the stratigraphic positions at which the samples were taken, and references to literature that was particularly helpful in planning the field work.

The original analytical data are tabulated in figures A2, B2 and C2 in a way that allows relatively easy comparison of areas and regions as well as comparison of the independent duplicate analyses for each sample. The first page of each table gives the sample numbers and the following pages each give the data for one particular element. The letter "L" following an analytical value indicates that the concentration was estimated to be less than the lower limit of determination for the analytical method. The analytical precision for each element in each unit, as a percentage of total observed variance, is given in parentheses in the column labeled "Between analyses" of tables A6, B6, and C6.

Figures A3, B3 and C3 identify the samples that contain concentrations of one or more elements above the 90, 95, 97.5, or 99th percentiles (see tables A2, B2 and C2 for estimated percentile values). Samples are identified as having concentrations above these percentiles only if both of the duplicate analyses showed values equal to or above the respective percentile. It is readily apparent from figure A3, for example, that certain samples, sections, and section pairs tend to stand out as anomalous by this criterion. Samples from sections A, B, C and D in southwestern New Mexico (locality 19) are especially high in a wide range of elements, including Fe, Ag, Co, Pb, V and Zn. These sections are located within a few miles of the Silver City mining district. Similarly, samples from section C in the Black Hills of southwestern South Dakota (locality 17) are generally high in Pb, Ag, Cu and Zn, a possible reflection of the well known ore deposits in this vicinity. However, there are other individual samples, such as 3CAR1 from southwestern Montana and 7FAR2 from southeastern Nevada, which are high in a suite of elements but were not collected close to any known mineral deposits.

The high percentile values for unit B appear to be widely scattered, as if randomly distributed, but the samples from a few particular stratigraphic sections may be exceptions. These include both samples from section 9B (9BBR1 and 9BBR2) in south central Arizona which are high in Ag, Pb, and Zn, and samples from central Wyoming (4BBR2, 4CBR1 and 4CBR2) which are high in Mo. Five samples from southeastern Arizona (8ABR1, 8ABR2, 8BBR1, 8BBR2 and 8CBR1) are rich in Nb and several samples from western Montana (2ABR1, 2ABR2, 2BBR1 and 2BBR2) tend to be high in Cr and Ni. Other possible anomalies in unit B may become apparent from close inspection of figure B3.

The greatest concentration of anomalous values in unit C appear in northwest Arizona in samples from sections 18E, 18F, 18G and 18H (figure C3), particularly for Fe, Ti, B, V, Y, and Yb. Other anomalous samples are from the Black Hills region (sections 17B and 17C) and from southeastern Arizona (section 8G).

The median concentrations of selected oxides and elements in the 20 sampled regions are listed in tables A3, B3 and C3 and the averages (arithmetic and geometric means) are listed in tables A4, B4 and C4. The standard errors or geometric errors of the averages in table A4, B4 and C4 are given in tables A5, B5 and C5, respectively. The geometric error may be interpreted in much the same manner as the standard error. Just as the true arithmetic mean has a 68 percent liklihood of being in the range from the arithmetic mean minus one standard error to the arithmetic mean plus one standard error, the true geometric mean has a 68 percent liklihood of being in the range from the geometric mean divided by the geometric error to the geometric mean times the geometric error. Similarly, there is about a 95 percent liklihood that the true geometric mean is in the range:

$$GM/GE^2 \quad \text{to} \quad GM \times GE^2 \qquad (11)$$

where GM is the geometric mean and GE is the geometric error.

The standard error of the arithmetic mean for a region and the log of the geometric error of the geometric mean for a region were estimated by:

$$s_{\bar{x}} = \left(\frac{\sigma_b^2}{2} + \frac{\sigma_c^2}{4} + \frac{\sigma_d^2}{8} + \frac{\sigma_e^2}{16} + \frac{\sigma_f^2}{32} \right)^{1/2} \qquad (12)$$

or

$$s_{\bar{x}} = \left(\frac{\sigma_d^2}{2} + \frac{\sigma_e^2}{4} + \frac{\sigma_f^2}{8} \right)^{1/2} \qquad (13)$$

depending on whether the mean was for a major region (equation 12) or a minor region (equation 13). In these computations, σ_b^2 through σ_f^2 were estimated from data within each specific region.

The estimated total variance for selected oxides and elements and the six estimated variance components for each variable are listed in tables A6, B6 and C6. The variance components are also given as percentages of the total variance to facilitate comparisons among constituents. All of the variances, except those for SiO_2, are derived from logarithms (base 10) of the analytical data and, therefore, are estimates of proportional rather than absolute variation. The proportional variation between the values 2 and 20, for example, is identical to that between the values 200 and 2000, whereas the absolute variation between 200 and 2000 is a great deal larger than that between 2 and 20. The use of proportional variation is customary in applied geochemistry, such as when values are reported or spoken of as so many "times" threshold or background.

Several features of the variance components in table A6, B6 and C6 stand out. First, although the statistical significance of the variance between analyses (the analytical precision) cannot be tested, it is obvious that important parts of the total variance in each constituent occur between duplicate analyses. The total variance in P_2O_5 in unit A (table A6), for example, would be only 32 percent of that observed if the analytical method had perfect precision. The analytical variance comprises 20 to 60 percent of the variance in most oxides or elements.

The greatest proportion of the total variance for most constituents, however, is between samples from within stratigraphic sections. This stratigraphic variance for most constituents in unit A approaches or exceeds the variance from all other sources and generally exceeds the total geographic variance over the western U.S. Of the four geographic variance components in unit A, those between areas and between pairs of sections are generally small. The variance component between areas reflects variance on scales of 10 to 50 miles and that between section pairs reflects variance on scales of 2 to 10 miles. Therefore, all constituents considered, relatively little variation occurs on scales of 2 to 50 miles. About one-half of the constituents show statistically significant components of variance between sections - that is, variance on scales of 0 to 2 miles - and two-thirds show significant variance on scales greater than 50 miles, among regions. None of the constituents shows a sufficiently high ratio to construct a geochemical map based on the means for the minor regions (minimum V_m , table A6) and many of those for the major regions (table A6, maximum V_m) are also small. Thus, because of the low ratios, especially when the minor regions are considered, the present data are regarded as inadequate for the construction of geochemical maps for most of the constituents.

The geographic variance components in unit B (table B6) reflect a wide diversity of patterns for the various constituents with the greater part of the variance concentrated at no particular scales. Most of the V_m ratios are low, precluding the construction of meaningful geochemical maps with the present data.

The geographic variance components for unit C (table C6) show that the carbonate rocks tend to be compositionally similar over distances of up to about 10 miles; variance components for sections and pairs of sections tend to be small and statistically non-significant. The largest geographic variance tends to be between areas 10 to 50 miles across. Nevertheless, although many maps could be drawn if sampling localities were spaced at 10 mile intervals, relatively stable maps are possible for only a few oxides (SiO_2, Al_2O_3, FeO, K_2O, P_2O_5) using the data on hand.

Conclusions

The geographic variance components are summarized graphically in figures A4 (unit A), B4 (unit B) and C4 (unit C) as cumulative-variance curves. The curves can be used to theorize about the efficiency and effectiveness of various possible sampling plans that might be devised.

To illustrate, we might consider some various possible plans if we wanted to map the geographic variation of SiO_2 in unit A (sandstone). Figure 4A shows that in order to map close to 100 percent of the geographic variation we would have to space the sampling localities at a distance near zero - that is, almost immediately adjacent to each other. Each widening of the sampling interval would cause some amount of the geographic variance to be lost. Whatever the sampling interval, the sampling within each locality (within stratigraphic sections) would have to be designed to effectively reduce the between sample (stratigraphic) and analytical variance components as estimated in table A6. They would have to be reduced sufficiently to raise the V_m ratio to at least unity.

If we were willing to settle for mapping less than all of the geographic variance in SiO2 we could consider spacing the localities at, say, 2 miles and map about 80 percent. Furthermore, if the spacing were widened to 10 mile intervals we could map about 45 percent of the variance. However, widening the interval from 10 miles to 50 miles would reduce the variance to be mapped from 45 percent down only to about 39 percent. Clearly, spacing the localities at intervals of 10 miles is only slightly better than spacing them at 50 miles and, considering the much greater cost, would appear to be highly inefficient. This appears to be true not only for SiO2, but for a good many of the chemical constituents in unit A.

One principal conclusion from the survey, thus, is that low-resolution, but perhaps useful geochemical maps of the sandstones of the Sauk sequence (unit A) could be made for many of the constituents if additional samples were collected and analyzed. A useful geochemical map is regarded as one that is statistically stable (reproducible) and one that describes a substantial portion of the total geographic variability. The cumulative-variance curves indicate that a 50-mile interval would be the most efficient spacing for the sampling localities; any closer interval would be not only impractical but wasteful. With a 50-mile interval, approximately one-third to one-half or more of the geographic variance in 16 of 24 constituents could be described (figure A4).

Sampling within localities of this 50-mile spacing would have to be designed using the variance component estimates in table A6 and trial computations of V_m according to:

$$V_m = \sigma_a^2 \Big/ \left(\frac{\sigma_b^2}{n_b} + \frac{\sigma_c^2}{n_b n_c} + \frac{\sigma_d^2}{n_b n_c n_d} + \frac{\sigma_e^2}{n_b n_c n_d n_e} + \frac{\sigma_f^2}{n_b n_c n_d n_e n_f} \right. \qquad (14)$$

where n_b = number of localities 50 miles apart

n_c = number of pairs of sections 10 miles apart

n_d = number of sections 2 miles apart

n_e = number of samples per section

n_f = number of analyses of each sample

The larger the value of V_m the better, but it certainly should be no less than unity according to both experiments by R. R. Tidball and theoretical considerations (see Connor and others, 1972). It will be apparent from equation 13 that increasing n_b will be more effective than increasing n_c , n_d , n_e or n_f , and that increasing n_c will be more effective than increasing n_d , n_e or n_f , and so forth. However, the field expenses involved often will be far less if n_e or n_f are increased rather than n_b , n_c or n_d . It may also be more effective to use a more precise (reproducible) analytical method than to increase n_f , if the analytical variance is an important part of the within locality variance.

The best overall design for a final sampling plan will depend on the objectives of the sampling and the specific estimated valus of σ_a^2 through σ_f^2 for those geochemical constituents of interest. Perhaps the greatest obstacle to the preparation of geochemical maps of the Sauk sequence would be the absence of outcrops suitable for sampling at the proposed 50-mile interval.

Many of the constituents in unit B (shale, fig. 4B) exhibit no appreciable variance at 50 mile intervals and geochemical maps of those constituents would be unstable (non-reproducible) and uninformative. Some of the cumulative-variance curves for the major oxides, however, such as SiO_2, Fe_2O_3, FeO and MgO, and some of the minors such as B, Ce, Yb, Sr and Y, exhibit the same flatness between 10 and 50 miles as do so many of the constituents in unit A, and these could be used to construct geochemical maps based on a 50-mile spacing of sampling localities. Again, sampling within localities would have to be sufficient to raise the V_m ratio to at least one.

The cumulative-variance curves for constituents in unit C (carbonate, fig. C4) are remarkably similar to each other, compared with the curves for units A and B, which suggests a lesser diversity in the factors that have controlled their variation. The most prominent flattening of the curves, however, occurs not between 10 and 50 miles as for unit A, but between 2 and 10 miles. A sampling locality spacing of 50 miles would capture some parts of the total variance, but sampling at 10 miles would clearly be better if it could be accomplished. Lessening the interval from 10 to 2 miles would cost a great deal more, and would lead to essentially no improvement in the geochemical maps.

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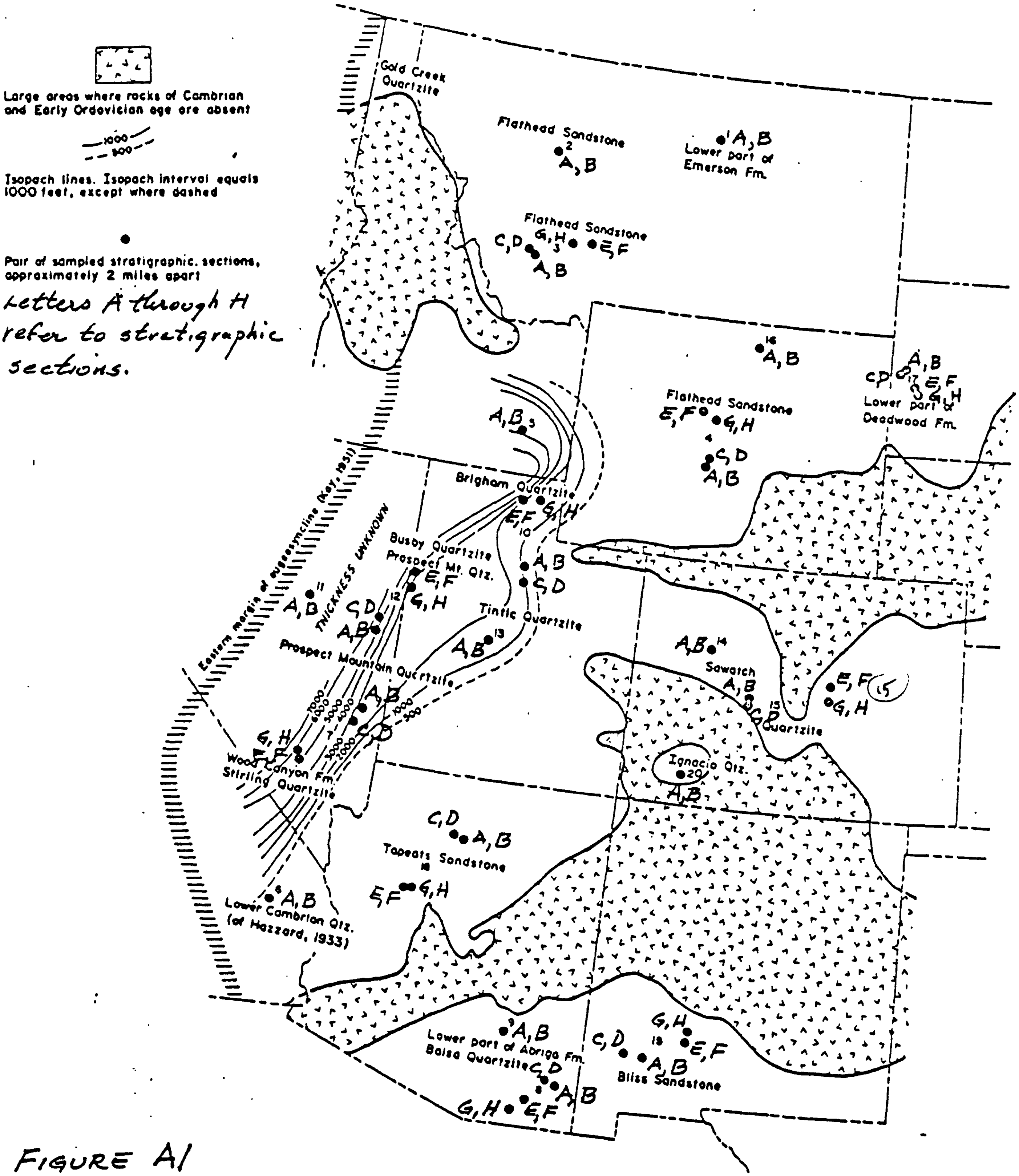
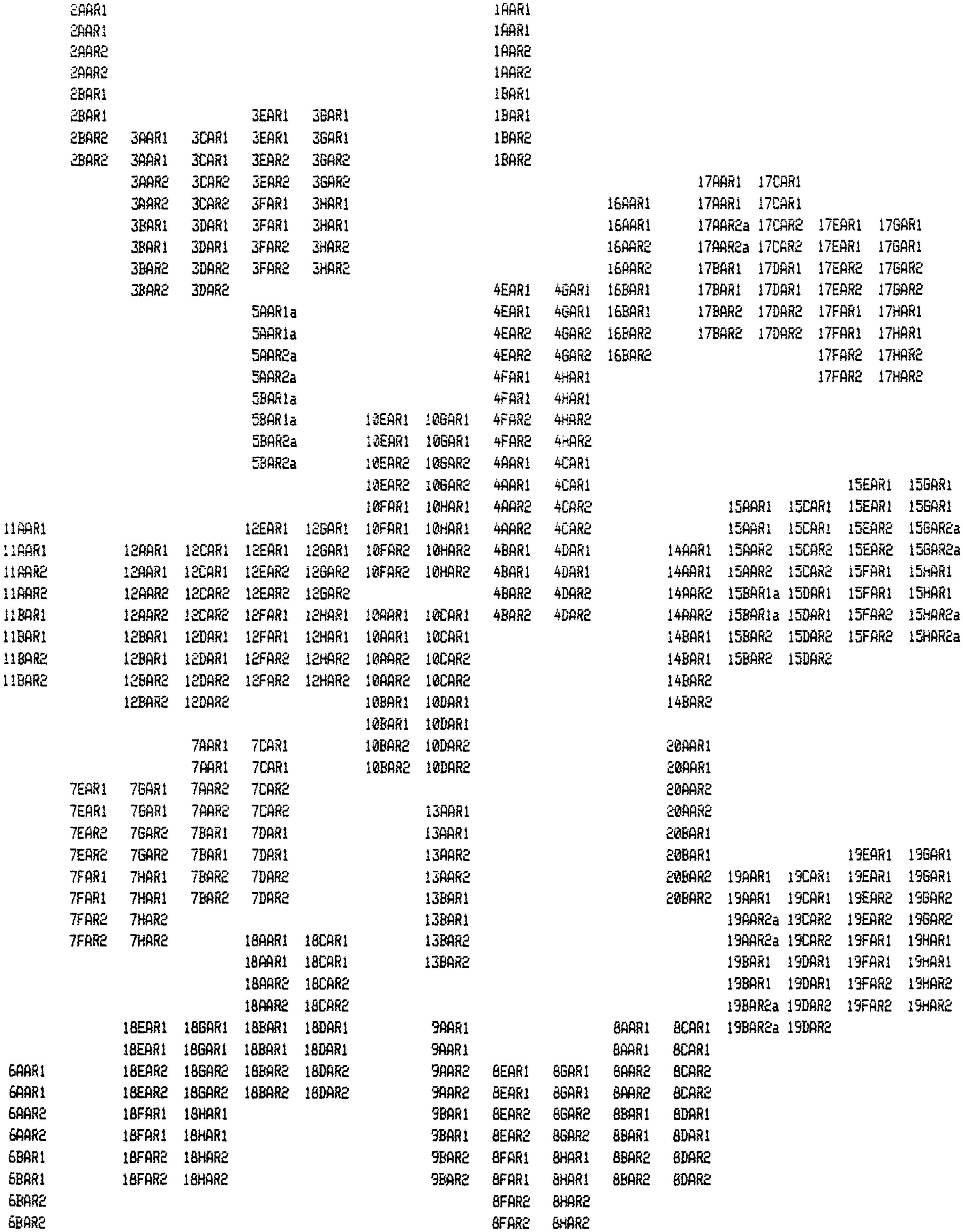
APPENDIX A


Large areas where rocks of Cambrian and Early Ordovician age are absent
1000
500
Isopach lines. Isopach interval equals 1000 feet, except where dashed
Pair of sampled stratigraphic sections, approximately 2 miles apart
Gold Creek Quartzite
Flathead Sandstone
2
A, B
1 A, B
Lower part of Emerson Fm.
Flathead Sandstone
C, D
G, H
3
E, F
A, B
16
A, B
A, B
C, D
17
E, F
G, H
Lower part of Deadwood Fm.
Flathead Sandstone
E, F
G, H
4
C, D
A, B
A, B
5
Eastern margin of eugeosyncline (Kay, 1951)
THICKNESS UNKNOWN
Brigham Quartzite
E, F
G, H
10
Busby Quartzite
Prospect Mt. Qtz.
E, F
G, H
A, B
C, D
Tintic Quartzite
11
A, B
12
C, D
A, B
13
A, B
Prospect Mountain Quartzite
A, B
C, D
7000
6000
5000
4000
3000
2000
1000
500
G, H
E, F
Wood Canyon Fm.
Stirling Quartzite
A, B
14
Sawatch
A, B
15
C, D
Quartzite
E, F
G, H
15
Ignacio Qtz.
20
A, B
C, D
A, B
Tapeats Sandstone
18
E, F
G, H
6
A, B
Lower Cambrian Qtz. (of Hazzard, 1933)
9
A, B
Lower part of Abrigo Fm.
Bolsa Quartzite
C, D
8
A, B
G, H
E, F
C, D
19
G, H
E, F
A, B
Bliss Sandstone

Letters A through H refer to stratigraphic sections.

FIGURE A1

GENERALIZED ISOPACH MAP OF BASAL CAMBRIAN SANDSTONES SHOWING LOCATIONS OF SAMPLED STRATIGRAPHIC SECTIONS AND NAMES OF GEOLOGIC UNITS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2AAR2
2AAR2
2BAR1
2BAR1
2BAR2
2BAR2
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3BAR1
3BAR1
3BAR2
3BAR2
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3CAR1
3CAR2
3CAR2
3DAR1
3DAR1
3DAR2
3DAR2
3EAR1
3EAR1
3EAR2
3EAR2
3FAR1
3FAR1
3FAR2
3FAR2
3GAR1
3GAR1
3GAR2
3GAR2
3HAR1
3HAR1
3HAR2
3HAR2
1AAR1
1AAR1
1AAR2
1AAR2
1BAR1
1BAR1
1BAR2
1BAR2
17AAR1
17AAR1
17AAR2a
17AAR2a
17BAR1
17BAR1
17BAR2
17BAR2
17CAR1
17CAR1
17CAR2
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6BAR2
6BAR2

Figure A2.-- Chemical data on sandstones from the Sauk sequence arranged schematically according to sampling locations - sample numbers (See table A1 and figure A1 for sampling locations).

```
        87.1                                                    92.5
        86.4                                                    92.5
        93.0                                                    95.6
        90.5                                                    95.6
        91.8                                                    97.8
        93.7                    94.7    93.7                    96.7
        93.8    97.4    64.6    94.6    95.1                    96.7
        93.7    98.3    65.4    95.1    78.3                    97.2
                95.6    91.2    95.3    79.0                                                90.9    90.6
                95.6    90.6    97.8    97.2                                    93.9        92.5    92.1
                97.6    96.3    96.9    96.6                                    94.9        92.1    96.1    94.2    79.1
                96.4    96.5    95.9    96.2                                    97.6        92.1    95.1    96.1    77.4
                97.5    95.5    96.1    96.7                                    96.8        93.6    94.2    79.6    78.4
                97.1    95.7                            82.6    94.0    74.2        92.7    94.2    79.6    75.4
                                93.2                            81.2    93.3    76.5        63.0    94.9    93.7    96.2
                                94.1                            95.8    97.4    98.1        66.7    95.6    93.2    95.5
                                94.2                            95.7    96.8    97.0                        70.2    94.5
                                93.2                            97.2    95.4                                70.0    94.9
                                94.9                            96.2    94.4
                                94.9            97.6    93.5    94.6    96.2
                                95.3            98.7    92.8    94.1    96.1
                                95.9            95.9    96.6    92.4    93.7
                                                95.5    96.7    92.2    94.4                                    97.7    91.4
                                                94.6    97.1    89.7    95.0                    75.4    93.5    97.0    91.5
95.7                            94.2    94.5    93.3    98.6    88.6    96.4                    77.4    92.7    97.5    96.3
95.6            97.8    94.2    93.6    94.9    94.2    97.4    95.0    94.3            82.3    62.0    86.7    96.8    96.6
90.6            98.1    93.2    93.7    93.3    93.9    98.2    95.2    93.8            80.8    62.4    86.1    95.7    76.2
89.6            96.6    92.5    93.0    92.7                    93.7    94.6            96.5    73.3    97.5    96.7    79.0
95.3            96.4    97.7    88.9    94.5    93.1    95.2    94.6    94.1            96.4    73.3    97.3    95.6    83.9
95.0            95.6    94.1    89.7    94.4    93.6    96.3                            95.6    84.2    96.6    96.0    83.9
97.0            96.3    94.1    97.2    93.7    97.3    97.2                            95.6    84.5    98.1
97.4            92.8    97.7    96.7    92.8    97.7    97.6                            96.7
                52.7    97.1                    97.7    96.1                            97.3
                                                97.8    96.3
                        95.6    94.7            96.6    95.4                            90.1
                        95.6    95.5            98.1    95.8                            89.4
        91.1    96.7    94.6    96.2                                                    86.4
        92.3    97.5    94.7    96.6                    96.4                            85.4
        84.4    89.8    96.8    85.2                    96.4                            91.5
        84.5    91.1    96.7    85.0                    98.2                            91.4                    77.4    77.4
        85.0    86.9    97.0    95.7                    97.2                            90.3    70.3    77.7    72.2    74.3
        84.5    87.0    97.7    96.5                    96.7                            90.2    72.6    76.5    88.3    89.9
        66.0    94.7                                    96.1                                    65.3    83.5    86.5    88.6
        66.0    93.6            96.6    93.6            96.4                                    66.4    81.5    87.0    93.6
                                96.6    94.1            95.2                                    58.8    82.9    89.0    92.7
                                89.4    91.8                                                    65.8    78.8    82.2    81.1
                                89.4    92.4                                                    81.5    78.9    84.9    82.7
                96.2    90.6    97.6    94.7            96.7                    61.6    91.4    79.8    79.1
                96.3    89.7    97.1    95.6            97.5                    64.3    90.2
96.7            94.6    95.1    97.6    95.6            90.1    89.3    93.7    89.4    59.6
96.0            94.9    95.7    96.7    96.1            87.6    89.9    95.1    88.3    62.8
86.1            93.2    93.9                            86.9    86.0    90.2    84.7    94.9
86.1            93.5    93.7                            87.5    84.8    89.3    85.0    94.0
81.5            93.6    92.3                            89.4    87.3    82.1    90.1    97.1
80.8            93.2    93.9                            90.2    87.7    82.8    89.2    96.1
89.5                                                            96.9    83.9
89.0                                                            95.7    83.8
```

Figure A2.--Continued--SiO2 (percent)

	0.56							0.84											
	0.69							0.76											
	3.40							1.20											
	4.60							1.40											
	0.71							0.90											
	0.95			0.73	2.00			0.78											
	1.00	0.75	15.50	1.00	1.80			0.46											
	1.00	0.84	15.50	1.60	5.80			0.77											
		1.10	2.50	1.80	5.30							0.28		0.89					
		1.20	2.80	0.84	0.69					0.75		0.27		1.70					
		0.45	0.48	0.65	0.56					0.85		1.60		0.45		2.50		0.28	
		0.37	0.38	1.20	1.10					0.74		1.70		0.55		0.94		0.37	
		0.45	0.67	1.50	1.50					0.56		0.19		0.78		0.18		0.46	
		0.88	0.70					6.20	1.80	0.59		0.67		0.68		0.45		0.39	
				1.90				6.80	1.90	0.45		0.20		1.10		0.84		0.66	
				2.10				1.10	0.66	0.45		0.46		0.29		1.10		1.50	
				1.60				0.69	0.76	0.27						0.46		0.39	
				1.70				0.66	1.40							0.94		0.11	
				1.40				0.48	1.60										
				1.80		0.46	2.50	1.10	1.10										
				1.10		0.27	2.60	1.30	1.10										
				1.20		1.60	1.10	2.30	4.20										
						1.50	0.78	2.00	1.60								0.19		3.40
						2.10	0.38	3.20	1.50				4.30		2.50		0.19		3.70
1.80				2.10	1.50	2.50	0.20	4.00	1.30				3.80		2.40		0.27		0.57
1.60		0.27	2.80	2.30	1.60	2.90	0.19	1.30	2.00		0.38		2.60		1.90		1.00		0.67
5.20		0.39	2.80	2.70	3.10	2.60	0.58	1.80	2.20		0.38		3.20		1.80		1.20		1.60
5.70		1.40	3.60	2.80	2.80			2.30	1.60		0.78		5.30		0.49		1.20		1.80
1.70		0.86	2.70	2.60	1.70	2.40	1.40	2.10	1.90		0.93		5.30		0.77		0.67		2.00
1.90		1.00	2.50	3.20	1.70	2.20	1.20				1.30		2.30		0.65		0.69		2.10
0.48		1.10	2.60	0.89	3.20	0.38	0.19				0.94		2.40		1.00				
0.56		3.00	0.66	2.10	3.00	0.20	0.27				1.50								
		3.30	0.67			0.58	1.20				0.90								
						0.48	1.80												
			1.20	2.00		1.20	1.40				4.00								
			1.20	2.00		0.38	1.70				4.10								
	2.80	1.60	1.80	1.60							5.30								
	2.70	0.78	1.90	1.00			0.56				5.50								
	6.60	3.60	0.67	7.30			0.77				3.00								
	6.50	3.40	0.75	6.90			0.69				3.10						1.70		0.84
	6.70	4.80	0.69	1.40			0.56				2.70		1.20		7.50		1.60		0.98
	6.70	4.50	0.99	1.00			1.20				2.60		1.20		8.00		0.38		2.20
	8.80	2.10					1.50						8.00		0.38		0.58		2.40
	8.90	2.40		1.00	2.50		1.30						7.80		0.58		3.20		2.00
				1.10	2.50		1.20						0.60		0.46		2.80		2.30
				4.10	2.50								1.20		0.69		1.00		2.20
				3.90	2.40								0.91		1.70		0.69		2.10
		0.75	3.40	0.66	1.20		0.61			13.00	1.20		1.40		1.20				
		1.30	3.80	0.46	1.00		0.40			13.90	1.40								
1.60		2.00	1.20	0.70	1.10		4.20	3.70	0.60	5.30	0.86								
0.87		1.80	1.00	0.66	1.20		4.30	3.80	0.65	5.10	0.84								
4.90		2.30	1.90				4.60	7.00	4.40	6.40	1.70								
5.20		2.20	2.10				4.60	7.40	4.30	7.60	1.70								
7.20		2.70	2.60				4.00	6.20	7.10	5.00	0.84								
8.20		2.60	2.40				4.20	6.40	6.90	5.20	0.91								
3.40								1.00	7.80										
3.50								1.50	7.20										

Figure A2.--Continued--Al2O3 (percent)

```
        1.60                                                    0.09
        2.00                                                    0.01L
        0.08                                                    0.42
        0.53                                                    0.24
        0.61                                                    0.01L
        0.18                    0.42    0.05                    0.04
        0.48    0.06    7.90    0.20    0.29                    0.01L
        0.93    0.06    8.20    0.70    2.40                    0.11
                1.00    1.20    0.33    2.30                                1.00    3.00
                0.51    1.10    0.04    0.01L                           1.00        0.51    2.60
                0.47    0.02    0.02    0.01L                           0.78        0.28    1.40    0.01L   0.40
                0.64    0.02    0.01L   0.01L                           0.16        0.23    1.50    0.01L   0.60
                0.11    0.01L   0.09    0.05                            0.28        0.44    3.10    0.52    0.27
                0.21    0.01L                           1.00    0.18    1.40        0.40    2.40    0.46    0.63
                                0.76                    1.30    0.36    1.20        3.70    2.30    0.17    0.21
                                0.61                    0.12    0.01L   0.07        3.50    1.90    0.17    0.09
                                1.80                    0.08    0.01L   0.04                        0.80    0.38
                                2.10                    0.34    0.11                                0.91    0.66
                                0.77                    0.10    0.01L
                                0.66            0.14    0.67    1.20    0.01L
                                0.17            0.01L   0.88    1.60    0.05
                                0.17            0.01L   0.02    1.20    0.45
                                                0.34    0.02    0.61    0.21                                    0.01L   0.07
                                                0.01L   0.04    2.60    0.04                    0.53    0.01L   0.04    0.05
0.01L                           0.39    0.73    0.26    0.01L   2.70    0.01L                   0.69    0.25    0.01L   0.01
0.10            0.14    0.41    0.55    0.92    0.01L   0.02    0.08    0.01L           0.16    0.14    0.46    0.21    0.01
0.21            0.01L   0.26    0.31    0.34    0.12    0.01L   0.21    0.01L           0.01L   0.13    0.24    0.01L   3.90
0.69            0.09    1.60    0.71    0.50                    0.14    0.02            0.35    0.19    0.01L   0.01    3.40
0.03            0.01L   0.86    3.50    0.69    0.09    0.01L   0.19    0.01L           0.05    0.11    0.01L   1.40    0.06
0.12            0.13    0.36    3.30    0.38    0.14    0.02                            0.24    0.01L   0.41    1.60    0.02
0.32            0.10    0.25    0.31    0.01L   0.06    0.01L                           0.02    0.01L   0.47
0.01L           0.01L   0.01L   0.12    0.01L   0.01L   0.05                            0.02
                0.35    0.01L                   0.01L   0.01L                           0.01L
                                                0.05    0.01L
                        0.27    0.02            0.22    0.01L                           0.22
                        0.26    0.01L           0.01L   0.27                            0.29
        1.40    0.06    0.22    0.32                                                    1.10
        1.10    0.18    0.14    0.54                    0.66                            1.10
        1.90    2.60    0.29    0.75                    0.31                            0.37
        1.90    2.80    0.01L   1.10                    0.05                            0.45                    9.70    0.68
        2.30    4.80    0.38    0.01                    0.01L                           0.41    7.90    5.00    9.60    0.70
        2.30    4.80    0.06    0.17                    0.06                            0.87    8.00    5.20    1.80    1.80
        8.70    0.20                                    0.01L                                  10.60    2.10    2.10    1.80
        5.10    0.46            0.16    0.31            0.01L                                  10.50    3.60    4.10    0.70
                                0.01L   0.04            0.28                                    3.20    0.90    3.60    0.82
                                1.50    0.01L                                                   2.30    1.40    3.10    0.59
                                1.70    0.01L                                                   1.50    2.20    3.10    0.73
                0.85    1.30    0.39    0.48            0.10                   15.30    0.26    1.50    2.40
                1.30    1.30    0.01L   0.46            0.08                   12.30    0.30
0.09            0.01L   0.40    0.01L   1.00            1.50    2.60    0.54    1.10    0.45
0.32            0.01L   0.27    0.24    0.49            1.80    2.60    0.52    0.68    0.51
1.00            1.10    0.74                            2.20    0.01    0.12    2.90    0.25
1.40            0.55    0.51                            2.00    0.20    0.10    3.00    0.33
1.10            0.42    0.93                            0.85    0.01L   4.00    0.76    0.01L
0.75            0.73    0.75                            0.71    0.01L   4.10    0.92    0.10
1.00                                                            0.01L   1.10
0.73                                                            0.01L   1.30
```

Figure A2.--Continued--Fe203 (percent)

```
        0.36                                                    0.06
        0.38                                                    0.10
        0.06                                                    0.08
        0.04                                                    0.08
        0.02L                                                   0.04
        0.06                    0.08    0.26                    0.06
        0.02L   0.08    0.66    0.06    0.10                    0.04
        0.02    0.04    0.60    0.10    0.16                    0.04
                0.06    0.12    0.24    0.16                                                0.06    0.02L
                0.06    0.20    0.06    0.04                                        0.08        0.14    0.02L
                0.10    0.08    0.08    0.04                                        0.04        0.12    0.04    0.08    0.06
                0.06    0.08    0.26    0.14                                        0.08        0.10    0.06    0.02    0.06
                0.04    0.16    0.10    0.08                                        0.06        0.04    0.08    0.02L   0.08
                0.04    0.18                                    0.74    0.08    0.02L       0.04    0.06    0.04    0.06
                                0.20                            0.76    0.04    0.02L       0.02L   0.12    0.08    0.04
                                0.26                            0.20    0.10    0.08        0.02L   0.24    0.08    0.06
                                0.16                            0.04    0.08    0.06                        0.02    0.02L
                                0.14                            0.06    0.08                                0.06    0.02
                                0.12                            0.06    0.08
                                0.14            0.06    0.16    0.08    0.04
                                0.09            0.12    0.12    0.08    0.06
                                0.14            0.24    0.08    0.06    0.08
                                                0.28    0.04    0.16    0.10                                    0.05    0.06
                                                0.12    0.06    0.10    0.06                    0.28    0.14    0.06    0.02L
0.10                            0.16    0.12    0.12    0.06    0.10    0.08                    0.16    0.14    0.12    0.12
0.08            0.12    0.16    0.14    0.16    0.09    0.08    0.04    0.08            0.12    0.16    0.24    0.08    0.04
0.14            0.09    0.14    0.36    0.12    0.12    0.06    0.04    0.12            0.14    0.20    0.34    0.04    0.20
0.14            0.16    0.24    0.18    0.18                    0.04    0.08            0.06    0.14    0.12    0.04    0.14
0.12            0.12    0.22    0.22    0.08    0.08    0.10    0.10    0.06            0.08    0.14    0.18    0.04    0.04
0.16            0.08    0.20    0.10    0.22    0.08    0.14                            0.08    0.12    0.08    0.02    0.08
0.12            0.02    0.24    0.04    0.10    0.08    0.12                            0.08    0.08    0.12
0.10            0.18    0.12    0.14    0.08    0.06    0.08                            0.08
                0.12    0.09                    0.09    0.08                            0.13
                                                0.08    0.09
                        0.28    0.08            0.08    0.38                            0.08
                        0.20    0.09            0.08    0.52                            0.08
        0.02    0.04    0.12    0.12                                                    0.10
        0.06    0.06    0.16    0.10                    0.04                            0.10
        0.46    0.24    0.10    0.32                    0.06                            0.09
        0.56    0.20    0.10    0.24                    0.04                            0.08                    0.84    0.62
        0.20    0.26    0.06    0.14                    0.06                            0.10    0.28    0.02L   0.88    0.70
        0.30    0.28    0.08    0.12                    0.04                            0.10    0.20    0.02L   0.20    0.94
        0.29    0.10                                    0.12                                    0.96    0.12    0.16    1.20
        3.00    0.10            0.08    0.08            0.12                                    0.84    0.02L   0.20    0.16
                                0.12    0.12            0.12                                    0.20    0.18    0.16    0.12
                                0.16    0.12                                                    0.16    0.12    0.24    0.12
                                0.12    0.10                                                    0.22    0.64    0.12    0.12
                0.08    0.10    0.10    0.04            0.08                    1.70    0.14    0.26    0.84
                0.12    0.06    0.06    0.08            0.02L                   0.20    0.20
0.10            0.08    0.06    0.18    0.06            0.08    0.26    0.16    0.16    0.20
0.08            0.08    0.02L   0.06    0.08            0.04    0.28    0.16    0.28    0.14
1.50            0.08    0.06                            0.08    0.10    0.08    0.60    0.06
1.40            0.10    0.32                            0.04    0.08    0.16    0.60    0.12
2.40            0.16    0.06                            0.06    0.04    0.24    0.14    0.16
2.50            0.08    0.12                            0.16    0.04    0.26    0.16    0.06
1.60                                                            0.09    0.16
1.70                                                            0.26    0.14
```

Figure A2.—Continued--FeO (percent)

```
        0.7                                                     0.05L
        0.4                                                     0.6
        0.2                                                     0.3
        0.3                                                     0.4
        0.4                                                     0.2
        0.5                     0.4     0.5                     0.2
        0.6     0.0     1.6     0.4     0.1                     0.5
        0.5     0.05L   1.2     0.4     0.5                     0.1
                0.1     0.6     0.5     1.1                                             1.0     0.7
                0.6     0.7     0.4     0.1                                     0.6         0.4     0.3
                0.2     0.6     0.3     0.5                                     0.1         0.3     0.2     0.4     0.5
                0.1     0.5     0.7     0.5                                     0.05        0.2     0.2     0.1     0.0L
                0.05L   0.7     0.1     0.1                                     0.1         0.1     0.1     0.8     0.4
                0.1     0.4                                     1.2     0.3     0.5         0.2     0.2     0.6     0.7
                                0.3                             0.8     0.3     0.7         0.4     0.1     0.6     0.3
                                0.1                             0.4     0.1     0.1         2.8     0.3     0.6     0.3
                                0.1                             0.8     0.05L   0.5                         1.8     0.5
                                0.1                             0.3     0.05L                               2.1     0.1
                                0.1                             0.4     0.5
                                0.1             0.05L   0.6     0.5     0.1
                                0.1             0.2     0.4     0.1     0.3
                                0.1             0.7     0.5     0.1     0.05L
                                                0.1     0.4     0.5     0.4                                     0.6     0.05L
                                                0.5     0.2     0.4     0.4                     3.1     0.5     0.5     0.1
0.1                             0.4     0.6     0.5     0.1     0.1     0.5                     2.8     0.6     0.5     0.2
0.5             0.05L   0.1     0.6     0.5     0.1     0.4     0.6     0.1             2.3     7.2     1.3     0.05L   0.1
0.2             0.2     0.5     0.05L   0.1     0.2     0.1     0.1     0.5             3.1     5.5     2.4     0.05L   0.4
0.7             0.05L   0.3     0.05L   0.7                     0.05L   0.05L           0.3     2.1     0.05L   0.05L   0.4
0.5             0.5     0.5     1.0     0.5     0.1     0.7     0.3     0.1             0.1     2.3     0.1     0.1     0.5
0.4             0.4     0.1     0.1     0.5     0.2     0.3                             0.05L   0.9     0.1     0.2     0.7
0.5             0.4     0.4     0.1     0.2     0.5     0.6                             0.2     0.1     0.1
0.2             6.8     0.5     0.1     0.6     0.7     0.05L                           0.3
                0.05L   0.5                     0.2     0.1                             0.2
                                                0.3     0.1
                        0.6     0.5             0.4     0.5                             0.1
                        0.5     0.1             0.05L   0.4                             0.1
        0.05L   0.3     0.5     0.1                                                     0.1
        0.5     0.3     0.3     0.3                     0.2                             0.1
        0.4     0.5     0.5     0.4                     0.5                             0.1
        1.0     0.2     0.7     0.2                     0.1                             0.1                     0.2     0.2
        0.1     0.1     0.1     0.05L                   0.1                             0.1     2.7     0.7     1.0     0.4
        0.1     0.1     0.1     0.1                     0.5                             0.1     3.2     0.1     0.6     1.7
        1.4     0.6                                     0.05L                                   1.6     2.5     0.6     2.0
        2.0     0.1             0.4     0.05L           0.4                                     1.6     2.7     0.6     0.5
                                0.1     0.4             0.4                                     0.6     2.0     0.3     0.1
                                0.3     0.4                                                     0.1     3.0     0.5     1.0
                                0.2     0.1                                                     0.5     3.7     0.5     0.1
                0.2     0.4     0.2     0.6             0.1                     0.1     0.7     1.0     3.4
                0.1     0.1     0.5     0.1             0.4                     0.5     1.3
0.1             0.7     0.3     0.2     0.1             0.2     0.1     1.0     0.2     5.0
0.05L           0.6     0.6     0.1     0.1             0.6     0.05L   0.5     0.4     3.7
0.9             0.1     0.05L                           0.2     0.3     0.3     0.5     0.4
0.3             0.4     0.2                             0.05L   0.0     0.6     0.1     0.1
1.1             0.4     0.4                             0.6     0.1     0.4     0.1     0.1
1.0             0.5     0.1                             0.1     0.1     0.4     0.3     0.1
0.7                                                             0.2     0.4
0.4                                                             0.05L   0.6
```

Figure A2.--Continued--MgO (percent)

	4.70							2.30											
	3.60							2.20											
	0.33							0.25											
	0.22							0.10											
	2.50							0.02											
	2.00			1.30	0.10			0.02L											
	1.40	0.10	0.26	1.50	0.25			0.12											
	1.50	0.15	0.15	0.18	4.30			0.05											
		0.15	0.95	0.05	4.90							2.20		0.42					
		0.25	1.20	0.15	0.10					0.81		1.90		0.65					
		0.25	0.32	0.15	0.02					0.56		1.40		0.38		1.10		11.10	
		0.24	0.35	0.22	0.02					0.20		1.40		0.58		0.71		12.50	
		0.35	0.89	0.10	0.08					0.13		2.50		0.19		11.50		10.60	
		0.21	0.92					1.00	0.25	11.60		2.60		0.10		10.90		11.80	
				0.43				1.70	0.18	12.20		16.40		0.21		1.50		0.90	
				0.39				0.32	0.29	0.30		12.00		0.05		1.60		0.45	
				0.35				0.20	0.18	0.15						13.00		1.30	
				0.31				0.48	0.20							13.00		1.50	
				0.41				0.26	0.18										
				0.45		0.02L	0.04	0.42	0.10										
				0.42		0.20	0.10	0.14	0.15										
				0.43		0.03	0.32	0.57	0.25										
						0.20	0.18	0.22	0.05								0.02		0.35
						0.05	0.15	0.10	0.43				5.90		0.44		0.10		0.31
0.10				0.04	0.24	0.18	0.03	0.28	0.08				5.70		0.62		0.02		0.40
0.05		0.10	0.25	0.23	0.02L	0.07	0.10	0.05	0.02		6.30		10.60		4.70		0.15		0.32
0.04		0.02	0.05	0.25	0.08	0.25	0.04	0.08	0.02		7.30		10.40		4.20		0.05		8.30
0.05		0.20	0.38	0.29	0.25			0.15	0.15		0.13		7.60		0.02		0.02		8.00
0.15		0.05	0.27	0.12	0.05	0.05	0.15	0.30	0.10		0.26		7.60		0.21		0.22		5.80
0.12		0.15	0.05	0.02	0.10	0.08	0.18				0.28		6.20		0.10		0.38		5.80
0.15		0.08	0.17	0.08	0.22	0.15	0.27				0.38		5.70		0.10				
0.29		0.02	0.10	0.02L	0.15	0.10	0.16				0.32								
		0.05	0.02			0.12	0.02				0.15								
						0.12	0.04												
			0.03	0.32		0.08	0.26				0.43								
			0.07	0.05		0.10	0.10				0.42								
	0.41	0.15	0.22	0.20							0.49								
	0.49	0.15	0.08	0.02L			0.10				0.52								
	0.37	0.08	0.10	0.18			0.02				0.42								
	0.30	0.30	0.22	0.15			0.02				0.40						5.20		11.20
	0.38	0.11	0.10	0.16			0.02L				0.42		7.40		1.40		7.30		12.10
	0.28	0.08	0.08	0.10			0.25				0.47		7.20		1.30		3.90		0.50
	3.50	0.18					0.10						2.60		4.20		5.00		0.38
	4.00	0.02L		0.21	0.20		0.08						2.70		5.00		0.83		0.02
				0.21	0.26		0.30						19.50		5.60		0.70		0.10
				0.40	1.30								15.40		6.50		6.20		6.80
				0.45	1.50								7.00		4.10		4.90		6.90
		0.04	1.00	0.20	1.00		0.20			0.10	2.30		7.40		4.30				
		0.35	1.00	0.03	0.67		0.04			0.15	2.40								
0.05		0.22	0.24	0.19	0.23		0.53	0.15	1.10	0.15	16.40								
0.15		0.05	0.11	0.32	0.10		1.50	0.05	1.00	0.02L	15.50								
0.39		0.25	0.32				0.35	0.10	0.29	0.10	0.11								
0.48		0.20	0.35				0.32	0.04	0.03	0.02	0.16								
0.32		0.04	0.05				0.10	0.08	0.10	0.08	0.10								
0.29		0.12	0.08				0.05	0.05	0.10	0.10	0.15								
0.30								0.13	0.14										
0.11								0.02	0.27										

Figure A2.--Continued--CaO (percent)

	0.05							0.10											
	0.19							0.05											
	0.54							0.22											
	1.10							0.26											
	0.29							0.01L											
	0.11			0.15	0.49			0.15											
	0.21	0.14	5.30	0.10	0.50			0.10											
	0.25	0.10	5.40	0.35	2.30			0.14											
		0.50	0.64	0.31	2.20							0.10		0.38					
		0.11	0.55	0.22	0.18					0.22		0.10		0.27					
		0.10	0.10	0.15	0.10					0.28		0.15		0.13		0.01L		0.10	
		0.01L	0.10	0.05	0.02					0.10		0.22		0.22		0.05		0.01	
		0.11	0.10	0.02	0.28					0.07		0.03		0.05		0.15		0.06	
		0.14	0.01L					3.10	0.75	0.19		0.10		0.10		0.10		0.09	
				0.35				3.80	1.20	0.15		0.12		0.01L		0.22		0.15	
				0.34				0.32	0.13	0.05		0.05		0.06		0.25		0.11	
				0.01L				0.52	0.20	0.05						0.55		0.08	
				0.01L				0.15	0.45							0.22		0.12	
				0.41				0.28	0.61										
				0.28		0.05	0.54	0.10	0.35										
				0.32		0.08	0.62	0.20	0.22										
				0.31		0.41	0.10	1.60	0.75										
						0.37	0.29	1.60	1.30								0.01L		2.90
						1.00	0.10	1.80	0.43				2.80		1.10		0.10		2.90
0.65				0.54	0.38	0.87	0.11	2.00	0.66				2.80		1.10		0.05		0.38
0.64		0.11	1.40	0.48	0.59	0.77	0.10	1.00	1.80		0.11		2.10		0.90		0.06		0.39
1.60		0.01L	1.60	0.80	0.93	0.90	0.12	1.20	1.70		0.12		2.00		0.75		0.29		1.10
1.80		0.35	0.75	1.00	0.88			1.60	1.20		0.48		4.20		0.08		0.22		1.10
0.32		0.22	0.55	1.20	0.52	1.90	0.12	1.50	1.10		0.41		4.10		0.15		0.02		1.60
0.77		0.55	1.10	1.30	0.41	1.70	0.15				0.70		1.30		0.45		0.15		1.70
0.31		0.65	0.65	0.37	1.30	0.12	0.05				0.60		1.20		0.48				
0.10		1.60	0.16	0.03	1.40	0.18	0.02				0.55								
		1.60	0.11			0.01L	0.64				0.30								
						0.19	0.51												
			0.58	0.75		0.29	0.16				3.10								
			0.43	0.71		0.05	0.46				3.10								
	0.65	0.45	1.10	0.53							4.40								
	0.55	0.37	1.00	0.62			0.11				4.50								
	2.30	1.20	0.04	3.20			0.11				2.40								
	2.50	1.20	0.01L	3.40			0.21				2.30						0.02		0.01L
	2.10	1.40	0.42	0.32			0.08				2.00		0.21		4.70		0.12		0.10
	2.10	1.40	0.15	0.35			0.28				2.00		0.21		4.70		0.01L		0.75
	1.60	1.50					0.55						2.80		0.10		0.06		0.65
	1.10	1.50		0.05	1.60		0.12						3.00		0.13		1.40		1.30
				0.06	1.70		0.22						0.37		0.21		1.20		1.60
				2.00	1.40								0.08		0.04		0.11		1.80
				2.10	1.30								0.06		0.24		0.25		1.70
		0.13	1.80	0.10	0.65		0.11			3.80	0.45		0.01L		0.20				
		0.15	2.00	0.06	0.10		0.23			3.50	0.45								
0.19		0.76	0.45	0.01L	0.50		0.22	1.90	0.19	1.60	0.30								
0.16		0.85	0.60	0.11	0.54		0.75	1.80	0.10	1.50	0.32								
2.30		1.30	1.20				3.10	5.30	2.40	2.50	0.75								
2.40		1.20	1.20				2.70	5.40	2.60	2.40	0.75								
3.90		1.10	1.40				1.70	4.40	3.70	1.50	0.43								
3.60		1.40	1.10				1.80	4.50	3.60	2.20	0.45								
1.50								0.64	4.00										
1.70								0.88	4.20										

Figure A2.--Continued--K_2O (percent)

	0.65							0.42											
	0.76							0.60											
	1.30							0.55											
	1.40							0.66											
	0.56							0.43											
	0.52			0.46	2.20			0.34											
	0.62	0.35	2.20	0.62	0.63			0.47											
	0.57	0.38	2.20	1.20	0.89			0.32											
		0.43	0.73	0.52	0.98							0.47		0.96					
		0.59	0.62	0.24	0.43					0.60		0.37		0.68					
		0.39	0.36	0.38	0.50					0.55		0.66		0.52		0.46		0.38	
		0.25	0.39	0.50	0.64					0.42		0.68		0.61		0.40		0.44	
		0.36	0.54	0.32	0.42					0.45		0.45		0.68		0.52		0.39	
		0.39	0.30					1.00	0.45	0.58		0.42		0.39		0.42		0.65	
				0.52				0.98	0.58	0.48		1.00		0.56		0.47		0.53	
				0.72				0.45	0.52	0.33		1.10		0.62		0.55		0.36	
				0.91				0.47	0.51	0.55						0.12L		0.46	
				0.91				0.30	0.54							0.51		0.66	
				0.57				0.58	0.39										
				0.35		0.45	0.73	0.68	0.52										
				0.26		0.28	0.90	0.80	0.38										
				0.57		0.61	0.35	0.45	0.31										
						0.55	0.56	0.38	0.55								0.48		0.37
						0.53	0.26	0.75	0.30				0.92		0.54		0.38		0.38
0.57				0.69	0.55	0.40	0.36	0.95	0.36				0.45		0.70		0.46		0.33
0.59		0.46	0.49	0.65	0.41	0.89	0.28	0.39	0.31		0.31		0.38		0.74		0.45		0.14
0.85		0.18	0.72	0.56	0.63	0.59	0.12	0.41	0.34		0.42		0.58		0.72		0.78		0.65
0.80		0.40	0.22	0.60	0.59			0.55	0.38		0.32		0.80		0.55		0.54		0.57
0.70		0.52	0.69	1.10	1.00	0.66	0.52	0.41	0.25		0.54		0.69		0.47		0.51		0.47
0.53		0.35	0.62	1.00	0.56	0.38	0.62				0.39		0.41		0.33		0.31		0.38
0.28		0.43	0.36	0.28	0.58	0.41	0.36				0.66		0.63		0.37				
0.44		0.36	0.45	0.44	0.60	0.40	0.22				0.18								
		0.54	0.49			0.29	0.46				0.34								
						0.37	0.38												
			0.59	0.55		0.27	0.64				0.27								
			0.54	0.31		0.47	0.61				0.30								
	0.36	0.36	0.43	0.59							0.39								
	0.40	0.39	0.28	0.48			0.48				0.44								
	0.55	0.48	0.50	0.45			0.28				0.31								
	0.66	0.55	0.62	0.66			0.41				0.22						0.74		0.60
	0.74	0.67	0.34	0.45			0.37				0.28		1.10		1.30		0.88		0.77
	0.73	0.83	0.40	0.53			0.55				0.34		1.10		1.20		0.14		1.20
	2.40	0.33					0.58						3.10		0.52		0.56		2.20
	2.30	0.44		0.45	0.48		0.59						2.70		0.45		0.92		0.69
				0.50	0.41		0.75						0.70		0.40		1.10		0.81
				0.70	0.53								0.70		0.59		0.69		0.65
				0.77	0.61								0.83		1.30		0.67		0.50
		0.63	0.54	0.52	0.37		0.22			1.40	0.42		1.00		1.00				
		0.40	0.44	0.50	0.42		0.44			1.40	0.47								
0.42		0.38	0.65	0.42	0.52		1.60	0.60	0.63	0.83	0.58								
0.48		0.51	0.55	0.32	0.51		1.70	0.62	0.54	0.88	0.46								
1.10		0.64	0.41				0.77	0.57	0.68	0.90	0.45								
1.00		0.61	0.48				0.76	0.59	0.52	0.71	0.51								
1.40		0.48	0.54				0.53	0.27	0.78	0.79	0.45								
1.30		0.45	0.47				0.70	0.50	0.68	0.64	0.43								
0.94								0.49	0.45										
0.80								0.43	0.82										

Figure A2.--Continued--H2O+ (percent)

```
        0.19                                                    0.05
        0.12                                                    0.02
        0.06                                                    0.14
        0.13                                                    0.09
        0.09                                                    0.01L
        0.06                    0.09    0.11                    0.05
        0.11    0.06    0.41    0.09    0.19                    0.07
        0.12    0.01L   0.34    0.01L   0.31                    0.07
                0.01L   0.04    0.05    0.29                                                0.02    0.14
                0.01L   0.03    0.01L   0.03                                    0.19        0.01L   0.11
                0.08    0.04    0.06    0.05                                    0.18        0.27    0.05    0.01L   0.05
                0.07    0.01    0.03    0.06                                    0.10        0.14    0.02    0.03    0.03
                0.03    0.01L   0.12    0.18                                    0.05        0.07    0.02    0.01L   0.12
                0.05    0.01L                                   0.29    0.12    0.09        0.01L   0.03    0.08    0.07
                                0.11                            0.32    0.06    0.01L       0.21    0.01L   0.03    0.02
                                0.07                            0.04    0.01L   0.05        0.24    0.01L   0.02    0.05
                                0.09                            0.01L   0.10    0.02                        0.62    0.03
                                0.09                            0.01L   0.15                                0.10    0.01L
                                0.07                            0.01L   0.05
                                0.07            0.03    0.07    0.05    0.11
                                0.08            0.04    0.03    0.14    0.11
                                0.05            0.01L   0.01L   0.06    0.01L
                                                0.02    0.01L   0.01L   0.01L                                   0.01L   0.05
                                                0.01L   0.01L   0.18    0.08                    0.08    0.05    0.05    0.01L
0.01L                           0.04    0.06    0.06    0.01L   0.01L   0.04                    0.01L   0.08    0.04    0.07
0.01L           0.01L   0.08    0.08    0.01L   0.01L   0.03    0.01L   0.01L          0.02    0.01L   0.15    0.11    0.08
0.09            0.01L   0.01L   0.09    0.06    0.01L   0.01L   0.01L   0.06            0.01L   0.02    0.13    0.52    0.12
0.05            0.06    0.06    0.06    0.01L                   0.09    0.01L          0.01L   0.30    0.01L   0.05    0.09
0.03            0.01L   0.01L   0.04    0.05    0.07    0.01L   0.08    0.04            0.01L   0.31    0.01L   0.03    0.17
0.01L           0.06    0.04    0.07    0.07    0.13    0.02                            0.03    0.05    0.08    0.18    0.16
0.02            0.01L   0.04    0.01L   0.01L   0.08    0.01L                           0.01L   0.05    0.04
0.01L           0.07    0.04    0.01L   0.03    0.01L   0.07                            0.01L
                0.01L   0.01L                   0.01L   0.04                            0.01L
                                                0.01L   0.01L
                        0.05    0.03            0.05    0.03                            0.07
                        0.07    0.01L           0.03    0.01L                           0.05
        0.02    0.01L   0.01L   0.04                                                    0.06
        0.01L   0.01L   0.01L   0.01L                   0.03                            0.07
        0.01L   0.05    0.07    0.06                    0.03                            0.06
        0.03    0.08    0.01L   0.07                    0.01L                           0.06                    0.18    0.06
        0.10    0.03    0.01L   0.01L                   0.03                            0.07    0.16    0.20    0.32    0.05
        0.08    0.07    0.01L   0.08                    0.01L                           0.06    0.13    0.28    0.46    0.04
        0.21    0.01L                                   0.01L                                   1.10    0.05    0.01L   0.10
        0.26    0.04            0.01L   0.10            0.04                                    1.10    0.05    0.38    0.03
                                0.02    0.01L           0.01L                                   0.06    0.08    0.31    0.06
                                0.24    0.08                                                    0.11    0.05    0.13    0.03
                                0.23    0.05                                                    0.27    0.14    0.07    0.12
                0.05    0.09    0.04    0.01L           0.16                    0.07    0.01L   0.38    0.16
                0.06    0.08    0.01L   0.12            0.03                    0.06    0.07
0.05            0.05    0.09    0.01L   0.04            0.16    0.02    0.06    0.01    0.01L
0.04            0.12    0.01L   0.02    0.01L           0.13    0.06    0.10    0.05    0.03
0.05            0.01L   0.01L                           0.21    0.04    0.02    0.07    0.09
0.04            0.08    0.08                            0.15    0.10    0.12    0.02    0.03
0.02            0.02    0.08                            0.13    0.05    0.10    0.08    0.01L
0.10            0.04    0.06                            0.16    0.01L   0.10    0.05    0.01L
0.06                                                            0.02    0.03
0.05                                                            0.04    0.04
```

Figure A2.--Continued--H2O (percent)

```
        0.05                                                    0.50
        0.06                                                    0.50
        0.32                                                    0.20
        0.40                                                    0.17
        0.22                                                    0.25
        0.16                    0.03    0.02                    0.18
        0.06    0.05    0.66    0.03    0.05                    0.08
        0.08    0.01    0.60    0.07    0.17                    0.08
                0.32    0.11    0.08    0.16                                                0.04    0.04
                0.34    0.12    0.07    0.04                                    0.08        0.02    0.08
                0.04    0.03    0.08    0.03                                    0.85        0.14    0.05    0.01L   0.01
                0.01    0.03    0.06    0.09                                    0.10        0.14    0.05    0.01L   0.03
                0.01    0.14    0.07    0.03                                    0.10        0.04    0.25    0.03    0.69
                0.01L   0.17                                    0.35    0.42    0.04        0.05    0.01    0.03    0.03
                                0.42                            0.39    0.67    0.06        0.07    0.02    0.11    0.03
                                0.33                            0.26    0.06    0.02        0.09    0.04    0.10    0.01
                                0.18                            0.29    0.06    0.03                        0.02    0.02
                                0.24                            0.04    0.72                                0.05    0.01L
                                0.17                            0.07    0.88
                                0.24            0.01L   0.08    0.21    0.53
                                0.01L           0.01L   0.06    0.21    0.47
                                0.15            0.04    0.01    0.08    0.06
                                                0.02    0.04    0.14    0.13                                    0.08    0.06
                                                0.38    0.02    0.20    0.29                    0.15    0.05    0.01    0.01
0.01                            0.14    0.16    0.11    0.03    0.19    0.29                    0.16    0.03    0.09    0.01
0.06            0.01L   0.25    0.13    0.17    0.11    0.01L   0.15    0.14            0.01    0.07    0.09    0.05    0.01
0.08            0.04    0.25    0.19    0.13    0.10    0.01L   0.14    0.12            0.02    0.02    0.06    0.01    0.04
0.09            0.02    0.12    0.19    0.14                    0.10    0.76            0.03    0.29    0.01L   0.01    0.03
0.05            0.06    0.05    0.29    0.13    0.10    0.30    0.05    0.82            0.02    0.32    0.01L   0.03    0.02
0.04            0.15    0.25    0.04    0.07    0.08    0.26                            0.01L   0.08    0.03    0.06    0.02
0.01L           0.38    0.25    0.08    0.02    0.06    0.04                            0.02    0.06    0.01L
0.02            0.14    0.07    0.12    0.01L   0.09    0.01                            0.03
                0.18    0.12                    0.04    0.02                            0.03
                                                0.02    0.04
                        0.09    0.05            0.01L   0.06                            0.43
                        0.04    0.05            0.01L   0.06                            0.26
        0.70    0.01    0.10    0.05                                                    0.62
        0.70    0.01L   0.07    0.04                    0.01L                           0.59
        0.58    0.30    0.14    0.55                    0.02                            0.65
        0.62    0.25    0.12    0.61                    0.03                            0.74                    0.19    0.21
        0.53    0.63    0.06    0.08                    0.04                            0.90    0.46    0.82    0.19    0.22
        0.55    0.63    0.03    0.10                    0.03                            0.88    0.47    0.85    0.14    0.34
        1.40    0.07                                    0.02                                    1.10    0.07    0.11    0.34
        1.30    0.01L           0.32    0.05            0.05                                    1.10    0.11    0.23    0.32
                                0.27    0.04            0.05                                    0.28    0.25    0.19    0.34
                                0.17    0.08                                                    0.38    0.26    0.01L   0.08
                                0.17    0.10                                                    0.74    0.92    0.08    0.04
                0.01L   0.31    0.01L   0.05            0.31                    2.80    0.29    0.71    1.00
                0.02    0.32    0.01L   0.06            0.31                    2.00    0.33
0.01L           0.18    0.06    0.04    0.03            0.18    0.85    0.13    1.30    0.12
0.01            0.12    0.11    0.04    0.01L           0.59    0.85    0.10    1.60    0.08
0.96            0.10    0.13                            0.53    0.95    1.00    0.33    0.47
0.97            0.06    0.16                            0.47    0.07    1.20    0.39    0.48
0.45            0.16    0.20                            0.93    0.14    0.79    0.03    0.11
0.42            0.15    0.11                            0.91    0.18    0.82    0.72    0.10
0.72                                                    0.50    0.14
0.72                                                    0.44    0.20
```

Figure A2.--Continued--TiO2 (percent)

	0.17							0.53											
	0.14							0.03											
	0.31							0.27											
	0.22							0.13											
	0.17							0.09											
	0.29			0.37	0.73			0.15											
	0.57	0.41	0.15	0.18	0.12			0.56											
	0.31	0.39	0.21	0.25	0.24			0.26											
		0.84	0.29	0.06	0.88					0.75		0.59		0.62					
		0.41	0.18	0.16	0.55					0.22		1.40		0.16		0.19		0.12	
		0.32	0.13	0.57	0.14					0.14		1.50		0.57		0.40		0.55	
		0.51	0.11	0.25	0.10					0.32		0.31		0.31		0.56		0.26	
		0.02L	0.05					0.33	0.22	0.67		0.56		0.30		0.48		0.35	
				0.02				0.48	0.15	0.53		2.20		0.27		0.65		0.41	
				0.02				0.05	0.25	0.20		2.10		0.38		0.72		0.12	
				0.04				0.15	0.18	0.53						0.18		0.50	
				0.04				0.23	0.12							0.39		0.09	
				0.03				0.15	0.30										
				0.03		0.27	0.30	0.27	0.02L										
				0.02		0.05	0.10	0.34	0.30										
				0.02L		0.33	0.37	0.24	0.38										
						0.16	0.13	0.06	0.04								0.04		0.17
						0.06	0.41	0.12	0.27				0.04		0.21		0.13		0.14
0.54				0.50	0.17	0.22	0.31	0.32	0.10				0.32		0.22		0.06		0.31
0.18		0.22	0.08	0.24	0.42	0.08	0.10	0.20	0.32		0.20		0.12		0.18		0.18		0.28
0.16		0.10	0.20	0.28	0.41	0.37	0.05	0.04	0.29		0.21		0.10		0.45		0.66		0.60
0.17		0.05	0.19	0.34	0.09			0.41	0.36		0.32		0.22		0.35		0.55		0.47
0.52		0.03	0.25	0.17	0.33	0.34	0.19	0.03	0.13		0.60		0.21		0.04		0.23		0.31
0.19		0.68	0.22	0.31	0.23	0.34	0.50				0.34		0.08		0.23		0.09		0.25
0.19		0.08	0.09	0.30	0.55	0.17	0.70				0.52		0.42		0.02L				
0.17		0.34	0.02L	0.02L	0.67	0.15	0.24				0.28								
		0.38	0.04			0.08	0.43				0.08								
						0.66	0.10												
			0.27	0.48		0.26	0.64				0.12								
			0.51	0.17		0.25	0.13				0.02								
	0.33	0.30	0.30	0.07							0.13								
	0.36	0.22	0.29	0.09			0.23				0.02								
	0.39	0.09	0.13	0.25			0.46				0.12								
	0.11	0.07	0.24	0.52			0.09				0.12						0.70		2.20
	0.22	0.16	0.09	0.44			0.31				0.14		1.20		0.65		0.56		2.00
	0.28	0.19	0.04	0.13			0.42				0.14		0.95		0.66		0.28		0.28
	0.78	0.15					0.39						0.76		0.40		0.41		0.15
	0.79	0.41		0.04	0.18		0.10						0.76		0.57		0.65		0.06
				0.14	0.18		0.53						0.72		0.46		0.62		0.28
				0.12	0.32								0.91		0.50		0.56		0.51
				0.13	0.38								0.33		0.56		0.67		0.57
		0.27	0.50	0.03	0.30		0.12			0.26	0.68		0.38		0.30				
		0.11	0.22	0.29	0.12		0.35			0.30	0.44								
0.27		0.19	0.33	0.15	0.36		0.13	0.36	0.92	0.36	0.12								
0.44		0.38	0.10	0.44	0.41		0.35	0.45	0.66	0.14	0.30								
0.06		0.47	0.35				0.11	0.07	0.15	0.23	0.23								
0.32		0.10	0.13				0.56	0.63	0.21	0.12	0.41								
0.26		0.07	0.32				0.23	0.59	0.20	0.33	0.02L								
0.26		0.27	0.17				0.15	0.12	0.17	0.30	0.47								
0.11								0.02	0.20										
0.46								0.35	0.18										

Figure A2.--Continued--P2O5 (percent)

```
        0.14                                                    0.01
        0.16                                                    0.03
        0.02                                                    0.01
        0.02                                                    0.02
        0.05                                                    0.01L
        0.04                    0.01    0.01L                   0.01
        0.07    0.01L   0.01L   0.01    0.01L                   0.03
        0.07    0.01L   0.02    0.06    0.03                    0.01L
                0.02    0.03    0.01L   0.02                                                0.12    1.30
                0.02    0.01L   0.02    0.01L                                   0.04        0.10    1.30
                0.01    0.01    0.01    0.02                                    0.01L       0.01    0.27    0.02    0.05
                0.01    0.01    0.01L   0.02                                    0.02        0.01L   0.20    0.01L   0.08
                0.02    0.02    0.01L   0.01                                    0.01L       0.12    0.15    0.06    0.01L
                0.01L   0.01L                                   0.07    0.01    0.11        0.11    0.01    0.05    0.05
                                0.01L                           0.06    0.01L   0.28        0.46    0.01L   0.01    0.02
                                0.01L                           0.01L   0.01L   0.01L       0.39    0.02    0.01    0.03
                                0.01L                           0.01L   0.01L   0.01L                       0.19    0.07
                                0.01L                           0.02    0.01L                               0.19    0.08
                                0.02                            0.01L   0.03
                                0.02            0.01L   0.01    0.01L   0.02
                                0.01L           0.01L   0.01    0.02    0.01
                                0.01L           0.01L   0.01    0.02    0.01L
                                                0.01L   0.01L   0.02    0.01L                                   0.01L   0.01L
                                                0.02    0.03    0.03    0.01                    0.03    0.02    0.01    0.06
0.02                            0.02    0.07    0.02    0.01L   0.01L   0.01L                   0.02    0.02    0.02    0.01L
0.01L           0.01L   0.02    0.02    0.06    0.01L   0.04    0.01L   0.01L           0.04    0.05    0.02    0.01L   0.01
0.01L           0.01L   0.01L   0.01L   0.01L   0.02    0.01L   0.01L   0.01            0.05    0.06    0.05    0.01L   0.08
0.02            0.03    0.03    0.03    0.02                    0.01L   0.01            0.02    0.06    0.01L   0.01    0.06
0.02            0.02    0.02    0.11    0.06    0.02    0.02    0.03    0.01            0.01L   0.06    0.01L   0.01L   0.05
0.02            0.01    0.01L   0.02    0.01L   0.02    0.01                            0.01L   0.04    0.01L   0.02    0.06
0.02            0.03    0.01L   0.02    0.02    0.01L   0.02                            0.01L   0.01L   0.03
0.01L           0.01    0.02    0.01    0.01L   0.01L   0.01                            0.01
                0.01L   0.01L                   0.01L   0.01L                           0.01L
                                                0.01L   0.01L
                        0.02    0.02            0.02    0.02                            0.01L
                        0.03    0.02            0.01L   0.02                            0.02
        0.08    0.01    0.01    0.05                                                    0.01L
        0.08    0.02    0.02    0.02                    0.02                            0.02
        0.06    0.03    0.01L   0.01L                   0.03                            0.01L
        0.04    0.01    0.02    0.01                    0.02                            0.01L                   0.05    0.10
        0.04    0.01L   0.03    0.03                    0.01L                           0.01L   0.10    0.32    0.05    0.13
        0.04    0.01L   0.02    0.01L                   0.01                            0.01L   0.09    0.33    0.07    0.02
        0.42    0.01L                                   0.01L                                   0.02    0.04    0.08    0.04
        0.47    0.01L           0.01L   0.01L           0.01L                                   0.02    0.07    0.02    0.02
                                0.01L   0.02            0.02                                    0.16    0.03    0.01    0.01L
                                0.03    0.01L                                                   0.24    0.06    0.01L   0.06
                                0.01L   0.01L                                                   0.12    0.09    0.02    0.03
                0.01L   0.01    0.03    0.04            0.01L                   0.03    0.01    0.11    0.08
                0.04    0.01L   0.01L   0.01L           0.02                    0.01L   0.03
0.01L           0.02    0.03    0.03    0.01            0.03    0.01    0.02    0.01    0.05
0.02            0.01    0.02    0.03    0.01L           0.10    0.01L   0.02    0.02    0.05
0.02            0.02    0.01                            0.01L   0.01    0.01L   0.01    0.01L
0.01            0.01    0.01                            0.03    0.03    0.01    0.02    0.03
0.03            0.01L   0.03                            0.02    0.01L   0.01    0.05    0.01L
0.02            0.01L   0.01L                           0.01L   0.01L   0.01    0.03    0.02
0.01                                                            0.01L   0.01L
0.01L                                                           0.01L   0.01L
```

Figure A2.--Continued--MnO (percent)

	3.40							1.40							
	4.30							1.30							
	0.10							0.05L							
	0.05L							0.08							
	1.60							0.16							
	1.20			0.05L	0.05			0.05L							
	0.09	0.05L	0.10	0.55	0.05			0.12							
	0.81	0.05L	0.05	0.12	3.80			0.25							
		0.08	0.92	0.12	3.40							2.70	0.05		
		0.05L	1.40	0.05L	0.05L					0.12		2.30	0.05L		
		0.05L	0.09	0.08	0.08					0.11		0.05	0.06	0.39	7.80
		0.10	0.14	0.05L	0.05L					0.05L		0.15	0.05L	0.22	8.50
		0.10	0.42	0.06	0.06					0.05L		1.20	0.06	5.80	8.20
		0.11	0.85					0.74	0.06	9.40		1.60	0.11	7.80	9.40
				0.05L				0.99	0.08	8.20		11.10	0.05	0.38	0.35
				0.05L				0.11	0.05L	0.05L		9.90	0.05	0.38	0.09
				0.05				0.10	0.05	0.05L				11.90	0.89
				0.05L				0.06	0.06					12.00	0.56
				0.05L				0.05L	0.05L						
				0.05L		0.05L	0.06	0.14	0.10						
				0.05L		0.05L	0.05L	0.11	0.05						
				0.05L		0.05L	0.06	0.12	0.12						
						0.05L	0.05L	0.20	0.08					0.10	0.05
						0.05	0.14	0.10	0.05L			6.30	0.24	0.14	0.12
0.05L				0.05	0.09	0.14	0.05	0.08	0.05			6.10	0.18	0.10	0.05L
0.08		0.05L	0.05L	0.05L	0.05L	0.09	0.06	0.05L	0.05L		7.40	14.50	3.20	0.05L	0.05
0.08		0.08	0.08	0.05L	0.11	0.05L	0.08	0.10	0.05		7.90	14.80	3.00	0.08	6.30
0.10		0.05L	0.05	0.11	0.09			0.12	0.05L		0.08	5.10	0.09	0.05L	5.30
0.05		0.05	0.11	0.10	0.05L	0.09	0.08	0.05L	0.05L		0.06	5.20	0.07	0.12	4.10
0.05L		0.09	0.05L	0.05L	0.05L	0.10	0.14				0.05L	4.40	0.05L	0.09	4.00
0.13		0.06	0.06	0.11	0.05L	0.05L	0.05L				0.11	4.20	0.08		
0.06		0.06	0.05L	0.06	0.05	0.05L	0.05L				0.05L				
		0.05	0.05L			0.09	0.12				0.10				
						0.05L	0.08								
			0.06	0.09		0.10	0.06				0.05L				
			0.06	0.09		0.05L	0.05L				0.05L				
	0.10	0.08	0.05L	0.05L							0.05L				
	0.05L	0.06	0.06	0.05L			0.14				0.05L				
	0.05L	0.11	0.05L	0.05L			0.10				0.05L				
	0.09	0.05L	0.05L	0.05L			0.10				0.05L			4.10	6.30
	0.09	0.05L	0.05L	0.05L			0.05L				0.05L	6.70	0.28	5.10	7.10
	0.09	0.06	0.05L	0.05L			0.05L				0.05L	5.80	0.16	3.00	0.18
	2.70	0.08					0.06					1.20	6.10	3.60	0.10
	2.70	0.12		0.11	0.05L		0.09					1.00	5.50	0.13	0.06
				0.11	0.10		0.05L					14.50	6.30	0.10	0.06
				0.09	0.65							12.00	7.70	4.70	4.80
				0.10	0.41							4.40	5.60	3.60	4.20
		0.09	0.30	0.05L	0.18		0.06			0.08	1.50	5.40	5.90		
		0.05L	0.42	0.11	0.11		0.05L			0.05L	1.90				
0.10		0.05	0.05L	0.08	0.05		0.11	0.05L	0.05	0.05L	16.30				
0.05L		0.08	0.05L	0.05L	0.06		0.11	0.05L	0.05L	0.05	16.40				
0.12		0.05L	0.05				0.05	0.05L	0.11	0.05	0.06				
0.05		0.05	0.05				0.05L	0.05L	0.10	0.06	0.15				
0.16		0.08	0.08				0.09	0.05L	0.05L	0.05	0.05L				
0.09		0.09	0.05L				0.09	0.08	0.10	0.05L	0.16				
0.05L								0.05L	0.08						
0.06								0.09	0.05L						

Figure A2.--Continued--CO2 (percent)

	0.46L							0.46L							
	0.46L							0.46L							
	0.46L							0.46L							
	0.46L							0.46L							
	0.46L							0.46L							
	0.46L			0.46L	0.46L			0.46L							
	0.46L	0.46L	0.46L	0.46L	0.46L			0.46L							
	0.46L	0.46L	0.46L	0.46L	0.46L			0.46L							
		0.46L	0.46L	0.46L	0.46L							0.46L	18.00		
		0.49	0.46L	0.46L	0.46L					0.46L		0.46L	13.00		
		0.46L	0.46L	0.46L	0.46L					0.46L		0.46L	9.60	0.46L	0.46L
		0.46L	0.46L	0.46L	0.46L					0.46L		0.46L	12.00	0.46L	0.46L
		0.46L	0.46L	0.46L	0.46L					0.46L		0.46	0.46L	0.46L	0.46L
		0.46L	0.46L					0.46L	0.46L	0.46L		0.46L	0.46L	0.46L	0.46L
				0.46L				0.46L	0.46L	0.46L		0.65	0.46L	0.46L	0.46L
				0.46L				0.46L	0.46L	0.46L		0.46L	0.46L	0.46L	0.46L
				0.46L				0.46L	0.46L	0.46L				0.46L	0.46L
				0.46L				0.46L	0.46L					0.46L	0.46L
				0.46L				0.46L	0.46L						
				0.46L		0.46L	0.46L	0.46L	0.46L						
				0.46L		0.46L	0.46L	0.46L	0.46L						
				0.46L		0.46L	0.46L	0.46L	0.46L						
						0.46L	0.46L	0.46L	0.46L					0.46L	0.46L
						0.46L	0.46L	0.46L	0.46L			0.46L	0.46L	0.46L	0.46L
0.46L				0.46L	0.46L	0.46L	0.46L	0.46L	0.46L			0.46L	0.46L	0.46L	0.46L
0.46L		0.46L	0.46L	0.46L	0.46L	0.46L	0.46L	0.46L	0.46L		0.46L	0.46L	0.46L	0.46L	0.46L
0.46L		0.46L	0.46L	0.46L	0.46L	0.46L	0.46L	0.46L	0.46L		0.46L	0.46L	0.46L	0.46L	0.46L
0.46L		0.46L	0.46L	0.46L	0.46L			0.46L	0.46L		0.46L	0.46L	0.46L	0.46L	0.46L
0.46L		0.46L	0.46L	0.46L	0.46L	0.46L	0.46L	0.46L	0.46L		0.46L	0.46L	0.46L	0.46L	0.46L
0.46L		0.46L	0.46L	0.46L	0.46L	0.46L	0.46L				0.46L	0.77	0.46L	0.46L	0.46L
0.46L		0.46L	0.46L	0.46L	0.46L	0.46L	0.46L				0.46L	0.55	0.46L		
0.46L		0.46L	0.46L	0.46L	0.46L	0.46L	0.46L				0.46L				
		0.46L	0.46L			0.46L	0.46L				0.46L				
						0.46L	0.46L								
			0.46L	0.46L		0.46L	0.46L				0.46L				
			0.46L	0.46L		0.46L	0.46L				1.40				
	0.46L	0.46L	0.46L	0.46L							1.40				
	0.46L	0.46L	0.46L	0.46L			0.46L				0.46L				
	0.46L	0.46L	0.46L	0.46L			0.46L				0.46L				
	0.46L	0.46L	0.46L	0.46L			0.46L				0.46L			0.46L	0.62
	0.46L	0.46L	0.46L	0.46L			0.46L				0.46L	0.46L	0.78	0.46L	0.85
	0.46L	0.48	0.46L	0.46L			0.46L				0.46L	0.46L	0.76	0.46L	1.20
	0.46L	0.46L					0.46L					1.40	0.46L	0.46L	1.40
	0.46L	0.46L		0.46L	0.46L		0.46L					1.20	0.46L	0.46L	0.46L
				0.46L	0.46L		0.46L					0.75	0.47	0.46L	0.50
				0.46L	0.46L							0.63	0.46L	0.46L	0.46L
				0.46L	0.46L							0.46L	0.63	0.46L	0.46L
		0.46L	0.46L	0.46L	0.46L		0.46L			0.46L	0.46L	0.46L	0.58		
		0.46L	0.46L	0.46L	0.46L		0.46L			0.46L	0.46L				
0.46L		0.46L	0.46L	0.46L	0.46L		0.46L	0.46L	0.46L	0.46L	0.46L				
0.46L		0.46L	0.46L	0.46L	0.46L		0.46L	0.46L	0.46L	0.46L	0.46L				
0.46L		0.46L	0.46L				0.46L	0.54	0.46L	0.46L	0.46L				
0.46L		0.46L	0.46L				0.46L	0.51	0.46L	0.46L	0.46L				
0.46L		0.49	0.46L				0.46L	0.46L	0.46L	0.46L	0.46L				
0.46L		0.46L	0.46L				0.46L	0.46L	0.46L	0.46L	0.46L				
0.46L								0.46L	0.46L						
0.46L								0.46L	0.46L						

Figure A2.--Continued--Ag (parts per million)

	220.L							220.L							
	220.L							220.L							
	220.L							220.L							
	220.L							220.L							
	220.L							220.L							
	220.L			220.L	220.L			220.L							
	220.L	220.L	220.L	220.L	220.L			220.L							
	220.L	220.L	220.L	220.L	220.L			220.L							
		220.L	220.L	220.L	220.L							220.L	410.		
		220.L	220.L	220.L	220.L					220.L		220.L	220.L		
		220.L	220.L	220.L	220.L					220.L		220.L	350.	220.L	220.L
		220.L	220.L	220.L	220.L					220.L		220.L	220.L	220.L	220.L
		220.L	220.L	220.L	220.L					220.L		220.L	220.L	220.L	220.L
		220.L	220.L					220.L	220.L	220.L		220.L	220.L	220.L	220.L
				220.L				220.L	220.L	220.L		220.L	220.L	220.L	220.L
				220.L				220.L	220.L	220.L		220.L	220.L	220.L	220.L
				220.L				220.L	220.L	220.L				220.L	220.L
				220.L				220.L	220.L					220.L	220.L
				220.L				220.L	220.L						
				220.L		220.L	220.L	220.L	220.L						
				220.L		220.L	220.L	220.L	220.L						
				220.L		220.L	220.L	220.L	220.L						
						220.L	220.L	220.L	220.L					220.L	220.L
						220.L	220.L	220.L	220.L			220.L	220.L	220.L	220.L
220.L				220.L	220.L	220.L	220.L	220.L	220.L			220.L	220.L	220.L	220.L
220.L		220.L	220.L	220.L	220.L	220.L	220.L	220.L	220.L		220.L	220.L	220.L	220.L	220.L
220.L		220.L	220.L	220.L	220.L	220.L	220.L	220.L	220.L		220.L	220.L	220.L	220.L	220.L
220.L		220.L	220.L	220.L	220.L			220.L	220.L		220.L	220.L	220.L	220.L	220.L
220.L		220.L	220.L	220.L	220.L	220.L	220.L	220.L	220.L		220.L	220.L	220.L	220.L	220.L
220.L		220.L	220.L	220.L	220.L	220.L	220.L				220.L	220.L	220.L	220.L	220.L
220.L		220.L	220.L	220.L	220.L	220.L	220.L				220.L	220.L	220.L		
220.L		220.L	220.L	220.L	220.L	220.L	220.L				220.L				
		220.L	220.L			220.L	220.L				220.L				
						220.L	220.L								
			220.L	220.L		220.L	220.L				220.L				
			220.L	220.L		220.L	220.L				220.L				
	220.L	220.L	220.L	220.L							220.L				
	220.L	220.L	220.L	220.L			220.L				220.L				
	220.L	220.L	220.L	220.L			220.L				220.L				
	220.L	220.L	220.L	220.L			220.L				220.L			220.L	220.L
	220.L	220.L	220.L	220.L			220.L				220.L	220.L	220.L	220.L	220.L
	220.L	220.L	220.L	220.L			220.L				220.L	220.L	220.L	220.L	220.L
	220.L	220.L					220.L					220.L	220.L	220.L	220.L
	220.L	220.L		220.L	220.L		220.L					220.L	220.L	220.L	220.L
				220.L	220.L		220.L					220.L	220.L	220.L	220.L
				220.L	220.L							220.L	220.L	220.L	220.L
				220.L	220.L							220.L	220.L	220.L	220.L
		220.L	220.L	220.L	220.L		220.L			220.L	220.L	220.L	220.L		
		220.L	220.L	220.L	220.L		220.L			220.L	220.L				
220.L		220.L	220.L	220.L	220.L		220.L	220.L	220.L	220.L	220.L				
220.L		220.L	220.L	220.L	220.L		220.L	220.L	220.L	220.L	220.L				
220.L		220.L	220.L				220.L	220.L	220.L	220.L	220.L				
220.L		220.L	220.L				220.L	220.L	220.L	220.L	220.L				
220.L		220.L	220.L				220.L	220.L	220.L	220.L	220.L				
220.L		220.L	220.L				220.L	220.L	220.L	220.L	220.L				
220.L								220.L	220.L						
220.L								220.L	220.L						

Figure A2.--Continued--As (parts per million)

```
          36.                                                     17.
          20.                                                     16.
          41.                                                     25.
          43.                                                     27.
          34.                                                      5.L
          35.                      5.L    27.                      5.L
          22.      5.L   200.     15.     29.                      5.L
          23.      5.L   190.     39.     62.                      5.L
                   5.L    37.     19.     40.                                                      5.L    16.
                   5.L    39.      7.     20.                                     30.              5.L     5.L
                   5.L     5.L     5.L    25.                                      6.              5.L     5.L     5.L    10.
                   5.L     5.L     5.L    18.                                     28.              5.L     5.L     5.L     7.
                   5.L    10.      5.L    29.                                      5.L             5.L     5.L    17.     14.
                   5.L     5.L                                    35.      5.L    18.              5.L     5.L     5.L     6.
                                   5.L                            44.     11.      5.L            20.      5.L    21.     30.
                                  15.                              5.L    10.      5.L            17.      5.L    52.      5.L
                                   5.L                             9.      5.L     5.L                            17.      5.L
                                   5.L                             5.L     5.L                                     6.      5.L
                                  18.                              5.L     5.L
                                   5.L             5.L    12.     65.     21.
                                  22.              5.L     5.     20.     21.
                                   5.L             5.L     5.L     6.      6.
                                                   5.L     5.L     5.L     5.L                                     5.L     5.L
                                                   5.L     5.L    30.     18.                     20.     57.      5.L     5.L
   5.L                            10.      5.      5.L     5.L    37.      5.L                    21.     73.      5.L     5.L
   5.L             5.L     5.L    11.      5.L     5.      5.L     5.L     5.L             6.     15.      5.L     5.L     5.L
  36.              5.L     5.L    23.     10.     20.      5.L     5.L     5.L             5.L     6.      5.L     5.L    34.
  34.              5.L     5.L    52.     10.                      5.L     5.L             5.L     5.L     8.      5.L    44.
  26.              5.L     5.L    17.      5.L     5.L     5.L     5.L     5.L             5.L     6.     11.      5.L    38.
  27.              5.L    16.     22.      5.L     5.L     8.                             25.      7.      5.L     5.L     5.L
   8.              5.L    13.      5.L     5.L    10.     10.                              5.L     5.L     5.L
   5.L             5.L     5.L     5.L     5.L     5.L     5.L                             5.L
                   5.L     5.L                     5.L     5.L                             5.L
                                                   5.L     5.L
                           5.L     7.              5.L    10.                             18.
                           5.L     5.L             5.L     5.L                            20.
           5.L     5.L     8.      5.L                                                    22.
           8.      5.L     5.L     5.L                     5.L                            17.
          27.     19.      5.L    10.                      5.L                            46.
          17.     16.      5.L    13.                      5.L                             5.L                    31.      5.L
          21.     59.      5.L     5.L                     5.L                            18.     32.     59.     47.      5.L
          29.     56.     18.      7.                      5.L                            22.     41.     49.      5.L     5.L
          41.      5.L                                    13.                                    140.      5.L     5.L    10.
          54.      5.L             5.L     5.L            16.                                    100.      8.     16.      5.L
                                   5.L     5.L            36.                                     21.      5.L    18.      5.L
                                  43.     30.                                                     12.      5.L     5.L     7.
                                  49.     17.                                                      5.L    35.     10.      5.L
                   6.     34.      5.L     5.L            10.                     37.      7.      5.L    22.
                   5.L    23.      5.L     5.L             5.L                    35.      5.L
   5.L            24.      5.L    34.     18.             17.     21.      5.L     5.L     5.L
   5.L            27.     19.      5.L    12.             18.     15.      5.L     5.L     5.L
  17.             41.     29.                             42.      5.L     5.L    18.     11.
  28.            110.     28.                             36.      5.L     5.L    19.      5.L
   5.             32.     15.                             45.      5.L    18.     25.      5.L
   5.L            37.     35.                             42.      5.L    22.      5.L     5.L
   5.L                                                             5.L    22.
   5.L                                                             5.L    16.
```

Figure A2.--Continued--B (parts per million)

```
            200.                                                     56.
            110.                                                     28.
            580.                                                     20.
            620.                                                     55.
            540.                                                     31.
            290.                     30.    220.                     40.
            110.     31.    250.     53.    580.                     75.
            120.     19.    330.     76.   8000.                     63.
                     55.     74.     48.   6100.                                                 27.   1000.
                     60.     52.     50.     25.                                     62.         38.    800.
                      8.     29.     85.      9.                                    110.         29.    200.     34.     16.
                     25.     40.     13.     33.                                     55.          5.    180.     49.     23.
                     32.     39.      9.     50.                                     39.         76.     53.     82.     28.
                     47.     33.                                    700.     57.     75.         51.     38.     77.     25.
                                    170.                            710.    110.     34.        210.     33.     63.     83.
                                     54.                             37.     13.     85.        200.     76.     62.     35.
                                    200.                             51.      9.     77.                        140.     50.
                                    250.                             26.     41.                                 54.     60.
                                    170.                             43.     42.
                                    270.             11.     37.     42.     50.
                                    210.             35.     32.     31.     32.
                                     50.             40.     33.    170.    140.
                                                     30.     19.     90.    110.                                     20.    340.
                                                    140.     12.    160.     81.                    200.     21.     12.    440.
     56.                             84.     83.     52.     12.    140.     62.                    250.     32.     17.     29.
     52.             62.    580.     79.     60.     65.      8.    100.    190.             36.    310.    110.      9.     28.
    180.             50.    720.     77.     93.     80.     15.     91.    130.             39.    270.    120.     43.     81.
    180.             45.    190.    140.     66.                    130.    100.             31.     17.     15.     39.    100.
     45.             20.    170.    160.     67.    260.     20.    120.     90.             39.     44.     14.     11.     36.
     30.            550.    100.    140.     54.    280.     62.                              95.    170.     53.     15.     60.
     24.            550.     62.     60.    110.     30.      7.                              80.     94.     69.
     37.            160.    250.     38.    130.     67.      7.                              64.
                    190.    110.                      8.     87.                              45.
                                                     14.     68.
                             56.    150.             10.     48.                            130.
                             60.     74.             15.     27.                            670.
            470.    120.    140.     73.                                                    420.
            580.    200.     86.     57.                   1800.                             81.
            360.    140.     28.    450.                   1600.                            160.
            330.    140.     45.    610.                      6.                             35.                     31.     46.
            350.    320.     32.     38.                     13.                             32.     22.    500.     43.     62.
            260.    300.     52.     45.                      8.                             62.     23.    620.     18.    770.
            290.    440.                                     22.                                     64.     37.     47.    860.
            450.    270.             31.     88.             16.                                     66.     49.    280.     85.
                                     30.     94.             45.                                     22.     34.    500.     89.
                                    160.    320.                                                     19.     25.     26.    220.
                                    170.    300.                                                    430.     46.     35.    160.
                     38.    130.     48.     99.             35.                    120.     80.    160.     30.
                     31.    130.     34.     85.             26.                    120.     56.
    110.             98.     64.     25.     84.             48.    110.     43.    130.     41.
    150.             93.     94.     24.     61.             51.    120.     38.     81.     35.
    280.            110.    130.                            280.    440.    300.    110.     87.
    430.            110.    100.                            370.    590.    260.    120.     64.
    580.             39.     73.                            180.    700.    280.     65.     62.
    700.            110.    130.                            120.    560.    320.    120.     47.
    150.                                                             65.    620.
    160.                                                             79.    640.
```

Figure A2.--Continued--Ba (parts per million)

```
        1.1                                                     1.0L
        1.0L                                                    1.0L
        1.8                                                     1.0L
        1.0L                                                    1.0L
        1.2                                                     1.7
        2.2                     1.0L    1.7                     1.0L
        1.0L    1.0L    2.6     1.8     3.0                     1.0L
        1.4     1.0L    3.0     2.3     2.3                     1.9
                1.5     3.5     1.8     1.0L                                1.0L    6.9
                2.8     2.1     1.0L    1.0L                            1.7     2.0     5.9
                1.0L    1.0L    1.0L    1.0L                            1.2     1.0L    4.0     1.0L    1.0L
                1.0L    1.0L    2.7     1.0L                            3.2     1.0L    3.9     1.6     1.0L
                1.7     1.4     1.0L    1.7                             1.9     2.4     1.5     1.1     1.0L
                2.8     1.0L                            1.0L    1.0L    1.4     2.7     1.0L    1.0L    1.0L
                                1.1                     1.0L    1.1     1.0L    2.9     1.5     1.3     2.6
                                1.0                     1.0L    1.8     2.6     2.5     1.4     1.3     1.0L
                                1.0L                    1.0L    1.0L    2.6                     6.4     2.3
                                1.0L                    1.0L    1.0L                            1.0L    1.4
                                1.0L                    1.3     1.3
                                1.0L            1.0L    2.4     3.2     3.3
                                1.0L            2.6     1.0L    2.6     1.0L
                                1.0L            3.3     1.0L    2.3     1.6
                                                3.0     1.0     1.3     1.8                                     1.1     2.6
                                                1.0L    1.0L    1.1     1.5                     1.0L    2.5     1.0L    2.2
1.9                             2.0     1.9     1.0L    1.0L    1.2     1.0L                    1.0L    1.5     1.5     1.0L
1.0L            2.8     1.7     1.7     1.2     1.0     1.0L    2.0     2.6             1.0L    1.0L    1.0L    1.0L    1.0L
5.9             1.4     1.4     1.0L    1.3     1.8     2.6     2.7     1.5             1.0L    1.0L    1.0L    1.3     1.7
3.9             2.2     2.1     2.5     1.5                     1.0L    1.6             1.0L    1.0L    1.0L    1.0L    1.9
1.9             1.2     2.6     1.5     1.4     1.5     1.0L    1.6     1.0L            1.2     1.0L    1.0L    2.2     1.0L
1.0L            1.0L    1.3     1.2     5.5     1.7     2.4                             2.6     1.5     1.0L    1.0L    1.0L
1.0L            1.0L    1.4     2.4     2.0     2.9     2.2                             2.0     1.0L    2.0
1.7             1.3     2.4     1.0L    2.8     1.3     1.0L                            1.0L
                1.2     1.0L                    1.0L    1.0L                            1.6
                                                1.6     1.7
                        1.8     2.2             1.1     3.1                             1.0L
                        1.1     1.2             1.6     1.0L                            1.0L
        1.0L    1.0L    2.4     2.3                                                     1.0L
        2.2     1.0L    1.0L    2.1                     1.2                             1.2
        1.5     1.9     1.0L    1.1                     2.8                             1.0L
        1.0L    1.0L    1.4     1.4                     2.0                             1.0L                    1.3     1.0L
        2.5     3.5     1.0L    1.3                     1.0L                            1.0L    1.0L    3.5     2.2     1.0L
        3.0     3.5     3.0     1.0L                    1.0L                            1.2     1.0L    1.5     1.4     1.0L
        1.0L    1.4                                     1.0L                                    3.4     1.0L    1.5     1.9
        2.3     1.0L            1.2     1.0L            1.3                                     3.1     2.5     3.6     1.2
                                1.0L    1.1             1.5                                     1.0L    1.0     3.8     1.7
                                3.8     1.2                                                     1.0L    1.0L    3.1     1.0L
                                3.0     2.1                                                     1.0     1.1     1.5     1.0L
                1.4     1.0L    2.3     1.0L            2.9                     1.0L    1.8     1.0L    1.0L
                1.0L    1.0L    1.2     1.0L            1.0L                    1.0L    1.0L
1.5             1.3     1.0L    1.3     1.6             2.2     2.8     1.1     3.3     1.0L
1.0L            1.9     1.5     2.2     2.0             1.4     1.3     1.0L    1.7     1.0L
1.0L            2.0     2.4                             2.8     1.0L    1.0L    3.6     1.7
2.0             1.3     1.0                             1.8     1.0L    1.9     2.1     1.0L
1.6             1.0L    1.1                            11.0     1.3     1.4     2.1     2.6
1.4             1.2     3.0                             2.2     1.9     1.5     1.8     1.3
1.0L                                                            1.6     1.5
2.0                                                             2.0     1.5
```

Figure A2.--Continued--Be (parts per million)

```
         11.00                                                    2.10
          7.60                                                    2.70
          4.20                                                    2.20
          2.90                                                    2.70
          5.40                                                    1.30
          4.20                    0.86    1.80                    0.71
          4.40    0.88   10.00    2.00    2.80                    1.50
          5.90    0.59   13.00    3.10    5.70                    0.46L
                  2.20    9.60    2.40    4.40                                                4.40   14.00
                  2.60    6.50    0.46L   0.46L                                   5.70        4.40   11.00
                  1.80    1.20    0.46L   1.20                                    2.50        0.57    4.60    1.80    2.20
                  2.00    1.40    1.70    0.46L                                   0.46L       1.90    7.00    1.90    2.50
                  1.60    2.90    1.10    1.70                                    1.60        3.50    2.80    7.60    2.10
                  3.00    2.70                                    5.70    0.46L   2.60        2.70    2.00    6.20    2.40
                                  0.46L                           6.30    1.70    2.10        9.10    3.20    5.90    7.70
                                  1.40                            1.30    1.40    0.46L       8.20    3.80    6.60    4.00
                                  0.90                            1.20    0.89    1.10                        4.90    2.10
                                  0.84                            1.40    0.46L                               3.10    2.40
                                  0.87                            1.40    0.46L
                                  1.20            0.46L   1.80    2.70    1.70
                                  0.46L           0.46L   1.60    2.50    0.46L
                                  0.46L           0.46L   0.46L   0.46L   2.60
                                                  1.70    0.46L   0.77    2.10                                    0.46L   0.46L
                                                  1.70    0.46L  12.00    1.90                    1.50    1.70    0.61    0.46L
  0.46L                           2.00    6.60    1.50    0.46L  13.00    1.60                    1.70    0.46L   1.70    5.80
  1.00            1.10    1.40    1.80    4.70    1.30    0.46L   0.84    2.10            0.46L   0.46L   1.70    0.46L   5.40
  0.46L           1.10    1.10    2.00    1.10    6.00    0.46L   0.46L   2.10            0.46L   0.46L   0.46L   0.46L   4.50
  0.46L           1.80    2.00    2.10    1.30                    0.96    0.46L           1.50    2.50    0.58    0.46L   4.70
  0.46L           0.46L   1.80    2.40    0.46L   2.00    0.46L   0.46L   0.46L           1.60    1.50    0.46L   0.46L   1.10
  0.46L           0.69    1.60    2.60    1.00    2.60    1.80                            2.00    2.00    1.10    0.46L   1.40
  1.40            0.73    1.60    0.46L   2.20    1.90    0.46L                           2.20    1.40    0.46L
  0.46L           1.90    1.50    0.46L   2.10    1.70    0.46L                           0.46L
                  1.00    0.46L                   0.46L   1.40                            0.46L
                                                  0.59    1.10
                          3.10    0.46L           0.46L  10.00                            0.83
                          3.10    0.46L           0.92    6.10                            0.82
          1.60    0.61    1.60    1.70                                                    0.83
          3.10    0.46L   0.46L   1.40                    0.46L                           2.60
          7.10    2.20    1.10    2.50                    1.70                            0.66
          5.70    1.70    1.60    2.60                    0.46L                           0.46L                  12.00   21.00
          9.50    9.20    0.87    0.46L                   1.50                            0.46L   9.50   24.00   12.00   21.00
          9.00   10.00    1.40    0.86                    0.48                            2.50    9.20   20.00    6.00    9.30
          7.70    0.97                                    0.46L                                  13.00    3.90    8.50   11.00
         10.00    0.46L           0.46L   2.50            3.40                                   13.00    5.60    5.50    7.40
                                  0.46L   2.30            3.00                                    1.70    2.40    4.20    9.40
                                  2.50    2.90                                                    0.46L   2.40    4.50    3.50
                                  2.10    3.00                                                    0.46L  12.00    4.70    3.00
                  3.60    0.74    2.20    3.40            2.30                    7.00    0.46L   1.40   10.00
                  3.10    1.30    0.46L   2.40            1.40                    6.80    0.46L
  0.46L           2.00    1.80    2.80    8.90            6.80    3.00    2.70    3.30    0.46L
  1.30            1.70    2.30    2.60    8.30            7.60    2.70    3.30    2.50    0.46L
 14.00            3.30    0.46L                           6.60    2.60    1.10    5.80    0.46L
 15.00            2.20    0.46L                           5.50    2.10    1.80    4.50    1.40
  7.60           11.00    0.46L                           3.10    0.46L   1.90    5.50    1.30
  7.80            1.30    1.30                            3.40    1.90    3.30    2.00    0.46L
  5.20                                                            0.46L   1.50
  4.20                                                            1.90    1.90
```

Figure A2.--Continued--Co (parts per million)

```
            7.80                                                    7.20
            5.70                                                    7.30
           63.00                                                    6.30
           15.00                                                    9.50
            5.80                                                    4.90
            9.20                    4.50    6.20                    3.40
            9.90    3.30   77.00   12.00    7.40                    6.70
           10.00    3.60   86.00   11.00   19.00                   10.00
                    6.30   15.00   10.00   13.00                                                6.20    8.20
                    8.10   12.00    4.30    7.00                                    8.60        6.50    4.90
                    4.70    3.80    6.00    7.10                                   12.00        2.10    7.20    5.60    4.30
                    5.20    4.40    5.20    9.20                                    5.40        5.70    7.10    5.40    4.70
                    4.00    9.30    7.30   12.00                                    6.70        8.60    6.00    6.30    4.60
                   10.00    5.80                                   17.00    8.50    4.70        5.60    5.10    4.80    6.00
                                    9.40                           18.00    6.80    2.90        8.70    6.70    9.60    9.60
                                    6.60                            5.70    6.80    8.10        8.30    5.30   10.00    5.00
                                    8.50                            4.80    4.40    6.90                        6.00    5.80
                                    5.20                            3.00    7.30                                6.20    4.30
                                    9.20                            4.30   78.00
                                    7.10            4.80    4.70   85.00    5.00
                                    8.10            5.30    4.80  160.00    7.90
                                    2.90            8.00    4.80    9.50    6.50
                                                   11.00    4.50    6.50    5.70                                    3.30    6.70
                                                    6.20    5.80   14.00    7.10                    5.80    8.00    0.46L   5.40
    6.30                            5.20   11.00    4.80    6.20    8.50    4.70                    7.50    6.20    3.30    8.70
    5.40            6.90   10.00   10.00    8.90    5.70    4.80    9.10    7.30            4.00    7.00    5.20    3.30    6.90
   11.00            4.30    7.90   10.00    8.40    9.90    5.10    7.90    6.60            4.60    7.60    5.70    2.70    7.50
   14.00            7.70    6.60    7.40    8.90                    5.30    6.10            3.70    8.50    3.60    2.90    8.10
   10.00            6.10    8.70    9.10    7.20    5.10    8.00    5.60   19.00            3.90   11.00    3.40    8.70   11.00
    7.80            5.80    8.30   10.00    6.70    7.50   12.00                           55.00    9.90    4.00    4.00    6.90
   10.00            5.90    8.40    7.30    5.80    9.50    6.00                            4.10    7.60    7.10
    6.10            7.00    5.90    5.50    7.90    6.50    3.20                            4.10
                    5.60    4.20                    4.10    9.60                            2.90
                                                    5.00    3.20
                            6.10    6.40            3.50    5.10                            2.60
                            7.20    4.60            5.00    8.60                            9.00
            7.20    2.40    5.80    7.60                                                    7.80
            9.30    4.00    5.70    8.20                    5.60                           11.00
           11.00   11.00    4.10    9.40                    5.90                            3.30
            8.60    7.60    4.80    6.70                    9.10                            2.40                   10.00    8.70
           15.00   30.00    4.20    5.30                    8.30                            2.10   22.00   27.00   28.00    7.70
           17.00   29.00    6.80    6.70                    4.80                            8.40   20.00   23.00    8.10    7.60
           41.00    8.90                                    5.30                                   42.00    6.20    9.20    8.50
           54.00    9.90            6.00    4.40            3.70                                   43.00    8.20    9.80    8.90
                                    4.60    4.00            5.50                                   17.00    5.20    7.00    5.40
                                   11.00    6.60                                                   18.00    4.90    6.50    6.00
                                    8.30    7.00                                                    5.10   15.00    9.40    6.90
                    4.60    7.30    4.70    3.80            6.50                   60.00    5.30    5.00   10.00
                    3.70    8.90    4.00    4.20            4.80                   41.00    3.00
   11.00            8.50    3.80    4.20    4.90            7.50   12.00    5.60   11.00    4.70
    6.10            6.30    5.50    3.60    4.40           10.00   11.00    5.10    5.10    3.20
   12.00            9.20    5.80                           11.00    9.00    7.90   15.00    8.40
   15.00            5.90   37.00                           10.00    8.20    8.40   16.00    6.80
   18.00           23.00    7.10                           10.00    5.00   11.00    9.80    4.00
   22.00            4.80    6.20                           11.00    6.70   16.00    8.80    4.00
    8.90                                                            4.80    7.00
    8.80                                                            5.80    5.40
```

Figure A2.--Continued--Cr (parts per million)

```
          9.20                                                    1.00
          4.40                                                    0.44
          3.10                                                    1.30
          2.40                                                    0.55
          1.20                                                    0.41
          2.40                    0.36    2.60                    0.49
          1.20    6.80    1.00    1.40    3.30                    0.78
          1.30    0.56    1.40    2.00    5.10                    0.79
                  3.60    1.90    1.50   10.00                                               14.00  150.00
                  4.70    2.30    0.84   16.00                                   44.00       11.20  210.00
                  1.60    1.20    1.10   14.00                                   14.00        2.00   40.00    2.20    2.50
                  2.60    1.20    0.54    4.20                                    1.20        6.10   76.00    1.50    2.30
                  2.60    0.88    0.72    7.30                                    1.20        9.00    2.70    4.00    3.90
                  1.80    0.86                                    7.50   43.00    1.90        6.30    2.30   53.00    4.30
                                  0.37                           46.00    2.70    1.40       36.00    8.40    2.60   13.00
                                  1.40                            0.28    0.54    1.30       42.00    8.10    3.30    3.80
                                  0.75                            0.84    0.39   78.00                        2.00    2.70
                                  0.82                            0.54    0.97                                1.40    2.70
                                  0.74                            0.44    0.92
                                  0.45            1.00    0.75   11.00    0.56
                                  0.90            1.50    1.10    7.90    0.49
                                  2.50            1.30    2.00    2.40    2.50
                                                  3.20    0.62    1.80    1.10                                    0.60    3.60
                                                  0.79    1.20    1.50    1.30                    0.36    1.10    1.20    3.10
  1.00                            2.20   38.00    6.30    0.22L   2.40    0.75                    0.38    0.99    0.78    3.80
  3.10            0.30    0.87    3.70    2.10    1.60    0.48    0.31    0.99            1.10    0.27    1.50    0.96    3.50
  1.70            0.22L   1.00    2.40    0.65    4.20    0.65    0.63    1.20            0.93    0.39    3.40    0.44    1.40
  1.30            0.82    0.22L   2.60    0.45                    0.51    1.20            2.10   14.00    0.37    0.65    1.80
  6.80            0.56    0.55    0.83    1.70    7.60    4.20    0.66    1.60            1.70    2.00    0.42    0.65    6.40
  1.70            1.20    0.38    0.75    2.20    8.80    5.70                            3.10    2.70    0.59    0.48    2.30
  8.40            2.00    0.33    0.59    1.10    3.40    2.60                            7.70    1.80    0.98
  1.60            0.65    1.80    0.36    1.40    2.50    6.50                            0.74
                  0.87    0.92                    0.96    6.40                            0.44
                                                  0.77    4.50
                          4.10   65.00            0.28    5.60                            0.76
                          4.60    0.50            0.87    4.70                            2.10
          4.10    0.22L   1.10    2.60                                                    2.00
          6.70    0.22L   1.20    2.20                    2.60                           10.00
          1.90    0.37    0.90    2.20                    3.50                            0.77
          0.72    2.10    1.00    1.60                    0.58                            1.30                   16.00    5.90
          3.20   20.00    1.30    1.40                    0.69                            0.71    0.77    5.60    1.40   16.00
          3.50   32.00    2.50    1.60                    3.30                            6.60    0.78    9.40    0.95    3.20
          3.90    0.48                                    0.25                                   21.00    9.20    1.60    2.50
          4.60    0.22            0.77    7.30            0.37                                   18.00    1.60    1.20    2.20
                                  0.55    6.30            1.50                                    1.70    2.00    1.90    2.70
                                  0.71   15.00                                                    1.10    1.50    2.20    0.94
                                  0.58   16.00                                                    0.33    2.90    2.00    8.80
                  1.20    1.20   81.00    2.90            2.80                    2.10    4.20    0.62    2.00
                  1.40    0.62   88.00    2.00            2.90                    0.96    3.30
  1.40            0.65    3.00  100.00   50.00            1.00    0.81    2.30    1.20    0.87
  6.30            0.76    1.00   85.00   23.00            1.40    1.90    2.50    1.70    1.20
160.00            8.60    1.20                            4.10    5.50    1.60    0.76    0.68
190.00            0.77    1.00                            4.10    5.70    6.60    0.76    1.30
 14.00            0.73    0.83                           18.00    8.60    1.10   48.00    0.48
 13.00            2.60    1.60                           15.00    8.00    2.10    1.20    1.50
  3.70                                                            8.40    1.90
  2.60                                                            7.60    1.70
```

Figure A2.--Continued--Cu (parts per million)

```
          36.0                                                            6.5
           5.7                                                            4.6L
          23.0                                                            7.6
          20.0                                                            8.2
          18.0                                                           22.0
          17.0                        4.6L     4.6L                       6.7
          12.0      4.6L    48.0      5.5      7.9                       10.0
          34.0     20.0     34.0     23.0     24.0                       25.0
                   19.0     14.0     29.0     22.0                                                       7.8     14.0
                   27.0     22.0      4.6L    25.0                                         17.0         10.0      7.2
                   19.0      4.6L    23.0     20.0                                         85.0          4.6L     8.6      4.6L    19.0
                    4.6L     4.6L     7.5     15.0                                         18.0         24.0     37.0      4.6L     4.6L
                   19.0     28.0     24.0      4.6L                                        19.0         11.0     19.0     36.0      4.6L
                    4.6L     4.6L                                        30.0     19.0     18.0          9.7     23.0      4.6L     4.8
                                     56.0                                29.0     15.0      9.9         59.0     16.0     14.0     21.0
                                      7.2                                 4.6L    35.0     15.0         58.0     20.0     19.0      4.6L
                                      5.7                                 4.6L     4.6L    15.0                           14.0     37.0
                                     17.0                                12.0      6.5                                    17.0      4.6L
                                     52.0                                 4.6L     8.8
                                     18.0              28.0     28.0     32.0      4.6L
                                      4.6L             17.0      4.6L    27.0     18.0
                                                        9.8      4.6L    25.0     16.0                                          4.8      4.6L
                                                        5.6      9.4     29.0     19.0                       11.0     22.0      5.8      4.6L
 15.0                                15.0     28.0      4.6L    19.0     25.0     19.0                       15.0      5.4      4.6L     5.7
  7.6               8.4     11.0     20.0     11.0      5.6      0.0B    16.0     17.0               4.6L     9.9     18.0      4.6L     7.5
  7.7               4.6L    21.0     14.0     14.0     17.0      4.6L    19.0     10.0               4.6L    14.0     21.0      4.6L    16.0
  5.7              12.0     18.0     33.0     13.0                       10.0     21.0              21.0      7.1     27.0      0.0B    26.0
 14.0               4.8     16.0     34.0     13.0     14.0     85.0     19.0     16.0               4.6     15.0     20.0     20.0     16.0
  4.6L             22.0     13.0     27.0     11.0     21.0    200.0                                70.0     12.0      4.6L     5.9     11.0
  6.8              14.0     10.0     15.0     24.0     25.0     24.0                                62.0      7.9     13.0
 23.0               7.8     30.0      4.6L    11.0     24.0      0.0B                               19.0
                    4.6L     4.6L                       4.6L    16.0                                 4.6L
                                                        5.3      9.1
                            22.0      8.4              17.0     25.0                                 4.6L
                             4.6L     4.6L             31.0      7.1                                38.0
          17.0     14.0     34.0     15.0                                                           14.0
           4.7     19.0     14.0     11.0                        8.5                                28.0
          30.0     21.0      7.0      9.6                       36.0                                20.0
          11.0     19.0     12.0     12.0                        4.6L                               24.0                       30.0     39.0
          33.0     46.0      9.4      4.6L                       4.6L                                0.0B    48.0     43.0     28.0     46.0
          23.0     35.0      9.1      8.1                       22.0                                18.0     38.0     43.0     25.0     17.0
          41.0      8.6                                          4.6L                                        34.0     23.0     30.0     11.0
          51.0     17.0              22.0      4.6L             23.0                                         28.0     23.0     31.0     15.0
                                      4.6L     4.6L             14.0                                         73.0     13.0     23.0      0.0B
                                     19.0     27.0                                                           65.0     13.0     31.0     32.0
                                     16.0      6.3                                                            8.5     26.0     16.0     28.0
                   18.0      6.9     24.0      4.6L             33.0                       35.0     15.0      9.5     24.0
                   17.0      7.7     26.0      4.6L              4.6L                      41.0      5.7
  8.3               6.5      4.6L     4.6L    24.0              31.0     36.0     34.0     44.0     10.0
  9.4               9.9      6.0      7.1      6.1              33.0     38.0      9.4     33.0      8.8
 26.0              15.0     13.0                                26.0     27.0     21.0     41.0     12.0
 27.0               9.0      8.9                                 5.3     21.0     14.0     44.0      7.7
 24.0              46.0      5.8                                66.0     27.0     37.0     20.0      6.8
 16.0               7.5     11.0                                58.0     22.0     44.0     83.0      4.6L
 31.0                                                                    14.0     29.0
 25.0                                                                    12.0     20.0
```

Figure A2.--Continued--La (parts per million)

```
        1.4                                                     1.0L
        1.0L                                                    1.0L
        1.0L                                                    1.0L
        1.0L                                                    1.0L
        1.0L                                                    1.0L
        1.0L                    1.0L    1.0L                    1.0L
        1.2     1.0L    3.6     1.0     1.3                     1.1
        1.0L    1.0L    3.4     1.6     1.3                     1.0L
                1.4     1.0     1.0L    1.1                                 1.3     8.3
                1.0L    1.0L    1.0L    1.1                             1.0L        1.4     4.8
                1.0L    1.0L    1.0L    1.0L                            1.0L        1.0L    5.3     1.0L    1.0L
                1.0L    1.0L    1.3     1.0L                            1.4         1.0L    5.1     1.0L    1.0L
                1.0L    1.1     1.0L    1.0L                            1.0L        1.2     1.0L    1.6     1.0L
                1.1     1.0L                            1.1     1.0L    1.7         1.5     1.0L    1.0L    1.2
                                1.0L                    1.0L    1.0L    1.0L        4.5     1.5     1.3     1.3
                                1.0L                    1.4     1.0L    1.1         3.7     1.9     1.0     1.0L
                                1.0L                    1.0L    1.0L    1.2                         1.3     1.1
                                1.0L                    1.0L    1.0L                                1.0L    1.0L
                                1.0L                    1.0L    1.0L
                                1.2             1.0L    1.0L    1.3     1.4
                                1.0L            1.0L    1.0L    1.3     1.0L
                                1.0L            1.2     1.3     1.2     1.1
                                                1.2     1.3     1.0L    1.0L                            1.0L    1.0
                                                1.0L    1.0L    1.0     1.7                     1.0L    1.3     1.0L    1.0L
1.2                             1.0L    1.0L    1.0L    1.0L    1.4     1.0L                    1.0L    1.0L    1.2     1.0L
1.0L            1.2     1.0L    1.8     1.0L    1.0L    1.0L    1.0L    1.0L            1.4     1.0L    1.0L    1.0L    1.3
1.0L            1.0L    1.0L    1.0L    1.0L    1.1     1.0     1.0L    2.3             1.0L    1.2     1.0L    1.0L    2.1
1.2             1.0L    1.0L    1.0     1.0L                    1.0L    1.1             1.0L    1.0L    1.0L    1.0L    1.6
1.6             1.0L    1.5     1.0L   18.0     1.0L    1.1     1.0L    1.0L            1.0L    1.0L    1.0L    1.2     1.0L
1.0L            1.0L    1.0L    1.6    14.0     1.0L    1.6                             1.0L    1.2     1.0L    1.0L    1.0L
1.0L            1.0L    1.0L    1.0L    1.0L    1.4     1.2                             1.0L    1.1     1.0L
1.0L            1.0     1.0L    1.0L    1.0L    1.0L    1.0L                            1.0L
                1.0L    1.0L                    1.0L    1.0L                            1.0L
                                                1.0L    1.0L
                        1.0L    1.8             1.0L    1.0L                            1.0L
                        1.0L    1.0L            1.0L    1.0L                            1.0L
        1.0L    1.0L    1.0L    1.4                                                     1.0L
        1.0L    1.0L    1.0L    1.0L                    1.0L                            1.0L
        1.0L    1.4     1.3     1.0L                    1.0                             1.0L
        1.5     1.0L    1.5     1.0L                    1.0L                            1.0L                    7.5     1.3
        1.3     2.3     1.0L    1.0L                    1.0L                            1.0L    3.7     2.5     9.4     1.3
        1.4     2.9     1.2     1.0L                    1.0L                            1.0L    5.2     3.1     1.3     1.0L
        4.5     1.0L                                    1.0L                                    4.1     1.0L    2.2     1.0L
        5.4     1.0L            1.0     1.0L            1.0L                                    4.2     1.5     1.7     1.0L
                                1.0L    1.0L            1.2                                     2.6     1.2     1.0L    1.0L
                                1.1     1.2                                                     2.8     1.0L    1.8     1.2
                                1.5     1.1                                                     1.0L    1.7     1.6     1.0L
                1.0L    1.0L    1.3     1.0L            1.0L                    7.8     1.3     1.0L    1.0L
                1.0L    1.0L    1.0L    1.0L            1.0L                    4.9     1.0L
1.0L            1.0L    1.0L    1.0L    1.0L            1.0L    1.1     1.0L    1.3     1.5
1.0L            1.8     1.0L    1.0L    1.0L            1.0     1.0L    1.0L    1.0L    1.4
1.3             1.8     1.0L                            1.7     1.0L    1.0L    1.6     1.0
1.8             1.0L    1.0L                            1.0L    1.0L    1.0L    1.0L    1.0L
1.6             5.0     1.0L                            1.0L    1.0L    1.1     1.1     1.0L
1.1             1.0L    1.4                             1.0L    1.2     1.1     1.0L    1.0L
1.0L                                                            1.0L    1.1
1.5                                                             1.1     1.4
```

Figure A2.--Continued--Mo (parts per million)

```
                    15.0                                                    14.0
                     2.2L                                                   17.0
                    11.0                                                     2.2L
                     3.2                                                     2.2L
                     5.4                                                    10.0
                     9.0                     2.2L    7.2                     2.2L
                     6.4     6.0    17.0     2.9    13.0                     8.6
                     5.1     4.9    17.0     4.2    14.0                     9.3
                             7.8    17.0     8.5     6.9                                                 6.2    22.0
                             8.1     9.1     2.2L    8.6                                    10.0         7.3    15.0
                             4.3     7.1     3.0     2.4                                    52.0         3.0    32.0     9.6     3.5
                             6.7     6.0     7.4     5.6                                    21.0         2.2L   37.0     5.0     5.1
                             5.9     6.4     7.6    11.0                                     4.8        24.0     6.1     4.3     5.2
                            11.0    11.0                                     7.5     9.5    14.0         8.2     3.6     2.9     7.8
                                            22.0                             7.5    25.0     2.2L        4.2     2.2L   14.0    16.0
                                            11.0                             2.6     3.2     8.0         2.2L    8.7     8.5     9.1
                                            11.0                            11.0     4.2     3.4                        18.0     5.9
                                             7.4                             2.5    25.0                                 4.1    12.0
                                            32.0                            13.0    28.0
                                             3.1             8.9    14.0    14.0    45.0
                                             9.5            10.0     7.0     9.9    16.0
                                             7.8             9.7     7.5     8.3     9.7
                                                             8.3     5.8     5.5     5.0                                     7.1     9.9
                                                             4.9     7.7    17.0    10.0                     7.9    11.0     4.7    14.0
             8.0                            16.0    18.0     5.9    14.0    12.0     8.3                     7.9     8.9     8.7    11.0
            11.0             2.8     9.9    20.0    13.0     7.9     2.2L   11.0    11.0             4.1     3.5     4.9     5.4    17.0
             7.6             7.6     8.5    15.0     7.6    13.0    11.0    10.0     7.9            11.0     9.0     6.0    11.0     7.7
            13.0             3.1    10.0    16.0     4.4                    12.0    36.0            12.0     3.7    11.0     2.2L   18.0
            12.0             8.7    10.0    11.0     9.4    18.0    42.0    15.0    23.0             4.3     4.9     7.1     8.2     5.5
             4.4             6.6    18.0    15.0     3.7     6.5    41.0                             7.8    20.0     4.5    10.0     4.5
             4.5             7.8     5.3     6.4     8.2     8.3     7.0                             4.2     8.4    19.0
             7.9             6.8    14.0     2.8     8.2    10.0     5.4                             5.5
                            13.0     2.2L                    9.3     5.8                             5.9
                                                            12.0    11.0
                                    15.0     5.9             2.2L   12.0                             6.8
                                     5.5     9.4             6.8     8.7                            11.0
                    17.0     5.0     7.9     5.2                                                     9.8
                    31.0     4.4     2.2L    8.8                     5.1                             2.6
                    16.0     9.0     8.0     8.7                     7.5                             5.1
                    16.0     6.1    10.0     9.3                     3.5                            11.0                     8.4     2.2L
                    23.0    17.0     7.7     2.2L                    9.3                            16.0     7.3    26.0     7.6     4.4
                    17.0    25.0     7.8     2.4                     3.3                             2.9     2.2L   21.0     2.6     6.5
                    17.0     7.7                                     2.2L                                    9.9     2.2L   13.0     5.5
                    32.0     6.6            16.0     9.7             2.2L                                    6.7     5.3     4.9     4.8
                                            11.0     2.2L           10.0                                     6.6     5.5     5.7     6.3
                                            18.0    14.0                                                     7.0     2.2L    5.9     5.6
                                            18.0    11.0                                                     8.0    30.0    16.0     6.9
                             6.2     3.3     2.5     2.2L           33.0                    16.0    28.0    15.0    24.0
                             2.2L   10.0     7.3     4.6            29.0                    20.0     5.0
            10.0             5.6    10.0     3.2     7.3            25.0    69.0    14.0    76.0     2.2L
            11.0             8.7    26.0     6.8     9.2            14.0    40.0     7.3    38.0     2.2L
            14.0            20.0    12.0                            29.0    35.0    52.0    30.0    22.0
            31.0             8.0     3.8                            27.0    32.0    73.0    28.0    14.0
            27.0             5.4    11.0                            25.0    18.0    61.0     8.7     9.6
            25.0             7.2    18.0                            30.0    18.0    66.0    44.0     4.1
            11.0                                                            40.0    31.0
            18.0                                                            42.0    20.0
```

Figure A2.--Continued--Nb (parts per million)

```
            12.0                                                     4.8
             4.4                                                     6.1
             5.7                                                     3.3
             3.9                                                     3.8
             4.7                                                     2.1
             6.3                     1.2     3.9                     1.2
             8.9     1.1    39.0     4.1     4.3                     3.4
             7.4     1.0L   42.0    11.0    19.0                     2.1
                     3.9    17.0     6.0    13.0                                                     4.1    19.0
                     3.1    14.0     1.0L    4.8                                    12.0         2.9    16.0
                     1.1     1.7     1.1     2.3                                     5.9         1.1    10.0     1.0L    1.3
                     2.4     1.5     3.5     1.4                                     3.8         4.5     6.3     1.0L    2.1
                     2.3     3.9     3.0     2.6                                     1.2         3.7     2.7     5.5     1.1
                     3.4     3.7                                    11.0     3.8     2.0         5.2     1.7     3.3     2.2
                                     1.6                             9.6     2.1     1.6        15.0     2.8     5.6    19.0
                                     3.6                             3.2     1.2     1.4        10.0     2.7     5.5     5.7
                                     2.7                             2.7     1.3     3.9                         6.3     3.3
                                     1.9                             1.1     2.3                                 3.2     2.8
                                     2.9                             1.6     2.3
                                     1.8             1.2     6.9     3.1     2.7
                                     1.6             1.0L    4.0     2.4     1.0L
                                     2.2             4.7     3.2    14.0    12.0
                                                     9.6     2.4     1.9     4.3                                     1.0L    8.9
                                                     1.7     1.1    15.0     4.3                     2.3     2.6     1.0L    2.3
     3.3                             2.5     6.9     1.0L    1.0L   17.0     1.2                     3.1     4.2     2.4     2.9
     1.0L            1.4     2.0     5.6     1.9     2.2     1.0L    1.0     2.5             1.6     1.8     2.9     1.0     3.1
     2.7             1.0L    1.4     2.6     1.4    10.0     1.4     1.7     5.0             1.5     2.4     6.6     1.4     5.1
     1.8             2.1     2.5     3.2     1.9                     1.0L    4.9             1.0L    8.3     1.2     1.0L    3.8
     5.2             3.3    12.0     3.5     1.1     3.7     5.8     1.8     1.7             1.6     2.6     1.0L    2.6    13.0
     3.7             1.0L    2.6     6.3     1.0     5.5     3.5                             2.4     1.4     1.0L    2.7     3.3
     4.9             1.0L    2.0     2.0     3.1     2.7     1.0L                            3.0     3.3     1.5
     2.0             5.2     1.0L    4.1     3.9     1.6     1.0L                            1.6
                     1.4     1.0L                    1.8     1.7                             1.0L
                                                     1.4     2.0
                             3.5     4.2             1.0L   12.0                             1.3
                             4.0     1.1             1.0L    9.9                             3.2
             2.1     1.0L    1.4     1.9                                                     1.4
             2.7     1.0L    3.1     1.5                     1.6                             2.0
             9.9     5.0     1.0L    4.3                     1.6                             1.4
            11.0     3.5     1.8     6.7                     1.0L                            1.7                    12.0     4.8
            15.0     9.6     1.0L    1.0L                    1.0L                            1.0L   11.0    18.0    17.0     8.2
            15.0    11.0     2.1     1.0L                    2.2                             2.3    10.0    16.0     3.4     4.7
            15.0     6.3                                     1.8                                    24.0     1.6     5.5     5.9
            13.0     1.0             1.6     1.2             3.8                                    22.0     2.4     7.1     3.1
                                     1.0L    1.7             2.5                                     2.0     2.0     4.9     4.5
                                     5.8     5.1                                                     4.5     1.0L    3.7     3.0
                                     7.1     3.0                                                     2.6     7.0     7.1     3.2
                     2.8     2.1     3.8     2.4             2.1                     9.8     2.7     1.3     4.4
                     2.8     2.1     5.7     1.1             1.6                    12.0     4.5
     1.0L            2.7     3.6     1.6     8.3             7.2     5.9     2.6     6.4     2.2
     1.1             5.1     2.3     1.9     9.9             9.2     7.1     3.1     3.0     1.6
     8.1             5.4     2.6                            12.0     2.7     1.4    12.0     1.7
    13.0             2.1     1.8                             7.7     3.1     1.4    10.0     1.9
    11.0            12.0     3.5                             3.6     1.6     7.4     7.1     1.9
     9.8             1.5     3.5                             3.9     1.6     8.8     3.2     1.3
     8.8                                                             1.3     5.4
    11.0                                                             2.0     6.9
```

Figure A2.--Continued--Ni (parts per million)

```
                   5.2                                                     2.7
                   2.6                                                     3.0
                  30.0                                                     3.1
                  26.0                                                     3.3
                   4.6                                                     3.6
                   6.8                     2.2L    3.9                     3.3
                   9.4     3.2    11.0     5.1     4.4                     9.4
                   7.8     2.2    12.0     3.2     7.7                     9.1
                           4.5     6.0     3.4     5.0                                                 4.1   390.0
                           7.1     4.0     2.4     4.3                                     6.9         3.9   320.0
                           2.2     3.0     2.5     3.0                                    18.0         6.1   200.0     3.5     2.2
                           2.4     3.6     6.0     2.9                                     6.0         3.1   220.0     3.2     2.2L
                           2.7     4.5     2.5     3.9                                     4.4         9.2     4.6     5.3     3.0
                           5.8     3.1                                 9.8     2.5     5.7         6.9     3.1     3.0     4.6
                                           4.5                        12.0     3.8     3.2        15.0     4.0     3.4     4.5
                                           4.1                         3.4     2.8     5.7        11.0     4.5     5.8     3.1
                                           4.7                         4.1     2.2L    7.9                         4.4     4.9
                                           4.7                         2.9     2.6                                 2.9     4.6
                                           4.6                         4.9     3.5
                                           4.6             2.2L    4.1     5.7     5.3
                                           4.5             4.8     2.6     4.3     2.6
                                           6.1             4.4     3.8     6.7     6.5
                                                           4.4     3.2     5.6     5.0                                     3.2    13.0
                                                           4.7     2.7     6.7     6.1                     3.8     5.5     2.2    14.0
          13.0                             6.8     8.0     2.2L    2.5     9.8     4.5                     3.7     5.2     3.5     5.2
           8.2             4.8     4.2     8.2     5.5     2.7     3.0     5.4     7.8             3.0     3.2     2.9     2.7     6.4
           5.2             3.9     6.0    32.0     3.2     5.8     4.3     7.7     5.5             5.8     3.2     2.7     4.6     8.8
           7.5             3.9     4.7    41.0     3.6                     4.5     5.9             3.2     4.3     3.7     2.5     8.1
           4.0             3.5     5.9     4.8     4.1     6.2     3.2     7.6     3.4             3.7     3.8     4.2     3.6     3.6
           2.9             3.4     3.7     4.9     4.4     9.6     4.2                             6.8    11.0     3.3     3.1     4.1
           3.4             3.2     3.4     4.8     7.1     5.0     5.4                             4.8     7.5     7.1
           3.3             4.7     4.5     2.8     5.1     4.2     2.8                             3.3
                           3.4     3.1                     4.1     3.6                             4.0
                                                           3.7     3.9
                                   3.4     7.4             5.0     6.1                             4.9
                                   4.6     4.5             6.2     5.0                             8.1
                   3.1     2.2L    4.9     6.5                                                     7.5
                   5.4     3.7     3.7     5.9                     3.2                             3.4
                   8.3     4.2     2.2L    9.0                     4.9                             5.2
                   5.7     4.3     3.8     9.3                     3.2                             3.9                     6.4     8.0
                   9.1    32.0     3.0     2.4                     3.6                             3.4    16.0    23.0    11.0     8.9
                   9.4    41.0     4.7     3.5                     2.2L                            2.8    15.0    17.0     3.5     6.8
                  10.0     6.3                                     3.6                                    19.0     4.7     5.5     8.8
                  14.0     4.5             3.8     4.0             4.9                                    17.0     7.1     8.4     5.5
                                           3.2     5.1             3.3                                     5.1   110.0     7.9     7.0
                                          10.0     6.4                                                     2.9    79.0     4.4     5.3
                                           7.6     6.1                                                     5.6    66.0     5.7     3.8
                           4.2     6.4     4.7     2.4             4.3                    11.0     6.8     2.2L   60.0
                           2.5     6.4     3.2     3.1             3.3                    11.0     3.1
           3.3             4.9     3.8     3.4     4.1             5.1    10.0     4.4    15.0     2.2L
           2.7             5.6     6.8     2.4     5.4             6.7     6.1     3.1    12.0     2.2L
           7.8             9.9     7.7                             7.9    15.0     5.9    16.0     5.4
           7.7             5.3     5.1                             7.1    14.0     6.7    17.0     3.9
           9.9            20.0     7.4                             8.5    17.0     8.0     7.0     7.1
          12.0             4.2     9.6                            11.0    18.0     8.5    19.0     3.3
           5.9                                                             5.6     9.3
           5.4                                                             7.0     8.3
```

Figure A2.--Continued--Pb (parts per million)

```
                  3.8                                                     1.4
                  2.9                                                     1.7
                  2.8                                                     1.5
                  2.8                                                     1.4
                  2.7                                                     1.2
                  2.6                     1.3     2.0                     1.5
                  2.6     1.3    13.0     1.4     1.9                     1.8
                  2.9     1.5    14.0     2.2     3.5                     1.9
                          1.9     3.1     1.5     2.2                                                 1.0L    2.0
                          2.7     2.3     1.8     1.6                                     2.7         1.3     1.8
                          1.3     1.4     1.4     1.6                                     3.1         1.2     2.7     1.2     1.3
                          1.8     1.5     1.9     1.9                                     2.1         1.4     2.4     1.7     1.0L
                          1.9     2.0     1.4     1.7                                     1.7         2.1     1.8     2.1     1.0L
                          2.1     1.6                                     4.2     2.0     2.4         1.7     1.5     1.9     1.9
                                          2.3                             4.7     2.7     1.3         3.6     1.4     1.9     1.4
                                          1.2                             1.6     1.5     1.8         3.8     1.9     2.0     1.5
                                          1.9                             2.0     1.4     1.7                         2.5     1.9
                                          2.0                             1.2     1.6                                 1.5     1.5
                                          1.9                             1.5     2.6
                                          1.8             1.8     1.2     2.1     3.4
                                          1.9             1.5     1.5     2.0     2.0
                                          1.8             2.1     1.7     2.6     2.5
                                                          1.2     1.7     1.8     1.5                                     1.3     2.0
                                                          1.5     1.3     2.5     1.6                     2.3     1.5     1.4     1.8
          1.7                             2.3     1.8     1.0L    1.6     2.5     1.4                     2.4     1.6     1.3     2.4
          1.6             1.8     2.0     1.8     1.5     1.4     1.0     1.7     3.2             1.8     1.9     2.1     1.6     3.0
          2.7             1.4     2.0     1.1     1.7     2.0     1.5     2.3     2.5             1.6     2.8     2.4     1.5     2.8
          2.5             1.8     2.0     3.1     1.5                     1.3     2.2             1.3     1.7     1.4     1.0L    2.6
          1.7             1.1     2.2     3.9     2.3     2.0     2.1     1.6     1.3             1.8     1.7     1.2     1.1     1.7
          1.1             1.1     2.0     4.2     1.4     2.1     2.7                             2.2     2.3     1.6     1.4     1.7
          1.0             1.5     1.6     1.6     1.7     1.7     1.5                             1.8     2.0     2.0
          1.4             1.9     2.1     1.3     1.6     1.5     1.5                             1.0L
                          1.9     1.0L                    1.0L    1.6                             1.1
                                                          1.9     1.2
                                  1.6     1.9             1.6     1.8                             1.6
                                  1.6     1.2             2.0     1.6                             2.4
                  1.1     1.9     2.1     1.8                                                     2.1
                  2.3     1.6     1.5     1.8                     1.6                             1.6
                  3.4     1.9     1.5     2.2                     2.1                             1.6
                  2.4     1.6     2.0     3.0                     1.8                             1.6                     6.4     3.5
                  6.3     4.5     1.3     1.1                     1.7                             1.7     5.0     8.4     8.2     5.7
                  5.3     5.7     2.1     1.5                     1.4                             1.7     5.2     9.1     2.5     1.9
                 13.0     1.9                                     1.4                                    14.0     2.1     3.4     3.2
                 16.0     2.1             1.4     1.5             1.4                                    11.0     2.9     3.9     1.7
                                          1.9     1.3             1.6                                     6.0     1.8     3.5     2.0
                                          2.6     2.6                                                     7.5     1.7     3.3     4.1
                                          2.7     2.1                                                     1.6     4.1     3.3     3.4
                          1.9     2.2     1.7     1.5             1.5                     8.4     2.1     1.8     3.0
                          1.3     2.1     2.0     1.5             1.7                    13.0     1.1
          1.8             2.1     1.5     1.4     2.1             2.4     3.7     2.0     4.0     1.8
          1.0L            2.4     1.9     1.6     1.6             2.6     3.6     2.0     2.9     1.9
          3.2             2.1     2.2                             3.5     1.8     2.1     6.3     2.5
          3.7             1.6     1.6                             4.0     2.0     2.4     6.4     1.9
          4.9             6.4     1.2                             4.7     1.8     4.6     2.8     1.7
          4.1             2.0     2.4                             3.1     2.3     5.1     3.2     1.2
          2.4                                                             1.5     2.4
          2.5                                                             2.4     2.1
```

Figure A2.--Continued--Sc (parts per million)

```
        4.9                                             4.6L
        4.6L                                            4.6L
        4.6L                                            4.6L
        4.6L                                            4.6L
        5.3                                             5.2
        6.5                     4.6L    4.6L                    4.6L
        4.9     4.6L    4.6L    6.2     8.1                     4.9
        5.7     4.6L    4.6L    5.5     5.3                     4.6L
                4.6L    7.7     4.6L    4.6L                                                4.6L    6.7
                4.8     4.7     4.6L    4.7                                     5.0         5.0     4.6L
                4.6L    4.6L    4.6L    5.0                                     7.0         4.6L    6.6     4.6L    4.6L
                4.6L    4.6L    4.6L    4.6L                                    7.5         4.6L    4.6     4.6L    4.6L
                4.6L    4.6L    4.6L    7.0                                     5.5         6.7     4.6L    4.6L    4.6L
                8.1     4.6L                                    4.6L    4.6L    6.0         6.3     4.6L    4.6L    5.0
                                4.6L                            4.6L    4.6L    4.6L        4.6L    4.8     4.6L    7.6
                                4.6L                            4.6L    7.1     6.1         4.6L    4.7     6.7     5.1
                                4.6L                            4.6L    4.6L    7.9                         4.6L    7.4
                                4.6L                            4.6L    4.6L                                4.6L    4.6L
                                4.6L                            5.0     4.6L
                                4.6L            5.3     4.6L    4.6L    5.5
                                4.6L            7.4     4.9     4.6L    4.6L
                                4.6L            7.3     5.3     5.4     4.6L
                                                7.6     4.6L    4.6L    4.6L                                    4.6L    7.5
                                                4.9     4.6L    4.6L    4.7                     4.6L    6.0     4.6L    7.9
5.6                             6.7     4.6L    4.6L    4.6L    4.6L    4.6L                    4.6L    5.9     5.4     4.6L
5.1             6.9     5.3     5.8     4.8     4.6L    5.0     5.4     4.6L            4.6L    4.6L    4.6L    4.6L    4.6L
7.9             4.6L    4.8     4.6L    4.6L    4.6L    7.1     7.0     5.3             4.6L    4.6L    4.6L    5.1     4.6L
9.4             4.6L    5.1     7.4     4.7                     4.6L    4.6L            4.6L    4.6L    4.9     4.6L    4.6L
6.0             4.8     4.6L    4.6L    4.6L    4.8     6.4     6.4     4.6L            4.6L    4.6L    4.6L    4.8     4.6L
4.6L            4.6L    5.3     4.6L    4.6L    6.2     5.3                             6.8     4.6L    4.6L    4.6L    4.6L
5.4             4.6L    4.6L    6.3     6.1     7.6     6.8                             4.6L    4.6L    6.9
5.5             5.6     4.6L    4.6L    6.0     5.1     4.6L                            4.6L
                4.6L    4.6L                    4.7     4.9                             5.0
                                                5.5     4.6L
                        5.4     6.6             4.6L    4.6L                            4.6L
                        4.6L    4.6L            4.6L    4.6L                            4.6L
        4.6L    4.6L    7.8     4.6L                                                    4.6L
        5.1     4.6L    4.6L    6.2                     6.7                             4.6L
        4.6L    4.6L    4.6L    4.6L                    7.0                             4.6L
        4.6L    4.6L    4.6L    4.6L                    5.4                             4.6L                    4.6L    4.6L
        6.6     6.7     4.6L    4.6L                    5.6                             4.6L    4.6L    6.0     4.6L    4.6L
        4.6L    4.6L    8.8     4.6L                    4.6L                            4.6L    4.6L    4.6L    4.6L    4.6L
        4.6L    5.2                                     7.6                                     4.6L    4.6L    4.6L    4.6L
        6.6     5.7             4.6L    4.6L            5.9                                     4.6L    4.6L    4.6L    4.6L
                                4.6L    4.6L            6.3                                     4.6L    4.6L    4.6L    6.4
                                4.6L    4.6L                                                    4.6L    4.6L    4.6L    4.6L
                                7.9     5.9                                                     4.6L    4.8     4.6L    4.6L
                4.6L    4.6L    7.1     4.6L            7.4                     4.6L    5.3     4.6L    4.6L
                4.6L    4.6L    5.4     4.6L            4.7                     4.6L    4.6L
5.8             4.6L    4.6L    4.6L    5.3             6.8     7.5     5.9     8.0     4.6L
4.6L            5.3     5.3     4.6L    4.6L            4.6L    4.6L    4.6L    4.6L    4.6L
4.6L            4.6L    6.4                             4.6L    4.6L    4.6L    4.6L    4.7
4.6L            4.8     4.6L                            4.6L    4.6L    5.0     4.6L    4.6L
4.6L            4.6L    5.1                             4.6L    4.6L    4.6L    5.6     7.0
5.0             4.6L    8.4                             4.6L    7.5     4.6L    7.7     4.6L
4.6L                                                            4.6L    4.6L
4.6L                                                            4.6     5.1
```

Figure A2.--Continued--Sn (parts per million)

	37.0							94.0											
	22.0							96.0											
	100.0							99.0											
	150.0							140.0											
	46.0							7.8											
	43.0			7.8	16.0			7.2											
	150.0	10.0	89.0	24.0	29.0			6.7											
	180.0	4.6	160.0	8.6	240.0			6.1											
		16.0	190.0	5.0	180.0							290.0		150.0					
		12.0	160.0	6.1	15.0					25.0		280.0		150.0					
		6.6	7.5	6.6	14.0					65.0		7.2		120.0		85.0		140.0	
		9.2	9.9	10.0	17.0					10.0		12.0		130.0		88.0		150.0	
		4.5	19.0	9.4	23.0					10.0		160.0		480.0		240.0		250.0	
		6.0	13.0					120.0	40.0	140.0		170.0		280.0		200.0		250.0	
				120.0				130.0	49.0	44.0		280.0		380.0		170.0		240.0	
				11.0				15.0	9.3	28.0		270.0		700.0		200.0		120.0	
				110.0				15.0	9.4	26.0						190.0		170.0	
				120.0				11.0	17.0							130.0		130.0	
				110.0				15.0	15.0										
				100.0		8.1	8.8	44.0	19.0										
				71.0		9.8	16.0	34.0	11.0										
				8.3		8.1	15.0	150.0	140.0										
						6.9	22.0	110.0	90.0								23.0		120.0
						14.0	8.6	110.0	53.0				55.0		8.1		13.0		180.0
4.6				5.8	17.0	6.0	7.1	160.0	48.0				47.0		8.9		15.0		25.0
5.1		5.4	43.0	7.1	10.0	9.5	6.1	55.0	110.0		13.0		43.0		36.0		11.0		43.0
13.0		7.4	40.0	8.3	13.0	190.0	5.0	66.0	80.0		20.0		50.0		46.0		13.0		130.0
8.4		11.0	15.0	13.0	12.0			49.0	140.0		8.3		26.0		7.8		12.0		150.0
9.0		8.2	18.0	76.0	11.0	87.0	13.0	64.0	83.0		6.4		12.0		5.6		22.0		10.0
8.6		20.0	8.1	70.0	12.0	150.0	37.0				21.0		64.0		11.0		19.0		15.0
3.8L		21.0	9.8	7.6	20.0	7.0	12.0				17.0		28.0		11.0				
6.1		23.0	9.1	7.4	26.0	3.8L	9.9				11.0								
		24.0	5.9			9.9	15.0				9.4								
						10.0	10.0												
			7.7	12.0		8.1	18.0				140.0								
			7.8	8.8		9.3	13.0				120.0								
	60.0	8.6	24.0	16.0							100.0								
	160.0	14.0	25.0	14.0			150.0				1200.0								
	150.0	27.0	18.0	100.0			170.0				150.0								
	150.0	31.0	28.0	110.0			11.0				47.0						62.0		100.0
	120.0	180.0	28.0	10.0			19.0				65.0		92.0		130.0		94.0		160.0
	94.0	160.0	40.0	11.0			18.0				940.0		69.0		130.0		17.0		34.0
	180.0	45.0					34.0						110.0		28.0		25.0		33.0
	180.0	33.0		120.0	120.0		92.0						110.0		45.0		230.0		21.0
				49.0	100.0		180.0						180.0		26.0		240.0		20.0
				160.0	140.0								180.0		18.0		22.0		75.0
				190.0	120.0								120.0		21.0		20.0		77.0
		13.0	180.0	22.0	62.0		60.0			100.0	66.0		20.0		19.0				
		11.0	140.0	13.0	94.0		43.0			110.0	36.0								
21.0		54.0	62.0	64.0	93.0		31.0	30.0	26.0	36.0	38.0								
26.0		73.0	72.0	31.0	79.0		34.0	27.0	28.0	21.0	34.0								
66.0		170.0	130.0				120.0	120.0	36.0	140.0	14.0								
84.0		130.0	140.0				110.0	110.0	30.0	120.0	11.0								
150.0		140.0	170.0				420.0	83.0	57.0	43.0	9.0								
140.0		130.0	190.0				400.0	100.0	68.0	50.0	7.2								
35.0								12.0	49.0										
42.0								11.0	38.0										

Figure A2.--Continued--Sr (parts per million)

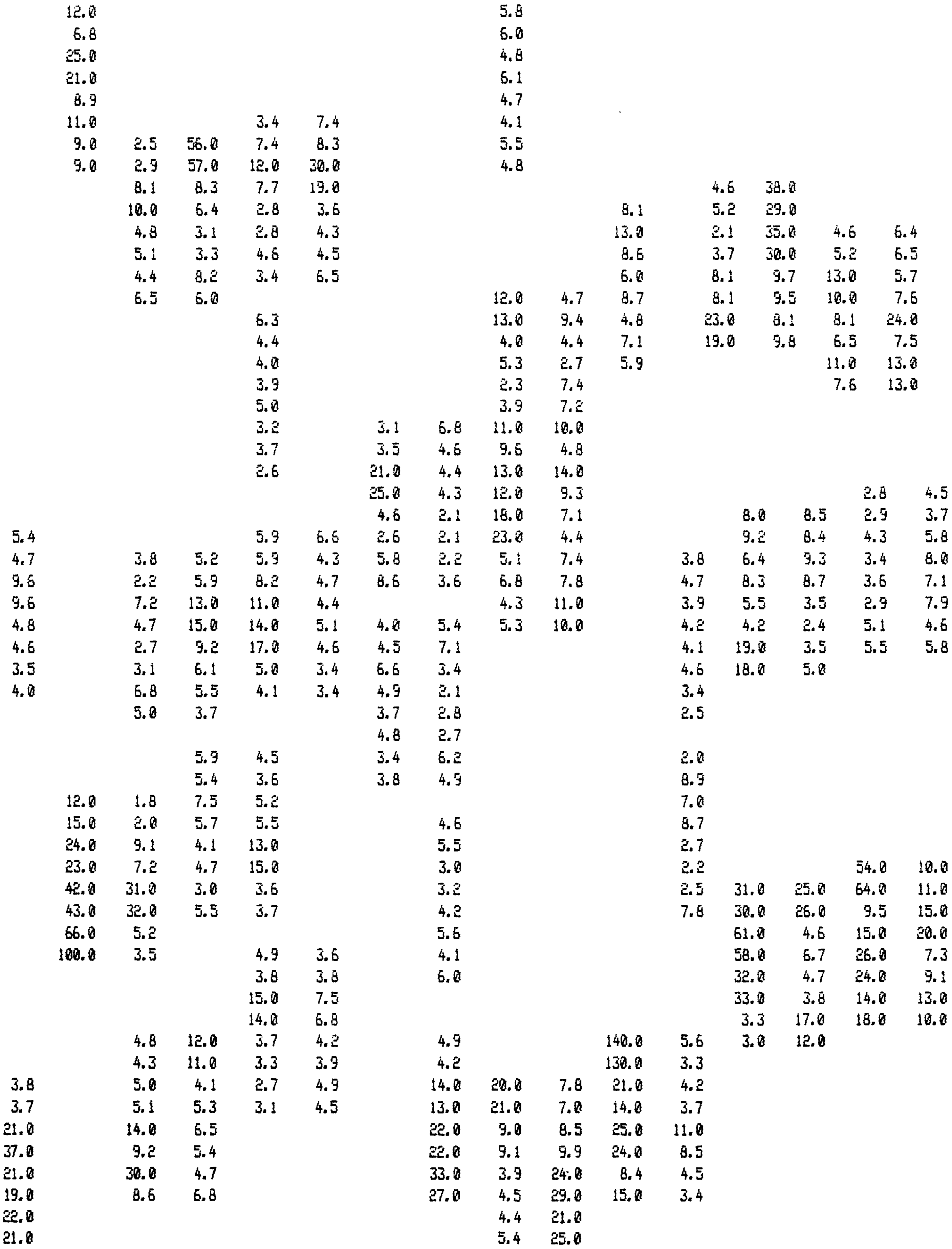


Figure A2.--Continued--V (parts per million)

```
        46.L                                                    46.L
        46.L                                                    46.L
        46.L                                                    46.L
        46.L                                                    46.L
        46.L                                                    46.L
        46.L                    46.L    46.L                    46.L
        46.L    46.L    46.L    46.L    46.L                    46.L
        46.L    46.L    46.L    46.L    46.L                    46.L
                46.L    46.L    46.L    46.L                                                46.L    46.L
                46.L    46.L    46.L    46.L                                        46.L        46.L    46.L
                46.L    46.L    46.L    46.L                                        46.L        46.L    46.L    46.L    46.L
                46.L    46.L    46.L    46.L                                        46.L        46.L    46.L    46.L    46.L
                46.L    46.L    46.L    46.L                                        46.L        46.L    46.L    46.L    46.L
                46.L    46.L                                    46.L    46.L    46.L        46.L    46.L    46.L    46.L
                                46.L                            46.L    46.L    46.L        46.L    46.L    46.L    46.L
                                46.L                            46.L    46.L    46.L        46.L    46.L    46.L    46.L
                                46.L                            46.L    46.L    46.L                        46.L    46.L
                                46.L                            46.L    46.L                                46.L    46.L
                                46.L                            46.L    46.L
                                46.L            46.L    46.L    46.L    46.L
                                46.L            46.L    46.L    46.L    46.L
                                46.L            46.L    46.L    46.L    46.L
                                                46.L    46.L    46.L    46.L                                    46.L    46.L
                                                46.L    46.L    46.L    46.L                    46.L    46.L    46.L    46.L
46.L                            46.L    46.L    46.L    46.L    46.L    46.L                    46.L    46.L    46.L    46.L
46.L            46.L    46.L    46.L    46.L    46.L    46.L    46.L    46.L            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L    46.L    46.L    46.L    46.L    46.L    46.L            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L    46.L    46.L                    46.L    46.L            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L    46.L    46.L    46.L    46.L    46.L    46.L            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L    46.L    46.L    46.L    46.L                            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L    46.L    46.L    46.L    46.L                            46.L    46.L    46.L
46.L            46.L    46.L    46.L    46.L    46.L    46.L                            46.L
                46.L    46.L                    46.L    46.L                            46.L
                                                46.L    46.L
                        46.L    46.L            46.L    46.L                            46.L
                        46.L    46.L            46.L    46.L                            46.L
        46.L    46.L    46.L    60.                                                     46.L
        46.L    46.L    46.L    46.L                    46.L                            46.L
        46.L    46.L    46.L    46.L                    46.L                            46.L
        46.L    46.L    46.L    46.L                    46.L                            46.L                    46.L    46.L
        46.L    46.L    46.L    46.L                    46.L                            46.L    46.L    46.L    46.L    46.L
        46.L    46.L    46.L    46.L                    46.L                            46.L    46.L    46.L    46.L    46.L
        46.L    46.L                                    46.L                                    46.L    46.L    46.L    46.L
        46.L    46.L            46.L    46.L            46.L                                    46.L    46.L    46.L    46.L
                                46.L    46.L            46.L                                    46.L    46.L    46.L    46.L
                                46.L    46.L                                                    46.L    46.L    46.L    46.L
                                46.L    46.L                                                    46.L    46.L    46.L    46.L
                46.L    46.L    46.L    46.L            46.L                    46.L    46.L    46.L    46.L
                46.L    46.L    46.L    46.L            46.L                    46.L    46.L
46.L            46.L    46.L    46.L    46.L            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L    46.L    46.L            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L                            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L                            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L                            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L                            46.L    46.L    46.L    46.L    46.L
46.L                                                            46.L    46.L
46.L                                                            46.L    46.L
```

Figure A2.--Continued--W (parts per million) 58

	6.2							7.3							
	4.3							7.9							
	4.6							3.1							
	7.5							3.8							
	7.0							3.7							
	6.1			2.0	9.3			2.6							
	4.3	1.3	17.0	4.6	7.9			2.4							
	4.4	1.1	19.0	5.3	26.0			2.5							
		7.5	8.0	5.2	16.0							5.4	53.0		
		9.6	6.1	1.7	3.0					24.0		4.2	33.0		
		1.2	1.6	2.8	2.6					55.0		1.4	91.0	4.4	3.7
		1.4	2.8	3.2	3.3					26.0		3.7	71.0	3.2	5.7
		1.8	4.7	1.4	3.7					21.0		10.0	6.3	7.8	3.6
		1.9	4.1					31.0	5.3	19.0		9.1	4.3	6.1	5.6
				23.0				34.0	11.0	12.0		76.0	5.7	12.0	8.6
				5.1				2.8	2.4	12.0		68.0	6.4	11.0	13.0
				17.0				3.6	1.6	9.1				9.1	7.1
				20.0				1.8	7.3					5.3	8.1
				20.0				2.0	16.0						
				27.0		3.2	13.0	5.2	15.0						
				8.9		5.3	5.5	4.7	7.1						
				2.2		6.5	3.5	18.0	14.0						
						13.0	4.8	17.0	5.9					3.0	5.1
						6.4	2.8	11.0	6.7			12.0	4.5	2.4	6.6
3.4				9.3	11.0	3.2	2.6	14.0	6.1			12.0	6.0	4.1	12.0
4.7		3.0	10.0	14.0	14.0	5.1	1.8	8.5	21.0		4.0	9.3	9.9	2.9	19.0
4.9		4.7	12.0	10.0	5.6	12.0	2.9	13.0	15.0		4.6	8.5	13.0	3.6	23.0
4.4		5.4	6.8	18.0	5.3			3.8	16.0		5.3	3.6	4.4	4.2	18.0
5.2		3.6	9.9	23.0	8.1	32.0	8.0	6.2	7.5		7.1	4.4	3.3	5.1	6.1
4.1		3.9	7.6	43.0	5.2	16.0	18.0				15.0	11.0	3.8	6.8	7.5
1.4		9.9	6.6	8.2	3.6	3.7	4.6				15.0	6.7	7.3		
2.4		10.0	5.5	6.8	3.8	6.3	3.0				4.1				
		11.0	6.3			5.4	6.6				5.1				
						5.3	5.1								
			4.1	3.9		1.0L	7.4				4.8				
			3.1	4.1		2.1	5.9				17.0				
	7.0	1.1	9.4	4.1							9.3				
	13.0	4.1	5.2	6.5			4.9				23.0				
	28.0	7.8	4.1	19.0			3.7				8.5				
	16.0	5.1	4.3	25.0			2.1				3.8			25.0	59.0
	24.0	36.0	2.7	3.9			4.9				3.0	53.0	48.0	25.0	73.0
	21.0	57.0	10.0	3.4			1.8				19.0	41.0	63.0	14.0	9.3
	65.0	5.0					3.6					45.0	13.0	23.0	11.0
	76.0	2.9		10.0	4.5		180.0					38.0	30.0	51.0	8.1
				15.0	5.8		4.9					59.0	9.8	39.0	11.0
				14.0	9.7							79.0	8.8	15.0	53.0
				16.0	4.9							16.0	23.0	15.0	44.0
		5.7	9.3	4.1	4.5		21.0			35.0	14.0	6.6	17.0		
		5.1	11.0	2.4	6.3		21.0			54.0	9.3				
3.8		5.9	6.6	4.5	5.6		16.0	52.0	37.0	110.0	9.1				
3.5		9.0	16.0	4.4	5.7		18.0	37.0	25.0	78.0	9.8				
15.0		14.0	27.0				41.0	16.0	27.0	63.0	17.0				
22.0		8.7	13.0				54.0	16.0	37.0	43.0	9.0				
23.0		61.0	8.9				53.0	13.0	58.0	33.0	9.2				
19.0		6.8	7.6				33.0	11.0	54.0	150.0	5.6				
10.0								18.0	17.0						
12.0								23.0	24.0						

Figure A2.--Continued--Y (parts per million)

```
                    31.0                                                    14.0
                    22.0                                                     4.6L
                    19.0                                                    11.0
                    16.0                                                    12.0
                    20.0                                                    12.0
                    22.0                     4.6L    7.7                    13.0
                    23.0     7.6    62.0     9.9    15.0                    15.0
                    24.0     8.3    62.0    11.0    25.0                    15.0
                            15.0    23.0     6.9    22.0                                                    13.0  1100.0
                            16.0    26.0     4.6     9.9                                    13.0            14.0  1000.0
                             8.5     8.4     5.9    11.0                                    24.0             7.2   370.0     5.4    10.0
                             7.0     8.6     8.5     9.6                                    35.0            22.0   370.0     8.6    11.0
                             9.8    15.0     9.1    15.0                                    27.0            41.0    15.0    17.0    16.0
                            15.0    14.0                                    18.0     7.6    27.0            34.0     9.0    72.0     4.6L
                                            12.0                            20.0    12.0    11.0           300.0    15.0    14.0    14.0
                                            12.0                             7.1    10.0    29.0           260.0    13.0    14.0     4.6L
                                             8.1                            11.0     5.5    26.0                             4.6L    9.7
                                             8.7                             5.7     9.8                                     4.6L   12.0
                                             4.6L                            6.8    13.0
                                             8.4             5.1    12.0    16.0     4.6L
                                             9.4            11.0     8.7    15.0     5.5
                                             8.1            14.0     9.7    11.0    20.0
                                                            13.0     4.6L    7.7    11.0                                     7.2     8.0
                                                             5.7     5.4    26.0     9.1                    17.0    15.0     6.1     8.1
             9.9                            16.0    13.0     4.6L    8.8    28.0     5.8                    14.0    13.0     4.6    41.0
            13.0            13.0     4.6L   16.0    13.0     4.6L    8.8     9.1    11.0            11.0    23.0    35.0     9.0    52.0
            19.0             7.8    13.0     6.0     9.2     9.8     7.8    11.0    11.0             4.6L   37.0    28.0     8.3    24.0
            16.0            11.0    14.0     4.6L    7.3                    10.0     4.6L            6.1    29.0    13.0     8.8    22.0
            15.0             4.6L   17.0    18.0    14.0    48.0     4.6L    7.5     4.6L            5.5     8.6    15.0     4.6L    4.6L
             4.6L            5.9    13.0    19.0     8.0    61.0     4.6L                           12.0    29.0     9.5     6.5    16.0
            15.0             8.8    14.0L   16.0     8.3    19.0    13.0L                           15.0    28.0    14.0
                            12.0     8.4                    11.0     4.6L                            6.0
                                                             7.8     8.7
                                     9.7    14.0             7.9    12.0                             6.0
                                    16.0    12.0            13.0     7.6                            92.0
                     4.6L    7.1     9.9     8.2                                                   110.0
                    17.0     9.8     9.8     4.6L                   10.0                             7.8
                    28.0    14.0    11.0    17.0                    12.0                             6.6
                    23.0    12.0    12.0     4.6L                    6.7                             4.9                    60.0    17.0
                    27.0    41.0     8.3     4.6L                   13.0                             5.5   100.0    79.0    52.0    25.0
                    24.0    37.0    11.0     6.9                    11.0                             8.5   110.0    63.0    15.0    24.0
                    98.0    10.0                                     5.7                                   340.0    93.0    21.0    30.0
                   120.0     7.9             4.6L    8.5             4.9                                   380.0   130.0    29.0     9.7
                                             8.8     7.4             9.7                                     4.6L  890.0    35.0    14.0
                                            18.0    12.0                                                     4.6L  730.0    26.0    11.0
                                            15.0     8.4                                                     4.6L  540.0    22.0     8.9
                            13.0     4.6L   13.0     4.6L            4.6L                  100.0    17.0     5.1   430.0
                             8.5    11.0    12.0     8.0            12.0                    78.0    16.0
             4.6L           11.0     6.5     8.1    21.0            18.0     4.6L   17.0    65.0    44.0
             9.3            11.0     8.7     9.5    25.0            20.0    23.0    16.0    55.0    40.0
            19.0            17.0    12.0                            20.0    16.0    17.0    60.0    25.0
            26.0            11.0     6.6                            18.0    17.0    20.0    54.0    23.0
            39.0           110.0     9.3                             7.2    10.0    24.0    16.0    14.0
            34.0            10.0    17.0                            15.0    11.0    27.0    30.0     8.3
            17.0                                                             4.6L   19.0
            24.0                                                            12.0    18.0
```

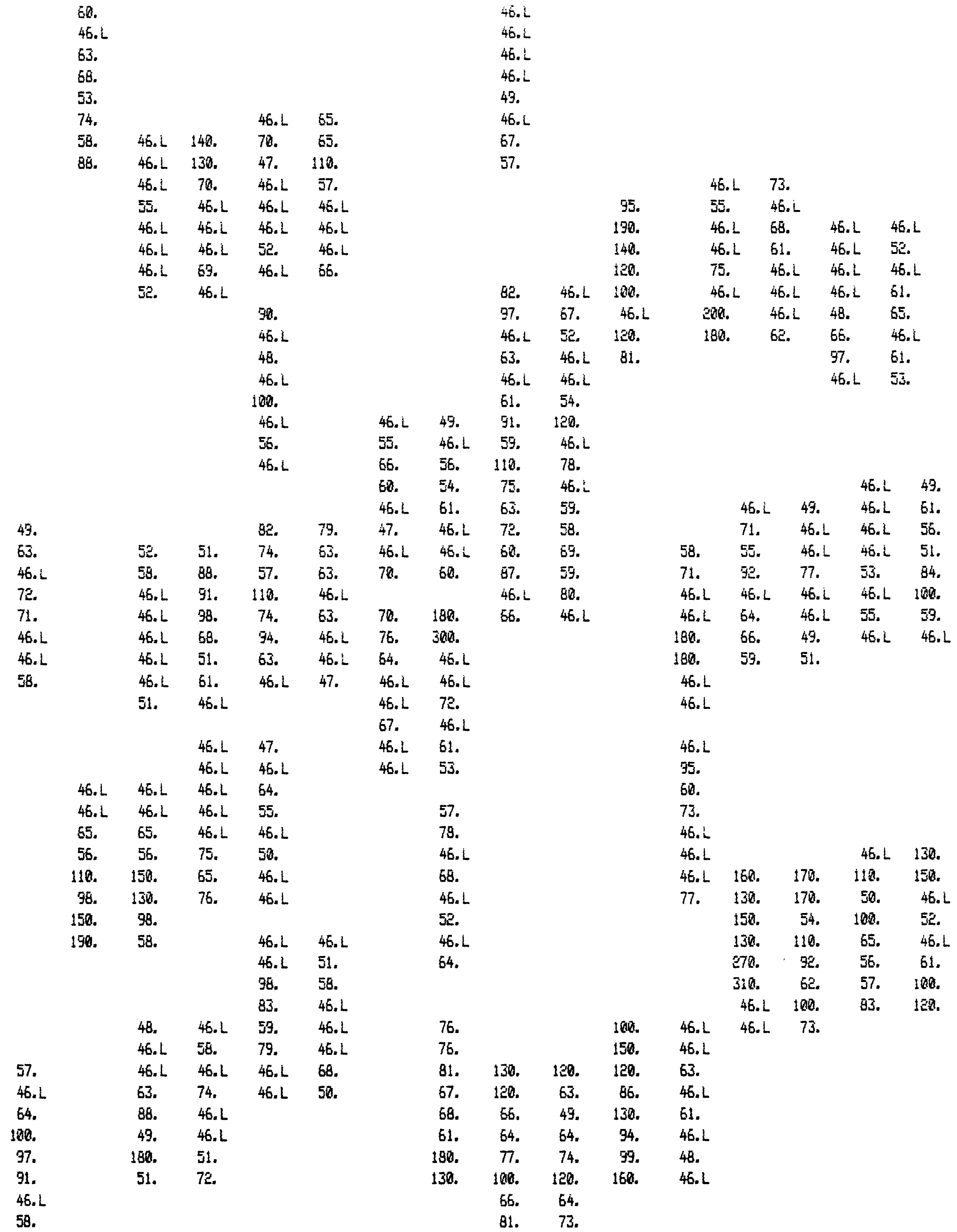
Figure A2.--Continued--Zn (parts per million)

```
            79.                                                           690.
            35.                                                           640.
           120.                                                           130.
           410.                                                           130.
           550.                                                           140.
           220.                        29.      78.                        95.
            97.      86.      95.     130.      50.                        53.
            98.      18.     110.     270.     230.                       180.
                    580.     260.     250.      83.                                                       25.      110.
                    330.     190.      43.      47.                                         130.          22.       74.
                     20.      52.      44.      55.                                         420.           8.      360.      15.      14.
                     40.      85.     160.      51.                                         150.          61.      300.      16.      27.
                     25.     640.      61.      54.                                         120.          92.       36.      34.      17.
                     18.     200.                                         250.     240.      55.         190.       20.      21.      63.
                                      660.                                320.     490.      26.          45.       60.      59.      57.
                                      330.                                 87.      29.      76.          44.       29.      39.      17.
                                      510.                                250.      32.      49.                           53.      25.
                                      590.                                 25.     380.                                    23.      25.
                                      700.                                 35.    1100.
                                       91.               21.      64.     820.    1700.
                                      170.               26.      29.     150.     740.
                                       14.              140.      12.     470.     370.
                                                         99.      70.     410.     140.                                         15.     130.
                                                        180.      18.      79.     140.                       320.      95.      14.     160.
   70.                                190.    1500.      49.      51.     120.     160.                       670.     160.      20.      48.
   45.               42.     270.     410.    1200.     190.      16.     260.     820.               24.     180.     110.     300.     140.
  110.               58.     520.     180.      98.      66.      24.     560.     440.               28.     100.      78.      88.      70.
  150.               57.      82.    1400.      64.                       160.    1100.              110.     110.      96.      90.     110.
  310.               55.     230.     320.     330.      80.     930.     260.     270.               87.     120.      42.      66.     230.
   91.               50.     270.    1200.     150.     110.    1600.                                140.     280.      99.     200.     230.
   23.               64.     400.      79.      31.      37.      78.                                 64.     200.      82.
   17.               97.      77.      64.      31.     140.      39.                                 79.
                    120.      28.                        74.     160.                                170.
                                                        100.     110.
                             150.     160.               21.     130.                                100.
                              59.     110.               20.     110.                                630.
           350.      15.     210.      85.                                                           430.
          1100.     110.     110.     160.                        21.                                 39.
           200.      64.      64.     460.                        29.                                240.
           230.      84.      37.     530.                        31.                                 37.                        120.      67.
           730.    1600.      28.      78.                       140.                                 24.     140.     600.     120.      66.
           410.    1700.     230.      47.                        52.                                 36.     110.     530.      56.     100.
           790.      56.                                          49.                                         300.      21.     170.     110.
          1000.      27.              300.      33.               36.                                         290.      80.     120.      59.
                                      510.      46.               69.                                         210.      46.     530.      89.
                                      240.     100.                                                           170.      31.      41.      58.
                                      280.      69.                                                           170.     510.      54.      37.
                     37.     340.      35.      33.             1400.                       190.      64.     240.     450.
                     22.     250.      16.      42.              920.                       270.      31.
   41.               74.      94.      28.      45.              360.    1700.      83.    1500.      52.
   47.               89.     620.      34.      35.              260.    1100.      55.     760.      27.
  460.              120.     150.                               1700.     180.     480.     250.     610.
 1200.               96.      66.                               1400.     230.     660.     130.     250.
  290.              140.      55.                               1100.      64.    1000.     370.     250.
  260.              140.      57.                                700.      90.    1300.     180.      84.
  210.                                                                    540.     110.
  410.                                                                    770.     140.
```

Figure A2.--Continued--Zr (parts per million)

```
        0.020                                                   0.018L
        0.022                                                   0.020
        0.036                                                   0.018L
        0.029                                                   0.018L
        0.018L                                                  0.018L
        0.020                   0.018L  0.018L                  0.018L
        0.024   0.018L  0.110   0.018   0.027                   0.018L
        0.024   0.018L  0.140   0.026   0.059                   0.018L
                0.022   0.039   0.018L  0.048                               0.018L  0.018L
                0.027   0.028   0.019   0.018L                          0.031       0.018L  0.018L
                0.018L  0.018L  0.023   0.018L                          0.088       0.018L  0.018L  0.018L  0.018L
                0.018L  0.018L  0.350   0.018L                          0.019       0.000B  0.039   0.018L  0.018L
                0.018L  0.018L  0.300   0.030                           0.018L      0.018L  0.018L  0.018   0.018L
                0.020   0.018L                          0.160   0.035   0.023       0.018L  0.018L  0.018L  0.018L
                                0.067                   0.160   0.038   0.018L      0.018L  0.018L  0.050   0.027
                                0.019                   0.019   0.018L  0.018L      0.018L  0.018L  0.033   0.018L
                                0.092                   0.022   0.018L  0.018L                      0.018L  0.018
                                0.090                   0.018L  0.025                               0.018L  0.018L
                                0.069                   0.018L  0.018L
                                0.110           0.018L  0.023   0.030   0.022
                                0.092           0.018L  0.021   0.018   0.018L
                                0.018L          0.025   0.018L  0.055   0.066
                                                0.020   0.018L  0.047   0.050                                   0.018L  0.130
                                                0.031   0.018L  0.060   0.042                   0.077   0.029   0.018L  0.120
0.018                           0.028   0.033   0.023   0.018L  0.073   0.027                   0.088   0.036   0.018L  0.018L
0.018L          0.018L  0.047   0.032   0.022   0.028   0.018L  0.035   0.071           0.019   0.082   0.032   0.018L  0.018L
0.050           0.018L  0.056   0.037   0.030   0.029   0.021   0.043   0.061           0.020   0.100   0.034   0.018L  0.041
0.057           0.024   0.110   0.041   0.029                   0.043   0.052           0.023   0.018L  0.018L  0.018L  0.038
0.025           0.018L  0.110   0.043   0.029   0.047   0.018L  0.058   0.040           0.018L  0.022   0.018L  0.018L  0.019
0.018L          0.026   0.027   0.037   0.034   0.067   0.020                           0.047   0.071   0.018L  0.018L  0.022
0.018L          0.030   0.026   0.022   0.047   0.021   0.018L                          0.036   0.061   0.025
0.018L          0.150   0.024   0.018L  0.046   0.018L  0.018L                          0.032
                0.110   0.018L                  0.018L  0.035                           0.027
                                                0.018L  0.024
                        0.024   0.039           0.018L  0.046                           0.076
                        0.031   0.034           0.021   0.037                           0.190
        0.740   0.018L  0.059   0.027                                                   0.160
        1.000   0.020   0.040   0.024                   0.018                           0.027
        1.800   0.027   0.018L  1.300                   0.022                           0.081
        1.500   0.028   0.019   1.500                   0.018L                          0.018L                  0.018L  0.025
        2.000   0.180   0.018L  0.018L                  0.018L                          0.018L  0.034   0.160   0.018L  0.021
        1.700   0.160   0.021   0.018L                  0.018L                          0.018L  0.026   0.130   0.018L  0.039
        2.000   0.089                                   0.018L                                  0.057   0.019   0.019   0.031
        2.100   0.072           0.018L  0.045           0.025                                   0.059   0.028   0.047   0.063
                                0.018L  0.049           0.029                                   0.031   0.018L  0.044   0.065
                                0.079   0.065                                                   0.028   0.018L  0.020   0.068
                                0.074   0.067                                                   0.100   0.018L  0.018L  0.069
                0.018L  0.056   0.020   0.025           0.019                   0.320   0.035   0.042   0.018L
                0.018L  0.062   0.018L  0.029           0.018L                  0.710   0.025
0.037           0.042   0.024   0.018L  0.028           0.034   0.074   0.019   0.071   0.027
0.044           0.045   0.033   0.018L  0.026           0.044   0.076   0.019   0.052   0.025
0.089           0.066   0.050                           0.110   0.220   0.072   0.098   0.034
0.110           0.069   0.045                           0.120   0.220   0.070   0.100   0.030
1.500           0.037   0.036                           0.083   0.190   0.083   0.035   0.025
1.500           0.061   0.057                           0.079   0.230   0.090   0.090   0.019
0.072                                                           0.030   0.110
0.073                                                           0.032   0.110
```

Figure A2.--Continued--Na (parts per million)


60.
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74.
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64.
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46.L
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78.
46.L
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46.L
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46.L
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98.
83.
59.
79.
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46.L
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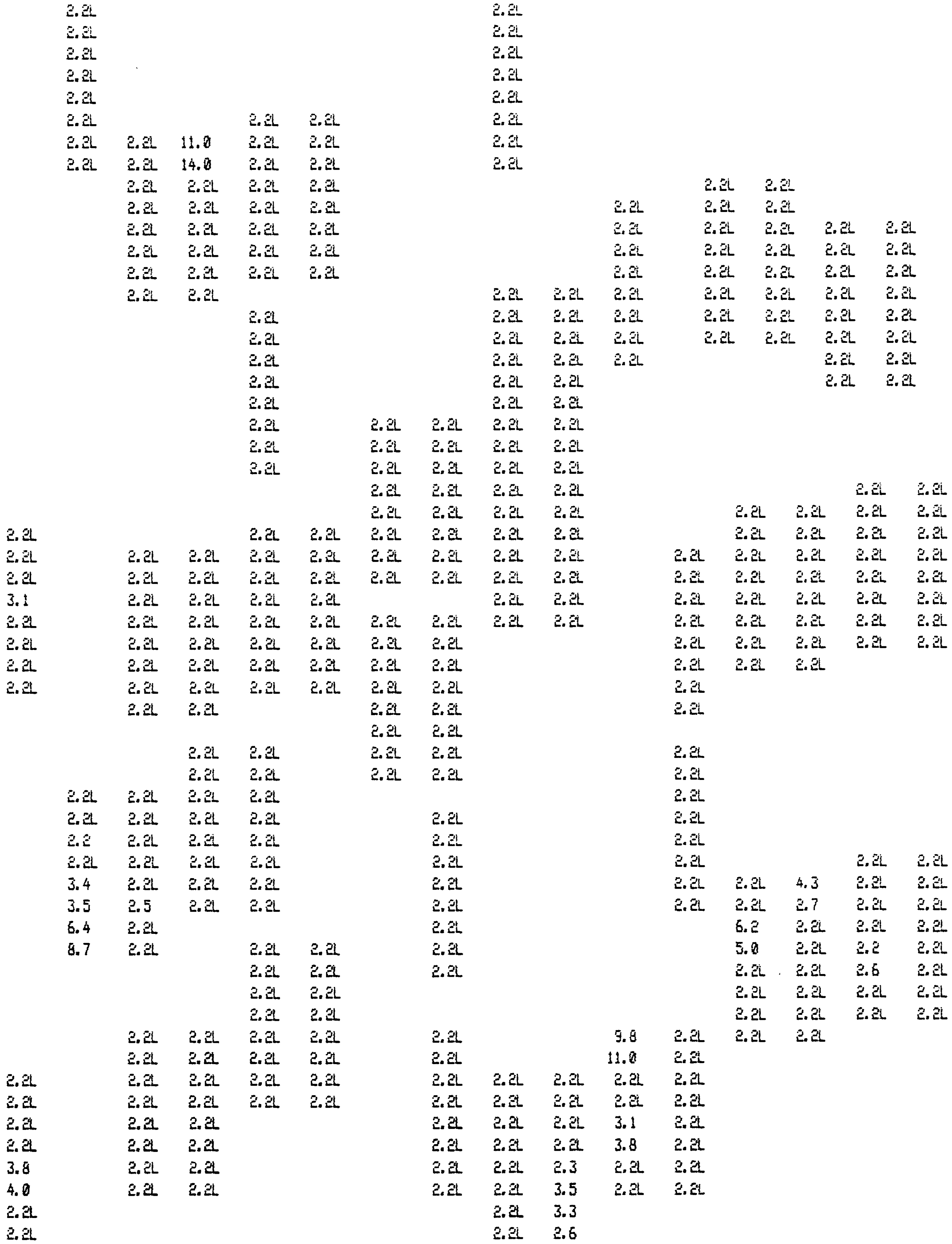
46.L
46.L
46.L
68.
50.
160.
130.
150.
130.
270.
310.
46.L
46.L
170.
170.
54.
110.
92.
62.
100.
73.
46.L
110.
50.
100.
65.
56.
57.
83.
130.
150.
46.L
52.
46.L
61.
100.
120.
48.
46.L
46.L
63.
88.
49.
180.
51.
46.L
58.
46.L
74.
46.L
46.L
51.
72.
57.
46.L
64.
100.
97.
91.
46.L
58.
76.
76.
81.
67.
68.
61.
180.
130.
130.
120.
66.
64.
77.
100.
66.
81.
120.
63.
49.
64.
74.
120.
64.
73.
100.
150.
120.
86.
130.
94.
99.
160.
46.L
46.L
63.
46.L
61.
46.L
48.
46.L

Figure A2.--Continued--Ce (parts per million)


2.2L 2.2L
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2.2L 2.2L 2.2L 2.2L
2.2L 2.2L 11.0 2.2L 2.2L 2.2L
2.2L 2.2L 14.0 2.2L 2.2L 2.2L
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2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L
3.1 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L
2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L
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2.2L 2.2L 2.2L 2.2L 2.2L 2.2L
2.2 2.2L 2.2L 2.2L 2.2L 2.2L
2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L
3.4 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 4.3 2.2L 2.2L
3.5 2.5 2.2L 2.2L 2.2L 2.2L 2.2L 2.7 2.2L 2.2L
6.4 2.2L 2.2L 6.2 2.2L 2.2L 2.2L
8.7 2.2L 2.2L 2.2L 2.2L 5.0 2.2L 2.2 2.2L
2.2L 2.2L 2.2L 2.2L 2.2L 2.6 2.2L
2.2L 2.2L 2.2L 2.2L 2.2L 2.2L
2.2L 2.2L 2.2L 2.2L 2.2L 2.2L
2.2L 2.2L 2.2L 2.2L 2.2L 9.8 2.2L 2.2L 2.2L
2.2L 2.2L 2.2L 2.2L 2.2L 11.0 2.2L
2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L
2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L
2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 3.1 2.2L
2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 3.8 2.2L
3.8 2.2L 2.2L 2.2L 2.2L 2.3 2.2L 2.2L
4.0 2.2L 2.2L 2.2L 2.2L 3.5 2.2L 2.2L
2.2L 2.2L 3.3
2.2L 2.2L 2.6

Figure A2.—Continued—Ga (parts per million)

64

```
        0.46L                                           2.00
        0.46L                                           2.20
        2.70                                            0.46L
        2.30                                            1.10
        2.80                                            0.46L
        3.50                    0.46L   2.80            2.30
        0.46L   1.50    0.46L   3.20    4.20            0.46L
        3.40    1.40    0.46L   3.50    0.46L           0.46L
                3.20    4.40    1.80    2.60                                            0.46L   0.46L
                0.46L   2.90    1.40    0.46L                           0.46L           0.46L   0.46L
                2.40    3.00    0.46L   3.20                            2.30            0.46L   4.40    2.40    1.00
                1.90    2.10    3.80    2.80                            3.70            0.78    3.50    3.20    1.10
                2.00    2.70    0.46L   3.80                            0.46L           3.90    3.30    2.90    1.40
                3.80    2.40                            0.46L   0.46L   0.46L           3.60    2.40    2.40    1.70
                                2.20                    1.20    2.90    0.46L           0.46L   2.70    3.60    3.20
                                0.46L                   2.10    3.40    0.46L           0.46L   3.40    3.40    2.40
                                0.46L                   0.46L   0.46L   0.46L                           0.46L   3.30
                                0.46L                   1.20    2.10                                    0.98    0.46L
                                1.70                    0.46L   2.20
                                2.10            2.40    0.46L   0.46L   3.60
                                1.20            0.46L   0.46L   3.30    0.46L
                                1.90            3.60    2.50    0.46L   2.80
                                                0.46L   2.90    2.30    0.46L                                   0.46L   3.50
                                                0.46L   0.46L   2.40    3.10                    0.46L   0.46L   1.00    3.80
0.46L                           0.46L   3.20    0.46L   1.30    0.46L   2.10                    0.60    2.40    3.20    0.50
0.46L           0.46L   0.46L   0.46L   2.50    0.46L   0.46L   2.50    3.10            0.46L   0.46L   0.46L   0.46L   1.60
2.80            0.46L   0.46L   0.46L   0.46L   0.46L   0.46L   3.70    0.46L           0.46L   0.46L   2.00    0.46L   3.30
4.40            3.60    0.46L   3.00    0.46L                   0.46L   0.46L           2.00    1.70    2.10    1.60    2.80
3.20            0.46L   3.30    0.46L   0.46L   2.00    0.46L   0.46L   0.46L           0.46L   0.46L   2.30    0.46L   1.80
2.50            0.73    0.46L   0.46L   0.46L   2.80    3.60                            0.46L   2.90    0.46L   2.20    1.10
0.46L           0.46L   2.90    0.46L   3.40    0.46L   3.50                            0.46L   0.46L   3.20
3.30            0.46L   0.46L   1.30    0.46L   3.30    0.46L                           0.46L
                0.46L   1.50                    0.46L   0.46L                           0.46L
                                                2.80    3.00
                        0.46L   3.50            2.60    3.60                            1.40
                        2.10    0.46L           3.90    0.46L                           0.46L
        0.46L   0.91    0.46L   0.46L                                                   0.46L
        0.46L   2.20    0.46L   2.70                    2.70                            1.80
        0.46L   0.46L   0.46L   0.46L                   3.70                            0.46L
        0.46L   0.46L   3.00    1.60                    0.46L                           2.30                    1.60    1.30
        2.90    3.30    2.10    0.46L                   2.80                            1.80    0.46L   0.46L   0.46L   2.40
        2.40    3.70    3.90    0.46L                   1.90                            1.30    1.90    0.46L   0.46L   1.80
        0.46L   0.46L                                   1.80                                    0.46L   0.46L   3.10    2.30
        0.46L   2.60            2.40    0.46L           2.40                                    4.80    3.20    0.46L   0.46L
                                0.46L   0.46L           2.70                                    0.46L   2.50    0.46L   3.50
                                3.00    2.70                                                    0.46L   1.60    3.40    0.46L
                                3.60    3.20                                                    1.60    2.70    3.40    1.10
                3.20    2.10    0.46L   1.40            3.90                    0.63    0.46L   0.46L   2.20
                0.46L   0.46L   2.90    2.30            2.50                    1.00    1.70
0.46L           0.46L   1.50    3.00    2.40            3.50    0.46L   2.90    2.90    0.46L
2.80            2.60    2.90    0.46L   3.70            2.70    2.40    1.80    2.10    0.46L
0.46L           3.30    3.50                            3.60    0.87    0.46L   2.80    0.46L
2.40            2.60    0.46L                           2.60    0.46L   2.70    0.46L   0.46L
0.46L           1.90    2.70                            1.80    1.90    1.90    3.10    3.20
0.46L           3.10    3.60                            0.46L   2.70    1.60    3.00    0.46L
0.46L                                                           2.70    2.30
2.60                                                            2.80    2.10
```

Figure A2.--Continued--Ge (parts per million)

```
         100.L                                                    100.L
         100.L                                                    100.L
         100.L                                                    100.L
         100.L                                                    100.L
         100.L                                                    100.L
         100.L                      100.L    100.L                      100.L
         100.L    100.L    100.L    100.L    100.L                      100.L
         100.L    100.L    100.L    100.L    100.L                      100.L
                  100.L    100.L    100.L    100.L                                                      100.L    100.L
                  100.L    100.L    100.L    100.L                                            100.L         100.L    100.L
                  100.L    100.L    100.L    100.L                                            100.L         100.L    100.L    100.L    100.L
                  100.L    100.L    100.L    100.L                                            100.L         100.L    100.L    100.L    100.L
                  100.L    100.L    100.L    100.L                                            100.L         100.L    100.L    100.L    100.L
                  100.L    100.L                                        100.L    100.L    100.L         100.L    100.L    100.L    100.L
                                    100.L                               100.L    100.L    100.L         100.L    100.L    100.L    100.L
                                    100.L                               100.L    100.L    100.L         100.L    100.L    100.L    100.L
                                    100.L                               100.L    100.L    100.L                           100.L    100.L
                                    100.L                               100.L    100.L                                    100.L    100.L
                                    100.L                               100.L    100.L
                                    100.L             100.L    100.L    100.L    100.L
                                    100.L             100.L    100.L    100.L    100.L
                                    100.L             100.L    100.L    100.L    100.L
                                                      100.L    100.L    100.L    100.L                                        100.L    100.L
                                                      100.L    100.L    100.L    100.L                      100.L    100.L    100.L    100.L
100.L                               100.L    100.L    100.L    100.L    100.L    100.L                      100.L    100.L    100.L    100.L
100.L             100.L    100.L    100.L    100.L    100.L    100.L    100.L    100.L             100.L    100.L    100.L    100.L    100.L
100.L             100.L    100.L    100.L    100.L    100.L    100.L    100.L    100.L             100.L    100.L    100.L    100.L    100.L
100.L             100.L    100.L    100.L    100.L                      100.L    100.L             100.L    100.L    100.L    100.L    100.L
100.L             100.L    100.L    100.L    100.L    100.L    100.L    100.L    100.L             100.L    100.L    100.L    100.L    100.L
100.L             100.L    100.L    120.     100.L    100.L    100.L                               100.L    100.L    100.L    100.L    100.L
100.L             100.L    100.L    100.L    100.L    100.L    100.L                               100.L    100.L    100.L
100.L             100.L    100.L    100.L    100.L    100.L    100.L                               100.L
                  100.L    100.L                      100.L    100.L                               100.L
                                                      100.L    100.L
                           100.L    100.L             100.L    100.L                               100.L
                           100.L    100.L             100.L    100.L                               100.L
         100.L    100.L    100.L    100.L                                                          100.L
         100.L    100.L    100.L    100.L                      100.L                               100.L
         110.     100.L    100.L    100.L                      100.L                               100.L
         100.L    100.L    100.L    100.L                      100.L                               100.L                      100.L    100.L
         100.L    100.L    100.L    100.L                      100.L                               100.L    100.L    100.L    100.L    100.L
         100.L    100.L    100.L    100.L                      100.L                               100.L    100.L    100.L    100.L    100.L
         100.L    100.L                                        100.L                                        100.L    100.L    100.L    100.L
         100.L    100.L             100.L    100.L             100.L                                        100.L    100.     100.L    100.L
                                    100.L    100.L             100.L                                        100.L    100.L    100.L    100.L
                                    100.L    100.L                                                          140.     100.L    100.L    100.L
                                    100.L    100.L                                                          100.L    100.L    100.L    100.L
                  100.L    100.L    100.L    100.L             100.L                      100.L    100.L    100.L    180.
                  100.L    100.L    100.L    100.L             100.L                      100.L    100.L
100.L             100.L    100.L    100.L    100.L             100.L    100.L    100.L    100.L    100.L
100.L             100.L    100.L    100.L    100.L             100.     100.L    100.L    100.L    100.L
100.L             100.L    100.L                               100.     100.L    100.L    100.L    100.L
170.              100.L    100.L                               100.L    100.L    100.L    100.L    100.L
100.L             100.L    100.L                               100.L    100.L    100.L    100.L    100.L
100.L             100.L    100.L                               100.L    100.L    100.L    100.L    100.L
100.L                                                                   100.L    100.L
100.L                                                                   100.L    100.L
```

Figure A2.--Continued--Li (parts per million)

	0.49							0.87							
	0.46L							0.73							
	0.52							0.46L							
	0.74							0.46L							
	0.75							0.46L							
	0.60			0.46L	0.51			0.46L							
	0.46L	0.46L	1.20	0.66	0.52			0.46L							
	0.54	0.46L	1.70	0.51	1.20			0.47							
		0.70	0.92	0.48	1.00							0.51	1.30		
		0.83	0.62	0.46L	0.46L					1.20		0.51	1.10		
		0.46L	0.46L	0.46L	0.52					5.30		0.46L	2.30	0.46L	0.46L
		0.46L	0.46L	0.46L	0.46L					1.10		0.51	2.00	0.51	0.50
		0.46L	0.56	0.46L	0.46L					0.99		0.95	0.49	0.63	0.46L
		0.46L	0.67					1.70	0.73	1.40		0.83	0.46L	0.60	0.49
				1.90				1.80	1.10	0.90		2.40	0.55	0.69	0.70
				0.49				0.46L	0.46L	0.69		3.00	0.55	0.58	0.82
				1.20				0.46L	0.46L	0.53				0.58	0.58
				1.60				0.46L	0.63					0.55	0.56
				1.60				0.46L	1.20						
				1.30		0.46L	0.78	0.55	1.40						
				1.10		0.52	0.55	0.59	0.76						
				0.46L		0.68	0.46L	1.40	1.10						
						0.91	0.49	1.60	0.59					0.46L	0.69
						0.81	0.46L	0.94	0.65			1.30	0.53	0.46L	0.74
0.46L				0.87	1.10	0.48	0.46L	1.20	0.56			1.10	0.67	0.46L	0.77
0.46L		0.46L	1.10	0.98	0.96	0.61	0.46L	0.79	1.60		0.50	0.83	0.92	0.50	1.10
0.63		0.46L	1.00	0.96	0.69	0.93	0.46L	1.10	1.00		0.56	0.75	0.94	0.48	1.80
0.67		0.50	0.63	1.40	0.50			0.54	1.40		0.52	0.54	0.46L	0.51	1.10
0.50		0.49	0.86	1.60	0.75	2.30	1.10	0.67	0.79		0.58	0.66	0.46L	0.46L	0.81
0.47		0.48	0.72	2.80	0.46L	1.30	1.70				0.98	1.10	0.47	0.63	0.61
0.46L		0.76	0.52	0.70	0.50	0.53	0.57				0.92	0.74	0.50		
0.46L		0.72	0.55	0.58	0.47	0.63	0.46L				0.55				
		0.92	0.49			0.48	0.71				0.54				
						0.55	0.67								
			0.53	0.49		0.46L	0.62				0.57				
			0.47	0.46L		0.46L	0.55				1.60				
	0.81	0.46L	0.94	0.55							1.20				
	1.20	0.46L	0.52	0.71			0.47				1.50				
	2.90	0.78	0.46L	1.50			0.56				1.20				
	1.60	0.53	0.66	1.90			0.46L				0.46L			1.60	2.80
	1.80	2.90	0.46L	0.55			0.61				0.46L	2.60	4.30	1.90	3.40
	1.50	2.60	0.93	0.56			0.46L				1.30	2.00	4.30	1.10	1.10
	7.10	0.57					0.46L					3.10	0.97	1.40	0.98
	6.80	0.46L		0.76	0.56		4.70					3.20	1.40	3.10	0.82
				1.30	0.56		0.56					3.80	0.97	2.50	0.96
				1.10	1.10							3.30	0.71	0.59	2.40
				1.30	0.64							1.80	2.30	1.20	1.60
		0.47	1.30	0.56	0.48		1.50			3.80	1.10	0.69	1.50		
		0.48	1.30	0.46L	0.71		1.30			6.40	0.71				
0.46L		0.67	0.73	0.46L	0.50		1.40	3.40	1.30	12.00	0.56				
0.46L		0.96	1.10	0.46L	0.46L		1.60	2.70	1.20	9.60	0.64				
1.30		1.00	1.30				3.60	1.30	2.20	6.80	1.50				
1.90		0.82	0.84				4.10	1.60	2.80	3.00	1.10				
1.80		2.90	0.68				4.20	1.20	4.40	1.30	0.81				
2.20		0.80	0.59				3.30	1.40	5.30	16.00	0.60				
1.00								1.30	1.40						
1.10								1.40	1.90						

Figure A2.--Continued--Yb (parts per million)

	46.L							49.							
	46.L							46.L							
	46.L							46.L							
	46.L							46.L							
	46.L							46.L							
	46.L			46.L	46.L			46.L							
	46.L	49.	62.	51.	51.			78.							
	46.L	46.L	46.L	46.L	51.			46.L							
		46.L	67.	46.L	46.L							46.L	46.L		
		49.	46.L	46.L	46.L					46.L		46.L	46.L		
		46.L	46.L	46.L	46.L					88.		46.L	46.L	46.L	46.L
		46.L	46.L	46.L	46.L					70.		46.L	46.L	47.	46.L
		46.L	46.L	46.L	67.					46.L		98.	46.L	46.L	46.L
		46.L	46.L					46.L	46.L	46.L		46.L	46.L	46.L	57.
				46.L				46.L	90.	46.L		46.L	46.L	46.L	46.L
				46.L				46.L	46.L	62.		46.L	46.L	46.L	46.L
				46.L				46.L	46.L	46.L				46.L	46.L
				46.L				46.L	46.L					46.L	46.L
				46.L				46.L	46.L						
				46.L		46.L	46.L	46.L	46.L						
				46.L		74.	46.L	57.	46.L						
				46.L		46.L	46.L	91.	46.L						
						64.	46.L	46.L	46.L					46.L	46.L
						46.L	59.	46.L	46.L			46.L	80.	62.	46.L
46.L				46.L	46.L	46.L	46.L	46.L	46.L			76.	46.L	46.L	46.L
51.		58.	46.L	46.L	46.L	46.L	46.L	46.L	46.L		46.L	46.L	46.L	46.L	46.L
64.		46.L	46.L	46.L	46.L	48.	66.	46.L	46.L		46.L	59.	46.L	46.L	46.L
46.L		46.L	61.	46.	46.L			46.L	46.L		46.L	46.L	46.L	46.L	46.L
46.L		46.L	76.	46.L	46.L	46.L	62.	46.L	46.L		46.L	46.L	46.L	46.L	46.L
46.L		46.L	64.	46.L	46.L	52.	55.				63.	110.	46.L	46.L	46.L
46.L		46.L	46.L	46.L	46.L	46.L	46.L				46.L	70.	46.L		
46.L		46.L	46.L	46.L	46.L	59.	46.L				46.L				
		46.L	52.			46.L	46.L				46.L				
						46.L	46.L								
			76.	46.L		46.L	46.L				46.L				
			46.L	70.		78.	46.L				48.				
	46.L	46.L	46.L	60.							46.L				
	46.L	46.L	46.L	60.			75.				46.L				
	46.L	60.	46.L	46.L			63.				46.L				
	46.L	46.L	80.	46.L			46.L				46.L			46.L	46.L
	55.	51.	46.L	46.L			55.				46.L	46.L	46.L	48.	46.L
	83.	46.L	46.L	46.L			46.L				46.L	46.L	46.L	46.L	46.L
	46.L	46.L					46.L					46.L	46.L	60.	46.L
	46.L	46.L		54.	46.L		46.L					46.L	56.	46.L	46.L
				46.L	46.L		48.					46.L	46.L	46.L	54.
				46.L	95.							46.L	46.L	46.L	58.
				46.L	46.L							46.L	46.L	46.L	46.L
		46.L	46.L	46.L	46.L		60.			46.L	46.L	46.L	46.L		
		46.L	46.L	57.	46.L		58.			46.L	46.L				
46.L		46.L	46.L	46.L	74.		46.L	46.L	46.L	95.	46.L				
62.		56.	46.L	46.L	46.L		72.	61.	46.L	46.L	46.L				
46.L		48.	46.L				46.L	46.L	46.L	89.	46.L				
110.		46.L	46.L				46.L	72.	46.L	46.L	46.L				
59.		46.L	46.L				55.	46.L	60.	46.L	88.				
94.		46.L	64.				46.L	63.	46.L	73.	46.L				
46.L								46.L	46.L						
53.								46.L	46.L						

Figure A2.--Continued--Nd (parts per million)

```
        46.L                                                    46.L
        46.L                                                    46.L
        46.L                                                    46.L
        46.L                                                    46.L
        46.L                                                    46.L
        46.L                    46.L    46.L                    46.L
        46.L    46.L    46.L    46.L    46.L                    57.
        46.L    46.L    46.L    46.L    46.L                    46.L
                46.L    46.L    46.L    46.L                                                    46.L    46.L
                46.L    46.L    46.L    46.L                                    46.L            46.L    46.L
                46.L    46.L    46.L    46.L                                    46.L            46.L    46.L    46.L    46.L
                46.L    46.L    46.L    46.L                                    46.L            46.L    46.L    46.L    46.L
                46.L    46.L    46.L    46.L                                    46.L            46.L    46.L    46.L    46.L
                46.L    46.L                                    46.L    46.L    46.L            46.L    46.L    46.L    46.L
                                46.L                            46.L    47.     46.L            54.     46.L    46.L    46.L
                                46.L                            46.L    46.L    46.L            46.L    46.L    46.L    46.L
                                46.L                            46.L    46.L    46.L                            46.L    46.L
                                46.L                            46.L    46.L                                    46.L    46.L
                                46.L                            46.L    46.L
                                46.L            46.L    46.L    46.L    46.L
                                46.L            46.L    46.L    46.L    46.L
                                46.L            46.L    46.L    46.L    46.L
                                                46.L    46.L    46.L    46.L                                    46.L    46.L
                                                46.L    46.L    46.L    46.L                    46.L    51.     46.L    46.L
46.L                            46.L    46.L    46.L    46.L    46.L    46.L                    46.L    46.L    46.L    46.L
46.L            46.L    46.L    46.L    46.L    46.L    46.L    46.L    46.L            46.L    46.L    46.L    46.L    46.L
47.             46.L    46.L    46.L    46.L    46.L    46.L    46.L    46.L            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L    46.L    46.L                    46.L    46.L            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L    46.L    46.L    46.L    46.L    46.L    46.L            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L    46.L    46.L    46.L    46.L                            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L    46.L    46.L    46.L    46.L                            46.L    46.L    46.L
46.L            46.L    46.L    46.L    46.L    46.L    46.L                            46.L
                46.L    46.L                    46.L    48.                             46.L
                                                46.L    46.L
                        46.L    46.L            46.L    46.L                            46.L
                        46.L    46.L            46.L    46.L                            46.L
        46.L    46.L    46.L    46.L                                                    46.L
        46.L    46.L    46.L    46.L                    46.L                            46.L
        46.L    46.L    46.L    46.L                    46.L                            46.L
        46.L    46.L    46.L    46.L                    46.L                            46.L                    46.L    46.L
        46.L    46.L    46.L    46.L                    46.L                            46.L    46.L    46.L    46.L    46.L
        46.L    46.L    46.L    46.L                    46.L                            46.L    46.L    46.L    46.L    46.L
        46.L    46.L                                    46.L                                    46.L    46.L    46.L    46.L
        46.L    46.L            46.L    46.L            46.L                                    46.L    46.L    46.L    46.L
                                46.L    46.L            46.L                                    46.L    46.L    46.L    46.L
                                46.L    46.L                                                    48.     46.L    46.L    52.
                                46.L    46.L                                                    46.L    46.L    46.L    46.L
                46.L    46.L    46.L    46.L            46.L                    46.L    46.L    46.L    46.L
                46.L    46.L    46.L    46.L            46.L                    46.L    46.L
46.L            46.L    46.L    46.L    46.L            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L    46.L    46.L            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L                            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L                            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L                            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L                            46.L    46.L    46.L    46.L    46.L
46.L                                                            46.L    46.L
46.L                                                            46.L    46.L
```

Figure A2.--Continued--Sm (parts per million)

	1.6							1.0L							
	2.5							2.4							
	4.5							1.9							
	2.0							1.0L							
	1.0L							3.2							
	3.0			2.2	3.7			1.0L							
	1.0L	1.7	1.0L	2.0	1.0L			3.2							
	2.0	1.0L	1.0L	1.0L	1.0L			1.0L							
		1.0L	2.6	1.6	2.1							1.8	2.7		
		2.2	2.6	1.0L	1.0L					3.0		1.0L	1.5		
		1.6	1.0L	1.0L	2.6					3.0		1.0L	4.8	1.0L	1.0L
		1.0L	1.0L	1.0L	1.0L					4.0		1.0L	5.3	1.4	1.8
		2.0	1.0L	2.0	1.0L					1.0L		3.8	1.0L	2.7	1.0L
		3.4	2.9					3.3	1.0L	1.0L		2.3	2.0	1.0L	1.0L
				2.9				3.7	1.0L	1.0		1.0L	1.5	1.0L	1.0L
				1.0L				1.7	3.1	1.0L		5.2	2.1	1.0L	1.0L
				1.0L				4.5	3.0	3.2				1.8	1.0L
				3.3				2.0	1.0L					1.7	2.5
				3.0				2.8	1.0L						
				1.0L		1.0L	2.1	1.0L	1.0L						
				1.8		1.0L	2.1	1.0L	1.0L						
				1.0L		4.0	1.9	3.9	1.8						
						1.0L	1.0L	1.0L	2.3					1.0L	1.0L
						1.0L	1.4	1.0L	1.0L			1.0L	1.0L	1.0L	3.2
2.0				1.0L	1.0L	2.9	2.9	1.0L	1.0L			1.0L	2.0	1.0L	1.0L
1.0L		1.0L	2.5	2.4	1.9	1.0L	2.3	1.0L	1.0L		1.0L	1.0L	1.5	1.6	2.9
1.0L		2.3	1.0L	1.9	1.0L	2.3	1.0L	1.0L	1.0L		1.0L	1.0L	2.5	1.9	1.6
1.0L		1.0L	1.0L	2.8	1.0L			1.0L	1.0L		1.8	1.0L	1.0L	1.0L	2.0
2.7		1.0L	1.0L	1.0L	3.0	1.0L	2.7	2.6	1.0L		1.0L	1.0L	1.4	2.5	2.2
2.7		1.0L	1.0L	1.0L	1.0L	3.7	3.4				2.9	1.0L	3.2	1.0L	3.4
1.0L		1.7	1.0L	3.2	1.0L	1.0L	1.6				1.0L	1.0L	2.8		
1.0L		3.3	1.0L	3.4	3.4	2.7	2.7				1.4				
		4.2	1.9			1.2	1.0L				2.0				
						1.0L	2.7								
			1.0L	2.1		1.8	3.2				1.8				
			1.0L	2.2		1.0L	1.8				1.0L				
	1.6	1.0L	1.0L	1.0L							3.5				
	1.0L	1.0L	1.0L	1.0L			1.0L				1.0L				
	1.0L	1.0L	2.0	1.6			1.0L				1.0L				
	2.7	1.0L	1.0L	1.8			2.9				1.0L			1.2	4.2
	1.0L	3.1	1.7	2.5			3.8				1.0L	3.5	2.9	2.0	5.0
	3.8	1.1	2.7	2.7			2.9				1.0L	1.0L	3.4	1.0L	2.7
	3.2	1.0L					1.0L					2.7	1.3	2.2	1.5
	3.2	1.0L		1.4	1.0L		3.8					1.0	3.3	1.9	1.0L
				2.3	3.3		1.0L					5.8	1.0L	2.8	1.0L
				1.0L	1.0L							4.7	1.0L	1.0L	3.7
				2.8	2.3							3.0	1.0L	1.0L	2.8
		1.0L	1.0L	1.0L	1.0L		2.7			2.7	2.5	2.5	2.0		
		1.0L	1.0L	2.7	2.1		2.3			2.7	1.0L				
1.0L		1.0L	2.2	2.0	2.6		3.3	2.9	1.0L	5.0	1.0L				
2.6		1.0L	1.0L	1.0L	3.4		1.0L	1.0L	1.0L	1.0L	1.0L				
2.8		2.5	2.6				2.4	2.0	1.0L	2.5	2.5				
3.3		2.4	1.0L				1.0L	3.6	1.0L	1.0L	1.0L				
2.7		3.4	1.0L				3.1	4.2	1.7	1.0L	1.0L				
3.5		2.1	2.4				1.0L	1.0L	1.0L	2.5	2.2				
1.0L								2.0	2.5						
1.0L								2.3	3.8						

Figure A2.--Continued—Eu (parts per million)

```
        2.7                                                     9.7
        2.2L                                                    19.0
        2.2L                                                    2.2L
        6.4                                                     4.9
        3.0                                                     2.2L
        2.8                     2.2L    8.8                     2.2L
        2.2L    8.5     7.3     2.2L    19.0                    6.0
        2.2L    2.2L    2.2L    5.7     16.0                    10.0
                13.0    17.0    16.0    2.2L                                7.4     9.5
                8.8     3.4     9.5     2.2L                            5.1         2.2L    2.2L
                10.0    3.6     2.2L    5.2                             14.0        6.3     2.2L    6.0     2.2L
                4.0     2.2L    8.8     2.2L                            2.2L        2.2L    16.0    2.2L    2.2L
                6.8     4.6     2.2L    12.0                            2.2L        6.9     9.4     6.6     2.2L
                10.0    9.1                             16.0    5.2     6.3         15.0    2.2L    2.2L    9.6
                                2.2L                    5.2     2.7     2.2L        2.2L    2.2L    13.0    2.2L
                                4.1                     4.3     2.2L    2.2L        2.2L    3.4     8.4     5.2
                                2.2L                    2.2L    2.2L    11.0                        2.2L    4.5
                                4.4                     2.2L    7.9                                 2.2L    9.5
                                8.2                     5.0     4.7
                                2.2L            2.2L    5.6     2.2L    17.0
                                2.2L            13.0    3.8     9.9     2.2L
                                2.2L            9.5     9.4     2.6     3.4
                                                12.0    11.0    2.2L    6.5                             7.5     3.9
                                                2.2L    2.2L    2.7     2.2L                    9.2     3.8     2.2L    15.0
2.2L                            2.2L    2.2L    2.2L    2.2L    2.2L    3.8                     8.1     12.0    10.0    2.2L
2.2L            10.0    6.3     14.0    2.2L    4.6     3.7     2.2L    2.2L            2.2L    2.2L    4.1     2.2L    5.6
22.0            4.9     3.8     2.2L    2.2L    16.0    6.2     2.2L    15.0            5.0     2.2L    2.2L    16.0    2.2L
10.0            2.2L    2.7     18.0    7.5                     2.2L    9.5             2.2L    2.2L    13.0    3.4     2.2L
8.8             2.2L    9.6     2.2L    2.2L    2.2L    2.2L    13.0    7.1             6.2     3.1     2.2L    4.9     2.2L
2.9             2.2L    2.6     2.2L    3.9     14.0    2.2L                            6.1     2.2L    2.2L    2.2L    2.2L
10.0            3.5     2.6     9.8     10.0    15.0    14.0                            7.4     2.2L    11.0
8.1             12.0    18.0    7.8     3.6     2.2L    4.2                             5.4
                2.2L    5.8                     3.3     3.0                             2.2L
                                                2.2L    2.2L
                        7.2     13.0            2.2L    4.8                             8.0
                        8.7     8.7             15.0    2.9                             6.7
        2.2L    2.2L    3.5     8.9                                                     2.2L
        18.0    2.2L    6.0     7.8                     2.2L                            4.0
        12.0    2.2L    2.2L    12.0                    2.2L                            2.2L
        10.0    2.2L    2.2L    20.0                    2.2L                            2.2L                    2.2L    2.2L
        6.3     2.2L    2.2L    2.2L                    6.1                             5.4     2.2L    19.0    2.2L    7.8
        13.0    2.2L    25.0    7.3                     2.2L                            2.2L    5.6     2.2L    7.8     2.2L
        2.2L    11.0                                    2.2L                                    7.8     2.2L    8.5     8.3
        13.0    2.2L            11.0    7.4             9.3                                     2.2L    15.0    9.8     2.2L
                                7.4     2.5             3.9                                     2.2L    2.2L    2.2L    7.4
                                7.8     11.0                                                    2.2L    2.2L    8.6     2.2L
                                2.2L    5.2                                                     2.2L    2.2L    5.5     2.2L
                2.2L    5.5     14.0    2.2L            2.2L                    28.0    13.0    3.7     2.2L
                2.2L    2.2L    2.2L    7.5             2.2L                    6.3     2.2L
5.5             8.6     13.0    4.8     11.0            16.0    5.7     2.2L    2.2L    3.4
4.4             2.2L    2.2L    2.2L    2.2L            9.7     8.0     3.0     13.0    2.2L
13.0            6.9     13.0                            2.2L    4.0     4.5     18.0    6.1
7.9             4.1     2.2L                            19.0    3.1     2.2L    21.0    3.9
6.0             2.2L    2.2L                            7.6     2.2L    2.2L    10.0    19.0
14.0            2.5     16.0                            17.0    8.1     13.0    4.4     6.2
6.8                                                             4.4     2.2L
2.2L                                                            7.8     6.4
```

Figure A2.--Continued--Gd (parts per million)

71

	10.L							10.L							
	10.L							10.L							
	10.L							10.L							
	10.L							10.L							
	10.L							10.L							
	10.L			10.L	10.L			10.L							
	10.L	10.L	10.L	10.L	10.L			10.L							
	10.L	10.L	10.L	10.L	10.L			10.L							
		15.	10.L	10.L	10.L							10.L	10.L		
		10.L	10.L	10.L	10.L						10.L	10.L	10.L		
		10.L	10.L	10.L	10.L						10.L	10.L	25.	10.L	10.L
		10.L	10.L	10.L	10.L						10.L	10.L	10.L	10.L	10.L
		10.L	10.L	10.L	10.L						10.L	10.L	10.L	10.L	10.L
		10.L	10.L					10.L	10.L		10.L	10.L	10.L	10.L	10.L
				10.L				10.L	10.L		10.L	10.L	10.L	10.L	10.L
				10.L				10.L	10.L		10.L	10.L	10.L	10.L	10.L
				10.L				10.L	10.L		10.L			10.L	10.L
				10.L				10.L	10.L					10.L	10.L
				10.L				10.L	10.L						
				10.L		10.L	10.L	10.L	10.L						
				10.L		10.L	10.L	10.L	10.L						
				10.L		10.L	10.L	12.	10.L						
						10.L	10.L	10.L	10.L					10.L	10.L
						10.L	10.L	10.L	10.L			10.L	10.L	10.L	10.L
10.L				10.L	10.L	10.L	10.L	10.L	10.L			10.L	10.L	10.L	10.L
10.L		10.L	10.L	10.L	10.L	10.L	10.L	10.L	10.L		10.L	10.L	10.L	10.L	10.L
10.L		10.L	10.L	10.L	10.L	10.L	10.L	10.L	10.L		10.L	10.L	10.L	10.L	10.L
10.L		10.L	10.L	10.	10.L			10.L	10.L		10.L	10.L	10.L	10.L	10.L
10.L		10.L	10.L	10.L	10.L	10.L	10.L	10.L	10.L		10.L	10.L	10.L	10.L	10.L
10.L		10.L	10.L	10.L	10.L	10.L	10.L				10.L	10.L	10.L	10.L	10.L
10.L		10.L	10.L	10.L	10.L	10.L	10.L				10.L	10.L	10.		
10.L		10.	10.L	10.L	10.L	10.L	10.L				10.L				
		10.L	10.L			10.L	10.L				10.L				
						10.L	10.L								
			10.L	10.L		10.L	10.L				10.L				
			10.L	10.L		10.L	10.L				10.L				
	10.L	10.L	10.	10.L							10.L				
	10.L	10.L	10.L	10.L			10.L				10.L				
	10.L	10.L	10.L	11.			10.L				10.L				
	10.L	10.L	10.L	10.L			10.L				10.L			10.L	15.
	10.L	10.L	10.L	10.L			10.L				10.L	10.L	10.L	10.L	17.
	10.L	10.L	10.L	10.L			10.L				10.L	10.L	10.L	10.L	10.L
	10.L	10.L					10.L					10.L	10.L	10.L	10.L
	10.L	10.L		10.L	12.		23.					10.L	10.L	10.L	10.L
				10.L	10.L		10.L					10.L	10.L	10.L	10.L
				10.L	10.L							10.L	10.L	10.L	10.L
				10.L	10.L							10.L	10.L	10.L	10.L
		10.L	10.L	10.L	10.L		10.L			10.L	10.L	10.L	10.L		
		11.	10.L	10.L	10.L		10.L			10.L	10.L				
10.L		10.L	10.L	10.L	12.		10.L	10.L	10.L	21.	10.L				
10.L		10.L	10.L	10.L	10.L		10.L	10.L	11.	12.	10.L				
10.L		10.L	16.				10.L	10.L	10.L	10.L	10.L				
10.L		10.L	10.L				10.L	10.L	10.L	10.L	10.L				
10.L		10.L	10.L				12.	10.L	10.L	12.	10.L				
10.L		10.L	10.L				11.	10.L	10.L	18.	10.L				
10.L								10.L	10.L						
10.L								10.L	10.L						

Figure A2.—Continued—Dy (parts per million)

	4.6L							4.6L							
	4.6L							4.6L							
	4.6L							4.6L							
	4.6L							4.6L							
	4.6L							4.6L							
	4.6L			4.6L	4.6L			4.6L							
	4.6L	4.6L	4.6L	4.6L	4.6L			4.6L							
	4.6L	4.6L	4.6L	4.6L	4.6L			4.6L							
		4.6L	4.6L	4.6L	4.6L							4.6L	4.6L		
		4.6L	4.6L	4.6L	4.6L					4.6L		4.6L	4.6L		
		4.6L	4.6L	4.6L	4.6L					4.6L		4.6L	4.6L	4.6L	4.6L
		4.6L	4.6L	4.6L	4.6L					4.6L		4.6L	4.6L	4.6L	4.6L
		4.6L	4.6L	4.6L	4.6L					4.6L		4.6L	4.6L	4.6L	4.6L
		4.6L	4.6L					4.6L	4.6L	4.6L		4.6L	4.6L	4.6L	4.6L
				4.6L				4.6L	4.6L	4.6L		4.6L	4.6L	4.6L	4.6L
				4.6L				4.6L	4.6L	4.6L		4.6L	4.6L	4.6L	4.6L
				4.6L				4.6L	4.6L	4.6L				4.6L	4.6L
				4.6L				4.6L	4.6L					4.6L	4.6L
				4.6L				4.6L	4.6L						
				4.6L		4.6L	4.6L	4.6L	4.6L						
				4.6L		4.6L	4.6L	4.6L	4.6L						
				4.6L		4.6L	4.6L	4.6L	4.6L						
						4.6L	4.6L	4.6L	4.6L					4.6L	4.6L
						4.6L	4.6L	4.6L	4.6L			4.6L	4.6L	4.6L	4.6L
4.6L				4.6L	4.6L	4.6L	4.6L	4.6L	4.6L			4.6L	4.6L	4.6L	4.6L
4.6L		4.6L	4.6L	4.6L	4.6L	4.6L	4.6L	4.6L	4.6L		4.6L	4.6L	4.6L	4.6L	4.6L
4.6L		4.6L	4.6L	4.6L	4.6L	4.6L	4.6L	4.6L	4.6L		4.6L	4.6L	4.6L	4.6L	4.6L
4.6L		4.6L	4.6L	4.6L	4.6L			4.6L	4.6L		4.6L	4.6L	4.6L	4.6L	4.6L
4.6L		4.6L	4.6L	4.6L	4.6L	4.6L	4.6L	4.6L	4.6L		4.6L	4.6L	4.6L	4.6L	4.6L
4.6L		4.6L	4.6L	4.6L	4.6L	4.6L	4.6L				4.6L	4.6L	4.6L	4.6L	4.6L
4.6L		4.6L	4.6L	4.6L	4.6L	4.6L	4.6L				4.6L	4.6L	4.6L		
4.6L		4.6L	4.6L	4.6L	4.6L	4.6L	4.6L				4.6L				
		4.6L	4.6L			4.6L	4.6L				4.6L				
						4.6L	4.6L								
			4.6L	4.6L		4.6L	4.6L				4.6L				
			4.6L	4.6L		4.6L	4.6L				4.6L				
	4.6L	4.6L	4.6L	4.6L							4.6L				
	4.6L	4.6L	4.6L	4.6L			4.6L				4.6L				
	4.6L	4.6L	4.6L	4.6L			4.6L				4.6L				
	4.6L	4.6L	4.6L	4.6L			4.6L				4.6L			4.6L	4.6L
	4.6L	4.6L	4.6L	4.6L			4.6L				4.6L	4.6L	4.6L	4.6L	4.6L
	4.6L	4.6L	4.6L	4.6L			4.6L				4.6L	4.6L	4.6L	4.6L	4.6L
	4.6L	4.6L					4.6L					4.6L	4.6L	4.6L	4.6L
	5.3	4.6L		4.6L	4.6L		5.3					4.6L	4.6L	4.6L	4.6L
				4.6L	4.6L		4.6L					4.6L	4.6L	4.6L	4.6L
				4.6L	4.6L							4.6L	4.6L	4.6L	4.6L
				4.6L	4.6L							4.6L	4.6L	4.6L	4.6L
		4.6L	4.6L	4.6L	4.6L		4.6L			4.7	4.6L	4.6L	4.6L		
		4.6L	4.6L	4.6L	4.6L		4.6L			5.0	4.6L				
4.6L		4.6L	4.6L	4.6L	4.6L		4.6L	4.6L	4.6L	4.6L	4.6L				
4.6L		4.6L	4.6L	4.6L	4.6L		4.6L	4.6L	4.6L	4.6L	4.6L				
4.6L		4.6L	4.6L				4.6L	4.6L	4.6L	4.6L	4.6L				
4.6L		4.6L	4.6L				4.6L	4.6L	4.6L	4.6L	4.6L				
4.6L		4.7	4.6L				4.6L	4.6L	4.6L	4.6L	4.6L				
4.6L		4.6L	4.6L				4.6L	4.6L	4.6L	4.8	4.6L				
4.6L								4.6L	4.6L						
4.6L								4.6L	4.6L						

Figure A2.--Continued--Er (parts per million)

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         10.L                                                           10.L
         10.L                                                           10.L
         10.L                                                           10.L
         10.L                                                           10.L
         10.L                                                           10.L
         10.L                       10.L     10.L                       10.L
         10.L     10.L     10.L     10.L     10.L                       10.L
         10.L     10.L     10.L     10.L     10.L                       10.L
                  10.L     10.L     10.L     10.L                                                           10.L     10.L
                  10.L     10.L     10.L     10.L                                         10.L              10.L     10.L
                  10.L     10.L     10.L     10.L                                         10.L              10.L     10.L     10.L     10.L
                  10.L     10.L     10.L     10.L                                         10.L              10.L     10.L     10.L     10.L
                  10.L     10.L     10.L     10.L                                         10.L              10.L     10.L     10.L     10.L
                  10.L     10.L                                         10.L     10.L     10.L              10.L     10.L     10.L     10.L
                                    10.L                                10.L     10.L     10.L              10.L     10.L     10.L     10.L
                                    10.L                                10.L     10.L     10.L              10.L     10.L     10.L     10.L
                                    10.L                                10.L     10.L     10.L                                10.L     10.L
                                    10.L                                10.L     10.L                                         10.L     10.L
                                    10.L                                10.L     10.L
                                    10.L              10.L     10.L     10.L     10.L
                                    10.L              10.L     10.L     10.L     10.L
                                    10.L              10.L     10.L     10.L     10.L
                                                      10.L     10.L     10.L     10.L                                         10.L     10.L
                                                      10.L     10.L     10.L     10.L                       10.L     10.L     10.L     10.L
10.L                                10.L     10.L     10.L     10.L     10.L     10.L                       10.L     10.L     10.L     10.L
10.L              10.L     10.L     10.L     10.L     10.L     10.L     10.L     10.L              10.L     10.L     10.L     10.L     10.L
10.L              10.L     10.L     10.L     10.L     10.L     10.L     10.L     10.L              10.L     10.L     10.L     10.L     10.L
10.L              10.L     10.L     10.L     10.L                       10.L     10.L              10.L     10.L     10.L     10.L     10.L
10.L              10.L     10.L     10.L     10.L     10.L     10.L     10.L     10.L              10.L     10.L     10.L     10.L     10.L
10.L              10.L     10.L     10.L     10.L     10.L     10.L                                10.L     10.L     10.L     10.L     10.L
10.L              10.L     10.L     11.      10.L     10.L     10.L                                10.L     10.L     10.L
10.L              10.L     10.L     10.L     10.L     10.L     10.L                                10.L
                  10.L     10.L                       10.L     10.L                                10.L
                                                      10.L     10.L
                           10.L     10.L              10.L     10.L                                10.L
                           10.L     10.L              10.L     10.L                                10.L
         10.L     10.L     10.L     10.L                                                           10.L
         10.L     10.L     10.L     10.L                       10.L                                10.L
         10.L     10.L     10.L     10.L                       10.L                                10.L
         10.L     10.L     10.L     10.L                       10.L                                10.L                       10.L     10.L
         10.L     10.L     10.L     10.L                       10.L                                10.L     10.L     10.L     10.L     10.L
         10.L     10.L     10.L     10.L                       10.L                                10.L     10.L     10.L     10.L     10.L
         10.L     10.L                                         10.L                                         10.L     10.L     10.L     10.L
         10.L     10.L              10.L     10.L              10.L                                         10.L     10.L     10.L     10.L
                                    10.L     10.L              10.L                                         10.L     10.L     10.L     10.L
                                    10.L     10.L                                                           10.L     10.L     10.L     10.L
                                    10.L     10.L                                                           10.L     10.L     10.L     10.L
                  10.L     10.L     10.L     10.L              10.L                       10.L     10.L     10.L     10.L
                  10.L     10.L     10.L     10.L              10.L                       10.L     10.L
10.L              10.L     10.L     10.L     10.L              10.L     10.L     10.L     10.L     10.L
10.L              10.L     10.L     10.L     10.L              10.L     10.L     10.L     10.L     10.L
10.L              10.L     10.L                                10.L     10.L     10.L     10.L     10.L
10.L              10.L     10.L                                10.L     10.L     10.L     10.L     10.L
10.L              10.L     10.L                                10.L     10.L     10.L     10.L     10.L
10.L              10.L     10.L                                10.L     10.L     10.L     10.L     10.L
10.L                                                                    10.L     10.L
10.L                                                                    10.L     10.L
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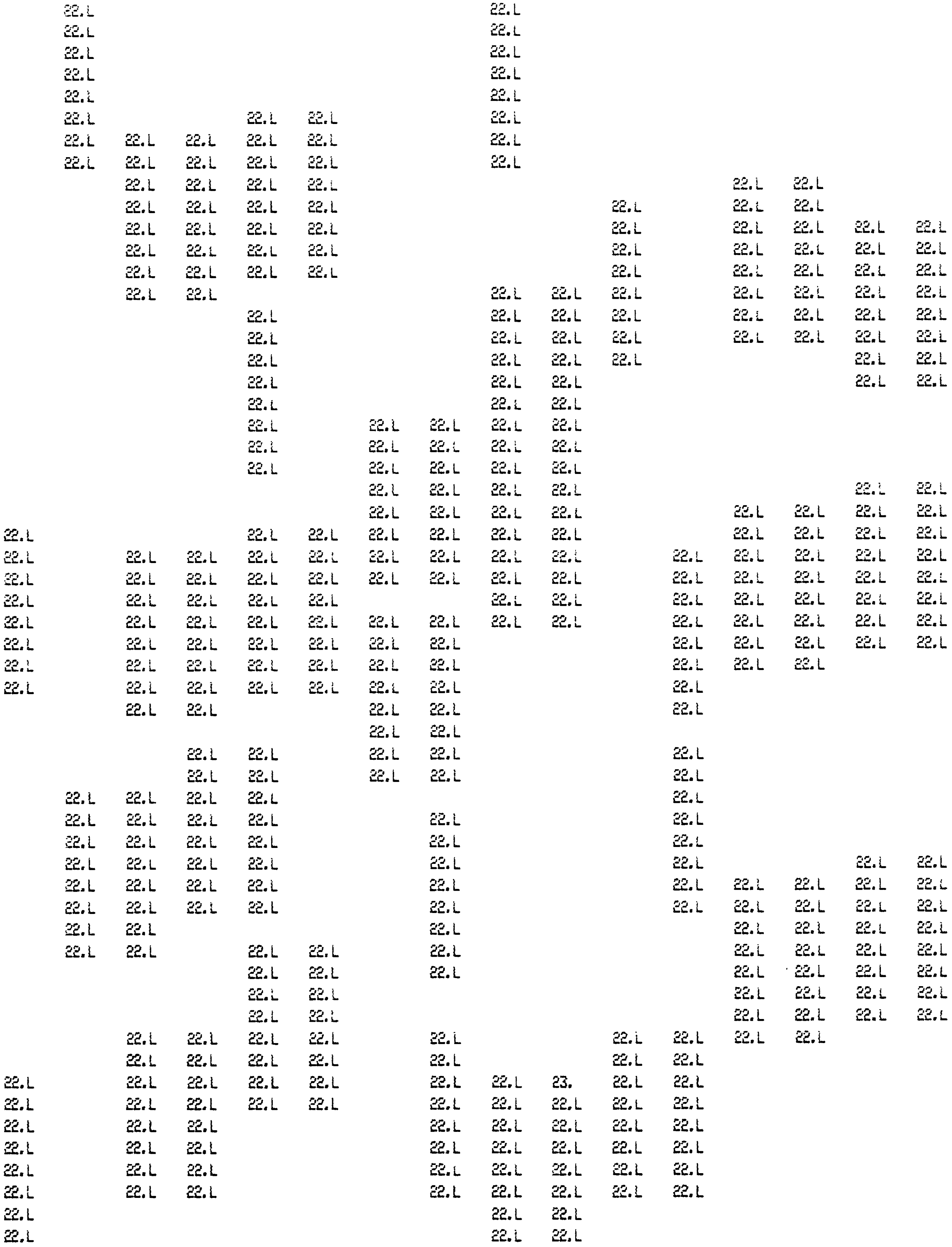
Figure A2.--Continued--Lu (parts per million)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22.L 22.L 22.L
22.L 22.L 22.L

Figure A2.--Continued--Os (parts per million)

	0.03							0.02L							
	0.03							0.03							
	0.05							0.02L							
	0.04							0.02L							
	0.02L							0.02L							
	0.03			0.02L	0.02L			0.02L							
	0.03	0.02L	0.15	0.02	0.04			0.02L							
	0.03	0.02L	0.19	0.04	0.08			0.02L							
		0.03	0.05	0.02L	0.06							0.02L	0.02L		
		0.04	0.04	0.03	0.02L					0.04		0.02L	0.02L		
		0.02L	0.02L	0.03	0.02L					0.12		0.02L	0.02L	0.02L	0.02L
		0.02L	0.02L	0.47	0.02L					0.03		0.008	0.05	0.02L	0.02L
		0.02L	0.02L	0.40	0.04					0.02L		0.02L	0.02L	0.02	0.02L
		0.03	0.02L					0.22	0.05	0.03		0.02L	0.02L	0.02L	0.02L
				0.09				0.22	0.05	0.02L		0.02L	0.02L	0.07	0.04
				0.03				0.03	0.02L	0.02L		0.02L	0.02L	0.04	0.02L
				0.12				0.03	0.02L	0.02L				0.02L	0.02
				0.12				0.02L	0.03					0.02L	0.02L
				0.09				0.02L	0.02L						
				0.15		0.02L	0.03	0.04	0.03						
				0.12		0.02L	0.03	0.02	0.02L						
				0.02L		0.03	0.02L	0.07	0.09						
						0.03	0.02L	0.06	0.07					0.02L	0.18
						0.04	0.02L	0.08	0.06			0.10	0.04	0.02L	0.16
0.02				0.04	0.04	0.03	0.02L	0.10	0.04			0.12	0.05	0.02L	0.02L
0.02L		0.02L	0.06	0.04	0.03	0.04	0.02L	0.05	0.10		0.03	0.11	0.04	0.02L	0.02L
0.07		0.02L	0.08	0.05	0.04	0.04	0.03	0.06	0.08		0.03	0.13	0.05	0.02L	0.06
0.08		0.03	0.15	0.06	0.04			0.06	0.07		0.03	0.02L	0.02L	0.02L	0.05
0.03		0.02L	0.15	0.06	0.04	0.06	0.02L	0.08	0.05		0.02L	0.03	0.02L	0.02L	0.03
0.02L		0.04	0.04	0.05	0.05	0.09	0.03				0.06	0.10	0.02L	0.02L	0.03
0.02L		0.04	0.04	0.03	0.06	0.03	0.02L				0.05	0.08	0.03		
0.02L		0.20	0.03	0.02L	0.06	0.02L	0.02L				0.04				
		0.15	0.02L			0.02L	0.05				0.04				
						0.02L	0.03								
			0.03	0.05		0.02L	0.06				0.10				
			0.04	0.05		0.03	0.05				0.25				
	1.00	0.02L	0.08	0.04							0.22				
	1.35	0.03	0.05	0.03			0.02				0.04				
	2.43	0.04	0.02L	1.75			0.03				0.11				
	2.02	0.04	0.03	2.02			0.02L				0.02L			0.02L	0.03
	2.70	0.24	0.02L	0.02L			0.02L				0.02L	0.05	0.22	0.02L	0.03
	2.29	0.24	0.03	0.02L			0.02L				0.02L	0.04	0.18	0.02L	0.05
	2.70	0.12					0.02L					0.08	0.03	0.03	0.04
	2.83	0.10		0.02L	0.06		0.03					0.08	0.04	0.06	0.08
				0.02L	0.07		0.04					0.04	0.02L	0.06	0.09
				0.11	0.09							0.04	0.02L	0.03	0.09
				0.10	0.09							0.13	0.02L	0.02L	0.09
		0.02L	0.08	0.03	0.03		0.03			0.43	0.05	0.06	0.02L		
		0.02L	0.08	0.02L	0.04		0.02L			0.36	0.03				
0.05		0.06	0.03	0.02L	0.04		0.05	0.10	0.03	0.10	0.04				
0.06		0.06	0.04	0.02L	0.04		0.06	0.10	0.03	0.07	0.03				
0.12		0.09	0.07				0.15	0.30	0.10	0.13	0.05				
0.15		0.09	0.06				0.16	0.30	0.09	0.13	0.04				
2.02		0.05	0.05				0.11	0.26	0.11	0.05	0.03				
2.02		0.08	0.08				0.11	0.31	0.12	0.12	0.03				
0.10								0.04	0.15						
0.10								0.04	0.15						

Figure A2.--Continued--Na2O (percent)

	Si	Al	Fe^{2}	Fe^{3}	Mg	Ca	Na	K	Ti	P	Mn	CO$_{2}$	Ag	As	B	Ba	Be	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sn	Sr
3AAR1	1																											
3AAR2																												
3BAR1																												
3BAR2																												
3CAR1		4	2	1	1			4							4			1	3			1		4		3		
3CAR2															1									1				
3DAR1																												
3DAR2																												
3EAR1																												
3EAR2																												
3FAR1																												
3FAR2							2																					
3GAR1																												
3GAR2		1													1	4								1				1
3HAR1																				1								
3HAR2																												
4AAR1																												
4AAR2																		2						2				
4BAR1																												
4BAR2																												
4CAR1																												
4CAR2																												
4DAR1																												
4DAR2									1																			
4EAR1		1		2			1	1								2			1							1		
	Si	Al	Fe^{2}	Fe^{3}	Mg	Ca	Na	K	Ti	P	Mn	CO$_{2}$	Ag	As	B	Ba	Be	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sn	Sr
4EAR2																												
4FAR1																												
4FAR2																			4									
4GAR1																												
4GAR2																												
4HAR1									1																			
4HAR2																												
7AAR1																												
7AAR2																												
7BAR1																												
7BAR2																												
7CAR1																												
7CAR2																												
7DAR1		1					3	1								1												
7DAR2																												
7EAR1							2		1		1					1												
7EAR2		1		1			3																					
7FAR1		1					3											1	1					2		1		
7FAR2		3	2	1	1		4		3	2	3				1				2		1	2		1		3		1
7GAR1																												
7GAR2																												
7HAR1			2				1								2		2	1	2	1		1			2	1		
7HAR2																												
18AAR1																												
18AAR2															1		1											
	Si	Al	Fe^{2}	Fe^{3}	Mg	Ca	Na	K	Ti	P	Mn	CO$_{2}$	Ag	As	B	Ba	Be	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sn	Sr

	V	W	Y	Zn	Zr	Ce	Ga	Ge	Li	Yb	Nd	Sm	Eu	Gd	Dy	Er	Lu	Os
3AAR1																		
3AAR2																		
3BAR1																		
3BAR2																		
3CAR1	3			1		1	4											
3CAR2																		
3DAR1																		
3DAR2																		
3EAR1																		
3EAR2																		
3FAR1																		
3FAR2																		
3GAR1																		
3GAR2																		
3HAR1																		
3HAR2																		
4AAR1																		
4AAR2																		
4BAR1																		
4BAR2																		
4CAR1																		
4CAR2																		
4DAR1																		
4DAR2																		
4EAR1																		
	V	W	Y	Zn	Zr	Ce	Ga	Ge	Li	Yb	Nd	Sm	Eu	Gd	Dy	Er	Lu	Os
4EAR2																		
4FAR1																		
4FAR2																		
4GAR1																		
4GAR2																		
4HAR1																		
4HAR2					1													
7AAR1																		
7AAR2																		
7BAR1																		
7BAR2																		
7CAR1																		
7CAR2																		
7DAR1																		
7DAR2																		
7EAR1																		
7EAR2																		
7FAR1	2						2											
7FAR2	4		2	2	1	1	3			3								
7GAR1																		
7GAR2																		
7HAR1	1				3	1				1								
7HAR2																		
18AAR1																		
18AAR2																		
	V	W	Y	Zn	Zr	Ce	Ga	Ge	Li	Yb	Nd	Sm	Eu	Gd	Dy	Er	Lu	Os

Figure A3.--Element concentrations in sandstones of the Sauk sequence greater than the 90th, 95th, 97.5th and 99th percentiles [1,greater than P90; 2,greater than P95; 3,greater than P97.5; 4,greater than P99]. (See table A1 for sampling locations.)

	Si	Al	Fe^{2}	Fe^{3}	Mg	Ca	Na	K	Ti	P	Mn	CO$_2$	Ag	As	B	Ba	Be	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sn	Sr	V	W	Y	Zn	Zr	Ce	Ga	Ge	Li	Yb	Nd	Sm	Eu	Gd	Dy	Er	Lu	Os
18BAR1																				3																										
18BAR2																				3																										
18CAR1																																														
18CAR2																				1																										
18DAR1																																														
18DAR2																		1		1																										
18EAR1																																														
18EAR2																																														
18FAR1															1																															
18FAR2																																														
18GAR1																																														
18GAR2																																														
18HAR1																																														
18HAR2																																														
10AAR1																																1														
10AAR2	1																																													
10BAR1	2																																													
10BAR2																																														
10CAR1																					4		2										1	2												
10CAR2																																														
10DAR1																																														
10DAR2				1																																										
10EAR1	1																																													
10EAR2																	1										1																			
10FAR1																																														
10FAR2																																														
10GAR1																																														
10GAR2																																														
10HAR1																																														
10HAR2	1																																													
12AAR1	2																																													
12AAR2																																														
12BAR1																1																														
12BAR2																																														
12CAR1																1																														
12CAR2																																														
12DAR1																																														
12DAR2																																														
12EAR1																																														
12EAR2																									2																					
12FAR1			1																							1																				
12FAR2																																														
12GAR1																																	2													
12GAR2																																														
12HAR1																						4																								
12HAR2																																														
15AAR1					2			1				1																																		
15AAR2					4	2						3																																		
15BAR1A		1			1	1		2				1																																		
15BAR2																																								1							

Figure A3.--Continued

	Si	Al	Fe^{2}	Fe^{3}	Mg	Ca	Na	K	Ti	P	Mn	CO$_2$	Ag	As	B	Ba	Be	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sn	Sr	V	W	Y	Zn	Zr	Ce	Ga	Ge	Li	Yb	Nd	Sm	Eu	Gd	Dy	Er	Lu	Os
15CAR1															2																															
15CAR2					1																																									
15DAR1	1																																													
15DAR2																																														
15EAR1																																														
15EAR2																																														
15FAR1																																														
15FAR2																																														
15GAR1							1	1																	1		1									1										
15GAR2A																																														
15HAR1			1			1						1																																		
15HAR2A						1																																								
17AAR1											1																	2																		
17AAR2A										3																																				
17BAR1											1																									1										
17BAR2			1			2				4	3	3						1		1	2	2						2			2	2		2				1								
17CAR1										1	4		4			3	3	2		4		2		2	4				1			4														
17CAR2											2		4				3			2		2	1		4				1		3	3				1					3					
17DAR1																												2																		
17DAR2																												3																		
17EAR1																																														
17EAR2						2						1																1																		
17FAR1										1																																				
17FAR2					1	3					2	3																																		
17GAR1						2						2																																		
17GAR2						2						2																2																		
17HAR1																																														
17HAR2																																														
8AAR1		4	4				2	1	4										2			2				3			4			1			4			2								
8AAR2									3														2		1						3	1	1					4					2			
8BAR1		1	1	1															1		1		1		1	2					1	1			2			1				2				
8BAR2																																											2			
8CAR1																																														
8CAR2					3	4						4																																		
8DAR1																																														
8DAR2																																														
8EAR1									1												1		2										2	1				1								
8EAR2		2					2	4								1							1		1																					
8FAR1		1					1	3								1									1																					
8FAR2																							2																							
8GAR1										1																																				
8GAR2									2														3																							
8HAR1		1	2					2	1												1		3			1					1		1					2								
8HAR2		2						2								2																														
19AAR1			2		2	1				3	1	1						1	1		1	2			1	1			1		1	2		1												
19AAR2A		2	4	2	1			1	3	2			3		3		1	2	2	1		2		4	1	3			3		1	3		1	3			1								
19BAR1						3				2	2	3	2						1		3	1				2		1	2		2			4				1			3					
19BAR2A						1			1		1																																			
19CAR1		2	2				1	3	1	1	3		2		2	1		4	1		1	1		2	1	3			1		1	1		2	2			2								
19CAR2					2							1																				1														

Figure A3.--Continued

```
             2  3
        SiAlFe Fe MgCaNa KTi PMnCO AgAs BBaBeCoCrCuLaMoNbNiPbScSnSr V W YZnZrCeGaGeLiYbNdSmEuGdDyErLuOs
                                 2
19DAR1             1              1                         3             4
19DAR2          2  3       2   1  1           1             3             3
19EAR1       3  2                             2       3   1   2     3     1
19EAR2
19FAR1       1               1              2                     2     1             1
19FAR2       1
19GAR1          1    2       4 1  1 2         4     1                   2     1       1     2   3
19GAR2          2  1                3     3   1
19HAR1
19HAR2               1                                                  1
1AAR1                                                                       1
1AAR2
1BAR1
1BAR2
2AAR1           1              2
2AAR2                                   1 1     1            2
2BAR1
2BAR2
5AAR1A
5AAR2A
5BAR1A
5BAR2A
6AAR1
6AAR2           3          2                  3   4
6BAR1      2    4      3 2                1     1 1           1                 2
             2  3
        SiAlFe Fe MgCaNa KTi PMnCO AgAs BBaBeCoCrCuLaMoNbNiPbScSnSr V W YZnZrCeGaGeLiYbNdSmEuGdDyErLuOs
                                 2
6BAR2           3          1
9AAR1                                                   1                   1
9AAR2
9BAR1                    1                              1               1   2         2
9BAR2                      2            1         1 2             3 1       1 1       1         2
11AAR1
11AAR2                                      3                   2
11BAR1
11BAR2
13AAR1                                    4                                             1
13AAR2
13BAR1
13BAR2
14AAR1             2 1            2
14AAR2
14BAR1                                            3                         2
14BAR2
16AAR1                                            1
16AAR2                                                                              1
16BAR1               2         1  2
16BAR2
20AAR1                   1
20AAR2     1             3
20BAR1
20BAR2                     2
             2  3
        SiAlFe Fe MgCaNa KTi PMnCO AgAs BBaBeCoCrCuLaMoNbNiPbScSnSr V W YZnZrCeGaGeLiYbNdSmEuGdDyErLuOs
                                 2
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Figure A3.--Continued

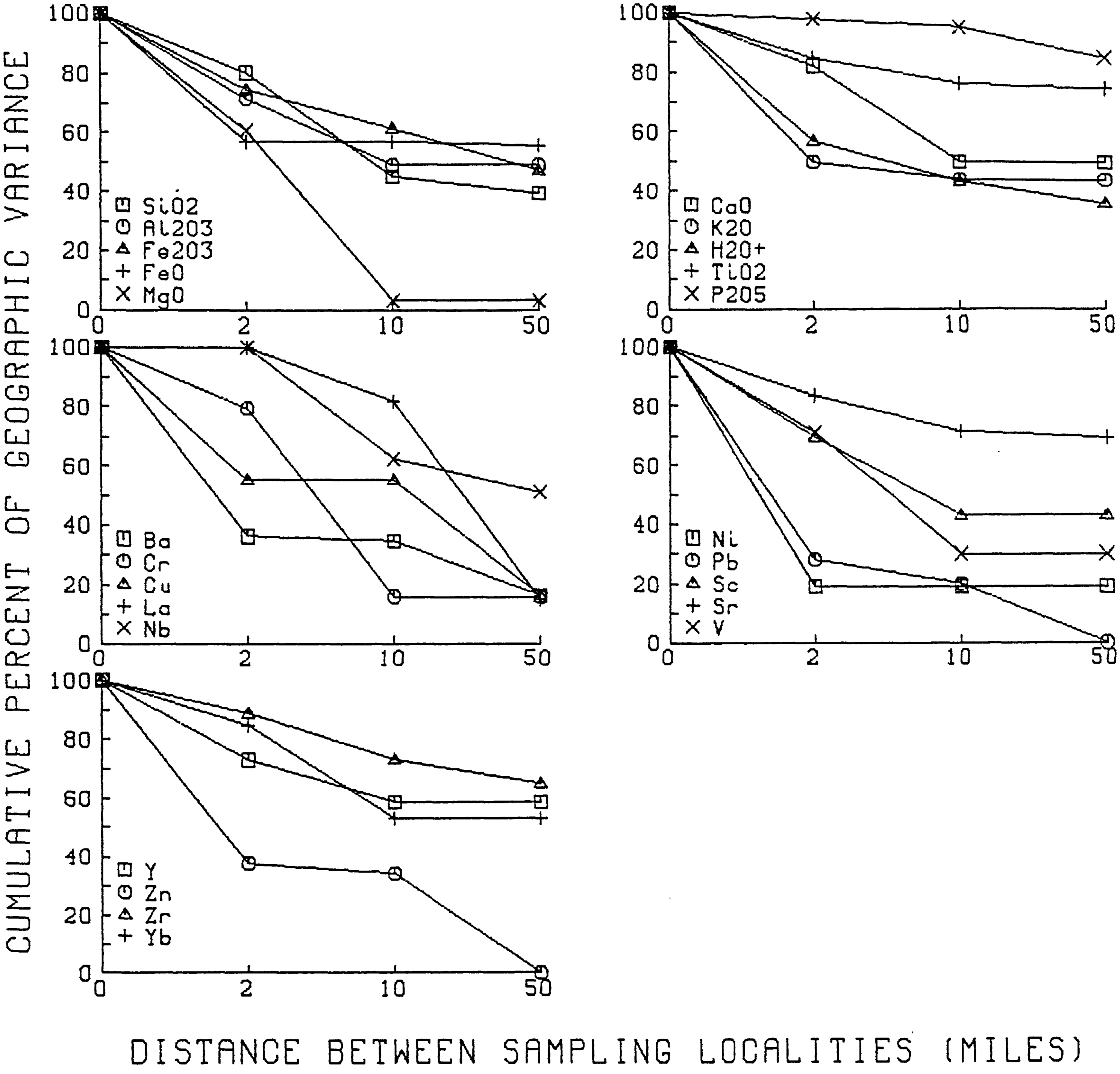

Figure A4.-- Cumulative-variance curves for the basal Cambrian sandstones (unit A)

Table A1.--Notes on sandstone samples and references.

1AAR1
Little Rocky Mountains, Montana, SW1/4 sec. 29, T26N,R25E. Flathead Sandstone, 25' from top, weathered conglomeratic sandstone. Sample is poorly sorted, well-rounded sublitharenite. Knechtel (1959)
1AAR2
Little Rocky Mountains, Montana, SW1/4 sec. 29, T26N,R25E. Flathead Sandstone, 5' from top, weathered conglomeratic sandstone. Sample is poorly sorted sublitharenite. Knechtel (1959)
1BAR1
Little Rocky Mountains, Montana, N1/2 sec. 3, T25N,R24E. Flathead Sandstone, 20' from top, poorly exposed conglomeratic sandstone. Sample is well-sorted sublitharenite. Knechtel (1959)
1BAR2
Little Rocky Mountains, Montana, N1/2 sec. 3, T25N,R24E. Flathead Sandstone, 35' from top, poorly exposed conglomeratic sandstone. Sample is well-rounded, well-sorted sublitharenite. Knechtel (1959)
2AAR1
Coopers Lake Quadrangle, Montana, 2 miles SE of Steamboat Mt. Flathead Sandstone, 18' from top, interbedded conglomerate and hematitic sandstone. Sample is poorly sorted, well-rounded calcareous sublitharenite. Deiss (1933)
2AAR2
Coopers Lake Quadrangle, Montana, 2 miles SE of Steamboat Mt. Flathead Sandstone, 100' from top, conglomeratic sandstone. Sample is poorly sorted sublitharenite. Deiss (1933)
2BAR1
Coopers Lake Quadrangle, Montana, 2 3/4 miles WSW of Laviere's Ranch on Elk Creek. Flathead Sandstone, 15' from top, conglomeratic sandstone. Sample is well-sorted, medium-grained sublitharenite. Deiss (1933)
2BAR2
Coopers Lake Quadrangle, Montana, 2 3/4 miles WSW of Laviere's Ranch on Elk Creek. Flathead Sandstone, 50' from top, conglomeratic sandstone. Sample is poorly sorted, well-rounded sublitharenite. Deiss (1933)
3AAR1
Divide 4 SE Quadrangle, Montana, center of sec. 34, T2S,R8W. Flathead Sandstone, 5' from base, dense massive quartzite. Sample is well-sorted, medium-grained quartz arenite. Hanson (1952)
3AAR2
Divide 4 SE Quadrangle, Montana, center of sec. 34, T2S,R8W. Flathead Sandstone, middle of formation, dense massive quartzite. Sample is well-sorted, medium-grained quartz arenite. Hanson (1952)
3BAR1
Divide 4 NE Quadrangle, Montana, W1/2 sec. 27, T2S,R8W. Flathead Sandstone, 12' from top, dense massive quartzite. Sample is well-sorted, well-rounded, medium-grained quartz arenite. Hanson(1952)

3BAR2
Divide 4 NE Quadrangle, Montana, W1/2 sec. 27, T2S,R8W. Flathead Sandstone, middle of formation, dense massive quartzite. Sample is well-sorted, well-rounded, coarse-grained sublitharenite. Hanson (1952)
3CAR1
Divide 4 NW Quadrangle, Montana, center of sec. 7, T2S,R8W. Flathead Sandstone, 20' from top, sandstone with thin shale beds. Sample is poorly sorted, well-rounded, lithic graywacke. Hanson (1952)
3CAR2
Divide 4 NW Quadrangle, Montana, center of sec. 7, T2S,R8W. Flathead Sandstone, 30' from top, dense massive quartzite. Sample is well-sorted, well-rounded, fine-grained sublitharenite. Hanson (1952)
3DAR1
Divide 4 NE Quadrangle, Montana, SE1/4 sec. 17, T2S,R8W. Flathead Sandstone, 14' from top, dense massive quartzite. Sample is well-sorted, well-rounded, fine-grained quartz arenite. Hanson (1952)
3DAR2
Divide 4 NE Quadrangle, Montana, SE1/4 sec. 17, T2S,R8W. Flathead Sandstone, 13' from top, dense massive quartzite. Sample is well-sorted, well-rounded, medium-grained quartz arenite. Hanson (1952)
3EAR1
Manhattan Quadrangle, Montana, SE1/4 sec. 24, T2N,R3E. Flathead Sandstone, 18' from top, dense massive quartzite. Sample is well-sorted, well-rounded, medium-grained quartz arenite. Deiss (1936), Varall (1955)
3EAR2
Manhattan Quadrangle, Montana, SE1/4 sec. 24, T2N,R3E. Flathead Sandstone, 6' from top, dense massive quartzite. Sample is well-sorted, well-rounded, medium-grained quartz arenite. Deiss (1936), Varall (1955)
3FAR1
Manhattan Quadrangle, Montana, NW1/4 sec. 27, T2N,R3E. Flathead Sandstone, 1' from top, dense massive quartzite. Sample is poorly sorted, well-rounded, sublitharenite. Deiss(1936), Varall(1955)
3FAR2
Manhattan Quadrangle, Montana, NW1/4 sec. 27, T2N,R3E. Flathead Sandstone, 45' from top, dense massive quartzite. Sample is well-sorted, well-rounded, medium-grained sublitharenite. Deiss (1936), Varall (1955)
3GAR1
Three Forks Quadrangle, Montana, E1/2 sec. 10, T1N,R1W. Flathead Sandstone, 7' from top, dense massive quartzite. Sample is well-sorted, well-rounded, fine-grained quartz arenite. G. D. Robinson (unpublished).
3GAR2
Three Forks Quadrangle, Montana, E1/2 sec. 10, T1N,R1W. Flathead Sandstone, 16' from top, medium-bedded quartzitic sandstone. Sample is poorly sorted, well-rounded, calcareous subarkose. G. D. Robinson (unpublished).

3HAR1
Jefferson Island Quadrangle, Montana, center of sec. 8, T1N, R1W. Flathead Sandstone, 17' from top, dense massive quartzite. Sample is well-sorted, well-rounded, fine-grained quartz arenite. G. D. Robinson (unpublished).
3HAR2
Jefferson Island Quadrangle, Montana, center of sec. 8, T1N, R1W. Flathead Sandstone, 13' from top, dense massive quartzite. Sample is poorly-sorted quartz arenite. G. D. Robinson (unpublished).
4AAR1
Myers Ranch Quadrangle, Wyoming, NE1/4 sec. 13, T30N, R94W. Flathead Sandstone, 50' from base, dense massive quartzite. Sample is poorly-sorted subarkose. Van Hooten (1954)
4AAR2
Myers Ranch Quadrangle, Wyoming, NW1/4 sec. 18, T30N, R93W. Flathead Sandstone, 130' from base, medium-bedded quartzitic sandstone. Sample is poorly-sorted, glauconitic, arkosic sublitharenite. Van Hooten (1954)
4BAR1
Graham Ranch Quadrangle, Wyoming, SE1/4 sec. 8, T30N, R93W. Flathead Sandstone, 50' from base, irregularly bedded purple conglomerate. Sample is poorly sorted, well-rounded subarkose. Van Hooten (1954)
4BAR2
Graham Ranch Quadrangle, Wyoming, SE1/4 sec. 8, T30N, R93W. Flathead Sandstone, 120' from base, medium-bedded limonitic sandstone. Sample is poorly sorted subarkose. Van Hooten (1954)
4CAR1
Blue Gulch Quadrangle, Wyoming, NE1/4 sec. 13, T32N, R94W. Flathead Sandstone, 4' from top, medium-bedded quartzitic sandstone. Sample is poorly sorted subarkose. Van Hooten (1954)
4CAR2
Blue Gulch Quadrangle, Wyoming, NE1/4 sec. 13, T32N, R94W. Flathead Sandstone, 100' from top, massive quartzitic sandstone and conglomerate. Sample is poorly sorted sublitharenite. Van Hooten (1954)
4DAR1
Elkhorn Springs Quadrangle, Wyoming, N1/2 sec. 23, T32N, R94W. Flathead Sandstone, 30' from top, medium-bedded quartzite. Sample is poorly-sorted, arkosic sublitharenite. Van Hooten (1954)
4DAR2
Elkhorn Springs Quadrangle, Wyoming, NE1/4 sec. 23, T32N, R94W. Flathead Sandstone, 80' from top, massive quartzite and conglomerate Sample is poorly sorted, arkosic sublitharenite. Van Hooten (1954)
4EAR1
Boysen Quadrangle, Wyoming, NE1/4 sec. 28, T6N, R6E. Flathead Sandstone, 60' from top, siltstone with thin interbedded sandstone. Sample is well-sorted, very fine-grained, glauconitic, micaceous sublitharenite. Deiss (1938), Tourtelot and Thompson (1948)
4EAR2
Boysen Quadrangle, Wyoming, NW1/4 sec. 28, T6N, R6E. Flathead Sandstone, 175' from top, poorly cemented cross-bedded sandstone. Sample is poorly sorted, well-rounded, sublitharenite. Deiss (1938), Tourtelot and Thompson (1948)

4FAR1
Boysen Quadrangle, Wyoming, SE1/4 sec. 8, T5N,R6E. Flathead Sandstone, 150' from top, coarse grained quartzitic sandstone. Sample is well-sorted, well-rounded, coarse-grained quartz arenite. Deiss (1938), Tourtelot and Thompson (1948)

4FAR2
Boysen Quadrangle, Wyoming, SE1/4 sec. 8, T5N,R6E. Flathead Sandstone, 16' below 4FAR1, coarse grained quartzitic sandstone. Sample is well-sorted, well-rounded, medium-grained quartz arenite. Deiss (1938), Tourtelot and Thompson (1948)

4GAR1
Guffy Peak Quadrangle, Wyoming, SE1/4 sec. 6, T39N,R92W. Flathead Sandstone, 2' from top, poorly cemented quartzite sandstone. Sample is well-rounded quartz arenite. Tourtelot (1953), Miller (1936)

4GAR2
Guffy Peak Quadrangle, Wyoming, SE1/4 sec. 6, T39N,R92W. Flathead Sandstone, 50' from top, evenly bedded dense quartzite. Sample is poorly-sorted, well-rounded, quartz arenite. Tourtelot (1953), Miller (1936)

4HAR1
Guffy Peak Quadrangle, Wyoming, E1/2 sec. 5, T39N,R92W. Flathead Sandstone, 50' from top, thin- to medium-bedded quartzitic sandstone. Sample is poorly sorted, well-rounded sublitharenite. Tourtelot (1953), Miller (1936)

4HAR2
Guffy Peak Quadrangle, Wyoming, E1/2 sec. 5, T39N,R92W. Flathead Sandstone, 8' below 4HAR1, thin- to medium-bedded quartzitic sandstone. Sample is poorly sorted, well-rounded, sublitharenite. Tourtelot (1953), Miller (1936)

5AAR1a
Pocatello Quadrangle, Idaho, NE1/4 sec. 6, T7S,R36E. Cambrian Quartzite of Trimble and Schaeffer (1965) near middle of formation, thick-bedded gray quartzite and shale. Sample is poorly sorted, well-rounded sublitharenite. D. E. Trimble (unpublished), Trimble and Schaeffer (1965)

5AAR2a
Pocatello Quadrangle, Idaho, NE1/4 sec. 6, T7S,R36E. Cambrian Quartzite of Trimble & Schaeffer (1965), several feet from top, thick-bedded gray quartzite. Sample is poorly sorted, well-rounded sublitharenite. D. E. Trimble (unpublished), Trimble and Schaeffer (1965)

5BAR1a
Pocatello Quadrangle, Idaho, NE1/4 sec. 29, T7S,R36E. Cambrian Quartzite of Trimble and Schaeffer (1965), 20' from top, thick-bedded gray quartzite. Sample is well-rounded sublitharenite. D. E. Trimble (unpublished), Trimble and Schaeffer (1965)

5BAR2a
Pocatello Quadrangle, Idaho, NW1/4 sec. 29, T7S,R36E. Cambrian Quartzite of Trimble and Schaeffer (1965), near middle of formation, thick-bedded white & pink quartzite. Sample is well-rounded sublitharenite. D. E. Trimble (unpublished), Trimble and Schaeffer (1965)

6AAR1
Danby Quadrangle, California, SE1/4 sec. 11, T5N,R14E. Lower Cambrian Quartzite of Hazzard (1933), 80' from top, ledge forming pink quartzite. Sample is well-sorted, well-rounded, fine-grained sublitharenite. Hazzard (1933), Crickmay (1933)
6AAR2.
Danby Quadrangle, California, SE1/4 sec. 11, T5N,R14E. Lower Cambrian Quartzite of Hazzard (1933), 21' from base, conglomerate and conglomeratic sandstone. Sample is poorly sorted, well-rounded, micaceous subarkose. Hazzard (1933), Crickmay (1933)
6BAR1
Cadiz Quadrangle, California, NE1/4 sec. 28, T6N,R14E. Lower Cambrian Quartzite of Hazzard (1933), 66' from top, massive gray quartzite. Sample is well-sorted, very fine-grained arkose. Hazzard (1933), Crickmay (1933)
6BAR2
Cadiz Quadrangle, California, NE1/4 sec. 28, T6N,R14E. Lower Cambrian Quartzite of Hazzard (1933), 19' from base, conglomeratic sandstone. Sample is well-rounded sublitharenite. Hazzard (1933), Crickmay (1933)
7AAR1
Highland Range, Lincoln County, Nevada, T4S, R67E. Prospect Mountain Quartzite, 1500' from top, medium-bedded purple quartzite. Sample is well-sorted, well-rounded, coarse-grained sublitharenite. Tschanz and Pampeyan (1961)
7AAR2
Highland Range, Lincoln County, Nevada, T4S, R67E. Prospect Mountain Quartzite, 700' from top, medium-bedded purple quartzite. Sample is well-sorted, well-rounded, medium-grained subarkose. Tschanz and Pampeyam (1961)
7BAR1
Highland Range, Lincoln County, Nevada, T2S,R66E. Prospect Mountain Quartzite, 100' from top, massive white quartzite. Sample is well-rounded sublitharenite. Tschanz and Pampeyan (1961)
7BAR2
Highland Range, Lincoln County, Nevada, T2S,R66E. Prospect Mountain Quartzite, 300' from top, massive pink quartzite. Sample is well-rounded sublitharenite. Tschanz and Pampeyan (1961)
7CAR1
Delmar Range, Delmar mining district, Lincoln County, Nevada. Prospect Mountain Quartzite, near middle, conglomeratic quartzite. Sample is poorly sorted, well-rounded sublitharenite. Callaghan (1937)
7CAR2
Delmar Range, Delmar mining district, Lincoln County, Nevada. Prospect Mountain Quartzite, near middle of lower half of formation, conglomeratic quartzite. Sample is well-sorted, well-rounded, very fine-grained arkose wacke. Callaghan (1937)
7DAR1
Delmar Range, south east of Delmar mining district, Lincoln County, Nevada. Prospect Mountain Quartzite, 600' from top, quartzite with hemetitic sandstone and siltstone. Sample is poorly sorted sublitharenite. Callaghan (1937)

7DAR2
Delmar Range, south west of Delmar mining district, Lincoln County, Nevada. Prospect Mountain Quartzite, near base of exposure, thick-bedded white quartzite. Sample is poorly sorted, well-rounded sublitharenite. Callaghan (1937)

7EAR1
Southern section in southern part of Desert Range, Clark County, Nevada. Stirling Quartzite, 100' from top, red brown quartzite with some shale. Sample is well-rounded subarkose. Bowyer and others (1958), C. R. Longwell (unpublished)

7EAR2
Southern section in southern part of Desert Range, Clark County, Nevada. Wood Canyon Fm., 700' from top, fine grained quartzite and platy shale. Sample is well-sorted, medium-grained subarkose. Bowyer and others (1958), C. R. Longwell (unpublished)

7FAR1
Northern section in southern part of Desert Range, Clark County, Nevada. Wood Canyon Formation, 1300' from top, medium-bedded quartzite. Sample is poorly sorted, arkosic litharenite. Bowyer and others (1958), C. R. Longwell (unpublished)

7FAR2
Northern section in southern part of Desert Range, Clark County, Nevada. Wood Canyon Formation, 800' from top, interbedded quartzite, siltstone, and shale. Sample is well-sorted, very fine-grained, micaceous, arkosic litharenite. Bowyer and others (1958), C. R. Longwell (unpublished)

7GAR1
Northern section in northern part of Desert Range, Lincoln County, Nevada. Stirling Quartzite, 350' from top, quartzitic sandstone and quartzite. Sample is poorly sorted sublitharenite. Tschanz and Pampeyan (1961), C. R. Longwell (unpublished)

7GAR2
Northern section in northern part of Desert Range, Lincoln County, Nevada. Stirling Quartzite,500' from base, conglomeratic quartzite. Sample is poorly sorted litharenite. Tschanz and Pampeyan (1961), C. R. Longwell (unpublished)

7HAR1
Southern section in northern part of Desert Range, Lincoln County, Nevada. Stirling Quartzite, 1700' from top, interbedded quartzite and shale. Sample is poorly sorted, poorly rounded litharenite. Tschanz and Pampeyan (1961), C. R. Longwell (unpublished)

7HAR2
Southern section in northern part of Desert Range, Lincoln County, Nevada. Stirling Quartzite, 600' from base, thick bedded quartzite. Sample is well-sorted, coarse-grained sublitharenite. Tschanz and Pampeyan (1961), C. R. Longwell (unpublished)

8AAR1
Cochise Head Quadrangle, Arizona, NW1/4 sec. 7, T15S, R29E. Bolsa Quartzite, 4' from base, coarse conglomerate. Sample is unsorted lithic graywacke. Sabins (1957)

8AAR2
Cochise Head Quadrangle, Arizona, NW1/4 sec. 7, T15S, R29E. Bolsa Quartzite, 23' from base, coarse-grained sandstone. Sample is unsorted lithic graywacke. Sabins (1957)

8BAR1
Cochise Head Quadrangle, Arizona, NW1/4 sec. 1, T15S,R28E. Bolsa Quartzite, 100' from top, interbedded coarse- and fine-grained sandstone. Sample is poorly sorted, poorly rounded lithic graywacke. Sabins (1957)
8BAR2
Cochise Head Quadrangle, Arizona, NW1/4 sec. 1, T15S,R28E. Bolsa Quartzite, 6' from base, conglomerate with pebbles up to 2" across. Sample is poorly sorted, poorly rounded lithic graywacke. Sabins (1957)
8CAR1
Dos Cabezas Quadrangle, Arizona, SW1/4 sec. 32, T14S,R27E. Bolsa Quartzite, 85' from base, medium-bedded coarse-grained quartzite. Sample is poorly sorted, well-rounded sublitharenite. Jones and Bacheller (1953)
8CAR2
Dos Cabezas Quadrangle, Arizona, SW1/4 sec. 32, T14S,R27E. Bolsa Quartzite, near middle, medium- to coarse-grained quartzite, brecciated and limonitic. Sample is dolomitic quartz arenite. Jones and Bacheller (1953)
8DAR1
Dos Cabezas Quadrangle, Arizona, NW1/4 sec. 25, T14S,R26E. Bolsa Quartzite, 200' from top, massive medium- to fine-grained quartzite. Sample is well-sorted, very fine-grained, quartz arenite. Jones and Bacheller (1953)
8DAR2
Dos Cabezas Quadrangle, Arizona, NW1/4 sec. 25, T14S,R26E. Bolsa Quartzite, 7' below 8DAR1, massive medium- to fine-grained quartzite. Sample is well-sorted, well-rounded, fine-grained sublitharenite. Jones and Bacheller (1953)
8EAR1
Tombstone Quadrangle, Arizona, NE1/4 sec. 27, T20S,R22E. Bolsa Quartzite, 85' from top, pink, locally purple, sandstone and pebble conglomerate. Sample is poorly sorted sublitharenite. Gilluly (1956)
8EAR2
Tombstone Quadrangle, Arizona, NE1/4 sec. 27, T20S,R22E. Bolsa Quartzite, 8' from base, pink conglomeratic sandstone. Sample is brecciated, arkosic litharenite. Gilluly (1956)
8FAR1
Tombstone Quadrangle, Arizona, SE1/4 sec. 22, T20S,R22E. Bolsa Quartzite, 10' from base, conglomeratic quartzite. Sample is arkosic arenite. Gilluly (1956)
8FAR2
Tombstone Quadrangle, Arizona, SE1/4 sec. 22, T20S,R22E. Bolsa Quartzite, 20' from top, massive pink quartzite, locally mineralized on fractures. Sample is poorly sorted sublitharenite. Gilluly (1956)
8GAR1
Pyeatt Ranch Quadrangle, Arizona, Huachuca Canyon. Bolsa Quartzite, 120' from top, interbedded medium- to coarse-grained quartzite. Sample is well-sorted, well-rounded, medium-grained sublitharenite. Weber (1950)

8GAR2
Pyeatt Ranch Quadrangle, Arizona, Huachuca Canyon. Bolsa Quartzite, 45' from base, pebble conglomerate. Sample is well-rounded, arkosic sublitharenite. Weber (1950)

8HAR1
Miller Peak Quadrangle, Arizona, Garden Canyon. Bolsa Quartzite, 150' from top, purple coarse-grained quartzite, worm trails. Sample is poorly sorted sublitharenite. Weber (1950)

8HAR2
Miller Peak Quadrangle, Arizona, Garden Canyon. Bolsa Quartzite, 13' from base, pebble conglomerate, cross-bedded. Sample is lithic subarkose. Weber (1950)

9AAR1
Holy Joe Peak Quadrangle, Arizona, W1/2 sec. 17, T6S,R17E. Abrigo Formation, 400' from top, quartzitic sandstone, evenly bedded. Sample is well-sorted, well-rounded, very fine-grained, quartz arenite. Krieger (1961, unpublished)

9AAR2
Holy Joe Peak Quadrangle, Arizona, W1/2 sec. 17, T6S,R17E. Bolsa Quartzite, 10' from base, evenly bedded quartzite. Sample is medium-grained quartz arenite. Krieger (1961, unpublished)

9BAR1
Holy Joe Peak Quadrangle, Arizona, W1/2, sec. 7, T6S,R17E. Abrigo Formation, 350' from top, quartzites and quartzitic sandstone. Sample is poorly sorted subarkose. Krieger (1961, unpublished)

9BAR2
Holy Joe Peak Quadrangle, Arizona, W1/2 sec. 7, T6S,R17E. Abrigo Formation, 60' below 9BAR1, interbedded quartzite, quartzitic sandstone, and siltstone. Sample is poorly sorted subarkose. Krieger (1961, unpublished)

10AAR1
Dromedary Peak Quadrangle, Utah, 1 mile SW of Alta. Tintic Quartzite, 50' from top, medium- to thin-bedded white quartzite. Sample is arkosic sublitharenite. Calkins and Butler (1943)

10AAR2
Dromedary Peak Quadrangle, Utah, 1 mile SW of Alta. Tintic Quartzite, 280' from top, thick-bedded white quartzite. Sample is coarse-grained quartz arenite. Calkins and Butler (1943)

10BAR1
Brighton Quadrangle, Utah, Mary Ellen Gulch. Tintic Quartzite, 300' from top, thick-bedded light brown quartzite. Sample is sublitharenite. Calkins and Butler (1943)

10BAR2
Brighton Quadrangle, Utah, Mary Ellen Gulch. Tintic Quartzite, 600' from top, thin- to thick-bedded pink quartzite. Sample is sublitharenite. Calkins and Butler (1943)

10CAR1
Springville Quadrangle, Utah, NW1/4 sec. 9, T7S,R3E. Tintic Quartzite, 200' from top, light brown and green quartzite. Sample is brecciated quartz arenite. Baker (1947)

10CAR2
Springville Quadrangle, Utah, NW1/4 sec. 9, T7S,R3E. Tintic Quartzite, 400' from top, thick-bedded light brown sandstone. Sample is brecciated quartz arenite. Baker (1947)

10DAR1
Bridal Veil Quadrangle, Utah, SE1/4 sec. 29, T6S,R3E. Tintic Quartzite, 100' from top, quartzite with interbedded siltstone. Sample is poorly sorted sublitharenite. Baker (1947)
10DAR2
Bridal Veil Falls Quadrangle, Utah, SE1/4 sec. 29, T6S,R3E. Tintic Quartzite, 100' from base, greenish-brown cross-bedded quartzite. Sample is well-rounded sublitharenite. Baker (1947)
10EAR1
Mount Pisgah Quadrangle, Utah, NE1/4 sec. 17, T9N,R1W. Brigham Quartzite, 500' from top, massive light brown quartzite. Sample is sublitharenite. Williams (1948)
10EAR2
Mount Pisgah Quadrangle, Utah, W1/2 sec. 17, T9N,R1W. Brigham Quartzite, 1300' from top, massive white quartzite. Sample is well-sorted, well-rounded, fine-grained sublitharenite. Williams (1948)
10FAR1
Brigham City Quadrangle, Utah, SW1/4 sec. 6, T9N,R1W. Brigham Quartzite, 900' from top, medium- to thick-bedded brown quartzite. Sample is well-rounded sublitharenite. Williams (1948)
10FAR2
Brigham City Quadrangle, Utah, SW1/4 sec. 6, T9N,R1W. Brigham Quartzite, 1200' from top, massive white quartzite. Sample is well-rounded sublitharenite. Williams (1948)
10GAR1
Logan Quadrangle, Utah-Idaho, NW1/4 sec. 15, T10N,R3E. Brigham Quartzite, 1300' from top, thick-bedded conglomeratic quartzite. Sample is well-sorted, well-rounded, medium-grained sublitharenite. Williams (1948)
10GAR2
Logan Quadrangle, Utah-Idaho, NE1/4 sec. 16, T10N,R3E. Brigham Quartzite, 800' from top, thick-bedded conglomeratic quartzite. Sample is well-sorted, well-rounded, coarse-grained sublitharenite. Williams (1948)
10HAR1
Logan Quadrangle, Utah-Idaho, N1/2 sec. 29, T11N,R4E. Brigham Quartzite, 150' below 10HAR2, massive pink quartzite with some conglomerate. Sample is well-sorted, well-rounded, medium-grained sublitharenite. Williams (1948)
10HAR2
Logan Quadrangle, Utah-Idaho, NW1/4 sec. 28, T11N,R4E. Brigham Quartzite, near middle of formation, pink conglomeratic quartzite. Sample is well-sorted, coarse-grained sublitharenite. Williams (1948)
11AAR1
Bellevue Peak Quadrangle, Nevada, Cave Canyon. Prospect Mountain Quartzite, 200' from top, medium- to thick-bedded white quartzite. Sample is sublitharenite. Nolan (1962), Nolan and others (1956)
11AAR2
Bellevue Peak Quadrangle, Nevada, Cave Canyon. Prospect Mountain Quartzite, 500' from top, medium-bedded white quartzite, limonitic. Sample is well-sorted, fine-grained, altered arkose(?). Nolan (1962), Nolan and others (1956)

11BAR1
Pinto Summit Quadrangle, Nevada, 1/3 mile south of Prospect Peak. Prospect Mountain Quartzite, 500' from top, massive white quartzite, partly limonitic. Sample is well-rounded quartz arenite. Nolan (1962), Nolan and others (1956)
11BAR2
Bellevue Quadrangle, Nevada, near head of Dugout Canyon. Prospect Mountain Quartzite, 80' below 11BAR1, massive white quartzite, limonitic. Sample is coarse-grained quartz arenite. Nolan (1962), Nolan and others (1956)
12AAR1
Connors Pass Quadrangle, Nevada, one mile north of Majors Place. Prospect Mountain Quartzite, 50' from top, medium-bedded brown and white quartzite. Sample is medium-grained quartz arenite. Harald Drewes (unpublished)
12AAR2
Connors Pass Quadrangle, Nevada, one mile north of Majors Place. Prospect Mountain Quartzite, 125' from top, medium-bedded, white quartzite. Sample is medium-grained quartz arenite. Harald Drewes (unpublished)
12BAR1
Connors Pass Quadrangle, Nevada, 3 miles north of Majors Place. Prospect Mountain Quartzite, 300' from top, light gray, fine-grained, laminated quartzite. Sample is subarkose. Harald Drewes (unpublished)
12BAR2
Connors Pass Quadrangle, Nevada, 3 miles north of Majors Place. Prospect Mountain Quartzite, 500' from top, light gray, laminated quartzite. Sample is medium-grained subarkose. Harald Drewes (unpublished)
12CAR1
Connors Pass Quadrangle, Nevada, northeast of Cleve Creek. Prospect Mountain Quartzite, 600' from top, thick-bedded, purple quartzite with some siltstone. Sample is well-sorted, fine-grained lithic subarkose. Harald Drewes (unpublished)
12CAR2
Connors Pass Quadrangle, Nevada, 1/2 mile west of Indian Springs. Prospect Mountain Quartzite, 300' from base, thick-bedded, conglomeratic quartzite. Sample is well-sorted, well-rounded, coarse-grained sublitharenite. Harald Drewes (unpublished)
12DAR1
Connors Pass Quadrangle, Nevada, near Cleve Creek campgound. Prospect Mountain Quartzite, 700' from top, thick-bedded, purple quartzite, some conglomerate. Sample is well-rounded sublitharenite. Harald Drewes (unpublished)
12DAR2
Connors Pass Quadrangle, Nevada, 1/2 mile northeast of Cleve Creek campgound. Prospect Mountain Quartzite, near middle of formation, thick-bedded, purple, conglomeratic quartzite. Sample is well-rounded sublitharenite. Harald Drewes (unpublished)
12EAR1
Gold Hill Quadrangle, Utah, Bagley Gulch. Prospect Mountain Quartzite, 60' from top, thick-bedded, white quartzite. Sample is poorly sorted, sublitharenite. Nolan (1935), Bick (1959)

12EAR2
Gold Hill Quadrangle, Utah, Bagley Gulch. Prospect Mountain Quartzite, 300' from top, massive white quartzite. Sample is poorly sorted sublitharenite. Nolan (1935), Bick (1959)
12FAR1
Gold Hill Quadrangle, Utah, near Willow Spring. Busby Quartzite, 25' from base, medium-bedded, dark quartzite. Sample is poorly sorted, poorly rounded, sublitharenite. Nolan (1935), Bick (1959)
12FAR2
Gold Hill Quadrangle, Utah, near Willow Spring. Prospect Mountain Quartzite, 700' from top, medium-bedded, white quartzite. Sample is poorly sorted, well-rounded, sublitharenite. Nolan (1935), Bick (1959)
12GAR1
Deep Creek Range, Utah, 1 mile north of Basin Creek. Prospect Mountain Quartzite, 300' from top, thick-bedded, brown quartzite. Sample is poorly sorted sublitharenite. Bick (1959), Bick (1958)
12GAR2
Deep Creek Range, Utah, 1 mile north of Basin Creek. Prospect Mountain Quartzite, 300' from base, interbedded quartzite and quartzite conglomerate. Sample is poorly sorted sublitharenite. Bick (1959), Bick (1958)
12HAR1
Deep Creek Range, Utah, 1/2 mile south of Basin Creek. Prospect Mountain Quartzite, 100' from top, thick-bedded, dark quartzite and siltstone. Sample is poorly sorted litharenite. Bick (1959), Bick (1958)
12HAR2
Deep Creek Range, Utah, 1/2 mile south of Basin Creek. Prospect Mountain Quartzite, 700' from base, medium-bedded, brownish white quartzite. Sample is poorly sorted, well-rounded litharenite. Bick (1959), Bick (1958)
13AAR1
Oak City Quadrangle, Utah, NW1/4 sec. 12, T17S, R4W. Tintic Quartzite, 500' from top, thick-bedded, light brown quartzite. Sample is well-sorted, well-rounded, coarse-grained quartz arenite. Christiansen (1951), Hanson (1952)
13AAR2
Oak City Quadrangle, Utah, NW1/4 sec. 12, T17S, R4W. Tintic Quartzite, 600' from base, medium-bedded white quartzite. Sample is well-sorted, well-rounded, medium-grained, quartz arenite. Christiansen (1951)
13BAR1
Oak City Quadrangle, Utah, NE1/4 sec. 22, T17S, R4W. Tintic Quartzite, near base, thick-bedded sandstone and conglomerate. Sample is poorly sorted, well-rounded sublitharenite. Christiansen (1951)
13BAR2
Oak City Quadrangle, Utah, NW1/4 sec. 23, T17S, R4W. Tintic Quartzite, 400' from base, thick-bedded, brown sandstone and conglomerate. Sample is well-sorted, well-rounded, medium-grained sublitharenite. Christiansen (1951)

14AAR1
Glenwood Springs Quadrangle, Colorado, NW1/4 sec. 18, T5S,R89W. Sawatch Quartzite, 10' from top, thick-bedded, coarse-grained sandstone. Sample is well-sorted, coarse-grained, dolomitic quartz arenite. MacQuown (1945)
14AAR2
Glenwood Springs Quadrangle, Colorado, NW1/4 sec. 18, T5S,R89W. Sawatch Quartzite, 100' from top, massive quartzitic sandstone and quartzite. Sample is sublitharenite. MacQuown (1945)
14BAR1
Glenwood Springs Quadrangle, Colorado, SW1/4 sec. 12, T5S,R90W. Sawatch Quartzite, 80' from top, thick-bedded brown quartzite. Sample is well-sorted, well-rounded, coarse-grained, quartz arenite. MacQuown (1945)
14BAR2
Glenwood Springs Quadrangle, Colorado, SW1/4 sec. 12, T5S,R90W. Sawatch Quartzite, 250' from top, thick-bedded, cross-bedded, white and purple quartzite. Sample is poorly sorted sublitharenite. MacQuown (1945)
15AAR1
Garfield Quadrangle, Colorado, Slaughterhouse Creek. Sawatch Quartzite, 40' from top, medium-bedded brown quartzite and quartzitic sandstone. Sample is well-sorted, fine-grained, dolomitic and glauconitic(?) subarkose. Dings and Robinson (1957)
15AAR2
Garfield Quadrangle, Colorado, Slaughterhouse Creek. Sawatch Quartzite, 30' from top, medium-bedded brown quartzite and quartzitic sandstone. Sample is well-sorted, fine-grained, dolomitic subarkose. Dings and Robinson (1957)
15BAR1a
Garfield Quadrangle, Colorado, south slope of Duncan Hill. Sawatch Quartzite, 15' from top, light gray, fine-grained quartzite. Sample is well-sorted, poorly rounded, very fine-grained, calcareous subarkose. Dings and Robinson (1957)
15BAR2
Garfield Quadrangle, Colorado, south slope of Duncan Hill. Sawatch Quartzite, 10' from top, light gray, fine-grained quartzite. Sample is poorly sorted, calcareous sublitharenite. Dings and Robinson (1957)
15CAR1
Garfield Quadrangle, Colorado, Halls Gulch. Sawatch Quartzite, 2' from top, medium-bedded white and brown quartzite. Sample is poorly sorted, well-rounded, quartz arenite. Dings and Robinson (1957)
15CAR2
Garfield Quadrangle, Colorado, Halls Gulch. Sawatch Quartzite, 60' from top, medium-bedded, calcareous sandstone and quartzite. Sample is well-rounded, calcareous quartz arenite. Dings and Robinson (1957)
15DAR1
Garfield Quadrangle, Colorado, Quartz Creek. Sawatch Quartzite, 30' from top, massive, white and brown, fine-grained quartzite. Sample is well-sorted, well-rounded, medium-grained, quartz arenite. Dings and Robinson (1957)

15DAR2
Garfield Quadrangle, Colorado, Quartz Creek. Sawatch Quartzite, 10' from base, medium-bedded pink to red quartzite. Sample is well-rounded quartz arenite. Dings and Robinson (1957)
15EAR1
Larkspur Quadrangle, Colorado, NW1/4 sec. 2, T10S, R68W. Sawatch Sandstone, 3' from base, massive, red, coarse-grained, friable sandstone. Sample is brecciated quartz arenite. Richardson (1915)
15EAR2
Larkspur Quadrangle, Colorado, NW1/4 sec. 2, T10S, R68W. Sawatch Sandstone, 9' from base, massive, red, coarse-grained sandstone overlain by calcareous sandstone. Sample is poorly sorted quartz arenite. Richardson (1915)
15FAR1
Castle Rock Quadrangle, Colorado, SW1/4 sec. 22, T9S, R68W. Sawatch Sandstone, 20' from base, massive, coarse, cross-bedded, white sandstone. Sample is well-rounded sublitharenite. Richardson (1915)
15FAR2
Castle Rock Quadrangle, Colorado, SW1/4 sec. 22, T9S, R68W. Sawatch Sandstone, 47' from base, massive, coarse, cross-bedded, white sandstone. Sample is poorly sorted, quartz arenite. Richardson (1915)
15GAR1
Cascade Quadrangle, Colorado, SE1/4 sec. 20, T13S, R67W. Sawatch Sandstone, 5' from base, thick-bedded red sandstone. Sample is poorly sorted, poorly rounded subarkose. Finlay (1916)
15GAR2a
Cascade Quadrangle, Colorado, SE1/4 sec. 20, T13S, R67W. Sawatch Sandstone, 16' from base, medium-bedded, coarse, friable, red and white sandstone. Sample is poorly sorted subarkose. Finlay (1916)
15HAR1
Cascade Quadrangle, Colorado, W1/2 sec. 32, T13S, R67W. Sawatch Sandstone, 22' from base, thick- to thin-bedded red sandstone with locally abundant glauconite. Sample is poorly sorted, calcareous, glauconitic litharenite. Finlay (1916)
15HAR2a
Cascade Quadrangle, Colorado, W1/2 sec. 32, T13S, R67W. Sawatch Sandstone, 2' from base, thin- to medium-bedded, coarse- grained, friable sandstone. Sample is poorly sorted, poorly rounded, calcareous subarkose. Finlay (1916)
16AAR1
Dayton Qudarangle, Wyoming, near Tepee Creek. Flathead Sandstone, 65' from base, interbedded green shale and coarse-grained limonitic sandstone. Sample is poorly sorted, poorly rounded, calcareous subarkose. Mapel (1959)
16AAR2
Dayton Quadrangle, Wyoming, near Tepee Creek. Flathead Sandstone, 300' from base, thick-bedded, coarse-grained, light brown, cross-bedded sandstone. Sample is unsorted, glauconitic(?), quartz wacke. Mapel (1959)

16BAR1
Dayton Quadrangle, Wyoming, 2 miles north of Tepee Creek. Flathead Sandstone, 250' from base, medium-bedded, coarse-grained, cross-bedded sandstone. Sample is well-sorted, well-rounded, medium-grained, calcareous, glauconitic, quartz arenite. Mapel (1959)
16BAR2
Dayton Quadrangle, Wyoming, 2 miles north of Tepee Creek. Flathead Sandstone, 75' from base, medium-bedded, brown and red, fine- to medium- grained sandstone. Sample is well-sorted, medium-grained, quartz arenite. Mapel (1959)
17AAR1
Sturgis Quadrangle, So. Dakota, north Deadwood, So. Dakota. Deadwood Formation, 32' from base, medium-bedded brown sandstone and quartzite. Sample is well-sorted, well-rounded, medium-grained, calcareous, quartz arenite. Furnish and others (1936)
17AAR2a
Sturgis Quadrangle, So. Dakota, north Deadwood, So. Dakota. Deadwood Formation, 17' from base, cross-bedded, thick-bedded, brown quartzite. Sample is medium-grained sublitharenite. Furnish and others (1936)
17BAR1
Sturgis Quadrangle, So. Dakota, SW1/4 sec. 7, T5N, R4E. Deadwood Formation, 31' from base, medium-bedded quartzite and thin-bedded limonitic sandstone. Sample is well-sorted, well-rounded, medium-grained, calcareous, quartz arenite. Furnish and others (1936)
17BAR2
Sturgis Quadrangle, So. Dakota, SW1/4 sec. 7, T5N, R4E. Deadwood Formation, 26' from base, medium-bedded quartzite and thin-bedded limonitic sandstone. Sample is medium-grained, calcareous, apatitic, quartz arenite. Furnish and others (1936)
17CAR1
Spearfish Quadrangle, So. Dakota, south side of Bald Mountain. Deadwood Formation, 5' from base, massive quartzite overlain by porphyry and underlain by schist. Sample is quartz arenite. Furnish and others (1936)
17CAR2
Spearfish Quadrangle, So. Dakota, south side of Bald Mountain. Deadwood Formation, 8' from base, massive quartzite overlain by porphyry and underlain by schist. Sample is well-sorted, well-rounded, medium-grained, quartz arenite. Furnish and others (1936)
17DAR1
Spearfish Quadrangle, So. Dakota, Englewood, So. Dakota. Deadwood Formation, 42' from base, massive hard quartzite. Sample is well-sorted, well-rounded, medium-grained, glauconitic(?), quartz arenite. Furnish and others (1936)
17DAR2
Spearfish Quadrangle, So. Dakota, Englewood, So. Dakota. Deadwood Formation, 29' from base, massive hard quartzite. Sample is well-sorted, well-rounded, coarse-grained, quartz arenite. Furnish and others (1936)

17EAR1

Piedmont Quadrangle, So. Dakota, NE1/4 sec. 27, T3N,R5E. Deadwood Formation, 14' from base, thick- to medium-bedded coarse-grained quartzite and sandstone. Sample is well-sorted, coarse-grained, glauconitic(?) sublitharenite. Furnish and others (1936)

17EAR2

Piedmont Quadrangle, So. Dakota, NE1/4 sec. 27, T3N,R5E. Deadwood Formation, 15' from base, thick- to medium-bedded coarse-grained quartzite and sandstone. Sample is dolomitic sublitharenite. Furnish and others (1936)

17FAR1

Piedmont Quadrangle, So. Dakota, N1/2 sec. 12, T3N,R5E. Deadwood Formation, 13' from base, massive sandstone and quartzitic sandstone. Sample is poorly sorted quartz arenite. Furnish and others (1936)

17FAR2

Piedmont Quadrangle, So. Dakota, N1/2 sec. 12, T3N,R5E. Deadwood Formation, 17' from base, massive sandstone and quartzitic sandstone. Sample is well-sorted, poorly rounded, medium-grained, calcareous, glauconitic(?), quartz arenite. Furnish and others (1936)

17GAR1

Rapid City West Quadrangle, So. Dakota, SE1/4 sec. 14, T1N,R6E. Deadwood Formation, 21' from base, massive coarse-grained sandstone and conglomerate. Sample is well-sorted, medium-grained, dolomitic, glauconitic sublitharenite. Furnish and others (1936)

17GAR2

Rapid City West Quadrangle, So. Dakota, SE1/4 sec. 14, T1N,R6E. Deadwood Formation, 8' from base, massive coarse-grained sandstone and conglomerate. Sample is poorly rounded, calcareous, sublitharenite. Furnish and others (1936)

17HAR1

Pactola Dam Quadrangle, So. Dakota, NW1/4 sec. 5, T1N,R6E. Deadwood Formation, 10' from base, massive to medium-bedded coarse-grained sandstone and quartzite. Sample is well-sorted coarse-grained sublitharenite. Furnish and others (1936)

17HAR2

Pactola Dam Quadrangle, So. Dakota, NW1/4 sec. 5, T1N,R6E. Deadwood Formation, 18' from base, massive to medium-bedded coarse-grained sandstone and quartzite. Sample is well-sorted coarse-grained, quartz arenite. Furnish and others (1936)

18AAR1

Grand Canyon, Arizona, Cottonwood Creek, west of Horseshoe Mesa. Tapeats Sandstone, 35' from base, cross bedded, purple, yellow, and red conglomerate. Sample is litharenite. Noble (1922)

18AAR2

Grand Canyon, Arizona, Cottonwood Creek, west of Horseshoe Mesa. Tapeats Sandstone, 80' from base, cross-bedded purple sandstone and conglomerate. Sample is poorly sorted, well-rounded, arkosic sublitharenite. Noble (1922)

18BAR1

Grand Canyon, Arizona, Red Canyon, north of Moran Point. Tapeats Sandstone, 2' from top, cross-bedded medium-grained quartzite. Sample is well-sorted coarse-grained sublitharenite. Noble (1922)

18BAR2
Grand Canyon, Arizona, Red Canyon, north of Moran Point. Tapeats Sandstone, 5' from top, cross-bedded medium-grained quartzite. Sample is well-sorted, well-rounded, coarse-grained sublitharenite. Noble (1922)

18CAR1
Bright Angel Quadrangle, Arizona, Garden Creek. Tapeats Sandstone, 70' from top, medium-bedded, friable, brown sandstone and conglomerate. Sample is poorly sorted, arkosic sublitharenite. Noble (1922), Maxson (1961)

18CAR2
Bright Angel Quadrangle, Arizona, Garden Creek. Tapeats Sandstone, 110' from top, cross-bedded, medium-bedded, conglomeratic sandstone. Sample is subarkose. Noble (1922), Maxson (1961)

18DAR1
Bright Angel Quadrangle, Arizona, near Kaibab Trail. Tapeats Sandstone, 28' from top, thick-bedded, cross-bedded quartzite. Sample is poorly sorted sublitharenite. Noble (1922), Maxson (1961)

18DAR2
Bright Angel Quadrangle, Arizona, near Kaibab Trail. Tapeats Sandstone, 23' from top, thick-bedded, cross-bedded quartzite. Sample is well-sorted, fine-grained sublitharenite. Noble (1922), Maxson (1961)

18EAR1
Camp Wood Quadrangle, Arizona, 1 mile west of Geo Wood Canyon. Tapeats Sandstone, near top, medium-bedded limonitic sandstone. Sample is well-rounded sublitharenite. Wood (1955), McNair (1951), M. H. Krieger (unpublished)

18EAR2
Camp Wood Quadrangle, Arizona, 1 mile west of Geo Wood Canyon. Tapeats Sandstone, 100' from top, medium-bedded, red and white, laminated sandstone. Sample is poorly sorted sublitharenite. Wood (1955), McNair (1951), M. H. Krieger (unpublished)

18FAR1
Camp Wood Quadrangle, Arizona, SE1/4 sec. 18, T18N,R6W. Tapeats Sandstone, 60' from top, medium-bedded, red and white, mottled sandstone. Sample is sublitharenite. Wood (1955), McNair (1951), M. H. Krieger (unpublished)

18FAR2
Camp Wood Quadrangle, Arizona, SE1/4 sec. 18, T18N,R6W. Tapeats Sandstone, 120' from top, medium-bedded, red, cross-bedded sandstone. Sample is poorly sorted, well-rounded sublitharenite. Wood (1955), McNair (1951), M. H. Krieger (unpublished)

18GAR1
Camp Wood Quadrangle, Arizona, SE1/4 sec. 31, T19N,R5W. Tapeats Sandstone, 140' from top, thick-bedded red sandstone and conglomerate. Sample is well-sorted, well-rounded, fine-grained subarkose. Wood (1955), McNair (1951), M. H. Krieger (unpublished)

18GAR2
Camp Wood Quadrangle, Arizona, SE1/4 sec. 31, T19N,R5W. Tapeats Sandstone, 90' from top, medium-bedded conglomeratic quartzite. Sample is poorly sorted litharenite. Wood (1955), McNair (1951), M. H. Krieger (unpublished)

18HAR1
Camp Wood Quadrangle, Arizona, SW1/4 sec. 12, T18N,R6W. Tapeats Sandstone, 15' from top, medium-bedded red sandstone with some conglomerate. Sample is well-rounded subarkose. Wood (1955), McNair (1951), M. H. Krieger (unpublished)

18HAR2
Camp Wood Quadrangle, Arizona, SW1/4 sec. 12, T18N,R6W. Tapeats Sandstone, 13' from base, medium-bedded, red, conglomeratic sandstone. Sample is poorly sorted arkosic sublitharenite. Wood (1955), McNair (1951), M. H. Krieger (unpublished)

19AAR1
San Lorenzo Quadrangle, Mew Mexico, NE1/4 sec. 26, T17S,R11W. Bliss Formation, 70' from base, thick-bedded, red to brown, cross-bedded sandstone. Sample is poorly sorted, dolomitic sublitharenite. New Mexico Geological Society (1953)

19AAR2a
San Lorenzo Quadrangle, New Mexico, NE1/4 sec. 26, T17S,R11W. Bliss Formation 20' from base, medium-bedded red to brown sandstone. Sample is well-sorted, fine-grained, glauconitic sublitharenite. New Mexico Geological Society (1953)

19BAR1
San Lorenzo Quadrangle, New Mexico, S1/2 sec. 15, T17S,R11W. Bliss Formation, 28' from top, thin-bedded, cross-bedded, coarse red sandstone. Sample is calcareous sublitharenite. New Mexico Geological Society (1953)

19BAR2a
San Lorenzo Quadrangle, New Mexico, S1/2 sec. 15, T17S,R11W. Bliss Formation, 45' from top, medium-bedded, cross-bedded, coarse-grained sandstone. Sample is well-rounded, calcareous, quartz arenite. New Mexico Geological Society (1953)

19CAR1
Silver City Quadrangle, New Mexico, NW1/4 sec. 5, T18S,R14W. Bliss Formation, 80', thin-bedded, limonitic, porous sandstone. Sample is well-sorted, poorly rounded, very fine-grained, calcareous, glauconitic arkose. Paige (1916)

19CAR2
Silver City Quadrangle, New Mexico, NW1/4 sec. 5, T18S,R14W. Bliss Formation, 40' from top, thick-bedded, coarse, red quartzite. Sample is well-sorted coarse-grained sublitharenite. Paige (1916)

19DAR1
Circle Mesa Quadrangle, New Mexico, N1/2 sec. 27, T17S,R15W. Bliss Formation, 35' from top, thick-bedded quartzite with some carbonate and sandstone beds. Sample is well-sorted, well-rounded, coarse-grained, dolomitic sublitharenite. Paige (1916)

19DAR2
Circle Mesa Quadrangle, New Mexico, N1/2 sec. 27, T17S,R15W. Bliss Formation, 20' from base, thin-bedded, hematitic, glauconitic sandstone. Sample is well-sorted, fine-grained, dolomitic, quartz arenite. Paige (1916)

19EAR1
Garfield Quadrangle, New Mexico. SE1/4 sec. 4, T17S,R4W Bliss Formation, 11' from base, thick-bedded dark red to black sandstone. Sample is well-rounded, calcareous sublitharenite. Kelley and Silver(1952)

19EAR2
Garfield Quadrangle, New Mexico, SE1/4 sec. 4, T17S,R4W. Bliss Formation, 25' from base, thick-bedded, cross-bedded, friable sandstone. Sample is well-sorted, well-rounded, coarse-grained, quartz arenite. Kelley and Silver (1952)

19FAR1
Coballo Quadrangle, New Mexico, NW1/4 sec. 28, T16S,R4W. Bliss Formation, inches from base, thick-bedded, coarse, glauconitic sandstone. Sample is well-sorted, well-rounded, coarse-grained, quartz arenite. Kelley and Silver (1952)

19FAR2
Caballo Quadrangle, New Mexico, NW1/4 sec. 18, T16S,R4W. Bliss Formation, 13' from base, medium-bedded brown sandstone. Sample is quartz arenite. Kelley and Silver (1952)

19GAR1
Engle Quadrangle, New Mexico, 3 1/2 miles south of Truth or Consequences. Bliss Formation, 35' from base, thick-bedded coarse sandstone and quartzite. Sample is well-rounded, calcareous, apatitic sublitharenite. Kelley and Silver (1952)

19GAR2
Engle Quadrangle, New Mexico, 3 1/2 miles south of Truth or Consequences. Bliss Formation, 23' from base, thick-bedded coarse sandstone and quartzite. Sample is brecciated sublitharenite. Kelley and Silver (1952)

19HAR1
Engle Quadrangle, New Mexico, NE1/4 sec. 3, T15S, R4W. Bliss Formation, 22' from base, thick-bedded, coarse, brown quartzite and thin-bedded sandstone. Sample is well-rounded sublitharenite. Kelley and Silver (1952)

19HAR2
Engle Quadrangle, New Mexico, NE1/4 sec. 3, T15S,R4W. Bliss Formation, 11' from base, thick-bedded coarse sandstone. Sample is well-sorted, well-rounded, very coarse-grained, calcareous sublitharenite. Kelley and Silver (1952)

20AAR1
Hermosa Quadrangle, Colorado, S1/2 sec. 1, T37N,R9W. Ignacio Quartzite, 17' from base, thick-bedded arkosic conglomerate. Sample is poorly sorted, arkosic sublitharenite. Larsen and Cross (1956)

20AAR2
Hermosa Quadrangle, Colorado, S1/2 sec. 1, T37N,R9W. Ignacio Quartzite, 18' from top, medium-bedded purple sandstone. Sample is well-sorted, fine-grained subarkose. Larsen and Cross (1956)

20BAR1
Hermosa Quadrangle, Colorado, SE1/4 sec. 13, T37N,R9W. Ignacio Quartzite, 25' from base, thick-bedded arkosic quartzite. Sample is subarkose. Larsen and Cross (1956)

20BAR2
Hermosa Quadrangle, Colorado, SE1/4 sec. 13, T37N,R9W. Ignacio Quartzite, 21' from base, thick-bedded arkosic quartzite. Sample is poorly sorted subarkose. Larson and Cross (1956)

Table A2.--Ranges and percentile concentrations of oxides/elements from 400 analyses of sandstones of the Sauk sequence. [-,percentile not determined because of insufficient data]

Oxide/element	Minimum_/	Percentile 1	2.5	5	10	50	90	95	97.5	99	Maximum
Percent											
SiO_2	58.8 (0)	62.2	65.4	72.4	79.0	94.0	97.2	97.6	97.8	98.2	98.7
Al_2O_3	0.11(0)	0.19	0.24	0.37	0.46	1.50	5.20	6.90	7.80	10.95	15.50
Fe_2O_3	0.01(69)	-	-	-	0.01	0.33	2.60	3.80	7.90	10.10	15.30
FeO	0.02(16)	-	-	0.02	0.04	0.10	0.28	0.63	0.95	1.70	3.00
MgO	0.05(33)	-	-	-	0.10	0.34	1.00	2.10	3.05	4.35	7.20
CaO	0.02(8)	-	0.02	0.02	0.04	0.24	5.70	9.35	12.05	15.45	19.50
Na_2O	0.02(125)	-	-	-	-	0.04	0.15	0.26	1.55	2.36	2.83
K_2O	0.01(15)	-	-	0.02	0.06	0.45	2.40	3.55	4.30	5.00	5.40
H_2O+	0.12(1)	0.16	0.23	0.28	0.33	0.52	0.92	1.20	1.50	2.25	3.10
H_2O-	0.01(105)	-	-	-	-	0.05	0.16	0.27	0.32	0.49	1.10
TiO_2	0.01(27)	-	-	-	0.01	0.10	0.67	0.87	1.00	1.35	2.80
P_2O_5	0.02(7)	-	0.02	0.04	0.07	0.26	0.60	0.69	0.85	1.75	2.20
MnO	0.01(135)	-	-	-	-	0.02	0.07	0.12	0.26	0.44	1.30
CO_2	0.05(120)	-	-	-	-	0.08	4.45	7.25	9.65	14.50	16.40
Parts per million											
Ag	0.46(371)	-	-	-	-	-	-	0.6	1.0	5.5	18
As	220 (398)	-	-	-	-	-	-	-	-	-	410
B	5 (209)	-	-	-	-	-	36	45	58	105	200
Ba	5 (0)	7	9	13	22	67	395	600	715	1300	8000
Be	1.0 (156)	-	-	-	-	1.3	2.8	3.3	3.8	5.9	11.0
Co	0.46(90)	-	-	-	-	1.8	7.7	10	13	15	24
Cr	0.46(1)	2.4	2.9	3.3	4.0	6.9	14	23	43	78	160
Cu	0.22(5)	-	0.3	0.4	0.5	1.8	12	37	77	125	210
La	4.6 (60)	-	-	-	-	15	35	45	59	78	200
Mo	1.0 (247)	-	-	-	-	-	1.7	3.5	5.1	8.1	18
Nb	2.2 (27)	-	-	-	3	9	25	32	42	64	76
Ni	1.0 (39)	-	-	-	1.0	2.8	11	14	17	21	42
Pb	2.2 (11)	-	-	2.5	2.8	4.7	11	18	37	160	390
Sc	1.0 (9)	-	1.0	1.2	1.3	1.9	3.8	5.5	8.3	13	16
Sn	4.6 (252)	-	-	-	-	-	6.7	7.5	7.9	8.1	9.4
Sr	3.8 (2)	4.6	5.7	6.6	8.1	34	170	200	280	450	1200
V	2.0 (0)	2.1	2.3	2.7	3.3	6.1	24	31	49	65	140
W	46 (399)	-	-	-	-	-	-	-	-	-	60
Y	1.0 (1)	1.3	1.6	2.1	3.0	7.7	37	55	70	85	180
Zn	4.6 (39)	-	-	-	5	12	41	96	320	635	1100
Zr	8 (0)	14	16	20	27	110	625	1050	1400	1600	1700
Ce	46 (143)	-	-	-	-	57	110	150	180	195	310
Ga	2.2 (375)	-	-	-	-	-	-	2.6	3.9	9.3	14
Ge	0.46(170)	-	-	-	-	1.6	3.4	3.6	3.8	4.3	4.8
Li	100 (392)	-	-	-	-	-	-	-	-	115	180
Yb	0.46(74)	-	-	-	-	0.7	2.3	3.4	4.6	7.0	16
Nd	46 (313)	-	-	-	-	-	62	75	88	95	110
Sm	46 (392)	-	-	-	-	-	-	-	-	50	57
Eu	1.0 (192)	-	-	-	-	1.4	3.3	3.8	4.2	5.0	5.8
Gd	2.2 (166)	-	-	-	-	3.9	13	16	19	21	28
Dy	10 (378)	-	-	-	-	-	-	10	12	18	25
Er	4.6 (394)	-	-	-	-	-	-	-	-	4.8	5.3
Lu	10 (399)	-	-	-	-	-	-	-	-	-	11
Os	22 (399)	-	-	-	-	-	-	-	-	-	23

_/Minimum reported value. Value in parentheses is the number of determinations reported as below the minimum.

Table A3.--Median concentrations of oxides/elements in sandstones of the Sauk sequence in 20 regions of the western U.S.

	Percent									
Locality	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	K_2O	H_2O^+	TiO_2	P_2O_5
Southwestern Montana	95.30	1.05	0.15	0.08	0.40	0.23	0.14	0.48	0.06	0.24
Central Wyoming	94.50	1.60	0.13	0.08	0.30	0.19	0.87	0.45	0.20	0.22
Southeastern Nevada	94.65	2.05	0.42	0.13	0.30	0.15	0.87	0.51	0.11	0.24
Northern Arizona	94.35	1.95	0.47	0.08	0.20	0.22	0.97	0.50	0.10	0.20
Northern Utah	96.45	1.20	0.02	0.08	0.30	0.10	0.18	0.43	0.04	0.24
Eastern Nevada	94.20	2.40	0.32	0.14	0.40	0.10	0.62	0.54	0.13	0.22
Central Colorado	92.10	1.80	0.09	0.12	0.45	0.42	0.99	0.47	0.03	0.21
Western South Dakota	92.60	0.50	0.56	0.06	0.34	1.50	0.10	0.51	0.04	0.40
Southeastern Arizona	89.25	4.69	0.51	0.16	0.30	0.10	1.85	0.58	0.41	0.28
Southwestern New Mexico	80.45	1.30	2.25	0.20	0.65	5.00	0.21	0.79	0.27	0.56
North-Central Montana	96.15	0.81	0.06	0.06	0.24	0.11	0.12	0.45	0.19	0.20
Northwestern Montana	92.40	0.97	0.57	0.05	0.45	1.73	0.23	0.63	0.11	0.25
Southeastern Utah	94.55	1.65	0.71	0.14	0.10	0.41	0.31	0.57	0.21	0.02
Southern California	87.55	4.14	0.87	1.55	0.53	0.29	1.98	0.97	0.57	0.26
South-Central Arizona	89.75	4.20	1.13	0.07	0.20	0.25	1.13	0.73	0.50	0.19
Central Nevada	95.45	1.75	0.11	0.12	0.45	0.11	0.64	0.58	0.04	0.18
Central Utah	96.40	0.96	0.05	0.06	0.28	0.09	0.16	0.51	0.03	0.35
West-Central Colorado	96.00	0.91	0.03	0.08	0.24	0.30	0.44	0.36	0.02	0.30
North-Central Wyoming	95.35	0.57	0.47	0.06	0.23	0.41	0.12	0.51	0.07	0.41
Southwestern Colorado	90.15	3.52	0.43	0.09	0.10	0.42	2.73	0.30	0.63	0.12

(Continued on next page)

Table A3.--Median concentrations of oxides/elements in sandstones of the Sauk sequence in 20 regions of the western U.S.
---- continued

Parts per million

Locality	Ba	Cr	Cu	La	Nb	Ni	Pb	Sc	Sr	V
Southwestern Montana	47.	7.	2.	19.	7.	3.	4.	2.	12.	6.
Central Wyoming	90.	7.	1.	17.	10.	2.	5.	2.	51.	7.
Southeastern Nevada	145.	7.	2.	14.	9.	3.	5.	2.	29.	6.
Northern Arizona	93.	6.	1.	8.	8.	3.	5.	2.	110.	5.
Northern Utah	31.	5.	2.	16.	8.	2.	4.	2.	10.	4.
Eastern Nevada	96.	7.	1.	13.	9.	2.	5.	2.	12.	5.
Central Colorado	43.	7.	1.	11.	8.	3.	4.	2.	22.	6.
Western South Dakota	53.	6.	4.	14.	7.	3.	5.	2.	170.	8.
Southeastern Arizona	115.	7.	2.	21.	28.	3.	8.	2.	37.	9.
Southwestern New Mexico	48.	9.	2.	28.	7.	5.	7.	3.	65.	15.
North-Central Montana	47.	7.	1.	8.	9.	3.	3.	2.	27.	5.
Northwestern Montana	241.	10.	2.	19.	6.	6.	7.	3.	68.	10.
Southeastern Utah	184.	8.	1.	16.	10.	2.	5.	2.	105.	4.
Southern California	212.	11.	9.	24.	16.	9.	7.	3.	53.	21.
South-Central Arizona	78.	10.	3.	32.	28.	5.	7.	3.	81.	18.
Central Nevada	48.	9.	2.	8.	8.	3.	5.	2.	7.	5.
Central Utah	19.	6.	1.	11.	4.	2.	3.	2.	56.	4.
West-Central Colorado	42.	4.	1.	9.	6.	2.	4.	2.	12.	4.
North-Central Wyoming	68.	7.	2.	17.	9.	3.	6.	2.	27.	8.
Southwestern Colorado	103.	5.	2.	21.	8.	2.	4.	2.	130.	4.

Parts per million

Locality	Y	Zn	Zr	Yb
Southwestern Montana	3.	10.	80.	0.
Central Wyoming	7.	10.	260.	1.
Southeastern Nevada	6.	11.	155.	1.
Northern Arizona	7.	10.	71.	1.
Northern Utah	5.	9.	72.	1.
Eastern Nevada	8.	10.	108.	1.
Central Colorado	6.	14.	110.	1.
Western South Dakota	7.	14.	35.	1.
Southeastern Arizona	24.	18.	240.	1.
Southwestern New Mexico	25.	29.	115.	2.
North-Central Montana	3.	12.	135.	0.
Northwestern Montana	5.	22.	108.	1.
Southeastern Utah	18.	9.	410.	1.
Southern California	13.	21.	275.	1.
South-Central Arizona	26.	16.	1006.	2.
Central Nevada	4.	14.	80.	0.
Central Utah	4.	10.	42.	1.
West-Central Colorado	5.	6.	83.	1.
North-Central Wyoming	20.	26.	95.	1.
Southwestern Colorado	9.	7.	62.	1.

Table A4.--Average concentrations of oxides/elements in sandstones of the Sauk sequence in 20 regions of the western U.S.

[The averages for SiO_2 are arithmetic means; all other averages are geometric means]

Locality	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	K_2O	H_2O+	TiO_2	P_2O_5
Southwestern Montana	92.83	1.25	0.14	0.10	0.29	0.26	0.19	0.55	0.06	0.22
Central Wyoming	93.71	1.64	0.11	0.08	0.21	0.18	0.72	0.48	0.20	0.16
Southeastern Nevada	90.79	2.40	0.42	0.15	0.25	0.16	0.71	0.54	0.14	0.22
Northern Arizona	94.23	1.64	0.21	0.09	0.21	0.23	0.51	0.50	0.07	0.19
Northern Utah	96.14	0.87	0.03	0.10	0.23	0.09	0.21	0.43	0.04	0.21
Eastern Nevada	94.52	1.78	0.17	0.13	0.25	0.09	0.49	0.51	0.10	0.17
Central Colorado	87.90	1.39	0.08	0.09	0.35	0.72	0.54	0.49	0.03	0.18
Western South Dakota	87.64	0.56	0.53	0.05	0.34	1.76	0.09	0.51	0.04	0.41
Southeastern Arizona	86.16	3.20	0.35	0.16	0.27	0.17	1.39	0.60	0.36	0.23
Southwestern New Mexico	79.60	1.47	2.45	0.22	0.75	3.08	0.25	0.83	0.26	0.53
North-Central Montana	95.58	0.85	0.04	0.06	0.22	0.15	0.09	0.46	0.20	0.18
Northwestern Montana	91.25	1.19	0.53	0.05	0.42	1.38	0.24	0.74	0.13	0.25
Southeastern Utah	94.46	1.57	0.63	0.15	0.11	0.40	0.13	0.56	0.15	0.03
Southern California	88.21	3.54	0.63	0.85	0.36	0.21	1.25	0.86	0.22	0.23
South-Central Arizona	90.74	2.51	0.70	0.06	0.19	0.21	0.76	0.70	0.46	0.21
Central Nevada	94.53	1.71	0.07	0.12	0.33	0.10	0.56	0.57	0.03	0.23
Central Utah	96.57	0.91	0.05	0.07	0.20	0.07	0.17	0.48	0.03	0.27
West-Central Colorado	92.65	0.80	0.04	0.09	0.31	0.55	0.34	0.37	0.02	0.27
North-Central Wyoming	91.13	0.55	0.34	0.04	0.21	0.72	0.12	0.49	0.07	0.36
Southwestern Colorado	89.34	3.65	0.51	0.09	0.10	0.44	2.84	0.31	0.59	0.08

(Continued on next page)

Table A4.--Average concentrations of oxides/elements in sandstones of the Sauk sequence in 20 regions of the western U.S. ---- continued

	Parts per million									
Locality	Ba	Cr	Cu	La	Nb	Ni	Pb	Sc	Sr	V
Southwestern Montana	62.	8.	2.	11.	7.	4.	4.	2.	17.	7.
Central Wyoming	77.	9.	1.	14.	11.	3.	5.	2.	45.	7.
Southeastern Nevada	152.	9.	2.	14.	9.	3.	6.	2.	37.	9.
Northern Arizona	79.	6.	3.	9.	7.	3.	5.	2.	81.	6.
Northern Utah	30.	6.	2.	13.	9.	2.	4.	2.	13.	4.
Eastern Nevada	112.	7.	1.	13.	8.	2.	5.	2.	14.	6.
Central Colorado	52.	5.	1.	9.	8.	2.	5.	2.	25.	6.
Western South Dakota	62.	6.	7.	11.	7.	4.	7.	2.	161.	10.
Southeastern Arizona	131.	8.	2.	20.	21.	3.	7.	3.	39.	11.
Southwestern New Mexico	78.	11.	3.	26.	7.	5.	10.	4.	55.	15.
North-Central Montana	42.	7.	1.	9.	5.	3.	4.	2.	27.	5.
Northwestern Montana	252.	11.	2.	18.	6.	6.	8.	3.	71.	12.
Southeastern Utah	147.	7.	1.	14.	10.	2.	5.	2.	57.	4.
Southern California	258.	12.	12.	19.	17.	6.	6.	3.	56.	15.
South-Central Arizona	92.	9.	4.	22.	26.	5.	6.	3.	94.	14.
Central Nevada	57.	8.	2.	9.	8.	3.	5.	2.	7.	5.
Central Utah	48.	6.	1.	10.	4.	2.	3.	2.	52.	4.
West-Central Colorado	50.	5.	2.	11.	6.	1.	4.	1.	12.	4.
North-Central Wyoming	63.	6.	5.	19.	9.	3.	6.	2.	30.	7.
Southwestern Colorado	116.	5.	2.	18.	7.	2.	5.	2.	175.	4.

	Parts per million			
Locality	Y	Zn	Zr	Yb
Southwestern Montana	4.	12.	86.	0.
Central Wyoming	8.	10.	240.	1.
Southeastern Nevada	8.	13.	166.	1.
Northern Arizona	8.	11.	83.	1.
Northern Utah	5.	8.	69.	1.
Eastern Nevada	8.	9.	149.	1.
Central Colorado	7.	14.	107.	1.
Western South Dakota	9.	23.	39.	1.
Southeastern Arizona	25.	21.	233.	2.
Southwestern New Mexico	25.	41.	120.	2.
North-Central Montana	4.	11.	177.	0.
Northwestern Montana	5.	22.	141.	1.
Southeastern Utah	12.	8.	237.	1.
Southern California	11.	17.	226.	1.
South-Central Arizona	29.	12.	828.	2.
Central Nevada	4.	12.	70.	0.
Central Utah	6.	9.	45.	1.
West-Central Colorado	7.	7.	73.	1.
North-Central Wyoming	19.	23.	92.	1.
Southwestern Colorado	9.	13.	97.	1.

Table A5.--Errors of the average concentrations given in table A4.

[The values for SiO_2 are standard errors; all other values are geometric errors]

Locality	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	K_2O	H_2O+	TiO_2	P_2O_5
Southwestern Montana	2.70	1.43	2.74	1.37	1.67	1.49	1.75	1.21	1.42	1.18
Central Wyoming	0.97	1.32	2.64	1.20	1.36	1.52	1.81	1.16	1.26	1.21
Southeastern Nevada	3.84	1.59	3.51	1.26	1.36	1.60	1.68	1.15	1.88	1.20
Northern Arizona	0.71	1.28	2.13	1.15	1.20	1.40	1.67	1.05	1.56	1.25
Northern Utah	0.59	1.33	1.38	1.26	1.21	1.20	1.55	1.14	1.48	1.32
Eastern Nevada	1.06	1.26	1.98	1.16	1.33	1.26	1.40	1.21	1.39	1.52
Central Colorado	5.40	1.48	1.78	1.67	2.05	2.96	2.28	1.17	1.48	1.32
Western South Dakota	2.83	1.27	2.40	1.35	1.34	2.00	1.41	1.21	1.47	1.36
Southeastern Arizona	3.79	1.58	2.54	1.32	1.62	2.02	1.51	1.19	1.35	1.19
Southwestern New Mexico	4.91	1.29	1.48	1.53	1.73	1.78	1.81	1.15	1.87	1.21
North-Central Montana	0.76	1.10	1.43	1.16	1.23	2.02	1.25	1.10	1.24	1.21
Northwestern Montana	1.00	1.26	1.33	1.57	1.10	1.41	1.30	1.15	1.30	1.11
Southeastern Utah	0.39	1.08	1.35	1.11	1.07	1.04	1.63	1.16	1.36	1.12
Southern California	1.63	1.23	1.27	1.54	1.44	1.24	1.41	1.13	1.82	1.15
South-Central Arizona	1.12	1.32	1.47	1.18	1.21	1.41	1.72	1.23	1.21	1.15
Central Nevada	0.83	1.33	1.40	1.07	1.15	1.31	1.37	1.11	1.26	1.11
Central Utah	0.24	1.20	1.51	1.17	1.22	1.56	1.21	1.13	1.17	1.15
West-Central Colorado	1.87	1.19	1.33	1.09	1.48	1.57	1.23	1.10	1.14	1.17
North-Central Wyoming	2.80	1.14	1.55	1.22	1.31	1.71	1.23	1.04	1.47	1.12
Southwestern Colorado	0.76	1.13	1.21	1.04	1.00	1.02	1.14	1.05	1.15	1.33

(Continued on next page)

Table A5.--Errors of the average concentrations given in table A4 --- continued

Locality	Ba	Cr	Cu	La	Nb	Ni	Pb	Sc	Sr	V
Southwestern Montana	1.74	1.28	1.67	1.23	1.25	1.45	1.14	1.18	1.71	1.28
Central Wyoming	1.50	1.34	1.46	1.40	1.20	1.35	1.24	1.10	1.95	1.26
Southeastern Nevada	1.96	1.46	1.39	1.51	1.47	1.64	1.33	1.40	1.88	1.65
Northern Arizona	1.29	1.23	3.13	1.31	1.20	1.21	1.23	1.08	1.33	1.30
Northern Utah	1.45	1.09	1.61	1.55	1.18	1.28	1.20	1.09	1.30	1.20
Eastern Nevada	1.47	1.10	1.64	1.28	1.18	1.31	1.29	1.10	1.27	1.26
Central Colorado	1.63	1.32	1.44	1.35	1.16	1.38	1.24	1.17	1.56	1.22
Western South Dakota	1.44	1.08	2.22	1.43	1.30	1.49	2.21	1.13	1.26	1.27
Southeastern Arizona	1.72	1.36	1.42	1.50	1.60	1.38	1.42	1.33	1.33	1.58
Southwestern New Mexico	1.40	1.25	1.28	1.17	1.27	1.31	1.52	1.17	1.32	1.33
North-Central Montana	1.09	1.09	1.10	1.25	1.36	1.21	1.17	1.04	1.98	1.04
Northwestern Montana	1.26	1.22	1.30	1.14	1.18	1.08	1.30	1.03	1.28	1.12
Southeastern Utah	1.15	1.08	1.14	1.22	1.17	1.07	1.02	1.04	1.26	1.07
Southern California	1.24	1.13	1.72	1.16	1.12	1.36	1.16	1.17	1.25	1.29
South-Central Arizona	1.54	1.11	1.45	1.29	1.06	1.25	1.16	1.17	1.52	1.35
Central Nevada	1.31	1.10	1.28	1.14	1.13	1.22	1.24	1.13	1.15	1.13
Central Utah	1.94	1.10	1.22	1.26	1.24	1.24	1.07	1.06	1.44	1.06
West-Central Colorado	1.17	1.20	1.32	1.42	1.11	1.13	1.06	1.11	1.13	1.05
North-Central Wyoming	1.10	1.12	1.56	1.18	1.39	1.20	1.12	1.07	1.25	1.08
Southwestern Colorado	1.47	1.20	1.20	1.18	1.16	1.12	1.11	1.05	1.27	1.16

Locality	Y	Zn	Zr	Yb
Southwestern Montana	1.37	1.27	1.29	1.17
Central Wyoming	1.42	1.20	1.37	1.25
Southeastern Nevada	1.52	1.49	1.53	1.43
Northern Arizona	1.37	1.18	1.45	1.29
Northern Utah	1.23	1.28	1.55	1.17
Eastern Nevada	1.23	1.16	1.52	1.17
Central Colorado	1.30	1.40	1.32	1.25
Western South Dakota	1.65	2.82	1.52	1.39
Southeastern Arizona	1.62	1.53	1.37	1.63
Southwestern New Mexico	1.25	1.91	1.51	1.19
North-Central Montana	1.17	1.13	1.29	1.12
Northwestern Montana	1.05	1.05	1.27	1.08
Southeastern Utah	1.24	1.10	1.46	1.13
Southern California	1.24	1.25	1.42	1.24
South-Central Arizona	1.24	1.17	1.20	1.27
Central Nevada	1.12	1.11	1.33	1.11
Central Utah	1.36	1.11	1.13	1.23
West-Central Colorado	1.17	1.10	1.20	1.07
North-Central Wyoming	1.23	1.09	1.39	1.13
Southwestern Colorado	1.22	1.54	1.41	1.21

Table A6.--Variance components in compositional data on sandstones of the Sauk sequence in the western U.S.

Oxide/ element	Total variance (of logs except where noted)	Variance components [Values in parentheses are percentages of the total variance. *indicates statistical significance at 0.05 probability, **at 0.01; some tests were performed on pooled variance estimates] Between regions	Between areas	Between pairs of sections	Between sections	Between samples	Between analyses	vm_/ Minimum	Maximum
SiO2	68.3_/	11.6 (17*)	1.7 (2)	10.4 (15**)	5.9 (9)	37.9 (56**)	0.8 (1)	0.5	1.8
Al2O3	0.1623	0.0329(20**)	0.0 (0)	0.0152(9*)	0.0192(12)	0.0832(51**)	0.0119(7)	0.7	2.8
Fe2O3	0.8340	0.1581(19)	0.0478(6*)	0.0437(5)	0.0862(10)	0.3206(38**)	0.1775(21)	0.7	2.2
FeO	0.1626	0.0418(26**)	0.0010(1)	0.0 (0)	0.0326(20**)	0.0540(33**)	0.0330(20)	1.2	4.6
MgO	0.2435	0.0020(1)	0.0 (0)	0.0379(16*)	0.0259(11*)	0.0387(16**)	0.1391(57)	0.0	0.1
CaO	0.5972	0.1803(30**)	0.0 (0)	0.1161(19**)	0.0654(11*)	0.1575(26**)	0.0777(13)	0.9	3.6
K2O	0.4486	0.0953(21**)	0.0 (0)	0.0128(3)	0.1092(24*)	0.1592(36**)	0.0720(16)	0.8	3.3
H2O+	0.0400	0.0039(10**)	0.0008(2)	0.0015(4)	0.0047(12)	0.0162(40**)	0.0130(32)	0.4	1.4
TiO2	0.3776	0.1263(33**)	0.0027(1)	0.0137(4)	0.0266(7)	0.1480(39**)	0.0603(16)	1.7	6.6
P2O5	0.1613	0.0372(23**)	0.0045(3)	0.0011(1)	0.0010(1)	0.0073(5**)	0.1102(68)	1.7	5.7
Ba	0.2464	0.0140(6*)	0.0156(6)	0.0013(1)	0.0544(22*)	0.1362(55**)	0.0250(10)	0.2	0.6
Cr	0.0734	0.0021(3*)	0.0 (0)	0.0083(11)	0.0027(4)	0.0354(48**)	0.0248(34)	0.1	0.4
Cu	0.3363	0.0203(6)	0.0483(14*)	0.0 (0)	0.0557(17*)	0.1194(36**)	0.0926(28)	0.2	0.5
La	0.1357	0.0030(2)	0.0132(10**)	0.0036(3)	0.0 (0)	0.0336(25**)	0.0823(60)	0.1	0.2
Nb	0.1263	0.0152(12*)	0.0034(3)	0.0112(9*)	0.0 (0)	0.0328(26**)	0.0636(50)	0.5	1.8
Ni	0.1489	0.0077(5)	0.0 (0)	0.0 (0)	0.0330(22**)	0.0695(47**)	0.0387(26)	0.2	0.8
Pb	0.1113	0.0 (0)	0.0144(13)	0.0056(5)	0.0516(46**)	0.0234(21**)	0.0164(14)	0.0	0.0
Sc	0.0468	0.0077(17*)	0.0 (0)	0.0048(10*)	0.0055(12)	0.0186(40**)	0.0101(22)	0.6	2.3
Sr	0.2852	0.1022(36**)	0.0031(1)	0.0178(6*)	0.0244(9)	0.1080(38**)	0.0298(10)	1.6	6.1
V	0.1234	0.0170(14)	0.0 (0)	0.0234(19*)	0.0164(13*)	0.0568(46**)	0.0099(8)	0.4	1.4
Y	0.1856	0.0538(29**)	0.0 (0)	0.0131(7)	0.0248(13*)	0.0624(34**)	0.0315(16)	1.2	4.8
Zn	0.1904	0.0 (0)	0.0391(21**)	0.0039(2)	0.0712(37**)	0.0351(18**)	0.0412(22)	0.0	0.0
Zr	0.2601	0.0466(18**)	0.0058(2)	0.0113(4)	0.0081(3)	0.1255(48**)	0.0628(24)	0.8	2.8
Yb	0.1119	0.0312(28**)	0.0 (0)	0.0186(17**)	0.0090(8)	0.0327(29**)	0.0203(18)	0.9	3.7

_/Variance of percentage data, not logarithms.

_/Ratio of variance between regions to variance of the region means.

APPENDIX B

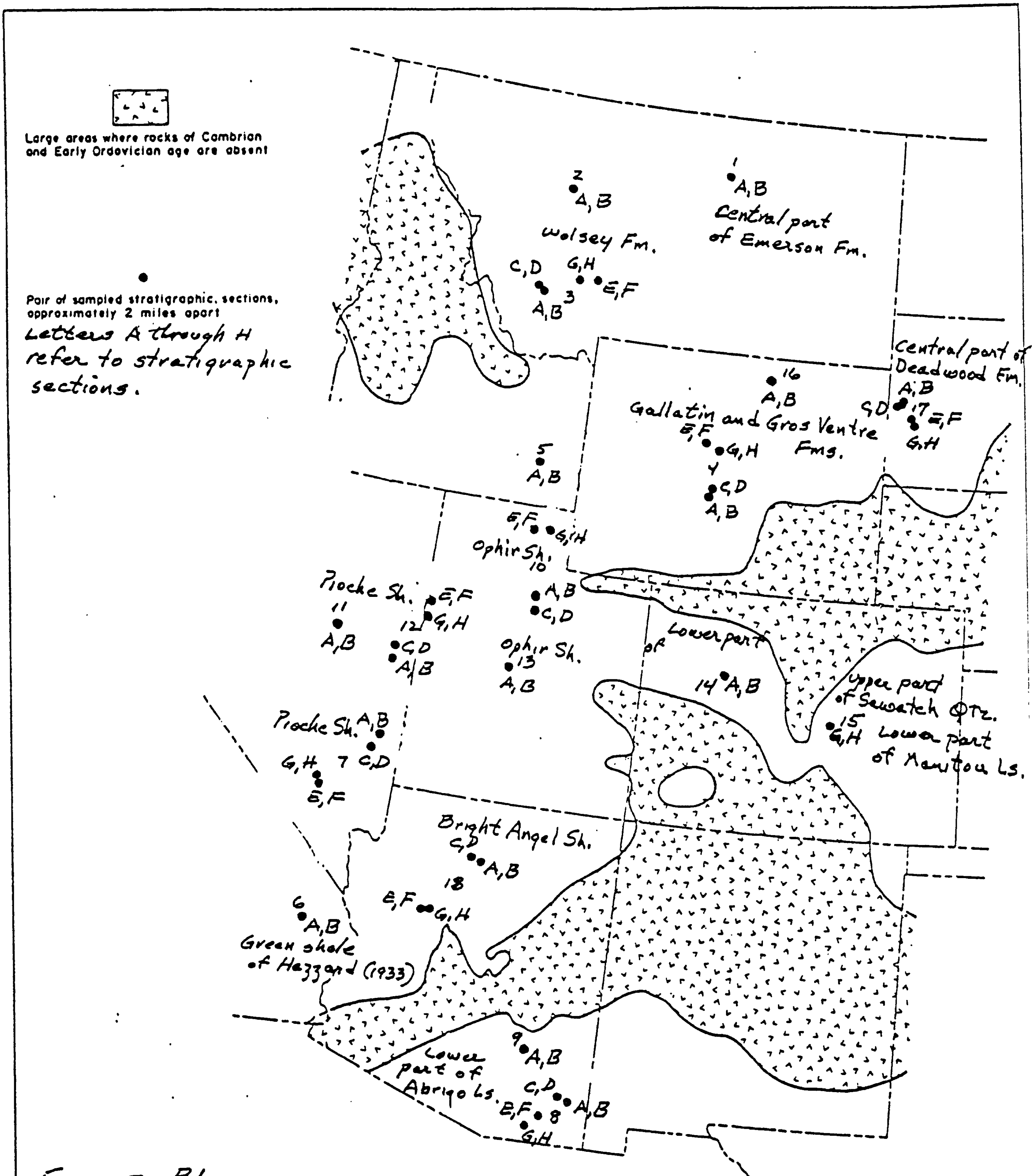
Large areas where rocks of Cambrian and Early Ordovician age are absent
Pair of sampled stratigraphic sections, approximately 2 miles apart
Letters A through H refer to stratigraphic sections.
1 A,B
Central part of Emerson Fm.
2 A,B
Wolsey Fm.
C,D G,H E,F 3 A,B
16 A,B
Gallatin and Gros Ventre Fms.
E,F G,H 4 C,D A,B
Central part of Deadwood Fm.
A,B C,D 17 E,F G,H
5 A,B
E,F G,H
Ophir Sh.
10 A,B C,D
Pioche Sh.
11 A,B
E,F 12 G,H C,D A,B
Ophir Sh.
13 A,B
Lower part of
14 A,B
Upper part of Sawatch Qtz.
15 G,H
Lower part of Manitou Ls.
Pioche Sh.
A,B 7 C,D G,H E,F
Bright Angel Sh.
C,D A,B 18 E,F G,H
6 A,B
Green shale of Hazzard (1933)
9 A,B
Lower part of Abrigo Ls.
C,D A,B E,F 8 G,H

FIGURE B1

GENERALIZED ~~ISOPACH MAP~~ MAP OF ~~BASAL~~ CAMBRIAN SHALES AND SILTSTONES ~~SANDSTONES~~ SHOWING LOCATIONS OF SAMPLED STRATIGRAPHIC SECTIONS AND NAMES OF GEOLOGIC UNITS

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          2ABR1                                                                 1ABR1
          2ABR1                                                                 1ABR1
          2ABR2                                                                 1ABR2
          2ABR2                                                                 1ABR2
          2BBR1                                                                 1BBR1
          2BBR1                         3EBR1     3GBR1                         1BBR1
          2BBR2     3ABR1     3CBR1     3EBR1     3GBR1                         1BBR2
          2BBR2     3ABR1     3CBR1     3EBR2     3GBR2                         1BBR2
                    3ABR2     3CBR2     3EBR2     3GBR2                                                             17ABR1    17CBR1
                    3ABR2     3CBR2     3FBR1     3HBR1                                             16ABR1          17ABR1    17CBR1
                    3BBR1     3DBR1     3FBR1     3HBR1                                             16ABR1          17ABR2a   17CBR2    17EBR1    17GBR1
                    3BBR1     3DBR1     3FBR2     3HBR2                                             16ABR2          17ABR2a   17CBR2    17EBR1    17GBR1
                    3BBR2     3DBR2     3FBR2     3HBR2                                             16ABR2          17BBR1    17DBR1    17EBR2    17GBR2
                    3BBR2     3DBR2                                         4EBR1     4GBR1     16BBR1          17BBR1    17DBR1    17EBR2    17GBR2
                                        5ABR1a                              4EBR1     4GBR1     16BBR1          17BBR2    17DBR2    17FBR1    17HBR1
                                        5ABR1a                              4EBR2     4GBR2     16BBR2          17BBR2    17DBR2    17FBR1    17HBR1
                                        5ABR2a                              4EBR2     4GBR2     16BBR2                              17FBR2    17HBR2
                                        5ABR2a                              4FBR1     4HBR1                                         17FBR2    17HBR2
                                        5BBR1a                              4FBR1     4HBR1
                                        5BBR1a              10EBR1    10GBR1    4FBR2     4HBR2
                                        5BBR2a              10EBR1    10GBR1    4FBR2     4HBR2
                                        5BBR2a              10EBR2    10GBR2    4ABR1     4CBR1
                                                            10EBR2    10GBR2    4ABR1     4CBR1                                                   15GBR1
                                                            10FBR1    10HBR1    4ABR2     4CBR2                                                   15GBR1
11ABR1                                  12EBR1    12GBR1    10FBR1    10HBR1    4ABR2     4CBR2                                                   15GBR2
11ABR1              12ABR1    12CBR1    12EBR1    12GBR1    10FBR2    10HBR2    4BBR1     4DBR1               14ABR1                              15GBR2
11ABR2              12ABR1    12CBR1    12EBR2    12GBR2    10FBR2    10HBR2    4BBR1     4DBR1               14ABR1                              15HBR1
11ABR2              12ABR2    12CBR2    12EBR2    12GBR2                        4BBR2     4DBR2               14ABR2                              15HBR1
11BBR1              12ABR2    12CBR2    12FBR1    12HBR1    10ABR1    10CBR1    4BBR2     4DBR2               14ABR2                              15HBR2
11BBR1              12BBR1    12DBR1    12FBR1    12HBR1    10ABR1    10CBR1                                  14BBR1                              15HBR2
11BBR2              12BBR1    12DBR1    12FBR2    12HBR2    10ABR2    10CBR2                                  14BBR1
11BBR2              12BBR2    12DBR2    12FBR2    12HBR2    10ABR2    10CBR2                                  14BBR2
                    12BBR2    12DBR2                        10BBR1    10DBR1                                  14BBR2
                                                            10BBR1    10DBR1
                              7ABR1     7CBR1               10BBR2    10DBR2
                              7ABR1     7CBR1               10BBR2    10DBR2
          7EBR1     7GBR1     7ABR2     7CBR2
          7EBR1     7GBR1     7ABR2     7CBR2                         13ABR1
          7EBR2     7GBR2     7BBR1     7DBR1                         13ABR1
          7EBR2     7GBR2     7BBR1     7DBR1                         13ABR2
          7FBR1     7HBR1     7BBR2     7DBR2                         13ABR2
          7FBR1     7HBR1     7BBR2     7DBR2                         13BBR1
          7FBR2     7HBR2                                             13BBR1
          7FBR2     7HBR2               18ABR1    18CBR1              13BBR2
                                        18ABR1    18CBR1              13BBR2
                                        18ABR2    18CBR2
                                        18ABR2    18CBR2
                    18EBR1    18GBR1    18BBR1    18DBR1              9ABR1                         8ABR1     8CBR1
                    18EBR1    18GBR1    18BBR1    18DBR1              9ABR1                         8ABR1     8CBR1
6ABR1               18EBR2    18GBR2    18BBR2    18DBR2              9ABR2     8EBR1     8GBR1     8ABR2     8CBR2
6ABR1               18EBR2    18GBR2    18BBR2    18DBR2              9ABR2     8EBR1     8GBR1     8ABR2     8CBR2
6ABR2               18FBR1    18HBR1                                  9BBR1     8EBR2     8GBR2     8BBR1     8DBR1
6ABR2               18FBR1    18HBR1                                  9BBR1     8EBR2     8GBR2     8BBR1     8DBR1
6BBR1               18FBR2    18HBR2                                  9BBR2     8FBR1     8HBR1     8BBR2     8DBR2
6BBR1               18FBR2    18HBR2                                  9BBR2     8FBR1     8HBR1     8BBR2     8DBR2
6BBR2                                                                           8FBR2     8HBR2
6BBR2                                                                           8FBR2     8HBR2
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Figure B2.-- Chemical data on shales and siltstones from the Sauk sequence arranged schematically according to sampling locality - sample numbers (See table B1 and figure B1 for sampling locations).

```
        50.8                                                    54.9
        51.7                                                    54.6
        52.0                                                    52.8
        51.0                                                    53.3
        53.9                                                    53.0
        55.2                    53.2    56.4                    53.2
        57.4    47.4    71.2    52.6    56.7                    53.0
        58.2    47.4    58.4    57.3    51.9                    53.5
                50.2    31.1    58.0    52.4                                                60.0    58.9
                50.1    31.8    62.7    59.6                                    57.4        60.6    60.3
                53.3    30.0    62.8    59.6                                    57.7        68.6    60.7    58.0    45.2
                54.1    29.6    54.8    66.2                                    51.6        65.6    60.2    58.7    44.8
                24.5    56.7    55.1    70.1                                    52.7        52.7    62.3    79.2    15.6
                23.4    55.5                                    72.7    70.0    62.9        52.3    62.2    80.6    15.9
                                56.4                            74.0    70.1    62.5        57.2    61.3    76.0    17.0
                                56.3                            62.0    60.0    71.7        57.2    61.4    61.2    16.6
                                54.9                            61.8    58.6    69.8                        61.0    25.6
                                54.6                            71.1    77.6                                61.8    25.6
                                49.4                            71.7    61.9
                                49.9            67.2    78.7    57.5    63.7
                                59.0            65.7    79.5    56.2    69.6
                                59.5            57.8    48.0    71.8    57.7
                                                57.2    48.3    63.1    56.5                                            14.0
                                                52.0    54.4    62.5    59.2                                            12.9
70.7                            55.4    65.0    51.0    55.5    62.2    59.3                                            11.4
70.4            33.6    52.6    56.0    64.9    71.0    61.8    74.6    52.5            65.3                            11.4
68.1            34.9    52.6    62.4    54.8    71.2    62.4    76.1    52.4            64.3                            25.0
68.2            59.1    52.4    62.4    54.4                    61.7    53.2            58.7                            26.0
58.4            72.9    52.3    78.4    68.1    66.9    55.4    60.9    53.9            58.2                            19.2
59.2            67.0    25.9    57.9    69.5    66.7    55.1                            57.2                            19.4
52.5            66.4    27.0    60.2    74.2    58.7    65.5                            58.6
52.2            79.2    71.0    60.2    74.8    72.0    64.3                            50.9
                84.0    69.3                    62.7    40.0                            49.2
                                                63.5    40.3
                        67.6    55.3            64.9    64.4
                        67.3    54.3            64.4    64.8
        62.0    60.4    67.6    56.6
        62.3    60.2    67.4    78.9                    78.6
        64.4    52.4    77.4    59.4                    77.0
        64.1    53.0    76.8    59.6                    50.9
        57.8    64.6    56.0    66.2                    49.5
        69.3    64.9    56.7    67.2                    52.1
        53.4    56.7                                    52.9
        52.9    56.7            65.2    63.2            58.6
                                65.2    64.0            58.9
                                59.4    59.1
                                59.5    59.4
                58.7    55.0    64.8    62.7            71.4                    68.1    66.1
                59.5    55.6    66.2    64.5            70.7                    68.7    66.4
52.2            58.7    63.1    55.5    64.4            79.0    57.8    51.3    62.7    54.2
52.3            59.3    71.8    55.7    63.9            79.1    58.0    51.3    62.9    54.4
51.8            53.5    61.5                            71.2    55.2    54.6    61.4    79.1
51.5            59.2    63.2                            70.9    56.4    54.6    61.7    78.6
53.3            54.6    55.3                            66.1    55.7    46.4    61.5    71.2
53.2            55.2    54.7                            65.0    56.0    47.0    60.8    83.8
51.5                                                            56.7    54.4
51.5                                                            56.7    54.4
```

Figure B2.--Continued--SiO2 (percent)

	21.70							19.20								
	22.20							19.30								
	22.00							21.20								
	22.00							22.00								
	20.80							19.50								
	20.30			23.00	21.20			19.60								
	19.30	19.70	9.30	22.00	20.50			19.50								
	19.40	19.50	19.60	19.10	14.30			19.30								
		18.60	10.00	18.70	14.50							14.00	17.50			
		18.20	10.20	15.80	21.00					14.30		13.40	18.30			
		23.10	10.00	15.80	21.00					15.10		10.30	17.50	5.00	7.20	
		24.00	10.50	12.40	17.20					18.70		10.40	18.20	4.80	6.80	
		10.30	24.70	12.00	14.40					19.00		12.50	18.10	5.80	3.50	
		10.60	23.70					7.90	11.50	10.50		12.40	18.10	5.60	4.00	
				24.00				7.70	12.00	10.20		17.20	17.70	7.30	3.70	
				23.40				14.60	11.40	9.30		17.40	17.50	18.60	3.70	
				24.40				14.80	11.40	10.20				9.40	3.60	
				25.50				10.60	6.60					9.10	3.70	
				17.10				10.50	18.70							
				17.10		14.50	8.70	21.40	8.10							
				20.80		14.70	8.30	21.70	6.50							
				21.00		19.30	25.40	9.00	7.40							
						19.30	26.10	17.80	7.80							3.70
						28.30	23.80	17.50	12.30							3.40
13.90				26.70	17.50	28.80	22.20	17.30	12.80							2.80
13.70		4.30	13.00	24.80	17.70	15.80	17.30	7.10	6.40		18.70					2.50
17.10		3.90	13.30	20.00	23.60	16.60	17.10	6.50	6.40		15.00					5.70
16.90		20.50	13.80	19.90	23.70			10.80	19.20		13.20					5.90
10.80		12.00	13.80	8.10	15.70	13.50	19.00	11.20	18.90		13.30					5.10
10.60		13.40	4.30	21.90	15.60	13.30	18.80				13.30					5.20
22.60		13.90	3.80	21.30	12.20	20.60	16.20				12.80					
21.10		9.80	14.50	21.20	12.00	11.90	16.00				10.80					
		8.00	14.30			16.20	8.60				10.80					
						16.30	8.40									
			13.90	24.00		15.70	17.10									
			14.40	23.40		15.80	17.10									
	18.60	19.50	15.60	17.10												
	19.00	19.20	15.50	8.90			7.40									
	12.00	24.00	8.40	19.70			8.10									
	12.10	24.50	8.50	19.80			24.70									
	21.50	16.90	21.60	15.20			23.60									
	13.60	16.50	21.60	15.10			24.70									
	24.30	21.70					24.50									
	26.10	21.10		3.80	16.30		20.60									
				13.70	16.00		20.60									
				20.70	19.90											
				20.90	19.60											
		20.80	22.50	19.00	16.20		12.60			13.20	16.40					
		20.30	22.70	18.60	16.20		12.50			13.70	16.70					
26.00		20.80	17.80	23.40	16.50		9.10	13.30	17.50	17.20	24.40					
25.70		20.00	9.10	22.70	16.40		9.10	13.10	17.10	17.30	24.30					
25.20		24.80	14.50				13.30	16.20	20.20	18.70	9.40					
24.50		19.50	14.30				13.70	16.30	21.30	18.70	9.30					
23.30		21.00	22.50				17.40	17.30	16.70	15.80	14.20					
22.40		20.50	22.80				17.30	17.40	16.80	16.10	6.40					
24.80								16.50	19.70							
24.00								17.30	19.40							

Figure 82.--Continued--Al2O3 (percent)

```
          5.70                                                    3.40
          5.60                                                    3.10
          5.80                                                    5.50
          5.70                                                    5.60
          4.90                                                    5.60
          4.20                    5.40    3.70                    5.20
          4.20    4.60    6.60    5.30    3.30                    4.10
          3.20    4.70    6.00    4.40    4.40                    4.00
                  4.60    1.80    4.50    4.10                                                6.20    3.20
                  4.60    1.70    3.70    3.80                                    8.20        6.90    2.90
                  4.50    2.20    3.90    3.90                                    8.30        2.80    3.10    4.90    4.00
                  4.20    2.20    1.80    2.10                                    8.40        2.90    3.40    4.70    4.30
                  1.40    3.00    1.40    0.36                                    8.90        3.00    2.60    4.70    1.20
                  1.40    3.10                                    5.40    3.80    9.50        2.90    2.70    4.20    0.90
                                  4.00                            5.20    3.90    9.40        3.50    3.80    6.50    1.70
                                  4.00                            4.30   12.30    4.30        2.50    3.40    3.70    0.94
                                  2.00                            4.30   12.10    5.10                       11.10    2.30
                                  1.70                            1.60    5.30                               10.80    3.00
                                  2.50                            1.40    1.40
                                  1.00            3.50    1.30    3.00   11.40
                                  1.80            3.60    1.40    2.70    9.90
                                  0.01L           3.50    3.50    7.40    4.80
                                                  3.40    3.80    4.00   18.90                                            1.30
                                                  2.30    4.00    4.60   11.00                                            1.20
  5.10                            3.50    6.40    2.10    4.50    4.80   11.10                                            0.80
  5.00            1.20    1.40    2.80    6.80    1.50    2.20    7.50    3.30            2.10                            1.00
  2.60            1.10    1.50    3.20    3.10    1.40    2.00    6.90    3.30            1.60                            1.00
  3.00            3.00    2.10    3.30    3.50                   10.40    4.40            1.30                            1.10
  3.90            2.00    2.00    1.10    3.00    4.00    1.80   10.60    4.30            1.50                            1.60
  2.90            1.20    1.00    5.20    3.10    1.70    2.10                            2.10                            2.00
  5.30            1.40    0.74    5.80    1.30    1.30    2.10                            1.40
  5.70            1.70    3.80    6.20    1.10    0.76    3.10                            1.10
                  1.70    3.60                    2.30    1.40                            1.10
                                                  2.20    1.00
                          3.20    3.30            2.20    2.20
                          3.00    4.50            2.30    1.70
          2.90    3.70    2.40    3.00
          2.30    2.50    2.20    3.50                    1.60
          0.78    2.60    1.10    3.90                    1.30
          0.18    2.50    1.20    3.90                    3.60
          2.80    2.60    4.10    2.80                    3.90
          0.01L   2.30    4.30    2.90                    3.80
          1.20    3.00                                    3.50
          1.00    3.10            2.40    4.80            4.70
                                  2.20    4.60            4.40
                                  3.10    5.10
                                  3.30    5.30
                  3.10    4.00    2.40    5.10            3.30                    1.80    2.20
                  3.30    3.90    1.90    4.70            3.10                    1.90    2.10
  3.00            3.60    4.00    4.20    5.40            1.20    2.10    0.45    2.00    4.30
  3.30            3.60    7.50    4.50    5.70            1.30    2.00    1.70    2.70    3.70
  3.10            5.00    7.60                            3.20    3.00    3.60    3.20    1.30
  3.30            7.00    7.40                            2.90    3.40    3.50    2.70    1.60
  5.10            5.90    4.10                            3.50    3.90    1.40    2.00    1.50
  4.20            6.20    3.90                            3.80    4.10    0.69    2.10    1.00
  3.80                                                            3.50    3.70
  3.50                                                            3.50    3.20
```

Figure B2.--Continued--Fe2O3 (percent)

```
        3.10                                                    3.00
        3.30                                                    3.20
        3.10                                                    2.20
        3.20                                                    2.00
        3.10                                                    2.40
        2.80                    1.60    1.10                    2.70
        2.70    1.50    1.20    1.60    1.40                    3.60
        2.70    1.50    0.68    2.60    2.00                    3.70
                1.70    2.80    2.50    2.20                                                1.80    0.92
                1.80    2.90    2.00    1.90                                    1.30        1.60    1.10
                0.84    3.00    2.00    1.50                                    1.20        0.52    0.92    0.28    1.50
                2.92    2.90    1.80    1.60                                    0.96        0.44    0.68    0.36    1.70
                4.60    0.80    1.90    1.40                                    0.64        0.60    1.50    0.20    2.80
                4.60    0.88                                    2.10    0.92    2.20        0.84    1.60    0.40    3.00
                                1.70                            1.60    0.88    2.20        1.40    1.50    0.44    3.20
                                1.90                            3.60    2.00    0.56        1.40    1.60    0.44    3.60
                                4.50                            3.70    2.50    0.56                        0.84    3.00
                                4.60                            2.00    1.20                                0.84    2.90
                                3.90                            2.20    2.50
                                5.10            3.50    3.30    2.50    1.70
                                4.60            3.70    3.30    2.60    1.60
                                4.70            5.00    3.80    0.44    1.30
                                                5.20    3.60    0.44    1.60                                            0.20
                                                1.00    2.00    0.52    1.50                                            0.36
0.32                            2.60    0.20    1.00    1.90    0.36    1.40                                            0.36
0.48            0.24    1.90    2.40    0.24    0.64    4.40    0.36    0.64            0.92                            0.20
0.80            0.56    1.70    3.40    4.60    0.72    4.20    0.36    0.56            0.96                            0.24
0.40            2.40    1.80    3.30    4.20                    3.20    1.90            1.00                            0.12
0.48            2.40    1.70    3.20    1.10    3.00    4.30    3.30    1.90            0.88                            0.52
1.40            1.90    0.44    2.40    0.96    5.10    4.00                            1.00                            0.32
0.72            2.00    0.60    0.56    1.20    3.90    2.90                            1.10
0.76            0.48    0.52    0.20    1.20    3.40    3.00                            1.30
                0.36    0.60                    2.50    1.40                            1.40
                                                2.60    1.50
                        4.00    3.20            2.40    3.70
                        3.90    3.40            2.30    3.60
        3.40    2.70    3.10    1.00
        3.80    3.70    3.10    1.00                    0.32
        2.20    5.00    0.40    3.30                    0.44
        2.20    5.10    0.32    3.30                    1.40
        3.80    2.80    3.90    1.70                    0.96
        1.80    3.00    3.50    1.60                    0.40
        4.60    4.40                                    4.00
        4.60    4.20            0.92    1.80            1.30
                                1.10    1.90            1.50
                                0.68    0.68
                                0.52    0.76
                1.20    0.76    0.44    1.10            0.52                    2.50    0.44
                0.88    0.72    0.52    1.20            0.56                    2.50    0.36
2.80            0.88    0.48    0.96    0.64            0.40    2.80    5.50    2.40    0.52
2.80            0.72    0.48    0.80    0.52            0.44    2.80    4.00    2.00    0.68
3.40            0.72    0.28                            0.20    2.60    2.80    1.60    0.36
3.30            0.68    0.24                            0.32    2.50    2.80    1.80    0.16
1.80            0.72    0.72                            0.40    1.80    5.20    3.30    0.36
2.40            0.52    0.92                            0.40    1.90    5.10    3.20    0.60
3.70                                                            2.50    3.30
3.70                                                            2.50    3.70
```

Figure B2.--Continued--FeO (percent)

	2.90							2.80								
	2.60							2.50								
	2.60							2.50								
	2.80							2.50								
	2.60							3.70								
	1.70			2.60	1.90			3.70								
	2.60	3.40	1.10	2.50	1.70			4.30								
	2.80	3.60	1.50	2.70	2.20			4.20								
		3.70	8.70	2.40	2.40							1.80	2.10			
		3.80	8.70	2.00	1.70					2.80		1.80	1.90			
		2.50	9.00	1.90	1.70					2.60		0.80	1.90	0.34	6.60	
		2.00	9.10	1.40	1.20					2.90		1.10	1.80	0.43	6.20	
		9.50	1.40	1.40	0.25					3.00		1.90	1.90	0.53	12.90	
		9.60	1.40					1.50	1.00	2.50		1.90	1.90	0.56	12.80	
				1.30				1.50	1.20	2.40		2.40	2.20	1.30	11.90	
				1.40				2.60	2.00	0.88		2.40	1.80	1.00	12.40	
				1.80				2.30	1.90	0.85				1.50	9.40	
				1.80				2.00	1.20					1.20	9.20	
				1.70				2.00	0.94							
				1.70		1.90	1.40	2.00	2.20							
				2.00		1.80	1.50	2.20	3.00							
				1.90		2.50	3.00	1.10	5.10							
						2.60	2.90	1.40	1.20							16.30
						1.70	2.40	1.10	1.90							16.30
0.60				1.10	0.31	1.60	2.30	1.30	1.90							5.70
0.61		0.50	2.00	1.20	0.37	1.10	2.70	1.50	0.72		0.94					6.10
0.75		0.55	1.60	1.30	1.40	1.00	2.60	1.50	0.86		1.60					13.20
0.86		2.30	2.40	1.30	1.40			2.90	3.00		3.60					13.70
0.22		1.20	2.50	1.00	1.00	2.50	2.30	2.90	2.90		3.70					15.10
0.50		1.40	0.51	1.00	1.00	2.90	2.20				3.80					14.70
0.98		1.50	0.45	0.40	1.00	2.30	1.90				3.80					
1.20		0.90	0.91	0.39	0.50	1.30	2.00				5.40					
		0.57	1.20			2.00	1.20				5.40					
						1.80	1.10									
			1.50	1.60		1.80	1.90									
			1.60	1.60		1.90	1.80									
	1.80	2.00	1.50	2.50												
	1.60	2.10	1.60	1.10			1.00									
	1.50	2.70	0.26	2.40			1.10									
	1.70	2.40	0.44	2.40			1.60									
	1.90	1.90	2.20	1.80			1.70									
	0.12	2.00	2.00	1.50			1.80									
	2.40	2.00					1.80									
	2.30	2.00		1.80	1.50		1.80									
				1.90	1.60		1.70									
				1.20	1.30											
				1.20	1.30											
		1.80	1.90	0.65	1.90		0.20			1.60	1.70					
		1.70	1.70	0.70	1.60		0.25			1.40	1.70					
2.30		1.80	1.30	1.10	1.10		0.25	3.10	2.80	1.80	2.10					
2.10		1.70	1.00	1.30	1.00		0.10	3.20	2.50	1.60	2.10					
2.40		1.40	0.93				0.04	3.10	2.70	1.40	0.46					
2.50		2.40	0.68				0.10	2.90	2.60	1.30	0.45					
2.20		1.50	1.60				0.48	2.30	3.70	2.40	0.30					
2.40		1.50	1.70				0.41	2.30	4.10	2.40	0.60					
3.00								2.20	3.20							
2.90								2.40	3.10							

Figure B2.--Continued--MgO (percent)

```
          1.00                                                    2.50
          0.01L                                                   2.50
          0.41                                                    0.34
          1.10                                                    0.71
          0.76                                                    1.10
          0.72                    0.36    1.40                    1.00
          0.64    4.60    0.45    0.75    1.10                    1.30
          0.85    5.20    1.20    1.70    8.60                    1.30
                  4.10   15.50    1.40    8.00                                                3.96    1.60
                  4.10   14.80    2.60    0.31                                    1.60        1.40    0.73
                  1.30   15.70    2.20    0.62                                    1.60        4.90    0.82   14.70   11.80
                  0.76   16.30   11.00    0.62                                    1.20        5.90    0.58   14.50   12.10
                 22.50    0.21   11.10    1.10                                    1.20       10.20    0.04    2.10   25.40
                 22.40    0.30                                    1.20    2.20    1.60       10.50    0.08    2.00   25.40
                                  0.84                            1.60    2.50    1.70        2.50    0.40    0.54   24.80
                                  0.81                            1.20    0.52    1.50        2.30    0.12    0.49   25.00
                                  0.49                            1.20    0.56    1.10                        3.70   23.00
                                  0.23                            1.70    1.00                                3.00   22.00
                                  9.10                            1.80    0.01L
                                  9.40            0.70    0.16    0.45    2.20
                                  0.77            0.34    0.30    0.88    1.80
                                  0.57            0.01L   0.50    0.58   10.50
                                                  0.20    0.39    0.45    3.20                                           24.60
                                                  0.78    0.76    0.50    0.75                                           24.50
  0.58                            0.70    0.24    0.48    0.37    0.90    0.85                                           40.20
  0.70           31.50   12.20    0.45    0.15    0.48    0.61    1.20   16.90            2.10                           39.80
  0.29           30.70   12.30    0.08    0.30    0.02    0.84    1.80   16.10            1.80                           21.20
  0.66            1.10   11.10    0.33    0.15                    0.65    1.80            4.60                           19.80
  9.90            0.70   11.10    0.61    0.34    1.20    4.10    0.60    1.80            4.30                           22.10
  9.60            3.50   36.50    0.80    0.26    1.90    4.50                            4.60                           20.90
  3.80            2.70   36.10    0.85    1.20    1.40    0.50                            4.70
  4.20            1.50    0.01L   0.57    0.83    0.65    0.65                           10.10
                  0.80    1.10                    1.20   23.70                           10.10
                                                  0.93   23.10
                          0.60    0.93            0.34    0.95
                          0.91    0.91            0.77    0.83
          0.60    0.39    0.85    2.70
          0.37    0.68    0.52    0.78                    2.30
          6.60    1.20    4.30    0.50                    2.60
          7.20    0.52    4.50    0.52                    3.80
          0.95    0.70    0.46    2.40                    5.10
          0.38    1.10    0.31    1.20                    0.55
          1.20    0.64                                    0.74
          0.85    0.81            1.90    0.46            0.30
                                  2.50    0.32            0.26
                                  0.92    0.57
                                  0.40    0.22
                  0.83    1.00    0.52    0.90            0.27                    1.30    1.50
                  0.24    0.55    0.48    0.13            0.76                    0.62    1.20
  0.84            1.20    0.42    0.52    0.84            0.92    6.00    7.30    1.00    1.70
  0.84            0.70    0.15    0.84    0.50            0.24    6.40    7.40    0.41    1.90
  0.92            0.31    2.90                            0.06    4.90    2.20    0.25    0.55
  1.20            0.41    2.00                            0.08    4.20    2.30    0.57    1.40
  1.70            1.60    0.80                            0.10    4.50    8.80    1.60    1.10
  2.30            2.00    0.86                            0.15    4.30    9.10    1.50    0.92
  1.40                                                            5.10    2.10
  1.50                                                            4.40    2.80
```

Figure B2.--Continued--CaO (percent)

```
        0.42                                                    0.22
        0.31                                                    0.34
        0.13                                                    0.09
        0.44                                                    0.05
        0.18                                                    0.02
        0.51            0.25    0.08                            0.02
        0.12    0.11    0.53    0.28    0.16                    0.40
        0.11    0.28    0.09    0.09    0.22                    0.27
                0.11    0.13    0.03    0.12                                0.26    0.60
                0.39    0.02    0.35    0.40                            0.32        0.13    0.20
                0.75    0.06    0.02    0.31                            0.15        0.12    0.22    0.30    0.01L
                0.28    0.02    0.32    0.39                            0.31        0.52    0.23    0.21    0.01L
                0.70    0.05    0.26    3.70                            0.06        0.16    0.40    0.05    0.08
                0.81    0.30                            0.01L   0.18    0.14        0.50    0.18    0.27    0.29
                                1.70                    0.25    0.07    0.68        0.46    0.20    0.56    0.10
                                1.30                    0.19    0.10    0.33        0.09    0.38    0.06    0.18
                                1.10                    0.20    0.08    0.05                        0.25    0.01L
                                1.30                    0.01L   0.20                                0.34    0.01L
                                0.40                    0.12    0.62
                                0.51            0.09    0.01L   0.14    0.30
                                0.90            0.27    0.01L   0.12    0.15
                                0.95            0.11    0.01L   0.10    2.80
                                                0.05    0.15    0.53    0.60                                        0.38
                                                0.14    0.06    0.15    0.06                                        0.37
0.22                            1.50    0.58    0.09    0.10    0.11    0.34                                        0.01L
0.06            0.38    0.36    1.80    0.42    0.13    0.15    0.04    0.03            0.78                        0.25
0.35            0.45    0.06    0.85    0.80    0.02    0.33    0.20    0.16            0.38                        0.06
0.24            0.56    0.06    0.81    1.10                    0.18    0.45            0.25                        0.05
0.35            1.10    0.24    0.23    0.43    0.52    0.30    0.10    0.04            0.39                        0.10
0.06            2.20    0.48    0.48    0.28    0.91    0.37                            0.10                        0.35
0.20            2.40    0.53    0.39    1.40    0.16    0.05                            0.15
0.58            0.50    0.04    0.42    1.50    1.50    0.24                            0.08
                0.18    0.36                    0.14    1.40                            0.06
                                                0.12    1.40
                        1.20    0.55            0.25    0.72
                        1.30    0.53            0.25    0.77
        1.10    0.73    1.30    0.32
        1.30    0.86    0.90    0.13                    0.07
        1.60    0.40    2.00    0.26                    0.08
        1.70    0.41    1.80    0.04                    0.32
        0.47    1.10    0.41    1.80                    1.50
        0.40    1.10    0.14    1.70                    1.10
        0.68    0.50                                    1.00
        0.53    0.62            0.30    0.26            0.43
                                0.52    0.10            0.10
                                0.15    0.14
                                0.09    0.06
                0.08    0.16    0.07    0.50            0.26                    0.37    0.35
                0.14    0.08    0.10    0.13            0.43                    0.30    0.08
0.28            0.40    0.28    0.05    0.33            0.44    0.48    0.54    0.30    0.23
0.43            0.38    0.50    0.10    0.38            0.17    0.37    0.38    0.22    0.12
0.43            0.10    0.26                            0.03    0.32    0.04    0.20    0.18
0.65            0.31    0.24                            0.20    0.26    0.07    0.24    0.30
0.20            0.10    0.42                            0.18    0.24    0.24    0.66    3.80
0.60            0.31    0.22                            0.42    0.07    0.04    0.49    0.20
0.45                                                            0.16    0.13
0.32                                                            0.22    0.08
```

Figure B2.--Continued--Na_2O (percent)

```
                   6.00                                                    5.20
                   5.20                                                    5.60
                   5.50                                                    5.70
                   5.40                                                    5.60
                   5.30                                                    6.20
                   6.10                    6.50    7.90                    6.40
                   6.20    7.80    5.20    6.60    7.30                    6.00
                   5.90    8.30    8.00    5.30    5.30                    5.50
                           8.60    4.90    5.10    5.30                                                9.40   10.00
                           8.40    4.40    4.30    5.70                                    5.50        8.00    9.70
                           8.80    4.20    4.10    6.80                                    5.40        5.80   10.40    3.00    4.20
                           9.10    4.40    4.20    6.10                                    6.60        7.10   10.40    3.00    4.00
                           1.80    8.30    4.00    5.70                                    6.30        8.80    8.30    3.60    1.50
                           1.90    8.40                                    3.50    3.80    4.90        9.00    8.30    3.60    2.00
                                           3.80                            3.40    4.10    4.80       12.50    8.40    2.50    2.20
                                           4.20                            5.70    4.30    3.00       12.50    9.00    9.10    2.20
                                           4.20                            6.20    4.50    3.10                        6.70    2.10
                                           4.00                            5.70    2.40                                6.20    2.10
                                           4.00                            5.70    9.30
                                           3.90            5.60    3.00    5.60    3.60
                                           4.90            5.60    2.50    5.40    2.90
                                           4.90            7.10    7.80    5.00    1.10
                                                           7.20    7.20    8.40    4.70                                            2.30
                                                           9.60    6.60    7.20    6.30                                            2.00
           4.90                            4.50    4.60    9.50    7.00    7.70    6.70                                            1.40
           5.00            2.40    3.70    4.90    4.50    6.30    5.60    3.30    4.70            5.90                            1.80
           5.90            2.40    3.60    3.20    5.00    5.90    5.90    2.90    4.60           10.50                            3.70
           5.60            8.40    3.80    3.40    5.00                    4.10    9.10            8.80                            3.20
           5.70            5.50    3.80    1.70    6.40    5.70    6.20    3.70    8.60            8.80                            2.90
           5.40            4.90    2.10    5.10    6.30    4.80    5.90                            8.70                            3.20
           5.90            5.40    1.80    5.40    5.90    8.10    6.10                            8.60
           6.20            3.40    6.60    5.60    6.00    5.90    6.10                            5.40
                           2.60    6.60                    7.80    2.30                            6.80
                                                           7.60    2.30
                                   2.10    5.30            7.70    4.80
                                   2.30    5.50            8.00    5.10
                   5.10    5.90    3.10   12.80
                   1.70    5.80    3.50    1.70                    4.40
                   4.10    6.00    1.40    5.20                    4.80
                   4.20    6.00    1.40    5.20                    4.40
                   5.90    4.80    5.60    4.00                    4.00
                  10.10    4.90    5.50    4.10                    4.60
                   6.60    6.00                                    4.60
                   5.20    5.60            7.20    6.60            7.10
                                           7.20    6.10            6.90
                                           7.30    6.70
                                           7.20    6.80
                           7.60    8.40    5.60    6.40            8.80                    8.40    7.00
                           7.70    8.50    5.70    6.10            9.10                    8.20    7.30
           6.10            7.70    7.60    6.70    6.50            7.00    5.30    5.50   10.10    8.40
           6.50            7.70    4.90    7.20    6.50            7.20    5.30    5.60   10.20    8.00
           5.90            7.80    6.50                            9.70    5.90    7.50   10.10    5.10
           6.10            5.20    6.50                            9.80    5.80    7.00   10.00    5.40
           5.60            6.90    7.90                            8.70    6.80    5.30    9.50    5.70
           6.20            7.30    7.90                            9.40    6.60    5.30    9.60    3.40
           6.30                                                            5.90    6.50
           6.40                                                            6.20    6.50
```

Figure B2.--Continued--K2O (percent)

```
        5.40                                                    3.30
        5.70                                                    3.70
        5.70                                                    5.80
        5.50                                                    3.80
        5.60                                                    4.50
        5.60            4.70    3.20                            3.70
        4.60    4.00    2.80    5.10    4.30                    4.90
        4.10    3.20    2.50    3.50    2.60                    4.30
                2.50    1.60    3.70    2.80                                                3.20    2.40
                2.40    1.80    3.40    3.30                                    5.00        2.70    2.20
                3.10    1.40    4.20    2.60                                    3.70        1.50    2.00    2.00    1.60
                2.50    1.20    2.30    2.20                                    5.40        1.30    1.70    1.80    2.30
                3.90    2.70    2.90    2.20                                    3.70        1.70    2.40    1.30    0.76
                3.30    4.40                                    3.50    2.60    2.90        1.40    3.00    1.50    0.81
                                5.40                            2.70    1.40    3.50        0.88    2.20    1.90    1.50
                                3.40                            3.30    4.30    2.60        1.70    2.20    2.30    1.00
                                3.90                            2.40    5.20    2.80                        2.10    1.00
                                4.70                            1.50    2.10                                2.70    1.00
                                3.90                            1.70    2.00
                                3.70            1.50    2.50    5.10    2.80
                                3.10            2.60    2.20    4.90    3.20
                                4.10            3.40    5.30    2.10    3.00
                                                3.60    4.40    1.80    2.80                                            0.82
                                                2.10    3.70    3.20    4.70                                            0.83
2.30                            3.70    3.30    3.00    3.20    3.00    2.60                                            0.71
2.00            0.94    2.20    4.00    3.20    1.70    3.20    1.50    1.50            1.50                            0.66
2.70            0.70    2.30    3.90    4.10    2.20    3.20    1.90    1.30            1.80                            1.10
2.70            0.76    3.00    3.50    1.40                    3.70    3.00            1.60                            1.20
2.00            1.20    2.80    3.70    2.00    0.72    2.60    3.90    3.10            1.60                            1.40
2.60            1.20    0.60    3.80    1.80    0.76    2.60                            2.00                            0.92
4.30            1.10    0.75    2.90    0.90    2.00    2.70                            0.89
3.40            1.70    1.60    3.20    0.75    1.40    2.70                            1.80
                1.20    2.00                    2.30    1.00                            1.70
                                                2.70    1.50
                        3.50    3.80            2.50    2.40
                        3.30    4.10            2.60    2.50
        2.40    3.30    2.90    1.70
        2.80    3.00    3.30    2.20                    1.20
        1.50    4.10    1.80    3.50                    1.10
        1.40    3.80    0.89    3.60                    3.70
        3.40    3.00    3.90    2.50                    4.50
        3.00    2.70    3.70    2.10                    5.20
        4.40    3.20                                    4.90
        4.30    3.80            2.00    2.40            2.80
                                1.50    3.40            4.00
                                4.20    3.80
                                4.50    4.40
                3.40    3.10    4.40    3.20            1.30                    0.94    1.80
                3.30    3.50    3.30    3.20            0.95                    0.89    1.80
4.40            2.50    2.20    5.00    3.00            1.00    2.50    2.90    1.20    2.10
4.00            3.20    2.40    4.00    2.60            1.60    3.00    3.10    1.20    2.10
4.20            5.00    2.30                            0.93    3.60    3.70    1.50    2.00
3.80            2.80    2.30                            1.00    3.70    3.00    1.70    1.20
4.00            4.70    3.20                            1.80    3.00    3.60    1.40    0.81
4.20            3.30    4.20                            2.10    2.50    3.70    1.20    0.50
4.00                                                            3.20    3.80
4.30                                                            2.50    3.50
```

Figure B2.--Continued--H2O+ (percent)

	1.30							1.80								
	1.50							1.10								
	1.50							2.60								
	1.50							2.50								
	1.40							2.60								
	1.30			1.20	1.40			2.60								
	0.91	0.81	0.65	1.90	0.85			1.40								
	1.10	0.44	0.60	1.40	1.00			2.00								
		0.61	0.20	1.50	0.95							1.10	1.40			
		0.70	0.13	0.87	0.34					2.10		1.10	1.30			
		0.91	0.16	1.00	0.38					2.40		0.48	1.20	0.40	0.60	
		0.99	0.17	0.63	0.25					2.60		0.44	1.40	0.23	0.61	
		0.23	0.53	0.61	0.24					3.00		0.69	0.91	0.28	0.19	
		0.26	0.57					0.49	1.10	1.70		0.64	0.51	0.31	0.19	
				0.37				0.43	0.37	1.80		0.52	1.20	1.40	0.21	
				1.40				0.65	1.90	2.10		0.43	1.30	1.30	0.19	
				1.00				1.00	2.10	2.30				0.87	0.31	
				0.54				0.39	0.76					0.76	0.33	
				0.52				0.29	0.71							
				0.22		0.13	0.20	0.81	1.40							
				0.37		0.19	0.17	1.20	0.83							
				0.42		0.04	1.20	1.00	0.67							
						0.15	1.10	0.98	1.00							0.14
						0.17	0.92	1.10	1.50							0.16
0.25				0.19	0.13	0.22	1.00	1.10	1.40							0.10
0.26		0.05	0.39	0.17	0.21	0.03	0.48	0.73	0.25		0.53					0.08
0.39		0.06	0.39	0.21	0.37	0.01L	0.30	0.50	0.24		0.42					0.65
0.34		0.06	0.27	0.21	3.10			1.30	1.60		0.20					0.65
0.48		0.11	0.28	0.31	0.06	0.14	0.22	1.20	1.80		0.41					0.28
0.33		0.08	0.10	0.24	0.13	0.12	0.32				0.53					4.20
0.73		0.16	0.11	0.21	0.06	0.13	0.14				0.41					
1.10		0.16	0.15	0.24	0.09	0.14	0.22				0.42					
		0.07	0.21			0.74	0.12				0.24					
						0.72	0.08									
			0.53	0.62		0.24	0.13									
			0.44	0.58		0.33	0.24									
	0.15	0.25	0.63	0.67												
	0.15	0.29	0.36	0.30			0.15									
	0.14	0.35	0.07	0.55			0.22									
	0.14	0.30	0.21	0.58			1.60									
	0.09	0.23	0.57	0.14			1.60									
	0.24	0.10	0.57	0.35			1.10									
	0.29	0.22					0.73									
	0.11	0.10		0.29	1.10		0.75									
				0.69	0.95		0.74									
				0.95	1.00											
				1.10	1.00											
		1.20	1.60	0.85	0.81		0.11			0.01L	0.08					
		0.81	1.60	0.77	0.54		0.01L			0.11	0.16					
0.90		1.30	0.96	1.10	0.41		0.13	1.10	0.29	0.08	0.28					
0.95		1.20	0.99	1.30	0.77		0.12	0.62	0.13	0.10	0.18					
0.64		0.12	0.67				0.17	0.68	0.30	0.15	0.27					
0.85		1.40	0.32				0.23	1.10	0.33	0.11	0.30					
0.74		1.40	1.70				0.22	1.00	0.22	0.26	0.19					
0.71		1.50	1.60				0.13	1.10	0.24	0.27	0.24					
0.55								0.47	0.61							
0.70								0.72	0.70							

Figure B2.--Continued--H2O- (percent)

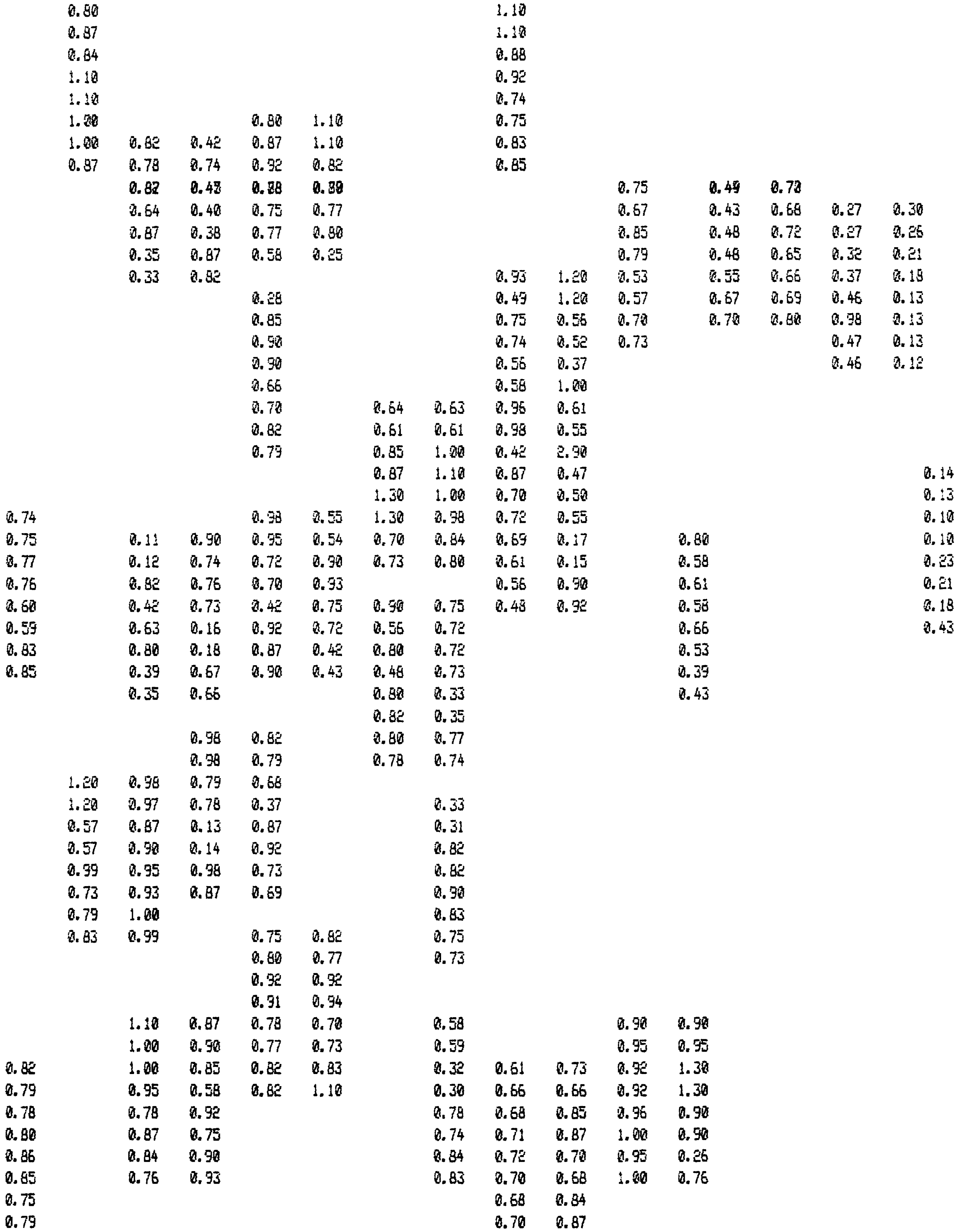

0.80
0.87
0.84
1.10
1.10
1.20
1.00
0.87
1.10
1.10
0.88
0.92
0.74
0.75
0.83
0.85
0.82
0.78
0.82
0.64
0.87
0.35
0.33
0.42
0.74
0.43
0.40
0.38
0.87
0.82
0.80
0.87
0.92
0.88
0.75
0.77
0.58
1.10
1.10
0.82
0.80
0.77
0.80
0.25
0.28
0.85
0.90
0.90
0.66
0.70
0.82
0.79
0.75
0.67
0.85
0.79
0.53
0.57
0.70
0.73
0.49
0.43
0.48
0.48
0.55
0.67
0.70
0.70
0.68
0.72
0.65
0.66
0.69
0.80
0.27
0.27
0.32
0.37
0.46
0.98
0.47
0.46
0.30
0.26
0.21
0.18
0.13
0.13
0.13
0.12
0.93
0.49
0.75
0.74
0.56
0.58
0.96
0.98
0.42
0.87
0.70
0.72
0.69
0.61
0.56
0.48
1.20
1.20
0.56
0.52
0.37
1.00
0.61
0.55
2.90
0.47
0.50
0.55
0.17
0.15
0.90
0.92
0.64
0.61
0.85
0.87
1.30
1.30
0.70
0.73
0.63
0.61
1.00
1.10
1.00
0.98
0.84
0.80
0.14
0.13
0.10
0.10
0.23
0.21
0.18
0.43
0.74
0.75
0.77
0.76
0.60
0.59
0.83
0.85
0.98
0.95
0.72
0.70
0.42
0.92
0.87
0.90
0.55
0.54
0.90
0.93
0.75
0.72
0.42
0.43
0.11
0.12
0.82
0.42
0.63
0.80
0.39
0.35
0.90
0.74
0.76
0.73
0.16
0.18
0.67
0.66
0.80
0.58
0.61
0.58
0.66
0.53
0.39
0.43
0.90
0.56
0.80
0.48
0.80
0.82
0.80
0.78
0.75
0.72
0.72
0.73
0.33
0.35
0.77
0.74
0.98
0.98
0.79
0.78
0.13
0.14
0.98
0.87
0.82
0.79
0.68
0.37
0.87
0.92
0.73
0.69
1.20
1.20
0.57
0.57
0.99
0.73
0.79
0.83
0.98
0.97
0.87
0.90
0.95
0.93
1.00
0.99
0.33
0.31
0.82
0.82
0.90
0.83
0.75
0.73
0.75
0.80
0.92
0.91
0.78
0.77
0.82
0.82
0.82
0.77
0.92
0.94
0.70
0.73
0.83
1.10
1.10
1.00
1.00
0.95
0.78
0.87
0.84
0.76
0.87
0.90
0.85
0.58
0.92
0.75
0.90
0.93
0.58
0.59
0.32
0.30
0.78
0.74
0.84
0.83
0.90
0.95
0.92
0.92
0.96
1.00
0.95
1.00
0.90
0.95
1.30
1.30
0.90
0.90
0.26
0.76
0.82
0.79
0.78
0.80
0.86
0.85
0.75
0.79
0.61
0.66
0.68
0.71
0.72
0.70
0.68
0.70
0.73
0.66
0.85
0.87
0.70
0.68
0.84
0.87

Figure B2.--Continued--TiO2 (percent)

	0.08							0.22								
	0.07							0.21								
	0.06							0.11								
	0.07							0.08								
	0.07							0.16								
	0.10			0.11	0.16			0.18								
	0.10	0.07	0.40	0.11	0.16			0.12								
	0.12	0.09	0.12	0.12	0.14			0.13								
		0.09	0.08	0.16	0.09							0.10	0.21			
		0.08	0.08	0.18	0.15					0.63		0.37	0.14			
		0.07	0.13	0.18	0.19					0.62		0.47	0.13	10.30	0.61	
		0.08	0.17	0.16	1.20					0.28		0.46	0.15	10.10	0.62	
		0.07	0.09	0.14	0.08					0.29		0.21	0.05	1.20	0.31	
		0.08	0.13					0.76	1.40	0.67		0.13	0.08	0.12	0.32	
				0.10				0.74	1.50	0.15		0.10	0.06	0.45	0.09	
				0.35				0.53	0.40	2.00		0.16	0.09	0.16	0.08	
				0.08				0.52	0.45	2.70				1.80	0.30	
				0.11				0.18	0.43					1.80	0.27	
				0.13				0.15	0.17							
				0.12		0.10	0.08	0.12	0.52							
				0.11		0.10	0.06	0.09	0.42							
				0.12		0.08	0.15	0.42	0.55							
						0.07	0.11	0.12	0.12							0.04
						0.10	0.16	0.33	0.20							0.04
0.18				0.12	0.12	0.12	0.14	0.33	0.37							0.03
0.20		0.18	0.12	0.12	0.12	0.08	0.01L	0.58	0.30		0.26					0.04
0.08		0.20	0.11	0.12	0.18	0.08	0.14	0.53	0.28		0.14					0.11
0.07		0.14	0.11	0.14	0.21			0.23	0.73		0.15					0.09
0.18		0.24	0.14	0.19	0.10	0.13	0.26	0.23	0.12		0.14					
0.16		0.07	0.29	0.09	0.05	0.24	0.26				0.19					0.06
0.12		0.10	0.27	0.13	0.15	0.15	0.13				0.13					
0.13		0.10	0.07	0.14	0.16	0.28	0.73				0.21					
		0.07	0.08			0.16	0.19				0.21					
						0.16	0.18									
			0.20	0.16		0.19	0.20									
			0.16	0.13		0.19	0.23									
	0.08	0.11	0.09	0.17												
	0.06	0.11	0.12	0.21			0.32									
	0.17	0.12	0.10	0.07			0.32									
	0.22	0.12	0.11	0.09			0.10									
	0.12	0.06	0.11	0.14			0.09									
	0.11	0.08	0.09	0.14			0.12									
	0.18	0.10					0.10									
	0.19	0.12		0.07	0.12		0.14									
				0.08	0.13		0.13									
				0.27	0.10											
				0.30	0.07											
		0.08	0.13	0.26	0.11		0.17			0.50	0.74					
		0.09	0.12	0.24	0.13		0.15			0.46	0.16					
0.12		0.10	0.15	0.18	0.13		0.08	0.10	0.08	0.24	1.00					
0.09		0.10	0.40	0.18	0.14		0.10	0.10	0.07	0.25	1.10					
0.22		0.12	0.10				0.09	0.08	0.10	0.25	0.27					
0.26		0.11	0.10				0.08	0.08	0.05	0.21	0.25					
0.14		0.12	0.08				0.10	0.08	0.04	0.54	0.08					
0.13		0.14	0.10				0.10	0.08	0.07	0.54	0.27					
0.20								0.08	0.07							
0.14								0.05	0.07							

Figure B2.--Continued--P2O5 (percent)

```
        0.08                                                    0.07
        0.05                                                    0.06
        0.01L                                                   0.04
        0.03                                                    0.05
        0.11                                                    0.08
        0.06                    0.05    0.08                    0.05
        0.01L   0.14    0.05    0.06    0.06                    0.02
        0.07    0.01L   0.04    0.07    0.06                    0.02
                0.01L   0.04    0.04    0.08                                                0.06    0.08
                0.13    0.20    0.11    0.08                                    0.09        0.05    0.08
                0.05    0.09    0.06    0.05                                    0.16        0.16    0.07    0.03    0.01L
                0.05    0.26    0.08    0.03                                    0.08        0.11    0.12    0.02    0.39
                0.19    0.11    0.13    0.08                                    0.16        0.21    0.05    0.01L   0.03
                0.37    0.06                                    0.06    0.03    0.01L       0.03    0.02    0.06    0.36
                                0.01L                           0.06    0.12    0.07        0.08    0.16    0.08    0.12
                                0.06                            0.06    0.07    0.04        0.12    0.05    0.05    0.14
                                0.12                            0.11    0.02    0.01L                       0.01L   0.85
                                0.03                            0.16    0.12                                0.08    0.85
                                0.15                            0.08    0.05
                                0.02            0.01L   0.01L   0.02    0.06
                                0.01L           0.06    0.03    0.05    0.06
                                0.01L           0.03    0.08    0.01L   0.06
                                                0.07    0.01L   0.03    0.03                                            0.21
                                                0.03    0.05    0.04    0.03                                            0.15
0.01L                           0.07    0.06    0.03    0.03    0.04    0.08                                            0.08
0.08            0.06    0.08    0.11    0.05    0.03    0.02    0.12    0.02            0.05                            0.16
0.02            0.08    0.08    0.11    0.12    0.03    0.03    0.05    0.03            0.08                            0.04
0.08            0.02    0.06    0.10    0.11                    0.12    0.06            0.06                            0.08
0.16            0.11    0.06    0.06    0.03    0.11    0.07    0.05    0.07            0.08                            0.19
0.10            0.08    0.09    0.11    0.04    0.08    0.16                            0.03                            0.06
0.03            0.11    0.11    0.12    0.05    0.10    0.05                            0.03
0.13            0.08    0.01L   0.01L   0.09    0.08    0.01L                           0.12
                0.05    0.02                    0.07    0.21                            0.04
                                                0.08    0.12
                        0.08    0.05            0.03    0.07
                        0.08    0.11            0.06    0.12
        0.01L   0.04    0.08    0.15
        0.08    0.02    0.02    0.02                    0.03
        0.07    0.10    0.03    0.02                    0.05
        0.07    0.07    0.05    0.04                    0.05
        0.03    0.16    0.12    0.03                    0.03
        0.06    0.01L   0.01L   0.12                    0.06
        0.12    0.07                                    0.06
        0.03    0.02            0.03    0.01L           0.08
                                0.06    0.06            0.02
                                0.05    0.03
                                0.04    0.08
                0.03    0.05    0.01L   0.08            0.08                    0.01L   0.03
                0.02    0.08    0.02    0.02            0.06                    0.01L   0.03
0.05            0.01L   0.08    0.08    0.09            0.02    0.08    0.01L   0.05    0.08
0.12            0.08    0.08    0.16    0.11            0.12    0.02    0.03    0.01L   0.05
0.01L           0.06    0.20                            0.07    0.03    0.07    0.01L   0.12
0.08            0.03    0.06                            0.02    0.08    0.06    0.05    0.08
0.24            0.11    0.11                            0.02    0.12    0.11    0.06    0.03
0.06            0.16    0.02                            0.01L   0.05    0.03    0.12    0.12
0.02                                                            0.03    0.05
0.07                                                            0.04    0.08
```

Figure B2.--Continued--MnO (percent)

	0.05L							1.80								
	0.05L							1.70								
	0.05							0.05L								
	0.05L							0.05L								
	0.05L							0.09								
	0.10			0.05L	0.23			0.05L								
	0.10	4.50	0.15	0.08	0.39			0.11								
	0.05L	4.70	0.11	0.42	6.10			0.18								
		4.30	22.60	0.52	5.40							0.34	0.05L			
		4.10	22.50	1.20	0.05L					0.06		0.32	0.05L			
		0.08	23.50	0.93	0.05L					0.05		2.90	0.11	0.55	15.70	
		0.09	22.70	8.30	0.05L					0.05L		3.20	0.05L	0.59	15.40	
		19.90	0.05L	8.40	0.05					0.05		6.60	0.05L	0.05L	34.80	
		20.20	0.05L					0.05L	0.08	0.05L		6.70	0.05L	0.05	33.70	
				0.05L				0.05	0.08	0.05L		0.50	0.05L	0.05L	33.20	
				0.05L				0.11	0.05L	0.05		0.72	0.08	0.05	33.90	
				0.05L				0.16	0.05	0.05L				0.05L	28.40	
				0.05L				1.70	0.05L					0.07	28.40	
				6.60				2.20	0.08							
				6.60		0.05L	0.05L	0.05L	0.59							
				0.22		0.05L	0.05L	0.05L	0.55							
				0.18		0.05L	0.05L	0.08	1.20							
						0.05	0.05L	0.05L	1.10							35.80
						0.05L	0.09	0.06	0.05L							36.90
0.05L				0.05L	0.25	0.05L	0.05L	0.05L	0.05L							36.20
0.05L		24.60	9.00	0.05L	0.05	0.05L	0.05L	0.05	11.90		0.05L					35.90
0.05		24.10	9.60	0.05L	0.05L	0.05L	0.05L	0.05	12.80		0.72					27.80
0.05L		0.09	8.00	0.05L	0.05L			0.05	0.61		5.40					27.40
6.90		0.05L	8.10	0.05	0.08	0.05	2.20	0.05	0.74		5.60					31.10
5.60		2.30	27.50	0.08	0.10	0.06	2.50				5.80					32.00
1.90		1.90	27.50	0.10	0.05L	0.05L	0.05				6.00					
2.30		0.05	0.05L	0.11	0.05	0.05L	0.11				11.80					
		0.05	0.05L			0.39	18.20				12.50					
						0.32	18.60									
			0.14	0.05		0.12	0.28									
			0.15	0.08		0.05	0.18									
	0.18	0.05L	0.05	0.42												
	0.28	0.63	0.05L	0.05			1.80									
	4.40	0.08	2.10	0.05L			1.70									
	4.20	0.05	2.80	0.05L			2.00									
	0.21	0.18	0.08	0.40			2.60									
	0.09	0.18	0.05L	0.34			0.05L									
	0.25	0.05L					0.05L									
	0.28	0.05L		2.40	0.05L		0.05L									
				2.40	0.09		0.05L									
				0.11	0.06											
				0.10	0.05L											
		0.05L	0.05L	0.05	0.07		0.06			0.05L	0.05L					
		0.05	0.05L	0.08	0.11		0.05L			0.05L	0.06					
0.05		0.05	0.09	0.05L	0.11		0.05L	4.00	5.00	0.05L	0.06					
0.05		0.08	0.05L	0.05L	0.05L		0.05L	4.10	4.80	0.05L	0.05L					
0.24		0.05	1.30				0.05L	3.00	1.20	0.05L	0.05L					
0.31		0.05	1.20				0.05L	2.40	1.30	0.05L	0.05L					
0.86		0.42	0.05L				0.08	2.50	6.60	0.11	0.36					
0.30		0.56	0.08				0.05L	2.40	6.50	0.08	0.40					
0.11								2.10	1.00							
0.05								2.60	1.10							

Figure B2.--Continued--CO2 (percent)

```
        0.46L                                                   0.46L
        0.46L                                                   0.46L
        0.46L                                                   0.46L
        0.46L                                                   0.46L
        0.46L                                                   0.46L
        0.46L                   0.46L   0.46L                   0.46L
        0.46L   0.46L   0.46L   0.46L   0.46L                   0.46L
        0.46L   0.46L   0.46L   0.46L   0.46L                   0.46L
                0.46L   0.46L   0.46L   0.46L                                               0.46L   0.46L
                0.46L   0.46L   0.46L   0.46L                           0.46L               0.46L   0.46L
                0.46L   0.46L   0.46L   0.46L                           0.46L               0.46L   0.46L   0.92    0.46L
                0.46L   0.46L   0.46L   0.46L                           0.46L               0.46L   0.46L   0.98    0.65
                0.46L   0.94    0.46L   0.46L                           0.46L               0.68    0.46L   0.46L   0.46L
                0.46L   1.30                            0.46L   0.46L   0.46L               0.46L   0.46L   0.46L   0.46L
                                0.46L                   0.46L   0.46L   0.46L               0.49    0.46L   0.55    0.46L
                                0.46L                   0.46L   0.46L   0.81                0.46L   0.46L   0.67    0.46L
                                0.46L                   0.46L   0.46L   0.54                                0.58    0.46L
                                0.46L                   0.46L   0.46L                                       0.78    0.46L
                                0.46L                   0.46L   0.46L
                                0.46L           0.46L   0.46L   0.46L   0.46L
                                0.46L           0.46L   0.46L   0.46L   0.51
                                0.46L           0.46L   0.46L   0.46L   0.58
                                                0.46L   0.46L   0.46L   0.46L                                          0.46L
                                                0.46L   0.46L   0.46L   0.46L                                          0.46L
0.46L                           0.46L   0.46L   0.46L   0.46L   0.46L   0.46L                                          0.46L
0.46L           0.46L   0.46L   0.46L   0.46L   0.46L   0.46L   0.46L   0.46L           0.46L                          0.46L
1.60            0.46L   0.46L   0.46L   0.46L   0.46L   0.46L   0.46L   0.46L           0.46L                          0.46L
1.30            0.46L   0.46L   0.46L   0.46L                   0.46L   0.46L           0.46L                          0.46L
0.46L           0.46L   0.70    0.46L   0.46L   0.46L   0.46L   0.46L   0.46L           0.46L                          0.46L
0.46L           0.46L   0.46L   0.46L   0.46L   0.46L   0.46L                           0.46L                          0.46L
0.46L           0.46L   0.46L   0.46L   0.46L   0.46L   0.46L                           0.46L
0.46L           0.46L   0.46L   0.46L   0.46L   0.46L   0.46L                           0.46L
                0.46L   0.46L                   0.46L   0.46L                           0.46L
                                                0.46L   0.46L
                        0.46L   0.46L           0.46L   0.46L
                        0.46L   0.46L           0.46L   0.46L
        0.46L   0.46L   0.46L   0.46L
        0.46L   0.46L   0.46L   0.46L                   0.46L
        0.46L   0.46L   0.46L   0.46L                   0.46L
        0.46L   0.46L   0.46L   0.46L                   0.46L
        0.46L   0.46L   0.46L   0.46L                   0.46L
        0.46L   0.46L   0.46L   0.46L                   0.46L
        0.46L   0.46L                                   0.46L
        0.46L   0.46L           0.46L   0.46L           0.46L
                                0.46L   0.46L           0.46L
                                0.46L   0.46L
                                0.46L   0.46L
                0.46L   0.46L   0.55    0.46L           0.46L                   0.46L   0.46L
                0.46L   0.46L   0.64    0.46L           0.46L                   0.46L   0.46L
0.46L           0.46L   0.46L   0.46L   0.46L           0.46L   0.46L   0.46L   0.46L   0.46L
0.46L           0.46L   0.46L   0.46L   0.46L           0.46L   0.46L   0.46L   0.46L   0.46L
0.46L           0.46L   0.46L                           0.64    0.46L   0.46L   0.46L   0.46L
0.46L           0.46L   0.46L                           0.81    0.46L   0.46L   0.46L   0.46L
0.46L           0.46L   0.46L                           0.99    0.46L   0.46L   0.46L   0.46L
0.46L           0.46L   0.46L                           0.81    0.46L   0.46L   0.46L   0.46L
0.46L                                                           0.46L   0.46L
0.46L                                                           0.46L   0.46L
```

Figure B2.--Continued--Ag (parts per million)

	220.L							220.L							
	220.L							220.L							
	220.L							220.L							
	220.L							220.L							
	220.L							220.L							
	220.L			220.L	220.L			220.L							
	220.L	220.L	220.L	220.L	220.L			220.L							
	220.L	220.L	220.L	220.L	220.L			220.L							
		220.L	220.L	220.L	220.L							220.L	220.L		
		220.L	220.L	220.L	220.L					220.L		220.L	220.L		
		220.L	220.L	220.L	220.L					220.L		220.L	220.L	220.L	220.L
		220.L	220.L	220.L	220.L					220.L		220.L	220.L	220.L	220.L
		220.L	560.	220.L	220.L					220.L		220.L	220.L	220.L	220.L
		220.L	670.					220.L	220.L	220.L		220.L	220.L	220.L	220.L
				220.L				220.L	220.L	220.L		220.L	220.L	220.L	220.L
				220.L				220.L	220.L	220.L		220.L	220.L	220.L	220.L
				220.L				220.L	220.L	220.L				220.L	220.L
				220.L				220.L	220.L					220.L	220.L
				220.L				220.L	220.L						
				220.L		220.L	220.L	220.L	220.L						
				220.L		220.L	220.L	220.L	220.L						
				220.L		220.L	220.L	220.L	220.L						
						220.L	220.L	220.L	220.L						220.L
						220.L	220.L	220.L	220.L						220.L
220.L				220.L	220.L	220.L	220.L	220.L	220.L						220.L
220.L		220.L	220.L	220.L	220.L	220.L	220.L	220.L	220.L		220.L				220.L
220.L		220.L	220.L	220.L	220.L	220.L	220.L	220.L	220.L		220.L				220.L
220.		220.L	220.L	220.L	220.L			220.L	220.L		220.L				220.L
220.L		220.L	220.L	220.L	220.L	220.L	220.L	220.L	220.L		220.L				220.L
220.L		220.L	220.L	220.L	220.L	220.L	220.L				220.L				220.L
220.L		220.L	220.L	220.L	220.L	220.L	220.L				220.L				
220.L		220.L	220.L	220.L	220.L	220.L	220.L				220.L				
		220.L	220.L			220.L	220.L				220.L				
						220.L	220.L								
			220.L	220.L		220.L	220.L								
			220.L	220.L		220.L	220.L								
	220.L	220.L	220.L	220.L											
	220.L	220.L	220.L	220.L			220.L								
	220.L	220.L	220.L	220.L			220.L								
	220.L	220.L	220.L	220.L			220.L								
	220.L	220.L	220.L	220.L			220.L								
	220.L	220.L	220.L	220.L			220.L								
	220.L	220.L					220.L								
	220.L	220.L		220.L	220.L		220.L								
				220.L	220.L		220.L								
				220.L	220.L										
				220.L	220.L										
		220.L	220.L	220.L	220.L		220.L			220.L	220.L				
		220.L	220.L	220.L	220.L		220.L			220.L	220.L				
220.L		220.L	220.L	220.L	220.L		220.L	220.L	220.L	220.L	220.L				
220.L		220.L	220.L	220.L	220.L		220.L	220.L	220.L	220.L	220.L				
220.L		220.L	220.L				220.L	220.L	220.L	220.L	220.L				
220.L		220.L	220.L				220.L	220.L	220.L	220.L	220.L				
220.L		220.L	220.L				220.L	220.L	220.L	220.L	220.L				
220.L		220.L	220.L				220.L	220.L	220.L	220.L	220.L				
220.L								220.L	220.L						
220.L								220.L	220.L						

Figure B2.--Continued--As (parts per million)

	240.							150.							
	170.							100.							
	220.							170.							
	160.							170.							
	160.							140.							
	160.			220.	260.			170.							
	160.	190.	260.	150.	220.			150.							
	210.	180.	200.	130.	110.			110.							
		170.	110.	160.	120.							240.	190.		
		190.	140.	92.	190.					190.		150.	200.		
		180.	100.	99.	170.					180.		140.	150.	130.	130.
		300.	110.	73.	69.					110.		130.	150.	120.	170.
		52.	160.	66.	81.					110.		48.	200.	140.	48.
		59.	210.					170.	120.	180.		36.	140.	170.	52.
				81.				120.	100.	110.		31.	150.	220.	77.
				93.				190.	190.	100.		47.	120.	220.	52.
				87.				140.	200.	110.				250.	62.
				120.				59.	120.					270.	76.
				99.				75.	96.						
				78.		72.	59.	130.	180.						
				62.		59.	62.	150.	170.						
				61.		90.	210.	130.	160.						
						72.	220.	100.	36.						21.
						180.	210.	110.	150.						19.
190.				88.	78.	160.	170.	140.	230.						17.
260.		9.	61.	86.	83.	65.	130.	64.	87.		72.				5.L
250.		22.	62.	54.	70.	77.	130.	66.	88.		89.				55.
250.		56.	51.	66.	81.			56.	200.		110.				36.
81.		25.	61.	65.	55.	63.	190.	180.	170.		110.				29.
97.		42.	17.	99.	38.	40.	190.				110.				42.
110.		40.	20.	110.	26.	110.	52.				96.				
110.		38.	44.	140.	31.	130.	65.				65.				
		36.	74.			87.	60.				73.				
						69.	50.								
			59.	90.		67.	130.								
			58.	82.		52.	110.								
	86.	93.	85.	51.											
	98.	93.	59.	59.			68.								
	43.	100.	17.	66.			76.								
	36.	97.	26.	58.			160.								
	96.	92.	99.	60.			120.								
	79.	76.	130.	49.			150.								
	150.	87.					150.								
	170.	90.		75.	100.		140.								
				93.	130.		150.								
				170.	200.										
				270.	150.										
		170.	220.	160.	160.		82.			22.	140.				
		200.	270.	200.	150.		58.			23.	150.				
280.		200.	150.	210.	130.		15.	34.	76.	24.	210.				
260.		200.	210.	190.	110.		91.	46.	77.	29.	170.				
210.		280.	240.				110.	72.	100.	120.	65.				
260.		210.	190.				99.	72.	100.	110.	62.				
160.		260.	180.				59.	110.	54.	100.	48.				
150.		210.	200.				60.	90.	56.	140.	42.				
170.								100.	100.						
160.								74.	85.						

Figure B2.--Continued--B (parts per million)

	350.							620.								
	290.							550.								
	410.							690.								
	510.							690.								
	520.							370.								
	490.			460.	990.			360.								
	590.	490.	590.	400.	1300.			590.								
	860.	590.	680.	580.	710.			600.								
		570.	410.	610.	760.							370.	710.			
		690.	370.	1200.	590.					600.		340.	740.			
		430.	300.	950.	560.					640.		510.	570.	240.	150.	
		570.	350.	650.	1100.					750.		590.	580.	230.	240.	
		190.	660.	410.	1000.					470.		570.	380.	140.	160.	
		200.	460.					340.	700.	370.		480.	620.	190.	140.	
				960.				280.	520.	270.		520.	370.	770.	95.	
				790.				730.	290.	430.		750.	490.	550.	110.	
				520.				670.	350.	410.				190.	120.	
				810.				950.	190.					310.	140.	
				1000.				740.	230.							
				880.		910.	190.	680.	210.							
				880.		970.	190.	720.	270.							
				860.		1400.	210.	650.	510.							
						1100.	220.	690.	450.							120.
						750.	310.	780.	490.							120.
550.				770.	910.	930.	270.	890.	670.							200.
580.		560.	830.	870.	690.	900.	590.	300.	500.		600.					150.
3200.		530.	520.	440.	620.	1000.	700.	320.	590.		630.					120.
2400.		1100.	610.	500.	730.			210.	760.		520.					110.
1000.		810.	790.	590.	1600.	590.	780.	250.	780.		370.					130.
1200.		820.	540.	700.	1400.	570.	500.				630.					180.
700.		1400.	570.	720.	1100.	810.	920.				440.					
580.		410.	1100.	620.	1200.	790.	960.				340.					
		520.	1900.			1000.	280.				440.					
						1000.	230.									
			720.	860.		1300.	760.									
			830.	600.		1200.	590.									
	740.	1600.	480.	120.												
	820.	1500.	480.	120.			700.									
	790.	740.	170.	520.			840.									
	750.	600.	120.	470.			460.									
	950.	1200.	1500.	1000.			430.									
	580.	1900.	1200.	610.			350.									
	500.	740.					380.									
	540.	870.		780.	600.		510.									
				1100.	790.		560.									
				630.	550.											
				580.	640.											
		530.	520.	670.	560.		1200.			630.	340.					
		550.	540.	560.	760.		1700.			730.	330.					
300.		600.	610.	550.	600.		1900.	580.	430.	410.	250.					
350.		580.	770.	600.	690.		1700.	780.	470.	600.	230.					
410.		380.	500.				730.	670.	420.	700.	350.					
310.		350.	650.				790.	530.	400.	590.	420.					
330.		470.	310.				720.	410.	550.	630.	300.					
450.		380.	420.				790.	530.	650.	530.	230.					
360.								630.	630.							
290.								590.	530.							

Figure B2.--Continued--Ba (parts per million)

	1.0L							1.6								
	1.4							1.0L								
	1.0L							1.5								
	1.7							1.6								
	1.4							1.5								
	1.0L			2.1	1.3			1.7								
	1.0L	1.1	1.5	1.5	1.4			1.8								
	1.4	1.4	1.0L	1.4	1.2			1.7								
		1.3	1.0L	1.3	1.3							8.1	1.3			
		1.5	1.0L	1.0	2.4					1.0L		9.8	1.5			
		1.4	1.0L	1.0L	2.3					1.0L		2.5	1.0L	1.8	1.4	
		1.6	1.0L	1.0L	1.6					1.3		2.9	1.1	2.2	1.8	
		1.0L	1.7	1.0L	1.3					1.0L		1.4	1.4	1.7	1.0L	
		1.0L	1.2					2.2	1.0L	1.2		1.2	1.6	1.8	1.0L	
				3.3				1.9	1.0L	1.0L		1.1	1.4	1.3	1.3	
				2.3				1.6	2.4	1.1		1.1	1.5	1.3	1.2	
				2.4				1.6	2.3	1.2				3.0	1.1	
				2.7				1.0L	1.6					3.6	1.1	
				2.0				1.0L	1.5							
				1.5		1.7	1.0L	2.2	3.2							
				2.0		2.1	1.7	2.8	3.2							
				1.9		2.0	2.4	2.3	3.3							
						2.1	2.5	2.8	3.4							1.0L
						2.5	2.1	1.2	3.2							1.0L
1.6				2.4	2.1	2.6	2.0	1.3	3.8							1.2
1.7		1.0L	1.4	3.3	2.4	1.5	1.4	1.1	1.4		1.1					1.0L
1.8		1.0L	1.3	2.0	2.9	1.5	1.7	2.2	1.3		1.1					1.0L
1.3		1.6	1.2	2.6	3.7			2.4	2.7		1.3					1.0L
1.1		1.8	1.4	2.4	2.3	2.3	2.4	2.4	2.0		1.3					1.1
1.1		1.2	1.0L	2.1	1.8	2.7	2.0				1.3					1.0L
2.0		1.4	1.0L	2.0	1.1	1.9	3.1				1.4					
1.8		1.4	1.8	5.6	1.2	1.5	3.6				1.0L					
		1.7	2.1			2.1	1.0L				1.0					
						1.6	1.0L									
			1.6	2.4		1.8	2.3									
			1.7	1.8		1.4	1.9									
	2.3	2.6	2.2	1.6												
	2.5	1.9	2.3	2.5			1.5									
	1.2	2.1	1.1	2.1			1.5									
	1.3	2.1	1.0L	1.9			2.0									
	2.2	2.1	2.9	1.8			2.0									
	1.9	2.2	2.1	1.4			1.9									
	2.0	2.1					2.3									
	2.1	2.0		1.0	1.0L		2.3									
				1.3	1.8		2.6									
				3.2	2.5											
				2.3	2.8											
		1.6	2.6	2.6	1.9		1.0L			2.1	3.2					
		2.2	2.2	2.6	2.0		1.0L			2.1	2.9					
2.1		2.1	1.6	3.5	1.7		1.7	1.6	1.8	1.7	4.8					
1.8		1.7	1.7	4.1	1.5		1.0L	1.9	1.9	2.4	4.4					
2.1		2.2	2.2				1.1	1.7	1.9	2.2	1.1					
2.4		1.8	2.8				1.1	1.8	1.9	2.3	1.0					
2.0		1.9	1.5				1.4	2.0	1.6	3.7	1.5					
2.1		2.0	2.0				1.4	1.9	2.0	3.1	1.4					
2.0								1.7	2.0							
2.2								1.7	2.1							

Figure B2.--Continued--Be (parts per million)

```
               31.                                       25.
               20.                                       21.
               24.                                       20.
               27.                                       23.
               28.                                       18.
               24.               18.   19.               16.
               26.    9.   27.   16.   22.               21.
               28.   13.   24.   21.   22.               20.
                     19.   12.   22.   23.                                    29.   14.
                     23.   12.   21.   23.                           25.      27.   15.
                      5.   12.   19.   16.                           26.      16.   14.   58.   12.
                      7.   12.   12.   14.                           27.      20.   18.   65.   14.
                     18.   11.   12.   13.                           25.      14.   14.   31.    9.
                     19.    9.                           31.   20.   19.      17.   19.   65.   11.
                                 15.                     28.   20.   12.      22.   22.   12.   11.
                                 18.                     25.   24.    3.      24.   22.   11.   11.
                                 11.                     25.   21.    3.                  18.   13.
                                 14.                      7.   18.                        23.   14.
                                 16.                      7.   18.
                                 14.         14.    9.   21.   50.
                                 13.         18.   11.   21.   56.
                                 12.         21.   14.   13.   19.
                                             14.   15.   15.   23.                                  6.
                                              8.   20.    9.   28.                                  6.
         13.                      8.   20.    9.   15.    8.   32.                                  4.
         10.          7.   11.    9.   19.    6.   18.   25.    9.         11.                      4.
          2.          4.    9.   10.   20.    5.   20.   21.    8.         13.                      6.
          2.          9.   13.    9.   25.               40.   23.         10.                      5.
         10.         10.   14.   21.   18.   29.   24.   32.   20.          8.                      7.
         10.         11.    7.   17.   13.   23.   22.                     11.                      8.
         26.         12.    5.   14.    4.   27.   15.                     11.
         18.         10.    8.   14.    5.   23.   15.                      9.
                     11.    9.               19.    8.                      9.
                                             17.    9.
                           15.   23.         19.   23.
                           13.   23.         18.   21.
               27.   22.   27.    8.
               22.   21.   29.    6.                6.
                7.   23.    7.   13.                6.
                6.   22.    6.   12.               16.
               23.   19.   25.   13.               14.
               19.   22.   20.    9.               30.
               14.   25.                           28.
               15.   27.         10.   19.         18.
                                 11.   26.         18.
                                 10.   22.
                                 10.   23.
                     11.    8.   11.   19.          9.               14.    4.
                     13.    9.   11.   15.          9.               14.    4.
         19.         14.   24.   19.   24.          6.   11.   26.    8.    6.
         16.         13.   24.   17.   22.          5.   19.   25.   13.    5.
         16.         15.   29.                      9.   22.   21.   13.    6.
         14.         16.   42.                     10.   24.   22.   14.    7.
         14.         21.    7.                      7.   15.   19.   12.    3.
         19.         20.   12.                      8.   17.   19.   12.    2.
         19.                                             22.   25.
         16.                                             19.   17.
```

Figure B2.--Continued--Co (parts per million)

	140.0							120.0								
	110.0							84.0								
	110.0							110.0								
	130.0							110.0								
	120.0							76.0								
	100.0			99.0	180.0			83.0								
	100.0	60.0	100.0	91.0	200.0			79.0								
	120.0	85.0	88.0	85.0	84.0			76.0								
		93.0	49.0	83.0	89.0							60.0	95.0			
		94.0	49.0	73.0	150.0					76.0		56.0	110.0			
		58.0	44.0	62.0	120.0					87.0		31.0	71.0	91.0	22.0	
		95.0	45.0	45.0	100.0					91.0		40.0	69.0	110.0	29.0	
		47.0	160.0	47.0	100.0					90.0		44.0	83.0	35.0	15.0	
		45.0	150.0					49.0	69.0	52.0		42.0	97.0	41.0	19.0	
				96.0				48.0	66.0	37.0		47.0	76.0	160.0	18.0	
				87.0				71.0	57.0	46.0		74.0	85.0	140.0	17.0	
				76.0				71.0	59.0	50.0				60.0	19.0	
				98.0				37.0	31.0					81.0	20.0	
				68.0				36.0	39.0							
				59.0		61.0	37.0	85.0	63.0							
				74.0		65.0	45.0	67.0	60.0							
				73.0		97.0	130.0	28.0	59.0							
						78.0	140.0	31.0	59.0							12.0
						110.0	130.0	49.0	42.0							11.0
38.0				76.0	75.0	130.0	120.0	42.0	54.0							8.8
36.0		13.0	45.0	94.0	70.0	58.0	86.0	32.0	16.0		40.0					5.4
84.0		9.7	37.0	61.0	65.0	52.0	81.0	26.0	13.0		49.0					18.0
73.0		31.0	44.0	62.0	75.0			59.0	79.0		46.0					16.0
33.0		30.0	53.0	64.0	63.0	47.0	77.0	64.0	75.0		39.0					16.0
36.0		37.0	10.0	69.0	51.0	50.0	66.0				44.0					22.0
100.0		47.0	16.0	72.0	27.0	58.0	48.0				43.0					
80.0		24.0	40.0	65.0	31.0	55.0	53.0				27.0					
		25.0	46.0			52.0	19.0				32.0					
						49.0	20.0									
			53.0	89.0		52.0	69.0									
			53.0	75.0		44.0	56.0									
	67.0	67.0	61.0	26.0												
	66.0	58.0	61.0	33.0			18.0									
	31.0	92.0	14.0	69.0			22.0									
	29.0	91.0	11.0	61.0			98.0									
	92.0	47.0	82.0	55.0			87.0									
	75.0	56.0	66.0	39.0			99.0									
	80.0	84.0					110.0									
	92.0	100.0		41.0	50.0		64.0									
				50.0	60.0		68.0									
				62.0	65.0											
				60.0	68.0											
		62.0	71.0	56.0	56.0		30.0			34.0	49.0					
		82.0	73.0	60.0	53.0		31.0			32.0	46.0					
87.0		79.0	55.0	66.0	62.0		15.0	35.0	52.0	20.0	59.0					
79.0		76.0	56.0	69.0	52.0		9.5	43.0	57.0	38.0	62.0					
95.0		60.0	41.0				23.0	49.0	68.0	51.0	20.0					
89.0		66.0	53.0				23.0	52.0	68.0	52.0	23.0					
64.0		73.0	46.0				40.0	47.0	52.0	44.0	14.0					
82.0		62.0	83.0				45.0	50.0	57.0	39.0	11.0					
76.0								56.0	57.0							
75.0								48.0	57.0							

Figure B2.--Continued--Cr (parts per million)

```
           42.00                                                   64.00
           11.00                                                   14.00
           18.00                                                   23.00
           24.00                                                   24.00
            6.70                                                   37.00
            5.30                   36.00    5.30                   33.00
            7.40    6.70    5.30   34.00    7.40                   63.00
            8.40   13.00    4.00   34.00   18.00                   75.00
                   12.00   18.00   23.00   21.00                                               25.00   48.00
                   18.00   22.00   34.00   11.00                                   12.00       23.00   38.00
                    4.50   11.00   21.00   14.00                                   13.00        8.00   69.00   58.00    9.70
                    8.80   12.00    3.30    5.30                                   41.00       15.00   77.00   55.00   16.00
                  140.00   78.00    3.70    5.00                                   34.00       51.00   24.00   25.00   15.00
                  130.00   69.00                                   19.00   20.00    4.80       58.00   43.00   34.00   88.00
                                   22.00                           15.00   20.00    3.30       21.00   21.00   37.00    6.10
                                   24.00                           22.00   13.00   17.00       22.00   14.00   23.00    6.90
                                   35.00                           29.00    8.60   25.00                       11.00   21.00
                                   34.00                            2.70    5.80                               23.00   31.00
                                   24.00                            2.70    7.00
                                   23.00            1.80   28.00    5.20    6.80
                                   19.00            1.20   34.00   10.00   33.00
                                                    0.86   26.00   14.00   29.00                                            2.80
                                                    2.30    5.70    7.60   15.00                                            2.30
    6.00                           25.00   64.00    2.80    5.20    7.40   21.00                                            1.40
    5.60            4.60   18.00   38.00   52.00    1.40   14.00   20.00   12.00            5.10                            1.80
    2.40            3.60   15.00   27.00   36.00    1.50   14.00   41.00   13.00            5.20                            3.50
    1.90            3.50   31.00   22.00   39.00                   14.00    6.60            2.30                            3.30
    3.40            3.20   19.00   51.00   25.00   18.00   21.00   11.00    6.40            1.80                            3.00
    3.60            1.50    1.90   43.00   18.00   19.00   31.00                            7.80                            3.20
   31.00            1.90    2.10   36.00    0.90   35.00   12.00                            1.90
   33.00            8.40    1.20   34.00    1.70   23.00   13.00                            2.50
                    8.60    1.60                   34.00   17.00                            3.30
                                                   40.00   17.00
                           18.00    5.80           13.00   34.00
                           27.00   19.00           12.00   26.00
            5.30   11.00   23.00    3.80
            5.10   11.00   35.00    4.00                    1.40
            3.30    3.10    1.50   10.00                    1.60
            3.30    3.20    1.20    7.80                   22.00
            9.70   12.00   18.00   12.00                   36.00
            7.90   21.00   11.00    5.60                   35.00
           36.00   54.00                                   21.00
           37.00   54.00            6.00    4.00            3.00
                                    8.30    5.20            3.10
                                    7.30   35.00
                                    9.40   23.00
                   24.00   18.00   47.00    4.90            4.00                    3.80   14.00
                   21.00   12.00   53.00    4.70            3.70                    3.70   11.00
   36.00           21.00   36.00   57.00   36.00            3.30   19.00   27.00    2.80   13.00
   35.00           28.00   45.00   58.00   34.00            2.50   29.00   22.00    4.00   20.00
    6.20           35.00    4.40                           16.00   49.00   13.00    6.90    5.20
    6.30           40.00    5.70                           18.00   43.00   35.00    5.60    8.10
   38.00           23.00   12.00                           34.00   24.00   37.00    8.70    6.50
   38.00           36.00   31.00                           33.00   24.00   34.00    5.70    4.30
   25.00                                                           25.00   13.00
   34.00                                                           24.00   14.00
```

Figure B2.--Continued--Cu (parts per million)

	55.							60.								
	48.							62.								
	51.							47.								
	56.							61.								
	72.							61.								
	94.			85.	60.			52.								
	52.	63.	45.	60.	62.			88.								
	61.	68.	41.	60.	57.			80.								
		58.	48.	54.	67.							57.	42.			
		68.	45.	41.	97.					54.		44.	51.			
		60.	45.	38.	65.					62.		50.	37.	83.	42.	
		64.	45.	43.	78.					54.		56.	44.	96.	51.	
		70.	58.	46.	61.					50.		57.	69.	54.	58.	
		75.	57.					120.	91.	46.		59.	86.	62.	53.	
				86.				100.	74.	49.		48.	57.	61.	47.	
				67.				96.	94.	57.		48.	70.	60.	44.	
				56.				76.	69.	83.				50.	46.	
				91.				69.	120.					62.	48.	
				75.				61.	110.							
				69.		66.	52.	110.	68.							
				76.		61.	49.	88.	99.							
				71.		68.	51.	76.	92.							
						55.	51.	92.	82.							47.
						68.	65.	88.	61.							48.
48.				67.	75.	86.	50.	78.	62.							52.
37.		50.	64.	65.	84.	95.	65.	78.	31.		35.					58.
58.		46.	63.	120.	63.	62.	70.	86.	33.		39.					30.
48.		62.	50.	92.	70.			52.	95.		75.					27.
71.		63.	49.	77.	120.	44.	71.	47.	86.		63.					33.
63.		70.	60.	69.	79.	37.	61.				57.					32.
98.		70.	61.	75.	43.	71.	79.				55.					
64.		70.	54.	68.	41.	56.	61.				40.					
		53.	57.			60.	42.				35.					
						70.	40.									
			120.	64.		68.	58.									
			81.	70.		62.	48.									
	70.	81.	90.	46.												
	59.	69.	73.	41.			58.									
	60.	61.	25.	67.			44.									
	41.	56.	24.	64.			77.									
	91.	59.	75.	69.			63.									
	86.	71.	60.	52.			45.									
	65.	54.					64.									
	68.	66.		64.	75.		73.									
				49.	98.		78.									
				99.	67.											
				92.	69.											
		68.	79.	86.	74.		60.			91.	73.					
		88.	86.	79.	68.		76.			86.	57.					
63.		88.	62.	63.	71.		52.	45.	63.	88.	67.					
63.		99.	58.	70.	52.		54.	56.	76.	100.	64.					
74.		83.	48.				52.	59.	71.	140.	43.					
66.		76.	66.				48.	51.	72.	120.	46.					
49.		72.	65.				79.	65.	62.	140.	38.					
56.		63.	85.				82.	84.	71.	150.	27.					
65.								64.	75.							
62.								58.	67.							

Figure B2.--Continued--La (parts per million)

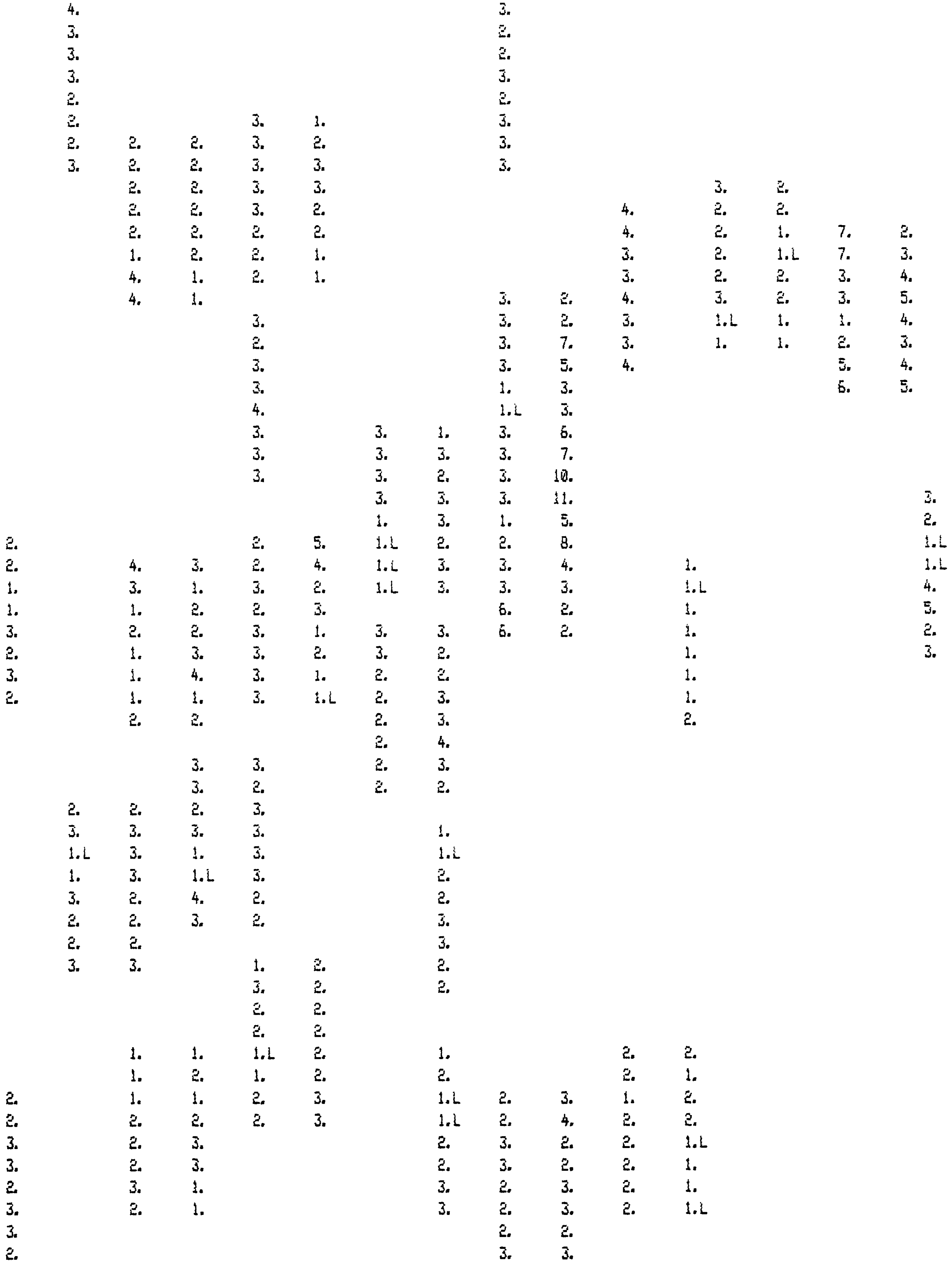

4. 3. 3. 3. 2. 2. 2. 3.
3. 2. 2. 3. 2. 3. 3. 3.
3. 3. 3. 3. 3. 2. 2. 2.
1. 2. 3. 3. 2. 2. 1. 1.
2. 2. 2. 2. 2. 1. 4. 4.
2. 2. 2. 2. 2. 2. 1. 1.
3. 2. 2. 2. 2. 3. 1.L 1.
2. 2. 1. 1.L 2. 2. 1. 1.
4. 4. 3. 3. 4. 3. 3. 4.
7. 7. 3. 3. 1. 2. 5. 6.
2. 3. 4. 5. 4. 3. 4. 5.
3. 3. 3. 3. 1. 1.L 3. 3. 3. 3. 1. 2. 3. 3. 6. 6.
2. 2. 7. 5. 3. 3. 6. 7. 10. 11. 5. 8. 4. 3. 2. 2.
3. 2. 3. 3. 4. 3. 3. 3.
3. 3. 3. 3. 1. 1.L 1.L 1.L
1. 3. 2. 3. 3. 2. 3. 3.
3. 2. 1.L 1.L 4. 5. 2. 3.
2. 2. 1. 1. 3. 2. 3. 2.
2. 2. 3. 2. 3. 3. 3. 3.
5. 4. 2. 3. 1. 2. 1. 1.L
4. 3. 1. 2. 1. 1. 1. 2.
3. 1. 2. 2. 3. 4. 1. 2.
1. 1.L 1. 1. 1. 1. 1. 2.
3. 3. 2. 2. 2. 2. 2. 2.
3. 2. 2. 3. 3. 4. 3. 2.
3. 3. 2. 3. 1. 1.L 4. 3.
3. 2. 3. 3. 3. 3. 2. 2.
2. 3. 1.L 1. 3. 2. 2. 3.
2. 3. 3. 3. 2. 2. 2. 3.
1. 1.L 2. 2. 3. 3. 2. 2.
1. 3. 2. 2. 1.L 1. 2. 2.
2. 2. 2. 2. 2. 2. 3. 3.
1. 1. 1. 2. 2. 2. 3. 2.
1. 2. 1. 2. 3. 3. 1. 1.
1. 2. 1.L 1.L 2. 2. 3. 3.
2. 2. 1. 2. 2. 2. 2. 2.
2. 1. 2. 2. 1.L 1. 1. 1.L
2. 2. 3. 3. 2. 3. 3. 2.
2. 2. 3. 3. 2. 2. 2. 3.
3. 4. 2. 2. 3. 3. 2. 3.

Figure B2.--Continued--Mo (parts per million)

```
           10.0                               20.0
           12.0                               14.0
            9.8                               12.0
           20.0                               19.0
           18.0                                7.9
            8.8           15.0 23.0           16.0
           17.0 25.0 16.0 26.0 25.0            9.8
           20.0  8.9  8.1 25.0 11.0           14.0
                17.0 11.0 18.0 17.0                             9.1 18.0
                 7.0  3.7 20.0 17.0                     11.0   11.0 15.0
                16.0 2.2L 25.0  2.7                      3.0    8.7 13.0  2.2 11.0
                19.0  8.4 22.0 14.0                     14.0   22.0  5.5 2.2L  6.8
                 9.1 14.0 23.0 20.0                     15.0   20.0 20.0  3.1 2.2L
                 4.2 14.0                  5.8 11.0  6.9   14.0 20.0 17.0 2.2L
                          24.0            15.0 15.0  8.0   11.0 15.0  6.9 14.0
                          16.0            13.0  5.7  6.2   21.0 19.0 19.0 2.2L
                          15.0            16.0 14.0 16.0              5.5 11.0
                          26.0            12.0 2.2L                  2.2L 2.2L
                          24.0            10.0  7.8
                          22.0      17.0 15.0 33.0 10.0
                          19.0      13.0 19.0 20.0  6.7
                          29.0      13.0 17.0 17.0 2.2L
                                    16.0 16.0  3.3  3.8                          5.6
                                    38.0 11.0 21.0 17.0                          6.2
      29.0                26.0 13.0 35.0  9.6 21.0 22.0                         12.0
      20.0      2.2L 38.0 28.0 22.0 25.0 20.0 11.0  5.3      29.0               10.0
      29.0       4.1 35.0 25.0 21.0 33.0 16.0 19.0  4.7      22.0               10.0
      18.0      19.0 23.0 24.0 38.0           12.0 28.0      21.0                3.2
      17.0      23.0 15.0 27.0 27.0 13.0 26.0 2.2L 31.0      20.0                9.5
      18.0      21.0 2.2L 33.0 32.0 19.0 18.0                24.0                7.7
       8.8      26.0  9.5 29.0 14.0 18.0 25.0                19.0
      17.0      22.0 25.0 33.0 24.0 14.0 22.0                17.0
                26.0 38.0           34.0 17.0                17.0
                                    27.0  4.4
                     19.0 23.0      38.0 28.0
                     26.0 25.0      33.0 26.0
           47.0 19.0 25.0 19.0
           53.0 37.0 27.0 18.0           18.0
           23.0 18.0  7.9 40.0           14.0
           26.0 21.0  5.7 40.0           31.0
           25.0 28.0 25.0 24.0           25.0
           17.0 24.0 26.0 27.0           20.0
           30.0 23.0                     27.0
           23.0 30.0      18.0 12.0      25.0
                          24.0 21.0      29.0
                          22.0 26.0
                          16.0 36.0
                17.0 24.0 31.0 17.0      21.0           48.0 38.0
                33.0 22.0 26.0 25.0      18.0           48.0 36.0
      29.0      38.0 19.0 25.0 22.0      16.0 28.0 51.0 76.0 33.0
      29.0      12.0 35.0 19.0 24.0      15.0 28.0 37.0 73.0 30.0
      20.0      27.0 2.2L                24.0 26.0 24.0 62.0 34.0
      26.0      30.0 24.0                30.0 24.0 28.0 64.0 30.0
      21.0      30.0 22.0                29.0 42.0 22.0 39.0 28.0
      30.0      17.0 17.0                32.0 43.0 17.0 43.0 23.0
      18.0                                    29.0 20.0
      13.0                                    26.0 33.0
```

Figure B2.--Continued--Nb (parts per million)

```
          79.0                                                    75.0
          72.0                                                    46.0
          65.0                                                    52.0
          81.0                                                    60.0
          65.0                                                    42.0
          58.0                    53.0    55.0                    49.0
          62.0    28.0    74.0    47.0    61.0                    48.0
          79.0    42.0    64.0    48.0    46.0                    43.0
                  51.0    22.0    49.0    48.0                                                    29.0    37.0
                  56.0    24.0    46.0    63.0                                    47.0        26.0    45.0
                  29.0    24.0    41.0    46.0                                    49.0        19.0    36.0    39.0    15.0
                  38.0    25.0    23.0    42.0                                    56.0        24.0    37.0    42.0    19.0
                  31.0    30.0    25.0    41.0                                    54.0        24.0    41.0    22.0    12.0
                  31.0    30.0                                    32.0    31.0    25.0        23.0    48.0    33.0    11.0
                                  41.0                            29.0    25.0    18.0        32.0    47.0    43.0    11.0
                                  42.0                            40.0    33.0     7.0        37.0    49.0    47.0    11.0
                                  38.0                            37.0    24.0     7.5                        20.0    14.0
                                  50.0                            13.0    24.0                                25.0    16.0
                                  43.0                            15.0    22.0
                                  35.0            29.0    24.0    44.0    66.0
                                  43.0            33.0    33.0    42.0    86.0
                                  41.0            45.0    69.0    17.0    24.0
                                                  37.0    77.0    19.0    24.0                                             8.9
                                                  22.0    61.0    16.0    29.0                                             6.1
  20.0                            17.0    83.0    24.0    52.0    15.0    33.0                                             4.7
  17.0             5.8    24.0    23.0    72.0    17.0    51.0    23.0     5.7            21.0                             4.8
  14.0             4.3    21.0    17.0    38.0    14.0    52.0    21.0     5.2            25.0                            12.0
  12.0            21.0    24.0    17.0    44.0                    40.0    38.0            20.0                            11.0
  11.0            13.0    28.0    39.0    23.0    29.0    44.0    40.0    35.0            16.0                            11.0
  13.0            16.0     2.8    42.0    20.0    31.0    38.0                            18.0                            12.0
  51.0            21.0     4.7    38.0    10.0    43.0    28.0                            15.0
  39.0            16.0    21.0    37.0     8.9    32.0    29.0                            15.0
                  17.0    23.0                    41.0    14.0                            16.0
                                                  38.0    14.0
                          24.0    54.0            37.0    44.0
                          22.0    43.0            34.0    34.0
          42.0    37.0    34.0    12.0
          41.0    32.0    32.0    12.0                     5.6
          14.0    51.0     6.4    37.0                     8.0
          11.0    53.0     4.9    30.0                    51.0
          48.0    29.0    53.0    26.0                    48.0
          41.0    37.0    38.0    19.0                    59.0
          40.0    47.0                                    60.0
          42.0    60.0            18.0    28.0            33.0
                                  21.0    35.0            35.0
                                  21.0    35.0
                                  19.0    39.0
                  35.0    29.0    17.0    26.0            16.0                    17.0    10.0
                  47.0    30.0    16.0    26.0            17.0                    17.0    10.0
  52.0            39.0    35.0    29.0    37.0             9.5    20.0    36.0    12.0    10.0
  46.0            38.0    38.0    31.0    34.0             7.5    26.0    38.0    22.0    11.0
  49.0            38.0    40.0                            11.0    32.0    38.0    25.0    11.0
  46.0            36.0    54.0                            10.0    34.0    39.0    24.0    13.0
  34.0            43.0    23.0                            17.0    29.0    34.0    19.0     6.2
  43.0            34.0    40.0                            20.0    37.0    40.0    17.0     4.6
  41.0                                                            42.0    37.0
  40.0                                                            35.0    35.0
```

Figure B2.--Continued--Ni (parts per million)

	16.0							13.0								
	14.0							8.6								
	14.0							10.0								
	18.0							11.0								
	20.0							16.0								
	18.0			16.0	11.0			13.0								
	14.0	6.2	15.0	16.0	12.0			17.0								
	17.0	12.0	12.0	14.0	17.0			16.0								
		14.0	9.8	13.0	14.0							15.0	14.0			
		16.0	9.3	12.0	20.0					19.0		15.0	12.0			
		4.7	8.6	11.0	17.0					18.0		12.0	11.0	48.0	5.6	
		8.5	8.0	21.0	17.0					22.0		16.0	9.9	52.0	8.0	
		7.1	570.0	23.0	15.0					20.0		15.0	13.0	9.0	3.6	
		8.3	620.0					18.0	45.0	13.0		16.0	16.0	12.0	4.6	
				21.0				17.0	36.0	7.1		17.0	12.0	19.0	3.3	
				20.0				22.0	18.0	47.0		20.0	15.0	16.0	3.1	
				25.0				18.0	14.0	46.0				16.0	4.8	
				28.0				14.0	13.0					21.0	5.4	
				21.0				16.0	13.0							
				16.0		13.0	8.2	15.0	14.0							
				16.0		13.0	8.0	18.0	17.0							
				16.0		13.0	7.9	17.0	18.0							
						11.0	8.1	18.0	19.0							10.0
						9.2	6.5	30.0	19.0							8.7
11.0				21.0	21.0	10.0	6.1	28.0	23.0							7.5
10.0		13.0	11.0	33.0	23.0	8.3	11.0	17.0	9.7		9.0					6.6
13.0		11.0	9.0	15.0	17.0	5.9	11.0	17.0	10.0		10.0					4.4
12.0		16.0	13.0	17.0	20.0			16.0	20.0		9.1					2.8
17.0		16.0	14.0	25.0	31.0	10.0	15.0	15.0	15.0		5.7					6.9
17.0		12.0	8.1	27.0	25.0	12.0	12.0				8.7					7.4
24.0		12.0	10.0	11.0	21.0	13.0	18.0				6.5					
22.0		9.5	11.0	11.0	23.0	8.8	19.0				4.8					
		9.6	15.0			17.0	13.0				7.7					
						15.0	14.0									
			13.0	7.5		17.0	13.0									
			15.0	7.6		17.0	9.7									
	9.8	8.2	23.0	23.0												
	10.0	7.8	23.0	24.0			12.0									
	12.0	9.3	8.7	15.0			13.0									
	12.0	8.1	3.3	13.0			10.0									
	8.6	5.9	6.6	11.0			7.8									
	8.1	8.4	5.8	7.0			21.0									
	9.2	12.0					21.0									
	9.3	11.0		17.0	17.0		16.0									
				23.0	22.0		15.0									
				20.0	16.0											
				18.0	19.0											
		13.0	14.0	20.0	20.0		6.6			16.0	55.0					
		17.0	13.0	19.0	17.0		6.1			17.0	52.0					
11.0		16.0	12.0	16.0	22.0		5.1	13.0	14.0	5.3	41.0					
8.2		17.0	14.0	18.0	17.0		5.3	19.0	17.0	10.0	50.0					
17.0		13.0	13.0				250.0	15.0	17.0	17.0	19.0					
17.0		11.0	17.0				240.0	15.0	18.0	19.0	30.0					
12.0		15.0	6.4				590.0	12.0	9.0	58.0	20.0					
14.0		13.0	16.0				500.0	12.0	9.6	50.0	14.0					
7.5								17.0	12.0							
7.2								13.0	12.0							

Figure B2.--Continued--Pb (parts per million)

	20.0							18.0								
	19.0							13.0								
	15.0							19.0								
	16.0							20.0								
	18.0							16.0								
	17.0			26.0	19.0			13.0								
	12.0	13.0	20.0	20.0	19.0			21.0								
	19.0	19.0	16.0	16.0	19.0			22.0								
		15.0	9.5	14.0	21.0							14.0	19.0			
		19.0	7.6	16.0	21.0					14.0		8.9	15.0			
		15.0	7.7	11.0	14.0					16.0		9.3	14.0	15.0	4.8	
		18.0	9.2	11.0	18.0					19.0		13.0	15.0	18.0	6.9	
		13.0	23.0	11.0	17.0					15.0		16.0	17.0	7.7	4.5	
		11.0	24.0					16.0	15.0	8.9		13.0	21.0	14.0	5.0	
				26.0				15.0	14.0	6.1		14.0	14.0	24.0	5.2	
				22.0				22.0	17.0	6.8		14.0	14.0	24.0	4.5	
				16.0				16.0	11.0	11.0				14.0	5.4	
				29.0				7.6	12.0					24.0	5.4	
				21.0				8.3	9.7							
				18.0		11.0	5.0	21.0	11.0							
				23.0		18.0	5.6	25.0	15.0							
				21.0		20.0	20.0	8.4	19.0							
						15.0	17.0	12.0	16.0							5.3
						20.0	22.0	14.0	13.0							4.7
14.0				18.0	21.0	23.0	19.0	12.0	15.0							9.1
9.5		9.4	15.0	21.0	19.0	14.0	16.0	6.4	6.9		9.2					10.0
21.0		8.2	14.0	16.0	14.0	11.0	18.0	5.7	7.1		13.0					3.0
15.0		10.0	15.0	16.0	18.0			8.2	21.0		17.0					2.9
15.0		10.0	18.0	20.0	23.0	20.0	26.0	8.1	17.0		13.0					5.7
15.0		14.0	14.0	18.0	15.0	17.0	20.0				10.0					4.2
30.0		24.0	14.0	21.0	8.2	20.0	18.0				10.0					
19.0		6.1	14.0	16.0	8.9	17.0	18.0				12.0					
		8.2	14.0			18.0	15.0				13.0					
						18.0	13.0									
			20.0	22.0		23.0	23.0									
			15.0	19.0		21.0	16.0									
	24.0	24.0	21.0	8.7												
	25.0	22.0	19.0	7.7			8.3									
	14.0	22.0	5.7	19.0			8.0									
	14.0	22.0	4.2	15.0			24.0									
	25.0	17.0	23.0	25.0			22.0									
	21.0	22.0	17.0	14.0			18.0									
	19.0	20.0					21.0									
	19.0	21.0		20.0	17.0		17.0									
				15.0	25.0		22.0									
				23.0	23.0											
				22.0	22.0											
		20.0	27.0	21.0	21.0		11.0			15.0	21.0					
		24.0	26.0	25.0	18.0		13.0			13.0	16.0					
24.0		26.0	20.0	24.0	26.0		5.1	13.0	21.0	12.0	20.0					
22.0		30.0	21.0	25.0	22.0		4.5	19.0	20.0	19.0	21.0					
24.0		23.0	16.0				13.0	21.0	18.0	22.0	6.7					
25.0		22.0	23.0				10.0	23.0	21.0	19.0	7.2					
23.0		26.0	19.0				27.0	18.0	19.0	19.0	5.9					
22.0		18.0	20.0				27.0	25.0	22.0	20.0	4.2					
19.0								24.0	23.0							
22.0								18.0	16.0							

Figure B2.--Continued--Sc (parts per million)

	4.6L							4.6L								
	4.6L							4.6L								
	4.6L							4.6L								
	4.6L							4.6L								
	4.6L							4.6L								
	4.6L			4.6L	4.6L			4.6L								
	4.6L	4.6L	4.6L	4.6L	4.6L			4.6L								
	4.6L	4.6L	4.6L	4.6L	4.6L			4.6L								
		4.6L	4.6L	4.6L	4.6L							4.6L	4.6L			
		4.6L	4.6L	4.6L	4.6L					4.6L		4.6L	4.6L			
		4.6L	4.6L	4.6L	4.6L					4.6L		4.6L	4.6L	4.6L	4.6L	
		4.6L	4.6L	4.6L	4.6L					4.6L		4.6L	4.6L	4.6L	4.6L	
		4.6	4.6L	4.6L	4.6L					4.6L		4.6L	4.6L	4.6L	4.6L	
		4.9	4.6L					4.6L	4.6L	4.6L		4.6L	4.6L	4.6L	4.6L	
				4.6L				4.6L	4.6L	4.6L		4.6L	4.6L	4.6L	4.6L	
				4.6L				4.6L	4.6L	4.6L		4.6L	4.6L	4.6L	4.6L	
				4.6L				4.6L	4.6L	4.6L				4.6L	4.6L	
				4.6L				4.6L	4.6L					4.6L	4.6L	
				4.6L				4.6L	4.6L							
				4.6L		4.6L	4.6L	4.6L	4.6L							
				4.6L		4.6L	4.6L	4.6L	4.6L							
				4.6L		4.6L	4.6L	4.6L	4.6L							
						4.6L	4.6L	4.6L	4.6L							4.6L
						4.6L	4.6L	4.6L	4.6L							4.6L
4.6L				4.6L	4.6L	4.6L	4.6L	4.6L	4.6L							4.6L
4.6L		4.6L	4.6L	4.6L	4.6L	4.6L	4.6L	4.6L	4.6L		4.6L					4.6L
4.6L		4.6L	4.6L	4.6L	4.6L	4.6L	4.6L	4.6L	4.6L		4.6L					4.6L
4.6L		4.6L	4.6L	4.6L	4.6L			4.6L	4.6L		4.6L					4.6L
4.6L		4.6L	4.6L	4.6L	4.6L	4.6L	4.6L	4.6L	4.6L		4.6L					4.6L
4.6L		4.6L	4.6L	4.6L	4.6L	4.6L	4.6L				4.6L					4.6L
4.6L		4.6L	4.6L	4.6L	4.6L	4.6L	4.6L				4.6L					
4.6L		5.6	4.6L	4.6L	4.6L	4.6L	4.6L				4.6L					
		4.6L	4.6L			4.6L	4.6L				4.6L					
						4.6L	4.6L									
			4.6L	4.6L		4.6L	4.6L									
			4.6L	4.6L		4.6L	4.6L									
	4.6L	4.6L	4.6L	4.6L												
	4.6L	4.6L	4.6L	4.6L			4.6L									
	4.6L	4.6L	4.9	4.6L			4.6L									
	4.6L	4.6L	4.6L	4.6L			4.6L									
	4.6L	4.6L	4.6L	4.6L			4.6L									
	4.6L	4.6L	4.6L	4.6L			4.6L									
	4.6L	4.6L					4.6L									
	4.6L	4.6L		4.6L	4.6L		4.6L									
				4.6L	4.6L		4.6L									
				4.6L	4.6L											
				4.6L	4.6L											
		4.6L	4.6L	4.6L	4.6L		4.6L			8.2	4.6L					
		4.6L	4.6L	4.6L	4.6L		4.6L			4.6L	4.6L					
4.6L		4.6L	4.6L	4.6L	4.6L		6.6	4.6L	4.6L	4.6L	4.6L					
4.6L		4.6L	4.6L	4.6L	4.6L		5.1	4.6L	4.6L	4.6L	4.6L					
4.6L		4.6L	4.6L				4.6L	4.6L	4.6L	4.6L	4.6L					
4.6L		4.6L	4.6L				4.6L	4.6L	4.6L	4.6L	5.1					
4.6L		4.6L	4.6L				4.6L	4.6L	4.6L	4.6L	5.1					
4.6L		4.6L	4.6L				4.6L	4.6L	4.6L	4.6L	4.6L					
4.6L								4.6L	4.6L							
4.6L								4.6L	4.6L							

Figure B2.--Continued--Sn (parts per million)

```
            160.                                                    190.
            140.                                                    170.
            140.                                                    130.
            140.                                                    120.
            200.                                                    110.
            180.                    220.    150.                     84.
            170.    130.    200.    190.    220.                    150.
            120.    170.    140.    140.    200.                    190.
                    240.    120.    130.    170.                                                   1500.    140.
                    150.    130.    120.    350.                                    170.           1400.    130.
                    130.    120.    110.    350.                                    160.            250.    120.    860.    140.
                     87.    140.    130.    310.                                    150.            370.    170.   1000.    170.
                    430.    160.    160.    440.                                    140.            200.    140.    450.    200.
                    430.    160.                                    180.    280.    190.            180.    180.    560.    160.
                                    280.                            160.    210.    140.            220.    120.    230.    140.
                                    270.                            170.    160.    140.            200.    130.    210.    180.
                                    290.                            170.    150.    160.                            260.    300.
                                    280.                            180.    180.                                    310.    140.
                                    260.                            200.    230.
                                    250.             92.     64.    240.    180.
                                    130.            120.     85.    200.    190.
                                    110.            100.     75.    190.    140.
                                                    120.    110.    270.    170.                                            210.
                                                     68.     68.    210.    280.                                            120.
     95.                            180.    140.     80.    100.    210.    250.                                            320.
     89.            260.    260.    200.    140.     74.    110.    140.    160.            120.                            260.
    130.            250.    260.    170.    160.     64.    120.    120.    160.            130.                            120.
    100.            120.    190.    170.    170.                    140.    240.            100.                            140.
    120.            120.    220.    150.    160.    140.    130.    130.    230.             96.                            160.
    110.            110.    500.    150.    130.    150.    120.                            120.                            200.
    140.            130.    610.    130.    120.    110.     94.                            120.
    120.            130.    190.    130.    140.    130.     69.                            140.
                    110.    160.                    110.    470.                            160.
                                                    120.    470.
                            120.    120.            140.    120.
                            110.    110.            130.     88.
             95.    100.    130.    140.
            100.    110.    110.    140.                    120.
            150.    110.    120.     71.                    120.
            160.    120.    110.     64.                    160.
             92.    110.    120.    130.                    200.
            160.    120.     98.    110.                    200.
            200.    100.                                    180.
            170.    110.            180.    190.            180.
                                    160.    380.            190.
                                    320.    300.
                                    320.    480.
                    180.    170.    430.    200.            150.                    170.    140.
                    380.    180.    300.    180.            150.                    150.    110.
    150.            240.    150.    200.    210.            110.    120.    150.    120.    110.
    140.            210.    160.    210.    310.            100.    140.    160.    120.     92.
    140.            240.    280.                            160.    120.     80.    190.    110.
    150.            240.    290.                            120.    140.     95.    220.    110.
    120.            200.    200.                            110.    110.    200.    170.    120.
    130.            190.    190.                            120.    100.    160.    290.    120.
    120.                                                            200.    110.
    120.                                                            190.    130.
```

Figure B2.--Continued--Sr (parts per million)

```
            56.0                                                   130.0
            70.0                                                    68.0
            63.0                                                    62.0
            74.0                                                    67.0
            75.0                                                    64.0
            72.0                    85.0    95.0                    76.0
            77.0    59.0    72.0    71.0   120.0                    80.0
            79.0    64.0    56.0    75.0    61.0                    58.0
                    56.0    27.0    67.0    71.0                                                47.0    61.0
                    59.0    27.0    67.0    81.0                                    57.0        42.0    69.0
                    58.0    21.0    54.0    75.0                                    61.0        25.0    40.0    37.0    19.0
                    72.0    23.0    38.0    77.0                                    74.0        28.0    42.0    39.0    25.0
                    25.0   110.0    48.0    57.0                                    59.0        33.0    71.0    31.0    13.0
                    25.0    93.0                                    57.0    57.0    31.0        31.0    77.0    40.0    12.0
                                    98.0                            48.0    50.0    30.0        34.0    73.0   140.0     9.2
                                    90.0                            56.0    53.0    43.0        54.0    83.0   120.0     9.9
                                    75.0                            51.0    41.0    62.0                        51.0    12.0
                                   100.0                            30.0    33.0                                60.0    13.0
                                    73.0                            27.0    32.0
                                    52.0            56.0    29.0    95.0    55.0
                                    68.0            46.0    37.0   110.0    65.0
                                    66.0            65.0    93.0    58.0    40.0
                                                    64.0    98.0    48.0    44.0                                             9.4
                                                   110.0   110.0    44.0    51.0                                             9.3
    48.0                            89.0   280.0   110.0    91.0    48.0    65.0                                            15.0
    46.0            17.0    54.0   110.0   270.0    57.0    78.0    46.0    16.0            35.0                            12.0
    81.0            15.0    38.0    65.0    59.0    62.0    77.0    44.0    14.0            49.0                            31.0
    87.0            42.0    52.0    61.0    70.0                    46.0    83.0            45.0                            28.0
    36.0            31.0    46.0    56.0    61.0    41.0    81.0    51.0    72.0            37.0                            81.0
    35.0            42.0    14.0    70.0    47.0    50.0    79.0                            35.0                            98.0
    77.0            46.0    18.0    64.0    26.0    67.0    46.0                            37.0
    63.0            25.0    49.0    74.0    28.0    55.0    56.0                            27.0
                    27.0    61.0                    67.0    24.0                            29.0
                                                    53.0    24.0
                            62.0    79.0            56.0    86.0
                            51.0    75.0            52.0    64.0
           110.0    69.0    69.0    25.0
           130.0    73.0    78.0    27.0                    27.0
            47.0    83.0    13.0    73.0                    32.0
            28.0    77.0    10.0    65.0                    98.0
            78.0    52.0    70.0    63.0                    88.0
            68.0    72.0    75.0    51.0                    73.0
            75.0    71.0                                    76.0
            96.0    85.0            50.0    49.0            58.0
                                    51.0    63.0            61.0
                                    69.0    93.0
                                    76.0    63.0
                    80.0    99.0    92.0    65.0            36.0                    42.0    63.0
                    82.0    89.0    91.0    61.0            48.0                    44.0    67.0
    91.0            90.0    52.0    79.0    60.0            23.0    36.0    67.0    38.0    89.0
    62.0            84.0    84.0    86.0    59.0            21.0    41.0    62.0    48.0    81.0
    82.0            71.0    59.0                            47.0    62.0    73.0    75.0    34.0
    52.0            64.0    67.0                            47.0    64.0    80.0    67.0    38.0
    61.0            80.0    75.0                            71.0    56.0    54.0    41.0    24.0
    79.0            50.0    84.0                            72.0    57.0    63.0    55.0    20.0
    66.0                                                            69.0    62.0
    63.0                                                            62.0    60.0
```

Figure B2.--Continued--V (parts per million)

	16.0							23.0								
	17.0							17.0								
	14.0							15.0								
	13.0							15.0								
	19.0							15.0								
	28.0			36.0	19.0			13.0								
	22.0	23.0	19.0	24.0	21.0			23.0								
	22.0	24.0	17.0	26.0	25.0			24.0								
		24.0	23.0	24.0	35.0							26.0	15.0			
		28.0	17.0	44.0	34.0					23.0		21.0	17.0			
		23.0	15.0	37.0	26.0					26.0		43.0	13.0	130.0	27.0	
		22.0	16.0	32.0	52.0					17.0		48.0	16.0	36.0	37.0	
		24.0	20.0	32.0	43.0					15.0		34.0	21.0	42.0	16.0	
		21.0	18.0					82.0	94.0	35.0		29.0	22.0	63.0	17.0	
				39.0				68.0	80.0	43.0		16.0	14.0	25.0	16.0	
				36.0				65.0	54.0	44.0		17.0	14.0	21.0	12.0	
				27.0				57.0	46.0	71.0				46.0	19.0	
				48.0				55.0	74.0					58.0	20.0	
				47.0				43.0	65.0							
				44.0		46.0	58.0	39.0	43.0							
				41.0		42.0	24.0	37.0	57.0							
				45.0		32.0	19.0	85.0	95.0							
						27.0	24.0	68.0	98.0							3.4
						33.0	24.0	42.0	58.0							8.7
40.0				44.0	49.0	44.0	20.0	45.0	51.0							16.2
30.0		98.0	54.0	40.0	42.0	23.0	28.0	140.0	41.0		17.0					16.0
41.0		80.0	51.0	40.0	30.0	27.0	33.0	120.0	39.0		21.0					5.9
30.0		50.0	41.0	35.0	45.0			37.0	38.0		29.0					7.2
56.0		43.0	40.0	44.0	45.0	44.0	49.0	32.0	35.0		21.0					8.5
54.0		43.0	79.0	40.0	51.0	41.0	44.0				22.0					7.0
50.0		54.0	68.0	49.0	24.0	33.0	60.0				24.0					
34.0		41.0	47.0	35.0	25.0	24.0	49.0				27.0					
		38.0	51.0			49.0	51.0				22.0					
						42.0	59.0									
			84.0	37.0		56.0	48.0									
			60.0	42.0		52.0	42.0									
	53.0	55.0	62.0	42.0												
	61.0	50.0	65.0	41.0			52.0									
	58.0	32.0	44.0	41.0			43.0									
	48.0	34.0	29.0	39.0			30.0									
	43.0	45.0	43.0	54.0			26.0									
	40.0	56.0	37.0	42.0			21.0									
	22.0	30.0					24.0									
	24.0	46.0		49.0	58.0		40.0									
				36.0	62.0		46.0									
				57.0	50.0											
				50.0	51.0											
		40.0	37.0	41.0	45.0		38.0			84.0	49.0					
		47.0	35.0	56.0	46.0		45.0			91.0	44.0					
34.0		46.0	38.0	41.0	50.0		22.0	40.0	47.0	62.0	49.0					
29.0		51.0	51.0	43.0	47.0		30.0	51.0	52.0	56.0	44.0					
39.0		44.0	43.0				65.0	49.0	50.0	72.0	58.0					
35.0		39.0	56.0				60.0	46.0	50.0	68.0	60.0					
27.0		47.0	45.0				57.0	47.0	41.0	76.0	54.0					
27.0		36.0	47.0				62.0	62.0	47.0	100.0	44.0					
26.0								46.0	51.0							
25.0								45.0	47.0							

Figure B2.--Continued--Y (parts per million)

```
           100.                                                    100.
           110.                                                     90.
           120.                                                    110.
           120.                                                     86.
           130.                                                     92.
           110.                     96.     68.                     99.
            88.     49.     82.    100.     74.                    130.
           110.     60.     66.    110.    100.                    110.
                    56.     55.    110.     85.                                                     56.     40.
                    60.     58.     98.     71.                                     92.             55.     44.
                    41.     63.     93.     54.                                     81.             34.     31.     50.     35.
                    52.     66.     55.     44.                                     94.             42.     39.     52.     48.
                    99.    180.     65.     43.                                     80.             65.     43.     26.     32.
                   110.    240.                                     69.     54.     70.             67.     56.     34.     18.
                                   110.                             65.     45.     45.             50.     48.     34.     32.
                                   130.                             87.     83.     29.             52.     51.     32.     57.
                                   120.                             74.     85.     30.                             55.     15.L
                                   130.                             43.     54.                                     58.     15.L
                                   140.                             34.     56.
                                   110.             38.     31.     72.     80.
                                    90.             52.     41.     75.     95.
                                   100.             50.     49.     51.     77.
                                                    42.     46.     67.     77.                                                     20.
                                                    15.L    38.     48.     73.                                                     40.
    47.                             75.    110.     23.     31.     62.     84.                                                     15.L
    36.             15.L   120.     74.    100.     20.     37.     75.     63.             30.                                     15.L
    25.             46.     95.    110.    160.     20.     41.     76.     15.L            30.                                     43.
    26.             41.     92.    110.    180.                    120.     94.             33.                                     44.
    49.             38.     95.    120.     36.     57.    120.     99.     75.             28.                                     67.
    45.             45.     15.L   150.     35.     74.    110.                             35.                                     53.
   100.             58.     36.L    80.     19.     40.     68.                             30.
                    25.     32.                     84.     99.                             43.
                                                    63.     67.
                           100.    130.             62.     76.
                            87.    110.             55.     88.
           130.     97.    100.     77.
           120.    120.    110.     60.                     15.L
            41.    120.     27.     95.                     19.
            44.    120.     18.     92.                     61.
           120.     98.    150.     77.                     71.
           120.    110.    140.     60.                     99.
            77.    120.                                    110.
            86.    110.             52.     69.             58.
                                    53.     68.             59.
                                    52.     72.
                                    56.     76.
                    71.     64.     46.     86.             26.                     53.     57.
                    75.     59.     41.     85.             24.                     37.     42.
    88.             74.     51.     71.     74.             23.     61.    100.     34.     67.
    76.             65.     59.     59.     63.             27.     66.    110.     52.     66.
    99.             45.     45.                            420.     82.     77.     53.     30.
    91.             50.     50.                            420.     75.     70.     64.     22.
    75.             70.     55.                           1200.     65.     99.     58.     28.
    88.             69.     64.                           1000.     71.     86.     53.     20.
    78.                                                             85.     83.
    83.                                                             81.     76.
```

Figure B2.--Continued--Zn (parts per million)

```
                   60.                                                    110.
                   70.                                                     89.
                   83.                                                     68.
                  110.                                                     81.
                  200.                                                    110.
                  210.                    170.    130.                    100.
                  120.    130.    140.     90.    160.                    210.
                  130.    110.     93.    160.    220.                    250.
                          130.    190.    140.    370.                                                    180.    130.
                          150.    150.    290.    120.                                    190.            170.    120.
                          120.    110.    230.    120.                                    170.            430.    110.    230.    320.
                           86.    130.    260.    290.                                    200.            670.    120.    240.    430.
                           93.     83.    260.    300.                                    120.            490.    110.     85.    140.
                           87.     80.                                    890.   1000.    260.            410.    130.    100.    150.
                                          110.                           1000.    910.    450.            190.     83.    240.    190.
                                          130.                            490.    450.    560.            130.     82.    220.     95.
                                           81.                            420.    420.    720.                            130.    220.
                                          150.                            500.    710.                                    140.    150.
                                          230.                            440.    710.
                                          190.            480.    450.    210.    710.
                                          250.            550.    720.    400.    640.
                                          290.            280.     85.    950.    700.
                                                          230.     65.    910.    880.                                             53.
                                                          190.    180.    260.    440.                                             51.
          200.                            180.    120.    180.    120.    360.    470.                                            110.
          170.            210.    320.    150.    110.    330.    290.   1200.    250.            120.                            180.
          730.            280.    380.    190.    130.    860.    300.   1100.    230.            180.                             97.
          340.            250.    240.    220.    200.                    280.    230.            210.                             92.
          610.            260.    230.    230.    590.    170.    140.    230.    220.            200.                             93.
          400.            390.    600.    350.    420.    140.    170.                            220.                             60.
          180.            400.    600.    250.    240.    140.    410.                            210.
          130.            730.    270.    210.    320.    110.    390.                            220.
                          830.    780.                    240.    260.                            190.
                                                          210.    240.
                                 1100.    140.            260.    200.
                                  740.    140.            320.    180.
                  350.    270.    500.    240.
                  370.    230.    530.    210.                    540.
                  450.     88.    170.    270.                    530.
                  690.     88.    110.    230.                    120.
                  170.    210.    120.    380.                     96.
                  150.    270.    100.    300.                     60.
                   81.     97.                                     71.
                   81.    170.            460.    330.            220.
                                          730.    750.            360.
                                          190.    240.
                                          290.    300.
                          140.    110.    340.    310.            240.            600.    370.
                          190.    160.    560.    300.            250.            660.    320.
          160.            250.    170.    130.    330.            270.    280.    260.    610.    240.
          120.            200.    190.    130.    380.            190.    630.    240.    310.    250.
          110.            200.    220.                            360.    250.    130.    420.   1300.
          110.            200.    420.                            400.    210.    230.    400.   1000.
          130.            190.    150.                            350.    260.    150.    600.   1200.
          140.            120.    170.                            400.    310.    220.    670.    860.
           97.                                                            210.    190.
          100.                                                            180.    150.
```

Figure B2.--Continued--Zr (parts per million)

```
            140.                                                    130.
             87.                                                    120.
            110.                                                     92.
            140.                                                    110.
            150.                                                    120.
            190.                    150.    140.                    110.
            120.    110.    120.    120.    130.                    170.
            130.    160.    100.    130.    170.                    160.
                    140.    130.    100.    150.                                                    170.    110.
                    170.    100.    130.    160.                                    140.        130.     76.
                    120.     90.     98.    130.                                    140.        100.     64.    300.    100.
                    120.    110.    120.    170.                                    150.        150.     66.    330.    150.
                    160.    110.    120.    140.                                    110.        140.    140.    120.    130.
                    160.    120.                                    320.    230.    130.        140.    160.    120.    150.
                                    140.                            310.    180.    110.        120.    120.    110.    130.
                                    150.                            220.    260.    160.         84.     99.    100.    120.
                                    110.                            200.    200.    240.                        150.    120.
                                    170.                            140.    330.                                210.    120.
                                    180.                            160.    310.
                                    150.            170.    110.    180.    210.
                                    150.            160.    120.    180.    280.
                                    150.            180.    110.    200.    370.
                                                    160.    130.    240.    300.                                            110.
                                                    130.    140.    170.    180.                                             87.
    120.                            130.    150.    150.    120.    150.    160.                                            120.
     87.            150.    140.    160.    170.    200.    140.    220.    130.             67.                            120.
    140.            170.    130.    220.    130.    130.    150.    240.    110.            100.                             48.
    110.            140.    120.    170.    160.                    150.    170.            130.                             46.
    190.            150.    120.    170.    230.    120.    140.    160.    170.             58.                             75.
    180.            170.    210.    150.    160.    120.    140.                             99.                             77.
    220.            170.    270.    150.     81.    180.    140.                            120.
    150.            150.    120.    150.     55.    150.    160.                             65.
                    130.    120.                    130.    120.                             86.
                                                    140.    120.
                            290.    140.            140.    140.
                            190.    140.            150.    130.
            190.    170.    160.    160.
            150.    150.    180.    110.                    160.
            130.    120.    100.    190.                    140.
            110.    120.     65.    140.                    130.
            170.    130.    160.    150.                    140.
            170.    150.    130.    130.                    140.
            130.    120.                                    140.
            130.    140.            150.    200.            150.
                                    150.    240.            170.
                                    200.    160.
                                    220.    150.
                    140.    160.    180.    170.            140.                    200.    140.
                    170.    170.    170.    170.            140.                    220.    110.
    120.            160.    130.    150.    140.            100.    110.    170.    150.    160.
    150.            180.    130.    130.    170.            120.    140.    180.    180.    140.
    160.            160.    120.                            120.    140.    150.    240.    100.
    160.            160.    180.                            100.    150.    160.    210.    110.
    120.            160.    130.                            160.    150.    140.    280.    120.
    130.            150.    170.                            160.    170.    150.    340.     65.
    130.                                                            140.    170.
    110.                                                            130.    130.
```

Figure B2.--Continued--Ce (parts per million)

	19.0							17.0							
	22.0							18.0							
	20.0							17.0							
	23.0							18.0							
	16.0							20.0							
	16.0			21.0	22.0			15.0							
	17.0	8.1	20.0	18.0	23.0			23.0							
	22.0	20.0	13.0	17.0	15.0			24.0							
		17.0	5.7	16.0	13.0						16.0	17.0			
		22.0	5.8	12.0	28.0					13.0	15.0	19.0			
		12.0	6.8	10.0	18.0					13.0	6.7	20.0	2.2	5.1	
		23.0	5.7	8.8	13.0					16.0	10.0	17.0	2.2	6.4	
		10.0	22.0	9.9	13.0					14.0	10.0	15.0	2.2L	2.2L	
		7.7	24.0					6.4	6.5	7.3	8.6	24.0	3.7	2.2L	
				24.0				6.1	5.2	2.5	15.0	16.0	18.0	2.2L	
				20.0				13.0	9.0	5.5	18.0	16.0	19.0	2.2L	
				22.0				12.0	9.7	5.9			7.4	2.2L	
				26.0				4.4	4.3				10.0	2.2L	
				15.0				4.8	4.3						
				12.0		12.0	3.3	16.0	5.6						
				20.0		13.0	4.7	26.0	7.1						
				21.0		19.0	25.0	6.2	11.0						
						16.0	29.0	6.4	10.0						2.2L
						24.0	25.0	13.0	12.0						2.2L
9.5				22.0	13.0	33.0	21.0	9.4	13.0						2.2L
10.0		2.2L	11.0	29.0	12.0	13.0	13.0	2.8	4.6		14.0				2.2L
20.0		2.2L	10.0	13.0	17.0	11.0	15.0	2.5	4.9		14.0				2.2L
15.0		8.5	13.0	15.0	21.0			7.9	23.0		12.0				2.2L
7.6		7.5	15.0	16.0	16.0	11.0	22.0	7.3	21.0		8.1				2.2L
7.5		11.0	2.2L	18.0	11.0	9.9	15.0				12.0				2.2L
22.0		11.0	2.2L	22.0	6.0	20.0	14.0				11.0				
20.0		4.7	11.0	20.0	7.9	21.0	14.0				6.3				
		5.3	14.0			20.0	4.5				7.3				
						16.0	5.8								
			9.4	20.0		16.0	16.0								
			9.1	20.0		16.0	13.0								
	18.0	24.0	13.0	4.1											
	14.0	17.0	13.0	4.3			4.3								
	7.5	26.0	4.0	16.0			5.7								
	8.8	24.0	2.5	14.0			23.0								
	25.0	12.0	21.0	17.0			20.0								
	16.0	15.0	16.0	9.6			20.0								
	23.0	19.0					27.0								
	23.0	21.0		9.4	10.0		21.0								
				13.0	14.0		23.0								
				20.0	18.0										
				16.0	24.0										
		17.0	22.0	13.0	13.0		7.3			16.0	18.0				
		25.0	21.0	16.0	13.0		8.8			13.0	19.0				
27.0		22.0	14.0	19.0	15.0		3.6	9.5	19.0	9.0	19.0				
19.0		21.0	17.0	22.0	12.0		2.6	16.0	22.0	17.0	22.0				
25.0		26.0	11.0				6.4	15.0	25.0	22.0	3.7				
20.0		22.0	14.0				6.8	15.0	23.0	20.0	5.8				
20.0		23.0	8.5				16.0	17.0	16.0	23.0	2.2				
25.0		18.0	25.0				19.0	15.0	16.0	16.0	2.2L				
18.0								19.0	18.0						
19.0								14.0	19.0						

Figure B2.--Continued--Ga (parts per million)

```
          1.20                                                    2.10
          0.46L                                                   0.51
          0.46L                                                   1.20
          0.46L                                                   0.76
          1.10                                                    1.00
          0.46L                   0.46L   0.46L                   0.46L
          1.40    0.46L   1.10    0.46L   0.46L                   0.46L
          1.10    0.46L   0.46L   0.46L   1.60                    1.40
                  1.20    0.46L   1.10    1.80                                                0.46L   0.46L
                  0.46L   0.46L   0.46L   0.46L                                   1.80        0.46L   1.90
                  0.46L   0.46L   2.10    0.46L                                   1.30        0.46L   1.20    0.46L   0.46L
                  0.46L   0.46L   1.30    0.46L                                   0.46L       3.80    0.46L   0.46L   0.46L
                  0.46L   0.73    1.50    0.46L                                   0.46L       1.20    0.46L   0.46L   2.70
                  1.50    0.46L                                   0.46L   0.46L   0.46L       1.50    0.88    0.46L   3.30
                                  0.46L                           0.46L   0.46L   0.46L       0.46L   0.70    1.40    0.46L
                                  0.46L                           0.46L   0.46L   1.90        0.46L   0.61    0.46L   2.60
                                  0.46L                           0.46L   0.46L   1.70                        0.46L   3.00
                                  0.46L                           0.46L   2.50                                0.46L   2.90
                                  0.46L                           1.10    1.30
                                  0.46L           0.46L   0.46L   1.10    1.60
                                  0.46L           1.90    0.46L   1.70    0.46L
                                  1.10            0.85    0.46L   0.46L   0.46L
                                                  0.46L   0.46L   2.30    0.46L                                          0.46L
                                                  0.46L   0.70    0.88    1.10                                           0.46L
  2.80                            0.46L   1.70    0.46L   0.62    0.46L   0.46L                                          0.46L
  1.40            0.46L   2.50    0.46L   0.46L   2.20    0.46L   1.60    2.70            1.10                           0.46L
  2.20            0.46L   0.46L   0.46L   0.46L   1.30    0.46L   0.46L   1.30            0.46L                          0.46L
  0.46L           0.46L   1.30    1.10    0.46L                   0.46L   0.46L           0.46L                          0.46L
  0.46L           2.10    1.40    0.46L   0.46L   0.46L   0.46L   2.50    0.46L           0.82                           0.46L
  0.46L           0.46L   0.46L   0.74    1.10    0.46L   0.77                            1.60                           0.46L
  0.46L           0.46L   0.46L   0.72    1.60    0.46L   1.10                            0.46L
  0.46L           2.30    2.10    1.10    1.80    0.46L   1.70                            0.46L
                  2.40    2.80                    0.46L   0.46L                           0.46L
                                                  0.46L   1.00
                          0.46L   0.46L           1.80    1.70
                          1.70    1.20            1.20    0.46L
          0.46L   0.46L   2.20    0.46L
          1.00    0.46L   1.90    0.46L                   0.46L
          0.46L   1.30    2.30    0.46L                   2.20
          0.96    0.46L   1.50    0.46L                   0.46L
          0.46L   2.20    2.30    1.70                    1.50
          0.46L   0.46L   0.46L   1.10                    0.46L
          1.40    0.46L                                   1.90
          0.46L   1.90            1.40    0.99            0.72
                                  2.40    0.46L           0.99
                                  0.46L   1.40
                                  0.94    1.10
                  0.46L   0.46L   0.46L   1.70            0.46L                   0.46L   0.46L
                  0.46L   0.46L   0.46L   2.40            0.90                    1.30    0.46L
  1.20            0.85    1.50    0.46L   1.70            2.30    2.20    0.46L   0.46L   0.46L
  0.46L           0.46L   2.30    0.46L   1.50            2.10    2.50    1.20    1.50    0.46L
  0.46L           0.46L   1.30                            0.46L   0.46L   0.46L   0.46L   0.46L
  0.46L           0.46L   0.46L                           0.46L   1.70    0.46L   0.46L   2.20
  0.46L           0.46L   0.75                            1.60    0.63    0.46L   3.20    2.60
  0.46L           1.30    0.46L                           0.46L   0.46L   0.46L   0.46L   0.46L
  0.46L                                                           0.46L   1.30
  1.40                                                            0.46L   0.46L
```

Figure B2.--Continued--Ge (parts per million)

	100.L							100.L							
	100.L							100.L							
	100.L							100.L							
	100.L							100.L							
	100.L							100.L							
	100.L			100.L	100.L			100.L							
	100.L	100.L	100.L	100.L	100.L			100.L							
	100.L	100.L	100.L	180.	100.L			100.L							
		100.L	100.L	100.L	100.L							100.L	100.L		
		100.L	100.L	100.L	100.L					100.L		100.L	100.L		
		100.L	100.L	100.L	100.L					100.L		100.L	100.L	100.L	100.L
		100.L	100.L	160.	100.L					100.L		100.L	100.L	100.L	100.L
		100.L	100.L	100.L	100.L					100.L		100.L	100.L	100.L	100.L
		100.L	100.L					100.L	100.L	100.L		100.L	100.L	100.L	100.L
				100.L				100.L	100.L	100.L		100.L	100.L	100.L	100.L
				100.L				100.L	100.L	100.L		100.L	100.L	100.L	100.L
				100.L				100.L	100.L	100.L				100.L	100.L
				100.L				100.L	100.L					100.L	100.L
				100.L				100.L	100.L						
				100.L		100.L	100.L	100.L	100.L						
				100.L		100.L	100.L	100.L	100.L						
				100.L		100.L	100.L	250.	100.L						
						100.L	100.L	100.L	100.L						100.L
						200.	100.L	100.L	100.L						100.L
100.L				100.L	100.L	100.L	100.L	100.L	100.L						100.L
210.		100.L	100.L	100.L	100.L	100.L	100.L	100.L	100.L		100.L				100.L
100.L		100.L	100.L	100.L	100.L	100.L	100.L	100.L	100.L		100.L				100.L
100.L		200.	100.L	100.L	100.L			100.L	100.L		100.L				100.L
100.L		100.L	100.L	100.L	100.L	100.L	100.L	100.L	100.L		100.L				100.L
100.L		100.L	100.L	100.L	100.L	100.L	100.L				100.L				100.L
100.L		100.L	100.L	100.L	120.	100.L	100.L				100.L				
100.L		100.L	100.L	100.L	100.L	100.L	100.L				100.L				
		100.L	100.L			100.L	100.L				100.L				
						100.L	100.L								
			100.L	100.L		100.L	100.L								
			100.L	100.L		100.L	100.L								
	100.L	100.L	100.L	100.L											
	100.L	100.L	100.L	100.L			100.L								
	100.L	100.L	100.L	100.L			100.L								
	150.	100.L	100.L	100.L			100.L								
	100.L	100.L	100.L	100.L			100.L								
	100.L	100.L	100.L	100.L			100.L								
	100.L	100.L					250.								
	100.L	100.L		100.L	100.L		100.L								
				100.L	100.L		100.L								
				100.L	100.L										
				100.L	100.L										
		100.L	100.L	100.L	100.L		100.L			100.L	100.L				
		100.L	100.L	220.	100.L		100.L			100.L	100.L				
100.L		100.L	100.L	100.L	100.L		100.L	100.L	100.L	130.	100.L				
100.L		100.L	100.L	100.L	100.L		110.	100.L	100.L	100.L	100.L				
100.L		100.L	100.L				100.L	100.L	100.L	100.L	100.L				
100.L		100.L	100.L				100.L	100.L	100.L	100.L	100.L				
100.L		100.L	100.L				100.L	100.L	100.L	100.L	100.L				
100.L		100.L	100.L				100.L	100.L	100.L	100.L	100.L				
100.L								100.L	100.L						
100.L								100.L	100.L						

Figure B2.--Continued--Li (parts per million)

```
            1.70                                                    1.80
            1.40                                                    1.50
            1.40                                                    1.20
            1.40                                                    1.40
            1.60                                                    1.50
            2.10                    2.20    2.00                    1.40
            1.50    1.30    1.70    2.10    2.30                    2.10
            1.90    1.70    1.60    2.40    2.20                    2.20
                    1.90    1.60    2.90    2.30                                                    2.50    1.50
                    2.10    1.40    2.80    2.70                                    2.10            2.20    1.50
                    1.80    1.20    3.10    2.70                                    2.10            2.80    1.50   12.00    2.00
                    1.80    1.20    2.00    4.30                                    2.00            4.00    1.50   13.00    2.40
                    1.70    1.60    2.10    3.70                                    1.90            3.00    1.60    2.40    0.98
                    1.30    1.80                                    8.70   11.00    2.20            2.50    1.90    2.60    1.10
                                    3.90                            4.90    5.60    2.10            2.30    1.70    3.20    1.20
                                    3.30                            6.60    6.20    4.90            2.20    1.70    2.70    0.83
                                    2.80                            5.00    3.80    4.60                            3.40    1.20
                                    3.60                            5.40    6.30                                    4.70    1.20
                                    3.00                            3.80    6.00
                                    2.50            4.40    4.20    3.30    3.90
                                    3.40            3.00    1.70    3.90    6.90
                                    3.00            3.10    2.10    6.50   11.00
                                                    3.00    2.30    4.90   11.00                                            0.75
                                                    3.80    2.30    3.20    6.60                                            0.73
    3.00                            4.00    3.70    3.40    2.30    3.70    6.50                                            1.20
    3.10            5.10    4.00    3.70    3.30    2.20    2.90   16.00    2.60            2.00                            0.94
    3.00            4.10    3.10    2.50    3.40    2.70    2.50   13.00    2.60            2.10                            0.62
    3.00            4.50    2.70    3.30    4.80                    3.90    3.10            2.40                            0.54
    3.20            2.70    3.10    4.40    4.30    2.90    3.70    3.10    2.80            2.20                            0.97
    3.50            3.50    4.60    3.60    3.50    3.30    3.50                            2.20                            0.88
    3.40            3.70    3.80    4.90    2.30    3.30    5.00                            2.20
    2.60            3.00    4.10    3.90    2.90    3.20    5.30                            2.00
                    3.60    4.40                    4.90    3.20                            2.10
                                                    3.30    3.80
                           10.00    3.60            4.60    4.00
                            8.90    4.10            3.50    3.40
            5.70    6.10    5.90    2.60
            5.50    4.50    6.50    2.50                    3.70
            4.70    2.60    2.50    4.10                    3.60
            4.00    2.60    2.20    3.40                    2.40
            3.40    4.20    4.00    5.00                    2.70
            2.80    5.10    3.50    3.60                    2.10
            2.30    2.90                                    2.20
            2.80    3.80            5.40    6.00            3.30
                                    5.60    7.30            4.30
                                    6.10    6.00
                                    5.20    5.90
                    3.50    3.60    5.90    3.50            3.40                   14.00    4.90
                    4.70    3.00    6.60    4.30            3.30                   13.00    4.60
    2.80            4.30    3.20    3.80    5.80            2.00    3.00    3.60    4.60    6.60
    2.50            4.00    4.50    4.70    4.60            1.90    3.80    4.20    7.60    6.20
    3.50            4.20    3.70                            4.30    4.10    4.20    7.80    6.60
    2.90            3.60    6.10                            4.50    3.40    4.70    9.20    6.90
    2.60            4.00    3.00                            4.80    3.90    2.80   12.00    5.20
    2.90            3.10    4.00                            5.60    4.20    3.10   14.00    3.30
    2.90                                                            3.50    4.00
    2.80                                                            4.10    4.20
```

Figure B2.--Continued--Yb (parts per million)

```
           68.L                                                    68.L
           68.L                                                    68.L
           68.L                                                    68.L
           68.L                                                    68.L
           68.L                                                    68.L
           68.L                    68.L    68.L                    68.L
           68.L    68.L    68.L    68.L    68.L                    68.L
           68.L    68.L    68.L    68.L    68.L                    68.L
                   68.L    68.L    68.L    68.L                                                68.L    68.L
                   68.L    68.L    68.L    68.L                                    68.L        68.L    68.L
                   68.L    68.L    68.L    68.L                                    68.L        68.L    68.L    68.L    68.L
                   68.L    68.L    68.L    68.L                                    68.L        68.L    68.L    68.L    68.L
                   68.L    68.L    68.L    68.L                                    68.L        68.L    68.L    68.L    68.L
                   68.L    68.L                                    68.L    68.L    68.L        68.L    68.L    68.L    68.L
                                   68.L                            68.L    68.L    68.L        68.L    68.L    68.L    68.L
                                   68.L                            68.L    68.L    68.L        68.L    68.L    68.L    68.L
                                   68.L                            68.L    68.L    68.L                        68.L    68.L
                                   68.L                            68.L    68.L                                68.L    68.L
                                   68.L                            68.L    68.L
                                   68.L            68.L    68.L    68.L    68.L
                                   68.L            68.L    68.L    68.L    68.L
                                   68.L            68.L    68.L    68.L    68.L
                                                   68.L    68.L    68.L    68.L                                           68.L
                                                   68.L    68.L    68.L    68.L                                           68.L
   68.L                            68.L    68.L    68.L    68.L    68.L    68.L                                           68.L
   68.L            68.L    68.L    68.L    68.L    68.L    68.L    68.L    68.L            68.L                           68.L
   68.L            68.L    68.L    68.L    68.L    68.L    68.L    68.L    68.L            68.L                           68.L
   68.L            68.L    68.L    68.L    68.L                    68.L    68.L            68.L                           68.L
   68.L            68.L    68.L    68.L    70.     68.L    68.L    68.L    68.L            68.L                           68.L
   68.L            68.L    68.L    68.L    68.L    68.L    68.L                            68.L                           68.L
   68.L            68.L    68.L    68.L    68.L    68.L    68.L                            68.L
   68.L            68.L    68.L    68.L    68.L    68.L    68.L                            68.L
                   68.L    68.L                    68.L    68.L                            68.L
                                                   68.L    68.L
                           68.L    68.L            68.L    68.L
                           68.L    68.L            68.L    68.L
           68.L    68.L    68.L    68.L
           68.L    68.L    68.L    68.L                    68.L
           68.L    68.L    68.L    68.L                    68.L
           68.L    68.L    68.L    68.L                    68.L
           68.L    68.L    68.L    68.L                    68.L
           68.L    68.L    68.L    68.L                    68.L
           68.L    68.L                                    68.L
           68.L    68.L            68.L    68.L            68.L
                                   68.L    68.L            68.L
                                   68.L    68.L
                                   68.L    68.L
                   68.L    68.L    68.L    68.L            68.L                    68.     68.L
                   68.L    68.L    68.L    68.L            68.L                    68.L    68.L
   68.L            68.L    68.L    68.L    68.L            68.L    68.L    68.L    68.L    68.L
   68.L            68.L    68.L    68.L    68.L            68.L    68.L    68.L    68.L    68.L
   68.L            68.L    68.L                            68.L    68.L    68.L    68.L    68.L
   68.L            68.L    68.L                            68.L    68.L    68.L    68.L    68.L
   68.L            68.L    68.L                            68.L    68.L    68.L    68.L    68.L
   68.L            68.L    68.L                            68.L    68.L    68.L    68.L    68.L
   68.L                                                            68.L    68.L
   68.L                                                            68.L    68.L
```

Figure B2.--Continued--Pr (parts per million)

```
       46.L                                          46.L
       46.L                                          46.L
       46.L                                          46.L
       46.L                                          46.L
       56.                                           68.
       55.                46.L   46.L                47.
       46.L   46.L   46.L   46.L   87.                 46.L
       46.L   89.    74.    46.L   54.                 46.L
              74.    46.L   46.L   46.L                                          46.L   46.L
              63.    46.L   57.    120.                              46.L          57.    48.
              70.    46.L   71.    68.                               46.L          46.L   46.L   56.    54.
              46.L   46.L   46.L   95.                               46.L          53.    46.L   110.   46.L
              46.L   72.    50.    57.                               46.L          46.L   96.    46.L   79.
              88.    65.                                54.    110.   59.           46.L   120.   46.L   46.L
                            46.L                        53.    59.    46.L          58.    88.    60.    46.L
                            87.                         66.    46.L   46.L          46.L   46.L   46.L   46.L
                            46.L                        46.L   46.L   53.                         46.L   46.L
                            90.                         50.    46.L                               57.    46.L
                            120.                        67.    110.
                            130.          46.L   46.L   47.    97.
                            63.           86.    46.L   46.L   78.
                            46.L          77.    61.    46.L   47.
                                          87.    120.   91.    150.                                      64.
                                          72.    46.L   87.    82.                                       60.
46.L                        72.    46.L   100.   86.    68.    46.L                                      99.
46.L          49.    46.L   53.    56.    71.    55.    47.    46.L          46.L                        110.
100.          67.    46.L   48.    76.    46.L   46.L   46.L   58.           72.                         46.L
46.L          53.    84.    65.    81.                  46.L   78.           46.L                        46.L
76.           46.L   46.L   71.    120.   86.    85.    46.L   46.L          68.                         46.L
55.           80.    57.    110.   73.    58.    46.L                        46.L                        46.L
91.           72.    56.    110.   46.L   99.    46.L                        46.L
87.           46.L   46.L   46.L   46.L   69.    69.                         46.L
              46.L   56.                  46.L   49.                         46.L
                                          48.    77.
                     70.    54.           46.L   76.
                     46.L   71.           46.L   46.L
       100.   69.    46.L   46.L
       46.L   46.L   50.    46.L                 46.L
       87.    87.    46.L   46.L                 46.L
       46.L   72.    46.L   65.                  70.
       130.   53.    62.    63.                  51.
       46.L   46.L   65.    46.L                 86.
       46.L   94.                                72.
       79.    61.           67.    46.L          93.
                            46.L   110.          96.
                            75.    99.
                            46.L   46.L
              53.    61.    46.L   83.           46.L                 46.L   46.L
              120.   62.    110.   46.L          46.L                 84.    46.L
46.L          57.    56.    46.L   48.           63.    46.L   66.    56.    66.
46.L          120.   63.    48.    49.           46.L   66.    100.   82.    53.
110.          51.    87.                         46.L   61.    55.    78.    46.L
74.           62.    74.                         46.L   72.    46.L   77.    46.L
46.L          77.    81.                         46.L   72.    68.    59.    69.
100.          99.    46.L                        58.    46.L   80.    62.    56.
46.L                                                    46.L   46.L
46.L                                                    46.L   80.
```

Figure B2.--Continued--Nd (parts per million)

```
        46.L                                                    46.L
        46.L                                                    46.L
        46.L                                                    46.L
        46.L                                                    46.L
        46.L                                                    46.L
        46.L                    46.L    46.L                    46.L
        46.L    46.L    46.L    46.L    47.                     46.L
        46.L    46.L    46.L    46.L    46.L                    46.L
                46.L    48.     46.L    46.L                                                46.L    46.L
                46.L    46.L    47.     46.L                                    46.L        46.L    46.L
                49.     46.L    46.L    46.L                                    46.L        46.L    46.L    49.     46.L
                46.L    46.L    46.L    46.L                                    46.L        46.L    46.L    62.     46.L
                46.L    46.L    46.L    46.L                                    46.L        46.L    46.L    46.L    50.
                46.L    49.                                     51.     48.     46.L        46.L    46.L    46.L    50.
                                46.L                            46.L    46.L    46.L        46.L    46.L    46.L    46.L
                                46.L                            50.     46.L    46.L        46.L    46.L    46.L    46.L
                                46.L                            46.L    46.L    46.L                        46.L    46.L
                                46.L                            46.L    52.                                 46.L    46.L
                                46.L                            46.L    46.L
                                46.L            46.L    46.L    46.L    46.L
                                54.             46.L    46.L    46.L    46.L
                                46.L            46.L    47.     46.L    46.L
                                                46.L    46.L    46.L    46.L                                           46.L
                                                46.L    49.     46.L    46.L                                           46.L
46.L                            47.     55.     46.L    46.L    46.L    46.L                                           46.L
46.L            46.L    48.     46.L    46.L    53.     46.L    48.     46.L            46.L                           60.
46.L            46.L    46.L    46.L    46.L    46.L    46.L    46.L    46.L            46.L                           46.L
46.L            46.L    46.L    46.L    46.L                    46.L    46.L            46.L                           46.L
46.L            46.L    46.L    46.L    46.L    46.L    46.L    46.L    46.L            46.L                           46.L
46.L            46.L    46.L    46.L    46.L    46.L    46.L                            46.L                           46.L
46.L            46.L    46.L    46.L    46.L    46.L    46.L                            46.L
46.L            51.     46.L    48.     46.L    48.     46.L                            46.L
                46.L    46.L                    46.L    46.L                            46.L
                                                46.L    46.L
                        48.     46.L            46.L    46.L
                        46.L    46.L            46.L    46.L
        46.L    51.     46.L    46.L
        46.L    46.L    46.L    47.                     46.L
        46.L    46.L    46.L    46.L                    46.L
        46.L    46.L    46.L    46.L                    46.L
        46.L    46.L    46.L    46.L                    46.L
        46.L    46.L    46.L    46.L                    46.L
        46.L    46.L                                    46.L
        46.L    46.L            46.L    46.L            46.L
                                46.L    46.L            46.L
                                46.L    46.L
                                46.L    46.L
                46.L    46.L    46.L    46.L            46.L                    53.     46.L
                46.L    46.L    46.L    46.L            46.L                    46.L    46.L
46.L            46.L    46.L    46.L    46.L            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L    46.L    46.L            48.     53.     46.L    46.L    47.
46.L            46.L    46.L                            46.L    46.L    49.     47.     46.L
46.L            46.L    46.L                            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L                            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L                            46.L    46.L    46.L    46.L    46.L
46.L                                                            46.L    46.L
46.L                                                            46.L    46.L
```

Figure B2.--Continued--Sm (parts per million)

```
      3.                                        3.
      2.                                        2.
      2.                                        1.
      2.                                        2.
      3.                                        2.
      1.L               3.    2.                1.L
      1.L   1.    1.L   2.    3.                1.L
      2.    3.    3.    1.L   3.                1.
            2.    3.    2.    3.                                        3.    2.
            2.    1.L   4.    5.                            1.L         2.    1.L
            1.L   2.    1.L   5.                            2.          3.    3.    13.   1.L
            3.    2.    3.    5.                            1.L         5.    2.    13.   1.L
            3.    3.    3.    6.                            1.L         2.    2.    3.    2.
            3.    3.                            5.    8.    2.          2.    1.L   4.    2.
                        3.                      4.    6.    3.          1.L   3.    3.    1.L
                        2.                      4.    4.    7.          2.    1.L   2.    1.L
                        2.                      4.    4.    7.                      1.L   1.L
                        3.                      2.    4.                            5.    3.
                        3.                      3.    5.
                        3.          3.    2.    1.L   2.
                        3.          3.    2.    3.    1.L
                        2.          3.    2.    2.    5.
                                    2.    3.    3.    5.                                  3.
                                    3.    2.    3.    3.                                  1.L
1.L                     3.    1.L   4.    4.    1.    1.L                                 1.L
2.          4.    2.    4.    3.    3.    3.    4.    3.          1.L                     1.L
2.          6.    2.    3.    3.    4.    2.    1.L   3.          3.                      3.
3.          2.    2.    3.    3.                1.L   1.          4.                      1.L
3.          4.    1.L   3.    4.    3.    4.    1.    2.          1.                      1.L
3.          3.    3.    2.    4.    4.    2.                      3.                      1.
5.          4.    1.L   1.L   1.L   3.    2.                      2.
3.          4.    2.    3.    3.    1.    3.                      3.
            3.    4.                2.    3.                      1.L
                                    3.    5.
                  4.    1.L         4.    3.
                  3.    2.          3.    3.
      2.    3.    3.    1.L
      2.    3.    3.    1.L               3.
      3.    1.    1.L   3.                4.
      2.    2.    2.    2.                2.
      3.    4.    2.    3.                1.
      3.    4.    2.    1.L               1.L
      3.    1.L                           2.
      1.L   2.          3.    3.          3.
                        3.    4.          2.
                        1.L   2.
                        3.    4.
            3.    2.    3.    1.L         4.                4.    3.
            4.    2.    3.    3.          1.L               4.    3.
3.          3.    2.    2.    3.          1.L   2.    4.    3.    3.
2.          4.    3.    1.    5.          2.    1.L   3.    2.    3.
3.          3.    1.                      3.    1.L   3.    3.    2.
3.          4.    3.                      2.    3.    4.    4.    3.
4.          3.    1.L                     5.    2.    2.    3.    2.
2.          4.    3.                      4.    3.    1.    1.L   1.L
3.                                              3.    3.
3.                                              1.L   3.
```

Figure 82.--Continued--Eu (parts per million)

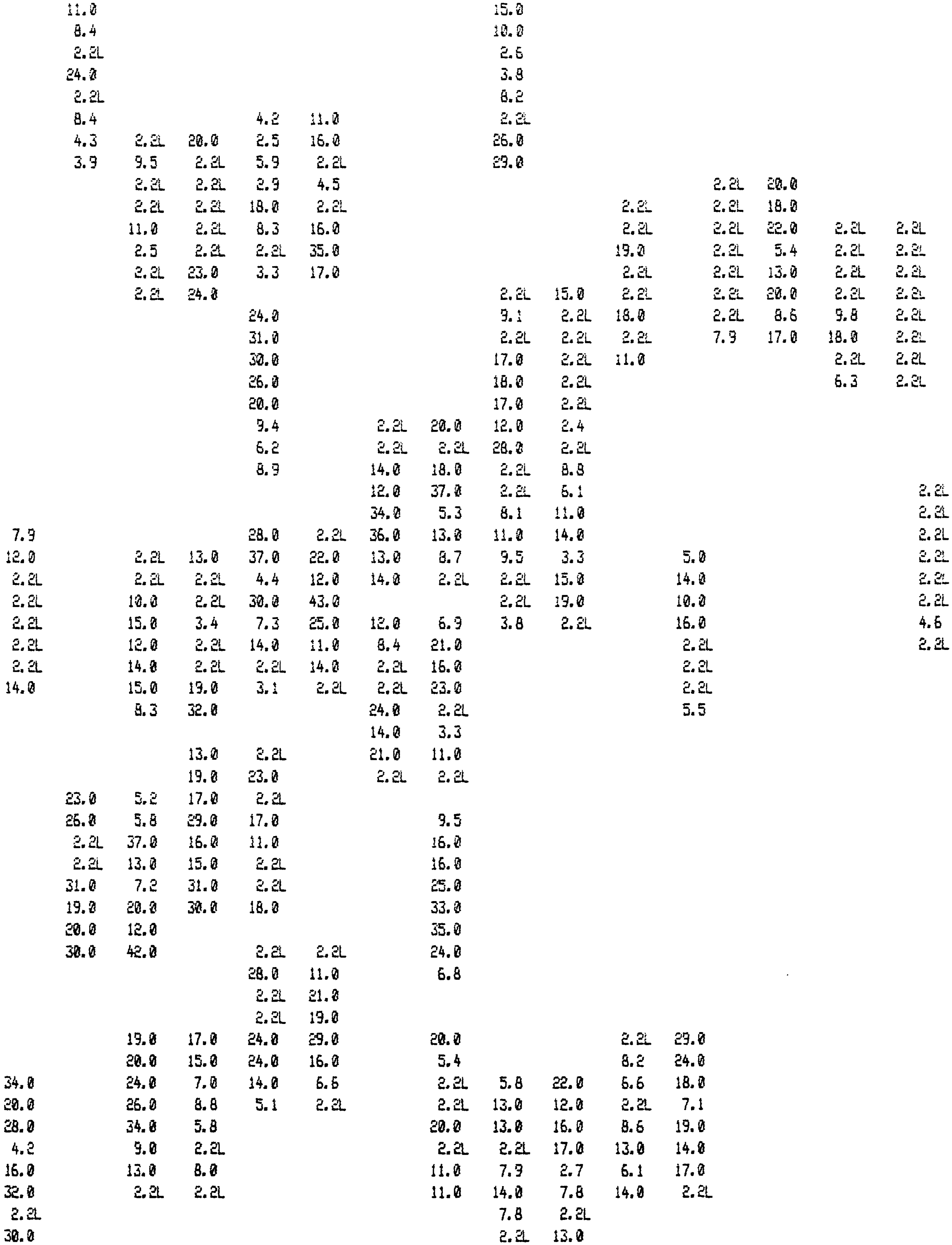

11.0 15.0
8.4 10.0
2.2L 2.6
24.0 3.8
2.2L 8.2
8.4 4.2 11.0 2.2L
4.3 2.2L 20.0 2.5 16.0 26.0
3.9 9.5 2.2L 5.9 2.2L 29.0
2.2L 2.2L 2.9 4.5 2.2L 20.0
2.2L 2.2L 18.0 2.2L 2.2L 2.2L 18.0
11.0 2.2L 8.3 16.0 2.2L 2.2L 22.0 2.2L 2.2L
2.5 2.2L 2.2L 35.0 19.0 2.2L 5.4 2.2L 2.2L
2.2L 23.0 3.3 17.0 2.2L 2.2L 13.0 2.2L 2.2L
2.2L 24.0 2.2L 15.0 2.2L 2.2L 20.0 2.2L 2.2L
24.0 9.1 2.2L 18.0 2.2L 8.6 9.8 2.2L
31.0 2.2L 2.2L 2.2L 7.9 17.0 18.0 2.2L
30.0 17.0 2.2L 11.0 2.2L 2.2L
26.0 18.0 2.2L 6.3 2.2L
20.0 17.0 2.2L
9.4 2.2L 20.0 12.0 2.4
6.2 2.2L 2.2L 28.0 2.2L
8.9 14.0 18.0 2.2L 8.8
12.0 37.0 2.2L 6.1 2.2L
34.0 5.3 8.1 11.0 2.2L
7.9 28.0 2.2L 36.0 13.0 11.0 14.0 2.2L
12.0 2.2L 13.0 37.0 22.0 13.0 8.7 9.5 3.3 5.0 2.2L
2.2L 2.2L 2.2L 4.4 12.0 14.0 2.2L 2.2L 15.0 14.0 2.2L
2.2L 10.0 2.2L 30.0 43.0 2.2L 19.0 10.0 2.2L
2.2L 15.0 3.4 7.3 25.0 12.0 6.9 3.8 2.2L 16.0 4.6
2.2L 12.0 2.2L 14.0 11.0 8.4 21.0 2.2L 2.2L
2.2L 14.0 2.2L 2.2L 14.0 2.2L 16.0 2.2L
14.0 15.0 19.0 3.1 2.2L 2.2L 23.0 2.2L
8.3 32.0 24.0 2.2L 5.5
14.0 3.3
13.0 2.2L 21.0 11.0
19.0 23.0 2.2L 2.2L
23.0 5.2 17.0 2.2L
26.0 5.8 29.0 17.0 9.5
2.2L 37.0 16.0 11.0 16.0
2.2L 13.0 15.0 2.2L 16.0
31.0 7.2 31.0 2.2L 25.0
19.0 20.0 30.0 18.0 33.0
20.0 12.0 35.0
30.0 42.0 2.2L 2.2L 24.0
28.0 11.0 6.8
2.2L 21.0
2.2L 19.0
19.0 17.0 24.0 29.0 20.0 2.2L 29.0
20.0 15.0 24.0 16.0 5.4 8.2 24.0
34.0 24.0 7.0 14.0 6.6 2.2L 5.8 22.0 6.6 18.0
20.0 26.0 8.8 5.1 2.2L 2.2L 13.0 12.0 2.2L 7.1
28.0 34.0 5.8 20.0 13.0 16.0 8.6 19.0
4.2 9.0 2.2L 2.2L 2.2L 17.0 13.0 14.0
16.0 13.0 8.0 11.0 7.9 2.7 6.1 17.0
32.0 2.2L 2.2L 11.0 14.0 7.8 14.0 2.2L
2.2L 7.8 2.2L
30.0 2.2L 13.0

Figure B2.--Continued--Gd (parts per million)

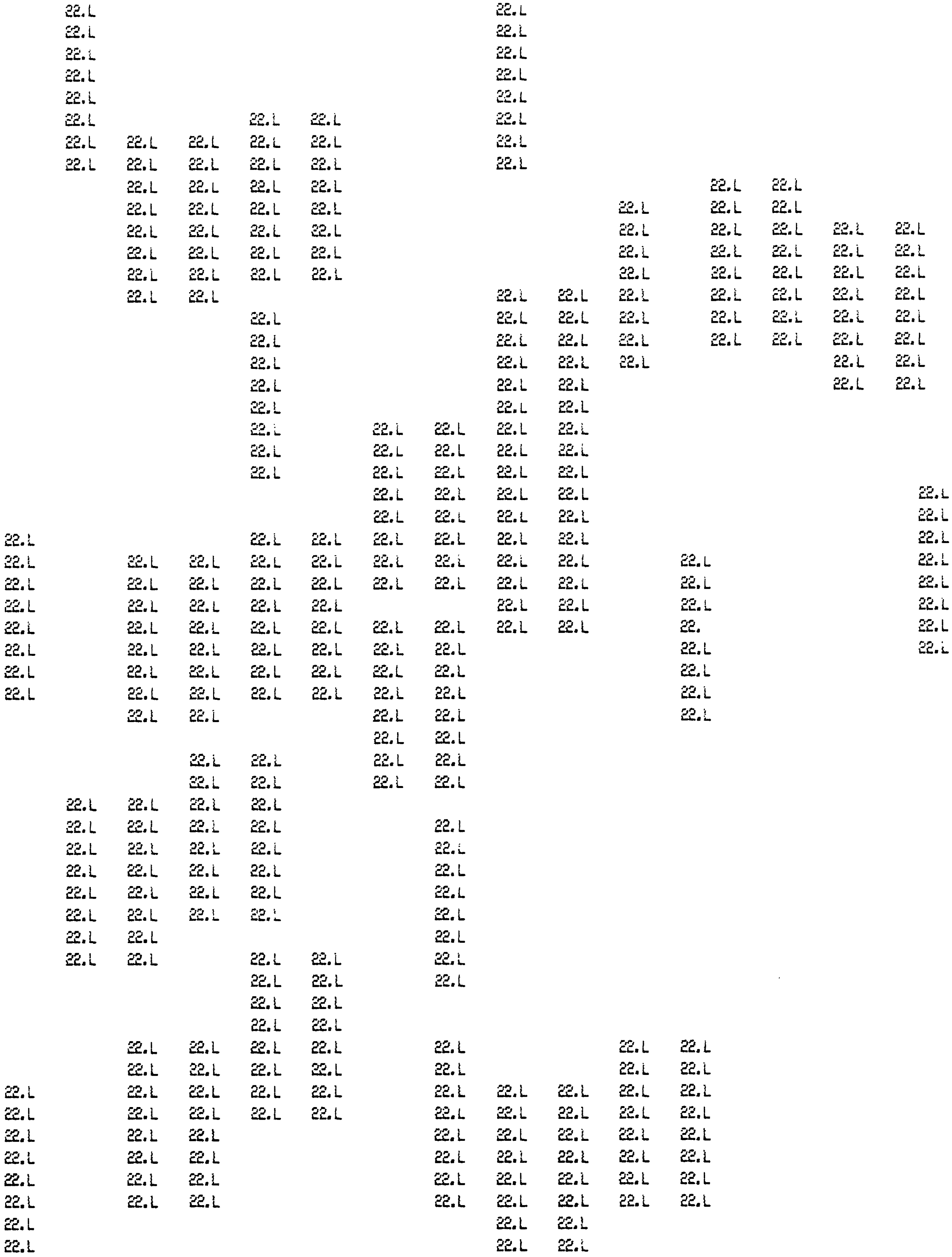


Figure B2.--Continued--Tb (parts per million)

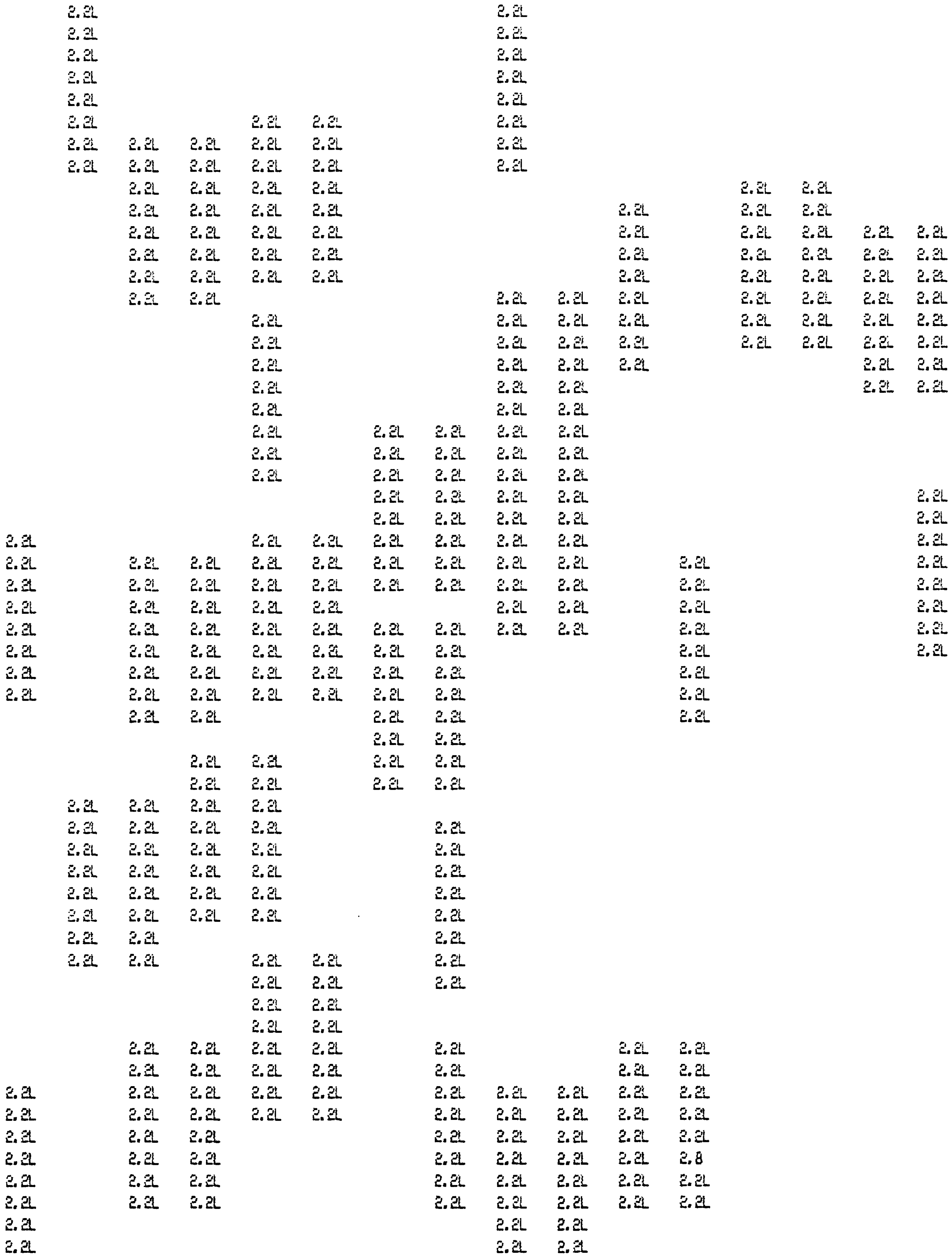
```
        10.L                                                    10.L
        10.L                                                    10.L
        10.L                                                    10.L
        10.L                                                    10.L
        10.L                                                    10.L
        10.L                    10.L    10.L                    10.L
        10.L    10.L    10.L    10.L    10.L                    10.L
        10.L    10.L    10.L    10.L    10.L                    10.L
                10.L    10.L    10.L    10.L                                                    10.L    10.L
                10.L    10.L    10.L    10.L                                    10.L            10.L    10.L
                10.L    10.L    10.L    10.L                                    10.L            10.L    10.L    50.     10.L
                10.L    10.L    10.L    10.L                                    10.L            10.L    10.L    50.     10.L
                10.L    10.L    10.L    10.L                                    10.L            10.L    10.L    10.L    10.L
                10.L    10.L                                    10.L    10.L    10.L            10.L    10.L    10.L    10.L
                                10.L                            10.L    10.L    10.L            10.L    10.L    10.L    10.L
                                10.L                            10.L    10.L    10.L            10.L    10.L    10.L    10.L
                                10.L                            10.L    10.L    10.L                            10.L    10.L
                                10.L                            10.L    10.L                                    10.L    10.L
                                10.L                            10.L    10.L
                                10.L            10.L    10.L    10.L    10.L
                                10.L            10.L    10.L    10.L    10.L
                                10.L            10.L    10.L    10.L    10.L
                                                10.L    10.L    10.L    10.L                                            10.L
                                                10.L    10.L    10.L    10.L                                            10.L
10.L                            10.L    10.L    10.L    10.L    10.L    10.L                                            10.L
10.L            16.     10.L    10.L    10.L    10.L    10.L    10.L    10.L            10.L                            10.L
10.L            10.L    10.L    10.L    10.L    10.L    10.L    10.L    10.L            10.L                            10.L
10.L            10.L    10.L    10.L    10.L                    10.L    10.L            10.L                            10.L
10.L            10.L    10.L    10.L    10.L    10.L    10.L    10.L    10.L            10.L                            10.L
10.L            10.L    12.     10.L    10.L    10.L    10.L                            10.L                            10.L
10.L            10.L    10.L    10.L    10.L    10.L    10.L                            10.L
10.L            10.L    10.L    10.L    10.L    10.L    10.L                            10.L
                10.L    10.L                    10.L    10.L                            10.L
                                                10.L    10.L
                        10.L    10.L            10.L    10.L
                        10.L    10.L            10.L    10.L
        10.L    10.L    10.L    10.L
        10.L    10.L    10.L    10.L                    10.L
        32.     10.L    20.     10.L                    10.L
        10.L    10.L    10.L    10.L                    10.L
        10.L    10.L    10.L    10.L                    10.L
        10.L    10.L    10.L    10.L                    10.L
        10.L    10.L                                    10.L
        10.L    10.L            10.L    10.L            10.L
                                10.L    10.L            10.L
                                10.L    10.L
                                10.L    10.L
                10.L    10.L    10.L    10.L            10.L                    10.L    10.L
                10.L    10.L    28.     10.L            10.L                    10.L    10.L
10.L            10.L    10.L    10.L    10.L            10.L    10.L    10.L    10.L    10.L
10.L            10.L    10.L    10.L    10.L            15.     10.L    10.L    10.L    10.L
10.L            10.L    10.L                            10.L    10.L    10.L    10.L    18.
10.L            10.L    10.L                            10.L    10.L    10.L    10.L    20.
10.L            10.L    10.L                            10.L    10.L    10.L    10.L    10.L
10.L            10.L    10.L                            10.L    10.L    10.L    10.L    10.L
10.L                                                            10.L    10.L
10.L                                                            10.L    10.L
```

Figure B2.--Continued--Dy (parts per million)

155

	4.6L							4.6L							
	4.6L							4.6L							
	4.6L							4.6L							
	4.6L							4.6L							
	4.6L							4.6L							
	4.6L			4.6L	4.6L			4.6L							
	4.6L	4.6L	4.6L	4.6L	4.6L			4.6L							
	4.6L	4.6L	4.6L	4.6L	4.6L			4.6L							
		4.6L	4.6L	4.6L	4.6L							4.6L	4.6L		
		4.6L	4.6L	4.6L	4.6L					4.6L		4.6L	4.6L		
		4.6L	4.6L	4.6L	4.6L					4.6L		4.6L	4.6L	5.7	4.6L
		4.6L	4.6L	4.6L	4.6L					4.6L		4.6L	4.6L	6.7	4.6L
		4.6L	4.6L	4.6L	4.6L					4.6L		4.6L	4.6L	4.6L	4.6L
		4.6L	4.6L					5.2	4.8	4.8		4.6L	4.6L	4.6L	4.6L
				4.6L				5.2	4.6L	4.6L		4.6L	4.6L	4.6L	4.6L
				4.6L				5.2	5.6	4.6L		4.6L	4.6L	4.6L	4.6L
				4.6L				4.9	5.0	4.6L				4.7	4.6L
				4.6L				4.6L	4.8					5.7	4.6L
				4.6L				4.6L	4.6L						
				4.6L		4.6L	4.6L	4.5L	5.1						
				4.6L		4.6L	4.6L	4.6L	6.2						
				4.6L		4.7	4.6L	4.6L	8.0						
						4.6L	4.6L	5.5	8.4						4.6L
						4.6L	4.6L	4.6L	5.5						4.6L
4.6L				4.6L	4.6L	4.6L	4.6L	4.6L	5.5						4.6L
4.6L		4.8	4.6L	4.6L	4.6L	4.6L	4.6L	6.1	4.6L		4.6L				5.2
4.6L		4.6L	4.6L	4.6L	4.6L	4.6L	4.6L	5.2	4.6L		4.6L				4.6L
4.6L		4.6L	4.6L	4.6L	4.6L			5.2	4.6L		4.6L				4.6L
4.6L		4.6L	4.6L	4.6L	4.6L	4.6L	4.6L	4.6L	4.6L		4.6L				4.6L
4.6L		4.6L	4.6L	4.6L	4.6L	4.6L	4.6L				4.6L				4.6L
4.6L		4.6L	4.6L	4.6L	4.6L	4.6L	4.6L				4.6L				
4.6L		4.6L	4.6L	4.6L	4.6L	4.6L	4.6L				4.6L				
		4.6L	4.6L			4.6L	4.6L				4.6L				
						4.6L	4.6L								
			5.6	4.6L		4.6L	4.6L								
			4.6L	4.6L		4.6L	4.6L								
	4.6L	4.6L	4.6L	4.6L											
	4.6L	4.6L	4.7	4.6L			4.6L								
	4.6L	4.6L	4.6L	4.6L			4.6L								
	4.6L	4.6L	4.6L	4.6L			4.6L								
	4.6L	4.6L	4.6L	4.6L			4.6L								
	4.6L	4.6L	4.6L	4.6L			4.6L								
	4.6L	4.6L					4.6L								
	4.6L	4.6L		4.6L	4.6L		4.6L								
				4.6L	4.8		4.6L								
				4.6L	4.6L										
				4.6L	4.6L										
		4.6L	4.6L	4.6L	4.6L		4.6L			4.9	4.6L				
		4.6L	4.6L	4.6L	4.6L		4.6L			4.6L	4.6L				
4.6L		4.6L	4.6L	4.6L	4.8		4.6L	4.6L	4.6L	4.6L	4.6L				
4.6L		4.6L	4.6L	4.6L	4.6L		4.6L	4.6L	4.6L	4.6L	4.6L				
4.6L		4.6L	4.6L				4.6L	4.6L	4.6L	4.6L	4.6L				
4.6L		4.6L	5.2				4.6L	4.6L	4.6L	4.6L	4.6L				
4.6L		4.6L	4.6L				4.6L	4.6L	4.6L	5.2	4.6L				
4.6L		4.6L	4.6L				4.6L	4.6L	4.6L	5.6	4.6L				
4.5L								4.6L	4.6L						
4.6L								4.6L	4.6L						

Figure B2.--Continued--Er (parts per million)


2.2L 2.2L
2.2L 2.2L
2.2L 2.2L
2.2L 2.2L
2.2L 2.2L
2.2L 2.2L 2.2L 2.2L
2.2L 2.2L 2.2L 2.2L 2.2L 2.2L
2.2L 2.2L 2.2L 2.2L 2.2L 2.2L
2.2L 2.2L 2.2L 2.2L 2.2L 2.2L
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2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L
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2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L
2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.8
2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L
2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L 2.2L
2.2L 2.2L 2.2L
2.2L 2.2L 2.2L

Figure B2.--Continued--Tm (parts per million)

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        46.L                                                    46.L
        46.L                                                    46.L
        46.L                                                    46.L
        46.L                                                    46.L
        46.L                                                    46.L
        46.L                    46.L    46.L                    46.L
        46.L    46.L    46.L    46.L    46.L                    46.L
        46.L    46.L    46.L    46.L    46.L                    46.L
                46.L    46.L    46.L    46.L                                                    46.L    46.L
                46.L    46.L    46.L    46.L                                    46.L            46.L    46.L
                46.L    46.L    46.L    46.L                                    46.L            46.L    46.L    46.L    46.L
                46.L    46.L    46.L    46.L                                    46.L            46.L    46.L    46.L    46.L
                46.L    46.L    46.L    46.L                                    46.L            46.L    46.L    46.L    46.L
                46.L    46.L                                    46.L    46.L    46.L            46.L    46.L    46.L    46.L
                                46.L                            46.L    46.L    46.L            46.L    46.L    46.L    46.L
                                46.L                            46.L    46.L    46.L            46.L    46.L    46.L    46.L
                                46.L                            46.L    46.L    46.L                            46.L    46.L
                                46.L                            46.L    46.L                                    46.L    46.L
                                46.L                            46.L    46.L
                                46.L            46.L    46.L    46.L    46.L
                                46.L            46.L    46.L    46.L    46.L
                                46.L            46.L    46.L    46.L    46.L
                                                46.L    46.L    46.L    46.L                                            46.L
                                                46.L    46.L    46.L    46.L                                            46.L
46.L                            46.L    46.L    46.L    46.L    46.L    46.L                                            46.L
46.L            46.L    46.L    46.L    46.L    46.L    46.L    46.L    46.L            46.L                            52.
46.L            46.L    46.L    46.L    46.L    46.L    46.L    46.L    46.L            46.L                            46.L
46.L            46.L    46.L    46.L    46.L                    46.L    46.L            46.L                            46.L
46.L            46.L    46.L    46.L    46.L    46.L    46.L    46.L    46.L            46.L                            46.L
46.L            46.L    46.L    46.L    46.L    46.L    46.L                            46.L                            46.L
46.L            46.L    46.L    46.L    46.L    46.L    46.L                            46.L
46.L            46.L    46.L    46.L    46.L    46.L    46.L                            46.L
                46.L    46.L                    46.L    46.L                            46.L
                                                46.L    46.L
                        46.L    46.L            46.L    46.L
                        46.L    46.L            46.L    46.L
        46.L    46.L    46.L    46.L
        46.L    46.L    46.L    46.L                    46.L
        46.L    46.L    46.L    46.L                    46.L
        46.L    46.L    46.L    46.L                    46.L
        46.L    46.L    46.L    46.L                    46.L
        46.L    46.L    46.L    46.L                    46.L
        46.L    46.L                                    46.L
        46.L    46.L            46.L    46.L            46.L
                                46.L    46.L            46.L
                                46.L    46.L
                                46.L    46.L
                46.L    46.L    46.L    46.L            46.L                    46.L    46.L
                46.L    46.L    46.L    46.L            46.L                    46.L    46.L
46.L            46.L    46.L    46.L    46.L            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L    46.L    46.L            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L                            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L                            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L                            46.L    46.L    46.L    46.L    46.L
46.L            46.L    46.L                            46.L    46.L    46.L    46.L    46.L
46.L                                                            46.L    46.L
46.L                                                            46.L    46.L
```

Figure B2.--Continued--Ir (parts per million)

	Si	Al	Fe^{2}	Fe^{3}	Mg	Ca	Na	K	Ti	P	Mn	CO$_2$	Ag	As	B	Ba	Be	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sn	Sr	V	Y	Zn	Zr	Ce	Ga	Ge	Li	Yb	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Er	Ta	Ir
3ABR1																																															
3ABR2																																															
3BBR1								1																																							
3BBR2				2	2	2					2	1								4		1						2																			
3CBR1			1																					2																							
3CBR2					1	1						1																																			
3DBR1					2	1						1																																			
3DBR2		1											3	4					3	2					4				1		3																
3EBR1																																															
3EBR2																																															
3FBR1																																															
3FBR2																																															
3GBR1									1						1				4					1					1																		
3GBR2																																															
3HBR1																			1									1													1						
3HBR2																			1									1													1						
4ABR1																														1		2															
4ABR2																									1																						
4BBR1	1		1							1																				4		3	1				3								1		
4BBR2			2															2				2																									
4CBR1																	2					4								3		1	2				2				2				4		
4CBR2			3														1	1				2															1								2		
4DBR1						1						1																																			
4DBR2																																															
4EBR1	1									2								1			2									1		2	3												1		
	Si	Al	Fe^{2}	Fe^{3}	Mg	Ca	Na	K	Ti	P	Mn	CO$_2$	Ag	As	B	Ba	Be	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sn	Sr	V	Y	Zn	Zr	Ce	Ga	Ge	Li	Yb	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Er	Ta	Ir
4EBR2										1																																			1		
4FBR1																																															
4FBR2																													1																		
4GBR1									2	3															1					2		2									3						
4GBR2			4																			2																							1		
4HBR1																					2									1		1	3														
4HBR2			2														1	3				2		2								1	1												1		
7ABR1				1			1																									1					2										
7ABR2																		1																													
7BBR1	1						2																																								
7BBR2																1															2											1					
7CBR1																																															
7CBR2																																															
7DBR1																							2																								
7DBR2							2																																								
7EBR1							1		2														2						2		1																
7EBR2							2																																								
7FBR1																															1																
7FBR2		1		2																																											
7GBR1																2																															
7GBR2		1		2																											1			1													
7HBR1							1									1																															
7HBR2				1					1											1																											
18ABR1																																															
18ABR2																					1							1																			
	Si	Al	Fe^{2}	Fe^{3}	Mg	Ca	Na	K	Ti	P	Mn	CO$_2$	Ag	As	B	Ba	Be	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sn	Sr	V	Y	Zn	Zr	Ce	Ga	Ge	Li	Yb	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Er	Ta	Ir

Figure B3.--Element concentrations in shales and siltstones of the Sauk sequence greater than the 90th, 95th, 97.5th and 99th percentiles. [1,greater than p90; 2,greater than p95; 3,greater than p97.5; 4,greater than p99] (See table B1 for sampling locations.)

	Si	Al	Fe^{2}	Fe^{3}	Mg	Ca	Na	K	Ti	P	Mn	CO$_{2}$	Ag	As	B	Ba	Be	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sn	Sr	V	Y	Zn	Zr	Ce	Ga	Ge	Li	Yb	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Er	Tm	Ir
18BBR1																					1								1	1																			
18BBR2																	2			2																													
18CBR1																																																
18CBR2																													1																			
18DBR1																																																
18DBR2																																																
18EBR1									1																																						
18EBR2																											2																					
18FBR1																																																
18FBR2			1																																												
18GBR1															1											2																					
18GBR2																																																
18HBR1			1														1																														
18HBR2																																																
10ABR1																																																
10ABR2																																																
10BBR1																																																
10BBR2																1																														
10CBR1				1																																										
10CBR2																	1																													
10DBR1						2	1					1															2																			
10DBR2																																																
10EBR1																																																
10EBR2				2												1																														
10FBR1		4						1	3										1				1						2					1								2					
10FBR2																																																
10GBR1	2																			3																											
10GBR2		2							1										2					2					1					2													
10HBR1																			1										1																		
10HBR2				1																																										
12ABR1						3						1																		2											1						
12ABR2																																																
12BBR1							3																																							
12BBR2	3																															1			1												
12CBR1						1						1											1																								
12CBR2																																																
12DBR1						3						2																3		1			1														
12DBR2																1																														
12EBR1		2					2																																				1					
12EBR2																					1																											
12FBR1																				1					1						1																
12FBR2																																																
12GBR1			1																1		1		2					4																		
12GBR2		1		1													1														3																
12HBR1																2									1																						
12HBR2	1						1									1																														
15GBR1					4	2					1	3																																		
15GBR2					1	4						3																										1								
15HBR1					3	1						2										1																								
15HBR2					3	1						2																																		

Figure B3.--Continued

	Si	Al	Fe^{2}	Fe^{3}	Mg	Ca	Na	K	Ti	P	Mn	CO_2	Ag	As	B	Ba	Be	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sn	Sr	V	Y	Zn	Zr	Ce	Ga	Ge	Li	Yb	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Er	Tm	Ir
17ABR1			1					1									4	1										4																			
17ABR2A																																															
17BBR1								1												1																											
17BBR2								4																																							
17CBR1								2																																							
17CBR2								3												2																											
17DBR1																																							1								
17DBR2																																															
17EBR1						1				4			3					4		1		3			2			3					2				3			1	4			4	3		
17EBR2	3																	2										2																			
17FBR1															1				2										3																		
17FBR2			3							3					2		1					2																									
17GBR1					1	1				1		1																																			
17GBR2					3	3						3										1													2					2							
17HBR1					2	2						3																																			
17HBR2					2	1					4	2										1													3												
8ABR1																							3							2							3				1						
8ABR2								2															4																								
8BBR1								2													2		3							1			1				2										
8BBR2								1		1							1				4		2		2					2			2				3								1		
8CBR1																	1						1		2																						
8CBR2		1							3	2							3								2												1										
8DBR1	2																															3					1							3			
8DBR2																																2															
8EBR1																																			1												
8EBR2																				1																											
8FBR1																							2																								
8FBR2																																															
8GBR1				1																			1																								
8GBR2																																															
8HBR1				3																																											
8HBR2																																															
1ABR1									1																																						
1ABR2																			1																												
1BBR1																																															
1BBR2					1															2																											
2ABR1																			1					2																							
2ABR2																			1					2							1																
2BBR1									1										1					1																							
2BBR2																			1					1																							
5ABR1A							1																						1																		
5ABR2A		1		1			1																		1						1																
5BBR1A				1																																			2								
5BBR2A				2																																											
6ABR1		3													2																																
6ABR2		1																																													
6BBR1																																															
6BBR2		1																																													
9ABR1								1								1																															
9ABR2	2															3											3																				

Figure B3.--Continued

	Si	Al	Fe^{2}	Fe^{3}	Mg	Ca	Na	K	Ti	P	Mn	CO$_{2}$	Ag	As	B	Ba	Be	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sn	Sr	V	Y	Zn	Zr	Ce	Ga	Ge	Li	Yb	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Er	Tm	Ir
9BBR1								2					2												3						3																
9BBR2													3												3	3					4																
11ABR1																																															
11ABR2													4		2	4																															
11BBR1																																															
11BBR2																																															
13ABR1	2																																														
13ABR2		1																																													
13BBR1		1																1						1																		2					
13BBR2																																															
14ABR1																																															
14ABR2								1																																							
14BBR1					1																																										
14BBR2					1							1																																			
16ABR1			2							1																																					
16ABR2			2																					1																							
16BBR1			2																																												
16BBR2										3															2																3						
	Si	Al	Fe^{2}	Fe^{3}	Mg	Ca	Na	K	Ti	P	Mn	CO$_{2}$	Ag	As	B	Ba	Be	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sn	Sr	V	Y	Zn	Zr	Ce	Ga	Ge	Li	Yb	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Er	Tm	Ir

Figure 83.--Continued

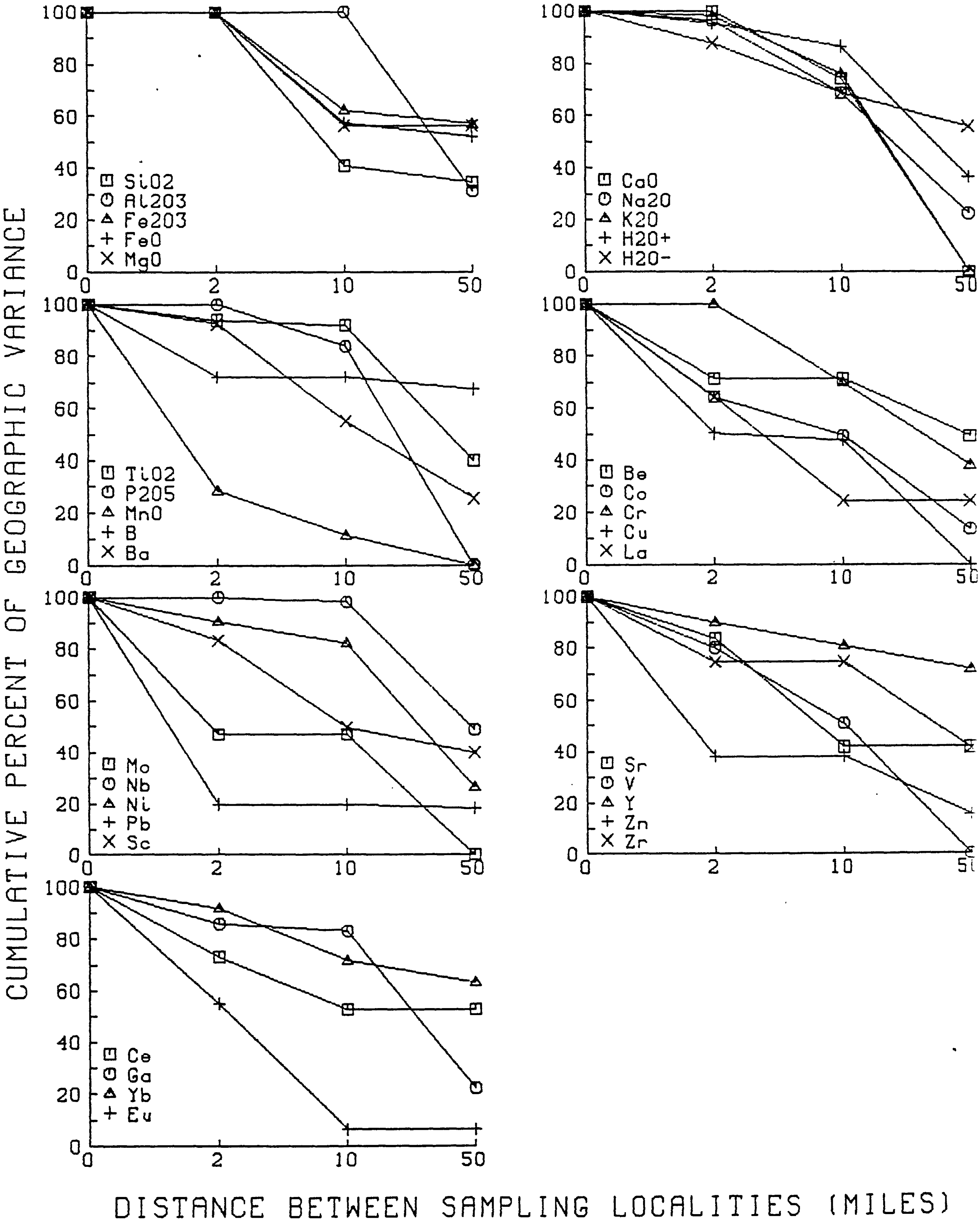


Figure B4.-- Cumulative-variance curves for shales and siltstones of the Sauk sequence (unit B).

Table B1.--Notes on shale and siltstone samples and references.

1ABR1
Little Rocky Mountains, Montana, SW1/4 sec. 30, T26N, R25E. Emerson Formation, about 900' from top, black fissile shale. Sample is micaceous silty claystone. Knechtel (1959)

1ABR2
Little Rocky Mountains, Montana, SW1/4 sec. 30, T26N, R25E. Emerson Formation, about 850' from top, black fissile shale. Sample is micaceous claystone. Knechtel (1959)

1BBR1
Little Rocky Mountains, Montana, NE1/4 sec. 16, T25N, R24E. Emerson Formation, about 925' from top, black fissile shale. Sample is biotitic, muscovitic, glauconitic siltstone. Knechtel (1959)

1BBR2
Little Rocky Mountains, Montana, NE1/4 sec. 16, T25N, R24E. Emerson Formation, abount 900' from top, black fissile shale. Sample is micaceous, glauconitic, silty claystone. Knechtel (1959)

2ABR1
Coopers Lake Quadrangle, Montana, 2 miles SE of Steamboat Mt. Wolsey Formation, middle of formation, interbedded shale and sandstone. Sample is biotitic, muscovitic, glauconitic, sandy claystone. Deiss (1933)

2ABR2
Coopers Lake Quadrangle, Montana, 2 miles SE of Steamboat Mt. Wolsey Formation, middle of formation, 10' below 2ABR1. Sample is micaceous, silty claystone. Deiss (1933)

2BBR1
Coopers Lake Quadrangle, Montana, 2 miles SE of Steamboat Mt. Wolsey Formation, 50' below 2ABR1, interbedded shale and sandstone. Sample is biotitic, glauconitic, dolomitic, feldspathic, sandy siltstone. Deiss (1933)

2BBR2
Coopers Lake Quadrangle, Montana, 2 miles SE of Steamboat Mt. Wolsey Formation, 80' below 2ABR1, interbedded shale and sandstone. Sample is biotitic, muscovitic, glauconitic, sandy claystone. Deiss (1933)

3ABR1
Divide 4 SE Quadrangle, Montana, SW1/4 sec. 34, T2S, R8W. Wolsey Formation, 7' below 3ABR2. Sample is dolomitic claystone. Hanson (1952)

3ABR2
Divide 4 SE Quadrangle, Montana, SW1/4 sec. 34, T2S, R8W. Wolsey Formation, 30' from base, interbedded shale and sandstone. Sample is dolomitic claystone. Hanson (1952)

3BBR1
Divide 4 NE Quadrangle, Montana, E1/2 sec. 28, T2S, R8W. Wolsey Formation, lower half of formation, fissile shale. Sample is claystone. Hanson (1952)

3BBR2
Divide 4 NE Quadrangle, Montana, NE1/4 sec. 28, T2S, R8W. Wolsey Formation, about 25' below 3BBR1, 5' above a basalt sill. Sample is argillaceous, very fine-grained dolomite. Hanson (1952)

3CBR1
Divide 4 NW Quadrangle, Montana, center of sec. 7, T2S,R8W. Wolsey Formation, 5' above base, shale with minor siltstone. Sample is micaceous, silty claystone. Hanson (1952)
3CBR2
Divide 4 NW Quadrangle, Montana, center of sec. 7, T2S,R8W. Wolsey Formation, 40' above base, finely bedded siltstone and shale. Sample is micaceous, silty, fine-grained dolomite. Hanson (1952)
3DBR1
Divide 4 NE Quadrangle, Montana, SE1/4 sec. 17, T2S,R8W. Wolsey Formation, 70' above base, interbedded sandstone and shale. Sample is silty, very fine-grained dolomite. Hanson (1952)
3DBR2
Divide 4 NE Quadrangle, Montana, SE1/4 sec. 17, T2S,R8W. Wolsey Formation, 40' above base, shale 4' below basalt sill. Sample is silty claystone. Hanson (1952)
3EBR1
Manhattan Quadrangle, Montana, E1/2 sec. 24, T2N,R3E. Wolsey Formation, 70' from top, maroon shale. Sample is claystone. Deiss (1936), Varall (1955)
3EBR2
Manhattan Quadrangle, Montana, E1/2 sec. 24, T2N,R3E. Wolsey Formation, 40' from top, interbedded shale and sandstone. Sample is micaceous, silty claystone. Deiss (1936), Varall (1955)
3FBR1
Manhattan Quadrangle, Montana, SW1/4 sec. 23, T2N,R3E. Wolsey Formation, 100' from top, fissile shale. Sample is micaceous, glauconitic, dolomitic, silty arenite. Deiss (1936), Varall(1955)
3FBR2
Manhattan Quadrangle, Montana, SW1/4 sec. 23, T2N,R3E. Wolsey Formation, 20' from top, interbedded shale and limestone. Sample is micaceous, calcareous siltstone. Deiss (1936), Varall (1955)
3GBR1
Three Forks Quadrangle, Montana, NE1/4 sec. 10, T1N,R1W. Wolsey Formation, 30' from base, shale with thin lentils of sandstone. Sample is biotitic, muscovitic, glauconitic, silty claystone. G. D. Robinson (unpublished)
3GBR2
Three Forks Quadrangle, Montana, NE1/4 sec. 10, T1N,R1W. Wolsey Formation, 200' from top, shale with thin interbedded limestone. Sample is biotitic, muscovitic, glauconitic, silty claystone. Robinson and Barnett (1963)
3HBR1
Jefferson Island Quadrangle, Montana, NW1/4 sec. 8, T1N,R1W. Wolsey Formation, 30' from base, fissile shale. Sample is muscovitic, feldspathic, argillaceous siltstone. G. D. Robinson (unpublished)
3HBR2
Jefferson Island Quadrangle, Montana, NW1/4 sec. 8, T1N,R1W. Wolsey Formation, 50' from base, argillaceous siltstone. Sample is muscovitic, feldspathic, argillaceous, silty arenite. G. D. Robinson (unpublished)

4ABR1
Myers Ranch Quadrangle, Wyoming, SW1/4 sec. 7, T30N,R93W. Gallatin and Gros Ventre Formations undivided, 240' from top, irregularly bedded siltstone. Sample is glauconitic subarkose. Van Houten (1954)
4ABR2
Myers Ranch Quadrangle, Wyoming, SW1/4 sec. 7, T30N,R93W. Gallatin and Gros Ventre Formations undivided, 7' below 4ABR1, argillaceous siltstone and fine-grained sandstone. Sample is biotitic, muscovitic, glauconitic, argillaceous subarkose. Van Houten (1954)
4BBR1
Graham Ranch Quadrangle, Wyoming, SW1/4 sec. 8, T30N,R93W. Gallatin and Gros Ventre Formations undivided, 2' below 4BBR2, interbedded siltstone and sandstone. Sample is muscovitic, glauconitic, argillaceous, sandy siltstone. Van Houten (1954)
4BBR2
Graham Ranch Quadrangle, Wyoming, SW1/4 sec. 8, T30N,R93W. Gallatin and Gros Ventre Formations undivided, near middle, interbedded siltstone and sandstone. Sample is glauconitic, argillaceous subarkose. Van Houten (1954)
4CBR1
Blue Gulch Quadrangle, Wyoming, SE1/4 sec. 12, T32N,R94W. Gallatin and Gros Ventre Formations undivided, 150' from base, irregularly bedded siltstone. Sample is glauconitic, hematitic, dolomitic, feldspathic, sandy siltstone. Van Houten (1954)
4CBR2
Blue Gulch Quadrangle, Wyoming, SE1/4 sec. 12, T32N,R94W. Gallatin and Gros Ventre Formations undivided, 100' from base, interbedded siltstone and sandstone. Sample is glauconitic, hematitic, feldspathic, sandy siltstone. Van Houten (1954)
4DBR1
Elkhorn Springs Quadrangle, Wyoming, SE1/4 sec. 22, T32N,R94W. Gallatin and Gros Ventre Formations undivided, 250' from top, siltstones with thin interbedded limestones. Sample is biotitic, muscovitic, glauconitic, calcareous, silty subarkose. Van Houten (1954)
4DBR2
Elkhorn Springs Quadrangle, Wyoming, SE1/4 sec. 22, T32N,R94W. Gallatin and Gros Ventre Formations undivided, 30' below 4DBR1, alternating thin, laminated sandstone and shale. Sample is muscovitic, biotitic, glauconitic claystone. Van Houten (1954)
4EBR1
Boysen Quadrangle, Wyoming, NE1/4 sec. 28, T6N, R6E. Gros Ventre Formation, 165' from top, interbedded siltstone and sandstone. Sample is glauconitic, silty, quartz arenite. Deiss (1938), Tourtelot and Thompson (1948)
4EBR2
Boysen Quadrangle, Wyoming, NE1/4 sec. 28, T6N, R6E. Gros Ventre Formation, 200' from top, interbedded siltstone and sandstone. Sample is biotitic, glauconitic, calcareous, quartz arenite. Deiss (1938), Tourtelot and Thompson (1948)

4FBR1
Boysen Quadrangle, Wyoming, SW1/4 sec. 4, T5N,R6E. Gros Ventre Formation, 160' from top, siltstone with thin beds of sandstone. Sample is biotitic, glauconitic, calcareous, feldspathic siltstone. Deiss (1938), Tourtelot and Thompson (1948)

4FBR2
Boysen Quadrangle, Wyoming, SW1/4 sec. 4, T5N,R6E. Gros Ventre Formation, 280' from top, green shale with interbedded sandstone. Sample is glauconitic, silty claystone. Deiss (1938), Tourtelot and Thompson (1948)

4GBR1
Guffy Peak Quadrangle, Wyoming, NE1/4 sec. 6, T39N,R92W. Gros Ventre Formation, 70' from top, interbedded quartzite and siltstone. Sample is subarkose. Tourtelot (1953), Miller (1936)

4GBR2
Guffy Peak Quadrangle, Wyoming, NE1/4 sec. 6, T39N,R92W. Gros Ventre Formation, 120' from top, siltstone with some interbedded sandstone. Sample is glauconitic, silty, quartz arenite. Tourtelot (1953), Miller (1936)

4HBR1
Guffy Peak Quadrangle, Wyoming, E1/2 sec. 5, T39N,R92W. Gros Ventre Formation, 100' from top, shale and siltstone with some sandstone beds. Sample is glauconitic subarkose. Tourtelot (1953), Miller (1936)

4HBR2
Guffy Peak Quadrangle, Wyoming, E1/2 sec. 5, T39N,R92W. Gros Ventre Formation, 20' from base, siltstone with interbedded coarse-grained sandstone. Sample is glauconitic, hematitic, quartz arenite. Tourtelot (1953), Miller (1936)

5ABR1a
Pocatello Quadrangle, Idaho, NW1/4 sec. 5, T7S,R36E. Cambrian Shale of Trimble, near top, green micaceous shale. Sample is muscovitic, biotitic, chloritic, silty claystone. D. E. Trimble (unpublished), Trimble and Schaeffer (1965)

5ABR2a
Pocatello Quadrangle, Idaho, NW1/4 sec. 5, T7S,R36E. Cambrian Shale of Trimble, 30' below 5ABR1a, black and green micaceous shale. Sample is chloritic, silty claystone. D. E. Trimble (unpublished), Trimble and Schaeffer (1965)

5BBR1
Pocatello Quadrangle, Idaho, NW1/4 sec. 28, T7S,R36E. Cambrian Shale of Trimble, 70' from top of siltstone-shale unit. Sample is muscovitic, chloritic, calcareous, silty claystone. D. E. Trimble (unpublished), Trimble and Schaeffer (1965)

5BBR2
Pocatello Quadrangle, Idaho, NW1/4 sec. 28, T7S,R36E. Cambrian Shale of Trimble, 50' from top of siltstone-shale unit, argillaceous siltstone. Sample is muscovitic, silty claystone. D. E. Trimble (unpublished), Trimble and Schaeffer (1965)

6ABR1
Danby Quadrangle, California. E1/2 sec. 11, T5N,R14E Lower Cambrian "Green Shale" of Hazzard (1933, p. 69), 7' from base, green and gray shales and siltstone. Sample is muscovitic, silty claystone. Hazzard(1933), Crickmay(1933)

6ABR2
Danby Quadrangle, California, E1/2 sec. 11, T5N,R14E. Lower Cambrian "Green Shale" of Hazzard (1933), 10' from base, green and gray shale and siltstone. Sample is muscovitic, silty claystone. Hazzard (1933), Crickmay (1933)
6BBR1
Cadiz Quadrangle, California, NE1/4 sec. 28, T6N,R14E. Lower Cambrian "Green Shale" of Hazzard (1933), 22' from base, argillaceous siltstone and thin quartzite. Sample is claystone. Hazzard (1933), Crickmay (1933)
6BBR2
Cadiz Quadrangle, California, NE1/4 sec. 28, T6N,R14E. Lower Cambrian "Green Shale" of Hazzard (1933), 11' from base, green to maroon shale, with some quartzite. Sample is claystone. Hazzard (1933), Crickmay (1933)
7ABR1
Highland Range, Lincoln County, Nevada, T4S,R67E. Pioche Shale, 37' from top, micaceous siltstone. Sample is muscovitic, chloritic, feldspathic, argillaceous siltstone. Tschanz and Pampeyan (1961)
7ABR2
Highland Range, Lincoln County, Nevada, T4S,R67E. Pioche Shale, 69' from top, micaceous siltstone. Sample is silty claystone. Tschanz and Pampeyan (1961)
7BBR1
Highland Range, Lincoln County, Nevada, T2S,R66E. Pioche Shale, 200' from base, micaceous siltstone. Sample is glauconitic, muscovitic, argillaceous siltstone. Tschanz and Pampeyan (1961)
7BBR2
Highland Range, Lincoln County, Nevada, T2S,R66E. Pioche Shale, 30' from top, micaceous siltstone. Sample is claystone. Tschanz and Pampeyan (1961)
7CBR1
Delmar Range, east of Delmar mining district, Lincoln County, Nevada. Pioche Shale, 219' from base, micaceous shale and siltstone. Sample is chloritic, glauconitic, sandy claystone. Callaghan (1937)
7CBR2
Delmar Range, east of Delmar mining district, Lincoln County, Nevada. Pioche Shale, 319' from base, micaceous siltstone with some quartzite. Sample is argillaceous sublitharenite. Callaghan (1937)
7DBR1
Delmar Range, south of Delmar mining district, Lincoln County, Nevada. Pioche Shale, 440' from base, micaceous shale and siltstone. Sample is chloritic, muscovitic, silty claystone. Callaghan (1937)
7DBR2
Delmar Range, south of Delmar mining district, Lincoln County, Nevada. Pioche Shale, 530' from base, micaceous shale and siltstone. Sample is muscovitic, argillaceous siltstone. Callaghan (1937)

7EBR1
Southern section in southern Desert Range, Clark County, Nevada. Pioche Shale, 50' from base, green and red-brown shale and quartzite. Sample is muscovitic, chloritic, silty claystone. Bowyer and others (1958), C. R. Longwell (unpublished)
7EBR2
Southern section in southern Desert Range, Clark County, Nevada. Pioche Shale, 6' from top, micaceous siltstone. Sample is muscovitic, calcareous, argillaceous siltstone. Bowyer and others (1958), C. R. Longwell (unpublished)
7FBR1
Northern section in southern Desert Range, Clark County, Nevada. Pioche Shale, 22' from base, micaceous siltstone. Sample is muscovitic, chloritic, silty claystone. Bowyer and others (1958), C. R. Longwell (unpublished)
7FBR2
Northern section in southern Desert Range, Clark County, Nevada. Lyndon Limestone, 100' from top, argillaceous siltstone. Sample is chloritic, silty claystone. Bowyer and others (1958), C. R. Longwell (unpublished)
7GBR1
Northern section in northern Desert Range, Lincoln County, Nevada. Chisholm Shale, 80' from top, thin-bedded shale and siltstone. Sample is chloritic, muscovitic, argillaceous siltite. Tschanz and Pampeyan (1961), C. R. Longwell (unpublished)
7GBR2
Northern section in northern Desert Range, Lincoln County, Nevada. Pioche Shale, 140' from top, micaceous siltstone. Sample is silty claystone. Tschanz and Pampeyan (1961), C. R. Longwell (unpublished)
7HBR1
Southern section in northern Desert Range, Lincoln County, Nevada. Pioche Shale, 100' from top, micaceous shale and siltstone. Sample is chloritic, muscovitic, silty claystone. Tschanz and Pampeyan (1961), C. R. Longwell (unpublished)
7HBR2
Southern section in northern Desert Range, Lincoln County, Nevada. Pioche Shale, 75' from base, micaceous shale and siltstone. Sample is chloritic, muscovitic, silty claystone. Tschanz and Pampeyan (1961), C. R. Longwell (unpublished)
8ABR1
Cochise Head Quadrangle, Arizona, NW1/4 sec. 7, T15S, R29E. Abrigo Formation, 14' from top of 25-foot shale bed near base of formation, black indurated shale. Sample is biotitic sublitharenite. Sabins (1957)
8ABR2
Cochise Head Quadrangle, Arizona, NW1/4 sec. 7, T15S, R29E. Abrigo Formation, 9' below 8ABR2, black indurated shale with thin quartzite. Sample is biotitic, sandy claystone. Sabins (1957)
8BBR1
Cochise Head Quadrangle, Arizona, NW1/4 sec. 1, T15S, R28E. Abrigo Formation, 1' from top of 50-foot shale bed near base of formation, black indurated shale. Sample is muscovitic, silty claystone. Sabins (1957)

8BBR2
Cochise Head Quadrangle, Arizona, NW1/4 sec. 1, T15S,R28E. Abrigo Formation, 6' from base of 50-foot shale bed near base of formation, black induated shale with thin quartzite. Sample is quartz wacke. Sabins (1957)
8CBR1
Dos Cabezas Quadrangle, Arizona, SE1/4 sec. 31, T14S,R27E. Bolsa Quartzite, 7' below 8CBR2, cross-bedded quartzite with thin shale beds. Sample is argillaceous litharenite. Jones and Bacheller (1953)
8CBR2
Dos Cabezas Quadrangle, Arizona, SE1/4 sec. 31, T14S,R27E. Bolsa Quartzite, 50' below top of formation, cross-bedded quartzite with thin shale beds. Sample is claystone. Jones and Bacheller (1953)
8DBR1
Dos Cabezas Quadrangle, Arizona, NE1/4 sec. 26, T14S,R26E. Bolsa Quartzite, 100' below top of formation, massive quartzite with red clayey siltstone bed. Sample is muscovitic, argillaceous sublitharenite. Jones and Bacheller (1953)
8DBR2
Dos Cabezas Quadrangle, Arizona, NE1/4 sec. 26, T14S,R26E. Bolsa Quartzite, 100' below top of formation, massive quartzite with red clayey siltstone bed. Sample is muscovitic, argillaceous sublitharenite. Jones and Bacheller (1953)
8EBR1
Tombstone Quadrangle, Arizona, NW1/4 sec. 26, T20S,R22E. Abrigo Limestone, 60' from base, interbedded limestone and greenish hornfels. Sample is dolomitic, argillaceous siltstone. Gilluly (1956)
8EBR2
Tombstone Quadrangle, Arizona, NW1/4 sec. 26, T20S,R22E. Abrigo Limestone, 30' from base, interbedded limestone, sandstone, and greenish hornfels. Sample is epidotitic, silty, calcareous claystone. Gilluly (1956)
8FBR1
Tombstone Quadrangle, Arizona, NW1/4 sec. 23, T20S,R22E. Abrigo Limestone, 5' below 8FBR2, green and maroon shale and siltstone. Sample is muscovitic, calcareous siltstone. Gilluly (1956)
8FBR2
Tombstone Quadrangle, Arizona, NW1/4 sec. 23, T20S,R22E. Abrigo Limestone, 60' from base, green and maroon shale and siltstone. Sample is muscovitic, calcareous, silty claystone. Gilluly (1956)
8GBR1
Pyeatt Ranch Quadrangle, Arizona, Huachuca Canyon. Cochise Formation, 20' from top, hard green limestone and siltstone. Sample is muscovitic, biotitic, calcareous, silty claystone. Weber (1950)
8GBR2
Pyeatt Ranch Quadrangle, Arizona, Huachuca Canyon. Cochise Formation, lower half of formation, greenish yellow silty shale. Sample is silty claystone. Weber (1950)

8HBR1
Miller Peak Quadrangle, Arizona, Garden Canyon. Cochise Formation, 2' below 8HBR2, green limy shale. Sample is muscovitic, calcareous, silty shale. Weber (1950)
8HBR2
Miller Peak Quadrangle, Arizona, Garden Canyon. Cochise Formation, near middle of formation, green limy shale. Sample is silty claystone. Weber (1950)
9ABR1
Holy Joe Peak Quadrangle, Arizona, W1/2 sec. 17, T6S, R17E. Abrigo Formation, 100' from base, red and purple siltstone with some quartzite. Sample is sandy, feldspathic siltstone. Krieger (1961, unpublished)
9ABR2
Holy Joe Peak Quadrangle, Arizona, W1/2 sec. 17, T6S, R17E. Abrigo Formation, 15' from base, limonitic siltstone grading into quartzite below. Sample is silty arkose. Krieger (1961, unpublished)
9BBR1
Holy Joe Peak Quadrangle, Arizona, W1/2 sec. 7, T6S, R17E. Abrigo Formation, 150' from base, red and purple siltstone with interbedded quartzite. Sample is brecciated arkosic wacke(?). Krieger (1961, unpublished)
9BBR2
Holy Joe Peak Quadrangle, Arizona, W1/2 sec. 7, T6S, R17E. Abrigo Formation, 130' from base, red and purple siltstone with interbedded quartzite. Sample is hematitic claystone. Krieger (1961, unpublished)
10ABR1
Dromedary Peak Quadrangle, Utah, 1/2 mile west of Alta. Ophir Shale, 17' below 10ABR2, black shale and siltstone. Sample is muscovitic, argillaceous siltstone. Calkins and Butler (1943)
10ABR2
Dromedary Peak Quadrangle, Utah, 1/2 mile west of Alta. Ophir Shale, 90' from base, black shale and siltstone. Sample is muscovitic, biotitic, silty claystone. Calkins and Butler (1943)
10BBR1
Brighton Quadrangle, Utah, Mary Ellen Gulch. Ophir Shale, 100' from top, irregularly bedded siltstone. Sample is muscovitic, argillaceous siltstone. Calkins and Butler (1943)
10BBR2
Brighton Quadrangle, Utah, Mary Ellen Gulch. Ophir Shale, large float block of micaceous siltstone, 10' above 10BBR1. Sample is muscovitic, argillaceous siltstone. Calkins and Butler (1943)
10CBR1
Springville Quadrangle, Utah, NW1/4 sec. 9, T7S, R3E. Ophir Shale, 100' from top, thin-bedded greenish brown siltstone. Sample is claystone. Baker (1947)
10CBR2
Springville Quadrangle, Utah, NW1/4 sec. 9, T7S, R3E. Tintic Quartzite, 20' from top, interbedded quartzite and phyllite. Sample is muscovitic, chloritic, lithic graywacke. Baker (1947)

10DBR1
Bridal Veil Falls Quadrangle, Utah, SE1/4 sec. 29, T6S,R3E. Ophir Shale, 15' from top, greenish brown siltstone and thin quartzite. Sample is muscovitic, silty micrite. Baker (1947)
10DBR2
Bridal Veil Falls Quadrangle, Utah, SE1/4 sec. 29, T6S,R3E. Ophir Shale, 70' from top, greenish brown siltstone and thin quartzite. Sample is muscovitic, argillaceous siltstone. Baker (1947)
10EBR1
Mount Pisgah Quadrangle, Utah, NW1/4 sec. 16, T9N,R1W. Brigham Quartzite, 50' from top, interbedded quartzite and thin shale. Sample is muscovitic, chloritic, lithic graywacke. Williams (1948)
10EBR2
Mount Pisgah Quadrangle, Utah, NW1/4 sec. 16, T9N,R1W. Brigham Quartzite, 1' below 10EBR1, interbedded quartzite and thin shale. Sample is muscovitic, chloritic, lithic graywacke. Williams (1948)
10FBR1
Brigham City Quadrangle, Utah, NW1/4 sec. 6, T9N,R1W. Brigham Quartzite, 125' from top, interbedded quartzite and platy siltstone. Sample is sandy claystone. Williams (1948)
10FBR2
Brigham City Quadrangle, Utah, NW1/4 sec. 6, T9N,R1W. Brigham Quartzite, 150' from top, interbedded quartzite and micaceous siltstone. Sample is muscovitic, quartz wacke. Williams (1948)
10GBR1
Logan Quadrangle, Utah-Idaho, SW1/4 sec. 9, T10N,R3E. Brigham Quartzite, 50' from top, green micaceous siltstone and shale. Sample is sublitharenite. Williams (1948)
10GBR2
Logan Quadrangle, Utah-Idaho, SW1/4 sec. 9, T10N,R3E. Brigham Quartzite, 3' below 10GBR1, green micaceous siltstone and shale. Sample is muscovitic, chloritic, silty claystone. Williams (1948)
10HBR1
Logan Quadrangle, Utah-Idaho, SW1/4 sec. 24, T11N,R3E. Brigham Quartzite, near top, interbedded quartzite and green micaceous shale. Sample is quartz wacke. Williams (1948)
10HBR2
Logan Quadrangle, Utah-Idaho, SW1/4 sec. 24, T11N,R3E. Brigham Quartzite, 10' below 10HBR1, interbedded quartzite and green micaceous shale. Sample is argillaceous subarkose. Williams (1948)
11ABR1
Bellevue Peak Quadrangle, Nevada, NE1/4 sec. 33, T19N,R53E. Pioche Shale, 200' from top, limonitic argillaceous siltstone. Sample is muscovitic, argillaceous siltstone. Nolan (1962), Nolan and others (1956)
11ABR2
Bellevue Peak Quadrangle, Nevada, NE1/4 sec. 33, T19N,R53E. Pioche Shale, 50' from top, limonitic argillaceous siltstone and brown quartzite. Sample is micaceous litharenite. Nolan (1962), Nolan and others (1956)

11BBR1
Pinto Summit Quadrangle, Nevada, 1/4 mile south of Prospect Peak. Pioche Shale, 10' from top, brown micaceous siltstone and dark blue limestone. Sample is muscovitic, calcareous litharenite. Nolan (1962), Nolan and others (1956)
11BBR2
Pinto Summit Quadrangle, Nevada, 1/4 mile south of Prospect Peak. Pioche Shale, 50' from base, red-brown clay shale. Sample is calcareous, argillaceous siltstone. Nolan (1962), Nolan and others (1956)
12ABR1
Connors Pass Quadrangle, Nevada, 3/4 mile north of Majors Place. Pioche Shale, 15' from top, quartzite and calcareous siltstone. Sample is sandy limestone. Drewes (1964)
12ABR2
Connors Pass Quadrangle, Nevada, 3/4 mile north of Majors Place. Pioche Shale, 25' from top, quartzite and calcareous siltstone. Sample is muscovitic, biotitic sublitharenite. Drewes (1964)
12BBR1
Connors Pass Quadrangle, Nevada, 3 miles north of Majors Place. Pioche Shale, 70' from top, calcareous micaceous siltstone. Sample is muscovitic, biotitic sublitharenite. Drewes (1964)
12BBR2
Connors Pass Quadrangle, Nevada, 3 miles north of Majors Place. Pioche Shale, near base of formation, brown siltstone, shale, and quartzite. Sample is muscovitic arenite. Drewes (1964)
12CBR1
Connors Pass Quadrangle, Nevada, southwest of Cleve Creek. Pioche Shale, 30' from top, dark gray micaceous siltstone. Sample is muscovitic, calcareous siltstone. Drewes (1964)
12CBR2
Connors Pass Quadrangle, Nevada, southwest of Cleve Creek. Pioche Shale, near middle of formation, greenish brown argillaceous siltstone. Sample is calcareous, lithic graywacke. Drewes (1964)
12DBR1
Connors Pass Quadrangle, Nevada, 1/2 mile south of Cleve Creek Campground. Pioche Shale, 35' from top, calcareous siltstone and silty cross-bedded limestone. Sample is sandy pelsparite. Drewes (1964)
12DBR2
Connors Pass Quadrangle, Nevada, 1/2 mile south of Cleve Creek Campground. Pioche Shale, 50' from base, purple micaceous siltstone. Sample is muscovitic, pyritic, sandy claystone. Drewes (1964)
12EBR1
Gold Hill Quadrangle, Utah, Bogley Gulch. Cabin Shale, 100' from base, thin-bedded micaceous siltstone. Sample is silty claystone. Nolan (1935)
12EBR2
Gold Hill Quadrangle, Utah, Bogley Gulch. Cabin Shale, 120' from base, thin-bedded micaceous siltstone. Sample is muscovitic, sandy claystone. Nolan (1935)

12FBR1
Gold Hill Quadrangle, Utah, near willow Spring. Cabin Shale, 125' from top, thin-bedded gray shale and red-brown siltstone. Sample is muscovitic, sandy claystone. Nolan (1935)
12FBR2
Gold Hill Quadrangle, Utah, near Willow Spring. Cabin Shale, 275' from top, thin-bedded, gray micaceous siltstone and thick quartzite. Sample is muscovitic, sandy claystone. Nolan (1935)
12GBR1
Deep Creek Range, Utah, 1 mile north of Basin Creek. Pioche Shale, 10' from base, thin-bedded brown siltstone, some mica. Sample is claystone. Bick (1958), Bick (1959)
12GBR2
Deep Creek Range, Utah, 1 mile north of Basin Creek. Pioche Shale, 100' from top, black micaceous shale with siltsrone partings. Sample is claystone. Bick (1958), Bick (1959)
12HBR1
Deep Creek Range, Utah, NE1/4 sec. 4, T11S,R18W. Pioche Shale, near middle, interbedded quartzite and phyllite. Sample is muscovitic, lithic graywacke(?). Bick (1958), Bick (1959)
12HBR2
Deep Creek Range, Utah, NE1/4 sec. 4, T11S,R18W. Pioche Shale, 30' from base, gray micaceous siltstone. Sample is muscovitic, biotitic sublitharenite. Bick (1958), Bick (1959)
13ABR1
Oak City Quadrangle, Utah, NW1/4 sec. 12, T17S,R4W. Ophir Formation, 350' from top, interbedded limestone and calcareous siltstone. Sample is glauconitic subarkose. Christiansen (1951)
13ABR2
Oak City Quadrangle, Utah, NW1/4 sec. 12, T17S,R4W. Ophir Formation, 150' from top, interbedded blue limestone and brown argillaceous shale. Sample is claystone. Christiansen (1951)
13BBR1
Oak City Quadrangle, Utah, NE1/4 sec. 26, T17S,R4W. Ophir Formation, 70' from top, interbedded blue limestone and brown argillaceous shale. Sample is claystone. Christiansen (1951)
13BBR2
Oak City Quadrangle, Utah, SE1/4 sec. 26, T17S,R4W. Tintic Quartzite, near top, interbedded quartzite and brown micaceous siltstone. Sample is muscovitic, biotitic, silty litharenite. Christiansen (1951)
14ABR1
Glenwood Springs Quadrangle, Colorado, NW1/4 sec. 18, T5S,R89W. Dotsero Dolomite, 25' from base, limestone, limestone conglomerate, and thin shale beds. Sample is glauconitic, muscovitic, calcareous, dolomitic subarkose. MacQuown (1945)
14ABR2
Glenwood Springs Quadrangle, Colorado, NW1/4 sec. 18, T5S,R89W. Dotsero Dolomite, 10' from base, limestone, limestone conglomerate, and thin shale beds. Sample is glauconitic, dolomitic subarkose. MacQuown (1945)

14BBR1
Glenwood Springs Quadrangle, Colorado, SW1/4 sec. 12, T5S,R90W. Dotsero Dolomite, 2' from base, interbedded buff dolomite and green shale. Sample is glauconitic, dolomitic subarkose. MacQuown (1945)
14BBR2
Glenwood Springs Quadrangle, Colorado, SW1/4 sec. 12, T5S,R90W. Dotsero Dolomite, 8' from base, interbedded buff dolomite and green shale. Sample is glauconitic, dolomitic subarkose. MacQuown (1945)
15GBR1
Cascade Quadrangle, Colorado, SE1/4 sec. 20, T13S,R67W. Manitou Limestone, 2' from base, interbedded red siltstone, limestone, and thin silty shale. Sample is pelletal dolomite. Finlay (1916)
15GBR2
Cascade Quadrangle, Colorado, SE1/4 sec. 20, T13S,R67W. Manitou Limestone, 3' from base, interbedded red siltstone, limestone, and thin silty shale. Sample is dolomitic intrasparite. Finlay (1916)
15HBR1
Cascade Quadrangle, Colorado, W1/2 sec. 32, T13S,R67W. Sawatcn Sandstone, 3' from top, platy siltstone and red fine-grained quartzite. Sample is dolomite. Finlay (1916)
15HBR2
Cascade Quadrangle, Colorado, W1/2 sec. 32, T13S,R67W. Sawatch Sandstone, 6' from top, red platy siltstone overlain by siltstone and quartzite. Sample is dolomite. Finlay (1916)
16ABR1
Dayton Quadrangle, Wyoming, near Tepee Creek. Undifferentiated Gros Ventre and Gallatin Formations of Mapel (1959), 50' from base, interbedded impure sandstone and brown shale. Sample is glauconitic subarkose. Mapel (1959)
16ABR2
Dayton Quadrangle, Wyoming, near Tepee Creek. Undifferentiated Gros Ventre and Gallatin Formations of Mapel (1959,) 55' from base, interbedded sandstone and thin brown shale. Sample is glauconitic, muscovitic, silty claystone. Mapel (1959)
16BBR1
Dayton Quadrangle, Wyoming, NE1/4 sec. 12, T53N,R85W. Undifferentiated Gros Ventre and Gallatin Formations of Mapel (1959), 500' from top, red-brown and green argillaceous siltstone. Sample is glauconitic, ferruginous subarkose. Mapel (1959)
16BBR2
Dayton Quadrangle, Wyoming, NE1/4 sec. 12, T53N,R85W. Undifferentiated Gros Ventre and Gallatin Formations of Mapel (1959), 12' below 16BBR1, limonitic argillaceous siltstone. Sample is glauconitic, ferruginous subarkose. Mapel (1959)
17ABR1
Sturgis Quadrangle, South Dakota, North Deadwood, South Dakota. Deadwood Formation, 45' from base, coarse-grained red sandstone with green and brown shale beds. Sample is glauconitic, silty claystone. Furnish and others (1936), Darton and Paige (1925)

17ABR2
Sturgis Quadrangle, South Dakota, North Deadwood, South Dakota. Deadwood Formation, 47' from base, coarse-grained red sandstone with green and brown shale. Sample is glauconitic, calcareous, feldspathic siltstone. Furnish and others (1936), Darton and Paige (1925)
17BBR1
Sturgis Quadrangle, South Dakota, SW1/4 sec. 7, T5N, R4E. Deadwood Formation, 50' from base, hard green shale and brown siltstone. Sample is calcareous, feldspathic siltstone. Furnish and others (1936), Darton and Paige (1925)
17BBR2
Sturgis Quadrangle, South Dakota, SW1/4 sec. 7, T5N, R4E. Deadwood Formation, 50' from base, hard green shale and brown siltstone. Sample is muscovitic, silty claystone. Furnish and others (1936), Darton and Paige (1925)
17CBR1
Spearfish Quadrangle, South Dakota, North Trojan, South Dakota. Deadwood Formation, 4' below 17CBR2, dark green fissile shale with interbedded limestone pebble conglomerate. Sample is silty claystone. Furnish and others (1936), Darton and Paige (1925)
17CBR2
Spearfish Quadrangle, South Dakota, North Trojan, South Dakota. Deadwood Formation 50' from base, dark green fissile shale with interbedded limestone pebble conglomerate. Sample is silty claystone. Furnish and others (1936), Darton and Paige (1925)
17DBR1
Spearfish Quadrangle, South Dakota, North Trojan, South Dakota. Deadwood Formation, 3' below 17DBR2, dark gray to black fissile shale. Sample is claystone. Furnish and others (1936), Darton and Paige (1925)
17DBR2
Spearfish Quadrangle, South Dakota, North Trojan, South Dakota. Deadwood Formation, 70' from base, dark gray to black fissile shale. Sample is claystone. Furnish and others (1936), Darton and Paige (1925)
17EBR1
Nemo Quadrangle, South Dakota, N1/2 sec. 27, T3N, R5E. Deadwood Formation, 55' from base, varigated sandstone with red and green shale and siltstone. Sample is glauconitic subarkose. Furnish and others (1936), Darton and Paige (1925)
17EBR2
Nemo Quadrangle, South Dakota, N1/2 sec. 27, T3N, R5E. Deadwood Formation, 60' from base, varigated sandstone with red and green shale and siltstone. Sample is calcareous, glauconitic subarkose. Furnish and others (1936), Darton and Paige (1925)
17FBR1
Piedmont Quadrangle, South Dakota, NW1/4 sec. 12, T3N, R5E. Deadwood Formation, 30' from base, dark green argillaceous shale and glauconitic sandstone. Sample is silty claystone. Furnish and others (1936), Darton and Paige (1925)

17FBR2
Piedmont Quadrangle, South Dakota, NW1/4 sec. 12, T3N,R5E. Deadwood Formation, 40' from base, dark green argillaceous shale and glauconitic sandstone. Sample is glauconitic, argillaceous arenite. Furnish and others (1936), Darton and Paige (1925)
17GBR1
Rapid City West Quadrangle, South Dakota, E1/2 sec. 17, T1N,R6E. Deadwood Formation, 40' from base, interbedded glauconitic sandstone, siltstone, and green shale. Sample is glauconitic, calcareous subarkose. Furnish and others (1936), Darton and Paige (1925)
17GBR2
Rapid City West Quadrangle, South Dakota, E1/2 sec. 14, T1N,R6E. Deadwood Formation, 4' below 17GBR1, interbedded glauconitic sandstone, siltstone, and green shale. Sample is glauconitic dolomite. Furnish and others (1936), Darton and Paige (1925)
17HBR1
Rapid City West Quadrangle, South Dakota, E1/2 sec. 14, T1N,R6E. Deadwood Formation, 1' below 17HBR2, interbedded glauconitic sandstone, siltstone, and shale. Sample is glauconitic, sandy dolomite. Furnish and others (1936), Darton and Paige (1925)
17HBR2
Rapid City West Quadrangle, South Dakota, E1/2 sec. 14, T1N,R6E. Deadwood Formation, 35' from base, interbedded glauconitic sandstone, siltstone, and shale. Sample is glauconitic, calcareous, ferruginous, sandy dolomite. Furnish and others (1936), Darton and Paige (1925)
18ABR1
Grand Canyon, Arizona, Cottonwood Creek, west of Horseshoe Mesa. Bright Angel Shale, 70' from top, green shale with interbedded sandstone. Sample is muscovitic, biotitic, glauconitic siltstone. Noble (1922)
18ABR2
Grand Canyon, Arizona, Cottonwood Creek, west of Horseshoe Mesa. Bright Angel Shale, 50' from base, green shale with interbedded sandstone. Sample is glauconitic, pyritic, sandy claystone. Noble (1922)
18BBR1
Grand Canyon, Arizona, north of Moran Point. Bright Angel Shale, 25' from top, green shale and coarse glauconitic sandstone. Sample is muscovitic, glauconitic, sandy claystone. Noble (1922)
18BBR2
Grand Canyon, Arizona, north of Moran Point. Bright Angel Shale, 45' from top, gray-green fissle shale. Sample is claystone. Noble (1922)
18CBR1
Bright Angel Quadrangle, Arizona, Garden Creek. Bright Angel Shale, 75' from top, thin-bedded, green, silty shale with some sandstone. Sample is glauconitic litharenite. Noble (1922), Maxson (1961)

18CBR2
Bright Angel Quadrangle, Arizona, Garden Creek. Bright Angel Shale, 250' from top, green micaceous shale with thin beds of sandstone. Sample is muscovitic, argillaceous siltstone. Noble (1922), Maxson (1961)
18DBR1
Bright Angel Quadrangle, Arizona, near Kaibab Trail. Bright Angel Shale, 200' from top, thin-bedded, silty, micaceous, green and purple shale. Sample is glauconitic, muscovitic, ferruginous, sandy siltstone. Noble (1922), Maxson (1961)
18DBR2
Bright Angel Quadrangle, Arizona, near Kaibab Trail. Bright Angel Shale, 235' from top, thin-bedded, silty, micaceous, green shale. Sample is glauconitic, muscovitic, ferruginous, sandy siltstone. Noble (1922), Maxson (1961)
18EBR1
Camp Wood Quadrangle, Arizona, 1 mile west of Geo Wood Canyon. Bright Angel Shale, 80' from top, sandy green shale. Sample is claystone. Wood (1955), McNair (1951), Krieger (1965)
18EBR2
Camp Wood Quadrangle, Arizona, 1 mile west of Geo Wood Canyon. Bright Angel Shale, 100' from top, silty green shale. Sample is silty claystone. Wood (1955), McNair (1951), Krieger (1965)
18FBR1
Camp Wood Quadrangle, Arizona, NE1/4 sec. 18, T18N,R6W. Bright Angel Shale, 20' from base, green shale. Sample is claystone. Wood (1955), McNair (1951), Krieger (1965)
18FBR2
Camp Wood Quadrangle, Arizona, NE1/4 sec. 18, T18N,R6W. Bright Angel Shale, 35' from base, green shale. Sample is glauconitic, dolomitic, argillaceous siltstone. Wood (1955), McNair (1951), Krieger (1965)
18GBR1
Camp Wood Quadrangle, Arizona, SE1/4 sec. 1, T18N,R6W. Bright Angel Shale, 10' from top, green shale. Sample is claystone. Wood (1955), McNair (1951), Krieger (1965)
18GBR2
Camp Wood Quadrangle, Arizona, SE1/4 sec. 1, T18N,R6W. Bright Angel Shale, 5' from top, green shale. Sample is muscovitic, silty claystone. Wood (1955), McNair (1951), Krieger (1965)
18HBR1
Camp Wood Quadrangle, Arizona, SW1/4 sec. 12, T18N,R6W. Bright Angel Shale, 75' from top, interbedded green silty shale and fine-grained quartzite. Sample is muscovitic, biotitic, glauconitic, ferruginous litharenite. Wood (1955), McNair (1951), Krieger (1965)
18HBR2
Camp Wood Quadrangle, Arizona, SW1/4 sec. 12, T18N,R6W. Bright Angel Shale, 85' from top, green shale. Sample is claystone. Wood (1955), McNair (1951), Krieger (1965)

Table B2.--Ranges and percentile concentrations of oxides/elements from 336 analyses of shales and siltstones of the Sauk sequence [-,percentile not determined because of insufficient data]

Oxide/element	Minimum_/	Percentile									Maximum
		1	2.5	5	10	50	90	95	97.5	99	
						Percent					
SiO2	11.4 (0)	13.9	19.0	26.0	48.3	58.7	71.2	76.9	79.0	79.5	84.0
Al2O3	2.50(0)	3.49	3.70	5.06	7.41	16.7	23.40	24.50	25.42	26.10	28.80
Fe2O3	0.01(2)	0.33	0.78	1.00	1.31	3.30	5.89	8.02	10.62	11.44	18.90
FeO	0.12(0)	0.20	0.24	0.32	0.40	1.70	3.80	4.57	5.03	5.10	5.50
MgO	0.04(0)	0.12	0.25	0.41	0.65	1.80	3.70	8.70	12.45	14.84	16.30
CaO	0.01(4)	-	0.08	0.15	0.30	1.10	11.73	22.31	25.02	36.74	40.20
Na2O	0.01(10)	-	-	0.02	0.05	0.26	1.00	1.47	1.81	2.43	3.80
K2O	1.10(0)	1.40	1.80	2.10	3.01	5.75	8.79	9.57	10.10	10.51	12.80
H2O+	0.50(0)	0.69	0.76	0.89	1.10	2.70	4.39	4.97	5.41	5.60	5.80
H2O-	0.01(3)	0.03	0.06	0.08	0.12	0.49	1.40	1.80	2.41	2.60	4.20
TiO2	0.10(0)	0.12	0.13	0.18	0.33	0.76	0.98	1.10	1.21	1.30	2.90
P2O5	0.01(1)	0.03	0.05	0.06	0.07	0.13	0.46	0.71	1.20	2.03	10.30
MnO	0.01(33)	-	-	-	0.02	0.06	0.12	0.16	0.21	0.37	0.85
CO2	0.05(107)	-	-	-	-	0.08	8.94	24.45	32.09	35.94	36.90
						Parts per million					
Ag	0.46(312)	-	-	-	-	-	-	0.6	0.8	1.0	1.6
As	220 (333)	-	-	-	-	-	-	-	-	220	670
B	5 (1)	17	21	29	43	110	210	240	260	270	300
Ba	95 (0)	119	120	163	230	580	1000	1200	1600	1900	3200
Be	1.0 (45)	-	-	-	-	1.7	2.7	3.2	3.7	4.9	9.8
Co	2.0 (0)	2.5	3.3	5.1	6.9	15	26	29	32	57	65
Cr	5.4 (0)	9.6	12	16	23	59	99	120	141	161	200
Cu	0.86(0)	1.2	1.5	1.8	2.8	15	41	56	69	80	140
La	24 (0)	27	33	39	44	63	90	98	121	121	150
Mo	1.0 (18)	-	-	-	1.2	2.3	3.5	4.7	5.9	7.0	11.0
Nb	2.2 (13)	-	-	3.1	6.2	20	33	38	47	63	76
Ni	2.8 (0)	4.6	5.6	7.5	11	32	52	62	72	79	86
Pb	2.8 (0)	3.3	4.8	5.8	7.4	14	23	40	52	535	620
Sc	2.9 (0)	4.2	4.7	5.4	7.7	17	24	25	26	27	30
Sn	4.6 (327)	-	-	-	-	-	-	-	4.9	5.7	1178
Sr	64 (0)	67	75	93	100	150	280	377	470	895	1500
V	9.2 (0)	9.8	13	17	26	61	89	98	110	130	280
Y	6.9 (0)	8.3	13	15	17	41	62	75	92	100	140
Zn	15 (10)	-	-	20	29	65	110	130	150	445	1200
Zr	51 (0)	63	79	83	97	220	622	771	954	1100	1300
Ce	46 (1)	65	77	87	100	140	200	240	301	331	370
Ga	2.2 (20)	-	-	-	4	15	23	25	26	28	33
Ge	0.46(196)	-	-	-	-	-	2.1	2.4	2.7	3.0	3.8
Li	100 (324)	-	-	-	-	-	-	-	152	211	250
Yb	0.54(0)	0.76	0.98	1.2	1.6	3.3	6.1	7.5	11	13	16
Pr	68 (334)	-	-	-	-	-	-	-	-	-	70
Nd	46 (149)	-	-	-	-	53	93	110	120	120	150
Sm	46 (302)	-	-	-	-	-	47	49	51	54	62
Eu	1.0 (58)	-	-	-	-	2.6	4.0	4.6	4.9	7.3	13
Gd	2.2 (111)	-	-	-	-	8.5	26	31	34	37	43
Tb	22 (335)	-	-	-	-	-	-	-	-	-	22
Dy	10 (326)	-	-	-	-	-	-	10	15	29	58
Er	4.6 (302)	-	-	-	-	-	4.7	5.2	5.6	6.2	8.4
Ta	2.2 (335)	-	-	-	-	-	-	-	-	-	2.8
Ir	46 (335)	-	-	-	-	-	-	-	-	-	52

/Minimum reported value. Value in parentheses is the number of determinations reported as below the minimum.

Table B3.--Median concentrations of oxides/elements in shales and siltstones of the Sauk sequence in 18 regions of the western U. S. --- continued

Parts per million

Locality	B	Ba	Be	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sr
Southwestern Montana	155.	585.	1.	17.	86.	13.	60.	2.	16.	42.	13.	16.	16
Central Wyoming	130.	515.	2.	21.	55.	12.	84.	3.	12.	27.	17.	13.	18
Southeastern Nevada	83.	740.	2.	19.	63.	10.	65.	3.	25.	37.	9.	19.	11
Northern Arizona	195.	580.	2.	15.	61.	23.	71.	2.	23.	34.	17.	22.	21
Northern Utah	82.	770.	2.	17.	58.	15.	61.	2.	18.	34.	11.	18.	11
Eastern Nevada	55.	725.	2.	10.	46.	18.	64.	2.	24.	21.	15.	15.	16
Western South Dakota	140.	370.	1.	16.	58.	23.	54.	2.	11.	27.	13.	14.	20
Southeastern Arizona	76.	530.	2.	14.	49.	13.	67.	2.	33.	24.	17.	19.	12
Central Colorado	25.	125.	1.	6.	14.	3.	39.	3.	9.	10.	7.	5.	17
North-Central Montana	150.	595.	2.	20.	83.	35.	61.	3.	14.	48.	13.	18.	14
Northwestern Montana	165.	500.	1.	26.	115.	10.	55.	3.	14.	68.	16.	17.	15
Southeastern Utah	84.	870.	2.	14.	75.	23.	73.	3.	23.	41.	20.	21.	26
Southern California	189.	340.	2.	16.	80.	34.	63.	3.	23.	44.	11.	22.	13
South-Central Arizona	70.	974.	1.	8.	26.	8.	57.	2.	22.	13.	40.	12.	12
Central Nevada	145.	837.	2.	10.	53.	4.	60.	2.	18.	15.	15.	15.	11
Central Utah	145.	484.	2.	17.	77.	8.	63.	2.	25.	41.	14.	19.	18
West-Central Colorado	92.	478.	1.	10.	41.	3.	47.	1.	20.	17.	8.	12.	12
North-Central Wyoming	110.	450.	1.	22.	63.	15.	54.	3.	9.	34.	19.	12.	15

Parts per million

Locality	V	Y	Zn	Zr	Ce	Ga	Yb	Eu
Southwestern Montana	62.	24.	67.	135.	130.	14.	2.	3.
Central Wyoming	49.	56.	73.	480.	200.	7.	5.	3.
Southeastern Nevada	70.	43.	100.	220.	140.	16.	4.	2.
Northern Arizona	73.	46.	63.	210.	160.	17.	4.	3.
Northern Utah	63.	42.	47.	235.	140.	15.	3.	3.
Eastern Nevada	50.	44.	62.	255.	150.	11.	4.	3.
Western South Dakota	39.	21.	43.	150.	125.	10.	2.	2.
Southeastern Arizona	61.	50.	65.	295.	150.	16.	4.	3.
Central Colorado	20.	9.	41.	92.	82.	2.	1.	1.
North-Central Montana	72.	15.	99.	105.	120.	17.	2.	1.
Northwestern Montana	73.	18.	110.	115.	135.	19.	2.	2.
Southeastern Utah	74.	42.	115.	169.	150.	20.	3.	3.
Southern California	64.	28.	85.	115.	130.	20.	3.	3.
South-Central Arizona	47.	51.	106.	307.	130.	7.	4.	3.
Central Nevada	55.	40.	46.	261.	145.	12.	3.	3.
Central Utah	67.	35.	60.	162.	140.	20.	3.	2.
West-Central Colorado	36.	22.	31.	205.	98.	11.	2.	2.
North-Central Wyoming	58.	30.	75.	228.	140.	10.	2.	2.

Table B3.--Median concentrations of oxides/elements in shales and siltstones of the Sauk sequence in 18 regions of the western U. S.

Percent

Locality	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O+	H_2O-	TiO_2	P_2O_5	MnO
Southwestern Montana	54.45	18.40	3.85	1.85	2.30	1.93	0.20	5.90	2.85	0.62	0.78	0.12	0.06
Central Wyoming	61.95	11.30	4.80	1.65	1.90	1.20	0.15	4.70	2.80	0.99	0.61	0.38	0.06
Southeastern Nevada	61.20	18.80	2.80	3.30	1.85	0.83	0.71	5.20	3.25	0.29	0.87	0.12	0.05
Northern Arizona	59.45	19.75	4.35	0.72	1.50	0.63	0.14	7.05	3.25	0.99	0.84	0.12	0.06
Northern Utah	63.10	16.45	2.20	3.30	1.90	0.67	0.15	6.10	2.55	0.19	0.77	0.14	0.05
Eastern Nevada	61.30	14.10	2.42	1.43	1.00	0.81	0.48	4.75	2.00	0.16	0.71	0.12	0.08
Western South Dakota	60.10	10.35	3.30	1.24	1.90	2.74	0.20	6.90	1.75	0.60	0.46	0.21	0.08
Southeastern Arizona	57.25	16.75	2.15	2.50	2.30	2.00	0.24	6.55	2.29	0.27	0.86	0.10	0.05
Central Colorado	16.60	4.30	1.15	0.28	14.19	23.27	0.16	2.58	0.87	0.21	0.16	0.04	0.11
North-Central Montana	53.25	19.50	4.62	2.85	3.28	1.20	0.14	5.75	4.04	2.24	0.86	0.14	0.05
Northwestern Montana	52.95	21.25	5.24	3.10	2.60	0.74	0.24	5.70	5.60	1.35	0.93	0.07	0.05
Southeastern Utah	55.60	22.17	1.90	4.55	1.75	0.79	1.02	4.10	3.90	0.47	0.80	0.11	0.02
Southern California	52.00	24.65	3.40	3.04	2.40	1.30	0.43	6.15	4.10	0.72	0.79	0.14	0.06
South-Central Arizona	71.05	12.95	3.15	0.40	0.22	0.19	0.23	8.95	1.14	0.13	0.66	0.10	0.03
Central Nevada	63.65	15.33	4.42	0.59	0.68	1.81	0.25	5.65	2.65	0.36	0.75	0.14	0.08
Central Utah	55.75	22.05	3.70	1.12	1.70	1.30	0.63	4.60	3.85	0.74	0.78	0.12	0.05
West-Central Colorado	58.40	13.25	1.45	1.00	3.75	4.65	0.19	8.65	1.65	0.41	0.58	0.17	0.05
North-Central Wyoming	60.10	12.25	8.35	1.07	2.65	1.55	0.14	5.14	3.60	2.20	0.71	0.62	0.07

(Continued on next page)

Table B4.--Average concentrations of oxides/elements in shales and siltstones of the Sauk sequence in 18 regions of the western U. S. --- continued

Parts per million

Locality	B	Ba	Be	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sr
Southwestern Montana	137.	563.	1.	15.	82.	15.	57.	2.	13.	39.	16.	15.	179.
Central Wyoming	121.	469.	2.	20.	47.	11.	77.	3.	10.	26.	18.	12.	187.
Southeastern Nevada	72.	634.	2.	16.	55.	10.	62.	2.	24.	29.	10.	17.	116.
Northern Arizona	176.	570.	2.	16.	61.	18.	73.	2.	21.	31.	16.	22.	235.
Northern Utah	94.	614.	2.	15.	63.	11.	59.	2.	19.	34.	11.	17.	110.
Eastern Nevada	49.	766.	2.	11.	41.	10.	65.	2.	19.	19.	15.	14.	172.
Western South Dakota	115.	321.	2.	18.	50.	25.	55.	2.	8.	26.	12.	11.	246.
Southeastern Arizona	73.	478.	2.	12.	42.	13.	69.	2.	34.	21.	18.	16.	136.
Central Colorado	22.	138.	1.	6.	13.	3.	39.	2.	7.	8.	6.	5.	181.
North-Central Montana	143.	544.	1.	20.	91.	36.	63.	2.	14.	51.	13.	17.	138.
Northwestern Montana	183.	478.	1.	26.	116.	12.	60.	3.	14.	70.	16.	17.	154.
Southeastern Utah	83.	824.	2.	14.	78.	25.	73.	3.	21.	41.	20.	22.	221.
Southern California	200.	346.	2.	17.	80.	22.	62.	3.	22.	44.	11.	23.	133.
South-Central Arizona	63.	1101.	1.	7.	24.	9.	62.	2.	22.	13.	46.	12.	126.
Central Nevada	153.	1022.	2.	8.	55.	6.	59.	2.	19.	19.	15.	16.	112.
Central Utah	121.	508.	2.	15.	60.	8.	61.	2.	23.	29.	14.	16.	166.
West-Central Colorado	89.	484.	1.	10.	39.	3.	48.	1.	21.	18.	7.	12.	122.
North-Central Wyoming	132.	470.	1.	13.	63.	14.	56.	3.	9.	25.	20.	11.	155.

Parts per million

Locality	V	Y	Zn	Zr	Ce	Ga	Yb	Eu
Southwestern Montana	57.	25.	75.	148.	129.	14.	2.	2.
Central Wyoming	47.	57.	65.	506.	205.	8.	5.	2.
Southeastern Nevada	59.	44.	88.	221.	143.	13.	4.	2.
Northern Arizona	71.	46.	61.	242.	161.	17.	5.	3.
Northern Utah	61.	37.	47.	235.	139.	14.	3.	3.
Eastern Nevada	48.	45.	52.	289.	149.	10.	4.	2.
Western South Dakota	36.	25.	39.	176.	129.	7.	2.	2.
Southeastern Arizona	53.	54.	59.	349.	152.	14.	5.	2.
Central Colorado	24.	9.	30.	87.	77.	2.	1.	1.
North-Central Montana	76.	18.	101.	115.	124.	17.	2.	1.
Northwestern Montana	72.	18.	110.	116.	130.	19.	2.	2.
Southeastern Utah	76.	40.	115.	165.	150.	19.	3.	3.
Southern California	68.	30.	84.	119.	134.	21.	3.	3.
South-Central Arizona	42.	45.	130.	298.	128.	7.	3.	2.
Central Nevada	56.	41.	48.	289.	144.	13.	3.	2.
Central Utah	59.	34.	49.	180.	146.	15.	3.	2.
West-Central Colorado	36.	23.	33.	191.	96.	10.	2.	2.
North-Central Wyoming	50.	30.	59.	279.	143.	8.	3.	2.

Table B4.--Average concentrations of oxides/elements in shales and siltstones of the Sauk sequence in 18 regions of the western U. S.

[The averages for SiO_2 are arithmetic means; all other averages are geometric means]

	Percent												
Locality	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O^+	H_2O^-	TiO_2	P_2O_5	MnO
Southwestern Montana	51.38	16.28	3.09	1.77	2.52	2.43	0.16	5.67	2.85	0.56	0.67	0.13	0.07
Central Wyoming	63.63	11.11	5.30	1.35	1.71	1.19	0.14	4.72	2.66	0.83	0.64	0.34	0.05
Southeastern Nevada	62.17	17.18	1.94	2.64	1.55	0.96	0.66	4.35	2.86	0.26	0.75	0.12	0.05
Northern Arizona	60.36	17.77	4.27	0.72	1.37	0.66	0.17	6.88	3.20	0.89	0.85	0.13	0.05
Northern Utah	60.98	16.38	2.18	2.68	1.92	0.67	0.16	5.82	2.32	0.20	0.75	0.13	0.04
Eastern Nevada	59.96	13.28	2.31	1.12	0.96	1.21	0.49	4.21	1.85	0.16	0.55	0.13	0.06
Western South Dakota	53.26	9.33	3.35	1.07	2.21	2.78	0.14	5.47	1.70	0.58	0.40	0.28	0.07
Southeastern Arizona	60.25	16.00	2.23	1.73	1.89	2.11	0.22	6.76	2.04	0.26	0.80	0.16	0.04
Central Colorado	17.41	4.07	1.20	0.27	11.78	25.64	0.11	2.44	0.93	0.31	0.17	0.05	0.10
North-Central Montana	53.54	19.93	4.45	2.79	3.25	1.14	0.10	5.79	4.19	1.99	0.89	0.14	0.04
Northwestern Montana	53.78	20.93	4.82	2.99	2.55	0.42	0.24	5.69	5.25	1.30	0.94	0.08	0.04
Southeastern Utah	55.00	21.44	1.07	3.61	1.68	1.14	0.93	4.22	3.97	0.52	0.70	0.13	0.03
Southern California	52.16	24.46	3.61	2.91	2.46	1.26	0.39	6.13	4.11	0.74	0.80	0.15	0.05
South-Central Arizona	71.68	12.79	2.58	0.39	0.18	0.21	0.21	8.65	1.27	0.10	0.58	0.10	0.04
Central Nevada	62.46	15.30	4.02	0.61	0.65	1.88	0.21	5.56	2.67	0.43	0.73	0.13	0.05
Central Utah	59.81	17.54	3.08	0.94	1.53	1.18	0.37	4.99	2.98	0.66	0.64	0.15	0.04
West-Central Colorado	57.80	13.30	1.48	1.06	3.10	4.55	0.19	7.76	1.57	0.38	0.56	0.17	0.05
North-Central Wyoming	60.79	12.93	7.50	1.05	2.05	1.42	0.14	4.77	3.59	2.22	0.69	0.60	0.05

(Continued on next page)

Table B5.--Errors of the average concentrations given in table B4 --- continued

Locality	B	Ba	Be	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sr
Southwestern Montana	1.15	1.28	1.12	1.20	1.17	1.34	1.11	1.11	1.38	1.15	1.38	1.11	1.17
Central Wyoming	1.12	1.19	1.20	1.20	1.23	1.41	1.17	1.21	1.26	1.29	1.11	1.14	1.07
Southeastern Nevada	1.26	1.41	1.09	1.20	1.25	1.42	1.12	1.11	1.11	1.31	1.18	1.23	1.06
Northern Arizona	1.20	1.16	1.09	1.18	1.05	1.31	1.06	1.12	1.13	1.20	1.18	1.04	1.12
Northern Utah	1.21	1.38	1.11	1.24	1.34	1.91	1.07	1.19	1.16	1.19	1.24	1.15	1.28
Eastern Nevada	1.36	1.13	1.38	1.27	1.49	2.38	1.13	1.17	1.37	1.53	1.33	1.17	1.18
Western South Dakota	1.32	1.63	1.24	1.25	1.47	1.20	1.07	1.54	1.86	1.29	1.47	1.35	1.38
Southeastern Arizona	1.29	1.19	1.19	1.67	1.31	1.94	1.23	1.32	1.20	1.62	1.36	1.24	1.11
Central Colorado	1.33	1.06	1.04	1.07	1.19	1.13	1.14	1.25	1.10	1.18	1.13	1.16	1.09
North-Central Montana	1.05	1.08	1.07	1.04	1.08	1.17	1.05	1.05	1.11	1.07	1.10	1.06	1.09
Northwestern Montana	1.04	1.12	1.10	1.03	1.04	1.34	1.07	1.08	1.07	1.03	1.03	1.03	1.04
Southeastern Utah	1.06	1.05	1.09	1.04	1.07	1.06	1.04	1.04	1.07	1.02	1.08	1.04	1.13
Southern California	1.12	1.03	1.02	1.03	1.04	1.25	1.04	1.02	1.07	1.05	1.11	1.03	1.04
South-Central Arizona	1.13	1.21	1.09	1.08	1.15	1.64	1.07	1.24	1.13	1.12	2.82	1.23	1.05
Central Nevada	1.24	1.23	1.07	1.30	1.16	1.35	1.11	1.15	1.13	1.19	1.15	1.08	1.04
Central Utah	1.10	1.09	1.07	1.25	1.22	1.58	1.06	1.16	1.08	1.30	1.14	1.14	1.06
West-Central Colorado	1.07	1.06	1.07	1.04	1.05	1.13	1.10	1.09	1.05	1.06	1.05	1.05	1.05
North-Central Wyoming	1.08	1.14	1.06	1.41	1.17	1.28	1.05	1.02	1.13	1.43	1.22	1.19	1.02

Locality	V	Y	Zn	Zr	Ce	Ga	Yb	Eu
Southwestern Montana	1.26	1.22	1.12	1.32	1.09	1.16	1.27	1.19
Central Wyoming	1.15	1.11	1.10	1.16	1.13	1.25	1.17	1.30
Southeastern Nevada	1.29	1.11	1.17	1.35	1.09	1.35	1.15	1.15
Northern Arizona	1.07	1.06	1.10	1.35	1.06	1.11	1.19	1.19
Northern Utah	1.19	1.24	1.44	1.22	1.06	1.17	1.16	1.06
Eastern Nevada	1.53	1.18	1.53	1.39	1.07	1.60	1.05	1.20
Western South Dakota	1.47	1.28	1.23	1.31	1.14	2.08	1.41	1.39
Southeastern Arizona	1.18	1.13	1.37	1.57	1.19	1.29	1.39	1.16
Central Colorado	1.46	1.13	1.31	1.12	1.19	1.00	1.08	1.13
North-Central Montana	1.06	1.08	1.03	1.16	1.05	1.08	1.06	1.20
Northwestern Montana	1.03	1.11	1.03	1.17	1.06	1.04	1.06	1.19
Southeastern Utah	1.09	1.06	1.03	1.20	1.04	1.08	1.03	1.04
Southern California	1.04	1.07	1.02	1.05	1.05	1.03	1.02	1.06
South-Central Arizona	1.18	1.17	2.28	1.13	1.06	1.21	1.17	1.28
Central Nevada	1.12	1.08	1.21	1.21	1.13	1.16	1.02	1.17
Central Utah	1.16	1.11	1.27	1.31	1.02	1.22	1.09	1.14
West-Central Colorado	1.07	1.03	1.05	1.05	1.05	1.08	1.02	1.15
North-Central Wyoming	1.12	1.24	1.21	1.29	1.06	1.30	1.12	1.46

Table B5.--Errors of the average concentrations given in table B4

[The values for SiO2 are standard errors; all other values are geometric errors]

Locality	SiO2	Al2O3	Fe2O3	FeO	MgO	CaO	Na2O	K2O	H2O+	H2O-	TiO2	P2O5	MnO
Southwestern Montana	7.47	1.09	1.17	1.18	1.55	1.66	1.40	1.12	1.14	1.36	1.16	1.26	1.24
Central Wyoming	3.06	1.11	1.23	1.49	1.12	1.60	1.27	1.12	1.14	1.23	1.18	1.25	1.26
Southeastern Nevada	2.98	1.13	1.53	1.37	1.22	1.27	1.33	1.21	1.10	1.49	1.23	1.10	1.21
Northern Arizona	1.94	1.10	1.16	1.18	1.10	1.19	1.29	1.05	1.08	1.18	1.03	1.13	1.20
Northern Utah	3.44	1.14	1.21	1.25	1.09	2.47	2.60	1.13	1.23	1.66	1.14	1.58	1.68
Eastern Nevada	4.15	1.39	1.43	1.35	1.22	3.37	1.41	1.16	1.39	1.28	1.31	1.12	1.18
Western South Dakota	10.47	1.65	1.34	1.58	1.90	2.66	1.91	1.67	1.16	1.44	1.51	1.97	1.55
Southeastern Arizona	6.25	1.11	1.17	1.78	1.54	2.22	1.33	1.12	1.57	1.91	1.12	2.20	1.28
Central Colorado	2.49	1.15	1.08	1.12	1.14	1.11	1.37	1.15	1.11	1.68	1.21	1.14	1.16
North-Central Montana	0.21	1.01	1.08	1.07	1.10	1.23	1.48	1.02	1.04	1.10	1.06	1.12	1.16
Northwestern Montana	1.20	1.02	1.09	1.03	1.03	1.40	1.15	1.02	1.03	1.06	1.03	1.08	1.28
Southeastern Utah	1.22	1.06	1.60	1.12	1.04	1.47	1.20	1.03	1.05	1.22	1.08	1.09	1.34
Southern California	0.23	1.02	1.07	1.08	1.03	1.16	1.08	1.01	1.01	1.05	1.01	1.11	1.23
South-Central Arizona	1.69	1.09	1.14	1.11	1.28	1.51	1.20	1.04	1.09	1.33	1.17	1.08	1.29
Central Nevada	3.44	1.10	1.10	1.15	1.16	1.82	1.16	1.02	1.07	1.18	1.04	1.13	1.37
Central Utah	3.54	1.15	1.15	1.20	1.08	1.67	1.49	1.07	1.18	1.31	1.13	1.17	1.11
West-Central Colorado	1.91	1.06	1.07	1.06	1.21	1.23	1.45	1.05	1.05	1.08	1.07	1.05	1.11
North-Central Wyoming	2.97	1.13	1.09	1.20	1.19	1.05	1.20	1.11	1.11	1.06	1.05	1.31	1.63

(Continued on next page)

Table B6.--Variance components in compositional data on shales and siltstones of the Sauk sequence in the western U.S.

		Variance components [Values in parentheses are percentages of the total variance. *indicates statistical significance at 0.05 probability, **at 0.01; some tests were performed on pooled variance estimates]						vm_/	
Oxide/ element	Total variance (of logs except where noted)	Between regions	Between areas	Between pairs of sections)	Between sections	Between samples	Between analyses	Minimum	Maximum
SiO2	174.2_/	31.3 (18)	5.7 (3)	53.4 (31**)	0.0 (0)	76.1 (44**)	7.6 (4)	0.4	1.5
Al2O3	0.0455	0.0072(16)	0.0158(35**)	0.0 (0)	0.0 (0)	0.0178(39**)	0.0047(10)	0.3	0.8
Fe2O3	0.1182	0.0221(19*)	0.0020(2)	0.0147(12*)	0.0 (0)	0.0307(26**)	0.0487(41)	0.7	2.7
FeO	0.1524	0.0436(29**)	0.0042(3)	0.0356(23**)	0.0 (0)	0.0598(39**)	0.0093(6)	0.8	2.9
MgO	0.1338	0.0475(35**)	0.0 (0)	0.0367(27**)	0.0 (0)	0.0387(29**)	0.0109(8)	1.0	4.0
CaO	0.4496	0.0 (0)	0.1323(29*)	0.0460(10*)	0.0 (0)	0.1945(43**)	0.0769(17)	0.0	0.0
Na2O	0.2735	0.0188(7)	0.0388(14)	0.0231(8*)	0.0031(1)	0.0705(26**)	0.1191(44)	0.2	0.6
K2O	0.0362	0.0 (0)	0.0114(32**)	0.0033(9*)	0.0003(1)	0.0130(36**)	0.0082(23)	0.0	0.0
H2O+	0.0520	0.0102(20)	0.0138(26**)	0.0025(5)	0.0013(3)	0.0184(35**)	0.0058(11)	0.5	1.1
H2O-	0.2077	0.0725(35**)	0.0162(8)	0.0246(12**)	0.0158(8)	0.0440(21**)	0.0346(17)	1.1	3.6
TiO2	0.0496	0.0085(17)	0.0110(22**)	0.0004(1)	0.0013(3)	0.0206(41**)	0.0078(16)	0.5	1.2
P2O5	0.1285	0.0 (0)	0.0513(40**)	0.0098(8*)	0.0 (0)	0.0364(28**)	0.0310(24)	0.0	0.0
MnO	0.1566	0.0 (0)	0.0019(1)	0.0028(2)	0.0118(8)	0.0018(1)	0.1383(88)	0.0	0.0
B	0.0852	0.0341(40**)	0.0024(3)	0.0 (0)	0.0140(16**)	0.0244(29**)	0.0104(12)	2.0	7.1
Ba	0.0656	0.0089(14)	0.0103(16)	0.0130(20**)	0.0026(4)	0.0259(40**)	0.0048(7)	0.3	0.9
Be	0.0419	0.0077(18)	0.0035(8*)	0.0 (0)	0.0045(11)	0.0188(45**)	0.0073(17)	0.7	2.1
Co	0.0614	0.0035(6)	0.0094(15*)	0.0039(6)	0.0094(15*)	0.0316(52**)	0.0036(6)	0.1	0.4
Cr	0.0676	0.0125(18*)	0.0105(16)	0.0100(15**)	0.0 (0)	0.0316(47**)	0.0030(4)	0.4	1.3
Cu	0.2186	0.0 (0)	0.0479(22*)	0.0027(1)	0.0503(23**)	0.1036(47**)	0.0142(6)	0.0	0.0
La	0.0171	0.0017(10*)	0.0 (0)	0.0028(16)	0.0025(14*)	0.0071(42**)	0.0030(18)	0.3	1.1
Mo	0.0471	0.0 (0)	0.0090(19*)	0.0 (0)	0.0101(21**)	0.0210(44**)	0.0071(15)	0.0	0.0
Nb	0.1131	0.0217(19)	0.0219(19**)	0.0008(1)	0.0 (0)	0.0291(26**)	0.0395(35)	0.6	1.5
Ni	0.0762	0.0089(12)	0.0187(25**)	0.0028(4)	0.0032(4)	0.0393(52**)	0.0033(4)	0.3	0.7
Pb	0.0930	0.0093(10)	0.0008(1)	0.0 (0)	0.0408(44**)	0.0371(40**)	0.0049(5)	0.3	1.2
Sc	0.0396	0.0074(19*)	0.0018(5)	0.0062(16**)	0.0031(8)	0.0159(40**)	0.0051(13)	0.5	1.9
Sr	0.0433	0.0098(23*)	0.0 (0)	0.0098(23**)	0.0039(9)	0.0156(36**)	0.0042(10)	0.6	2.4
V	0.0538	0.0 (0)	0.0086(16**)	0.0049(9)	0.0034(6)	0.0335(62**)	0.0033(6)	0.0	0.0
Y	0.0502	0.0252(50*)	0.0032(6*)	0.0032(6)	0.0036(7*)	0.0104(21**)	0.0047(9)	2.2	6.9
Zn	0.0944	0.0098(10*)	0.0141(15**)	0.0 (0)	0.0388(41**)	0.0250(26**)	0.0066(7)	0.2	0.7
Zr	0.0948	0.0202(21)	0.0162(17**)	0.0 (0)	0.0125(13*)	0.0372(39**)	0.0087(9)	0.6	1.6
Ce	0.0184	0.0047(25**)	0.0 (0)	0.0018(10)	0.0024(13*)	0.0058(32**)	0.0038(20)	1.0	3.8
Ga	0.1064	0.0121(11)	0.0329(31**)	0.0014(1)	0.0077(7)	0.0456(43**)	0.0068(6)	0.2	0.6
Yb	0.0585	0.0267(46**)	0.0035(6)	0.0084(14**)	0.0035(6)	0.0122(21**)	0.0043(7)	1.6	5.2
Eu	0.0783	0.0014(2)	0.0 (0)	0.0103(13)	0.0096(12**)	0.0042(5)	0.0528(67)	0.1	0.3

_/Variance of percentage data, not logarithms.

_/Ratio of variance between regions to variance of the region means.

APPENDIX C

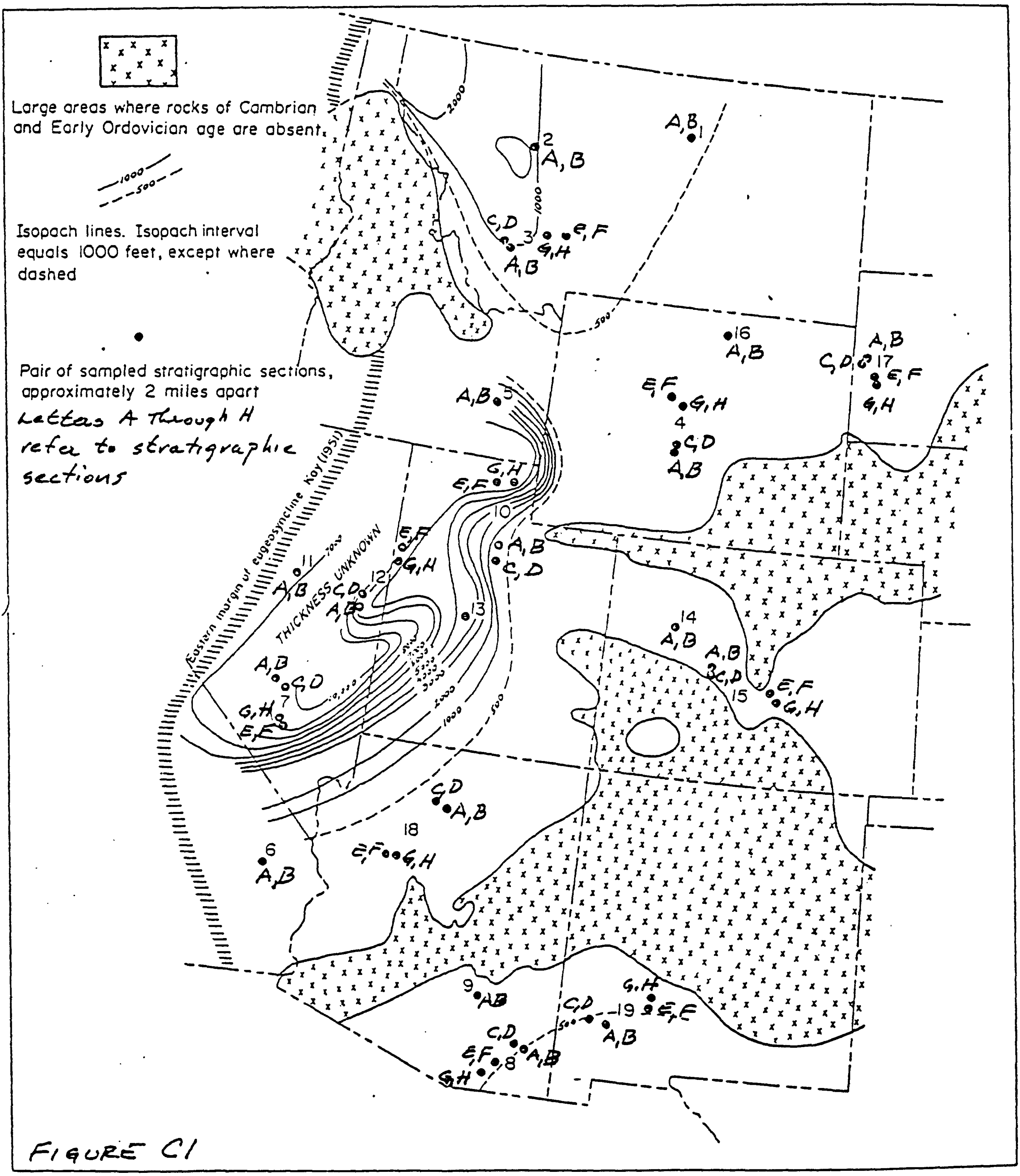

Large areas where rocks of Cambrian and Early Ordovician age are absent.
1000
500
Isopach lines. Isopach interval equals 1000 feet, except where dashed
Pair of sampled stratigraphic sections, approximately 2 miles apart
Letters A through H refer to stratigraphic sections
Eastern margin of eugeosyncline Kay (1951)
THICKNESS UNKNOWN
2000
1000
500
1 A,B
2 A,B
3 C,D E,F G,H A,B
4 E,F G,H C,D A,B
5 A,B
6 A,B
7 A,B C,D G,H E,F
8 C,D A,B E,F G,H
9 A,B
10 G,H E,F A,B C,D
11 A,B
12 E,F G,H C,D A,B
13
14 A,B
15 A,B C,D E,F G,H
16 A,B
17 A,B C,D E,F G,H
18 C,D A,B E,F G,H
19 G,H C,D E,F A,B

FIGURE C1

GENERALIZED ISOPACH MAP OF CAMBRO-ORDOVICIAN CARBONATE ROCKS SHOWING LOCATIONS OF SAMPLED STRATIGRAPHIC SECTIONS

	2ACR1							1ACR1											
	2ACR1							1ACR1											
	2ACR2							1ACR2a											
	2ACR2							1ACR2a											
	2BCR1							1BCR1											
	2BCR1			3ECR1	3GCR1			1BCR1											
	2BCR2	3ACR1	3CCR1	3ECR1	3GCR1			1BCR2a											
	2BCR2	3ACR1	3CCR1	3ECR2	3GCR2			1BCR2a											
		3ACR2	3CCR2	3ECR2	3GCR2							17ACR1		17CCR1					
		3ACR2	3CCR2	3FCR1	3HCR1					16ACR1		17ACR1		17CCR1					
		3BCR1	3DCR1	3FCR1	3HCR1					16ACR1		17ACR2a		17CCR2		17ECR1		17GCR1	
		3BCR1	3DCR1	3FCR2	3HCR2					16ACR2		17ACR2a		17CCR2		17ECR1		17GCR1	
		3BCR2	3DCR2	3FCR2	3HCR2					16ACR2		17BCR1a		17DCR1		17ECR2		17GCR2	
		3BCR2	3DCR2					4ECR1	4GCR1	16BCR1		17BCR1a		17DCR1		17ECR2		17GCR2	
				5ACR1a				4ECR1	4GCR1	16BCR1		17BCR2		17DCR2		17FCR1		17HCR1	
				5ACR1a				4ECR2	4GCR2	16BCR2		17BCR2		17DCR2		17FCR1		17HCR1	
				5ACR2a				4ECR2	4GCR2	16BCR2						17FCR2a		17HCR2	
				5ACR2a				4FCR1a	4HCR1							17FCR2a		17HCR2	
				5BCR1a				4FCR1a	4HCR1										
				5BCR1a		10ECR1a	10GCR1	4FCR2	4HCR2										
				5BCR2a		10ECR1a	10GCR1	4FCR2	4HCR2										
				5BCR2a		10ECR2	10GCR2	4ACR1	4CCR1a										
						10ECR2	10GCR2	4ACR1	4CCR1a								15ECR1		15GCR1
						10FCR1	10HCR1	4ACR2	4CCR2				15ACR1		15CCR1		15ECR1		15GCR1
11ACR1				12ECR1	12GCR1	10FCR1	10HCR1	4ACR2	4CCR2				15ACR1		15CCR1		15ECR2		15GCR2a
11ACR1		12ACR1	12CCR1	12ECR1	12GCR1	10FCR2	10HCR2	4BCR1	4DCR1		14ACR1		15ACR2		15CCR2		15ECR2		15GCR2a
11ACR2		12ACR1	12CCR1	12ECR2	12GCR2	10FCR2	10HCR2	4BCR1	4DCR1		14ACR1		15ACR2		15CCR2		15FCR1		15HCR1
11ACR2		12ACR2	12CCR2	12ECR2	12GCR2			4BCR2	4DCR2		14ACR2		15BCR1a		15DCR1		15FCR1		15HCR1
11BCR1		12ACR2	12CCR2	12FCR1	12HCR1	10ACR1	10CCR1	4BCR2	4DCR2		14ACR2		15BCR1a		15DCR1		15FCR2		15HCR2a
11BCR1		12BCR1	12DCR1	12FCR1	12HCR1	10ACR1	10CCR1				14BCR1		15BCR2		15DCR2		15FCR2		15HCR2a
11BCR2		12BCR1	12DCR1	12FCR2	12HCR2	10ACR2	10CCR2				14BCR1		15BCR2		15DCR2				
11BCR2		12BCR2	12DCR2	12FCR2	12HCR2	10ACR2	10CCR2				14BCR2								
		12BCR2	12DCR2			10BCR1a	10DCR1				14BCR2								
						10BCR1a	10DCR1												
			7ACR1	7CCR1		10BCR2	10DCR2												
			7ACR1	7CCR1		10BCR2	10DCR2												
	7ECR1	7GCR1	7ACR2	7CCR2															
	7ECR1	7GCR1	7ACR2	7CCR2			13ACR1												
	7ECR2	7GCR2	7BCR1	7DCR1			13ACR1												
	7ECR2	7GCR2	7BCR1	7DCR1			13ACR2										19ECR1		19GCR1
	7FCR1	7HCR1	7BCR2	7DCR2			13ACR2						19ACR1		19CCR1		19ECR1		19GCR1
	7FCR1	7HCR1	7BCR2	7DCR2			13BCR1						19ACR1		19CCR1		19ECR2		19GCR2
	7FCR2	7HCR2					13BCR1						19ACR2a		19CCR2		19ECR2		19GCR2
	7FCR2	7HCR2		18ACR1	18CCR1		13BCR2						19ACR2a		19CCR2		19FCR1		19HCR1
				18ACR1	18CCR1		13BCR2						19BCR1		19DCR1		19FCR1		19HCR1
				18ACR2	18CCR2								19BCR1		19DCR1		19FCR2		19HCR2
				18ACR2	18CCR2								19BCR2a		19DCR2		19FCR2		19HCR2a
		18ECR1	18GCR1a	18BCR1	18DCR1		9ACR1			8ACR1	8CCR1		19BCR2a		19DCR2				
		18ECR1	18GCR1a	18BCR1	18DCR1		9ACR1			8ACR1	8CCR1								
6ACR1a		18ECR2a	18GCR2a	18BCR2	18DCR2		9ACR2	8ECR1	8GCR1	8ACR2a	8CCR2								
6ACR1a		18ECR2a	18GCR2a	18BCR2	18DCR2		9ACR2	8ECR1	8GCR1	8ACR2a	8CCR2								
6ACR2		18FCR1	18HCR1a				9BCR1	8ECR2	8GCR2	8BCR1	8DCR1								
6ACR2		18FCR1	18HCR1a				9BCR1	8ECR2	8GCR2	8BCR1	8DCR1								
6BCR1a		18FCR2a	18HCR2a				9BCR2	8FCR1	8HCR1	8BCR2	8DCR2								
6BCR1a		18FCR2a	18HCR2a				9BCR2	8FCR1	8HCR1	8BCR2	8DCR2								
6BCR2a								8FCR2	8HCR2										

Figure C2.-- Chemical data on carbonate rocks from the Sauk sequence arranged schematically according to sampling location - sample numbers (See table C1 and figure C1 for sampling locations).

```
                   0.4                                                     0.3
                   0.1                                                     0.2
                  20.7                                                    23.5
                  22.0                                                    24.0
                   3.3                                                    45.6
                   3.2                     1.6     1.3                    45.9
                   5.1     0.5     2.5     1.6     0.9                     5.6
                   7.1     0.6     2.3     3.7     0.6                     5.4
                           1.6     1.4     1.3     0.8                                                12.3     5.6
                           1.6     1.4     1.3     3.2                                     9.5        10.0     6.8
                           1.4     0.6     1.2     0.3                                     9.1        26.6    30.5    10.0    18.4
                           0.7     0.3     1.0     2.4                                    31.3        28.3    31.6    10.0    18.8
                           0.5     1.4     0.1L    2.8                                    31.6         9.7    36.6     8.6    16.2
                           0.5     0.8                                     1.6    15.7    36.2        10.2    38.9    11.0    15.2
                                          23.8                             1.4    12.1    37.2        38.9    31.3    12.1     8.6
                                          25.7                            10.5    12.8    22.0        37.5    31.8    17.5     9.0
                                           2.5                            10.2     9.5    22.8                             5.8     3.5
                                           2.5                             9.0     6.0                                     5.6     1.7
                                           5.2                            20.2     4.4
                                           3.6             2.4     5.5     8.7    11.5
                                           1.0             2.4     3.0     5.8    17.8
                                           0.8             0.9    25.4    29.9    15.2
                                                           0.7    27.1    30.8    15.2                                    10.0     1.0
                                                           1.8     3.4    35.2    36.2                     5.4     0.4    11.4     1.0
           0.4                             4.2    44.3     1.2     2.8    36.2    37.7                     6.1     0.6     5.8     8.0
           1.3             9.1     8.0     4.2    43.9     6.0     0.7    25.4    21.3             2.3    12.5     2.5     7.8     3.4
          18.7             9.3    10.0     0.4     0.6     6.0     0.6    26.6    21.0             3.2    12.7     2.5    10.1     4.4
          19.9             1.3    12.7     0.5     0.7                    23.3     1.8            10.3     1.2     0.7     9.0     4.7
           2.2             1.2     8.3    16.1     1.2     0.7     0.4    25.4     1.1            14.2     1.1     0.9     6.1     2.9
           0.1L           14.2     2.5    16.2     3.6     0.5     0.5                            30.0     1.0     2.4     6.4     2.6
           2.9            13.3     2.5    10.1     1.8     6.7     2.5                            30.7     1.0     2.0
           0.1L            0.9     3.2     9.0     1.3     6.4     2.6                             7.9
                           0.5     0.5                    16.8     0.6                             7.1
                                                          16.7     0.2
                                   4.6     0.4             1.0     2.4
                                   5.6     0.4             1.1     2.9
                   0.7    36.7    22.6     0.1L
                   0.3    36.2    23.0     0.3                     0.4
                   0.9    11.8     0.6     1.4                     0.4
                   0.9     8.9     0.7     2.8                     1.2                                                     8.6     4.1
                   0.7     1.0     4.1     1.7                     1.1                                     8.6     8.5     9.0     3.0
                   0.7     0.7     3.9     1.6                     2.3                                    13.0     7.6    17.2     6.3
                   0.3    25.4                                     1.6                                     4.8     4.6    16.7     7.2
                   0.7    22.9            25.4    22.0             8.2                                     5.0     4.3    16.7    20.2
                                          25.7    21.3             8.0                                     8.6    20.7    16.7    21.4
                                          48.1    16.2                                                     8.7    21.3    21.3    24.6
                                          48.5    16.9                                                     2.2    11.9    22.7    19.7
                          15.1     7.5     7.2     3.6            11.0                     4.3     1.1     1.4    11.9
                          13.6     7.3     5.9     3.2             9.0                     3.6     1.6
          20.8            31.4    41.2    13.0     4.2            17.8    49.3    31.2     6.3     6.0
           9.0            31.8    41.0    14.0     2.5            17.8    51.4    32.4     6.8     8.0
           3.6            14.9     7.0                             3.1    26.8    42.6    19.6     2.5
           3.4            15.0     6.2                             3.4    26.1    42.9    18.6     2.6
           2.0            12.9    26.2                             9.5     5.5    13.3     2.2     5.4
           1.7            13.3    25.3                            10.0     4.0    13.0     3.0     6.0
           3.1                                                            20.7    19.6
           3.1                                                            21.3    18.7
```

Figure C2.--Continued--SiO2 (percent)

```
        0.10                                                    0.10
        0.09                                                    2.22
        4.30                                                    2.00
        4.50                                                    1.90
        1.20                                                    4.30
        0.15                    0.46    0.10                    3.90
        2.10    0.10    1.20    0.56    0.60                    0.90
        2.40    0.10    0.50    0.37    0.30                    0.90
                0.10    1.10    0.40    0.30                                                3.00    1.60
                0.10    0.30    0.19    0.08                                    0.85        1.90    1.60
                0.65    0.30    0.08    0.04L                                   1.00        2.30    5.50    1.60    3.70
                0.20    0.10    0.37    0.81                                    2.20        2.50    5.80    1.30    3.10
                0.10    0.66    0.04L   0.60                                    2.20        1.40    4.90    2.40    3.50
                0.10    0.40                                    0.70    1.30    3.40        1.60    4.90    2.00    3.10
                                1.90                            0.40    0.80    3.20        5.90    2.50    1.60    1.40
                                1.90                            1.30    1.10    2.70        5.40    2.20    1.80    1.30
                                1.30                            1.50    0.70    2.70                        0.74    0.53
                                0.80                            3.00    0.96                                0.70    0.60
                                0.88                            3.10    0.79
                                1.30            0.64    1.80    1.70    1.40
                                1.50            0.89    0.90    0.70    2.30
                                0.10            0.27    2.50    2.20    2.40
                                                0.29    2.40    1.70    2.40                                    1.80    0.10
                                                0.10    0.50    2.90    5.50                    1.60    0.10    0.70    0.40
0.26                            0.70   13.60    0.10    1.30    3.20    5.80                    1.50    0.20    1.10    0.96
0.19            0.45    0.60    0.60   13.50    0.55    0.24    3.70    2.50            1.00    0.65    1.20    1.40    0.70
0.99            1.00    0.66    0.32    0.10    0.20    0.60    4.00    2.60            1.10    0.60    1.30    0.60    0.70
0.82            0.60    0.80    0.50    0.40                    3.80    0.35            3.20    0.10    0.50    0.20    1.10
0.04L           0.70    0.70    4.70    0.70    0.50    0.40    3.60    1.10            3.10    0.20    0.10    1.20    0.83
0.04            4.10    0.56    4.90    0.46    0.30    0.10                            4.00    0.60    0.40    1.00    0.50
0.30            4.20    0.30    3.40    0.60    1.60    1.30                            4.20    0.60    0.10
0.04L           0.10    0.08    3.70    0.80    2.30    1.60                            2.50
                0.10    0.20                    2.60    1.20                            2.10
                                                2.60    0.20
                        2.50    0.10            0.10    1.40
                        2.10    0.10            0.40    1.10
        0.20    3.70    1.70    0.04L
        0.10    3.50    1.80    0.10                    0.40
        0.10    0.14    0.25    0.10                    0.10
        0.32    0.10    0.30    0.29                    0.40                                                    0.90    0.70
        0.60    0.20    0.37    0.48                    0.20                                    0.40    0.90    0.70    0.50
        0.70    0.10    0.30    0.42                    0.75                                    0.20    0.42    0.60    1.10
        0.08    0.19                                    0.40                                    1.20    0.37    0.30    0.55
        0.19    0.04L           6.60    3.80            0.60                                    0.80    0.40    1.80    2.90
                                6.60    3.60            0.60                                    0.50    1.50    1.80    2.80
                                7.10    3.70                                                    0.95    1.30    0.87    2.70
                                7.20    3.20                                                    0.22    0.90    0.75    2.00
                4.30    1.40    1.40    1.50            1.00                    0.30    0.40    0.20    1.60
                4.20    1.40    1.70    1.10            0.90                    0.30    0.50
3.20            5.80    6.80    3.10    0.84            2.10    0.95    8.00    1.00    1.20
3.00            5.70    6.20    3.40    0.70            2.40    0.90    8.60    0.94    0.60
1.80            4.10    1.30                            0.20    3.20    9.10    3.00    0.42
1.60            4.30    1.40                            0.20    3.10    8.70    2.60    0.40
0.53            2.90    5.70                            1.00    1.50    2.50    1.10    0.20
0.29            2.30    5.70                            1.50    0.90    2.20    0.30    0.10
0.95                                                            3.60    4.40
1.00                                                            3.30    4.00
```

Figure C2.--Continued--Al2O3 (percent)

```
        0.15                                                    0.01L
        0.10                                                    0.04
        0.77                                                    0.50
        1.00                                                    0.76
        0.68                                                    1.40
        0.50                    0.24    0.31                    0.70
        0.68    0.04    0.16    0.31    0.29                    0.65
        1.00    0.25    0.20    0.44    0.29                    1.00
                0.17    0.28    0.47    0.27                                2.40    1.20
                0.22    0.10    0.15    0.19                            0.90    2.60    1.40
                1.20    0.22    0.30    0.24                            0.90    2.30    1.60    1.40    2.60
                1.30    0.17    0.33    0.46                            1.00    2.00    1.70    1.60    2.60
                0.31    0.17    0.35    0.48                            1.00    0.60    2.30    1.70    1.90
                0.23    0.08                            0.28    0.56    0.96    1.50    2.30    1.60    1.60
                                2.30                    0.38    0.60    1.00    2.30    2.00    2.70    1.50
                                2.30                    1.00    0.45    1.40    2.00    0.25    2.90    1.70
                                0.61                    1.10    0.60    1.40                    0.61    0.01L
                                0.52                    1.70    0.63                            1.00    0.47
                                0.12                    1.10    0.48
                                0.30            0.33    0.23    1.60    1.20
                                0.60            0.15    0.55    1.50    1.20
                                0.65            0.27    0.76    1.50    1.10
                                                0.30    0.52    1.20    1.10                            3.00    0.34
                                                0.01L   0.34    0.86    3.50                    0.63    0.03    3.50    0.40
0.16                            0.27    1.90    0.04    0.33    1.00    3.20                    0.75    0.01    1.20    0.46
0.21            0.25    0.40    0.25    1.90    0.01L   0.82    1.40    2.60            0.34    0.24    0.01L   1.10    0.19
0.16            0.60    0.19    0.01L   0.31    0.06    0.06    1.60    2.70            0.38    0.30    0.04    1.60    0.16
0.35            0.30    0.40    0.01L   0.11                    1.10    0.56            1.20    0.65    0.05    1.50    0.27
0.21            0.31    0.01L   1.30    0.31    0.20    0.09    1.10    0.73            1.10    0.01    0.05    1.20    0.76
0.01L           1.30    0.15    1.20    0.33    0.12    0.01                            0.59    0.01    0.01L   1.40    0.72
0.24            1.30    0.21    0.73    0.43    0.37    0.42                            0.59    0.15    0.01L
0.01L           0.08    0.20    0.65    0.40    0.40    0.14                            0.60
                0.29    0.04                    0.01L   0.16                            0.65
                                                0.63    0.18
                        0.58    0.03            0.10    0.50
                        0.86    0.15            0.15    0.54
        0.04    0.63    0.33    0.01L
        0.03    0.50    0.32    0.01L                   0.01L
        0.06    0.01L   0.01L   0.60                    0.01L
        0.12    0.09    0.01L   0.12                    0.02                                            0.30    0.30
        0.18    0.32    0.35    0.16                    0.01L                           0.36    0.28    0.33    0.33
        0.23    0.42    0.13    0.01L                   0.01L                           0.42    0.34    0.31    0.60
        0.24    0.19                                    0.02                            0.36    0.87    0.43    0.58
        0.26    0.01L           1.30    1.20            0.52                            0.46    0.85    0.73    0.68
                                1.60    0.70            0.34                            0.33    0.35    0.90    0.70
                                1.20    1.90                                            2.00    0.25    0.11    0.46
                                1.10    1.50                                            0.58    0.30    0.37    0.68
                3.40    0.57    1.50    0.63            1.10                    0.27    0.13    0.69    0.46
                4.10    0.57    1.70    0.65            1.00                    0.27    0.50
0.76            2.80    1.00    3.00    0.43            1.60    2.70    2.30    0.01L   0.01L
1.70            3.00    1.00    2.70    0.59            1.30    2.50    2.10    0.66    0.16
0.51            2.90    0.24                            0.40    1.30    2.10    0.62    0.20
0.54            3.30    0.45                            0.32    1.10    2.60    0.66    0.17
0.24            2.60    1.00                            0.62    0.32    0.50    0.01L   0.35
0.01L           2.00    1.80                            0.70    0.58    0.88    0.15    0.17
0.18                                                    0.94    1.00
0.01L                                                   0.85    1.10
```

Figure C2.--Continued--Fe2O3 (percent)

```
        0.02L                                                   0.16
        0.04                                                    0.14
        0.66                                                    0.36
        0.74                                                    0.40
        0.52                                                    0.50
        0.48                    0.14    0.24                    0.50
        0.32    0.22    0.54    0.10    0.06                    0.50
        0.34    0.20    0.52    0.10    0.26                    0.12
                0.18    0.44    0.08    0.08                                        0.54    1.20
                0.18    0.46    0.10    0.10                            0.18        0.46    1.10
                2.10    0.38    0.06    0.24                            0.18        1.30    0.60    0.80    4.30
                2.00    0.38    0.08    0.10                            0.22        1.30    0.60    0.80    4.30
                0.34    0.66    0.26    0.08                            0.20        1.00    0.20    0.70    0.34
                0.32    0.62                                    0.14    0.14    0.78        0.20    0.22    0.76    0.34
                                0.12                            0.12    0.16    0.84        0.60    0.40    0.84    1.10
                                0.10                            1.20    0.10    0.38        0.60    0.38    0.86    1.20
                                0.14                            1.10    0.10    0.02                            0.72    0.05
                                0.18                            0.24    0.20                                    0.32    0.28
                                0.14                            0.22    0.16
                                0.14            0.32    0.50    0.14    0.16
                                0.08            0.42    0.30    0.14    0.18
                                0.10            0.14    0.64    0.04    0.26
                                                0.14    0.60    0.04    0.36                                    0.02    0.04
                                                0.02    0.24    0.10    0.14                0.12    0.12    0.06    0.08
0.04                            0.18    2.20    0.06    0.22    0.10    0.16                0.10    0.14    0.10    0.26
0.06            0.14    0.10    0.20    2.30    0.12    0.02L   0.20    0.30            0.10    0.46    0.18    0.10    0.26
0.24            0.10    0.14    0.02    0.04    0.12    0.04    0.16    0.28            0.10    0.50    0.14    0.02    0.22
0.06            0.14    0.10    0.08    0.04                    0.16    0.14            0.82    0.14    0.10    0.02    0.28
0.04            0.14    0.10    1.20    0.06    0.04    0.06    0.16    0.10            0.78    0.14    0.10    0.04    0.34
0.07            0.58    0.04    1.20    0.06    0.05    0.04                            1.10    0.16    0.14    0.06    0.28
0.04            0.54    0.06    0.22    0.12    0.66    0.18                            1.10    0.08    0.14
0.12            0.06    0.06    0.20    0.12    0.70    0.16                            0.30
                0.06    0.02                    0.65    0.06                            0.30
                                                0.24    0.08
                        0.22    0.02            0.06    0.14
                        0.22    0.04            0.06    0.16
        0.04    0.02    0.10    0.02
        0.02    0.06    0.10    0.04                    0.14
        0.04    0.10    0.02    0.06                    0.14
        0.06    0.26    0.06    0.02                    0.08                                                    0.18    0.36
        0.08    0.18    0.06    0.04                    0.08                                0.06    0.06    0.22    0.32
        0.02    0.14    0.16    0.12                    0.10                                0.08    0.06    0.24    0.54
        0.04    0.10                                    0.18                                0.08    0.12    0.22    0.62
        0.02    0.06            1.20    0.30            0.18                                0.10    0.06    0.18    0.38
                                1.10    0.34            0.26                                0.22    0.50    0.20    0.40
                                0.42    3.50                                                0.24    0.50    0.24    0.40
                                0.42    3.70                                                0.10    0.58    0.40    0.12
                2.10    0.48    1.90    0.22            0.08                    0.18    0.22    0.06    0.58
                2.10    0.48    1.70    0.18            0.08                    0.18    0.24
0.40            1.70    0.36    4.50    0.40            0.06    0.66    0.46    0.12    0.46
0.40            1.50    0.38    4.50    0.36            0.06    0.70    0.48    0.12    0.44
0.14            2.90    0.40                            0.06    1.20    0.62    0.58    0.26
0.16            2.80    0.14                            0.08    1.20    0.62    0.54    0.22
0.10            1.50    1.00                            0.02    0.62    0.46    0.42    0.40
0.23            1.50    0.16                            0.06    0.62    0.52    0.40    0.38
0.12                                                            0.78    0.58
0.23                                                            0.70    0.48
```

Figure C2.--Continued--FeO (percent)

```
        21.70                                                   20.10
        21.50                                                   21.20
         1.10                                                    1.10
         1.20                                                    0.90
         2.60                                                    1.00
         2.80                    1.40   19.20                    0.60
         2.20   21.90   21.20    0.57   21.30                    0.80
         2.10   21.40   20.10    0.70    5.30                    1.00
                21.30   20.60    0.81    5.30                                                1.10    1.80
                21.20   20.90    1.40    0.58                                    1.00        0.70    1.30
                18.90   21.30    0.50    0.70                                    0.56        2.00    0.90    1.60   11.50
                20.10   21.30    0.57    1.20                                    0.30        2.20    0.90    1.50   11.00
                21.70   20.40    0.59    1.00                                    0.40        0.90    0.10    1.50    2.10
                21.90   22.00                                    1.10    0.50    3.20        0.75    0.10    1.10    2.10
                                15.60                            1.60    0.60    3.50        1.40    0.50    2.10    4.70
                                14.90                            4.70    0.47    0.50        1.40    0.50    1.70    4.00
                                 3.10                            4.90    0.50    1.10                        1.80   21.90
                                 3.50                            1.40    0.70                                2.00    1.70
                                 0.58                            1.40    0.65
                                 1.30            1.10    3.20    0.70    0.50
                                17.20            1.40    2.20    0.80    0.40
                                18.10           18.70   14.10    0.40    0.53
                                                19.20   14.50    0.33    0.50                                   18.40   17.40
                                                20.60    2.40    0.40    0.50                   17.40   21.30   17.50   16.40
 0.82                           20.40    2.30   21.50    2.00    0.20    0.90                   16.60   21.40   18.80   11.60
 0.70            1.40    1.40   20.20    4.00   20.60   27.60    0.10    0.60            1.20   18.00   20.60   19.30   18.40
 0.50            0.93    0.64   22.40   21.30   19.00   22.10    0.20    0.70            1.50   17.90   21.30   18.50   19.60
 0.25            3.60    1.50   20.50   20.50                    0.10    2.00           16.10   20.80   21.50   18.70   20.30
 1.00            4.20    1.10    1.60    3.10   21.30   21.50    0.30    2.10           16.40   21.50   21.30   19.40   21.00
 0.85            3.00    1.00    1.90    4.80   21.30   22.40                           12.20   20.60   21.90   19.00   19.70
 0.59            0.30    1.10    1.90    3.00    4.10    1.50                           12.70   20.70   22.00
 0.56            3.40    0.56    1.70    3.00    2.30    1.40                            5.50
                 4.00    0.61                    1.70   21.30                            5.70
                                                 1.60   21.50
                         1.10   21.00           21.00    2.10
                         1.10   21.70           20.90    1.80
        20.30    1.90    0.21   20.30
        21.50    1.90    0.50   21.10                   22.20
        11.70   17.50   20.50   21.70                   21.50
        11.50   18.20   21.00   20.20                   21.30                                                   18.50   17.20
         1.10    4.40    1.60   21.00                   21.10                                    1.00    1.40   17.80   18.30
         1.20    4.60    1.30   20.50                   20.10                                    0.95    1.20   17.10   15.30
         1.20    5.50                                   20.70                                    1.50   19.80   17.30   15.50
         1.30    5.40            7.10    2.20            1.30                                    2.20   20.00    0.88    0.50
                                 7.00    1.50            1.80                                   18.60   13.70    0.40    0.50
                                 0.25   11.70                                                   17.80   17.10    0.60    1.00
                                 0.43   12.10                                                   19.60   18.60    0.60    2.10
                14.60   18.70   18.00    1.20            2.20                    7.10   20.60   19.40   17.20
                13.40   18.20   18.90    1.70            2.40                    7.40   20.20
 1.10           10.30    1.20   14.20    2.90           10.60    1.70    1.10    0.90   19.70
 1.80           10.40    1.30   13.60    2.70           10.70    1.30    1.70    0.90   19.00
 1.70           13.60   19.20                            1.90    1.40    1.30    5.00   20.40
 1.90           15.10   18.30                            1.50    1.20    2.00    5.70   15.80
19.50           11.60   11.00                           15.30    2.20    1.10   20.50   19.80
20.80           10.20   12.40                           15.00    2.30    0.90   20.40   20.10
18.90                                                            1.10    0.70
22.00                                                            1.00    1.00
```

Figure C2.--Continued--MgO (percent)

```
          31.10                                                                 31.10
          30.20                                                                 30.50
          40.10                                                                 38.70
          36.30                                                                 38.70
          48.90                                                                 22.00
          48.90                         51.20     30.60                         22.70
          47.50     30.50     30.30     54.40     32.20                         49.70
          46.50     31.70     30.70     52.00     49.90                         50.00
                    30.00     28.60     54.30     50.00                                                             42.70     49.20
                    30.00     29.90     52.50     52.30                                             47.70          45.10     47.70
                    29.40     31.60     55.60     53.60                                             48.40          33.90     29.60     45.50     23.10
                    30.70     30.00     52.30     50.70                                             36.60          33.10     26.80     45.20     21.50
                    30.50     29.20     54.30     50.60                                             36.00          46.40     26.40     44.50     38.90
                    31.90     31.00                                             52.60     46.00     26.30          46.60     26.70     45.50     38.60
                                        19.60                                   51.70     49.00     22.50          23.40     33.90     42.80     41.80
                                        21.20                                   41.70     46.70     39.00          27.10     36.00     39.90     45.00
                                        46.50                                   42.20     48.50     40.90                              48.60     29.50
                                        46.90                                   45.30     50.80                                        48.50     51.40
                                        51.10                                   38.70     51.20
                                        50.00               51.50     47.50     46.00     46.40
                                        34.00               51.40     48.70     48.40     43.00
                                        35.20               32.60     21.50     36.00     43.40
                                                            32.30     19.70     37.40     43.50                                             25.60     34.80
                                                            30.40     46.90     33.50     28.40                         31.00     30.80     25.50     36.80
53.00                                   28.50     14.00     30.40     48.90     28.50     26.00                         29.90     31.50     27.40     31.80
52.90               51.40     50.50     28.60     14.00     28.50     21.50     36.20     38.20               50.90     27.30     29.60     27.10     29.90
43.50               49.10     49.40     29.30     30.10     28.70     31.50     35.80     40.10               50.00     25.60     29.70     27.30     27.60
44.70               49.30     45.90     30.50     30.50                         39.50     51.70               26.30     30.80     30.50     26.20     28.10
52.80               50.00     49.20     39.10     49.30     30.50     32.50     35.90     49.70               23.20     30.80     31.90     27.40     30.30
54.80               38.70     51.60     39.70     49.00     31.30     31.40                                   19.60     30.30     30.80     26.10     28.60
53.40               40.50     51.90     44.70     49.00     45.90     50.40                                   18.70     31.30     31.00
54.70               50.50     53.90     44.90     49.90     46.30     51.20                                   40.80
                    50.20     54.10                         41.20     31.20                                   42.50
                                                            41.80     30.20
                              48.40     30.10               29.70     49.00
                              45.60     30.50               29.80     49.50
          30.10     27.70     41.20     32.10
          32.50     27.60     42.00     32.10                         31.00
          42.40     28.70     29.70     32.90                         31.30
          41.80     30.60     30.00     30.40                         30.90                                                                 27.90     30.70
          54.90     48.10     51.40     29.20                         29.70                                             49.90     50.60     28.70     30.90
          55.20     49.30     51.80     30.20                         31.80                                             49.50     49.30     25.70     31.90
          55.90     35.80                                             30.00                                             49.40     28.20     26.20     31.00
          51.60     36.50               26.90     35.40               50.00                                             47.90     28.60     42.60     40.20
                                        26.60     38.10               49.90                                             27.50     21.50     43.20     40.20
                                        20.30     23.10                                                                 26.80     23.30     43.00     36.70
                                        20.10     21.40                                                                 30.90     26.00     43.00     40.10
                    19.70     27.70     26.10     49.20               47.80                         45.20     30.20     33.00     27.40
                    20.70     27.50     25.40     50.20               48.20                         45.40     30.50
39.20               17.70     24.40     23.50     48.20               28.60     24.40     23.60     50.00     28.80
44.60               17.40     24.30     21.70     50.60               30.00     23.70     27.50     49.20     28.60
49.10               20.40     27.90                                   51.20     36.20     20.70     38.70     29.30
49.90               20.70     28.80                                   51.10     36.10     21.40     38.70     34.60
31.00               29.50     21.70                                   28.40     48.70     44.70     30.90     30.00
30.10               30.60     20.40                                   31.00     50.20     43.90     29.10     30.80
30.60                                                                           36.50     39.10
27.30                                                                           40.20     39.90
```

Figure C2.--Continued--CaO (percent)

```
        0.02L                                                   0.06
        0.06                                                    0.08
        0.45                                                    0.02L
        1.60                                                    0.16
        0.12                                                    0.35
        0.02L                   0.02L   3.10                    0.10
        0.02L   0.02L   0.02L   0.02L   0.02L                   0.02
        0.62    0.50    0.12    0.06    0.02L                   0.06
                0.02L   3.00    0.02L   0.02L                                               0.77    1.00
                1.30    0.02L   0.02L   0.02L                                   0.02L       0.02L   0.08
                0.06    0.02L   0.12    0.08                                    0.06        0.10    0.12    0.12    0.02L
                0.02L   0.02L   1.50    0.90                                    0.02L       0.02L   2.30    0.02L   0.02L
                0.02L   0.02L   0.02L   0.06                                    0.14        0.05    0.12    0.02L   0.10
                0.02L   0.02L                                   0.02L   0.12    0.02L       0.06    0.02L   0.08    0.02L
                                3.10                            0.11    1.40    1.70        0.75    1.80    2.10    0.02L
                                0.02L                           0.02L   0.10    0.02L       0.89    0.02L   0.02L   0.08
                                0.02L                           0.02L   0.18    0.02L                       0.16    0.08
                                0.58                            0.02L   1.40                                0.13    0.02L
                                0.08                            0.06    0.08
                                0.02L           0.05    0.02L   0.02L   0.02L
                                0.12            0.10    0.02L   2.20    0.02L
                                0.02L           0.08    0.12    0.06    0.03
                                                0.09    0.02L   0.02L   0.05                                    0.02L   0.06
                                                0.85    0.12    0.10    0.10                    0.02L   0.42    0.10    0.10
2.00                            0.02L   3.70    2.50    0.02L   3.00    0.02L                   0.02L   0.02L   0.02L   1.00
0.02L           0.02L   0.02L   0.02L   0.85    1.40    0.08    2.20    0.78            0.02L   0.02L   0.08    0.12    0.10
0.08            0.50    0.08    0.02L   0.02L   0.02L   0.02L   0.02L   0.02L           0.12    0.02L   0.08    0.90    2.40
0.02L           0.65    0.02L   1.50    1.10                    0.22    0.08            0.15    0.02L   0.02L   1.50    2.40
0.02            0.85    0.02L   0.17    0.75    0.02L   0.02L   0.02L   0.02L           0.12    0.02L   0.02L   0.02L   0.10
0.08            1.60    0.02L   0.35    3.80    0.02L   0.02L                           0.10    1.70    0.02L   0.09    0.09
0.34            0.30    0.02L   0.06    0.06    0.02L   0.02L                           0.14    0.02L   0.02L
0.08            0.02L   0.02L   0.10    0.02L   0.08    0.50                            1.10
                1.40    0.08                    0.17    0.02L                           0.75
                                                0.05    0.08
                        0.69    0.90            1.50    0.20
                        2.10    0.02L           0.02L   0.07
        3.10    0.10    0.36    0.02L
        0.02L   0.02L   0.22    0.10                    0.02L
        0.02L   0.02L   0.02L   0.02L                   0.02L
        0.02    1.60    2.10    0.08                    0.02L                                                   0.08    0.12
        0.02L   0.58    0.02L   0.08                    2.00                                    0.02L   0.02L   1.30    0.02L
        1.40    0.02L   0.08    0.08                    0.02L                                   0.02L   0.02L   0.02L   0.09
        0.21    0.52                                    0.50                                    0.02L   0.08    0.85    2.50
        0.02L   0.12            0.02L   0.02L           0.21                                    0.02L   0.08    0.08    0.65
                                0.10    0.02L           0.02L                                   2.00    0.02L   0.12    0.02L
                                0.22    0.02L                                                   0.02L   0.02L   0.02L   0.02L
                                0.19    3.10                                                    0.08    0.02L   0.02L   0.10
                0.02L   0.07    2.30    0.06            0.02L                   2.20    0.02L   1.20    0.02L
                2.40    0.05    0.02L   0.02L           0.02L                   0.02L   0.02L
0.02L           0.15    0.02    0.02L   0.08            0.02L   0.02L   3.80    0.09    0.02L
0.03            0.15    0.07    0.02L   0.02L           0.02L   0.02L   0.10    0.22    1.10
0.02L           0.06    0.02L                           0.02L   0.08    1.10    2.60    0.08
0.02L           0.02L   0.15                            0.02L   0.10    0.12    0.02L   0.02L
0.02L           0.10    0.25                            0.02L   0.02L   0.02L   0.02L   0.02L
0.05            0.11    0.06                            0.02L   1.60    1.20    0.02L   0.02L
0.12                                                            0.02L   0.18
0.05                                                            0.02L   2.00
```

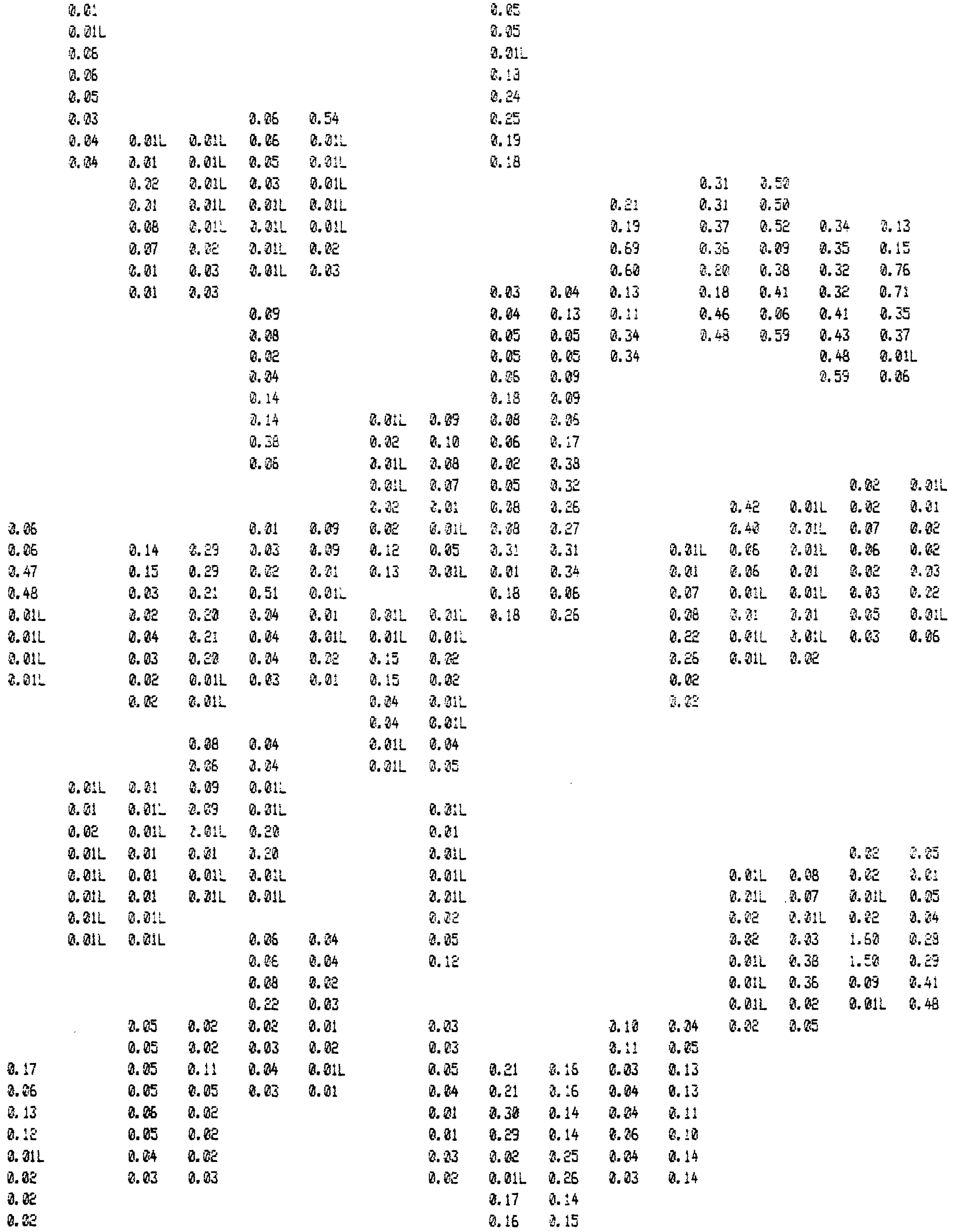
Figure C2.--Continued--Na2O (percent)

```
        0.08                                                    0.02
        0.05                                                    0.04
        1.40                                                    1.40
        1.40                                                    1.30
        0.47                                                    1.40
        0.46                    0.30    0.21                    1.50
        0.62    0.02L   0.10    0.24    0.28                    0.40
        0.52    0.10    0.16    0.81    0.14                    0.35
                0.13    0.08    0.14    0.15                                                0.59
                0.10    0.10    0.20    0.06                            0.53        1.60    0.35
                0.14    0.11    0.26    0.32                            0.59        1.30    2.30    1.10    1.50
                0.23    0.11    0.06    0.57                            1.30        1.30    2.40    1.10    1.50
                0.13    0.13    0.29    0.56                            1.40        0.80    2.40    1.40    2.00
                0.13    0.20                            0.36    0.86    1.70        0.60    2.30    0.27    1.90
                                0.29                    0.38    0.79    1.80        2.30    1.40    1.10    0.70
                                0.31                    1.20    0.75    1.60        3.10    0.13    1.20    0.28
                                0.64                    1.20    0.63    1.70                        0.60    0.11
                                0.59                    0.80    0.52                                0.45    0.34
                                0.38                    2.20    0.27
                                0.55            0.10    0.70    0.78    1.30
                                0.10            0.15    0.83    0.81    1.50
                                0.11            0.04    1.40    1.10    1.60
                                                0.06    1.40    1.00    1.20                                    0.02    0.08
                                                0.02L   0.51    1.60    2.50                    0.57    0.11    0.05    0.25
0.05                            0.88    4.60    0.09    0.57    1.70    3.80                    0.60    0.14    1.30    0.42
0.07            0.21    0.26    0.62    4.70    0.27    0.89    2.10    1.70            0.65    0.21    0.29    0.17    0.36
0.25            0.39    0.10    0.02    0.11    0.27    0.16    2.10    1.70            0.27    0.27    0.37    0.07    0.19
0.28            0.24    0.12    0.53    0.10                    2.00    0.11            1.60    0.06    0.10    0.11    0.33
0.02L           0.27    0.21    0.52    0.32    0.07    0.12    2.20    0.26            1.40    0.15    0.22    0.05    0.22
0.06            0.77    0.08    0.67    0.25    0.18    0.12                            3.00    0.13    0.17    0.11    0.14
0.13            0.80    0.14    0.86    0.36    0.91    0.62                            3.00    0.15    0.17
0.02L           0.13    0.09    1.10    0.36    1.10    0.71                            1.20
                0.22    0.04                    1.70    0.13                            1.20
                                                1.40    0.04
                        0.62    0.07            0.08    0.57
                        0.48    0.07            0.17    0.57
        0.10    2.10    0.69    0.02L
        0.12    2.00    0.75    0.10                    0.02L
        0.08    0.22    0.02L   0.10                    0.10
        0.27    0.19    0.16    0.03                    0.15                                                    0.27    0.26
        0.02L   0.18    0.19    0.11                    0.14                                    0.26    0.26    0.27    0.26
        0.08    0.28    0.33    0.02L                   0.17                                    0.26    0.31    0.15    0.57
        0.09    0.10                                    0.22                                    0.57    0.05    0.15    0.56
        0.23    0.11            2.30    2.60            0.28                                    0.66    0.04    1.10    1.40
                                2.20    1.80            0.32                                    0.21    0.39    0.98    1.40
                                5.00    1.40                                                    1.40    0.17    0.23    1.30
                                5.10    1.40                                                    0.04    0.27    0.33    1.50
                1.40    0.80    0.72    0.76            0.34                    0.21    0.19    0.11    0.19
                1.30    0.90    0.75    0.78            0.34                    0.15    0.30
2.10            3.00    3.60    1.00    0.34            0.67    0.31    3.10    0.40    0.25
1.00            3.00    4.00    1.10    0.49            0.64    0.26    3.20    0.40    0.31
0.56            1.40    0.62                            0.24    1.20    4.60    0.99    0.13
0.57            1.50    0.55                            0.21    1.20    4.60    0.88    0.07
0.10            1.20    2.60                            0.87    0.36    1.60    0.37    0.17
0.26            1.30    3.10                            0.42    0.47    1.70    0.36    0.18
0.50                                                    1.40    2.00
0.40                                                    1.60    1.50
```

Figure C2.--Continued--K2O (percent)

```
        0.01                                                    0.01L
        0.01L                                                   0.07
        0.07                                                    0.11
        0.25                                                    0.11
        0.07                                                    0.23
        0.06                    0.01L   0.02                    0.21
        0.10    0.01L   0.05    0.01L   0.03                    0.06
        0.10    0.01    0.02    0.03    0.01                    0.03
                0.02    0.03    0.02    0.01                                                0.26    0.07
                0.01    0.02    0.01L   0.01L                                   0.22        0.07    0.05
                0.02    0.02    0.01L   0.01L                                   0.24        0.10    0.26    0.07    0.21
                0.03    0.22    0.01L   0.26                                    0.29        0.10    0.22    0.28    0.20
                0.02    0.04    0.01L   0.26                                    0.10        0.22    0.21    0.07    0.10
                0.01    0.07                                    0.02    0.07    0.15        0.08    0.21    0.07    0.10
                                0.12                            0.01    0.06    0.15        0.34    0.13    0.05    0.03
                                0.12                            0.07    0.05    0.26        0.35    0.15    0.06    0.06
                                0.08                            0.07    0.25    0.09                        0.04    0.02
                                0.06                            0.11    0.01L                               0.03    0.01
                                0.05                            0.26    0.02
                                0.25            0.03    0.08    0.05    0.07
                                0.02            0.02    0.10    0.05    0.08
                                0.02            0.02    0.13    0.07    0.10
                                                0.03    0.15    0.08    0.08                                    0.05    0.01L
                                                0.01L   0.04    0.09    0.11                    0.07    0.02    0.07    0.03
0.03                            0.07    0.46    0.01    0.05    0.07    0.16                    0.07    0.02    0.09    0.06
0.01L           0.02    0.01    0.10    0.54    0.04    0.05    0.11    0.08            0.04    0.05    0.25    0.10    0.04
0.07            0.06    0.02    0.01L   0.02    0.02    0.03    0.12    0.10            0.06    0.05    0.06    0.25    0.04
0.07            0.02    0.05    0.01L   0.01L                   0.09    0.02            0.09    0.01L   0.02    0.05    0.05
0.01L           0.01    0.06    0.23    0.04    0.02    0.02    0.10    0.01            0.10    0.01    0.03    0.05    0.02
0.02            0.16    0.01L   0.15    0.02    0.02    0.02                            0.15    0.02    0.23    0.06    0.03
0.01L           0.15    0.01    0.13    0.04    0.07    0.05                            0.14    0.24    0.02
0.01L           0.01L   0.01L   0.12    0.01    0.10    0.05                            0.09
                0.01    0.01L                   0.10    0.02                            0.10
                                                0.11    0.07
                        0.06    0.01            0.01L   0.26
                        0.23    0.01            0.02    0.07
        0.01    0.25    0.04    0.01L
        0.01    0.27    0.05    0.01                    0.01L
        0.01L   0.02    0.01L   0.04                    0.01
        0.01L   0.01    0.01    0.02                    0.02                                                    0.04    0.03
        0.01L   0.02    0.01L   0.04                    0.02                                    0.03    0.03    0.05    0.03
        0.01L   0.02    0.05    0.07                    0.03                                    0.01    0.04    0.02    0.08
        0.01L   0.01L                                   0.04                                    0.02    0.02    0.03    0.07
        0.01L   0.02            0.38    0.19            0.02                                    0.03    0.02    0.17    0.28
                                0.35    0.21            0.03                                    0.03    0.09    0.14    0.30
                                0.31    0.23                                                    0.07    0.12    0.02    0.30
                                0.29    0.23                                                    0.01L   0.08    0.04    0.33
                0.26    0.09    0.12    0.07            0.03                    0.01    0.03    0.01    0.08
                0.25    0.09    0.12    0.10            0.03                    0.01    0.03
0.10            0.40    0.36    0.20    0.05            0.12    0.15    0.48    0.05    0.05
0.11            0.40    0.36    0.23    0.01            0.15    0.17    0.47    0.12    0.07
0.05            0.28    0.08                            0.01    0.21    0.57    0.10    0.05
0.05            0.30    0.06                            0.01    0.17    0.65    0.11    0.05
0.04            0.14    0.34                            0.06    0.05    0.15    0.05    0.02
0.02            0.14    0.35                            0.07    0.05    0.15    0.05    0.02
0.02                                                            0.20    0.23
0.02                                                            0.20    0.23
```

Figure C2.--Continued--TiO2 (percent)


0.01
0.01L
0.06
0.06
0.05
0.03
0.04
0.04
0.06
0.06
0.05
0.03
0.01L
0.01L
0.01L
0.01L
0.54
0.01L
0.01L
0.01L
0.01L
0.01L
0.02
0.03
0.01L
0.01
0.02
0.01
0.08
0.07
0.01
0.01
0.01L
0.01L
0.01L
0.01L
0.01L
0.02
0.03
0.03
0.05
0.05
0.01L
0.13
0.24
0.25
0.19
0.18
0.21
0.19
0.69
0.60
0.13
0.11
0.34
0.34
0.31
0.31
0.37
0.36
0.20
0.18
0.46
0.48
0.50
0.50
0.52
0.09
0.38
0.41
0.06
0.59
0.34
0.35
0.32
0.32
0.41
0.43
0.48
0.59
0.13
0.15
0.76
0.71
0.35
0.37
0.01L
0.06
0.09
0.08
0.02
0.04
0.14
0.14
0.38
0.06
0.03
0.04
0.05
0.05
0.06
0.18
0.08
0.06
0.02
0.05
0.08
0.08
0.31
0.01
0.18
0.18
0.04
0.13
0.05
0.05
0.09
0.09
0.06
0.17
0.38
0.32
0.26
0.27
0.31
0.34
0.06
0.26
0.01L
0.02
0.01L
0.01L
0.02
0.02
0.12
0.13
0.09
0.10
0.08
0.07
0.01
0.01L
0.05
0.01L
0.02
0.02
0.07
0.06
0.02
0.03
0.05
0.03
0.01L
0.01
0.02
0.02
0.03
0.22
0.01L
0.06
0.42
0.40
0.06
0.06
0.01L
0.01
0.01L
0.01L
0.01L
0.01L
0.01L
0.01
0.01L
0.01
0.01L
0.02
0.01L
0.01
0.07
0.08
0.22
0.26
0.02
0.02
0.06
0.06
0.47
0.48
0.01L
0.01L
0.01L
0.01L
0.14
0.15
0.03
0.02
0.04
0.03
0.02
0.02
0.29
0.29
0.21
0.20
0.21
0.20
0.01L
0.01L
0.01
0.03
0.02
0.51
0.04
0.04
0.04
0.03
0.09
0.09
0.21
0.01L
0.01
0.01L
0.02
0.01
0.01L
0.01L
0.15
0.15
0.04
0.04
0.01L
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0.01L
0.02
0.02
0.01L
0.01L
0.04
0.05
0.08
0.06
0.09
0.09
0.01L
0.01
0.01L
0.01L
0.04
0.04
0.01L
0.01L
0.20
0.20
0.01L
0.01L
0.01L
0.01
0.02
0.01L
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0.01
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0.01
0.01L
0.01L
0.01L
0.01
0.01L
0.01L
0.01L
0.02
0.05
0.12
0.02
0.02
0.01L
0.02
1.50
1.50
0.09
0.01L
0.05
0.01
0.05
0.04
0.29
0.29
0.41
0.48
0.01L
0.01L
0.02
0.02
0.01L
0.01L
0.01L
0.02
0.08
0.07
0.01L
0.03
0.38
0.36
0.02
0.05
0.06
0.06
0.08
0.22
0.02
0.03
0.04
0.03
0.04
0.04
0.02
0.03
0.01
0.02
0.01L
0.01
0.05
0.05
0.05
0.05
0.06
0.05
0.04
0.03
0.02
0.02
0.11
0.05
0.02
0.02
0.02
0.03
0.03
0.03
0.05
0.04
0.01
0.01
0.03
0.02
0.10
0.11
0.03
0.04
0.04
0.26
0.04
0.03
0.04
0.05
0.13
0.13
0.11
0.10
0.14
0.14
0.17
0.06
0.13
0.12
0.01L
0.02
0.02
0.02
0.21
0.21
0.30
0.29
0.02
0.01L
0.17
0.16
0.16
0.16
0.14
0.14
0.25
0.26
0.14
0.15

Figure C2.--Continued--P2O5 (percent)

	0.02							0.05											
	0.01L							0.02											
	0.08							0.18											
	0.04							0.15											
	0.04							0.10											
	0.01			0.01L	0.04			0.11											
	0.05	0.08	0.07	0.01L	0.02			0.17											
	0.01L	0.06	0.07	0.01L	0.01			0.26											
		0.03	0.06	0.01L	0.01L					0.12		0.36		0.27					
		0.16	0.09	0.01L	0.01L					0.03		0.23		0.29		0.55		0.59	
		0.19	0.03	0.01L	0.01					0.05		0.18		0.31		0.35		1.00	
		0.05	0.11	0.01L	0.01					0.03		0.26		0.25		0.31		0.18	
		0.05	0.05					0.01	0.03	0.14		0.19		0.25		0.01L		0.16	
				0.04				0.01	0.06	0.07		0.26		0.18		0.58		0.54	
				0.04				0.13	0.09	0.15		0.15		0.17		0.35		0.52	
				0.01				0.11	0.01	0.07						0.21		0.04	
				0.01				0.10	0.06							0.43		0.22	
				0.25				0.24	0.10										
				0.21		0.01L	0.01L	0.05	0.27										
				0.45		0.05	0.01	0.01	0.12										
				0.01		0.13	0.12	0.11	0.20										
						0.09	0.04	0.04	0.15								0.62		0.29
						0.02	0.01	0.06	0.35				0.08		0.01		1.10		0.16
0.10				0.01	0.03	0.01	0.01	0.10	0.17				0.07		0.02		0.78		0.12
0.01L		0.01L	0.05	0.21	0.04	0.02	0.10	0.14	0.10		0.01		0.14		0.07		0.64		0.09
0.10		0.01	0.09	0.02	0.21	0.05	0.01	0.13	0.12		0.02		0.07		0.02		0.56		0.14
0.02		0.01L	0.02	0.01L	0.01L			0.15	0.07		0.07		0.10		0.04		0.60		0.08
0.01L		0.01	0.01	0.02	0.01	0.05	0.04	0.09	0.01		0.06		0.04		0.02		0.43		0.29
0.01L		0.03	0.01L	0.01L	0.01L	0.03	0.03				0.05		0.08		0.03		0.74		0.28
0.01L		0.01	0.01	0.02	0.01	0.06	0.01				0.06		0.08		0.01				
0.01L		0.01L	0.01L	0.01	0.01	0.04	0.01				0.02								
		0.01	0.01L			0.10	0.09				0.03								
						0.22	0.04												
			0.01	0.01		0.06	0.01												
			0.01L	0.04		0.03	0.01												
	0.01	0.01	0.01	0.03															
	0.01	0.01	0.01L	0.01			0.06												
	0.01L	0.01L	0.01L	0.03			0.02												
	0.01L	0.01	0.01	0.04			0.22										0.07		0.11
	0.01L	0.01	0.01L	0.05			0.01						0.01		0.01L		0.03		0.06
	0.01L	0.01	0.01L	0.01L			0.01L						0.01		0.01		0.04		0.29
	0.01L	0.01L					0.01						0.01L		.0.23		0.05		0.17
	0.01L	0.01L		0.05	0.04		0.01						0.01		0.20		0.09		0.04
				0.05	0.02		0.01						0.22		0.36		0.02		0.01
				0.04	0.58								0.21		0.18		0.01L		0.03
				0.04	0.30								0.04		0.30		0.01		0.06
		0.24	0.01L	0.43	0.09		0.09			0.01	0.04		0.15		0.19				
		0.37	0.01L	0.41	0.03		0.04			0.01	0.02								
0.25		0.18	0.01L	1.20	0.11		0.06	0.15	0.09	0.01L	0.09								
0.19		0.21	0.04	0.56	0.02		0.05	0.14	0.07	0.01L	0.06								
0.01		0.20	0.01L				0.01	0.01L	0.06	0.02	0.11								
0.01		0.31	0.01L				0.01	0.10	0.06	0.01	0.12								
0.01L		0.44	0.01L				0.06	0.02	0.06	0.05	0.08								
0.01L		0.38	0.10				0.02	0.03	0.05	0.03	0.08								
0.01L								0.22	0.05										
0.01L								0.11	0.03										

Figure C2.--Continued--MnO (percent)

```
        46.9                                                    47.3
        45.8                                                    47.0
        31.7                                                    31.6
        30.9                                                    31.6
        40.7                                                    21.0
        41.5                    42.8    45.6                    21.2
        39.9    46.9    45.4    43.1    45.7                    39.9
        39.7    46.3    45.7    43.1    43.7                    40.2
                45.6    45.8    42.9    42.9                                                35.6    37.4
                45.7    46.2    43.4    43.3                                    39.8        35.9    37.5
                45.7    46.6    43.2    43.5                                    38.5        29.8    25.5    36.2    34.3
                45.5    46.7    43.0    41.3                                    27.5        28.5    25.1    35.7    34.4
                46.2    46.5    43.0    41.8                                    27.7        37.7    22.4    36.2    33.4
                46.4    46.5                                    42.7    35.7    25.8        37.6    21.7    35.2    34.0
                                34.5                            42.9    35.0    25.9        21.6    27.2    34.5    37.4
                                33.8                            36.1    37.0    31.5        22.4    27.4    33.9    37.3
                                41.6                            36.1    37.0    31.0                        39.9    42.9
                                42.3                            37.7    40.9                                39.9    41.3
                                40.8                            32.2    41.1
                                41.2            42.1    40.8    38.7    35.0
                                45.8            41.9    40.7    38.1    34.0
                                46.0            46.2    32.7    29.2    34.6
                                                46.0    32.2    28.5    34.9                                    39.7    46.1
                                                46.5    41.2    26.2    22.1                    41.5    46.2    39.5    45.8
42.5                            43.7    14.3    46.6    41.5    25.3    22.5                    46.0    47.1    42.4    44.2
43.2            38.3    37.7    43.2    14.3    43.4    46.9    29.5    31.8            41.3    40.2    44.8    42.3    44.4
34.3            37.9    38.8    47.2    47.3    43.2    46.4    28.5    31.2            41.5    40.3    44.7    40.7    44.4
34.6            43.4    37.9    46.7    47.3                    30.2    43.0            38.4    46.5    47.4    40.9    43.7
43.5            42.8    37.9    33.7    43.1    46.4    46.1    29.6    42.6            38.3    44.7    45.3    43.2    44.4
43.7            35.6    41.7    33.6    43.5    46.6    46.4                            29.4    45.5    42.2    43.5    44.3
42.9            35.9    41.6    37.4    42.5    39.9    41.6                            29.2    45.8    45.9
43.6            44.1    43.2    37.7    42.5    39.3    41.5                            39.5
                43.6    43.5                    34.4    46.5                            39.8
                                                34.7    46.8
                        40.4    46.3            46.9    41.6
                        40.2    46.6            46.7    41.2
        46.8    24.6    32.9    46.5
        46.8    25.7    32.4    47.3                    46.8
        44.5    41.7    47.0    40.9                    46.9
        45.2    41.6    47.0    45.4                    46.4                                                    42.4    44.2
        43.3    45.7    42.0    46.5                    46.7                                    36.4    39.1    42.9    44.6
        43.4    42.2    41.5    46.1                    46.0                                    37.0    39.5    38.6    41.1
        43.7    33.6                                    45.8                                    40.4    44.7    38.9    41.0
        43.5    34.2            29.8    32.0            38.7                                    40.7    44.9    33.3    32.3
                                29.7    31.9            38.6                                    42.7    39.6    33.2    32.0
                                16.7    35.5                                                    42.3    36.4    34.0    30.6
                                17.0    35.4                                                    45.4    41.0    33.5    32.7
                37.4    42.5    41.7    40.4            37.9                    40.8    45.8    45.0    41.2
                37.7    42.7    41.9    40.2            38.5                    40.5    45.8
31.6            26.4    20.8    37.5    41.6            36.4    20.2    23.7    40.7    42.4
37.9            26.4    21.3    36.8    41.3            36.6    19.5    23.4    40.3    42.3
40.2            35.8    42.7                            41.5    28.8    17.4    33.1    45.4
41.0            36.8    43.3                            41.5    29.5    17.6    33.5    45.7
45.7            37.4    30.2                            41.6    39.5    34.0    44.4    42.8
45.6            37.3    30.3                            42.0    39.5    33.6    44.7    43.3
45.3                                                            32.0    32.0
45.0                                                            31.7    32.0
```

Figure C2.--Continued--LDI (percent)

```
          47.1                                                                  47.2
          46.3                                                                  47.0
          31.7                                                                  31.0
          31.0                                                                  31.0
          42.7                                                                  20.6
          41.2                          41.8      45.7                          20.0
          39.2      46.7      45.4      43.1      45.4                          39.7
          39.0      46.8      46.0      43.2      44.0                          40.0
                    45.1      46.1      43.0      44.2                                                             34.9      37.2
                    46.0      46.1      43.4      43.8                                              38.6           35.4      37.1
                    45.7      46.8      43.5      42.5                                              38.2           29.2      25.5      35.9      33.9
                    45.8      46.6      43.3      41.5                                              27.9           28.3      25.2      35.7      34.1
                    46.7      46.0      43.0      41.7                                              27.8           37.4      21.9      36.2      33.6
                    46.5      46.0                                              42.8      35.7      25.4           37.0      21.8      35.8      32.6
                                        33.2                                    42.7      35.2      24.9           21.5      27.3      33.9      37.4
                                        32.8                                    35.8      37.0      31.4           22.1      27.0      33.2      38.7
                                        41.9                                    36.0      36.8      30.6                               39.3      42.6
                                        41.9                                    36.7      41.2                                         39.6      42.6
                                        40.6                                    31.6      41.1
                                        41.3                42.4      40.4      38.1      34.9
                                        45.3                42.0      40.6      37.5      33.7
                                        45.6                46.2      32.7      28.5      33.9
                                                            45.5      31.7      28.0      34.3                                              39.2      45.6
                                                            46.2      41.2      25.8      22.6                          42.6      46.6      39.5      45.4
43.3                                    43.6      11.0      46.5      41.3      25.7      21.1                          41.5      47.2      41.7      43.6
43.3                38.3      38.2      43.4      12.6      43.2      47.5      29.2      32.0                41.6      40.0      44.8      42.0      43.7
34.0                38.2      37.6      46.8      46.8      43.2      46.6      28.2      30.7                41.6      39.2      44.3      39.8      43.5
33.5                43.2      37.7      46.3      47.1                          30.1      43.2                37.4      46.3      47.4      40.0      44.0
44.1                43.0      37.7      33.0      43.2      46.2      46.6      29.4      43.0                37.4      44.3      46.0      42.1      44.9
43.9                35.0      41.7      32.6      43.8      47.2      46.7                                    28.5      45.8      42.2      42.7      44.3
44.0                34.3      42.2      36.7      42.5      39.9      41.5                                    27.9      46.1      45.4
43.6                44.0      43.8      36.0      42.8      39.4      41.7                                    38.5
                    44.0      43.1                          34.4      46.8                                    39.5
                                                            34.1      46.3
                              40.2      47.0                46.7      41.8
                              39.8      45.7                45.8      41.2
          45.9      24.8      32.6      47.3
          46.8      25.4      32.5      47.0                          46.5
          43.9      41.7      47.0      41.4                          47.2
          45.7      41.7      46.2      45.2                          46.0                                                                  42.1      44.6
          43.7      44.0      41.7      46.4                          46.6                                              38.8      38.8      42.2      44.0
          43.3      40.6      41.4      46.0                          45.4                                              37.2      39.5      38.1      40.7
          43.7      33.3                                              45.1                                              40.4      44.6      39.1      40.0
          42.7      34.3                27.9      31.4                39.0                                              40.6      44.5      33.2      32.5
                                        28.7      31.3                38.6                                              42.7      36.3      30.5      32.0
                                        16.4      35.3                                                                  41.9      35.5      33.7      30.5
                                        15.8      35.2                                                                  45.3      41.2      33.7      32.0
                    35.4      41.9      41.2      40.5                38.1                          41.0      45.6      45.2      40.9
                    36.7      42.4      41.4      40.4                37.7                          40.7      46.5
30.9                25.0      20.0      37.3      40.9                35.6      19.5      23.1      40.5      42.1
37.0                24.8      20.2      34.1      41.3                35.5      19.2      22.8      39.8      42.9
40.6                36.0      42.2                                    41.5      28.4      16.2      32.5      45.2
41.2                35.1      43.2                                    41.6      29.1      16.7      33.2      45.2
46.0                36.4      29.0                                    40.9      39.5      33.8      44.3      42.9
46.1                36.6      29.5                                    41.7      39.8      34.0      44.8      43.5
45.0                                                                            31.7      31.8
44.8                                                                            31.4      32.1
```

Figure C2.--Continued--CO2 (percent)

```
          0.92L                                                                 0.92L
          0.92L                                                                 0.92L
          0.92L                                                                 0.92L
          0.92L                                                                 0.92L
          0.92L                                                                 0.92L
          0.92L                         0.92L     0.92L                         0.92L
          0.92L     2.40      0.92L     0.92L     0.92L                         0.92L
          0.92L     2.80      0.92L     0.92L     0.92L                         0.92L
                    0.92L     0.92L     0.92L     0.92L                                                            0.92L     0.92L
                    0.92L     0.92L     0.92L     0.92L                                             0.92L          0.92L     0.92L
                    0.92L     0.92L     0.92L     0.92L                                             0.92L          0.92L     0.92L     0.92L     0.92L
                    0.92L     0.92L     0.92L     0.92L                                             0.92L          0.92L     0.92L     0.92L     0.92L
                    0.92L     0.92L     0.92L     0.92L                                             0.92L          0.92L     0.92L     0.92L     0.92L
                    0.92L     0.92L                                             2.00      0.92L     0.92L          0.92L     0.92L     0.92L     0.92L
                                        0.92L                                   0.92L     0.92L     0.92L          0.92L     0.92L     0.92L     0.92L
                                        0.92L                                   0.92L     0.92L     0.92L          0.92L     0.92L     0.92L     0.97
                                        0.92L                                   0.92L     0.92L     0.92L                              0.92L     0.92L
                                        0.92L                                   0.92L     0.92L                                        0.92L     0.92L
                                        0.92L                                   0.92L     0.92L
                                        0.92L               0.92L     0.92L     0.92L     0.92L
                                        0.92L               0.92L     0.92L     0.92L     0.92L
                                        0.92L               0.92L     0.92L     0.92L     0.92L
                                                            0.92L     0.92L     0.92L     0.92L                                             0.92L     0.92L
                                                            0.92L     0.92L     0.92L     0.92L                         0.92L     0.92L     0.92L     0.92L
0.92L                                   0.92L     0.92L     0.92L     0.92L     0.92L     0.92L                         0.92L     0.92L     0.92L     0.92L
0.92L               0.92L     0.92L     0.92L     0.92L     0.92L     0.92L     0.92L     0.92L               0.92L     0.92L     0.92L     0.92L     0.92L
0.92L               0.92L     0.92L     0.92L     0.92L     0.92L     0.92L     0.92L     0.92L               0.92L     0.92L     0.92L     0.92L     0.92L
0.92L               0.92L     0.92L     0.92L     0.92L                         0.92L     0.92L               0.92L     0.92L     0.92L     1.20      0.92L
0.92L               0.92L     0.92L     0.92L     0.92L     0.92L     0.92L     0.92L     0.92L               0.92L     0.92L     0.92L     0.92L     0.92L
0.92L               0.92L     0.92L     0.92L     0.92L     0.92L     0.92L                                   0.92L     0.92L     0.92L     0.92L     0.92L
0.92L               0.92L     0.92L     0.92L     0.92L     0.92L     0.92L                                   0.92L     0.92L     0.92L
0.92L               0.92L     0.92L     0.92L     0.92L     0.92L     0.92L                                   0.92L
                    0.92L     0.92L                         0.92L     0.92L                                   0.92L
                                                            0.92L     0.92L
                              0.92L     0.92L               0.92L     0.92L
                              0.92L     0.92L               0.92L     0.92L
          0.92L     0.92L     0.92L     0.92L
          0.92L     0.92L     0.92L     0.92L                         0.92L
          0.92L     0.92L     0.92L     0.92L                         0.92L
          0.92L     0.92L     0.92L     0.92L                         0.92L                                                                 0.92L     0.92L
          0.92L     0.92L     0.92L     0.92L                         0.92L                                             0.92L     0.92L     0.92L     0.92L
          0.92L     0.92L     0.92L     0.92L                         0.92L                                             0.92L     0.92L     0.92L     0.92L
          0.92L     0.92L                                             0.92L                                             0.92L     0.92L     0.92L     0.92L
          0.92L     0.92L               0.92L     0.92L               0.92L                                             0.92L     0.92L     0.92L     0.92L
                                        0.92L     0.92L               0.92L                                             0.92L     1.00      0.92L     0.92L
                                        0.92L     0.92L                                                                 0.92L     0.92L     0.92L     0.92L
                                        0.92L     0.92L                                                                 0.92L     0.92L     0.92L     0.92L
                    0.92L     0.92L     0.92L     0.92L               0.92L                         0.92L     0.92L     0.92L     0.92L
                    0.92L     0.92L     0.92L     0.92L               0.92L                         0.92L     0.92L
0.92L               0.92L     0.92L     0.92L     0.92L               0.92L     0.92L     0.92L     0.92L     0.92L
0.92L               0.92L     0.92L     0.92L     0.92L               0.92L     0.92L     0.92L     0.92L     0.92L
0.92L               0.92L     0.92L                                   0.92L     0.92L     0.92L     0.92L     0.92L
0.92L               0.92L     0.92L                                   0.92L     0.92L     0.92L     0.92L     0.92L
0.92L               0.92L     0.92L                                   0.92L     1.20      0.92L     0.92L     0.92L
0.92L               1.20      0.92L                                   0.92L     0.92L     0.92L     0.92L     0.92L
0.92L                                                                           0.92L     0.92L
0.92L                                                                           0.92L     0.92L
```

Figure C2.--Continued--Ag (parts per million)

```
        10.L                                                    10.L
        10.L                                                    10.L
        10.                                                     10.L
        10.L                                                    10.L
        10.L                                                    20.
        10.L                    10.L    10.L                    10.L
        10.L    10.L    10.L    10.L    10.L                    10.L
        10.L    10.L    10.L    10.L    10.L                    10.L
                10.L    10.L    10.L    10.L                                                    44.     10.L
                10.L    10.L    10.L    10.L                                    10.L            63.     10.L
                10.L    10.L    10.L    10.L                                    10.L            47.     13.     18.     30.
                10.L    10.L    10.L    10.L                                    10.L            10.L    10.L    10.L    20.
                10.L    10.L    10.L    10.L                                    10.L            10.L    31.     19.     10.L
                10.L    10.L                                    10.L    10.L    41.             10.L    22.     21.     13.
                                10.L                            10.L    10.L    10.L            26.     21.     20.     10.L
                                10.L                            10.L    10.L    21.             45.     39.     77.     17.
                                10.L                            10.L    10.L    15.                             10.L    10.L
                                10.L                            10.L    10.L                                    10.L    10.L
                                10.L                            10.L    10.L
                                10.L            10.L    10.L    10.L    10.L
                                10.L            10.L    10.L    10.L    10.L
                                21.             10.L    10.L    11.     10.L
                                                10.L    10.L    10.L    10.L                                    10.L    10.L
                                                10.L    10.L    10.L    20.                     22.     10.L    10.L    10.L
10.L                            10.L    10.L    10.L    10.L    10.L    19.                     10.L    10.L    10.L    24.
10.L            10.L    10.L    10.L    160.    10.     10.L    15.     18.             10.L    28.     14.     10.L    10.L
10.L            10.L    10.L    10.L    10.L    10.L    10.L    10.L    42.             10.L    10.L    80.     10.L    10.L
10.L            10.L    10.L    10.L    10.L                    10.L    10.L            10.L    10.L    10.L    10.L    17.
10.L            10.L    10.L    10.L    10.L    10.L    10.L    10.L    10.L            10.L    10.L    10.L    10.L    10.L
10.L            10.L    10.L    10.L    10.L    10.L    10.L                            10.L    10.L    10.L    10.L    10.L
10.L            10.L    10.L    40.     10.L    120.    10.L                            10.L    10.L    10.L
10.L            10.L    10.L    22.     10.L    10.L    10.L                            10.L
                10.L    10.L                    10.L    10.L                            10.L
                                                10.L    10.L
                        10.L    10.L            10.L    10.L
                        10.L    10.L            10.L    10.L
        10.L    10.L    10.L    10.L
        10.L    10.L    10.L    10.L                    10.L
        10.L    10.L    10.L    10.L                    10.L
        10.L    10.L    10.L    10.L                    10.L                                                    120.    10.L
        10.L    10.L    10.L    10.L                    10.L                                    10.L    10.L    10.L    10.L
        10.L    26.     10.L    10.L                    10.L                                    10.L    10.L    10.L    10.L
        10.L    10.L                                    10.L                                    10.L    10.L    10.L    10.L
        10.L    10.L            34.     18.             10.L                                    10.L    10.L    14.     10.L
                                54.     10.L            10.L                                    10.L    10.L    10.L    10.L
                                10.L    18.                                                     10.L    10.L    10.L    10.L
                                10.L    10.                                                     10.L    10.L    10.L    10.L
                49.     10.L    10.L    10.L            10.L                    10.L    10.L    10.L    10.L
                45.     10.L    10.L    11.             10.L                    10.L    10.L
10.L            56.     16.     10.L    10.L            22.     10.L    10.L    10.L    10.L
10.L            42.     30.     17.     10.L            10.     10.L    17.     10.L    10.L
10.L            30.     10.L                            10.L    16.     29.     10.     10.L
10.L            39.     10.L                            10.L    10.L    41.     11.     10.L
10.L            11.     48.                             10.L    10.L    10.L    10.L    10.L
10.L            15.     45.                             10.L    10.L    10.L    10.L    10.L
10.L                                                            10.L    10.L
10.L                                                            10.L    10.L
```

Figure C2.--Continued--B (parts per million)

```
             4.7                                                    8.4
             6.9                                                   14.0
           360.0                                                  130.0
            19.0                                                  120.0
            51.0                                                  750.0
           100.0                      22.0     20.0              1000.0
           120.0     13.0     64.0    19.0     21.0               110.0
            74.0      9.9    120.0    16.0      8.5                84.0
                      6.1     16.0    21.0      8.1                                                    84.0    640.0
                      4.3L    10.0    56.0      9.5                                   80.0            140.0    340.0
                     17.0     11.0    73.0      5.0                                   72.0            110.0    170.0     67.0    120.0
                     13.0     11.0    11.0     25.0                                  110.0              6.5    120.0    100.0    110.0
                     31.0      8.3    12.0     26.0                                  120.0             82.0    200.0     50.0     54.0
                     24.0      6.0                                 18.0    120.0     170.0             84.0    190.0     57.0    100.0
                                      19.0                         22.0    100.0     130.0            150.0     79.0     50.0     81.0
                                      22.0                        140.0    120.0     120.0            180.0    110.0    100.0     72.0
                                      75.0                        130.0    130.0     140.0                               69.0     15.0
                                      94.0                        280.0     58.0                                         56.0     17.0
                                      26.0                        220.0     70.0
                                      36.0              68.0     82.0      70.0    130.0
                                      17.0              66.0     69.0      77.0    160.0
                                      19.0               4.3L   110.0     770.0    230.0
                                                         7.2    130.0     330.0    220.0                                 56.0     19.0
                                                         5.7     51.0     310.0    350.0                     34.0      5.4     58.0     20.0
    51.0                              67.0    240.0      4.8     50.0     280.0    400.0                    300.0      5.4     55.0     41.0
    36.0             43.0     46.0    60.0    270.0     23.0      5.8     280.0    160.0              21.0    23.0     10.0     69.0     27.0
    18.0             68.0     34.0     6.2      7.7     15.0      6.8     200.0    220.0              23.0    20.0      7.7     60.0    330.0
    17.0             43.0     26.0     4.3L     7.2                       260.0     11.0             110.0    14.0     29.0     62.0     35.0
     5.9             27.0     30.0    62.0     13.0     16.0      6.4     200.0     19.0              68.0    11.0     38.0     52.0     44.0
     4.3L            88.0      9.7    73.0     14.0     11.0      4.3L                                91.0    16.0      8.9     53.0     35.0
     7.8             85.0      9.1   170.0     22.0    110.0     50.0                                140.0    12.0      6.1
     7.9             61.0      9.9   170.0     26.0     61.0     76.0                                 42.0
                     47.0      9.5                     180.0      7.8                                 23.0
                                                       180.0      5.2
                              96.0     4.3L              4.5     38.0
                             100.0     4.3L              7.4     24.0
            12.0    130.0    100.0     4.7
             8.6    150.0    110.0     5.0                        7.0
            10.0     53.0      6.7    26.0                        4.3L
             9.8     34.0      5.6     4.3L                       5.7                                                    17.0     89.0
             9.3     81.0     11.0    21.0                        5.5                                13.0     32.0     13.0     55.0
             7.3     83.0     15.0    13.0                        8.1                                 8.0     40.0     13.0     44.0
             7.0     12.0                                        12.0                                46.0     22.0     10.0     54.0
            13.0     12.0            180.0    300.0              44.0                                30.0     22.0    140.0    140.0
                                     210.0    200.0              40.0                                29.0     48.0    130.0    160.0
                                     390.0    170.0                                                  17.0     30.0     25.0    140.0
                                      70.0    130.0                                                  19.0     17.0     14.0    110.0
                    120.0     57.0    44.0     77.0              18.0                7.2     16.0    16.0     12.0
                    110.0     95.0    50.0     76.0              17.0                7.8     14.0
    98.0            260.0    330.0    96.0     72.0              56.0      31.0    210.0     84.0     25.0
   120.0            230.0    360.0   120.0     74.0              40.0      27.0    280.0     90.0     15.0
    64.0            110.0     56.0                                7.5     720.0    360.0     88.0      8.9
    51.0            100.0     70.0                                7.9     840.0    380.0     80.0     10.0
    30.0            220.0    230.0                               31.0     120.0    180.0     59.0      5.8
    37.0            200.0    180.0                               41.0      60.0    150.0     25.0      4.3L
    51.0                                                                  240.0    150.0
    36.0                                                                  150.0    220.0
```

Figure C2.--Continued--Ba (parts per million)

```
           1.30                                                    0.92L
           2.60                                                    0.92L
           8.30                                                   10.00
           2.10                                                    9.00
           2.80                                                    7.50
           3.70                    2.50    0.92L                   5.80
           4.50    0.92L   0.92L   2.70    2.90                    5.40
           0.92L   2.70    2.10    0.92L   0.92L                   6.10
                   2.30    0.92L   2.00    0.92L                                          17.00    9.90
                   1.30    1.40    0.92L   0.92L                                  10.00   24.00    9.10
                   5.00    0.92L   0.92L   0.92L                                  12.00   11.00    8.50    9.70   18.00
                   4.70    0.92L   2.30    3.10                                    2.60    1.30    4.30   12.00   10.00
                   2.70    1.50    1.40    3.00                                    2.80    5.60    9.60    5.20    6.20
                   0.92L   0.92L                                   1.90    2.90    3.70    8.60    8.40    7.80    9.00
                                   3.30                            0.92L   0.92L   3.00    7.40    4.80    5.90   11.00
                                   4.90                            0.92L   0.92L   5.00    8.60    6.20   10.00   11.00
                                   2.90                            2.20    2.60    5.40                   10.00    5.10
                                   0.92L                           4.20    3.00                            9.50    7.50
                                   1.90                            2.80    3.40
                                   3.20            3.10    3.20    0.92L   3.50
                                   2.20            3.20    2.50    4.40    2.80
                                   2.70            2.60    2.20   14.00    3.40
                                                   1.70    3.70   11.00    4.20                                   20.00    7.90
                                                   0.92L   2.70    2.70    5.00                    0.92L   2.50   20.00    8.10
   0.92L                           2.30   13.00    0.92L   2.70    2.60    4.20                    8.40    3.10    5.30    4.80
   0.92L           0.92L   0.92L   4.60   13.00    1.40    0.92L   3.70    3.30            2.60    3.00    1.10    7.00    4.10
   0.92L           3.40    0.92L   2.70    0.92L   0.92L   1.10    3.70    4.30            2.40    2.40    0.92L   5.00    2.60
   2.60            1.90    2.90    2.40    0.92L                   4.50    0.92L           6.80    1.40    0.92L   6.90    4.10
   0.92L           2.00    0.92L   4.80    0.92L   2.20    0.92L   4.60    2.70            5.70    0.92L   2.20    8.60    7.80
   0.92L           5.20    1.80    6.00    2.50    1.20    0.92L                           4.30    0.92L   0.92L   8.00    7.30
   2.00            5.10    3.10    4.80    0.92L   5.10    3.30                            4.70    2.10    1.80
   0.92L           2.70    2.20    4.90    0.92L   3.70    3.40                            3.00
                   2.50    0.92L                   3.50    1.60                            2.00
                                                   3.40    1.30
                           3.10    0.92L           0.92L   3.70
                           4.00    0.92L           0.92L   2.50
           0.92L   2.30    1.70    0.92L
           0.92L   2.30    0.92L   0.92L                   0.92L
           1.70    2.10    0.92L   0.92L                   0.92L
           1.40    1.80    0.92L   0.92L                   0.92L                                                   0.92L   0.92L
           2.00    3.00    2.20    0.92L                   2.60                                    0.92L   2.40    0.92L   0.92L
           3.20   11.00    0.92L   2.40                    0.92L                                   2.10    0.92L   2.70    0.92L
           0.92L   0.92L                                   0.92L                                   2.40    0.92L   2.00    0.92L
           0.92L   0.92L           6.80    4.90            2.90                                    2.50    1.10    0.92L   3.00
                                   6.50    3.80            3.20                                    2.00    2.60    0.92L   3.40
                                   6.00    3.70                                                    2.80    1.40    2.10    4.20
                                   1.40    3.90                                                    2.80    0.92L   0.92L   3.10
                   7.30    3.30    3.00    3.70            4.00                    0.92L   0.92L   2.20    0.92L
                   7.90    3.40    4.40    4.20            3.00                    2.20    1.30
   5.80            5.60    4.60    3.90    4.30            5.30    3.20    6.80    2.70    2.20
   5.80            5.20    5.80    5.30    3.40            6.60    3.50    7.20    1.70    1.70
   3.20            6.90    3.90                            0.92L   5.80    7.60    3.90    0.92L
   0.92L           8.50    3.20                            0.92L   8.70   11.00    3.90    2.30
   2.90           19.00    5.40                            2.50    4.10    3.00    3.20    0.92L
   0.92L          19.00    5.00                            2.80    4.60    3.00    0.92L   0.92L
   2.50                                                            6.50    3.30
   0.92L                                                           4.90    5.10
```

Figure C2.--Continued--Co (parts per million)

```
              8.                                                    260.
              6.                                                      8.
             33.                                                     13.
              9.                                                     12.
             10.                                                     16.
             14.                     18.     10.                     16.
             16.      7.      9.     12.      9.                     12.
             18.      6.      7.     10.      7.                     14.
                      6.      6.     10.      9.                                                  9.      11.
                      7.      7.     16.      7.                                     11.         16.       9.
                      8.      7.      9.      9.                                     11.         17.      15.     13.     12.
                     11.      6.     10.     11.                                     10.          6.      10.     16.     10.
                      6.     11.      7.     14.                                     11.         12.      12.     10.      9.
                      8.      8.                                      8.      9.     11.         12.      15.     16.     13.
                                      7.                              8.      9.     10.         23.       8.     14.     12.
                                     12.                              7.      8.     13.         25.      12.     12.     11.
                                     14.                             10.      8.     18.                          11.      8.
                                      9.                             12.     12.                                   9.      8.
                                     12.                              9.      9.
                                     11.             12.     12.     16.     12.
                                      8.             12.     10.     16.     10.
                                      8.             12.     12.     10.     13.
                                                      6.     12.     10.     11.                                       8.     12.
                                                     12.     12.      9.     39.                     11.      7.      8.      8.
      8.                             10.     52.      6.     14.     16.     12.                     18.      7.     12.     11.
      6.             61.      9.      9.     55.      8.      9.     11.     12.             14.     10.      6.     12.      8.
      9.             15.      8.      6.      7.     20.      7.     12.     15.             13.     10.      9.     10.     10.
     10.             12.      9.     10.      7.                     12.     12.             14.      9.      8.      7.      8.
     12.             11.      9.     16.     10.      5.     14.     11.     10.             14.     12.      7.     11.      7.
      8.             20.      7.     14.     10.      7.      6.                              9.      8.      7.      9.     10.
      6.             10.      6.     17.     12.     14.     11.                             14.      8.      7.
      7.              8.      8.     12.     12.     10.     11.                              9.
                      8.      7.                     14.      6.                              9.
                                                     13.      5.
                              9.     10.             12.      8.
                             12.      8.              5.     12.
              5.     14.      8.     12.
              7.      7.      8.      7.                      6.
             12.     10.      8.      8.                      8.
             14.      7.      6.     12.                      5.                                                       8.      9.
              8.     10.      8.      7.                      5.                                     10.      8.     13.      9.
              7.     12.      7.      8.                      8.                                     10.     10.      9.     16.
              7.      8.                                     10.                                     10.      7.      9.      8.
              8.      8.             11.     14.             12.                                     10.      8.      8.     18.
                                     13.      8.             10.                                     10.     10.     13.     16.
                                     11.     12.                                                     10.      8.      9.     10.
                                      7.     16.                                                      8.      8.      8.     16.
                     10.     12.     14.     11.             11.                      7.      7.      7.      8.
                     10.     13.     16.     12.             11.                      8.      7.
     15.             20.     12.     26.     10.              9.      8.     16.     14.      8.
     18.             20.     12.     11.     10.             10.      7.     10.     11.      9.
     11.              9.     10.                             11.     11.     26.     13.      7.
     14.             12.     12.                              9.     10.     21.     14.      7.
      8.             14.     18.                             22.     12.      8.     11.      6.
      9.             14.     16.                             14.     11.     16.     10.      6.
      9.                                                             12.     10.
     16.                                                             10.     17.
```

Figure C2.--Continued--Cr (parts per million)

```
         0.89                                                    0.72
         1.40                                                    0.44L
         4.20                                                    2.10
         1.50                                                    1.80
         2.50                                                    2.20
         1.60                    1.40    4.30                    1.60
        19.00    3.50    0.44L   0.87    4.90                   42.00
         1.70    3.40    0.44L   2.10    0.75                   62.00
                 0.77    0.45    2.60    1.40                                           11.00   53.00
                 2.30    0.44L   1.50    1.50                           35.00       13.00   45.00
                 9.00    0.44L   1.30    0.74                           39.00        7.90    3.30    5.10   10.00
                11.00    0.44L   9.00    3.00                            1.70        0.66    1.20    4.60    8.30
                 0.44L   0.74    1.10    4.50                            3.90        3.00    2.70    8.30    1.50
                 1.50    0.72                            0.56    2.10    1.00        3.70    3.30    7.60    1.50
                                 1.40                    0.93    2.80    1.20        3.70    1.30    7.20   15.00
                                 1.10                    1.00    0.84    2.30        3.80    2.10   10.00   16.00
                                 1.70                    1.30    1.50    2.00                        2.00   18.00
                                 3.40                    1.80    2.80                                2.10   21.00
                                 1.20                    2.30    2.30
                                 1.00            1.10    1.30    2.40    1.80
                                 5.40            1.10    1.50    2.60    2.20
                                 5.90            1.50    3.90   27.00    6.70
                                                 1.10    4.10   21.00    7.30                                   27.00   15.00
                                                 1.00    1.70    0.84    3.60                   34.00    0.92   24.00   16.00
 1.30                            0.59   30.00    0.44L   1.30    2.40    2.30                    3.90    0.81   30.00    5.80
 1.20            1.80    2.10    0.78   73.00    0.52    0.44L   2.20    1.40            1.50    0.44L   0.50    9.10    5.10
 0.44L           2.10    0.80    0.44L   0.44L   0.62    0.44L   2.20    1.40            0.75    0.44L   0.67   11.00    1.70
 0.84            1.60    0.46    0.71    0.55                    3.40    1.80            3.10    1.30    0.47   12.00    3.50
 0.44L           1.30    0.57    5.00    1.10    0.44L   0.44L   2.20    0.46            3.50    1.60    0.54   12.00    2.60
 0.47            4.70    0.44L   4.20    0.44L   0.44L   1.60                            2.70    0.45    3.40   11.00    3.10
 0.44L           4.90    0.44L   3.00    2.70    1.10    1.70                            3.00    0.44L   0.44L
 0.44L           0.55    0.44L   2.90    0.62    1.20    2.90                            1.30
                 0.44L   3.40                    1.80    0.44L                           1.10
                                                 1.80    0.44L
                         1.50    0.44L           2.70    2.50
                         3.10    0.44L           0.74    2.60
         0.44L   1.10    0.57    0.60
         0.80    0.95    0.64    0.44L                   0.49
         0.57    0.59    0.46    0.97                    0.62
         0.69    1.50    0.63    0.44L                   0.62                                            0.44L   0.93
         0.51    1.80    0.44L   0.71                    0.44L                           0.65    0.44L   0.66    1.20
         0.44L   6.20    0.44L   0.73                    0.44L                           0.73    0.54    0.54    0.44L
         0.64    0.44L                                   0.44L                           0.84    4.60    4.00    0.73
         0.44L   0.44L           8.60    2.40            0.75                            1.00    1.30    2.00    1.30
                                 7.70    2.50            2.00                            0.63    1.20    0.75    0.85
                                82.00    1.40                                            0.79    0.89    0.75    1.10
                                 0.70    2.00                                            2.10    0.64    0.44L   2.40
                 3.10    2.00    1.60    1.40            0.74                    0.44L   0.52    1.70    0.88
                 3.50    2.20    2.20    2.00            1.00                    0.44L   0.89
 4.40            3.30    4.50    4.70    2.00            2.00    0.99    6.20    0.44L   1.90
 3.90            3.20    3.90    4.70    2.50            2.30    1.20    5.50    0.44L   0.45
 1.20            4.30    0.44L                           0.44L   2.20   11.00    1.50    0.44L
 2.20            5.90    0.44L                           0.54    2.30   15.00    1.40    0.44L
 1.70            4.30   11.00                            0.87   59.00    1.40    5.00    0.44L
 1.50            4.90   10.00                            1.40    0.90    2.00    0.44L   0.84
 3.10                                                            2.60    2.70
11.00                                                            1.90    2.60
```

Figure C2.--Continued--Cu (parts per million)

```
        25.0                                                    34.0
        25.0                                                    38.0
        30.0                                                    37.0
         9.3L                                                   35.0
         9.3L                                                   24.0
         9.3L                    9.3L   45.0                    20.0
        56.0    30.0    35.0    17.0    40.0                    20.0
         9.7    45.0    35.0     9.3L   50.0                    24.0
                56.0    35.0     9.9    68.0                                            30.0    35.0
                32.0    41.0     9.3L    9.3L                                   32.0    40.0    43.0
                34.0    33.0     9.3L   56.0                                    37.0    58.0    32.0    31.0    49.0
                28.0    50.0     9.3L   26.0                                    11.0    18.0    27.0    51.0    60.0
                44.0    32.0    37.0    30.0                                    19.0    48.0    23.0    65.0    44.0
                23.0    38.0                                     9.3L   11.0    29.0    48.0    35.0    26.0    43.0
                                27.0                            11.0    12.0    27.0    66.0    34.0    26.0    30.0
                                23.0                            17.0     9.3L   31.0    84.0    38.0    59.0    33.0
                                16.0                             9.6    11.0    38.0                    52.0    37.0
                                 9.3L                           28.0    17.0                            47.0    40.0
                                 9.3L                           25.0    21.0
                                 9.3L           67.0    63.0    26.0    18.0
                                20.0             9.3L   11.0    28.0    23.0
                                24.0            29.0    25.0    10.0    39.0
                                                43.0    44.0    37.0    33.0                                    50.0    28.0
                                                33.0    12.0    55.0    28.0                    21.0    45.0    28.0    50.0
 9.3L                           27.0    53.0    33.0     9.3L   20.0    22.0                    34.0    44.0    27.0    42.0
 9.3L           42.0    20.0    38.0    55.0    19.0     9.3L   26.0    22.0             9.3L   42.0    29.0    24.0    37.0
 9.3L            9.3L   15.0    31.0    38.0    37.0    28.0    27.0    29.0             9.3L   41.0    37.0    23.0    22.0
66.0             9.3L    9.3L   39.0    34.0                    31.0     9.3L           26.0    19.0    43.0    47.0    26.0
62.0             9.3L   71.0    22.0     9.3L   38.0    44.0    26.0     9.4            18.0    23.0    22.0    55.0    34.0
 9.3L           21.0     9.3L   14.0     9.3L   12.0    35.0                            10.0    44.0    22.0    20.0    48.0
54.0            36.0     9.3L   33.0     9.3L   18.0    10.0                            21.0    40.0    19.0
58.0             9.3L   62.0    26.0    65.0    12.0    43.0                            11.0
                 9.3L   46.0                     9.3L   20.0                            46.0
                                                 9.3L   37.0
                         9.3L   36.0            35.0    12.0
                        61.0    39.0            44.0    17.0
        43.0    26.0    13.0    21.0
        52.0     9.3L   11.0    38.0                    49.0
        11.0    10.0    36.0     9.3L                   31.0
        56.0    46.0    42.0    28.0                    38.0                                                    34.0    29.0
         9.3L    9.3L   52.0    38.0                    39.0                                    57.0     9.3L   18.0    38.0
         9.3L   45.0    53.0    44.0                    28.0                                    46.0     9.3L   37.0     9.3L
        43.0    46.0                                    43.0                                     9.3L   13.0    12.0     9.9
        57.0     9.3L           26.0    61.0            19.0                                     9.3L   36.0    59.0    15.0
                                49.0    15.0             9.3L                                   39.0    24.0    14.0    15.0
                                11.0    32.0                                                    17.0    15.0    48.0    18.0
                                13.0    20.0                                                    45.0    34.0    33.0    11.0
                46.0    31.0    18.0    12.0             9.3L                   60.0    29.0    23.0    52.0
                24.0    47.0    27.0    21.0            59.0                     9.7    43.0
16.0            36.0    21.0    26.0    11.0            18.0    18.0    42.0     9.3L   40.0
13.0            39.0    57.0    39.0     9.3L           18.0     9.3L   66.0     9.4    40.0
13.0            37.0    19.0                             9.3L   15.0    53.0    53.0    29.0
60.0            44.0    50.0                             9.3L   21.0    62.0    59.0    38.0
22.0            55.0    31.0                            16.0    23.0    26.0    27.0    31.0
28.0            59.0    21.0                            38.0    25.0    22.0    33.0    18.0
46.0                                                            48.0    21.0
51.0                                                            21.0    27.0
```

Figure C2.--Continued--La (parts per million)

```
        2.0L                                                    2.0L
        2.4                                                     2.2
        2.0L                                                    2.5
        3.3                                                     2.0L
        3.5                                                     2.3
        4.4                     3.3     2.5                     2.0L
        4.2     2.9     2.2     3.8     2.0L                    2.0L
        2.7     2.4     2.0L    4.2     3.6                     5.1
                2.2     2.0L    2.0L    3.0                                                 2.4     2.8
                2.0L    2.0L    3.4     2.0L                                    4.4         5.2     3.0
                2.0L    3.2     3.0     2.5                                     3.9         2.8     2.0L    3.3     2.2
                2.0L    2.0L    2.8     2.5                                     2.0L        2.3     2.0L    3.4     2.8
                2.0L    2.0L    2.3     3.5                                     2.1         2.9     2.0L    2.0L    2.0L
                2.0L    2.0L                                    3.7     2.0L    2.2         2.0L    2.2     3.0     2.4
                                2.0L                            4.9     3.0     2.0L        2.0L    2.0L    2.0L    2.9
                                2.5                             2.2     2.0L    2.2         2.9     2.0L    4.2     2.9
                                3.4                             2.1     3.4     2.6                         2.8     3.0
                                3.1                             2.0L    3.6                                 2.0L    3.7
                                3.4                             2.0L    2.0L
                                2.0L            2.0L    3.2     3.4     2.2
                                2.0L            2.0L    3.4     3.9     2.0
                                2.0L            2.3     2.0L    3.5     3.0
                                                2.0L    2.0L    3.0     2.0L                                    4.3     2.4
                                                2.1     3.1     2.4     2.0L                    2.0L    2.1     3.0     2.0L
3.6                             2.0L    2.2     2.0L    3.1     2.2     2.2                     2.5     2.0     2.2     2.0L
2.0L            2.3     2.8     2.0L    2.0L    2.0L    2.0L    2.1     2.2             3.3     2.0L    2.0L    2.0     2.0L
3.1             2.7     2.7     3.4     2.6     2.0L    2.0L    2.0L    2.5             3.4     2.0L    2.3     2.0L    2.0L
2.4             2.8     3.3     2.9     2.4                     2.3     3.0             2.0L    2.0L    2.0L    2.3     2.0
3.6             2.5     4.7     2.9     2.8     2.0L    2.1     2.2     2.0L            2.0L    2.0L    2.0L    2.1     2.0L
3.5             2.1     2.0L    2.0L    3.0     2.0L    2.0L                            2.0L    2.0L    2.3     2.0L    2.1
2.0L            2.0L    2.0L    3.8     3.6     3.9     3.7                             2.0L    2.0L    2.0
2.0L            3.5     2.0L    2.1     4.0     2.0L    3.4                             2.0L
                2.0L    3.0                     3.2     2.0L                            2.0
                                                2.0L    2.0L
                        2.0L    2.0L            2.0L    2.3
                        2.4     2.0L            2.0L    2.4
        2.0L    2.0L    2.0L    2.0L
        2.0L    2.2     2.8     2.3                     2.2
        2.0L    2.0L    2.8     4.6                     2.0L
        2.8     2.0L    2.0L    2.0L                    2.0L                                                    2.0L    2.0L
        5.3     2.4     2.5     2.0L                    2.0L                                    3.2     5.0     2.0L    2.2
        2.0L    2.0L    3.6     2.0L                    2.0L                                    2.2     3.5     2.0L    2.0L
        3.4     2.0L                                    2.0L                                    2.0L    2.2     2.0L    2.0L
        2.0L    2.4             2.1     2.5             2.5                                     2.0L    2.6     3.3     2.0L
                                2.0L    2.0L            2.5                                     2.0L    2.0L    2.7     2.4
                                2.3     2.1                                                     2.4     2.0L    2.8     3.4
                                2.0L    3.1                                                     2.0L    2.0L    2.0L    2.0L
                2.7     2.0L    2.0L    2.0L            2.9                     2.0L    3.1     2.0L    2.2
                2.8     2.4     2.0     2.6             3.0                     2.7     2.0L
3.2             3.2     2.0L    3.0     3.4             2.0L    2.0L    2.0L    3.7     2.0L
3.5             2.0L    2.2     2.7     4.4             2.2     2.0L    2.0L    3.9     2.0
3.4             2.5     2.0L                            2.0L    2.2     2.0L    2.4     3.6
2.6             2.6     2.0L                            2.0L    2.9     3.8     3.0     2.0L
2.1             4.0     2.1                             2.0L    5.6     2.4     2.1     2.0L
2.4             3.9     2.0L                            2.5     3.3     2.6     2.0L    2.0L
2.3                                                             4.6     2.0
2.0L                                                            2.4     2.0L
```

Figure C2.--Continued--Mo (parts per million)

```
          4.3L                                                  16.0
          4.3L                                                   4.3L
          9.7                                                    9.3
          7.8                                                    6.6
          7.4                                                    4.5
         17.0                     4.3L    4.3L                  11.0
          6.8    12.0     4.3L   12.0    13.0                   15.0
          7.2     4.3L    7.9     7.6    11.0                   20.0
                  9.9     4.3L   25.0    17.0                                                    6.9    31.0
                  5.5     4.3L    4.3L   19.0                                   21.0            12.0     4.3L
                  4.3L    6.5    16.0     6.0                                   11.0            18.0     4.3L    4.3L    4.3L
                  4.3L    9.6    10.0    18.0                                   12.0            11.0    11.0     9.7     4.9
                  4.3L    9.5    12.0     8.6                                    6.1             4.3L    4.5    11.0     4.3L
                  4.3L    4.3L                                  28.0    13.0    11.0             4.3L   20.0     4.3L    4.3L
                                  7.0                            5.4     4.3L    4.3L           21.0     5.6     7.0     8.6
                                  4.3L                           4.3L    8.6     4.3L            9.9     4.3L   24.0    17.0
                                 17.0                            4.3L   17.0    11.0                             7.9     7.5
                                 10.0                           12.0     4.3L                                   11.0     4.3L
                                  9.3                           14.0    19.0
                                  7.7            26.0    25.0   28.0L    6.3L
                                  4.3L            4.3L   19.0    4.3L   13.0
                                                  4.3L    6.8   14.0    19.0                                     4.3L    4.3L
                                                  4.3     8.3    4.3L    4.7                     9.2     6.4     4.3L    8.2
 16.0                             4.3L   26.0     5.8    32.0   10.0    10.0                     5.2     5.4     4.3L   13.0
 12.0            13.0     4.8     4.3L   29.0     9.5     4.3L   4.3L    5.4            16.0     8.9     4.7     4.3L    9.4
 16.0             4.3L   13.0     4.3L    4.3L    8.2     4.3L   8.8    23.0             8.9     4.3L    4.3L    4.3L    9.1
 14.0             4.3L   10.0     4.3L   14.0                    6.9     4.3L            4.3L    4.8     4.3L    4.3L    4.3L
 28.0            12.0    18.0     8.6    15.0     4.3L    7.1    4.3L   31.0             4.3L    4.3L    4.3L    4.3L    8.1
 13.0             6.7    19.0     4.3L   25.0     8.4     4.3L                           4.8     4.3L    4.3L    4.3L    7.9
  4.3L            5.2    13.0    16.0     7.1     8.6    15.0                           11.0     5.6    10.0
 12.0             4.3L   13.0     5.4     4.3L   14.0     7.8                            4.3L
                  5.2    13.0                    13.0     4.3L                           4.3L
                                                 18.0    14.0
                         20.0    12.0             4.3L    4.3L
                          4.3L    4.3L           16.0    15.0
         11.0     4.3L    6.2     7.1
          4.3L    8.9     4.3L    7.2                     4.3L
          4.3L    4.3L    4.3L   21.0                     6.5
          8.9    13.0     6.6     4.3L                   18.0                                                    8.0     4.3L
         11.0     9.4     4.3L    6.1                     4.3L                                  15.0    17.0     4.3L   10.0
          4.3L   17.0    20.0    12.0                     4.3L                                   9.5    18.0    10.0     7.4
         22.0    12.0                                     4.3L                                  11.0     4.3L    4.3L    8.3
         30.0    13.0            12.0    18.0             7.9                                    5.3     4.3L    6.6     4.3L
                                 19.0     4.3L           10.0                                   11.0     4.3L    4.3L   15.0
                                 17.0     4.4                                                    5.4    12.0    13.0    11.0
                                  4.3L    9.8                                                    4.3L    4.3L    4.8    14.0
                 10.0     6.5    11.0     7.7             4.3L                   8.4     4.3L    4.3L    9.8
                 15.0    16.0     4.3L    4.3L            7.8                   10.0    15.0
  9.8            14.0    18.0     4.3L   11.0             4.3L  19.0    38.0     5.4     4.3L
 24.0            19.0    22.0     7.5    13.0             4.3L  12.0    59.0     4.3L    4.3L
  4.3L            7.4     4.3L                            9.9    5.9    39.0     4.3L    4.3L
  4.3L            7.6     9.0                            10.0    4.3L   54.0    14.0     4.3L
  5.6             4.3L   15.0                             4.3L  10.0    21.0     7.7     4.3L
  5.1             4.3L   17.0                             4.4   17.0     9.9     4.3L    4.3L
  4.3L                                                           7.8     9.6
  4.3L                                                           4.3L   29.0
```

Figure C2.--Continued--Nb (parts per million)

	2.0L							3.9							
	2.0L							2.0L							
	7.1							6.7							
	2.2							5.2							
	6.6							3.8							
	5.2			3.9	3.9			2.4							
	6.8	6.4	2.4	2.0L	3.2			5.2							
	4.9	2.0L	2.0L	5.9	4.5			8.5							
		2.3	2.1	2.5	2.0L							8.7	5.8		
		3.6	2.0L	2.4	2.1					12.0		13.0	6.1		
		22.0	6.8	7.6	2.0L					7.3		8.7	11.0	8.9	12.0
		9.4	2.0L	3.0	3.6					2.0L		2.0L	4.0	9.5	10.0
		2.0L	2.6	2.0L	5.2					4.0		5.7	10.0	2.7	5.6
		2.3	2.0L					2.0L	2.0L	11.0		11.0	12.0	5.3	6.5
				6.4				2.2	3.2	2.5		7.9	5.6	4.8	8.6
				4.9				2.0L	2.1	3.0		12.0	6.0	11.0	7.3
				4.5				2.2	2.0L	2.0L				6.3	2.0L
				7.1				2.0L	2.8					5.1	3.0
				2.1				4.2	3.1						
				2.0L		8.1	4.9	4.8	2.0L						
				2.0L		3.2	4.2	6.1	3.5						
				3.3		2.0L	3.5	13.0	4.1						
						2.0L	4.6	7.5	3.9					23.0	4.8
						2.0L	4.1	2.0L	7.9			5.0	2.4	14.0	4.0
2.0L				2.0L	27.0	2.0L	2.9	3.7	2.8			8.0	2.6	3.9	9.4
2.0L		4.4	2.0L	2.0L	25.0	2.0L	2.0L	2.6	2.0L		4.4	6.4	2.7	4.0	2.6
9.5		7.9	2.0L	5.8	2.0L	2.0L	2.0L	2.1	3.9		2.0L	2.4	4.1	2.8	12.0
2.0L		2.9	3.0	2.0L	2.0L			4.3	5.8		5.4	2.9	2.0L	3.1	2.0L
2.0L		2.0L	2.0L	8.5	2.5	2.0L	2.4	2.1	2.0L		5.1	3.3	2.4	10.0	2.7
2.0L		8.3	2.0L	7.5	2.1	2.0L	2.0L				4.0	2.2	2.0	4.3	3.1
2.0L		6.0	2.0L	12.0	4.7	9.0	4.8				5.5	2.1	2.0L		
2.0L		6.6	2.0L	4.8	3.0	4.5	2.9				4.8				
		2.0L	2.0L			4.1	2.0L				3.5				
						3.7	2.0L								
			4.7	2.0L		2.9	2.5								
			3.9	2.0L		2.0L	2.1								
	2.0L	2.0L	2.0L	2.7											
	2.0L	2.0L	2.0L	2.0L			2.0L								
	2.0L	2.0L	3.4	2.0			2.0L								
	4.0	2.0L	2.0L	2.0L			2.0L							7.0	2.0L
	2.6	4.0	2.0L	2.2			2.0L					2.0L	10.0	2.9	2.0L
	2.0L	7.3	2.0L	2.0L			2.0L					2.0L	2.0L	2.2	2.0L
	3.7	2.0L					2.0L					3.2	2.1	3.3	2.0L
	2.0L	2.0L		7.8	6.7		3.5					2.1	2.0L	2.6	3.8
				6.1	4.2		3.6					2.5	8.0	2.0L	3.8
				6.5	4.8							2.0L	2.0L	5.0	6.9
				2.3	4.3							3.0	2.2	2.9	4.8
		3.0	3.0	4.3	3.1		3.6			2.8	5.1	2.7	2.0L		
		6.4	7.7	5.0	3.6		4.5			2.0L	2.0L				
5.5		17.0	5.8	5.6	4.6		9.0	2.0L	8.1	5.8	5.4				
6.4		8.2	7.3	2.0L	4.7		9.7	2.0L	9.2	7.5	2.0L				
3.2		5.8	3.7				2.0L	3.2	7.8	5.4	4.9				
2.5		8.0	5.6				2.0L	4.8	9.4	6.0	2.0L				
3.0		15.0	20.0				3.2	9.6	14.0	2.4	2.0L				
7.5		16.0	7.7				5.4	4.3	4.9	2.0L	2.0L				
8.2								8.8	3.4						
6.4								2.4	5.9						

Figure C2.--Continued--Ni (parts per million)

```
           4.3L                                                              4.3L
           4.3L                                                              4.3L
           4.3L                                                              5.0
           4.3L                                                              4.3L
           4.3L                                                              9.4
           4.3L                        4.3L     11.0                         5.7
           7.8    170.0       4.3L     4.3L     11.0                         4.8
           4.8    180.0       4.3L    13.0      4.3L                         4.3L
                    6.0       4.3L    24.0      4.3L                                                          4.4       4.3L
                    4.3L      4.3L     4.3L     4.3L                                            4.3L          5.4       4.3L
                    7.2       4.3L     4.3L     4.3L                                            4.3L          4.3L      4.3L     4.3L      5.1
                    4.3L      4.3L     4.3      4.3L                                            4.3L          4.3L      4.3L     4.7       4.3L
                    4.3L      6.3      4.3L     4.3L                                            4.3L          4.3L      4.3L     4.3L      4.3L
                    4.3L      4.3L                                           4.3L      5.2      5.1           4.3L      4.3L     4.5       4.3L
                                       6.0                                   4.3L      4.3L     4.3L          4.3L      4.3L     4.3L      4.3L
                                       5.7                                   4.8       4.3      4.3L          4.3L      4.3L     5.2       4.5
                                       5.3                                   4.3L      6.9      4.3L                             4.3L      4.3L
                                       4.3L                                  7.7       4.3L                                      4.3L      4.3L
                                       4.3L                                  4.9       5.1
                                       4.3L               7.4       4.3L     4.3L      4.3L
                                       5.6                4.3L      4.3      4.3L      4.4
                                       6.1                4.3L      5.0      8.4       5.0
                                                          4.3L      4.3L     4.6       7.1                                            4.5       4.3L
                                                          4.3L      4.3L     6.5       4.3L                    4.3L     4.3L          5.3       4.3L
 9.4                                   4.3L     8.8       4.3L      4.3L     5.6       7.5                     7.1      4.3L          4.3L      4.3L
 7.9                4.3L      4.3L     4.3L     7.0       4.3L      4.3L     5.3       4.3L               4.3L 4.3L     4.3L          4.3       4.3L
 4.3L               4.3L      4.3L     4.3L     4.3L      4.3L      4.3L     4.5       4.3L               4.3L 4.3L     4.3L          4.3L      7.8
 4.3L               4.3L      4.3L     4.3L     4.3L                         5.7       4.3L               6.2  4.3L     4.3L          4.3L      4.3L
 4.3L               4.3L      4.3L     4.3L     4.3L      4.3L      4.3L     6.0       4.3L               5.2  4.3L     4.3L          4.3       4.3L
 4.3L               4.3L      4.3L     4.4      4.3L      4.3L      4.3L                                4.3L 7.8      4.3L          4.3L      4.3L
 4.4                4.3L      4.3L     6.9      4.3L      4.3L      4.3L                                6.2  5.7      4.3L
 4.5                4.3L      4.3L     4.8      4.6       4.3L      4.3L                                4.3L
                    4.3L      4.3L                        8.1       4.3L                                4.3L
                                                          8.8       4.3L
                              5.2      4.3L               4.3L      4.3L
                              5.1      4.3L               4.3L      4.3L
           4.3L     4.3L      4.3L     4.3L
           4.3L     4.9       4.3L     4.3L                         4.3L
           4.3L     4.3L      4.3L     4.3L                         4.3L
           4.3L     4.3L      4.3L     4.3L                         4.3L                                                              4.3L      5.5
           4.3L     4.5       4.3L     4.3L                         4.3L                                           4.3L     7.3       4.3L      4.6
           4.3L     4.5       4.3L     4.3L                         4.3L                                           4.3L    12.0       4.3L      4.3L
           4.3L     4.3L                                            4.3L                                           4.3L   250.0       4.3L      4.3L
           4.3L     4.3L               5.1     14.0                 4.3L                                           4.3L   220.0       4.3       4.3L
                                       5.0     11.0                 4.3L                                          28.0     82.0       4.3L      4.3L
                                       7.9      5.6                                                               16.0     62.0       4.3L      5.0
                                       4.3L     5.9                                                               82.0     68.0       5.7       4.3L
                    5.6       4.3L     4.9      4.3L                4.3                         4.3L      4.3L    75.0     70.0
                    5.4       4.3L     4.3L     4.6                 5.8                         4.4       4.3L
12.0                6.3       4.7      4.3L    15.0                 5.0      5.5       4.6      4.3L      5.1
12.0                7.5       8.4      5.1     17.0                 4.7      4.4       6.2      4.3L      5.6
27.0                6.0       4.3L                                  4.3      4.3L      7.6      4.3L      4.3L
18.0                6.3       4.3L                                  4.3L     4.5      13.0      5.4       4.3L
 4.3L               5.7       6.6                                   4.3L    38.0       4.3L     4.3L      4.3L
 4.3L               7.6       6.7                                   4.3L     5.9       4.9      4.3L      4.3L
 4.3L                                                                        5.7       4.3L
 4.3L                                                                        4.3L      5.7
```

Figure C2.--Continued--Pb (parts per million)

2/3

```
        3.5                                                     3.2
        3.2                                                     2.0L
        5.5                                                     5.9
        4.4                                                     5.5
        5.0                                                     4.1
        6.7                     4.7     3.1                     4.6
        5.9     3.0     3.3     4.8     3.2                     5.7
        4.1     2.8     3.1     5.3     4.7                     5.3
                3.6     3.4     4.7     5.2                                                 5.4     4.5
                2.6     2.0L    5.1     4.2                                     5.9         7.1     4.1
                3.4     2.2     2.0L    4.5                                     5.1         5.7     5.3     5.4     4.7
                2.9     3.1     4.2     5.0                                     3.8         3.6     5.7     5.5     4.1
                3.4     2.4     4.1     4.5                                     3.7         5.8     8.5     4.6     6.8
                2.9     2.4                                     4.7     6.1     4.9         5.6     9.9     5.8     11.0
                                2.6                             5.2     4.2     4.8         8.7     4.9     4.4     5.2
                                2.4                             3.1     4.6     5.8         8.5     7.6     6.3     4.9
                                5.5                             3.3     4.8     6.3                         5.7     3.5
                                3.8                             5.1     5.0                                 4.8     4.4
                                4.2                             6.2     4.6
                                5.6             5.1     5.9     6.6     4.5
                                3.5             4.8     5.2     6.8     4.6
                                3.0             2.9     3.9     4.6     6.1
                                                3.2     4.1     2.9     4.8                                     3.2     3.2
                                                3.4     4.3     4.7     5.4                     4.3     2.0L    2.8     3.5
4.8                             3.4     9.6     2.3     5.2     4.7     5.8                     5.9     3.1     3.5     4.2
4.6             3.8     4.5     2.4     9.8     2.8     4.0     6.2     3.6             4.7     2.0L    3.4     4.3     3.5
5.2             4.7     4.5     3.1     3.7     2.5     3.7     4.4     5.6             4.4     2.5     3.2     3.3     4.3
6.0             4.5     4.9     3.6     2.3                     4.7     4.9             3.7     3.7     2.9     2.8     2.7
5.4             3.8     5.0     6.2     4.3     4.3     3.4     4.7     4.7             3.2     3.1     3.3     4.1     3.4
5.4             6.2     4.6     6.1     5.3     3.0     3.4                             3.7     3.7     3.3     3.3     3.7
5.2             5.7     5.1     7.2     4.3     5.5     4.8                             3.7     3.5     3.3
4.8             2.0L    5.8     6.3     5.0     4.0     5.9                             6.2
                4.4     5.0                     6.4     3.5                             3.6
                                                5.7     3.6
                        6.2     2.3             3.0     4.6
                        5.5     2.0L            3.5     3.8
        2.6     4.0     4.0     2.0L
        2.0L    3.5     4.3     4.0                     2.0L
        3.8     2.8     4.0     4.4                     2.0L
        4.0     2.4     2.7     3.7                     2.4                                                     3.5     4.1
        5.6     4.2     5.1     4.2                     3.0                                     5.3     5.0     3.2     3.3
        4.7     5.0     3.7     3.7                     2.2                                     4.1     4.9     3.4     2.0L
        3.5     3.0                                     2.0L                                    5.3     3.6     3.2     3.3
        5.7     3.0             5.6     6.9             5.1                                     4.0     2.9     5.6     4.6
                                6.3     5.1             4.4                                     4.3     3.5     5.3     6.3
                                6.8     5.1                                                     3.2     3.3     3.6     6.1
                                2.8     4.5                                                     3.5     3.7     3.4     5.5
                4.7     3.7     3.3     6.0             4.7                     4.5     3.3     2.0L    3.6
                3.1     3.8     2.8     5.3             3.6                     4.1     2.5
7.5             7.1     7.1     4.0     5.4             4.5     3.3     7.6     2.9     3.4
6.3             7.0     7.2     4.1     4.6             3.5     3.7     9.3     5.1     2.9
5.4             5.0     3.1                             5.6     5.9     7.5     5.2     3.2
3.8             4.6     3.7                             4.9     5.9     9.3     5.5     3.9
3.5             6.1     7.1                             3.1     5.7     7.3     3.5     3.3
3.8             6.1     4.9                             2.9     5.4     5.9     2.8     2.2
3.7                                                             7.8     5.5
3.6                                                             4.8     7.3
```

Figure C2.--Continued--Sc (parts per million)

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```
                      34.                                                                   70.
                      45.                                                                   85.
                     300.                                                                  310.
                     300.                                                                  290.
                     340.                                                                  210.
                     570.                          380.       67.                          240.
                     390.       37.       56.      360.       59.                          450.
                     270.       42.       85.      530.      240.                          500.
                                43.       79.      510.      240.                                                                 300.      370.
                                36.       57.      390.      460.                                              480.           380.      290.
                                95.       53.      460.      410.                                              430.           250.      270.      310.      190.
                                63.       68.      370.      430.                                              190.            44.      220.      340.      160.
                                54.       82.      330.      370.                                              220.           380.      250.      240.      290.
                                40.       42.                                              370.      420.      240.           390.      280.      170.      330.
                                                    35.                                    460.      340.      200.           250.      250.      280.      300.
                                                    40.                                    230.      380.      280.           250.      330.      360.      290.
                                                   380.                                    250.      450.      360.                               400.      330.
                                                   330.                                    350.      440.                                         390.      370.
                                                   340.                                    390.      450.
                                                   370.                840.      400.      340.      260.
                                                    51.                320.      420.      310.      310.
                                                    58.                 99.       58.      350.      360.
                                                                       130.      110.      200.      390.                                               79.      170.
                                                                        32.      670.      310.      290.                           58.       59.       79.      160.
           370.                                     55.      250.       30.      710.      340.      250.                          270.       62.      130.      380.
           390.                340.      460.       46.      230.       42.       33.      320.      270.                240.       77.       65.      140.      220.
           340.                370.      440.       56.       57.       36.       42.      290.      320.                390.       68.       50.      120.      350.
           310.                670.      300.       56.       62.                          270.      360.                 59.       35.       56.      230.      120.
           340.                520.      470.      600.      310.       64.       74.      240.      380.                 39.       38.       50.      240.      120.
           320.                770.      540.      610.      500.       46.       50.                                     37.       61.       38.      160.       59.
           400.                610.      450.      580.      540.      390.      390.                                     61.       51.       39.
           400.                410.      390.      530.      690.      270.      410.                                    340.
                               320.      360.                          460.       51.                                    190.
                                                                       430.       46.
                                         660.       19.                 39.      370.
                                         450.       23.                 40.      310.
                      76.      210.      300.       31.
                      49.      200.      390.       30.                           43.
                     250.      280.       41.      360.                           36.
                     330.      230.       30.       40.                           32.                                                         44.       67.
                     240.      330.      730.       68.                           34.                                         400.      450.       36.       57.
                     390.      180.      620.       61.                           22.                                         270.      460.       36.       36.
                     370.      130.                                               27.                                         390.       41.       30.       49.
                     450.      150.                240.      220.                380.                                         320.       36.      340.      240.
                                                   220.      240.                330.                                          93.       46.      340.      300.
                                                   220.      160.                                                              47.       31.      370.      300.
                                                    32.      110.                                                              46.       35.       56.      320.
                               130.       91.       61.      300.                340.                          370.      110.       43.       30.
                                91.      120.       80.      380.                350.                          230.       92.
           690.                200.      270.       74.      420.                180.      200.      250.      390.      100.
           660.                140.      280.       88.      370.                130.      140.      320.      440.       62.
           740.                140.       50.                                    400.      310.      200.      380.       80.
           620.                110.       68.                                    470.      340.      280.      350.       87.
            45.                170.      140.                                    160.      480.      350.      180.       38.
            55.                200.      100.                                    250.      430.      320.       87.       34.
            56.                                                                            300.      230.
            59.                                                                            250.      370.
```

Figure C2.--Continued--Sr (parts per million)

```
             5.0                                       4.1
             5.4                                       5.6
            14.0                                      11.0
             6.1                                       9.1
             8.1                                       9.1
            10.0               6.6   8.5               7.5
            13.0   8.4   4.5   8.2   9.7               9.6
             8.8   8.0   5.7  11.0   8.0              11.0
                   5.1   6.5  14.0   6.2                                   10.0   8.8
                   4.0   4.8  13.0   8.4                           7.9     12.0   8.5
                  13.0   6.1  13.0   6.2                           7.1     12.0  14.0   8.7  12.0
                   9.8   7.1  15.0  13.0                           5.4      6.5   8.4  12.0  11.0
                   6.0   6.5  12.0  13.0                           6.5      8.5  11.0   8.2  15.0
                   6.5   5.5                           7.0   7.1  14.0      8.3  12.0   6.7  21.0
                               6.7                     7.7   6.5   7.0     14.0   6.8   6.8   8.8
                               7.8                     5.5   7.8   6.4     20.0   9.2  12.0   8.1
                              12.0                     6.4   7.7   8.6                  6.9   5.0
                               7.5                    11.0   6.7                        7.2   8.3
                               6.2                     8.9   8.3
                               7.4        11.0  12.0   9.0   7.2
                               7.5         7.9  12.0  13.0   7.6
                               9.4         4.2   7.0  56.0   9.5
                                           5.1   8.9  42.0  11.0                          17.0   6.7
                                           3.5   7.9  17.0  11.0              14.0   5.5  15.0   5.9
       6.9                     7.3  47.0   3.8   9.2  16.0  13.0              15.0   6.8   7.9   8.9
       6.1         5.5   6.7   7.4  48.0   4.9   3.2  14.0   8.3         7.7   8.7  12.0   8.3   6.2
       8.4        10.0   5.2   5.0   5.1   3.6   5.4  11.0  13.0         7.8   9.1   9.9   7.1  17.0
       7.7         6.6   8.9   5.5   6.1              11.0   7.3         9.3   6.6   7.3   7.8   6.6
       5.3         5.3  10.0  17.0   5.6   4.4  10.0  10.0  12.0         6.6   7.9   8.0   9.5   6.5
       5.6        17.0   6.0  16.0   8.6   4.8   7.9                     7.8   8.4   6.3   6.6   5.3
       7.0        14.0   5.4  15.0   7.7  12.0   9.8                     9.2   7.0   6.3
       6.5         9.0   5.9  15.0   9.6   9.5   7.9                    12.0
                   6.4   5.4              11.0   4.3                     8.4
                                          11.0   4.0
                         9.3   2.9         3.6   9.1
                         9.3   3.5         2.9   7.9
             4.9   7.8   4.7   4.5
             3.8   8.5   7.1   4.7               5.1
             3.2   4.0   4.2   8.1               5.1
             4.1   5.0   4.0   5.7               4.2                                        7.3   7.0
             8.0   8.5   5.8   7.1               4.1                           7.4   9.3   6.7   7.6
             6.0  11.0   5.7   5.5               3.3                           4.8   7.7   8.8   4.3
             6.2   4.0                           5.4                           6.2   3.6   7.4   4.6
             8.4   4.4        16.0  18.0         8.3                           5.9   5.1  18.0  10.0
                              17.0  14.0         7.1                           8.4   8.5  15.0  16.0
                              13.0  12.0                                       6.5   5.7  11.0  15.0
                               9.4  11.0                                       8.8   4.0   7.7  15.0
                  13.0  10.0   8.4   8.8         7.2               7.1   6.0   6.3   5.6
                  13.0  14.0   7.4  12.0         9.6               6.3   5.1
      14.0        29.0  16.0   7.2   9.6        20.0   4.0  17.0   9.2   8.0
      14.0        23.0  21.0   9.7  11.0        17.0   4.3  21.0   8.7   5.8
       8.5        17.0   9.9                    13.0   9.7  23.0  11.0   4.1
       6.8        18.0  11.0                    12.0  13.0  27.0  12.0   4.8
       6.8        30.0  28.0                    11.0  13.0  11.0   6.1   4.8
      11.0        30.0  23.0                    12.0  11.0   9.8   3.3   4.3
       8.4                                            12.0   8.9
       8.6                                             9.0  16.0
```

Figure C2.--Continued--V (parts per million)

```
                  2.0L                                                   2.1
                  2.0L                                                   2.0
                 17.0                                                   18.0
                  3.5                                                   15.0
                  6.1                                                   29.0
                  6.5                     6.1     4.8                   28.0
                  9.8     2.0L    3.6     8.1     4.5                   24.0
                  6.4     2.0L    3.8     8.0     2.0L                  24.0
                          2.3     3.5     9.9     2.0L                                              24.0    18.0
                          2.0L    2.8     3.4     2.0L                                  20.0        28.0    19.0
                          9.1     2.0L    4.0     2.0L                                  21.0        20.0    19.0    23.0    22.0
                          7.2     4.2     4.7     7.2                                    9.2         5.2    15.0    30.0    22.0
                          4.2     2.8     4.8     7.2                                   11.0        19.0    19.0    15.0    22.0
                          4.0     2.3                                6.4    14.0    15.0        18.0    19.0    21.0    29.0
                                          9.6                        7.8    13.0    15.0        29.0    21.0    15.0    17.0
                                         11.0                       11.0     8.7    21.0        31.0    26.0    35.0    20.0
                                          9.2                       12.0    11.0    22.0                        40.0    13.0
                                          6.6                       37.0     8.9                                33.0    17.0
                                          5.0                       25.0    14.0
                                          7.0             9.3     9.8   15.0    17.0
                                          5.5             9.4    11.0   17.0    18.0
                                          5.4             2.0L   10.0    8.3    32.0
                                                          2.0L   13.0    8.3    27.0                                     7.2    12.0
                                                          2.0L    5.8   18.0    30.0                    14.0     2.0L    7.2    12.0
          5.9                             8.8    13.0     2.0L    5.3   16.0    30.0                    19.0     2.5    12.0    23.0
          6.2             5.1    10.0     7.0    14.0     4.1     2.0L  24.0    18.0             6.1     5.6     4.4    12.0    20.0
         13.0             7.1     9.2     2.2     2.0L    3.6     3.2   24.0    31.0             6.3     5.6     3.2     9.5    15.0
         18.0             2.0L   11.0     2.0L    2.2                   21.0     6.3            13.0     3.9     2.0L   11.0    11.0
          2.0L            2.0L   16.0    10.0     2.0L    2.0L    4.8   20.0     7.3            11.0     3.6     3.6    20.0     7.4
          2.0L            9.2     5.2    12.0     2.5     2.0L    4.3                            9.0     3.0     2.0L   16.0     7.2
          2.0L            9.5     4.2    21.0     5.6    13.0    11.0                           11.0     3.3     2.0L
          2.0L            8.1     2.0L   19.0     5.1    10.0    12.0                            7.6
                          6.8     2.0L                   12.0     2.0L                           4.4
                                                         12.0     2.0L
                                 13.0     2.0L            2.0L   11.0
                                  9.5     2.0L            2.0L   11.0
                  2.0L    8.8     9.8     2.0L
                  2.0L   11.0    12.0     2.0L                    2.0L
                  2.0L    2.0L    3.6     4.6                     2.0L
                  2.0L    2.0L    2.6     5.6                     2.0L                                                   3.5     4.3
                  2.0L    6.5     4.2     2.0L                    2.0L                                   2.0L    4.6     2.0L    4.8
                  2.0L   17.0     2.0L    2.9                     4.2                                    2.0L    4.4     4.2     5.4
                  2.0L    2.0L                                    4.4                                    6.4     2.5     4.3     7.3
                  2.0L    2.0L           19.0    16.0             7.0                                    5.6     2.0L   23.0    17.0
                                         19.0    13.0             5.2                                    4.7    14.0    19.0    23.0
                                         34.0    14.0                                                    4.0     9.7     5.8    20.0
                                          8.5    15.0                                                    2.0L    6.1     3.8    17.0
                         22.0     7.9     8.5    14.0             8.4                    2.0     4.2     2.0L    6.0
                         18.0    10.0     9.5    17.0             8.2                    4.8     3.9
         35.0            39.0    30.0    10.0    15.0            13.0   15.0    45.0     5.2     5.9
         31.0            26.0    28.0    14.0    15.0            11.0   15.0    53.0     4.9     5.0
         16.0            26.0     8.0                            13.0   45.0    41.0     6.5     5.2
         14.0            26.0     7.1                            11.0   50.0    46.0     6.4     5.7
          5.0            52.0    21.0                             6.9   20.0    26.0     3.4     4.7
          2.0L           55.0    18.0                             8.2   20.0    26.0     2.0L    4.1
          4.8                                                           37.0    25.0
          6.4                                                           26.0    31.0
```

Figure C2.--Continued--Y (parts per million)

```
         29.0L                                                   29.0L
         74.0                                                    29.0L
         29.0L                                                   29.0L
         29.0L                                                   29.0L
         29.0L                                                   64.0
         29.0L                   29.0L   30.0                    29.0L
         29.0L  460.0    29.0L   29.0L   54.0                    29.0L
         38.0   540.0    29.0L  170.0    29.0L                   77.0
                 51.0   130.0   210.0    29.0L                                              29.0L   36.0
                 58.0    29.0L   29.0L   29.0L                                  29.0L      29.0L   29.0L
                 29.0L   29.0L  120.0    42.0                                   47.0       29.0L   55.0     29.0L  88.0
                 48.0    56.0    29.0L   29.0L                                  38.0       45.0    82.0     29.0L  29.0L
                 48.0    50.0    29.0L   29.0L                                  34.0       29.0L   70.0     29.0L  36.0
                 29.0L   29.0                                    29.0L   33.0   82.0       83.0    29.0L    29.0L  29.0L
                                 50.0                            53.0    29.0L  70.0       50.0    42.0     29.0L  48.0
                                 31.0                            29.0L   29.0L  29.0L      29.0L   82.0     29.0L  84.0
                                 29.0L                           38.0    51.0   96.0                        33.0   29.0L
                                 29.0L                          120.0    29.0L                              35.0   29.0L
                                 60.0                            90.0    39.0
                                 29.0L           29.0L   46.0    29.0L   29.0L
                                 75.0           170.0    29.0L   38.0    29.0L
                                 85.0            29.0L   42.0    89.0    70.0
                                                 68.0    76.0    69.0    69.0                                  54.0   100.0
                                                 29.0L   29.0L   56.0    31.0                  160.0    34.0    53.0   110.0
 58.0                            29.0L   66.0    29.0L   75.0    29.0L   58.0                   29.0L   29.0L   29.0L   75.0
 29.0L           29.0L   29.0L   40.0    61.0    43.0    29.0L   29.0L   29.0L          29.0L   40.0    72.0    50.0    66.0
 29.0L           44.0    30.0    29.0L   45.0    31.0    29.0L   29.0L   29.0L          47.0    72.0    46.0    42.0    38.0
 68.0            29.0L   40.0    56.0    48.0                    44.0    35.0           38.0    29.0L   29.0L   52.0    55.0
 29.0L           29.0L   29.0L   29.0    29.0L   29.0L   29.0L   29.0L   29.0L          38.0    84.0    49.0    54.0    50.0
 29.0L           29.0L   29.0L   71.0    29.0L   33.0    34.0                           29.0L   57.0    44.0    41.0    29.0L
 29.0L           76.0    40.0    93.0    42.0    57.0    40.0                           31.0    55.0    29.0L
170.0            29.0L   50.0    29.0L   29.0L   79.0    29.0L                          29.0L
                 29.0L  120.0                   150.0    29.0L                          29.0L
                                                 40.0    44.0
                         29.0L   35.0            58.0    86.0
                         86.0    29.0L           62.0    29.0L
         29.0L   58.0    40.0    29.0L
         29.0L   60.0    29.0L   84.0                    29.0L
         29.0L   50.0    29.0L   47.0                    29.0L
         29.0L   29.0L   29.0L   29.0L                   44.0                                                   47.0    83.0
         44.0    29.0L   29.0L   64.0                    29.0L                                  29.0L   39.0    50.0    68.0
         29.0L   60.0    32.0    29.0L                   36.0                                   48.0   130.0    44.0    29.0L
         64.0    45.0                                    29.0L                                  34.0   390.0    37.0    68.0
         65.0    50.0            29.0L  120.0            29.0L                                  29.0L  410.0    29.0L   49.0
                                 44.0    64.0            46.0                                  290.0   270.0    29.0L   29.0L
                                 73.0    29.0L                                                 230.0   220.0    29.0L   29.0L
                                120.0    50.0                                                  710.0   260.0    75.0    50.0
                 29.0L   29.0L   29.0L  110.0            29.0L                   29.0L  29.0L  560.0   280.0
                100.0    29.0L   29.0L   50.0            80.0                    31.0   68.0
110.0            49.0    84.0    39.0   120.0            51.0    29.0L   86.0   29.0L 100.0
 29.0L           55.0    46.0    50.0    29.0L           42.0    45.0    29.0L   29.0L  67.0
150.0            49.0    80.0                            35.0    46.0    51.0    29.0L  29.0L
130.0            42.0    51.0                            35.0    29.0L   67.0    29.0L  29.0L
 32.0            29.0L   29.0L                           40.0   160.0   120.0    62.0   41.0
 47.0            52.0    82.0                            29.0L  140.0    29.0L   41.0  100.0
 29.0L                                                           29.0L   29.0L
 29.0L                                                           29.0L   86.0
```

Figure C2.--Continued--Zn (parts per million)

```
                  11.0                                                     4.3L
                   8.4                                                     7.6
                 180.0                                                    62.0
                  15.0                                                    53.0
                  22.0                                                   230.0
                  40.0                    18.0     8.6                   160.0
                  42.0     6.2     8.9    16.0    17.0                    30.0
                  34.0     7.0    12.0    12.0     6.8                    42.0
                           8.1     7.5    15.0     6.8                                                64.0    24.0
                           6.6    10.0    10.0    30.0                                    72.0        82.0    41.0
                           7.9     6.1    13.0     8.8                                   110.0        72.0   120.0    97.0   140.0
                          30.0    10.0     8.5    35.0                                    29.0        17.0    85.0   170.0   160.0
                           9.3    21.0    30.0    29.0                                    45.0        51.0   130.0    48.0    32.0
                           7.1    15.0                                    12.0   220.0   200.0        56.0   120.0    50.0    44.0
                                         140.0                            15.0   250.0   170.0       250.0   100.0    42.0    44.0
                                         240.0                            71.0    90.0   110.0       400.0   140.0    74.0    87.0
                                          50.0                            70.0    91.0    95.0                        82.0    14.0
                                          27.0                           150.0    22.0                                88.0    15.0
                                          22.0                           110.0    28.0
                                          28.0            19.0    53.0    26.0   110.0
                                           5.9            39.0    73.0    35.0   100.0
                                          16.0            10.0    46.0    52.0   300.0
                                                          19.0   120.0    66.0   150.0                                    24.0    11.0
                                                           7.5    19.0   230.0   130.0                   130.0    12.0    41.0    24.0
          21.0                            32.0   130.0    4.3L   18.0   170.0   200.0                   190.0     8.3    63.0    25.0
          22.0            19.0    30.0    26.0   140.0    13.0     4.9   160.0    67.0            27.0    23.0    24.0    74.0    21.0
          59.0            34.0    29.0     9.9     8.0    25.0     8.6   180.0   170.0            18.0    31.0    21.0    24.0    95.0
          91.0            14.0    60.0     7.0    30.0                   120.0     9.7            97.0     6.8    10.0    24.0    29.0
          30.0             7.7    99.0    45.0    12.0    17.0    30.0   150.0    20.0            43.0     6.3    15.0    35.0    16.0
           7.6            45.0     7.6    40.0    20.0     7.6     5.5                            86.0    18.0     9.0    38.0    12.0
          30.0            52.0    11.0    84.0    16.0    52.0    23.0                           140.0    20.0     9.8
           8.9             6.5     4.3L   73.0    18.0    41.0    25.0                            37.0
                          13.0    30.0                    58.0     4.6                            24.0
                                                          60.0     8.2
                                  17.0     7.0            11.0    25.0
                                  19.0     7.5             5.0    21.0
                   8.2   170.0    50.0     4.3L
                  30.0   140.0    39.0    12.0                    11.0
                   6.9     6.3     7.3    13.0                     5.8
                   7.5     4.5     6.3    19.0                     7.6                                                    13.0    15.0
                   7.2    25.0    16.0    16.0                     6.3                                    14.0    20.0    11.0    14.0
                   9.8    54.0    11.0    12.0                     9.0                                    13.0    21.0    14.0    38.0
                   9.7     6.8                                    13.0                                    14.0    13.0     6.3    39.0
                   7.7    11.0           100.0   150.0            23.0                                    17.0     4.3    89.0   250.0
                                         110.0   160.0            18.0                                    20.0    95.0    64.0   370.0
                                         250.0   100.0                                                    17.0    36.0    18.0   190.0
                                          87.0   180.0                                                     9.0    32.0    12.0   180.0
                          84.0    40.0    37.0    35.0            18.0                     9.6    12.0     6.4    24.0
                          78.0    56.0    50.0    71.0            16.0                     9.1     9.0
          44.0           270.0   180.0    54.0   120.0            72.0    57.0   280.0    23.0    27.0
          47.0           170.0   200.0   100.0   120.0            54.0   100.0   320.0    23.0    19.0
          36.0            71.0    32.0                             8.3   180.0   430.0    43.0    20.0
          29.0            73.0    41.0                            16.0   220.0   550.0    52.0    20.0
          13.0           120.0   220.0                            16.0    50.0   150.0    18.0     7.1
          14.0           120.0   130.0                            22.0    57.0   110.0    10.0    30.0
          20.0                                                           190.0   120.0
          17.0                                                           170.0   180.0
```

Figure D2.--Continued--Zr (parts per million)

```
         93.L                                                    93.L
         93.L                                                    93.L
         96.                                                    150.
         93.L                                                   170.
         93.L                                                    93.L
        100.                    120.    100.                    110.
        150.     93.L    93.L    93.L    93.L                   120.
         93.L    94.     93.L   140.    130.                    200.
                 93.L    93.L   160.     93.L                                               140.    130.
                 93.L    93.L    93.L   160.                                    190.        210.    120.
                120.     93.L    93.    93.L                                    170.        210.    100.    160.    160.
                 93.L    93.L    93.L   140.                                     99.         93.L   120.    200.    100.
                 93.L    93.L    93.L   140.                                     93.L       200.    130.     93.L   130.
                 93.L    93.L                                    93.L   120.    130.        210.    130.    120.    130.
                                 93.L                           130.     93.L    93.L       110.    110.    100.    150.
                                 93.L                            93.L   110.    150.        170.    200.    230.    120.
                                120.                             93.L   120.    170.                        240.    110.
                                 93.L                           170.    120.                                190.    140.
                                 93.L                           140.    140.
                                 93.L           120.    140.    150.     99.
                                 93.L           120.    110.    120.    120.
                                110.             93.L    94.    130.    190.
                                                 93.L    98.     93.L   190.                                     93.L    93.L
                                                 93.L   110.    160.    120.                     93.L    93.L    93.L    93.L
150.                             93.L   110.     93.L   110.    110.    110.                    120.     93.L    93.L   150.
120.             93.L   110.     93.L   120.     93.L    93.L   130.    100.             93.L    93.L   110.     93.L   120.
160.             93.L   130.     93.L    93.L    93.L    93.L   140.    160.             93.L    93.L    93.L    93.L   140.
 93.L            93.L   120.    130.    100.                    110.     93.L            93.L    93.L    93.L    93.L    93.L
110.             93.L   150.    110.     93.L    93.L    93.L   110.    160.             93.L    93.L    93.L    99.     93.L
 93.L           110.    130.     93.L   130.     93.L    93.L                            93.L    93.L    93.L    93.L    93.L
110.             93.L   100.    150.     94.    170.    110.                             93.L    93.L    93.L
 93.L           150.    120.    150.    120.     93.L   130.                             93.L
                 93.L    93.L                    94.     93.L                            93.L
                                                130.     93.L
                        170.     93.L            93.L    93.L
                         93.L    93.L            93.L    93.L
         93.L    93.L    93.L    93.L
         93.L    93.L   110.     93.L                    93.L
         93.L    93.L    93.L    93.L                    93.L
         93.L    93.L    93.L    93.L                    93.L                                                    93.L    93.L
        140.     93.L    95.    130.                     93.L                                    93.L   110.     93.L    93.L
         93.L   140.     93.L    93.L                    93.L                                    93.L   110.     93.L    93.L
         93.L    93.L                                    93.L                                   130.     93.L    93.L    93.L
        110.     93.L            93.L   150.            130.                                     93.L    93.L   170.     93.L
                                 93.L    93.L            93.L                                   110.     93.L   130.    110.
                                110.    100.                                                     93.L    96.     93.L   130.
                                 93.L    93.L                                                    93.L   100.     93.L   110.
                100.     93.L   100.    140.             93.L                   120.     93.L    93.L    93.L
                 95.     93.L    93.L   100.             93.L                    95.    110.
120.            140.    100.     93.L   130.             93.L    93.L    99.     93.L   100.
130.             93.L    93.L    93.L    93.L            93.L    93.L   140.    130.     93.L
150.            100.     93.L                            93.L   120.    120.     98.     93.L
 93.L            93.L    93.L                           130.    130.    150.     94.     93.L
 93.L           130.     93.L                            93.L   170.    150.     93.L    93.L
 93.L           120.     93.L                            93.L   160.     98.     93.L    93.L
 93.L                                                           180.     94.
 93.L                                                           130.    120.
```

Figure C2.--Continued--Ce (parts per million)

```
        4.3L                                                    4.3L
        4.3L                                                    4.3L
        4.3L                                                    4.3L
        4.3L                                                    4.3L
        4.3L                                                    4.3L
        4.3L                    4.3L    4.3L                    4.3L
        4.3L    4.3L    4.3L    4.3L    4.3L                    4.3L
        4.3L    4.3L    4.3L    4.3L    4.3L                    4.3L
                4.3L    4.3L    4.3L    4.3L                                                4.3L    4.3L
                4.3L    4.3L    4.3L    4.3L                                    4.3L        4.3L    4.3L
                4.3L    4.3L    4.3L    4.3L                                    4.3L        4.3L    4.3L    4.3L    4.3L
                4.3L    4.3L    4.3L    4.3L                                    4.3L        4.3L    4.3L    4.3L    4.3L
                4.3L    4.3L    4.3L    4.3L                                    4.3L        4.3L    4.3L    4.3L    4.3L
                4.3L    4.3L                                    4.3L    4.3L    4.3L        4.3L    4.3L    4.3L    4.3L
                                4.3L                            4.3L    4.3L    4.3L        4.3L    4.3L    4.3L    4.3L
                                4.3L                            4.3L    4.3L    4.3L        4.3L    4.3L    4.3L    4.3L
                                4.3L                            4.3L    4.3L    4.3L                        4.3L    4.3L
                                4.3L                            4.3L    4.3L                                4.3L    4.3L
                                4.3L                            4.3L    4.3L
                                4.3L            4.3L    4.3L    4.3L    4.3L
                                4.3L            4.3L    4.3L    4.3L    4.3L
                                4.3L            4.3L    4.3L    4.3L    4.3L
                                                4.3L    4.3L    4.3L    4.3L                                    4.3L    4.3L
                                                4.3L    4.3L    4.3L    4.3L                    4.3L    4.3L    4.3L    4.3L
4.3L                            4.3L    5.6     4.3L    4.3L    4.3L    4.3L                    4.3L    4.3L    4.3L    4.3L
4.3L            4.3L    4.3L    4.3L    5.8     4.3L    4.3L    4.3L    4.3L            4.3L    4.3L    4.3L    4.3L    4.3L
4.3L            4.3L    4.3L    4.3L    4.3L    4.3L    4.3L    4.3L    4.3L            4.3L    4.3L    4.3L    4.3L    4.3L
4.3L            4.3L    4.3L    4.3L    4.3L                    4.3L    4.3L            4.3L    4.3L    4.3L    4.3L    4.3L
4.3L            4.3L    4.3L    4.3L    4.3L    4.3L    4.3L    4.3L    4.3L            4.3L    4.3L    4.3L    4.3L    4.3L
4.3L            4.3L    4.3L    4.3L    4.3L    4.3L    4.3L                            4.3L    4.3L    4.3L    4.3L    4.3L
4.3L            4.3L    4.3L    4.3L    4.3L    4.3L    4.3L                            4.3L    4.3L    4.3L
4.3L            4.3L    4.3L    4.3L    4.3L    4.3L    4.3L                            4.3L
                4.3L    4.3L                    4.3L    4.3L                            4.3L
                                                4.3L    4.3L
                        4.3L    4.3L            4.3L    4.3L
                        4.3L    4.3L            4.3L    4.3L
        4.3L    4.3L    4.3L    4.3L
        4.3L    4.3L    4.3L    4.3L                    4.3L
        4.3L    4.3L    4.3L    4.3L                    4.3L
        4.3L    4.3L    4.3L    4.3L                    4.3L                                                    4.3L    4.3L
        4.3L    4.3L    4.3L    4.3L                    4.3L                                    4.3L    4.3L    4.3L    4.3L
        4.3L    4.3L    4.3L    4.3L                    4.3L                                    4.3L    4.3L    4.3L    4.3L
        4.3L    4.3L                                    4.3L                                    4.3L    4.3L    4.3L    4.3L
        4.3L    4.3L            4.3L    4.3L            4.3L                                    4.3L    4.3L    4.3L    4.3L
                                4.3L    4.3L            4.3L                                    4.3L    4.3L    4.3L    4.3L
                                4.3L    4.3L                                                    4.3L    4.3L    4.3L    4.3L
                                4.3L    4.3L                                                    4.3L    4.3L    4.3L    4.3L
                4.3L    4.3L    4.3L    4.3L            4.3L                    4.3L    4.3L    4.3L    4.3L
                4.3L    4.3L    4.3L    4.3L            4.3L                    4.3L    4.3L
4.3L            4.3L    4.3L    4.3L    4.3L            4.3L    4.3L    4.3L    4.3L    4.3L
4.3L            4.3L    4.3L    4.3L    4.3L            4.3L    4.3L    4.3L    4.3L    4.3L
4.3L            4.3L    4.3L                            4.3L    4.3L    4.3L    4.3L    4.3L
4.3L            4.3L    4.3L                            4.3L    4.3L    4.3L    4.3L    4.3L
4.3L            4.3L    4.3L                            4.3L    4.3L    4.3L    4.3L    4.3L
4.3L            4.3L    4.3L                            4.3L    4.3L    4.3L    4.3L    4.3L
4.3L                                                            4.3L    4.3L
4.3L                                                            4.3L    4.3L
```

Figure C2.--Continued--Ga (parts per million)

	0.92L							0.92L							
	0.92L							0.92L							
	0.92L							0.92L							
	0.92L							0.92L							
	0.92L							0.92L							
	0.92L			0.92L	0.92L			0.92L							
	1.20	0.92L	0.92L	0.92L	0.92L			0.92L							
	0.92L	0.92L	0.92L	0.92L	0.92L			0.92L							
		0.92L	0.92L	0.92L	0.92L							0.92L	0.92L		
		0.92L	0.92L	0.92L	0.92L					0.92L		0.92L	0.92L		
		1.10	0.92L	0.92L	0.92L					0.92L		0.92L	0.92L	0.92L	0.92L
		0.92L	0.92L	0.92L	0.92L					0.92L		0.92L	0.92L	2.70	0.92L
		0.92L	0.92L	0.92L	0.92L					0.92L		1.70	2.00	0.92L	0.92L
		0.92L	0.92L					1.10	0.92L	0.92L		2.20	0.92L	0.92L	0.92L
				0.92L				0.92L	0.92L	1.10		0.92L	0.92L	0.92L	0.92L
				0.92L				0.92L	0.92L	0.92L		3.40	0.92L	0.92L	0.92L
				0.92L				0.92L	1.60	2.00				0.92L	0.92L
				0.92L				0.92L	0.92L					0.92L	0.92L
				0.92L				0.92L	0.92L						
				0.92L		0.92L	0.92L	0.92L	0.92L						
				0.92L		0.92L	0.92L	1.20	0.92L						
				0.92L		0.92L	0.92L	0.92L	1.10						
						0.92L	0.92L	0.92L	0.92L					0.92L	0.92L
						0.92L	0.92L	1.20	0.92L			0.92L	0.92L	0.92L	0.92L
0.92L				0.92L	0.92L	0.92L	0.92L	0.92L	2.50			0.92L	0.92L	0.92L	0.92L
0.92L		0.92L	0.92L	0.92L	2.10	0.92L	0.92L	0.93	0.92L		0.92L	0.92L	0.92L	0.92L	0.92L
0.92L		0.92L	0.92L	0.92L	0.92L	0.92L	0.92L	0.92L	2.20		0.92L	0.92L	0.92L	0.92L	0.92L
0.92L		0.92L	0.92L	0.92L	0.92L			0.92L	0.92L		0.92L	0.92L	0.92L	0.92L	0.92L
0.92L		0.92L	0.92L	0.92L	0.92L	0.92L	0.92L	0.92L	0.92L		0.92L	0.92L	0.92L	0.92L	0.92L
0.92L		0.92L	1.60	0.92L	0.92L	0.92L	0.92L				0.92L	0.92L	0.92L	0.92L	0.92L
0.92L		0.92L	0.92L	0.92L	0.92L	0.92L	0.92L				0.92L	0.92L	0.92L		
0.92L		0.92L	0.92L	0.92L	0.92L	0.92L	1.20				0.92L				
		0.92L	1.10			0.92L	0.92L				0.92L				
						1.60	0.92L								
			1.40	0.92L		0.92L	0.92L								
			0.92L	0.92L		0.92L	0.92L								
	0.92L	0.92L	0.92L	0.92L											
	0.92L	0.92L	0.92L	0.92L			0.92L								
	0.92L	0.92L	0.92L	0.92L			0.92L								
	0.92L	0.92L	0.92L	0.92L			0.92L							0.92L	0.92L
	0.92L	0.92L	0.92L	0.92L			0.92L					0.92L	0.92L	0.92L	0.92L
	0.92L	0.92L	0.92L	0.92L			0.92L					0.92L	0.92L	0.92L	0.92L
	0.92L	0.92L					0.92L					0.92L	0.92L	0.92L	0.92L
	0.92L	0.92L		0.92L	2.10		0.92L					0.92L	0.92L	1.10	0.92L
				0.92L	0.92L		0.92L					0.92L	0.92L	0.92L	1.50
				0.92L	0.92L							0.92L	0.92L	1.20	0.92L
				0.92L	1.60							0.92L	0.92L	0.92L	0.92L
		0.92L	0.92L	0.92L	0.92L		0.92L			0.92L	0.92L	0.92L	0.92L		
		0.92L	0.92L	0.92L	0.92L		0.92L			0.92L	0.92L				
0.92L		0.92L	1.40	0.92L	0.92L		0.92L	3.20	0.92L	0.92L	0.92L				
0.92L		1.00	1.80	0.92L	0.92L		0.92L	0.92L	0.92L	0.92L	0.92L				
0.92L		0.92L	0.92L				0.92L	0.92L	0.92L	0.92L	0.92L				
0.92L		0.92L	0.92L				0.92L	1.20	2.20	0.92L	0.92L				
0.92L		0.92L	0.92L				0.92L	0.92L	1.20	0.92L	0.92L				
0.92L		0.92L	0.92L				0.92L	0.92L	0.92L	0.92L	0.92L				
0.92L								0.92L	0.92L						
0.92L								0.92L	0.92L						

Figure D2.--Continued--Ge (parts per million)

```
       9.3L                                             9.3L
       9.3L                                             9.3L
       9.3L                                             9.3L
       9.3L                                             9.3L
       9.3L                                             9.3L
       9.3L                 9.3L   9.3L                 9.3L
       9.3L   9.3L   9.3L   9.3L   9.3L                 9.3L
       9.3L   9.3L   9.3L   9.3L   9.3L                 9.3L
              9.3L   9.3L   9.3L   9.3L                                             9.3L   9.3L
              9.3L   9.3L   9.3L   9.3L                               9.3L          9.3L   9.3L
              9.3L   9.3L   9.3L   9.3L                               9.3L          9.3L   9.3L   9.3L   9.3L
              9.3L   9.3L   9.3L   9.3L                               9.3L          9.3L   9.3L   9.3L   9.3L
              9.3L   9.3L   9.3L   9.3L                               9.3L          9.3L   9.3L   9.3L   9.3L
              9.3L   9.3L                               9.3L   9.3L   9.3L          9.3L   9.3L   9.3L   9.3L
                            9.3L                        9.3L   9.3L   9.3L          9.3L   9.3L   9.3L   9.3L
                            9.3L                        9.3L   9.3L   9.3L          9.3L   9.3L   9.3L   9.3L
                            9.3L                        9.3L   9.3L   9.3L                        9.3L   9.3L
                            9.3L                        9.3L   9.3L                               9.3L   9.3L
                            9.3L                        9.3L   9.3L
                            9.3L          9.3L   9.3L   9.3L   9.3L
                            9.3L          9.3L   9.3L   9.3L   9.3L
                            9.3L          9.3L   9.3L   9.3L   9.3L
                                          9.3L   9.3L   9.3L   9.3L                               9.3L   9.3L
                                          9.3L   9.3L   9.3L   9.3L                 9.3L   9.3L   9.3L   9.3L
9.3L                        9.3L   9.3L   9.3L   9.3L   9.3L   9.3L                 9.3L   9.3L   9.3L   9.3L
9.3L          9.3L   9.3L   9.3L   9.3L   9.3L   9.3L   9.3L   9.3L          9.3L   9.3L   9.3L   9.3L   9.3L
9.3L          9.3L   11.0   9.3L   9.3L   9.3L   9.3L   9.3L   9.3L          9.3L   9.3L   9.3L   9.3L   9.3L
9.3L          9.3L   9.3L   9.3L   9.3L                 9.3L   9.3L          9.3L   9.3L   9.3L   9.3L   9.3L
9.3L          9.3L   9.3L   9.3L   9.3L   9.3L   9.3L   9.3L   9.3L          9.3L   9.3L   9.3L   9.3L   9.3L
9.3L          9.3L   9.3L   9.3L   9.3L   9.3L   9.3L                        9.3L   9.3L   9.3L   9.3L   9.3L
9.3L          9.3L   9.3L   9.3L   9.3L   9.3L   9.3L                        9.3L   9.3L   9.3L
9.3L          9.3L   9.3L   9.3L   9.3L   9.3L   9.3L                        9.3L
              9.3L   9.3L                 9.3L   9.3L                        9.3L
                                          9.3L   9.3L
                     9.3L   9.3L          9.3L   9.3L
                     9.3L   9.3L          9.3L   9.3L
       9.3L   9.3L   9.3L   9.3L
       9.3L   9.3L   9.3L   9.3L                 9.3L
       9.3L   9.3L   9.3L   9.3L                 9.3L
       9.3L   9.3L   9.3L   9.3L                 9.3L                                             9.3L   9.3L
       9.3L   9.3L   9.3L   9.3L                 9.3L                               9.3L   9.3L   9.3L   9.3L
       9.3L   9.3L   9.3L   9.3L                 9.3L                               9.3L   9.3L   9.3L   9.3L
       9.3L   9.3L                               9.3L                               9.3L   9.3L   9.3L   9.3L
       9.3L   9.3L          9.3L   9.3L          9.3L                               9.3L   9.3L   9.3L   9.3L
                            9.3L   9.3L          9.3L                               9.3L   9.3L   9.3L   9.3L
                            9.3L   9.3L                                             9.3L   9.3L   9.3L   9.3L
                            9.3L   9.3L                                             9.3L   9.3L   9.3L   9.3L
              9.3L   9.3L   9.3L   9.3L          9.3L                 9.3L   9.3L   9.3L   9.3L
              9.3L   9.3L   9.3L   9.3L          9.3L                 9.3L   9.3L
9.3L          9.3L   9.3L   9.3L   9.3L          9.3L   9.3L   9.3L   9.3L   9.3L
9.3L          9.3L   9.3L   9.3L   9.3L          9.3L   9.3L   9.3L   9.3L   9.3L
9.3L          9.3L   9.3L                        9.3L   9.3L   9.3L   9.3L   9.3L
9.3L          9.3L   9.3L                        9.3L   9.3L   9.3L   9.3L   9.3L
9.3L          9.3L   9.3L                        9.3L   9.3L   9.3L   9.3L   9.3L
9.3L          9.3L   9.3L                        9.3L   9.3L   9.3L   9.3L   9.3L
9.3L                                                    9.3L   9.3L
9.3L                                                    9.3L   9.3L
```

Figure C2.--Continued--Tl (parts per million)

	0.92L							0.92L							
	0.92L							0.92L							
	1.20							1.50							
	0.92L							1.20							
	0.92L							1.90							
	0.92L			0.92L	0.92L			1.50							
	0.92L	0.92L	0.92L	0.92L	0.92L			1.40							
	0.92L	0.92L	0.92L	0.92L	0.92L			1.40							
		0.92L	0.92L	0.92L	0.92L							1.40	0.94		
		0.92L	0.92L	0.92L	0.92L					1.30		1.90	0.98		
		0.92L	0.92L	0.92L	0.92L					1.40		1.40	1.30	1.40	1.90
		0.92L	0.92L	0.92L	0.92L					0.92L		0.92L	1.10	1.80	1.50
		0.92L	0.92L	0.92L	0.92L					1.10		1.10	2.00	1.10	1.00
		0.92L	0.92L					0.92L	1.20	1.40		1.20	1.50	1.10	1.40
				0.92L				0.92L	0.95	1.20		2.20	1.20	1.10	1.30
				1.00				0.92	0.93	1.30		2.10	1.60	2.10	1.30
				0.92L				1.00	0.92L	1.60				2.00	0.93
				0.92L				2.20	0.92L					1.50	0.93
				0.92L				1.70	0.55						
				0.92L		0.92L	0.92L	1.10	1.20						
				0.92L		0.92L	0.92L	1.20	1.20						
				0.92L		0.92L	0.92L	1.00	2.20						
						0.92L	1.10	0.92	1.80					0.92L	0.92L
						0.92L	0.92L	1.60	2.40			1.10	0.92L	0.92L	1.10
0.92L				0.92L	1.50	0.92L	0.92L	1.40	2.10			1.40	0.92L	0.92L	1.00
0.92L		0.92L	0.92L	0.92L	1.60	0.92L	0.92L	1.60	1.50		0.92L	0.92L	0.92L	0.93	0.92L
1.30		0.92L	0.92L	0.92L	0.92L	0.92L	0.92L	1.30	2.00		0.92L	0.92L	0.92L	0.92L	1.50
1.40		0.92L	0.95	0.92L	0.92L			1.20	0.92L		1.00	0.92L	0.92L	0.92L	0.92L
0.92L		0.92L	1.20	0.92L	0.92L	0.92L	0.92L	1.20	0.92L		0.92L	0.92L	0.92L	1.10	0.92L
0.92L		0.99	0.92L	0.99	0.92L	0.92L	0.92L				0.92L	0.92L	0.92L	0.99	0.92L
0.92L		0.92L	0.92L	1.50	0.92L	0.92	0.97				1.10	0.92L	0.92L		
0.92L		0.92L	0.92L	1.30	0.92L	0.92L	0.92L				0.92L				
		0.92L	0.92L			1.20	0.92L				0.92L				
						1.20	0.92L								
			0.92L	0.92L		0.92L	0.92L								
			0.92	0.92L		0.92L	0.92L								
	0.92L	0.99	0.92L	0.92L											
	0.92L	1.20	0.92L	0.92L			0.92L								
	0.92L	0.92L	0.92L	0.92L			0.92L								
	0.92L	0.92L	0.92L	0.92L			0.92L							0.92L	0.92L
	0.92L	0.92L	0.92L	0.92L			0.92L					0.92L	0.92L	0.92L	0.92L
	0.92L	1.00	0.92L	0.92L			0.92L					0.92L	0.92L	0.92L	0.92L
	0.92L	0.92L					0.92L					0.92L	0.92L	0.92L	0.92L
	0.92L	0.92L		1.50	1.50		0.92L					0.92L	0.92L	1.50	1.30
				1.40	1.00		0.92L					0.92L	1.40	1.30	1.80
				2.90	1.90							0.92L	0.94	0.92L	2.00
				0.92L	1.30							0.92L	0.92L	0.92L	1.60
		1.40	0.92L	0.92L	1.20		0.92L			0.92L	0.92L	0.92L	0.92L		
		1.20	1.00	0.92L	1.20		0.92L			0.92L	0.92L				
1.70		2.50	2.40	1.00	1.20		0.92L	1.20	3.10	0.92L	0.92L				
1.70		2.10	2.50	1.20	1.20		0.92L	1.50	3.20	0.92L	0.92L				
1.20		2.00	0.92L				0.92L	2.50	3.00	0.92L	0.92L				
0.94		1.50	0.92L				0.92L	2.80	3.40	0.92L	0.92L				
0.92L		2.70	2.10				0.92L	1.20	2.40	0.92L	0.92L				
0.92L		2.90	1.90				0.92L	1.30	1.60	0.92L	0.92L				
0.92L								2.90	1.90						
0.92L								1.80	2.20						

Figure C2.--Continued--Yb (parts per million)

```
        140.L                                                   140.L
        140.L                                                   140.L
        140.L                                                   140.L
        140.L                                                   140.L
        140.L                                                   140.L
        140.L                   140.L   140.L                   140.L
        140.L   140.L   140.L   140.L   140.L                   140.L
        140.L   140.L   140.L   140.L   140.L                   140.L
                140.L   140.L   140.L   140.L                                               140.L   140.L
                140.L   140.L   140.L   140.L                                   140.L       140.L   140.L
                140.L   140.L   140.L   140.L                                   140.L       140.L   140.L   140.L   140.L
                140.L   140.L   140.L   140.L                                   140.L       140.L   140.L   140.L   140.L
                140.L   140.L   140.L   140.L                                   140.L       140.L   140.L   140.L   140.L
                140.L   140.L                                   140.L   140.L   140.L       140.L   140.L   140.L   140.L
                                140.L                           140.L   140.L   140.L       140.L   140.L   140.L   140.L
                                140.L                           140.L   140.L   140.L       140.L   140.L   140.L   140.L
                                140.L                           140.L   140.L   140.L                       140.L   140.L
                                140.L                           140.L   140.L                               140.L   140.L
                                140.L                           140.L   140.L
                                140.L           140.L   140.L   140.L   140.L
                                140.L           140.L   140.L   140.L   140.L
                                140.L           140.L   140.L   140.L   140.L
                                                140.L   140.L   140.L   140.L                                   140.L   140.L
                                                140.L   140.L   140.L   140.L                   140.L   140.L   140.L   140.L
140.L                           140.L   140.L   140.L   140.L   140.L   140.L                   140.L   140.L   140.L   140.L
140.L           140.L   140.L   140.L   140.L   140.L   140.L   140.L   140.L           140.L   140.L   140.L   140.L   140.L
140.L           140.L   140.L   140.L   140.L   140.L   140.L   140.L   140.L           140.L   140.L   140.L   140.L   140.L
140.L           140.L   140.L   140.L   140.L                   140.L   140.L           140.L   140.L   140.L   140.L   140.L
140.L           140.L   140.L   140.L   140.L   140.L   140.L   140.L   140.L           140.L   140.L   140.L   140.L   140.L
140.L           140.L   140.L   140.L   140.L   140.L   140.L                           140.L   140.L   140.L   140.L   140.L
140.L           140.L   140.L   140.L   140.L   140.L   140.L                           140.L   140.L   140.L
140.L           140.L   140.L   140.L   140.L   140.L   140.L                           140.L
                140.L   140.L                   140.L   140.L                           140.L
                                                140.L   140.L
                        140.L   140.L           140.L   140.L
                        140.L   140.L           140.L   140.L
        140.L   140.L   140.L   140.L
        140.L   140.L   140.L   140.L                   140.L
        140.L   140.L   140.L   140.L                   140.L
        140.L   140.L   140.L   140.L                   140.L                                                   140.L   140.L
        140.L   140.L   140.L   140.L                   140.L                                   140.L   140.L   140.L   140.L
        140.L   140.    140.L   140.L                   140.L                                   140.L   140.L   140.L   140.L
        140.L   140.L                                   140.L                                   140.L   140.L   140.L   140.L
        140.L   140.L           140.L   140.L           140.L                                   140.L   140.L   140.L   140.L
                                140.L   140.L           140.L                                   140.L   140.L   140.L   140.L
                                140.L   140.L                                                   140.L   140.L   140.L   140.L
                                140.L   140.L                                                   140.L   140.L   140.L   140.L
                140.L   140.L   140.L   140.L           140.L                   140.L   140.L   140.L   140.L
                140.L   140.L   140.L   140.L           140.L                   140.L   140.L
140.L           140.L   140.L   140.L   140.L           140.L   140.L   140.L   140.L   140.L
140.L           140.L   140.L   140.L   140.L           140.L   140.L   140.L   140.L   140.L
140.L           140.L   140.L                           140.L   140.L   140.L   140.L   140.L
140.L           140.L   140.L                           140.L   140.L   140.L   140.L   140.L
140.L           140.L   140.L                           140.L   140.L   140.L   140.L   140.L
140.L           140.L   140.L                           140.L   140.L   140.L   140.L   140.L
140.L                                                           140.L   140.L
140.L                                                           140.L   140.L
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Figure C2.--Continued--Pr (parts per million)

225

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        93.L                                                    93.L
        93.L                                                    93.L
        93.L                                                    96.
        93.L                                                    97.
        93.L                                                    93.L
        120.                    100.    93.L                    93.L
        110.    93.L    93.L    93.L    93.L                    130.
        93.L    93.L    120.    93.L    93.L                    250.
                93.L    93.L    100.    93.L                                                    130.    94.
                93.L    93.L    93.L    93.L                                    190.            94.     97.
                96.     93.L    93.L    93.L                                    93.L            170.    120.    100.    93.L
                93.L    93.L    93.L    93.L                                    93.L            93.L    93.L    93.L    93.L
                93.L    93.L    93.L    93.L                                    93.L            120.    210.    93.L    93.L
                93.L    93.L                                    93.L    93.L    93.L            220.    100.    93.L    93.L
                                93.L                            94.     93.L    93.L            93.L    93.L    120.    96.
                                93.L                            93.L    93.L    93.L            93.L    110.    93.L    93.L
                                100.                            93.L    95.     93.L                            93.L    120.
                                93.L                            120.    93.L                                    160.    93.L
                                93.L                            93.L    100.
                                93.L            110.    93.L    93.L    93.L
                                93.L            110.    110.    160.    100.
                                120.            93.L    93.L    93.L    130.
                                                130.    93.L    93.L    240.                                    93.L    93.L
                                                93.L    93.L    93.L    93.L                    93.L    93.L    93.L    93.L
96.                             93.L    93.L    93.L    93.L    96.     93.L                    93.L    93.L    93.L    140.
140.            93.L    93.L    93.L    93.L    93.L    93.L    93.L    93.L            93.L    93.L    93.L    93.L    93.L
140.            93.L    93.L    93.L    93.L    93.L    93.L    93.L    160.            93.L    93.L    93.L    93.L    120.
93.L            93.L    93.L    100.    93.L                    93.L    93.L            93.L    93.L    93.L    93.L    93.L
93.L            93.L    130.    93.L    93.L    93.L    93.L    93.L    93.L            93.L    93.L    93.L    93.L    93.L
93.L            94.     93.L    93.L    93.L    93.L    93.L                            93.L    93.L    93.L    93.L    100.
93.L            93.L    93.L    110.    98.     93.L    93.L                            93.L    93.L    93.L
93.L            180.    140.    93.L    110.    93.L    100.                            93.L
                98.     93.L                    120.    93.L                            93.L
                                                93.L    93.L
                        93.L    93.L            93.L    93.L
                        93.L    93.L            93.L    93.L
        93.L    93.L    93.L    93.L
        93.L    93.L    93.L    93.L                    93.L
        93.L    93.L    93.L    93.L                    93.L
        93.L    93.L    93.L    93.L                    93.L                                            93.L    93.L
        140.    93.L    100.    140.                    93.L                                    93.L    130.    93.L    93.L
        93.L    93.L    93.L    93.L                    93.L                                    93.L    93.L    93.L    93.L
        93.L    93.L                                    93.L                                    93.L    93.L    93.L    93.L
        170.    93.L            93.L    120.            130.                                    93.L    93.L    93.L    93.L
                                93.L    93.L            93.L                                    93.L    93.L    93.L    110.
                                93.L    100.                                                    93.L    93.L    93.L    93.L
                                93.L    93.L                                                    93.L    93.L    93.L    93.L
                93.L    93.L    93.L    100.            93.L                    93.L    93.L    93.L    93.L
                93.L    110.    93.L    93.L            93.L                    93.L    93.L
93.L            93.L    100.    93.L    93.L            93.L    93.L    93.L    93.L    93.L
150.            93.L    93.L    93.L    93.L            93.L    93.L    110.    93.L    93.L
190.            93.L    130.                            93.L    160.    93.     180.    93.L
93.L            93.L    93.L                            130.    93.L    93.L    93.L    93.L
93.L            110.    93.L                            93.L    150.    140.    93.L    93.L
93.L            93.L    100.                            93.L    99.     93.L    93.L    93.L
93.L                                                            120.    93.L
93.L                                                            93.L    110.
```
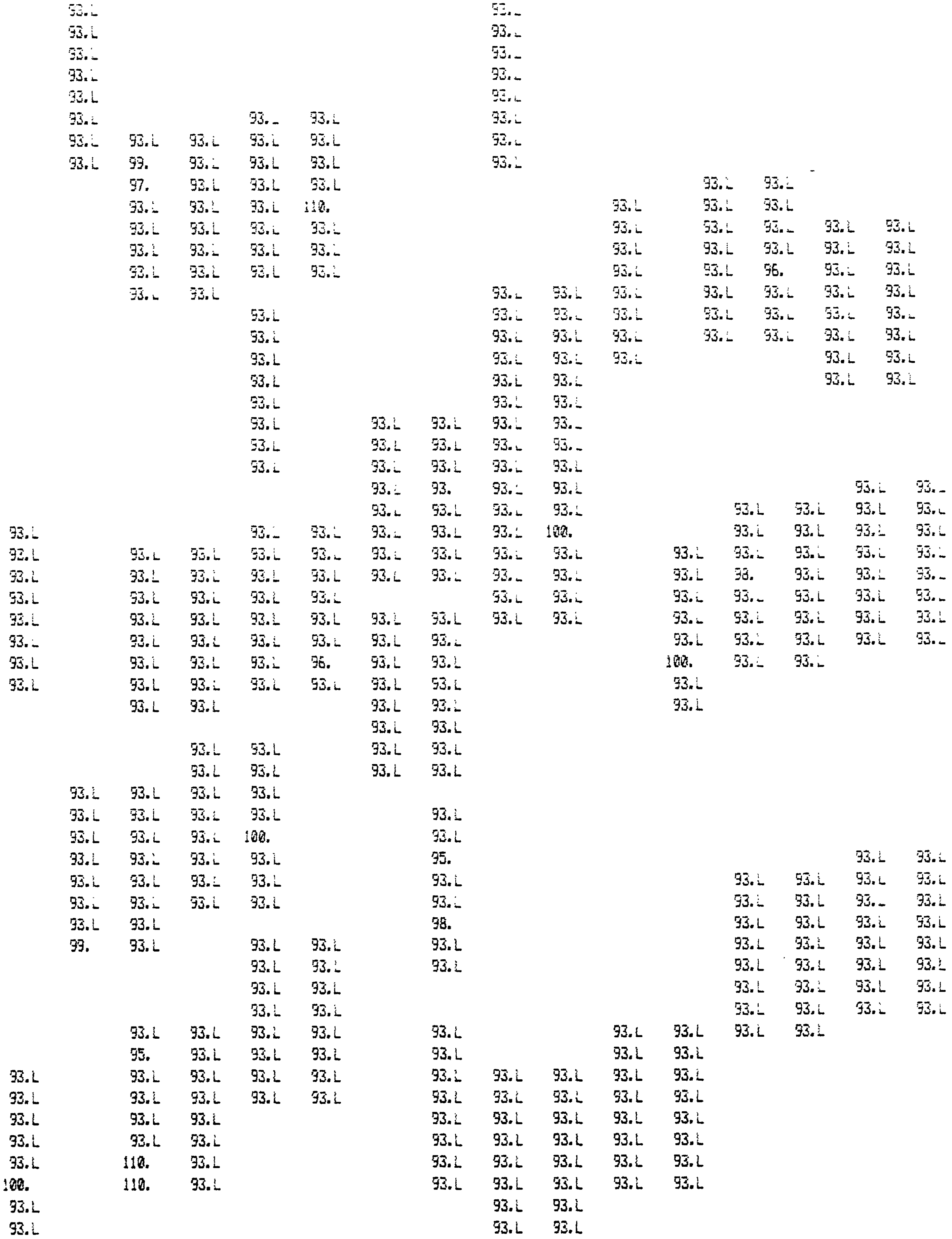

Figure C2.--Continued--Nd (parts per million)


93.L 93.L
93.L 93.L
93.L 93.L
93.L 93.L
93.L 93.L
93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L
93.L 99. 93.L 93.L 93.L 93.L
97. 93.L 93.L 93.L 93.L 93.L
93.L 93.L 93.L 110. 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L 96. 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L
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93.L 93.L 93.L 93.L 93.L
93.L 93. 93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L 100. 93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 98. 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L 96. 93.L 93.L 100. 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L
93.L 93.L
93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L
93.L 93.L 93.L 100. 93.L
93.L 93.L 93.L 93.L 95. 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L
93.L 93.L 98. 93.L 93.L 93.L 93.L
99. 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L
95. 93.L 93.L 93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L
93.L 93.L 93.L 93.L 93.L 93.L 93.L 93.L
93.L 110. 93.L 93.L 93.L 93.L 93.L 93.L
100. 110. 93.L 93.L 93.L 93.L 93.L 93.L
93.L 93.L 93.L
93.L 93.L 93.L

Figure C2.--Continued--Sm (parts per million)

```
        3.8                                                     2.4
        2.9                                                     3.2
        2.0L                                                    3.6
        2.0L                                                    4.9
        4.4                                                     2.0L
        2.0L                    2.0L    2.0L                    5.1
        2.0L    2.0L    3.5     2.0L    5.4                     2.0L
        2.0L    4.3     5.5     2.0L    6.3                     7.6
                5.3     2.0L    2.0L    2.0L                                                    2.0L    3.7
                2.0L    2.0L    2.2     5.5                                     3.2             3.1     2.0L
                4.4     2.0L    2.0L    2.0L                                    2.0L            3.8     2.0L    3.1     2.0 L
                2.1     2.0L    2.0L    2.0L                                    2.0L            6.6     5.9     2.0L    3.7
                2.0L    3.3     2.0L    2.0L                                    4.1             7.0     2.0L    3.6     2.0 L
                2.2     2.0L                                    5.5     2.4     2.1             2.0L    2.0L    2.0L    4.0
                                2.0L                            8.8     2.0L    2.0L            4.7     4.1     4.3     3.7
                                3.0                             2.0L    2.0L    2.0L            2.8     5.4     2.0L    2.6
                                2.0L                            2.7     7.2     4.7                             2.0L    2.0 L
                                2.0L                            3.9     2.0L                                    2.0L    3.2
                                2.0L                            5.7     4.7
                                3.5             5.1     7.2     2.0L    2.0L
                                3.9             2.0L    2.0L    2.0L    2.0L
                                3.2             2.0L    2.0L    5.5     2.0L
                                                2.0L    2.0L    2.0L    2.4                                     2.0L    2.0 L
                                                3.4     7.6     5.4     3.7                     5.7     2.0L    3.1     2.0 L
2.0L                            4.8     2.6     2.0L    5.7     2.0L    5.1                     4.2     3.5     2.0L    5.2
2.0L            3.4     2.0L    2.0L    2.0L    2.0L    6.5     2.0L    3.4             2.0L    3.4     2.0L    3.7     6.2
5.1             2.1     2.0L    2.0L    2.0L    3.8     3.4     3.9     5.9             2.0L    2.0L    3.6     2.0L    7.3
4.4             7.3     2.0L    2.0L    2.0L                    5.7     4.1             4.0     2.0L    2.0L    2.1     4.7
2.0L            3.2     2.0L    2.6     4.2     2.0L    3.2     4.3     6.7             4.2     2.0L    2.0L    4.2     2.0 L
2.0L            6.4     2.0L    2.0L    2.0L    2.0L    2.6                             2.0L    2.0L    2.0L    4.3     2.4
2.0L            4.2     4.2     6.5     4.8     2.0L    2.0L                            5.5     4.1     2.0L
2.0L            2.0L    2.0L    2.8     2.0L    2.0L    4.9                             4.6
                2.0L    5.2                     2.0L    5.6                             2.0L
                                                2.0L    2.0L
                        5.6     3.2             2.0L    7.0
                        2.0L    2.0L            4.0     2.6
        4.4     2.0L    2.0L    5.1
        4.1     2.0L    2.1     2.0L                    2.0L
        2.0L    2.0L    4.8     4.5                     2.7
        2.0L    2.0L    3.6     2.0L                    2.0L                                                    3.9     2.0L
        5.0     3.4     2.0L    2.0L                    2.0L                                    2.0L    2.0L    2.0L    4.5
        5.6     5.6     2.0L    3.1                     2.0L                                    2.0L    2.0L    2.0L    2.0
        2.9     2.0L                                    2.0L                                    2.0L    2.0L    2.0L    4.1
        2.0L    2.0L            2.0L    8.0             2.0L                                    4.0     2.0L    2.0L    3.5
                                2.0L    3.4             2.0L                                    2.0L    2.0L    2.0L    3.5
                                2.0L    2.0L                                                    4.8     2.0L    2.0L    4.7
                                2.0L    2.3                                                     3.0     2.0L    2.0L    2.1
                5.0     2.0L    3.7     2.0L            4.5                     3.2     2.0L    2.0L    2.0L
                2.0L    5.9     2.0L    2.0L            6.8                     4.5     2.0L
2.0L            3.2     5.0     2.0L    2.0L            2.0L    2.0L    2.0L    2.0L    6.8
5.8             4.1     4.9     2.0L    2.0L            2.0L    2.0L    2.6     2.0L    2.0L
2.0L            4.3     2.0L                            2.0L    7.7     3.5     5.8     3.6
3.4             2.0L    2.0L                            2.0L    6.7     2.0L    2.0L    2.0L
4.8             2.0L    2.0L                            2.0L    6.3     2.0L    2.0L    2.0L
2.0L            2.0L    2.0L                            2.0L    2.0L    3.3     2.0L    2.0L
3.4                                                             6.0     3.8
2.8                                                             2.0L    2.0L
```

Figure C2.—Continued--Eu (parts per million)

```
         4.3L                                                    5.8
         4.3L                                                    4.3
         4.3L                                                    4.3L
         4.3L                                                    4.3L
         4.3L                                                   12.0
        12.0                     4.3L    4.3L                   13.0
         4.3L    4.3L    4.3L    4.3L    6.7                     4.3L
         4.3L    6.2     4.3L    4.3L    4.3L                    4.3L
                 4.3L    4.3L    4.3L    4.3L                                                    4.3L    4.3L
                 4.3L    4.3L    4.3L    4.3L                                    4.3L            4.3L    4.3L
                 4.3L    4.3L    4.3L    4.3L                                    4.3L            4.3L    4.3L    4.3L    4.3L
                 4.3L    4.3L   15.0     4.3L                                   12.0             4.3L   19.0    13.0     4.3L
                 4.3L    4.3L   10.0     5.7                                     4.3L            4.3L    4.3L    4.3L    4.3L
                13.0     4.3L                                    9.2     4.3L    4.3L            6.0     4.3L    4.3L    4.3L
                                 4.3L                            4.3L    4.3L   20.0             4.3L    4.3L    4.3L    4.3L
                                13.0                             4.3L   13.0     4.3L            4.3L    4.3L    4.3L    4.3L
                                 4.3L                            4.3L    4.3L    4.3L                            4.3L    4.3L
                                 4.3L                            5.5     4.3L                                    4.3L    4.3L
                                 4.3L                            4.3L    4.3L
                                18.0             7.5     4.3L    4.3L    4.3L
                                 4.3L           11.0     4.3L    4.3L    4.3L
                                 4.3L            4.3L    4.3L    4.3L    4.3L
                                                 4.3L    4.3L    4.3L   23.0                                     4.3L    6.6
                                                 4.3L    6.1     4.3L    4.3L                    4.3L    4.3L    4.3L    4.3L
 4.3L                            4.3L   22.0     4.3L   15.0     4.4     4.3L                    4.3L    4.3L    4.3L    4.3L
 4.3L           16.0     4.3L    4.3L    7.8     4.3L    4.3L    4.3L    4.3L            4.3L    4.3L    4.3L    4.3L    4.3L
 4.3L            4.3L    8.0     4.3L    4.3L   12.0     4.3L    4.3L    4.3L            4.3L    4.3L    4.3L    4.3L    4.3L
 4.3L            4.3L    4.3L    4.3L    4.3L                    4.3L    5.9             4.3L    4.3L   20.0     4.3L    4.3L
 4.3L            4.3L    4.3L    9.5     4.3L    4.3L   15.0     4.3L   10.0             4.3L    4.3L    4.3L    4.3L    4.3L
 4.3L            4.3L    7.5     4.3L    4.3L    4.3L    4.3L                            4.3L    4.3L   12.0     4.3L    4.3L
 4.3L            4.3L    4.3L    4.3L    4.3L    4.3L    4.3L                            4.3L    4.3L   11.0
13.0             4.3L    4.3L    4.3L    4.3L    9.8     4.3L                            4.3L
                 4.3L    4.3L                    4.3L    4.3L                            4.3L
                                                17.0     4.3L
                         4.3L    4.3L            4.3L    4.3L
                         4.3L    4.3L            4.3L    4.3L
        19.0     4.3L    7.8    11.0
         4.3L    4.3L    4.3L    4.3L                    4.3L
         4.3L    4.3L    4.3L    4.3L                    4.3L
        13.0    13.0    24.0     4.3L                   11.0                                                     4.3L    4.3L
         4.3L    4.3L    4.3L    4.3L                    4.3L                                    4.3L    4.3L    4.3L    4.3L
         4.3L    4.3L    4.3L    4.3L                    4.3L                                   17.0    11.0    18.0    15.0
        11.0     9.3                                     4.8                                     4.3L    9.4     4.3L    4.3L
         4.3L    4.3L            4.3L    4.3L            4.3L                                    4.3L    4.3L    4.3L   17.0
                                11.0     4.3L            4.3L                                    4.3L    4.3L    4.3L    7.8
                                 4.3L    4.3L                                                    4.3L    6.5     4.3L    4.3L
                                 4.3L    4.3L                                                    4.3L    4.3L    4.3L    4.3L
                 4.3L   12.0     4.3L    4.3L            4.3L                    4.3L    4.3L    4.3L    4.3L
                 4.3L    4.3L    4.3L    4.3L            4.3L                    4.3L    4.3L
 4.3L            4.3L    4.3L    4.3L    4.3L            4.3L   10.0     4.3L   19.0     4.3L
14.0             4.3L   17.0     4.3L   24.0             4.6     4.3L    4.3L    4.3L   13.0
 4.3L            4.3L    4.3L                            4.3L    4.3L    4.3L    4.3L    4.3L
 4.3L            7.5     4.3L                            4.3L    4.3L   19.0     4.3L    4.3L
 4.3L            4.3L    4.3L                            4.3L    4.3L    4.3L    4.3L    4.3L
 6.8             4.3L    4.3L                            4.3L    4.3L    4.3L    4.3L    4.3L
12.0                                                             4.3L    4.3L
 4.3L                                                            4.3L    4.3L
```

Figure C2.--Continued--Gd (parts per million)

```
      20.L                                      20.L
      20.L                                      20.L
      20.L                                      20.L
      20.L                                      20.L
      20.L                                      20.L
      20.L              20.L  20.L              20.L
      20.L  20.L  20.L  20.L  20.L              20.L
      20.L  20.L  20.L  20.L  20.L              20.L
            20.L  20.L  20.L  20.L                                      20.L  20.L
            20.L  20.L  20.L  20.L                          20.L        20.L  20.L
            20.L  20.L  20.L  20.L                          20.L        20.L  20.L  20.L  20.L
            20.L  20.L  20.L  20.L                          20.L        20.L  20.L  24.   20.L
            20.L  20.L  20.L  20.L                          20.L        20.L  20.L  20.L  20.L
            20.L  20.L                          20.L  20.L  20.L        20.L  20.L  20.L  20.L
                        20.L                    20.L  20.L  20.L        20.L  20.L  20.L  20.L
                        20.L                    20.L  20.L  20.L        20.L  20.L  20.L  20.L
                        20.L                    20.L  20.L  20.L                    20.L  20.L
                        20.L                    20.L  20.L                          20.L  20.L
                        20.L                    20.L  20.L
                        20.L        20.L  20.L  20.L  20.L
                        20.L        20.L  20.L  20.L  20.L
                        20.L        20.L  20.L  20.L  20.L
                                    20.L  20.L  20.L  20.L                          20.L  20.L
                                    20.L  20.L  20.L  20.L              20.L  20.L  20.L  20.L
20.L                    20.L  20.L  20.L  20.L  20.L  20.L              20.L  20.L  20.L  20.L
20.L        20.L  20.L  20.L  20.L  20.L  20.L  20.L  20.L        20.L  20.L  20.L  20.L  20.L
20.L        20.L  20.L  20.L  20.L  20.L  20.L  20.L  20.L        20.L  20.L  20.L  20.L  20.L
20.L        20.L  20.L  20.L  20.L              20.L  20.L        20.   20.L  20.L  20.L  20.L
20.L        20.L  20.L  20.L  20.L  20.L  20.L  20.L  20.L        20.L  20.L  20.L  20.L  20.L
20.L        20.L  20.L  20.L  20.L  20.L  20.L                    20.L  20.L  20.L  20.L  20.L
20.L        20.L  20.L  20.L  20.L  20.L  20.L                    20.L  20.L  20.L
20.L        20.L  20.L  20.L  20.L  20.L  20.L                    20.L
            20.L  20.L              20.L  20.L                    20.L
                                    20.L  20.L
                  20.L  20.L        20.L  20.L
                  20.L  20.L        20.L  20.L
      20.L  20.L  20.L  20.L
      20.L  20.L  20.L  20.               20.L
      20.L  20.L  20.L  20.L              20.L
      20.L  20.L  20.L  20.L              20.L                                      20.L  20.L
      20.L  20.L  20.L  20.L              20.L                          20.L  20.L  20.L  20.L
      20.L  20.L  20.L  20.L              20.L                          20.L  20.L  20.L  20.L
      20.L  20.L                          20.L                          20.L  20.L  20.L  20.L
      20.L  20.L        20.L  20.L        20.L                          20.L  20.L  20.L  20.L
                        20.L  20.L        20.L                          20.L  20.L  20.L  20.L
                        20.L  20.L                                      20.L  20.L  20.L  20.L
                        20.L  20.L                                      20.L  20.L  20.L  20.L
            20.L  20.L  20.L  20.L        20.L              20.L  20.L  20.L  20.L
            20.L  20.L  20.L  20.L        20.L              20.L  20.L
20.L        20.L  20.L  20.L  20.L        20.L  23.   20.   20.L  20.L
20.L        20.L  20.L  20.L  20.L        20.L  20.L  20.L  20.L  20.L
20.L        20.L  20.L                    20.L  20.L  22.   20.L  20.L
20.L        20.L  20.L                    20.L  20.L  20.L  20.L  20.L
20.L        20.L  20.L                    20.L  20.L  20.L  20.L  20.L
20.L        20.L  21.                     20.L  20.L  20.L  20.L  20.L
20.L                                            20.L  20.L
20.L                                            20.L  20.L
```

Figure C2.--Continued--Dy (parts per million)

```
        93.L
        93.L                                            93.L
        93.L                                            93.L
        93.L                                            93.L
        93.L                                            93.L
        93.L                    93.L    93.L            93.L
        93.L    93.L    93.L    93.L    93.L            93.L
        93.L    93.L    93.L    93.L    93.L            93.L
                93.L    93.L    93.L    93.L                                            93.L    93.L
                93.L    93.L    93.L    93.L                            93.L            93.L    93.L
                93.L    93.L    93.L    93.L                            93.L            93.L    93.L    93.L    93.L
                93.L    93.L    93.L    93.L                            93.L            93.L    93.L    93.L    93.L
                93.L    93.L    93.L    93.L                            93.L            93.L    93.L    93.L    93.L
                93.L    93.L                            93.L    93.L    93.L            93.L    93.L    93.L    93.L
                                93.L                    93.L    93.L    93.L            93.L    93.L    93.L    93.L
                                93.L                    93.L    93.L    93.L            93.L    93.L    93.L    93.L
                                93.L                    93.L    93.L    93.L                            93.L    93.L
                                93.L                    93.L    93.L                                    93.L    93.L
                                93.L                    93.L    93.L
                                93.L            93.L    93.L    93.L    93.L
                                93.L            93.L    93.L    93.L    93.L
                                93.L            93.L    93.L    93.L    93.L
                                                93.L    93.L    93.L    93.L                            93.L    93.L
                                                93.L    93.L    93.L    93.L            93.L    93.L    93.L    93.L
93.L                            93.L    93.L    93.L    93.L    93.L    93.L            93.L    93.L    93.L    93.L
93.L            93.L    93.L    93.L    93.L    93.L    93.L    93.L    93.L    93.L    93.L    93.L    93.L    93.L
93.L            93.L    93.L    93.L    93.L    93.L    93.L    93.L    93.L    93.L    93.L    93.L    93.L    93.L
93.L            93.L    93.L    93.L    93.L                    93.L    93.L    93.L    93.L    93.L    93.L    93.L
93.L            93.L    93.L    93.L    93.L    93.L    93.L    93.L    93.L    93.L    93.L    93.L    93.L    93.L
93.L            93.L    93.L    93.L    93.L    93.L    93.L                    93.L    93.L    93.L    93.L    93.L
93.L            93.L    93.L    93.L    93.L    93.L    93.L                    93.L    93.L    93.L
93.L            93.L    93.L    93.L    93.L    93.L    100.                    93.L
                93.L    93.L                    93.L    93.L                    93.L
                                                93.L    93.L
                        93.L    93.L            93.L    93.L
                        93.L    93.L            93.L    93.L
        93.L    93.L    93.L    93.L
        93.L    93.L    93.L    93.L                    93.L
        93.L    93.L    93.L    93.L                    93.L
        93.L    93.L    93.L    93.L                    93.L                                    93.L    93.L
        93.L    93.L    93.L    93.L                    93.L                    93.L    93.L    93.L    93.L
        93.L    93.L    93.L    93.L                    93.L                    93.L    93.L    93.L    93.L
        93.L    93.L                                    93.L                    93.L    93.L    93.L    93.L
        93.L    93.L            93.L    93.L            93.L                    93.L    93.L    93.L    93.L
                                93.L    93.L            93.L                    93.L    93.L    93.L    93.L
                                93.L    93.L                                    93.L    93.L    93.L    93.L
                                93.L    93.L                                    93.L    93.L    93.L    93.L
                93.L    93.L    93.L    93.L            93.L            93.L    93.L    93.L    93.L
                93.L    93.L    93.L    93.L            93.L            93.L    93.L
93.L            93.L    93.L    93.L    93.L            93.L    93.L    93.L    93.L    93.L
93.L            93.L    93.L    93.L    93.L            93.L    93.L    93.L    93.L    93.L
93.L            93.L    93.L                            93.L    93.L    93.L    93.L    93.L
93.L            93.L    93.L                            93.L    93.L    93.L    93.L    93.L
93.L            93.L    93.L                            93.L    93.L    93.L    93.L    93.L
93.L            93.L    93.L                            93.L    93.L    93.L    93.L    93.L
93.L                                                    93.L    93.L
93.L                                                    93.L    93.L
```

Figure C2.--Continued--Ir (parts per million)

```
       SiAlFe2Fe3MgCaNa KTi PMnCO2Ag BBaCoCrCuLaMoNbNiPbScSr V YZnZrCeGaGeTlYbPrNdSmEuGdDyIr
3ACR1             1             1  4                   4         4
3ACR2
3BCR1          2                                     1
3BCR2             2             1
3CCR1
3CCR2
3DCR1             1             1
3DCR2
3ECR1               1
3ECR2               1                                  1   1     2
3FCR1               2
3FCR2               1
3GCR1                                                  1
3GCR2
3HCR1               1
3HCR2
4ACR1   1                              2 2   2               4
4ACR2   1                              1                     1     1
4BCR1                   1
4BCR2                   1
4CCR1A                                 1                       1     2           1
4CCR2   1 1 3           2              2                       1             1
4DCR1       1
4DCR2
4ECR1               1                            1
       SiAlFe2Fe3MgCaNa KTi PMnCO2Ag BBaCoCrCuLaMoNbNiPbScSr V YZnZrCeGaGeTlYbPrNdSmEuGdDyIr
4ECR2          1
4FCR1A                                 1
4FCR2                                                    1
4GCR1                                                              2
4GCR2
4HCR1
4HCR2
7ACR1
7ACR2
7BCR1
7BCR2               1                                      2
7CCR1                           1
7CCR2                           2
7DCR1
7DCR2
7ECR1
7ECR2
7FCR1               3
7FCR2               1                              1
7GCR1   1               1 1
7GCR2
7HCR1
7HCR2
18ACR1    2    1        1 2          1                       1
18ACR2  4 3             4 1
       SiAlFe2Fe3MgCaNa KTi PMnCO2Ag BBaCoCrCuLaMoNbNiPbScSr V YZnZrCeGaGeTlYbPrNdSmEuGdDyIr
```

Figure C3.--Element concentrations in carbonate rocks of the Sauk sequence greater than the 90th, 95th, 97.5th and 99th percentiles. [1,greater than P90; 2,greater than P95; 3,greater than P97.5; 4,greater than P99] (See table C6 for sampling locations.)

	Si	Al	Fe^{2+}	Fe^{3+}	Mg	Ca	Na	K	Ti	P	Mn	CO_2	Ag	B	Ba	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sr	V	Y	Zn	Zr	Ce	Ga	Ge	Tl	Yb	Pr	Nd	Sm	Eu	Gd	Dy	Ir
18BCR1				2							1																													
18BCR2			2	4							2																													
18CCR1																							1																	
18CCR2				3					1		1																													
18DCR1																																									
18DCR2																							2																	
18ECR1		1	4	2					1		1			2																											
18ECR2A	1	2	2	2				2	3					2	1		2							1		2	1		1					1							
18FCR1		1	2	3					1					1													1	1														
18FCR2A			1	2							1					3			1	1		3				3	4							3			4				
18GCR1A																																									
18GCR2A	2	2						3	2						2										1		1	1		1					2							
18HCR1A																																									
18HCR2A		2						2	2					2				1								2								1							
10ACR1					1																																			
10ACR2																																									
10BCR1A																							1																	
10BCR2																																									
10CCR1					1							1																												
10CCR2																																									
10DCR1					1							1																												
10DCR2																																									
10ECR1A						1																		4																
10ECR2																																									
10FCR1																																									

	Si	Al	Fe^{2+}	Fe^{3+}	Mg	Ca	Na	K	Ti	P	Mn	CO_2	Ag	B	Ba	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sr	V	Y	Zn	Zr	Ce	Ga	Ge	Tl	Yb	Pr	Nd	Sm	Eu	Gd	Dy	Ir
10FCR2																																									
10GCR1																																									
10GCR2																																									
10HCR1																									2													1			
10HCR2					3							1																												
12ACR1																																									
12ACR2																									1															
12BCR1		1																							2															
12BCR2																																									
12CCR1																																									
12CCR2																																									
12DCR1						1																																		
12DCR2						2																																		
12ECR1																																									
12ECR2												1																												
12FCR1		1		1																					2	1														
12FCR2														1										1	1															
12GCR1	3	4		3				3	3						1	2	4	2			2	4		4		4														
12GCR2												1																												
12HCR1																																									
12HCR2																				1					1															
15ACR1										1																														
15ACR2																																									
15BCR1A																																									
15BCR2																																									
	Si	Al	Fe^{2+}	Fe^{3+}	Mg	Ca	Na	K	Ti	P	Mn	CO_2	Ag	B	Ba	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sr	V	Y	Zn	Zr	Ce	Ga	Ge	Tl	Yb	Pr	Nd	Sm	Eu	Gd	Dy	Ir

Figure C3.--Continued

	Si	Al	Fe^{2}	Fe^{3}	Mg	Ca	Na	K	Ti	P	Mn	CO$_2$	Ag	B	Ba	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sr	V	Y	Zn	Zr	Ce	Ga	Ge	Tl	Yb	Pr	Nd	Sa	Eu	Gd	Dy	Ir
15CCR1					1							1																													
15CCR2																																									
15DCR1					1																																				
15DCR2					2																																				
15ECR1			3								3					4		2				2																			
15ECR2											3																														
15FCR1											2							1																							
15FCR2											1							1																							
15GCR1																		1										1													
15GCR2A																																									
15HCR1							2																																		
15HCR2A																																									
17ACR1			1								1			2		3		1																							
17ACR2A			1	1						1																															
17BCR1A																														3		2				2					
17BCR2	2	1	1					1	2	2				1			2		3					3			1		2					1							
17CCR1				1						2					2	1		3																							
17CCR2	1	1						1	1																																
17DCR1	2	1	1					1		1				1		1						1		3																	
17DCR2	1																																								
17ECR1										1	1					1						1								1											
17ECR2																																									
17FCR1			2							1	1																														
17FCR2A										2						1											2			2											
17GCR1			1	4							4					1						1																			
	Si	Al	Fe^{2}	Fe^{3}	Mg	Ca	Na	K	Ti	P	Mn	CO$_2$	Ag	B	Ba	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sr	V	Y	Zn	Zr	Ce	Ga	Ge	Tl	Yb	Pr	Nd	Sa	Eu	Gd	Dy	Ir
17GCR2								1		4														1																	
17HCR1				1						1	2					2		1																							
17HCR2																		2																							
8ACR1																																									
8ACR2A																				1																					
8BCR1																																									
8BCR2																																									
8CCR1																																									
8CCR2																																									
8DCR1																																									
8DCR2																																									
8ECR1	4		1																																						
8ECR2				1											3												3		1					2				2			
8FCR1																												1		1											
8FCR2																											1		1												
8GCR1	1	3	1					2	3						1						4			2		1	3		3					4							
8GCR2	3	4	1					3	4					1	2		2	1			4			2		2	3		4					3							
8HCR1																											1														
8HCR2								1	1																									1							
19ACR1																																									
19ACR2A																																									
19BCR1																							2					2													
19BCR2A																							3					4													
19CCR1																																									
19CCR2																							4					3													
	Si	Al	Fe^{2}	Fe^{3}	Mg	Ca	Na	K	Ti	P	Mn	CO$_2$	Ag	B	Ba	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sr	V	Y	Zn	Zr	Ce	Ga	Ge	Tl	Yb	Pr	Nd	Sa	Eu	Gd	Dy	Ir

Figure C3.--Continued

	Si	Al	Fe^{2}	Fe^{3}	Mg	Ca	Na	K	Ti	P	Mn	CO$_{2}$	Ag	B	Ba	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sr	V	Y	Zn	Zr	Ce	Ga	Ge	Tl	Yb	Pr	Nd	Sm	Eu	Gd	Dy	Ir
19DCR1										1													3					2													
19DCR2																							3					3													
19ECR1																																									
19ECR2																																									
19FCR1										4																															
19FCR2																																									
19GCR1																																									
19GCR2																																									
19HCR1									1																				2												
19HCR2A									1	1																			1												
1ACR1												2																													
1ACR2A																1																									
1BCR1	3														4												1												1		
1BCR2A																		3																		1					
2ACR1					1							1																													
2ACR2		1																																							
2BCR1																																									
2BCR2																																									
5ACR1A			1																																						
5ACR2A																																									
5BCR1A																																									
5BCR2A																																									
6ACR1A																							1	1	2		1														
6ACR2																							2		2			1													
6BCR1A																																									
	Si	Al	Fe^{2}	Fe^{3}	Mg	Ca	Na	K	Ti	P	Mn	CO$_{2}$	Ag	B	Ba	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sr	V	Y	Zn	Zr	Ce	Ga	Ge	Tl	Yb	Pr	Nd	Sm	Eu	Gd	Dy	Ir
6BCR2A																																									
9ACR1																																									
9ACR2																						1				1															
9BCR1						1																																			
9BCR2																																									
11ACR1						2																	1																		
11ACR2										2																															
11BCR1						2																																			
11BCR2						2													1																						
13ACR1					1							1																													
13ACR2																																									
13BCR1																																									
13BCR2																																									
14ACR1																																									
14ACR2																																									
14BCR1	1			1				2																																	
14BCR2																																									
16ACR1																1		3		1										1											
16ACR2	1									3																															
16BCR1	1																												1												
16BCR2										1																															
	Si	Al	Fe^{2}	Fe^{3}	Mg	Ca	Na	K	Ti	P	Mn	CO$_{2}$	Ag	B	Ba	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sc	Sr	V	Y	Zn	Zr	Ce	Ga	Ge	Tl	Yb	Pr	Nd	Sm	Eu	Gd	Dy	Ir

Figure C3.--Continued

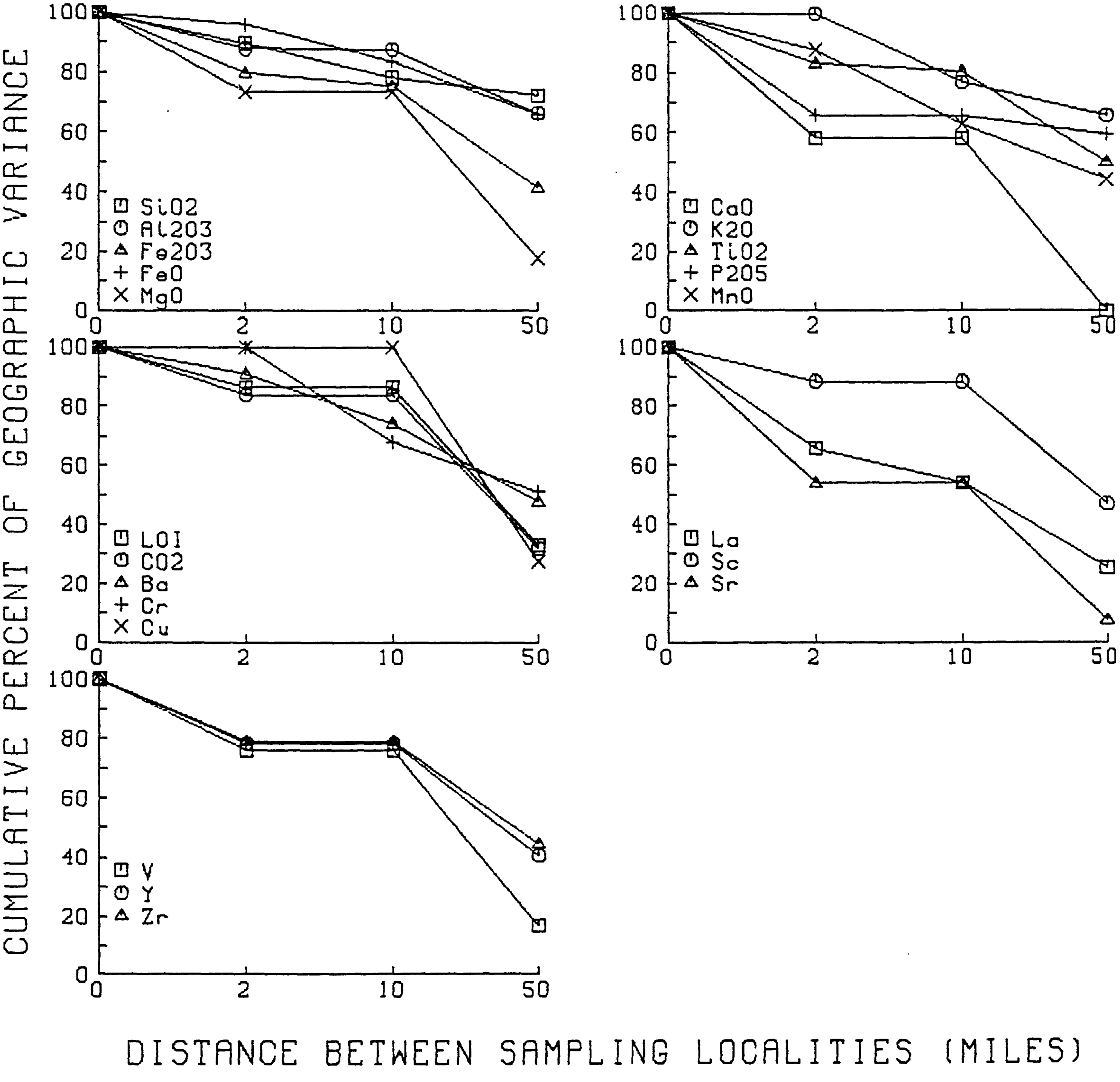

Figure C4.-- Cumulative-variance curves for the Cambro-Ordovician carbonate rocks (unit C).

Table C1.--Notes on carbonate rock samples and references.

1ACR1
Little Rocky Mountain, Montana, W1/2 sec. 30, T26N,R25E. Emerson Formation, 150' from top, massive dolomite. Sample is finely crystalline dolomite. Knechtel (1959)

1ACR2
Little Rocky Mountain, Montana, W1/2 sec. 30, T26N,R25E. Emerson Formation, 200' from top, interbedded clay shale and silty limestone. Sample is silty, glauconitic, cherty, dolomitic, medium crystalline limestone. Knechtel (1959)

1BCR1
Little Rocky Mountain, Montana, SE1/4 sec. 9, NE1/4 sec. 16, T25N,R24E. Emerson Formation, about 500' from top, interbedded limestone and shale. Sample is sandy, glauconitic, medium crystalline limestone. Knechtel (1959)

1BCR2a
Little Rocky Mountain, Montana, SE1/4 sec. 9, NE1/4 sec. 16, T25N,R24E. Emerson Formation, near middle of formation, interbedded limestone pebble conglomerate and silty limstone. Sample is intrasparudite. Knechtel (1959)

2ACR1
Coopers Lake Quadrangle, Montana, 3 miles south of Steamboat Mountain. Devils Glenn Formation, 250' from top, thick-bedded magnesian limestone. Sample is medium crystalline dolomite. Deiss (1933)

2ACR2
Coopers Lake Quadrangle, Montana, 2 1/3 miles SSE of Steamboat Mountain. Dearborn Formation, about 100' from top, interbedded limestone and siltstone. Sample is silty, glauconitic biomicrite. Deiss (1933)

2BCR1
Coopers Lake Quadrangle, Montana, 2 3/4 miles west of Laviere's Ranch on Elk Creek. Nannie Basin Formation, 25' from top, platy limestone with abundant irregular buff clay. Sample is micrite. Deiss (1933)

2BCR2
Coopers Lake Quadrangle, Montana, 2 1/2 miles WSW of Laviere's Ranch on Elk Creek. Dearborn Formation, near top. Sample is dismicrite. Deiss (1933)

3ACR1
Divide 4 SE Quadrangle, Montana, W1/2 sec. 34, T2S,R8W. Meagher Formation, 300' from top, massive dolomite. Sample is medium crystalline dolomite. Hanson (1952)

3ACR2
Divide 4 SE Quadrangle, Montana, E1/2 sec. 33, T2S,R8W. Pilgrim Limestone, 125' from top, massive dolomite. Sample is cherty, medium crystalline dolomite. Hanson (1952)

3BCR1
Divide 4 NE Quadrangle, Montana, SW1/4 sec. 28, T2S,R8W. Park Formation, 40' from top, dolomitic limestone. Sample is medium crystalline dolomite. Hanson (1952)

3BCR2
Divide 4 NE Quadrangle, Montana, SE1/4 sec. 28, T2S, R8W. Meagher Formation, 300' from top, thick-bedded dolomite. Sample is medium crystalline dolomite. Hanson (1952)
3CCR1
Divide 4 NW Quadrangle, Montana, SE1/4 sec. 7, T2S, R8W. Meagher Formation, 25' from base, medium-bedded dolomite. Sample is medium crystalline dolomite. Hanson (1952)
3CCR2
Divide 4 NW Quadrangle, Montana, SE1/4 sec. 7, T2S, R8W. Meagher Formation, 150' from top, massive dolomite. Sample is medium crystalline dolomite. Hanson (1952)
3DCR1
Divide 4 NW Quadrangle, Montana, SW1/4 sec. 6, T2S, R8W. Meagher Formation, 40' from base, medium-bedded dolomite. Sample is medium crystalline dolomite. Hanson (1952)
3DCR2
Divide 4 NW Quadrangle, Montana, SE1/4 sec. 1, T2S, R9W. Pilgrim Limestone, 20' above base, massive dolomite. Sample is medium crystalline dolomite. Hanson (1952)
3ECR1
Manhattan Quadrangle, Montana, NE1/4 sec. 24, T2N, R3E. Dry Creek Shale, 20' from base, conglomeratic limestone bed. Sample is pelsparite. Deiss (1936), Varall (1955)
3ECR2
Manhattan Quadrangle, Montana, NE1/4 sec. 24, T2N, R3E. Pilgrim Limestone, 15' from base, impure medium-bedded limestone. Sample is oosparite. Deiss (1936), Varall (1955)
3FCR1
Manhattan Quadrangle, Montana, N1/2 sec. 21, T2N, R3E. Pilgrim Limestone, 20' from top, limestone pebble conglomerate. Sample is dolomitic oosparite. Deiss (1936), Varall (1955)
3FCR2
Manhattan Quadrangle, Montana, N1/2 sec. 21, T2N, R3E. Pilgrim Limestone, 26' from top, limestone pebble conglomerate. Sample is dolomitic oosparite. Deiss (1936), Varall (1955)
3GCR1
Three Forks Quadrangle, Montana, NW1/4 sec. 11, T1N, R1W. Pilgrim Limestone, 250' from top, thin-bedded limestone and siltstone. Sample is medium crystalline dolomite. Robinson and Barnett (1963)
3GCR2
Three Forks Quadrangle, Montana, NW1/4 sec. 11, T1N, R1W. Meagher Formation, 350' from top, white massive limestone. Sample is medium crystalline limestone. Robinson and Barnett (1963)
3HCR1
Jefferson Island Quadrangle, Montana, NW1/4 sec. 8, T1N, R1W. Meagher Formation, 400' from top, blue platy limestone. Sample is dismicrite. Robinson and Barnett (1963)
3HCR2
Jefferson Island Quadrangle, Montana, NW1/4 sec. 8, T1N, R1W. Meagher Formation, 130' from top, thick-bedded massive limestone. Sample is finely to medium crystalline limestone. Robinson and Barnett (1963)

4ACR1
Myers Ranch Quadrangle, Wyoming, SW1/4 sec. 12, T30N,R94W. Gallatin and Gros Ventre Formations undivided, 75' from top, medium-bedded to platy arenaceous limestone. Sample is sandy medium crystalline limestone. Van Houten (1954)
4ACR2.
Myers Ranch Quadrangle, Wyoming, SW1/4 sec. 12, T30N,R94W. Gallatin and Gros Ventre Formations undivided, 150' from top, medium-bedded to platy limestone. Sample is sandy, glauconitic, medium crystalline limestone. Van Houten (1954)
4BCR1
Graham Ranch Quadrangle, Wyoming, SE1/4 sec. 7, T30N,R93W. Gallatin and Gros Ventre Formations undivided, 210' from top, platy limestone. Sample is silty, glauconitic, finely crystalline limestone. Van Houten (1954)
4BCR2
Graham Ranch Quadrangle, Wyoming, SE1/4 sec. 7, T30N,R93W. Gallatin and Gros Ventre Formations undivided, 5' below 4BCR1, limestone pebble conglomerate. Sample is silty biopelmicrite. Van Houten (1954)
4CCR1a
Blue Gulch Quadrangle, Wyoming, SE1/4 sec. 12, T32N,R94W. Gallatin and Gros Ventre Formations undivided, 140' from top, thin-bedded arenaceous limestone. Sample is silty, glauconitic biosparite. Van Houten (1954)
4CCR2
Blue Gulch Quadrangle, Wyoming, SE1/4 sec. 12, T32N,R94W. Gallatin and Gros Ventre Formations undivided, 100' from top, thin-bedded limestone. Sample is silty, glauconitic, medium crystalline limestone. Van Houten (1954)
4DCR1
Elkhorn Springs Quadrangle, Wyoming, SE1/4 sec. 22, T32N,R94W. Gallatin and Gros Ventre Formations undivided, 160' from top, limestone pebble conglomerate. Sample is sandy, glauconitic intrasparudite. Van Houten (1954)
4DCR2
Elkhorn Springs Quadrangle, Wyoming, NE1/4 sec. 22, T32N,R94W. Gallatin and Gros Ventre Formations undivided, 15' from top, evenly bedded limestone. Sample is biosparite. Van Houten (1954)
4ECR1
Boysen Quadrangle, Wyoming, NE1/4 sec. 28, T6N,R6E. Gallatin Formation, 200' from top, thin-bedded limestone with some fragmental beds. Sample is pelmicrite. Deiss (1938), Tourtelot and Thompson (1948)
4ECR2
Boysen Quadrangle, Wyoming, NE1/4 sec. 28, T6N,R6E. Gallatin Formation, 440' from top, cliff-forming limestone. Sample is sandy, glauconitic, dolomitic micrite. Deiss (1938), Tourtelot and Thompson (1948)
4FCR1
Boysen Quadrangle, Wyoming, NE1/4 sec. 8, T5N,R6E. Gallatin Formation, 40' from base, interbedded limy sandstone and limestone pebble conglomerate. Sample is silty, glauconitic intrasparudite. Deiss (1938), Tourtelot and Thompson (1948)

4FCR2
Boysen Quadrangle, Wyoming, NE1/4 sec. 8, T5N, R6E. Gallatin Formation, 100' from top, interbedded siltstone and limestone pebble conglomerate. Sample is intrasparite. Deiss (1938), Tourtelot and Thompson (1948)

4GCR1
Guffy Peak Quadrangle, Wyoming, NE1/4 sec. 6, T39N, R92W. Gallatin Formation, 30' from base, platy limestone and limestone pebble conglomerate. Sample is sandy, glauconitic intrasparite. Tourtelot (1953), Miller (1936)

4GCR2
Guffy Peak Quadrangle, Wyoming, NE1/4 sec. 6, T39N, R92W. Gallatin Formation, 46' from base, medium- to thin-bedded limestone pebble conglomerate. Sample is sandy intrasparudite. Tourtelot (1953), Miller (1936)

4HCR1
Picard Ranch Quadrangle, Wyoming, SE1/4 sec. 6, T39N, R92W. Gallatin Formation, 100' from top, limestone pebble conglomerate. Sample is sandy biosparudite. Tourtelot (1953), Miller (1936)

4HCR2
Picard Ranch Quadrangle, Wyoming, SE1/4 sec. 6, T39N, R92W. Gallatin Formation, 160' from top, limestone pebble conglomerate. Sample is sandy, glauconitic biosparite. Tourtelot (1953), Miller (1936)

5ACR1
Yandell Springs Quadrangle, Idaho, NE1/4 sec. 11, T5S, R36E. Unnamed Cambrian-Ordovician carbonate beds, 1500' from top, arenaceous limestone and dolomite. Sample is coarsely crystalline dolomite. Mansfield (1920), Ludlum (1943)

5ACR2
Yandell Springs Quadrangle, Idaho, NE1/4 sec. 11, T5S, R36E. Unnamed Cambrian-Ordovician carbonate beds, 2700' from top, massive limestone. Sample is pelmicrite. Mansfield (1920), Ludlum (1943)

5BCR1
Yandell Springs Quadrangle, Idaho, E1/2 sec. 27, T4S, R36E. Unnamed Cambrian-Ordovician carbonate beds, 1900' from top, arenaceous limestone. Sample is micrite. Mansfield (1920), Ludlum (1943)

5BCR2
Yandell Springs Quadrangle, Idaho, E1/2 sec. 27, T4S, R36E. Unnamed Cambrian-Ordovician carbonate beds, 2600' from top, brecciated silty limestone. Sample is coarsely crystalline limestone. Mansfield (1920), Ludlum (1943)

6ACR1a
Danby Quadrangle, California, NE1/4 sec. 11, T5N, R14E. Middle Cambrian of Hazzard (1933), 11' from base, medium-bedded nodular limestone. Sample is biomicrite. Hazzard (1933), Crickmay (1933)

6ACR2
Danby Quadrangle, California, NE1/4 sec. 11, T5N, R14E. Lower Cambrian of Hazzard (1933), 107' from top, massive silty limestone. Sample is micrite. Hazzard and Mason (1936)

6BCR1a
Cadiz Quadrangle, California, SW1/4 sec. 22, T6N, R14E. Bonanza King Formation, 140' from upper contact with volcanics, medium-bedded dark gray dolomite. Sample is finely crystalline dolomite. Hazzard and Mason (1936)

6BCR2a
Cadiz Quadrangle, California, SW1/4 sec. 22, T6N, R14E. Bonanza King Formation, 300' at upper contact with volcanics, medium-bedded dark gray dolomite. Sample is medium crystalline dolomite. Hazzard and Mason (1936)

7ACR1
Northern section in southern Timpahute Range, Lincoln County, Nevada. Highland Peak Limestone, 44' from base, medium-bedded, argillaceous, dark blue gray limestone. Sample is dismicrite. Tschanz and Pampeyan (1961)

7ACR2
Northern section in southern Timpahute Range, Lincoln County, Nevada. Pogonip Group, near middle, medium-bedded, arenaceous, dark gray limestone. Sample is silty biopelmicrite. Tschanz and Pampeyan (1961)

7BCR1
Southern section in southern Timpahute Range, Lincoln County, Nevada. Highland Peak Limestone, 1500' from base, massive gray dolomite with chert beds. Sample is medium crystalline dolomite. Tschanz and Pampeyan (1961)

7BCR2
Southern section in southern Timpahute Range, Lincoln County, Nevada. Cambrian limestone and dolomite of Tschanz and Pampeyan (1961), near top, dark gray dolomite with abundant clay and chert. Sample is finely crystalline limestone. Tschanz and Pampeyan (1961)

7CCR1
Northern section in southern Pahranagat Range, Lincoln County, Nevada. Cambrian limestone and dolomite of Tschanz and Pampeyan (1961), 350' below 7CCR2, light and dark gray limestone and dolomite. Sample is medium crystalline dolomite. Tschanz and Pampeyan (1961)

7CCR2
Northern section in southern Pahranagat Range, Lincoln County, Nevada. Cambrian limestone and dolomite of Tschanz and Pampeyan (1961), near middle, light and dark gray limestone and dolomite. Sample is finely to coarsely crystalline dolomite. Tschanz and Pampeyan (1961)

7DCR1
Southern section in southern Pahranagat Range, Lincoln County, Nevada. Cambrian limestone and dolomite of Tschanz and Pampeyan (1961), 136' from top, medium-bedded cherty limestone. Sample is finely to coarsely crystalline dolomite. Tschanz and Pampeyan (1961)

7DCR2
Southern section in southern Pahranagat Range, Lincoln County, Nevada. Cambrian limestone and dolomite of Tschanz and Pampeyan (1961), 500' below 7DCR1, medium-bedded cherty limestone. Sample is finely crystalline dolomite. Tschanz and Pampeyan (1961)

7ECR1
Southern section in southern Desert Range, Clark County, Nevada. Bonanza King Formation, 150' from top, dark dolomitic limestone. Sample is medium crystalline dolomite. Bowyer and others (1958), C. R. Longwell (unpublished)
7ECR2.
Southern section in southern Desert Range, Clark County, Nevada. Bonanza King Formation, 800' from top, light and dark gray limestone. Sample is dolomitic micrite. Bowyer and others (1958), C. R. Longwell (unpublished)
7FCR1
Northern section in southern Desert Range, Clark County, Nevada. Bonanza King Formation, 100' from base, light and dark gray limestone. Sample is pelsparite. Bowyer and others (1958), C. R. Longwell (unpublished)
7FCR2
Northern section in southern Desert Range, Clark County, Nevada. Bonanza King Formation, 300' from base, light and dark gray limestone. Sample is brecciated biomicrite. Bowyer and others (1958), C. R. Longwell (unpublished)
7GCR1
Northern section in northern Desert Range, Lincoln County, Nevada. Bonanza King Formation, 1500' from top, lignt and dark gray limestone and dolomite. Sample is silty, dolomitic, finely crystalline limestone. Tschanz and Pampeyan (1961), C. R. Longwell (unpublished)
7GCR2
Northern section in northern Desert Range, Lincoln County, Nevada. Bonanza King Formation, 1400' from top, light and dark gray limestone and dolomite. Sample is dolomitic pelmicrite. Tschanz and Pampeyan (1961), C. R. Longwell (unpublished)
7HCR1
Southern section in northern Desert Range, Lincoln County, Nevada. Bonanza King Formation, 130' from top, massive dark blue limestone. Sample is dolomitic dismicrite. Tschanz and Pampeyan (1961), C. R. Longwell (unpublished)
7HCR2
Southern section in northern Desert Range, Lincoln County, Nevada. Bonanza King Formation, 450' from top, massive, gray, cherty limestone. Sample is dolomitic pelmicrite. Tschanz and Pampeyan (1961), C. R. Longwell (unpublished)
8ACR1
Cochise Head Quadrangle, Arizona, SE1/4 sec. 7, T15S,R29E. El Paso Formation, 70' from top, crystalline limestone with moderate amount of chert. Sample is medium crystalline dolomite. Sabins (1957)
8ACR2a
Cochise Head Quadrangle, Arizona, SE1/4 sec. 7, T15S,R29E. El Paso Formation, 106' from top, medium-bedded, blue, cherty limestone. Sample is sandy, medium crystalline limestone. Sabins (1957)
8BCR1
Cochise Head Quadrangle, Arizona, NE1/4 sec. 2, T15S,R28E. El Paso Formation, 150' from base, thin-bedded, silty, cherty limestone. Sample is finely crystalline dolomite. Sabins (1957)

8BCR2
Cochise Head Quadrangle, Arizona, NE1/4 sec. 2, T15S,R28E. El Paso Formation, 23' from top, massive dolomitic limestone. Sample is medium crystalline dolomite. Sabins (1957)
8CCR1
Dos Cabezas Quadrangle, Arizona, SW1/4 sec. 32, T14S,R27E. Abrigo Limestone, 40' from base, massive silty limestone. Sample is medium crystalline dolomite. Jones and Bacheller (1953)
8CCR2
Dos Cabezas Quadrangle, Arizona, SE1/4 sec. 31, T14S,R27E. Abrigo Limestone, 50' from top, massive, cherty, dolomitic limestone. Sample is medium crystalline dolomite. Jones and Bacheller (1953)
8DCR1
Dos Cabezas Quadrangle, Arizona, NW1/4 sec. 25, T14S,R26E. Abrigo Limestone, 100' from base, arenaceous limestone. Sample is medium crystalline dolomite. Jones and Bacheller (1953)
8DCR2
Dos Cabezas Quadrangle, Arizona, NW1/4 sec. 25, T14S,R26E. Abrigo Limestone, 150' from base, massive cherty limestone. Sample is medium crystalline dolomite. Jones and Bacheller (1953)
8ECR1
Tombstone Quadrangle, Arizona, NW1/4 sec. 26, T20S,R22E. Abrigo Limestone, 150' from top, sandy limestone with shale interbeds. Sample is sandy, coarsely crystalline limestone. Gilluly (1956)
8ECR2
Tombstone Quadrangle, Arizona, NW1/4 sec. 26, T20S,R22E. Abrigo Limestone, 450' from top, thin-bedded limestone and shale. Sample is sandy intrasparudite. Gilluly (1956)
8FCR1
Tombstone Quadrangle, Arizona, SW1/4 sec. 23, T20S,R22E. Abrigo Limestone, 600' from top, shaly limestone and limestone conglomerate. Sample is intrasparudite. Gilluly (1956)
8FCR2
Tombstone Quadrangle, Arizona, SW1/4 sec. 23, T20S,R22E. Abrigo Limestone, 350' from top, shaly limestone with some edgewise conglomerate. Sample is silty finely crystalline limestone. Gilluly (1956)
8GCR1
Pyeatt Ranch Quadrangle, Arizona, Huachuca Canyon. Abrigo Limestone, 350' from top, thin-bedded limestone and siltstone with some red shale. Sample is silty biomicrudite. Weber (1950)
8GCR2
Pyeatt Ranch Quadrangle, Arizona, Huachuca Canyon. Abrigo Limestone, 4' below 8GCR1, thin-bedded limestone and siltstone with some red shale. Sample is calcareous micaceous siltstone. Weber (1950)
8HCR1
Miller Peak Quadrangle, Arizona, Garden Canyon. Abrigo Limestone, 60' from top, fine-grained limestone with thin silt beds. Sample is sandy biosparite. Weber (1950)
8HCR2
Miller Peak Quadrangle, Arizona, Garden Canyon. Abrigo Limestone, 120' from top, fine-grained limestone with thin silt beds. Sample is silty biosparite. Weber (1950)

9ACR1
Holy Joe Peak Quadrangle, Arizona, W1/2 sec. 17, T6S,R17E. Abrigo Formation, 75' from top, red silty limestone, irregularly bedded. Sample is biopelsparite. Krieger (1961, unpublished)
9ACR2
Holy Joe Peak Quadrangle, Arizona, W1/2 sec 17, T6S,R17E. Abrigo Formation, 60' from top, red silty limestone, irregularly bedded. Sample is dolomitic micrite. Krieger (1961, unpublished)
9BCR1
Holy Joe Peak Quadrangle, Arizona, W1/2 sec. 7, T6S,R17E. Abrigo Formation, 37' from top, interbedded fossiliferous and red silty limestone. Sample is biosparite. Krieger (1961, unpublished)
9BCR2
Holy Joe Peak Quadrangle, Arizona, W1/2 sec. 7, T6S,R17E. Abrigo Formation, 42' from top, interbedded fossiliferous and red silty limestone. Sample is finely crystalline dolomite. Krieger (1961, unpublished)
10ACR1
Brighton Quadrangle, Utah, American Fork Canyon. Maxfield Limestone, 400' from base, massive light gray limestone. Sample is medium crystalline dolomite. Calkins and Butler (1943)
10ACR2
Brighton Quadrangle, Utah, American Fork Canyon. Maxfield Limestone, 200' from base, massive arenaceous limestone. Sample is dolomitic biopelmicrite. Calkins and Butler (1943)
10BCR1a
Brighton Quadrangle, Utah, Mary Ellen Gulch. Maxfield Limestone 25' from base, medium- to thin-bedded arenaceous limestone. Sample is sandy biosparudite. Calkins and Butler (1943)
10BCR2
Brighton Quadrangle, Utah, Mary Ellen Gulch. Maxfield Limestone, near middle of formation, massive blue gray limestone. Sample is medium crystalline dolomite. Calkins and Butler (1943)
10CCR1
Springville Quadrangle, Utah, NW1/4 sec. 9, T7S,R3E. Maxfield Limestone, 400' from base, massive light gray dolomite. Sample is medium crystalline dolomite. Baker (1947)
10CCR2
Springville Quadrangle, Utah, NW1/4 sec. 9, T7S,R3E. Maxfield Limestone, 100' from base, thick-bedded, silty, mottled limestone. Sample is biomicrudite. Baker (1947)
10DCR1
Bridal Veil Falls Quadrangle, Utah, SW1/4 sec. 28, T6S,R3E. Maxfield Limestone, 200' from top, massive, medium gray, silty limestone. Sample is medium crystalline dolomite. Baker (1947)
10DCR2
Bridal Veil Falls Quadrangle, Utah, SW1/4 sec. 28, T6S,R3E. Maxfield Limestone, 70' from base, medium-bedded, dark blue, silty limestone. Sample is brecciated dolomitic micrite. Baker (1947)
10ECR1a
Mount Pisgah Quadrangle, Utah, NW1/4 sec. 16, T9N. Ute Formation, near middle, interbedded limestone and clay shale. Sample is oosparite. Williams (1948)

10ECR2
Mount Pisgah Quadrangle, Utah, NE1/4 sec. 16, T9N, R1W. Bloomington Formation, 500' from top, massive gray limestone. Sample is coarsely crystalline dolomite. Williams (1948)
10FCR1
Mount Pisgah Quadrangle, Utah, NW1/4 sec. 5, T9N, R1W. St. Charles Formation, 450' from top, medium-bedded dark gray dolomite. Sample is medium crystalline dolomite. Williams (1948)
10FCR2
Mount Pisgah Quadrangle, Utah, N1/2 sec. 5, T9N, R1W. St. Charles Formation, 300' from top, medium-bedded dark gray dolomite. Sample is medium crystalline dolomite. Williams (1948)
10GCR1
Logan Quadrangle, Utah-Idaho, NW1/4 sec. 7, T10N, R3E. Blacksmith Formation, near base, thick-bedded dark blue dolomite. Sample is biopelmicrite. Williams (1948)
10GCR2
Logan Quadrangle, Utah-Idaho, NW1/4 sec. 12, T10N, R2E. Nounan Formation, 30' from top, thin-bedded blue limestone. Sample is sandy, medium crystalline dolomite. Williams (1948)
10HCR1
Logan Quadrangle, Utan-Idaho, W1/2 sec. 21, T11N, R3E. Bloomington Formation, near middle, dark blue limestone with irregular bedding. Sample is micrite. Williams (1948)
10HCR2
Logan Quadrangle, Utah-Idaho, NW1/2 sec. 30, T11N, R3E. Nounan Formation, 100' from top, massive light gray dolomite. Sample is medium crystalline dolomite. Williams (1948)
11ACR1
Bellevue Peak Quadrangle, Nevada, NE1/4 sec. 33, T19N, R53E. Eldorado Dolomite, 300' from base, massive blue dolomite, some limonite. Sample is brecciated micrite. Nolan (1962), Nolan and others (1956)
11ACR2
Pinto Summit Quadrangle, Nevada, NW1/4 sec. 35, T19N, R53E. Goodwin Limestone, 500' from base, massive crystalline limestone. Sample is biopelsparite. Nolan (1962), Nolan and others (1956)
11BCR1
Pinto Summit Quadrangle, Nevada, 1/2 mile east of Prospect Peak. Eldorado Dolomite, 1000' from top, massive gray dolomite. Sample is pelmicrite. Nolan (1962), Nolan and others (1956)
11BCR2
Pinto Summit Quadrangle, Nevada, 1/2 mile east of Prospect Peak. Eldorado Dolomite, 800' from top, massive gray dolomite. Sample is intramicrudite. Nolan (1962), Nolan and others (1956)
12ACR1
Connors Pass Quadrangle, Nevada, 3 miles NNW of Majors Place. Undifferentiated limestone of Drewes (1964), 1000' from base, massive cherty limestone. Sample is silty micrite. Drewes (1964)
12ACR2
Connors Pass Quadrangle, Nevada, 3 miles north of Majors Place. Lincoln Peak Formation, near base, massive blue limestone. Sample is finely to medium crystalline limestone. Drewes (1964)

12BCR1
Connors Pass Quadrangle, Nevada, near mouth of Cooper Canyon. Lincoln Peak Formation, near middle, thin-bedded silty limestone. Sample is silty micrite. Drewes (1964)
12BCR2
Connors Pass Quadrangle, Nevada, near mouth of Cooper Canyon. Pole Canyon Limestone, near top, thick-bedded gray limestone, mottled orange. Sample is dolomitic micrite. Drewes (1964)
12CCR1
Connors Pass Quadrangle, Nevada, 3/4 mile ESE of Kolcheck Basin. Undifferentiated limestone of Drewes (1964), 1000' from base, massive limestone. Sample is sandy intrasparite. Drewes (1964)
12CCR2
Connors Pass Quadrangle, Nevada, 3/4 mile ESE of Kolcheck Basin. Undifferentiated limestone of Drewes (1964), near base, massive blue limestone. Sample is biopelsparite. Drewes (1964)
12DCR1
Connors Pass Quadrangle, Nevada, 1 mile SSW of Cottonwood Spring. Lincoln Peak Formation, 300' from top, interbedded limestone and quartzite. Sample is medium crystalline limestone. Drewes (1964)
12DCR2
Connors Pass Quadrangle, Nevada, 1 1/4 mile SSW of Cleve Creek Campground. Pole Canyon Limestone, near base, massive gray limestone. Sample is pelmicrite. Drewes (1964)
12ECR1
Gold Hill Quadrangle, Utah, 1/2 mile SE of Ibapah Peak. Lamb Dolomite, 100' from top, thin-bedded dolomite with sand partings. Sample is finely crystalline dolomite. Nolan (1935)
12ECR2
Gold Hill Quadrangle, Utah, on SE side of Ibapah Peak. Chokecherry Dolomite, 15' from top, medium-bedded, gray, oolitic dolomite. Sample is medium crystalline dolomite. Nolan (1935)
12FCR1
Gold Hill Quadrangle, Utah, Lamb Gulch. Trippe Limestone, 150' from top, thin, evenly bedded, gray, pink, and tan limestone. Sample is micrite. Nolan (1935)
12FCR2
Gold Hill Quadrangle, Utah, Lamb Gulch. Abercrombie Formation, near top, massive limestone. Sample is silty micrite. Nolan (1935)
12GCR1
Deep Creek Range, Utah, Sec. 27, T10S,R18W (unsurveyed). Trippe Limestone, near middle, interbedded dark blue limestone andh siltstone. Sample is pelsparite. Bick (1958), Bick (1959)
12GCR2
Deep Creek Range, Utah, Sec. 27, T10S,R18W (unsurveyed). Young Peak Dolomite, 200' from base, massive blue dolomite with abundant white veinlets. Sample is medium crystalline dolomite. Bick (1958), Bick (1959)
12HCR1
Deep Creek Range, Utah, Sec. 31, T10S,R18W (unsurveyed). Young Peak Dolomite, near middle, thick-bedded blue dolomite, with abundant white veinlets. Sample is dolomitic micrite. Bick (1958), Bick (1959)

12HCR2
Deep Creek Range, Utah, Sec. 31, T10S,R18W (unsurveyed). Abercrombie Formation, near middle, thin-bedded, laminated, crystalline, blue dolomite. Sample is finely to medium crystalline limestone. Bick (1958), Bick(1959)
13ACR1
Oak City Quadrangle, Utah, NW1/4 sec. 12, T17S,R4W. Undifferentiated limestones and dolomites of Christiansen (1951), 1500' from base, thick-bedded blue and gray limestone. Sample is finely crystalline dolomite. Christiansen (1951)
13ACR2
Oak City Quadrangle, Utah, NW1/4 sec. 12, T17S,R4W. Undifferentiated limestones and dolomites of Christiansen (1951), 4000' from base, thick-bedded blue limestone. Sample is coarsely crystalline dolomite. Christiansen (1951)
13BCR1
Saipio North Quadrangle, Utah, NE1/4 sec. 25, T17N,R4W. Undifferentiated limestones and dolomites of Christiansen (1951), 2000' from base, irregularly bedded gray limestone. Sample is medium crystalline dolomite. Christiansen (1951)
13BCR2
Saipio North Quadrangle, Utah, NE1/4 sec. 25, T17N,R4W. Undifferentiated limestones and dolomites of Christiansen (1951), 4000' from base, thin-bedded limestone and limestone conglomerate. Sample is intramicrudite. Christiansen (1951)
14ACR1
Glenwood Springs Quadrangle, Colorado, center sec. 17, T5S,R89W. Dotsero Dolomite, 30' from top, medium-bedded blue limestone. Sample is biomicrite. MacQuown (1945)
14ACR2
Glenwood Springs Quadrangle, Colorado, W1/2 sec. 17, T5S,R89W. Dotsero Dolomite, 25' from base, thin-bedded to platy dolomite. Sample is sandy medium crystalline dolomite. MacQuown (1945)
14BCR1
Glenwood Springs Quadrangle, Colorado, SW1/4 sec. 12, T5S,R90W. Dotsero Dolomite, 40' from base, thin- to medium-bedded dolomite. Sample is sandy, medium crystalline dolomite. MacQuown (1945)
14BCR2
Glenwood Springs Quadrangle, Colorado, SW1/4 sec. 12, T5S,R90W. Dotsero Dolomite, 100' from base, massive dark gray limestone. Sample is biomicrite. MacQuown (1945)
15ACR1
Garfield Quadrangle, Colorado, Slaugnterhouse Creek. Manitou Dolomite, 10' from base, thin-bedded gray dolomite. Sample is silty medium crystalline dolomite. Dings and Robinson (1957)
15ACR2
Garfield Quadrangle, Colorado, Slaughterhouse Creek. Manitou Dolomite, 40' from base, medium-bedded gray dolomite, chert bands. Sample is medium-crystalline dolomite. Dings and Robinson (1957)
15BCR1
Garfield Quadrangle, Colorado, south slope of Duncan Hill. Manitou Dolomite, 130' from base, thin- to thick-bedded cherty dolomite. Sample is medium crystalline dolomite. Dings and Robinson (1957)

15BCR2
Garfield Quadrangle, Colorado, south slope of Duncan Hill. Manitou Dolomite, 160' from base, thin- to thick-bedded, cherty dolomite. Sample is medium crystalline dolomite. Dings and Robinson (1957)
15CCR1
Garfield Quadrangle, Colorado, Halls Gulch. Manitou Dolomite, 35' from top, massive gray dolomite. Sample is medium crystalline dolomite. Dings and Robinson (1957)
15CCR2
Garfield Quadrangle, Colorado, Halls Gulch. Manitou Dolomite, 110' from top, massive gray dolomite. Sample is medium crystalline dolomite. Dings and Robinson (1957)
15DCR1
Garfield Quadrangle, Colorado, Quartz Creek. Manitou Dolomite, 150' from base, massive to medium-bedded gray dolomite. Sample is medium crystalline dolomite. Dings and Robinson (1957)
15DCR2
Garfield Quadrangle, Colorado, Quartz Creek. Manitou Dolomite, 120' from base, massive, gray, cherty dolomite. Sample is finely crystalline dolomite. Dings and Robinson (1957)
15ECR1
Cooper Mountain Quadrangle, Colorado, NE1/4 sec. 5, T18S,R69W. Manitou Limestone, 20' from top, medium- to thin-bedded red dolomite and red cherty dolomite. Sample is silty, ferruginous, medium crystalline dolomite. Maher (1950), Cross (1894)
15ECR2
Cooper Mountain Quadrangle, Colorado, NE1/4 sec. 5, T18S,R69W. Manitou Limestone, 1' from base, thick-bedded red dolomite. Sample is silty, cherty, ferruginous, medium crystalline dolomite. Maher (1950), Cross (1894)
15FCR1
Phantom Canyon Quadrangle, Colorado, SE1/4 sec. 4, T18S,R69W. Manitou Limestone, 8' from base, thick-bedded red dolomite with white chert layers. Sample is sandy, cherty, ferruginous, medium crystalline dolomite. Maher (1950), Cross (1894)
15FCR2
Phantom Canyon Quadrangle, Colorado, SE1/4 sec. 4, T18S,R69W. Manitou Limestone, at base, thick-bedded red dolomite. Sample is finely crystalline dolomite. Maher (1950), Cross (1894)
15GCR1
Cover Mountain Quadrangle, Colorado, S1/2 sec. 6, T17S,R70W. Manitou Limestone, 6' from base, thick-bedded red dolomite and dolomite conglomerate. Sample is brecciated medium crystalline dolomite. Maher (1950), Cross (1894)
15GCR2
Cover Mountain Quadrangle, Colorado, S1/2 sec. 6, T17S,R70W. Manitou Limestone, 10' from base, thick-bedded red dolomite and dolomite conglomerate. Sample is sandy, brecciated, medium crystalline dolomite. Maher (1950), Cross (1894)
15HCR1
Cooper Mountain Quadrangle, Colorado, 3/4 mile NNE of University of Kansas field camp. Manitou Limestone, 35' from base, thick-bedded, vuggy, red dolomite. Sample is silty finely crystalline dolomite. Maher (1950), Cross (1894)

15HCR2
Cooper Mountain Quadrangle, Colorado, 3/4 mile NNE of University of Kansas field camp. Manitou Limestone, 16' from top, thick-bedded red dolomite. Sample is finely crystalline dolomite. Maher (1950), Cross (1894)
16ACR1
Dayton Quadrangle, Wyoming, SW1/4 sec. 28, T54N, R85W. Undifferentiated Gros Ventre and Gallatin Formations of Mapel (1959), 85' from top, thin-bedded limestone and limestone conglomerate. Sample is silty, glauconitic, medium crystalline limestone. Mapel (1959)
16ACR2
Dayton Quadrangle, Wyoming, SW1/4 sec. 28, T54N, R85W. Undifferentiated Gros Ventre and Gallatin Formations of Mapel (1959), 10' from top, thin-bedded blue-gray limestone. Sample is biopelsparite. Mapel (1959)
16BCR1
Dayton Quadrangle, Wyoming, NE1/4 sec. 12, T53N, R85W. Undifferentiated Gros Ventre and Gallatin Formations of Mapel (1959), 30' from top, platy to medium-bedded limestone and limestone conglomerate. Sample is silty, glauconitic, pyritic pelsparite. Mapel (1959)
16BCR2
Dayton Quadrangle, Wyoming, NE1/4 sec. 12, T53N, R85W. Undifferentiated Gros Ventre and Gallatin Formations of Mapel (1959), 60' from top, thin- to medium-bedded limestone and limestone conglomerate. Sample is silty, glauconitic, finely crystalline limestone. Mapel (1959)
17ACR1
Sturgis Quadrangle, South Dakota, North Deadwood, South Dakota. Deadwood Formation, 57' from base, thin-bedded limestone and limestone conglomerate with thin green shale beds. Sample is silty, glauconitic biosparite. Furnish and others (1936), Darton and Paige (1925)
17ACR2
Sturgis Quadrangle, South Dakota, North Deadwood, South Dakota. Deadwood Formation, 260' from base, thin-bedded red sandstone, silty limestone and green shale. Sample is sandy glauconitic biomicrite. Furnish and others (1936), Darton and Paige (1925)
17BCR1a
Sturgis Quadrangle, South Dakota, SE1/4 sec. 7, T5N, R4E. Deadwood Formation, 130' below "Scolithus sandstone", thin-bedded blue limestone. Sample is silty intramicrudite. Furnisn and others (1936), Darton and Paige (1925)
17BCR2
Sturgis Quadrangle, South Dakota, SE1/4 sec. 7, T5N, R4E. Deadwood Formation, 200' below "Scolithus sandstone", thin-bedded limestone with thin green shale. Sample is silty biomicrite. Furnish and others (1936), Darton and Paige (1925)
17CCR1
Spearfish Quadrangle, South Dakota, North Trojan, South Dakota. Deadwood Formation, near base, green shale with interbeds of limestone pebble conglomerate. Sample is intrasparudite. Furnish and others (1936), Darton and Paige (1925)

17CCR2
Spearfish Quadrangle, South Dakota, North Trojan, South Dakota. Deadwood Formation, near base, green shale with interbeds of limestone pebble conglomerate. Sample is silty biosparite. Furnish and others (1936), Darton and Paige (1925)
17DCR1
Spearfish Quadrangle, South Dakota, 1 mile west of Ruby Flats. Deadwood Formation, 200' from top, thin-bedded limestone and green fissile shale. Sample is silty, glauconitic, finely crystalline limestone. Furnish and others (1936), Darton and Paige (1925)
17DCR2
Spearfish Quadrangle, South Dakota, 1/2 mile west of Ruby Flats. Deadwood Formation, 220' from top, interbedded green shale, limestone, and pebble conglomerate. Sample is silty, glauconitic, finely crystalline limestone. Furnish and others (1936), Darton and Paige (1925)
17ECR1
Piedmont Quadrangle, South Dakota, SE1/4 sec. 11, T3N, R5E. Deadwood Formation, 90' from base, interbedded limestone pebble conglomerate and green fissile shale. Sample is silty, glauconitic, dolomitic intramicrudite. Furnish and others (1936), Darton and Paige (1925)
17ECR2
Piedmont Quadrangle, South Dakota, SE1/4 sec. 11, T3N, R5E. Deadwood Formation, 80' from base, interbedded limestone pebble conglomerate and green fissile shale. Sample is silty, glauconitic, dolomitic biosparudite. Furnish and others (1936), Darton and Paige (1925)
17FCR1
Piedmont Quadrangle, South Dakota, NW1/4 sec. 7, T3N, R5E. Deadwood Formation, 1' below 17FCR2, interbedded sandstone, green shale, glauconitic dolomite, and limestone pebble conglomerate. Samole is silty, glauconitic, dolomitic biomicrudite. Furnish and others (1936), Darton and Paige (1925)
17FCR2a
Piedmont Quadrangle, South Dakota, NW1/4 sec. 7, T3N, R5E. Deadwood Formation, 110' from base, interbedded sandstone, green shale, glauconitic dolomite and limestone pebble conglomerate. Sample is glauconitic biosparite. Furnish and others (1936), Darton and Paige (1925)
17GCR1
Rapid City West Quadrangle, South Dakota, SE1/4 sec. 14, T1N, R6E. Deadwood Formation, 50' from base, limestone, limestone pebble conglomerate, sandstone, green shale, and dolomite. Sample is silty, medium crystalline dolomite. Furnish and others (1936), Darton and Paige (1925)
17GCR2
Rapid City West Quadrangle, South Dakota, SE1/4 sec. 14, T1N, R6E. Deadwood Formation, 90' from base, red sandstone, green shale, limestone, and limestone pebble conglomerate. Sample is glauconitic, dolomitic, ferruginous biosparite. Furnish and others (1936), Darton and Paige (1925)

17HCR1
Rapid City West Quadrangle, South Dakota, NE1/4 sec. 14, T1N, R6E. Deadwood Formation, 43' from base, sandstone, limestone, limestone pebble conglomerate, and green shale. Samole is silty, glauconitic, dolomitic biosparite. Furnish and others (1936), Darton and Paige (1925)
17HCR2
Rapid City West Quadrangle, South Dakota, NE1/4 sec. 14, T1N, R6E. Deadwood Formation, 55' from base, sandstone, limestone, limestone pebble conglomerate, and green shale. Samole is glauconitic biosparite. Furnish and others (1936), Darton and Paige (1925)
18ACR1
Grand Canyon, Arizona, Cottonwood Creek, west of Horseshoe Mesa. Muav Limestone, 80' from top, thin-bedded blue limestone and fine-grained sandstone. Sample is silty, muscovitic, glauconitic, calcareous, finely crystalline dolomite. Noble (1922)
18ACR2
Grand Canyon, Arizona, Cottonwood Creek, west of Horsehoe Mesa. Muav Limestone, 20' from base, green shale with thin interbedded limestone. Sample is muscovitic, chloritic, glauconitic, dolomitic siltstone. Noble (1922)
18BCR1
Grand Canyon, Arizona, Red Canyon, north of Moran Point. Muav Limestone, 20' from top, interbedded fine-grained sandstone and dolomite. Sample is finely crystalline dolomite. Noble (1922)
18BCR2
Grand Canyon, Arizona, Red Canyon, north of Moran Point. Muav Limestone, near middle, thin-bedded, brown, silty dolomite. Sample is silty finely crystalline dolomite. Noble (1922)
18CCR1
Bright Angel Quadrangle, Arizona, Garden Creek. Muav Limestone, 100' from base, thin-bedded limestone and limestone conglomerate. Sample is silty dolomitic micrite. Noble (1922), Maxson (1961)
18CCR2
Bright Angel Quadrangle, Arizona, Garden Creek. Muav Limestone, 50' from base, interbedded platy sandstone, limestone, and limestone conglomerate. Sample is silty finely crystalline dolomite. Noble (1922), Maxson (1961)
18DCR1
Bright Angel Quadrangle, Arizona, near Kaibab Trail. Muav Limestone, 17' from top, blue-gray thin-bedded limestone. Sample is intramicrite. Noble (1922), Maxson (1961)
18DCR2
Bright Angel Quadrangle, Arizona, near Kaibab Trail. Muav Limestone, 200' from top, thin-bedded mottled limestone. Sample is dolomitic pelmicrite. Noble (1922), Maxson (1961)
18ECR1
Camp Wood Quadrangle, Arizona, 1 mile west of Geo Wood Canyon. Muav Limestone, 10' from top, thin-bedded, silty, red limestone. Sample is finely crystalline dolomite. Wood (1955), McNair (1951), M. H. Krieger (unpublished)

18ECR2a
Camp Wood Quadrangle, Arizona, 1 mile west of Geo Wood Canyon. Muav Limestone, 30' from top, flaggy shale and silty limestone. Sample is silty, glauconitic, finely crystalline dolomite. Wood (1955), McNair (1951), M. H. Krieger (unpublished)
18FCR1
Camp Wood Quadrangle, Arizona, NE1/4 sec. 18, T18N,R6W. Muav Limestone, 23' from top, thin-bedded, brown, silty limestone. Sample is finely crystalline dolomite. Wood (1955), McNair (1951), M. H. Krieger (unpublished)
18FCR2a
Camp Wood Quadrangle, Arizona, NE1/4 sec. 18, T18N,R6W. Muav Limestone, 20' from top, interbedded siltstone and silty limestone. Sample is silty medium crystalline dolomite. Wood (1955), McNair (1951), M. H. Krieger (unpublished)
18GCR1a
24 miles SW of Seligman, Arizona, on SE side of Cross Mountain. Muav Limestone, 60' from top, medium-bedded gray limestone. Sample is finely crystalline dolomite. Wood (1955), McNair (1951)
18GCR2a
24 miles SW of Seligman, Arizona, on SE side of Cross Mountain. Muav Limestone, 95' from top, thin-bedded silty limestone. Sample is silty, muscovitic, glauconitic, finely crystalline limestone. Wood (1955), McNair (1951)
18HCR1a
25 miles SW of Seligman, Arizona, on SW side of Cross Mountain. Muav Limestone, 2' from top, thin-bedded gray limestone. Sample is finely crystalline dolomite. Wood (1955), McNair (1951)
18HCR2a
25 miles SW of Seligman, Arizona, on SW side of Cross Mountain. Muav Limestone, 65' from top, medium-bedded gray dolomite. Sample is silty finely crystalline dolomite. Wood (1955), McNair (1951)
19ACR1
San Lorenzo Quadrangle, New Mexico, NW1/4 sec. 26, T17S,R11W. Bat Cave Formation, 70' from top, medium- to thick-bedded, cherty, blue limestone. Sample is intramicrite. New Mexico Geological Society (1953)
19ACR2
San Lorenzo Quadrangle, New Mexico, NW1/4 sec. 26, T17S,R11W. Bat Cave Formation, 220' from top, thin- to medium-bedded blue limestone and limestone pebble conglomerate. Sample is biosparudite. New Mexico Geological Society (1953)
19BCR1
San Lorenzo Quadrangle, New Mexico, SW1/4 sec. 15, T17S,R11W. Bat Cave Formation, 23' from top, massive, cherty, gray dolomite. Sample is finely crystalline dolomite. New Mexico Geological Society (1953)
19BCR2
San Lorenzo Quadrangle, New Mexico, SW1/4 sec. 15, T17S,R11W. Bat Cave Formation, 15' from top, massive, cherty, gray dolomite. Sample is brecciated medium crystalline dolomite. New Mexico Geological Society (1953)

19CCR1
Silver City Quadrangle, New Mexico, N1/2 sec. 5, T18S, R14W. El Paso Limestone, 50' from base, medium-bedded gray dolomite with orange silt partings. Sample is biomicrudite. Paige (1916)
19CCR2
Silver City Quadrangle, New Mexico, NE1/4 sec. 5, T18S, R14W. El Paso Limestone, 150' from base, medium-bedded gray dolomite with some chert. Sample is sandy medium crystalline dolomite. Paige (1916)
19DCR1
Circle Mesa Quadrangle, New Mexico, NE1/4 sec. 27, T17S, R15W. El Paso Limestone, near middle, thin- to medium-bedded gray dolomite. Sample is sandy medium crystalline dolomite. Paige (1916)
19DCR2
Circle Mesa Quadrangle, New Mexico, NE1/4 sec. 27, T17S, R15W. El Paso Limestone, 35' below 19DCR1, thin- to medium-bedded gray dolomite. Sample is silty medium-grained dolomite. Paige (1916)
19ECR1
Garfield Quadrangle, New Mexico, SE1/4 sec. 4, T17S, R4W. Bat Cave Formation, 8' from top, massive pink dolomite with some chert. Sample is medium crystalline dolomite. Kelley and Silver (1952)
19ECR2
Garfield Quadrangle, New Mexico, SE1/4 sec. 4, T17S, R4W. Bat Cave Formation, 23' from top, massive pink dolomite with some chert. Sample is medium crystalline dolomite. Kelley and Silver (1952)
19FCR1
Caballo Quadrangle, New Mexico, NW1/4 sec. 28, T16S, R4W. Sierrite Limestone, 15' from top, thin-bedded cherty limestone. Sample is silty glauconitic biopelsparite. Kelley and Silver (1952)
19FCR2
Caballo Quadrangle, New Mexico, NW1/4 sec. 28, T16S, R4W. Bat Cave Formation, 50' from top, medium-bedded, gray, cherty limestone. Sample is biomicrite. Kelley and Silver (1952)
19GCR1
Engle Quadrangle, New Mexico, 3 1/2 miles south of Truth or Consequences. Bat Cave Formation, 120' from top, massive, gray, cherty dolomite, mottled pink. Sample is medium crystalline dolomite. Kelley and Silver (1952)
19GCR2
Engle Quadrangle, New Mexico, 3 1/2 miles south of Truth or Consequences. Sierrite Limestone, 80' from base, medium-bedded silty limestone, mottled pink. Sample is medium crystalline dolomite. Kelley and Silver (1952)
19HCR1
Engle Quadrangle, New Mexico, NE1/4 sec. 3, T15S, R4W. Sierrite Limestone, 35' from base, medium-bedded limestone with abundant silt lamellae. Sample is silty biomicrite. Kelley and Silver (1952)
19HCR2
Engle Quadrangle, New Mexico, NE1/4 sec. 3, T15S, R4W. Sierrite Limestone, 55' from base, medium-bedded limestone with abundant silt lamellae. Sample is silty pelsparite. Kelley and Silver (1952)

Table C2.--Ranges and percentile concentrations of oxides/elements from 392 analyses of carbonate rocks of the Sauk sequence [-,percentile not determined because of insufficient data]

		Percentile									
Oxide/element	Minimum_/	1	2.5	5	10	50	90	95	97.5	99	Maximum
						Percent					
SiO2	0.12(4)	0.1	0.3	0.4	0.7	9.0	27.0	36.2	42.2	47.2	51.4
Al2O3	0.04(6)	-	0.08	0.10	0.10	0.95	4.03	5.50	6.60	8.66	13.60
Fe2O3	0.01(29)	-	-	-	0.04	0.49	1.90	2.60	2.90	3.36	4.10
FeO	0.02(2)	0.02	0.02	0.04	0.04	0.18	0.84	1.48	2.17	4.05	4.50
MgO	0.10(0)	0.10	0.32	0.47	0.58	3.10	21.20	21.50	21.90	22.16	27.60
CaO	14.00(0)	17.83	20.22	21.51	25.10	35.00	50.83	52.27	54.04	54.86	55.90
Na2O	0.02(177)	-	-	-	-	0.06	1.40	2.19	2.60	3.10	3.80
K2O	0.02(9)	-	0.02	0.05	0.08	0.37	1.80	2.49	3.17	4.60	5.10
TiO2	0.01(39)	-	-	-	0.01	0.05	0.21	0.30	0.36	0.48	0.65
P2O5	0.01(82)	-	-	-	-	0.04	0.32	0.43	0.52	0.70	1.60
MnO	0.01(62)	-	-	-	-	0.04	0.29	0.43	0.58	0.87	1.20
LOI_/	14.3 (0)	17.1	21.1	23.7	29.2	40.9	46.4	46.8	47.0	47.3	48.9
CO2	11.0 (0)	16.4	20.0	23.1	28.4	40.7	46.2	46.8	47.0	47.2	47.5
						Parts per million					
Ag	0.92(384)	-	-	-	-	-	-	-	-	1.2	2.8
B	10 (320)	-	-	-	-	-	21	40	48	79	160
Ba	4.3 (10)	-	4.3	5.5	7.2	50	200	298	360	737	1000
Co	0.92(102)	-	-	-	-	2.8	6.1	10	13	19	24
Cr	4.7 (0)	5.3	5.7	6.4	6.8	10	16	18	23	47	260
Cu	0.44(59)	-	-	-	-	1.5	9.1	16	33	56	82
La	9.3 (56)	-	-	-	-	28	53	59	63	67	84
Mo	2.0 (170)	-	-	-	-	2.2	3.5	3.9	4.4	5.1	5.6
Nb	4.3 (136)	-	-	-	-	7.6	18	23	29	35	59
Ni	2.0 (118)	-	-	-	-	3.2	8.7	11	14	21	27
Pb	4.3 (247)	-	-	-	-	-	7.7	13	55	133	250
Sc	2.0 (14)	-	-	2.3	2.8	4.3	6.2	7.1	7.7	9.5	11
Sr	19 (0)	29	31	35	40	250	450	540	670	736	840
V	2.9 (0)	3.2	3.6	4.0	4.8	8.2	15	18	23	37	56
Y	2.0 (66)	-	-	-	-	8.3	25	31	36	48	55
Zn	29 (168)	-	-	-	-	38	94	149	251	439	710
Zr	4.3 (4)	4.3	5.7	6.4	7.6	29	160	200	250	349	550
Ce	93 (208)	-	-	-	-	-	150	170	190	210	240
Ga	4.3 (390)	-	-	-	-	-	-	-	-	-	5.8
Ge	0.92(357)	-	-	-	-	-	-	1.4	2.0	2.4	3.4
Tl	9.3 (391)	-	-	-	-	-	-	-	-	-	11
Yb	0.92(237)	-	-	-	-	-	1.8	2.1	2.6	3.0	3.4
Pr	140 (391)	-	-	-	-	-	-	-	-	-	140
Nd	93 (305)	-	-	-	-	-	120	140	170	202	290
Sm	93 (375)	-	-	-	-	-	-	-	98	100	110
Eu	2 (215)	-	-	-	-	-	5.5	6.4	7.1	7.7	9.2
Gd	4.3 (317)	-	-	-	-	-	11	15	19	21	24
Dy	20 (385)	-	-	-	-	-	-	-	-	21	24
Ir	93 (391)	-	-	-	-	-	-	-	-	-	100

_/Minimum reported value. Value in parentheses is the number of determinations reported as below the minimum.

_/Loss on ignition; largely CO2 with minor H2O and organic carbon.

Table C3.--Median concentrations of oxides/elements in carbonate rocks of the Sauk sequence in 19 regions of the western U. S.

Percent

Locality	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	K_2O	TiO_2	P_2O_5	MnO	LOI	CO_2
Southwestern Montana	1.30	0.30	0.26	0.16	19.65	31.80	0.14	0.02	0.01	0.02	45.55	45.40
Central Wyoming	15.20	1.93	1.10	0.16	0.57	43.20	1.20	0.07	0.08	0.10	34.95	34.60
Southeastern Nevada	1.18	0.22	0.15	0.06	8.50	34.35	0.11	0.01	0.01	0.01	43.45	43.50
Northern Arizona	14.95	3.65	1.40	1.05	11.30	24.90	1.40	0.23	0.03	0.09	36.80	35.35
Northern Utah	2.40	0.62	0.21	0.14	16.60	32.40	0.27	0.04	0.02	0.03	42.65	42.80
Eastern Nevada	3.89	0.63	0.30	0.11	2.65	49.00	0.26	0.02	0.03	0.01	42.10	42.35
Central Colorado	3.14	0.62	0.32	0.13	19.50	29.90	0.17	0.04	0.02	0.09	44.40	43.85
Western South Dakota	12.20	2.10	1.70	0.65	1.55	40.85	1.25	0.08	0.36	0.26	35.05	34.50
Southeastern Arizona	10.20	1.15	0.60	0.47	2.10	35.35	0.40	0.10	0.13	0.05	36.75	36.75
Southwestern New Mexico	8.85	0.88	0.42	0.22	15.40	31.45	0.27	0.04	0.02	0.05	40.00	39.75
North-Central Montana	11.47	1.31	0.73	0.38	1.00	34.90	0.72	0.09	0.18	0.10	35.75	35.35
Northwestern Montana	4.10	1.59	0.68	0.40	2.40	43.30	0.49	0.07	0.04	0.03	40.30	39.95
Southeastern Utah	3.00	1.30	0.60	0.13	9.20	41.05	0.34	0.05	0.08	0.02	41.40	41.60
Southern California	3.25	1.34	0.35	0.19	10.40	35.10	0.53	0.04	0.03	0.01	43.00	43.00
South-Central Arizona	9.75	1.00	0.84	0.06	6.50	39.40	0.38	0.04	0.03	0.04	40.00	39.50
Central Arizona	1.69	0.22	0.18	0.05	0.65	52.95	0.06	0.01	0.02	0.01	43.05	43.45
Central Utah	1.39	0.40	0.01	0.14	20.90	31.15	0.16	0.02	0.01	0.01	46.20	45.70
West-Central Colorado	9.02	2.78	0.59	0.48	8.95	33.55	1.30	0.09	0.04	0.04	39.00	37.95
North-Central Wyoming	26.71	2.44	1.00	0.21	0.78	37.80	1.50	0.09	0.27	0.07	29.35	29.25

Parts per million

Locality	Ba	Cr	Cu	La	Sc	Sr	V	Y	Zr
Southwestern Montana	14.	8.	1.	33.	3.	83.	8.	4.	10.
Central Wyoming	160.	10.	2.	22.	5.	340.	9.	16.	105.
Southeastern Nevada	12.	8.	1.	37.	4.	220.	6.	1.	11.
Northern Arizona	120.	12.	3.	29.	5.	140.	13.	16.	100.
Northern Utah	23.	11.	1.	26.	4.	104.	8.	5.	19.
Eastern Nevada	38.	10.	1.	24.	5.	425.	7.	7.	28.
Central Colorado	32.	9.	3.	34.	3.	79.	8.	7.	23.
Western South Dakota	92.	12.	5.	40.	5.	290.	9.	20.	78.
Southeastern Arizona	82.	10.	1.	28.	5.	250.	9.	10.	51.
Southwestern New Mexico	29.	9.	1.	20.	4.	56.	7.	5.	17.
North-Central Montana	115.	13.	2.	29.	5.	264.	9.	21.	47.
Northwestern Montana	61.	12.	2.	16.	5.	300.	8.	6.	27.
Southeastern Utah	24.	10.	2.	18.	4.	138.	8.	7.	27.
Southern California	51.	12.	3.	25.	4.	191.	9.	9.	24.
South-Central Arizona	24.	11.	1.	17.	4.	292.	12.	10.	17.
Central Arizona	12.	8.	0.	19.	5.	355.	7.	3.	26.
Central Utah	8.	8.	1.	34.	2.	35.	5.	2.	10.
West-Central Colorado	53.	13.	2.	14.	4.	108.	8.	8.	40.
North-Central Wyoming	120.	11.	2.	30.	5.	259.	7.	17.	102.

Table C4.--Average concentrations of oxides/elements in carbonate rocks of the Sauk sequence in 19 regions of the western U. S.

[The averages for MgO, CaO, LOI and CO_2 are arithmetic means; all other averages are geometric means]

Locality	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	K_2O	TiO_2	P_2O_5	MnO	LOI	CO_2
Southwestern Montana	1.03	0.23	0.26	0.18	12.42	40.08	0.15	0.02	0.02	0.02	44.72	44.73
Central Wyoming	12.02	1.73	1.04	0.17	0.96	42.25	1.03	0.06	0.09	0.07	34.11	33.83
Southeastern Nevada	1.99	0.28	0.10	0.06	10.76	38.63	0.14	0.02	0.01	0.01	41.76	41.56
Northern Arizona	13.91	3.05	1.31	0.36	9.84	27.69	1.43	0.18	0.03	0.08	34.36	33.55
Northern Utah	2.18	0.62	0.16	0.14	12.43	37.37	0.27	0.04	0.02	0.03	42.66	42.61
Eastern Nevada	3.60	0.78	0.23	0.14	5.67	42.42	0.30	0.03	0.04	0.01	39.47	39.07
Central Colorado	3.03	0.52	0.20	0.11	19.34	29.58	0.17	0.04	0.02	0.12	43.80	43.49
Western South Dakota	13.60	2.12	1.33	0.62	2.78	38.28	0.95	0.09	0.28	0.25	33.15	32.93
Southeastern Arizona	9.83	1.32	0.41	0.43	7.67	35.21	0.60	0.09	0.10	0.04	35.18	34.99
Southwestern New Mexico	9.47	0.81	0.45	0.20	10.43	35.37	0.32	0.05	0.04	0.05	39.20	38.82
North-Central Montana	6.26	1.02	0.32	0.29	5.84	35.43	0.38	0.07	0.09	0.09	34.97	34.56
Northwestern Montana	3.09	0.79	0.48	0.23	6.90	41.24	0.39	0.05	0.03	0.02	39.76	39.59
Southeastern Utah	3.93	0.95	0.63	0.12	9.29	38.31	0.31	0.05	0.08	0.03	40.75	40.32
Southern California	4.07	1.21	0.17	0.20	10.96	37.72	0.49	0.04	0.04	0.02	41.54	41.45
South-Central Arizona	8.65	0.85	0.77	0.06	7.45	39.54	0.42	0.04	0.02	0.03	39.50	39.08
Central Arizona	1.30	0.16	0.09	0.05	0.66	51.23	0.07	0.02	0.03	0.02	41.05	41.21
Central Utah	1.63	0.37	0.03	0.13	16.25	35.58	0.13	0.02	0.02	0.01	44.49	44.30
West-Central Colorado	9.29	2.36	0.62	0.40	8.91	34.00	1.23	0.09	0.04	0.03	37.19	36.55
North-Central Wyoming	22.14	2.06	1.05	0.23	1.30	37.18	1.21	0.07	0.27	0.07	30.96	30.60

Parts per million

Locality	Ba	Cr	Cu	La	Sc	Sr	V	Y	Zr
Southwestern Montana	16.	9.	1.	26.	3.	130.	8.	3.	12.
Central Wyoming	134.	11.	2.	19.	5.	327.	10.	15.	80.
Southeastern Nevada	18.	8.	1.	24.	4.	152.	6.	3.	14.
Northern Arizona	130.	12.	3.	27.	5.	145.	14.	17.	96.
Northern Utah	23.	10.	1.	21.	4.	135.	7.	4.	18.
Eastern Nevada	33.	11.	1.	19.	5.	304.	9.	5.	24.
Central Colorado	29.	9.	3.	32.	3.	95.	8.	6.	23.
Western South Dakota	86.	12.	5.	40.	6.	273.	10.	21.	70.
Southeastern Arizona	59.	10.	1.	27.	5.	198.	9.	11.	53.
Southwestern New Mexico	33.	10.	1.	21.	4.	100.	8.	5.	25.
North-Central Montana	103.	19.	3.	28.	4.	223.	8.	12.	37.
Northwestern Montana	42.	12.	2.	15.	5.	202.	8.	5.	27.
Southeastern Utah	31.	10.	2.	14.	4.	126.	8.	7.	36.
Southern California	55.	12.	3.	26.	5.	190.	9.	9.	25.
South-Central Arizona	22.	12.	1.	15.	4.	260.	12.	10.	22.
Central Arizona	13.	8.	1.	20.	5.	357.	7.	4.	27.
Central Utah	10.	8.	1.	28.	2.	58.	5.	3.	11.
West-Central Colorado	51.	12.	2.	15.	4.	115.	8.	8.	46.
North-Central Wyoming	114.	12.	4.	26.	5.	284.	8.	16.	88.

Table C5.--Errors of the average concentrations given in table C4.

[The values for MgO, CaO, LOI and CO2 are standard errors; all other values are geometric errors]

Locality	SiO2	Al2O3	Fe2O3	FeO	MgO	CaO	K2O	TiO2	P2O5	MnO	LOI	CO2
Southwestern Montana	1.23	1.34	1.24	2.46	8.60	9.70	1.44	1.33	1.35	2.67	1.41	1.44
Central Wyoming	1.51	1.52	1.35	1.25	0.42	4.59	1.35	1.38	1.41	1.46	3.43	3.52
Southeastern Nevada	2.28	1.53	1.52	1.35	3.76	3.83	1.68	1.42	1.87	1.30	2.64	2.66
Northern Arizona	1.32	1.24	1.49	1.62	2.88	4.01	1.26	1.27	1.32	2.26	2.38	2.42
Northern Utah	1.43	1.43	1.54	1.33	3.10	3.45	1.82	1.40	1.41	1.34	1.36	1.33
Eastern Nevada	1.46	1.72	1.48	1.46	4.57	7.70	1.66	1.73	1.56	1.22	2.16	2.38
Central Colorado	1.58	1.33	3.83	1.45	1.04	1.03	1.27	1.21	1.47	2.82	0.97	1.04
Western South Dakota	1.55	1.43	1.28	1.27	1.88	2.81	1.36	1.66	1.30	1.24	3.76	3.82
Southeastern Arizona	2.21	2.34	3.01	1.51	6.30	3.33	2.23	2.25	1.41	1.49	6.96	7.12
Southwestern New Mexico	1.38	1.37	1.13	1.48	3.87	3.78	1.52	1.54	1.75	1.59	2.61	2.66
North-Central Montana	1.87	1.45	1.66	1.16	2.49	3.58	1.67	1.33	1.57	1.23	3.06	3.17
Northwestern Montana	1.78	1.69	1.28	1.53	2.56	3.41	1.47	1.42	1.28	1.22	1.95	1.96
Southeastern Utah	1.42	1.24	1.35	1.08	2.57	3.95	1.23	1.30	1.31	1.29	1.35	1.44
Southern California	1.30	1.40	2.24	1.13	4.67	3.99	1.35	1.32	1.65	1.61	1.93	2.01
South-Central Arizona	1.24	1.31	1.26	1.10	1.98	3.56	1.16	1.35	1.24	1.32	1.08	1.17
Central Arizona	1.68	1.69	1.68	1.10	0.07	1.35	1.37	1.37	2.22	1.55	1.19	1.34
Central Utah	1.55	1.27	1.67	1.13	2.64	2.42	1.34	1.22	1.41	1.25	1.11	1.14
West-Central Colorado	1.29	1.17	1.16	1.36	2.05	4.27	1.24	1.15	1.51	1.24	1.35	1.47
North-Central Wyoming	1.18	1.20	1.05	1.32	0.37	2.50	1.18	1.19	1.22	1.23	1.54	1.51

Locality	Ba	Cr	Cu	La	Sc	Sr	V	Y	Zr
Southwestern Montana	1.24	1.18	1.65	1.42	1.22	2.34	1.25	1.20	1.26
Central Wyoming	1.45	1.12	1.40	1.30	1.07	1.09	1.33	1.24	1.37
Southeastern Nevada	1.74	1.06	1.25	1.21	1.12	1.53	1.12	1.41	1.36
Northern Arizona	1.22	1.07	1.38	1.35	1.09	1.26	1.27	1.23	1.18
Northern Utah	1.59	1.12	1.25	1.16	1.10	1.42	1.13	1.34	1.29
Eastern Nevada	1.36	1.19	1.45	1.34	1.10	1.67	1.26	1.34	1.41
Central Colorado	1.69	1.09	3.11	1.08	1.09	1.66	1.08	1.83	1.27
Western South Dakota	1.41	1.07	1.36	1.10	1.11	1.10	1.09	1.09	1.26
Southeastern Arizona	3.05	1.17	2.45	1.22	1.32	1.44	1.36	2.66	3.00
Southwestern New Mexico	1.46	1.11	1.19	1.22	1.12	1.53	1.26	1.47	1.48
North-Central Montana	1.67	1.24	1.79	1.13	1.14	1.21	1.10	1.46	1.49
Northwestern Montana	1.40	1.14	1.20	1.19	1.07	1.37	1.09	1.24	1.24
Southeastern Utah	1.21	1.05	1.25	1.21	1.10	1.44	1.04	1.12	1.52
Southern California	1.20	1.10	1.22	1.15	1.11	1.89	1.08	1.55	1.25
South-Central Arizona	1.26	1.07	1.19	1.18	1.07	1.15	1.11	1.08	1.22
Central Arizona	1.48	1.07	1.24	1.31	1.02	1.03	1.04	1.62	1.30
Central Utah	1.42	1.14	1.19	1.18	1.16	1.40	1.08	1.38	1.19
West-Central Colorado	1.27	1.08	1.20	1.17	1.05	1.37	1.05	1.11	1.24
North-Central Wyoming	1.10	1.05	1.59	1.12	1.06	1.12	1.07	1.10	1.25

Table C6.--Variance components in compositional data on carbonate rocks of the Sauk sequence in the western U.S.

Oxide/ element	Total variance (of logs except where noted)	Variance components [Values in parentheses are percentages of the total variance. *indicates statistical significance at 0.05 probability, **at 0.01; some tests were performed on pooled variance estimates]						vm_/	
		Between regions	Between areas	Between pairs of sections	Between sections	Between samples	Between analyses	Minimum	Maximum
SiO2	0.3956	0.1221(31**)	0.0097(2)	0.0193(5)	0.0176(4)	0.1989(50**)	0.0280(7)	1.3	4.8
Al2O3	0.3109	0.0930(30*)	0.0295(9**)	0.0004(0)	0.0171(6)	0.1305(42**)	0.0405(13)	1.2	3.5
Fe2O3	0.4727	0.0981(21)	0.0800(17**)	0.0102(2)	0.0479(10*)	0.1064(22**)	0.1302(28)	0.6	1.7
FeO	0.2646	0.0883(33*)	0.0231(9**)	0.0167(6)	0.0054(2)	0.1056(40**)	0.0255(10)	1.2	3.7
MgO	80.0_/	7.6 (9)	23.6 (30**)	0.0 (0)	11.4 (14*)	35.9 (45**)	1.5 (2)	0.2	0.5
CaO	110.1_/	0.0 (0)	26.4 (24**)	0.0 (0)	19.0 (17*)	61.6 (56**)	2.9 (3)	0.0	0.0
K2O	0.3245	0.0998(31**)	0.0163(5)	0.0348(11*)	0.0 (0)	0.1251(39**)	0.0486(15)	1.1	3.8
TiO2	0.2464	0.0553(22)	0.0333(14**)	0.0029(1)	0.0185(8)	0.1129(46**)	0.0234(9)	0.7	2.0
P2O5	0.4006	0.1284(32**)	0.0129(3)	0.0 (0)	0.0733(18**)	0.1294(32**)	0.0565(14)	1.4	5.0
MnO	0.3730	0.1023(27**)	0.0424(11)	0.0572(15**)	0.0282(8*)	0.0700(19**)	0.0729(20)	0.7	2.2
LOI_/	52.9_/	7.8 (15)	12.6 (24**)	0.0 (0)	3.2 (6)	28.7 (54**)	0.4 (1)	0.4	0.9
CO2	56.7_/	8.1 (14)	13.2 (23**)	0.0 (0)	4.1 (7)	30.5 (54**)	0.4 (1)	0.4	0.9
Ba	0.3152	0.0674(21**)	0.0376(12)	0.0239(8*)	0.0126(4)	0.1486(47**)	0.0250(8)	0.6	1.9
Cr	0.0307	0.0027(9**)	0.0009(3)	0.0017(6)	0.0 (0)	0.0082(27**)	0.0172(56)	0.4	1.4
Cu	0.2886	0.0254(9)	0.0668(23**)	0.0 (0)	0.0 (0)	0.1299(45**)	0.0666(23)	0.2	0.6
La	0.0941	0.0039(4*)	0.0044(5)	0.0018(2)	0.0053(6)	0.0194(21**)	0.0594(63)	0.2	0.6
Sc	0.0261	0.0036(14)	0.0032(12**)	0.0 (0)	0.0009(3)	0.0098(38**)	0.0085(33)	0.5	1.4
Sr	0.1773	0.0057(3)	0.0351(20**)	0.0 (0)	0.0350(20**)	0.0865(49**)	0.0150(8)	0.1	0.2
V	0.0434	0.0028(7)	0.0099(23**)	0.0 (0)	0.0040(9)	0.0203(47**)	0.0064(15)	0.2	0.4
Y	0.1993	0.0483(24)	0.0451(23**)	0.0 (0)	0.0257(13*)	0.0688(35**)	0.0115(6)	0.6	1.6
Zr	0.2573	0.0578(22)	0.0449(17**)	0.0 (0)	0.0272(11*)	0.0965(37**)	0.0308(12)	0.7	1.8

_/Variance of percentage data, not logarithms.

_/Ratio of variance between regions to variance of the region means.

_/Loss on ignition, largely CO2 with minor H2O and organic carbon.