U.S. DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

# ABUNDANCES OF MAJOR ELEMENTS AND SEDIMENTARY COMPONENTS IN CUTTINGS FROM THE FOXEN, SISQUOC, MONTEREY, AND POINT SAL FORMATIONS, OCS P-0315-1 WELL, POINT ARGUELLO OIL FIELD, OFFSHORE SANTA MARIA BASIN, SOUTHERN CALIFORNIA

by

Caroline M. Isaacs[1]
Marjorie D. Medrano[1]
David F. Siems[2]
J. Steven Mee[2]

Open-File Report 93-382



[1] U.S. Geological Survey
345 Middlefield Road, MS 999
Menlo Park, California 94025

[2] U.S. Geological Survey
Federal Center, Box 25046
Denver, Colorado 80225

1993

CONTENTS

## INTRODUCTION

As both a major petroleum source-rock and reservoir-rock, the Monterey Formation in the offshore Santa Maria basin and Santa Barbara Channel of southern California (Figure 1) has received considerable attention in recent years. For regional synthesis and correlation and for understanding the spatial distribution of high-quality reservoirs, a major need has been the identification of compositional variations and trends, both stratigraphically and laterally. Because of the formation's heterogeneity, however, meaningful identification of stratigraphic trends and compositional comparison of different Monterey sections has been difficult. As summarized by Isaacs and others (1986) and Isaacs (1987), analysis of cuttings has proven to be an efficient approach to this problem.

This report presents data on major oxides and sedimentary composition in cuttings from the OCS P-0315 No. 1 well (here designated "315-1") in the offshore Point Arguello field (Figure 1).

## STRATIGRAPHY AND SAMPLING

In the 315-1 well, formation tops (as defined by the operator, Texaco U.S.A.) are as follows: Foxen Formation 2042 ft, Sisquoc Formation 3005 ft, Monterey Formation 6575 ft, and Point Sal Formation 10240 ft to total depth at 13251 ft. Within the Monterey Formation, the chert zone (as defined by the operator) extends from 6998 to 10000 ft. Anticlinal hinges and faults are recognized within the interval 8184-9170 ft.

All intervals from the stratigraphic sequence sampled by the operator, from 1390 to 13251 ft, were analyzed. Intervals were all sampled by cuttings collected in 30-foot intervals.

Depths represent measured well depths. The reference elevation for the well is 820 ft above the seafloor. The well was very little deviated; for example, 13251 ft measured well depth was determined to be 12656 ft vertical depth (from the reference elevation).

## METHODS

After receipt of washed cuttings from the operator, samples were split with a riffle splitter and submitted for grinding and analysis by the U.S. Geological Survey Branch of Geochemistry. In contrast to samples reported by Isaacs and others (1989a, 1989b) and Isaacs and Tomson (1990) which were dried prior to analysis, all analyses reported here were made on powder fractions containing adsorbed water ($H_2O^-$) like samples reported by Isaacs and others (1990, 1992). Amounts of $H_2O^-$ probably range from about 1 wt% to as much as 5 wt% in clay-rich samples (Isaacs, 1980, appendix A).

Analytical Techniques - Major Elements

Samples were analyzed for major elements by X-ray fluorescence spectroscopy, using methods described by Taggart and Wahlberg (1980a, b) and Taggart and others (1981, 1987). Identical methods were used on samples reported by Isaacs and others (1989a, b; 1990) and Isaacs and Tomson (1990). For this analysis, 0.8 g of samples (ground to <100 mesh) was weighed into a tared platinum-gold (95:5) crucible and ignited for 45 minutes at 920°C, after which it was reweighed to determine loss on ignition (LOI). An 8 g charge of lithium tetraborate was then added to the crucible, physically mixed with the sample, and

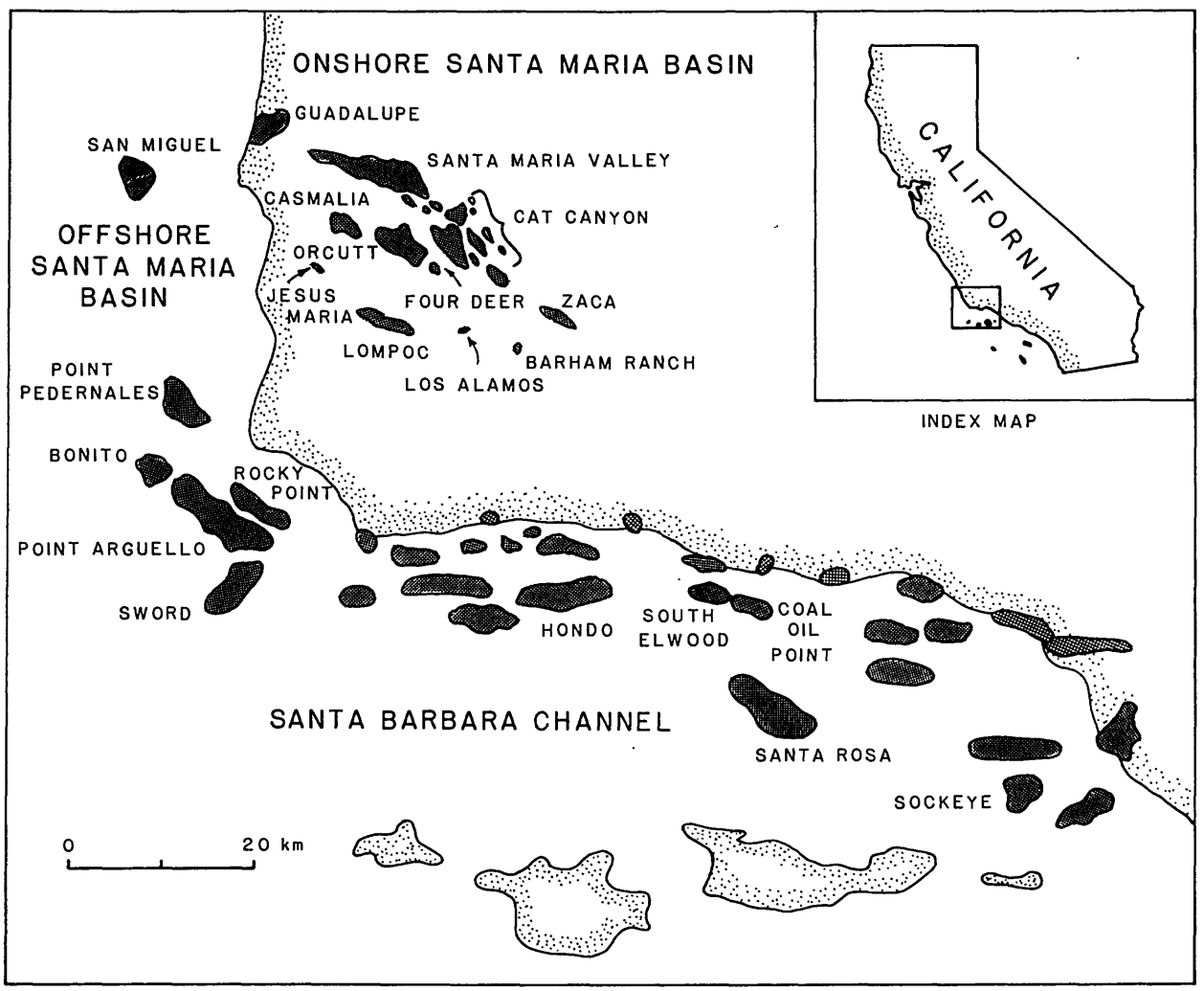


Fig. 1. Location map showing position of the Point Arguello oil field and other oil and gas fields in the Santa Maria and Santa Barbara-Ventura areas, California. Labeled fields have significant production or potential from Monterey Formation fractured reservoirs. Adapted from California Division of Oil and Gas (1974) and Williams (1985).

then fused at 1130° C for 40 minutes (Taggart and Wahlberg, 1980a) after which it was cast in a platinum-gold mold (Taggart and Wahlberg, 1980b) and allowed to cool. The disc was then presented to a Phillips PW1606 simultaneous X-ray spectrometer using an on-line 386 Personal Computer with Philips X46 software.

Determination of Sedimentary Components

The major sedimentary components in the Monterey Formation are termed silica (representing both biogenic and diagenetic silica, including opal-A, opal-CT, and diagenetic quartz), detritus (detrital quartz and aluminosilicate minerals, mainly consisting of mixed layer illite-smectite clay along with minor feldspar), carbonate minerals (calcite and dolomite), apatite, and organic matter. Abundances of silica and detritus were estimated from elemental abundances of $SiO_2$ and $Al_2O_3$ by constants developed for the Monterey Formation in adjacent onshore areas (Table 1). Resulting values are for the most part reliable for Monterey strata but probably underestimate the amount of aluminosilicate material where mica or chlorite is abundant because of their relatively low $Al_2O_3$ abundance. Values also may underestimate detrital quartz (and thus overestimate biogenous and diagenetic silica) in highly terrigenous samples. Abundances of silica and detritus for non-Monterey strata should therefore be regarded as approximations.

Abundances of calcite, dolomite, and apatite were estimated from abundances of CaO, MgO, and $P_2O_5$ after adjustment of these values for average abundances in the aluminosilicate fraction (Table 1). Because abundance values were not confirmed by X-ray diffraction analysis, they are preliminary estimates only.

This method of component determination probably underestimates dolomite relative to calcite inasmuch as dolomite in the Monterey Formation tends to have CaO in excess of the ideal values used here and may also have significant Fe (Murata and others, 1972). Moreover, a previous report noted that bulk X-ray diffraction analysis showed no detectable calcite in a number of dolomite-bearing samples estimated by these conversion parameters (Table 1) as having minor (5-10%) calcite (Isaacs and others, 1989b). However, Isaacs and others (1989a) compared the abundances of carbonate carbon represented by dolomite + calcite as estimated above (0.13 x dolomite + 0.12 x calcite) with the analytical determination of carbonate carbon. In that study, the average difference between each pair of calculated and measured values was 0.13 wt% carbonate carbon (about 1 wt% carbonate minerals), and the maximum difference was 0.30 wt% carbonate carbon (about 2.5 wt% carbonate minerals). These comparisons show that the total abundance of carbonate minerals is reliably estimated from major oxide analyses by the methods used here.

Another inaccuracy in the determination of sedimentary components is reflected by the presence of some negative numbers for calcite, dolomite, and apatite. Although clearly incorrect, these negative values are highly reproducible, as noted by Isaacs and others (1989a, 1989b) and thus seem likely to reflect errors in the conversion parameters (Table 1). The inaccuracy is probably due to partitioning slightly too much CaO, MgO and $P_2O_5$ into the aluminosilicate fraction.

Because samples were not analyzed for organic carbon in the 315-1 well, abundances of major sedimentary components (silica, terrigenous detritus, calcite, dolomite, and apatite) were all normalized to sum to 100% on an organic-matter-free basis.

### Reproducibility of Analyses of Cuttings

Previous studies (Isaacs and others, 1989a, 1989b) showed that the reproducibility of analytical results is excellent. The relative standard deviation is generally less than 2% of major oxide values (av 1.1%) for blind duplicate powder splits analyzed by the techniques used here. Reproducibility of the abundance of sedimentary components based on major oxide analyses is also excellent, with average standard deviations of 0.5 wt% detritus, 0.4 wt% silica, 0.1 wt% dolomite, 0.2 wt% calcite, and 0.01 wt% apatite.

Because some cuttings samples included individual pieces that were large (2-5 g) relative to sample size (10-15 g), some bias and (or) variability may have been introduced into analytical results by splitting. A previous report studied the additional variability introduced by the inhomogeneous character of cuttings, and showed that this variability results in larger average relative standard deviations - in the range 1-2.6% (av 2.0%) - of major oxides analyzed among blind duplicate splits of the same cuttings materials (Isaacs and others, 1989a). In that study, average standard deviations of sedimentary components in blind duplicate bulk (unpowdered) cuttings were 0.7 wt% detritus, 0.7 wt% silica, 0.5 wt% dolomite, 0.1 wt% calcite, and 0.01 wt% apatite. This reproducibility demonstrates that variation due to analytical methods is negligible for practical purposes.

## RESULTS

The abundances of major oxides in cuttings samples from the 315-1 well are presented in Table 2, and the abundances of major sedimentary components and values of other derived parameters in Table 3. In Table 3, derived parameters include the abundance of silica normalized to the sum of silica plus detritus (an indicator of potential fracturability), and the abundance of silica normalized to the sum of silica plus carbonate minerals (an indicator of the character of biogenic input). Figure 2 shows the abundances of oxides that are present mainly in the detritus fraction ($Fe_2O_3$, $Na_2O$, $K_2O$, and $TiO_2$) graphed against $Al_2O_3$, and Figure 3 shows the ratios of these oxides to $Al_2O_3$ graphed against depth. The abundances of major sedimentary components and values of other derived parameters are graphed against depth for the whole well in Figure 4, for the upper part of the well down to 7605 ft in Figures 5A and 6A, and for the lower part of the well up to 6195 ft in Figures 5B and 6B. In these tables and figures, the depth is given as the mid-point of the interval analyzed; for example, the sample listed at 2655 ft represents the interval 2640-2670 feet.

Table 1. Formulas used to convert elemental abundances to approximate mineral abundances. Formulas for detritus and silica contents and average abundance of major elements in detritus are derived from the evaluation in Isaacs (1980, appendix B) for the Monterey Formation in the western Santa Barbara coastal area. CaO and P2O5 abundances in apatite are based on published references (see Isaacs, 1980, p. 228), and calculations for calcite and dolomite are based on their molecular formulas. See text for comments on the calcite–dolomite partition.

| Quantity | Explanation | Formula |
|---|---|---|
| Detritus | Equals aluminosilicates + detrital quartz | Al2O3 x 5.6 |
| Aluminosilicates | Based on Al2O3 content | Al2O3 x 4.2 |
| Detrital quartz | Based on a proportion of aluminosiicates | Aluminosilicates ÷ 3 |
| Silica (biogenic and diagenetic) | Based on Si02 content adjusted for amounts in detritus | SiO2 – (3.5 x Al2O3) |
| Apatite | Based on P2O5 content adjusted for 0.7% P2O5 in aluminosilicates and assuming 42.4% P2O5 in apatite | {P2O5 – (0.032 x Al2O3)} ÷ 0.424 |
| Dolomite | Based on MgO content adjusted for 2.6% MgO in aluminosilicates and assuming 21.9% MgO in dolomite | {MgO – (0.11 x Al2O3)} ÷ 0.219 |
| Calcite | Based on CaO content adjusted for 1.9% Cao in aluminosilicates, 55.5% CaO in apatite, and 30.4% in dolomite, and assuming 56.0% CaO in calcite | {CaO – [(0.08 x Al2O3) – (0.555 x apatite) – (0.304 x dolomite)]} ÷ 0.56 |

Table 2. Elemental abundances in bulk cuttings from the OCS P-0315-1 well (in weight %). Each sample represents a 30 foot interval; the given depth (in ft) is the mid-point of the interval. "LOI" is loss on ignition at 925°C. Total Fe is reported as $Fe_2O_3$. Analysts: J. Taggart and A. Bartel (oxides and LOI)

| Depth | $SiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | MgO | CaO | $Na_2O$ | $K_2O$ | $TiO_2$ | $P_2O_5$ | MnO | LOI |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1405 | 17.3 | 2.90 | 2.07 | 3.07 | 41.5 | < 0.15 | 0.07 | 0.15 | 0.06 | 0.05 | 29.6 |
| 1435 | 23.5 | 3.18 | 2.53 | 2.87 | 36.0 | 0.27 | 0.36 | 0.15 | 0.09 | 0.05 | 27.0 |
| 1465 | 51.2 | 10.9 | 4.28 | 2.51 | 11.1 | 2.06 | 2.10 | 0.53 | 0.24 | 0.04 | 11.9 |
| 1495 | 39.4 | 8.15 | 3.75 | 2.77 | 21.4 | 1.40 | 1.41 | 0.40 | 0.17 | 0.05 | 17.2 |
| 1525 | 39.8 | 7.97 | 4.08 | 2.59 | 21.0 | 1.36 | 1.49 | 0.38 | 0.17 | 0.04 | 16.5 |
| 1555 | 28.5 | 5.30 | 2.98 | 3.18 | 30.9 | 0.71 | 0.69 | 0.25 | 0.11 | 0.05 | 23.5 |
| 1585 | 34.3 | 6.55 | 3.21 | 3.03 | 26.5 | 0.99 | 1.00 | 0.32 | 0.13 | 0.05 | 20.8 |
| 1615 | 39.9 | 7.93 | 3.89 | 2.72 | 20.2 | 1.44 | 1.40 | 0.38 | 0.17 | 0.05 | 18.4 |
| 1645 | 32.7 | 5.75 | 2.92 | 2.88 | 28.4 | 0.88 | 0.81 | 0.28 | 0.14 | 0.05 | 21.8 |
| 1675 | 24.9 | 4.56 | 2.51 | 3.18 | 35.4 | 0.52 | 0.47 | 0.23 | 0.09 | 0.05 | 25.0 |
| 1705 | 32.0 | 5.81 | 2.95 | 2.81 | 28.8 | 0.85 | 0.88 | 0.27 | 0.12 | 0.05 | 22.1 |
| 1735 | 37.9 | 7.01 | 3.37 | 2.71 | 22.4 | 1.22 | 1.23 | 0.33 | 0.15 | 0.05 | 18.5 |
| 1765 | 43.5 | 8.68 | 4.03 | 2.46 | 17.6 | 1.70 | 1.65 | 0.42 | 0.19 | 0.04 | 15.5 |
| 1795 | 40.0 | 7.98 | 3.48 | 2.57 | 20.9 | 1.53 | 1.47 | 0.38 | 0.18 | 0.04 | 18.3 |
| 1825 | 44.4 | 9.06 | 3.74 | 3.55 | 15.5 | 1.88 | 1.79 | 0.43 | 0.22 | 0.04 | 16.3 |
| 1855 | 44.0 | 9.29 | 4.36 | 3.52 | 14.8 | 1.89 | 1.84 | 0.46 | 0.21 | 0.04 | 15.3 |
| 1885 | 39.6 | 7.68 | 2.96 | 3.53 | 21.2 | 1.53 | 1.46 | 0.35 | 0.19 | 0.04 | 18.2 |
| 1915 | 36.4 | 6.65 | 3.05 | 3.60 | 23.1 | 1.31 | 1.28 | 0.29 | 0.17 | 0.04 | 19.8 |
| 1945 | 37.7 | 7.34 | 3.15 | 3.76 | 21.8 | 1.47 | 1.42 | 0.32 | 0.17 | 0.04 | 19.0 |
| 1975 | 42.3 | 7.90 | 3.12 | 3.82 | 18.9 | 1.64 | 1.57 | 0.35 | 0.19 | 0.04 | 17.7 |
| 2005 | 26.4 | 4.72 | 2.51 | 4.23 | 29.7 | 0.86 | 0.84 | 0.21 | 0.15 | 0.05 | 26.5 |
| 2035 | 36.7 | 6.67 | 3.18 | 4.39 | 21.2 | 1.28 | 1.33 | 0.29 | 0.19 | 0.04 | 20.5 |
| 2065 | 29.7 | 5.08 | 2.28 | 5.27 | 27.1 | 0.83 | 0.90 | 0.20 | 0.14 | 0.04 | 24.3 |
| 2095 | 32.0 | 4.85 | 2.29 | 6.23 | 24.8 | 0.88 | 0.92 | 0.19 | 0.16 | 0.04 | 24.1 |
| 2125 | 36.8 | 5.99 | 2.49 | 5.37 | 20.9 | 1.19 | 1.20 | 0.23 | 0.18 | 0.04 | 21.7 |
| 2155 | 38.9 | 6.11 | 1.79 | 6.42 | 19.5 | 1.31 | 1.48 | 0.17 | 0.16 | 0.03 | 21.0 |
| 2185 | 44.2 | 6.87 | 1.68 | 6.95 | 13.5 | 1.64 | 1.88 | 0.17 | 0.19 | 0.02 | 19.5 |
| 2215 | 43.8 | 6.71 | 1.44 | 7.73 | 13.9 | 1.61 | 1.85 | 0.15 | 0.18 | 0.02 | 20.2 |
| 2245 | 58.2 | 8.49 | 1.38 | 2.77 | 6.76 | 2.02 | 2.49 | 0.18 | 0.17 | 0.02 | 14.1 |
| 2275 | 59.6 | 8.90 | 1.82 | 1.97 | 5.33 | 1.93 | 2.49 | 0.23 | 0.17 | 0.02 | 14.3 |
| 2305 | - | - | - | - | - | - | - | - | - | - | - |
| 2335 | 56.5 | 10.3 | 3.40 | 1.92 | 6.85 | 2.05 | 2.19 | 0.44 | 0.34 | 0.03 | 12.8 |
| 2365 | 26.0 | 3.80 | 2.14 | 2.33 | 31.7 | 0.40 | 0.39 | 0.18 | 0.09 | 0.05 | 29.8 |
| 2385 | 31.3 | 4.89 | 2.39 | 2.18 | 25.8 | 0.76 | 0.76 | 0.22 | 0.17 | 0.04 | 27.4 |
| 2415 | 27.9 | 4.74 | 2.40 | 3.01 | 25.4 | 0.74 | 0.75 | 0.22 | 0.17 | 0.04 | 30.8 |
| 2445 | 24.7 | 4.22 | 2.36 | 6.15 | 24.3 | 0.74 | 0.71 | 0.18 | 0.16 | 0.05 | 33.5 |
| 2475 | 23.5 | 4.05 | 2.26 | 5.04 | 27.2 | 0.65 | 0.60 | 0.18 | 0.16 | 0.04 | 33.0 |
| 2505 | 25.7 | 5.04 | 3.02 | 8.67 | 18.9 | 1.02 | 1.02 | 0.21 | 0.22 | 0.05 | 33.1 |
| 2535 | 28.7 | 5.78 | 3.16 | 9.31 | 18.2 | 1.13 | 1.15 | 0.25 | 0.25 | 0.05 | 29.5 |
| 2565 | 25.8 | 4.70 | 2.52 | 6.42 | 24.0 | 0.79 | 0.79 | 0.21 | 0.18 | 0.05 | 31.2 |
| 2595 | 36.1 | 7.34 | 3.41 | 4.24 | 17.8 | 1.33 | 1.32 | 0.35 | 0.30 | 0.04 | 23.5 |
| 2625 | 19.8 | 4.18 | 2.90 | 11.2 | 22.4 | 0.83 | 0.71 | 0.20 | 0.28 | 0.05 | 34.7 |
| 2655 | 24.1 | 4.79 | 2.91 | 10.2 | 21.1 | 0.95 | 0.88 | 0.22 | 0.25 | 0.05 | 32.1 |

Table 2. continued

| Depth | $SiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | MgO | CaO | $Na_2O$ | $K_2O$ | $TiO_2$ | $P_2O_5$ | MnO | LOI |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2685 | 27.8 | 5.54 | 2.88 | 6.92 | 20.6 | 1.06 | 0.98 | 0.27 | 0.25 | 0.05 | 29.8 |
| 2715 | 23.6 | 3.90 | 2.88 | 9.70 | 24.0 | 0.74 | 0.65 | 0.19 | 0.23 | 0.05 | 31.4 |
| 2745 | 30.2 | 6.26 | 3.30 | 8.84 | 17.8 | 1.17 | 1.15 | 0.30 | 0.29 | 0.05 | 27.7 |
| 2775 | 37.9 | 8.04 | 3.87 | 5.97 | 14.3 | 1.51 | 1.51 | 0.38 | 0.34 | 0.05 | 22.5 |
| 2805 | 42.9 | 8.89 | 3.52 | 4.19 | 12.7 | 1.65 | 1.71 | 0.42 | 0.36 | 0.03 | 20.2 |
| 2835 | 29.2 | 6.20 | 3.43 | 9.26 | 17.5 | 1.19 | 1.14 | 0.30 | 0.31 | 0.05 | 28.5 |
| 2865 | 33.8 | 7.24 | 3.34 | 8.01 | 15.2 | 1.34 | 1.33 | 0.34 | 0.34 | 0.05 | 25.8 |
| 2895 | 38.2 | 8.20 | 3.62 | 6.31 | 12.9 | 1.52 | 1.50 | 0.41 | 0.37 | 0.04 | 23.5 |
| 2925 | 37.0 | 7.83 | 3.48 | 5.52 | 13.0 | 1.51 | 1.43 | 0.39 | 0.35 | 0.04 | 24.8 |
| 2955 | 20.1 | 4.66 | 2.89 | 13.0 | 20.4 | 0.88 | 0.80 | 0.23 | 0.26 | 0.05 | 34.2 |
| 2985 | 33.1 | 7.49 | 3.89 | 7.91 | 14.3 | 1.40 | 1.31 | 0.38 | 0.37 | 0.06 | 25.8 |
| 3015 | 30.3 | 6.84 | 3.60 | 8.76 | 16.4 | 1.20 | 1.18 | 0.34 | 0.33 | 0.05 | 27.2 |
| 3045 | 35.5 | 7.75 | 3.99 | 7.39 | 13.3 | 1.40 | 1.36 | 0.39 | 0.38 | 0.06 | 24.7 |
| 3075 | 42.4 | 9.11 | 4.21 | 5.14 | 10.1 | 1.63 | 1.60 | 0.46 | 0.50 | 0.05 | 20.5 |
| 3105 | 45.1 | 9.41 | 4.42 | 4.17 | 8.82 | 1.65 | 1.69 | 0.47 | 0.45 | 0.05 | 19.9 |
| 3135 | 21.1 | 4.28 | 3.29 | 12.6 | 19.2 | 0.81 | 0.73 | 0.22 | 0.26 | 0.08 | 34.4 |
| 3165 | 27.8 | 5.76 | 3.64 | 10.2 | 16.7 | 1.05 | 1.02 | 0.29 | 0.31 | 0.07 | 30.0 |
| 3195 | 24.9 | 5.00 | 2.84 | 11.1 | 18.7 | 0.93 | 0.85 | 0.25 | 0.30 | 0.05 | 31.8 |
| 3225 | 26.9 | 4.76 | 3.59 | 10.4 | 18.5 | 0.86 | 0.83 | 0.23 | 0.27 | 0.08 | 30.5 |
| 3255 | 29.9 | 6.17 | 3.72 | 9.68 | 15.9 | 1.09 | 1.09 | 0.31 | 0.31 | 0.07 | 28.3 |
| 3285 | 40.5 | 8.02 | 3.73 | 6.43 | 10.9 | 1.30 | 1.40 | 0.40 | 0.41 | 0.05 | 22.9 |
| 3315 | 37.0 | 7.65 | 3.95 | 6.22 | 13.5 | 1.24 | 1.31 | 0.39 | 0.36 | 0.06 | 24.2 |
| 3345 | 52.2 | 9.81 | 4.16 | 3.30 | 5.69 | 1.64 | 1.75 | 0.48 | 0.48 | 0.04 | 17.3 |
| 3375 | 55.4 | 11.1 | 4.75 | 2.10 | 2.96 | 1.79 | 1.96 | 0.56 | 0.48 | 0.04 | 16.9 |
| 3405 | 58.3 | 10.3 | 4.30 | 2.00 | 3.13 | 1.71 | 1.84 | 0.51 | 0.52 | 0.04 | 15.4 |
| 3435 | 54.7 | 8.50 | 3.63 | 3.67 | 5.66 | 1.47 | 1.52 | 0.42 | 0.47 | 0.04 | 16.2 |
| 3465 | 57.3 | 9.39 | 4.02 | 2.46 | 3.78 | 1.60 | 1.65 | 0.47 | 0.46 | 0.04 | 16.1 |
| 3495 | 62.4 | 8.87 | 3.70 | 1.45 | 2.50 | 1.50 | 1.59 | 0.45 | 0.43 | 0.03 | 15.3 |
| 3525 | 61.4 | 8.83 | 3.69 | 1.71 | 3.26 | 1.43 | 1.56 | 0.45 | 0.41 | 0.03 | 15.4 |
| 3555 | 55.6 | 7.30 | 3.36 | 3.74 | 6.42 | 1.21 | 1.30 | 0.37 | 0.38 | 0.04 | 16.2 |
| 3585 | 57.9 | 8.00 | 3.46 | 3.05 | 4.97 | 1.29 | 1.42 | 0.41 | 0.40 | 0.03 | 15.2 |
| 3615 | 61.4 | 9.27 | 3.78 | 2.05 | 2.93 | 1.59 | 1.66 | 0.47 | 0.72 | 0.03 | 14.2 |
| 3645 | 59.7 | 8.35 | 3.64 | 2.72 | 4.10 | 1.48 | 1.52 | 0.42 | 0.60 | 0.03 | 14.4 |
| 3675 | 64.4 | 8.52 | 3.59 | 1.94 | 2.50 | 1.39 | 1.54 | 0.44 | 0.42 | 0.03 | 12.8 |
| 3705 | 65.3 | 8.70 | 3.76 | 1.59 | 1.97 | 1.46 | 1.58 | 0.45 | 0.42 | 0.03 | 12.8 |
| 3735 | 67.9 | 7.87 | 3.25 | 1.25 | 1.87 | 1.39 | 1.46 | 0.41 | 0.40 | 0.03 | 12.1 |
| 3765 | 67.5 | 7.98 | 3.29 | 1.30 | 2.00 | 1.41 | 1.47 | 0.41 | 0.41 | 0.03 | 12.2 |
| 3795 | 63.6 | 8.82 | 3.66 | 1.97 | 2.92 | 1.43 | 1.57 | 0.45 | 0.40 | 0.03 | 13.2 |
| 3825 | 64.6 | 9.33 | 3.70 | 2.01 | 2.72 | 1.48 | 1.56 | 0.47 | 0.37 | 0.03 | 11.9 |
| 3855 | 62.9 | 10.9 | 4.77 | 2.21 | 2.27 | 1.53 | 1.65 | 0.54 | 0.28 | 0.04 | 11.4 |
| 3885 | 63.2 | 10.2 | 4.59 | 2.46 | 2.99 | 1.41 | 1.50 | 0.51 | 0.32 | 0.04 | 10.4 |
| 3915 | 65.5 | 10.3 | 4.48 | 2.01 | 2.06 | 1.34 | 1.53 | 0.51 | 0.28 | 0.04 | 10.4 |
| 3945 | 62.9 | 11.2 | 5.11 | 2.38 | 1.99 | 1.42 | 1.67 | 0.56 | 0.24 | 0.04 | 10.7 |
| 3975 | 62.6 | 11.4 | 5.03 | 2.30 | 1.90 | 1.43 | 1.72 | 0.56 | 0.24 | 0.04 | 11.1 |
| 4005 | 61.8 | 12.4 | 5.17 | 2.31 | 2.17 | 1.54 | 1.75 | 0.60 | 0.27 | 0.04 | 11.1 |
| 4035 | 63.3 | 11.7 | 4.98 | 2.13 | 1.81 | 1.53 | 1.70 | 0.58 | 0.28 | 0.04 | 10.6 |
| 4065 | 62.3 | 12.0 | 5.22 | 2.39 | 1.83 | 1.43 | 1.75 | 0.58 | 0.24 | 0.04 | 10.9 |

Table 2. continued

| Depth | $SiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | MgO | CaO | $Na_2O$ | $K_2O$ | $TiO_2$ | $P_2O_5$ | MnO | LOI |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4095 | 61.1 | 12.6 | 5.49 | 2.44 | 1.49 | 1.51 | 1.89 | 0.62 | 0.25 | 0.04 | 11.2 |
| 4125 | 62.2 | 12.3 | 5.40 | 2.33 | 1.45 | 1.50 | 1.86 | 0.62 | 0.24 | 0.04 | 11.0 |
| 4155 | 63.1 | 12.1 | 5.27 | 2.10 | 1.25 | 1.44 | 1.86 | 0.60 | 0.25 | 0.04 | 11.4 |
| 4185 | 63.8 | 11.2 | 4.68 | 1.99 | 2.18 | 1.47 | 1.66 | 0.54 | 0.32 | 0.03 | 10.8 |
| 4215 | 63.2 | 11.7 | 5.00 | 2.17 | 1.79 | 1.46 | 1.76 | 0.58 | 0.32 | 0.04 | 10.9 |
| 4245 | 61.5 | 12.3 | 5.45 | 2.60 | 1.68 | 1.46 | 1.86 | 0.61 | 0.29 | 0.04 | 11.4 |
| 4275 | 63.9 | 11.1 | 5.04 | 2.25 | 1.80 | 1.31 | 1.68 | 0.55 | 0.26 | 0.04 | 10.8 |
| 4305 | 63.3 | 11.3 | 5.13 | 2.37 | 1.76 | 1.32 | 1.71 | 0.55 | 0.26 | 0.04 | 10.9 |
| 4335 | 64.0 | 11.1 | 4.91 | 2.13 | 1.81 | 1.41 | 1.69 | 0.55 | 0.31 | 0.04 | 10.9 |
| 4365 | 64.0 | 11.0 | 4.89 | 2.36 | 1.84 | 1.34 | 1.67 | 0.55 | 0.31 | 0.04 | 10.7 |
| 4395 | 63.8 | 11.6 | 5.03 | 2.27 | 1.45 | 1.45 | 1.74 | 0.57 | 0.28 | 0.03 | 10.7 |
| 4425 | 64.0 | 11.0 | 5.01 | 2.46 | 1.74 | 1.33 | 1.62 | 0.54 | 0.28 | 0.04 | 10.5 |
| 4455 | 62.4 | 11.2 | 5.07 | 2.54 | 1.75 | 1.36 | 1.68 | 0.55 | 0.29 | 0.04 | 11.8 |
| 4485 | 61.8 | 11.1 | 4.73 | 2.26 | 2.32 | 1.48 | 1.78 | 0.55 | 0.41 | 0.04 | 11.9 |
| 4515 | 62.1 | 11.0 | 4.76 | 2.15 | 2.41 | 1.40 | 1.71 | 0.55 | 0.31 | 0.04 | 11.0 |
| 4545 | 64.4 | 10.1 | 4.36 | 2.14 | 2.58 | 1.34 | 1.56 | 0.50 | 0.29 | 0.03 | 10.5 |
| 4575 | 66.2 | 10.2 | 4.48 | 1.73 | 1.82 | 1.36 | 1.62 | 0.51 | 0.36 | 0.03 | 10.6 |
| 4605 | 65.6 | 9.62 | 4.15 | 2.07 | 2.50 | 1.32 | 1.52 | 0.48 | 0.34 | 0.03 | 10.7 |
| 4635 | 64.6 | 9.28 | 4.13 | 2.39 | 3.25 | 1.24 | 1.45 | 0.46 | 0.33 | 0.03 | 10.5 |
| 4665 | 68.0 | 9.23 | 4.05 | 1.70 | 2.08 | 1.21 | 1.45 | 0.47 | 0.30 | 0.03 | 9.88 |
| 4695 | 65.4 | 8.89 | 4.06 | 2.06 | 3.24 | 1.17 | 1.39 | 0.45 | 0.31 | 0.03 | 10.6 |
| 4725 | 67.3 | 9.55 | 4.26 | 1.66 | 2.18 | 1.31 | 1.49 | 0.48 | 0.33 | 0.03 | 10.2 |
| 4755 | 66.2 | 10.3 | 4.44 | 1.65 | 1.82 | 1.40 | 1.58 | 0.52 | 0.33 | 0.03 | 10.7 |
| 4785 | 65.9 | 9.92 | 4.28 | 1.75 | 2.47 | 1.44 | 1.54 | 0.50 | 0.33 | 0.03 | 10.6 |
| 4815 | 65.0 | 9.61 | 4.26 | 1.92 | 2.57 | 1.35 | 1.52 | 0.48 | 0.34 | 0.03 | 11.2 |
| 4845 | 65.1 | 9.73 | 4.34 | 1.85 | 2.41 | 1.32 | 1.54 | 0.49 | 0.34 | 0.03 | 11.3 |
| 4875 | 66.4 | 9.62 | 4.37 | 1.89 | 2.21 | 1.25 | 1.51 | 0.49 | 0.31 | 0.03 | 11.1 |
| 4905 | 66.9 | 9.38 | 4.21 | 1.68 | 2.34 | 1.23 | 1.47 | 0.47 | 0.30 | 0.03 | 11.0 |
| 4935 | 68.3 | 8.80 | 3.93 | 1.59 | 2.47 | 1.20 | 1.38 | 0.45 | 0.29 | 0.03 | 10.7 |
| 4965 | 68.6 | 8.39 | 3.78 | 1.76 | 2.72 | 1.03 | 1.30 | 0.43 | 0.26 | 0.03 | 10.7 |
| 4995 | 67.3 | 8.96 | 4.12 | 1.86 | 2.70 | 1.09 | 1.36 | 0.44 | 0.26 | 0.03 | 10.8 |
| 5025 | 65.9 | 9.57 | 4.48 | 2.17 | 2.41 | 1.05 | 1.44 | 0.47 | 0.27 | 0.03 | 11.1 |
| 5055 | 65.1 | 9.08 | 4.32 | 2.47 | 2.96 | 1.07 | 1.38 | 0.45 | 0.31 | 0.03 | 11.0 |
| 5085 | 67.1 | 8.57 | 3.92 | 1.94 | 3.05 | 1.08 | 1.34 | 0.43 | 0.33 | 0.03 | 10.9 |
| 5115 | 67.4 | 8.84 | 4.02 | 1.85 | 2.75 | 1.12 | 1.37 | 0.45 | 0.32 | 0.03 | 10.7 |
| 5145 | 66.6 | 8.93 | 4.17 | 2.04 | 2.97 | 1.16 | 1.40 | 0.46 | 0.32 | 0.03 | 10.9 |
| 5175 | 66.4 | 9.39 | 4.26 | 2.14 | 2.45 | 1.20 | 1.46 | 0.47 | 0.32 | 0.03 | 11.0 |
| 5205 | 66.2 | 9.52 | 4.33 | 2.12 | 2.46 | 1.25 | 1.47 | 0.49 | 0.31 | 0.03 | 11.0 |
| 5235 | 65.0 | 10.3 | 4.49 | 1.87 | 2.50 | 1.31 | 1.58 | 0.51 | 0.31 | 0.03 | 10.9 |
| 5265 | 66.4 | 10.2 | 4.42 | 1.76 | 2.37 | 1.26 | 1.56 | 0.50 | 0.30 | 0.03 | 10.8 |
| 5295 | 66.4 | 9.60 | 4.30 | 2.05 | 2.57 | 1.10 | 1.46 | 0.48 | 0.29 | 0.03 | 10.5 |
| 5325 | 66.7 | 9.55 | 4.39 | 2.10 | 2.49 | 1.22 | 1.47 | 0.49 | 0.29 | 0.03 | 9.82 |
| 5355 | 66.6 | 9.42 | 4.34 | 2.09 | 2.62 | 1.23 | 1.43 | 0.48 | 0.27 | 0.03 | 10.0 |
| 5385 | 65.7 | 9.24 | 4.31 | 2.47 | 2.90 | 1.17 | 1.41 | 0.46 | 0.26 | 0.03 | 10.3 |
| 5415 | 66.0 | 9.10 | 4.39 | 2.42 | 2.86 | 1.16 | 1.40 | 0.46 | 0.28 | 0.04 | 10.0 |
| 5443 | 67.6 | 8.74 | 4.31 | 2.24 | 2.64 | 1.11 | 1.34 | 0.44 | 0.27 | 0.04 | 9.49 |
| 5473 | 52.8 | 7.03 | 3.67 | 4.58 | 9.57 | 0.92 | 1.00 | 0.33 | 0.22 | 0.04 | 15.5 |

Table 2. continued

| Depth | $SiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | MgO | CaO | $Na_2O$ | $K_2O$ | $TiO_2$ | $P_2O_5$ | MnO | LOI |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5505 | 60.4 | 8.09 | 3.86 | 3.14 | 6.32 | 1.04 | 1.21 | 0.40 | 0.24 | 0.04 | 11.9 |
| 5535 | 58.7 | 8.23 | 4.08 | 3.71 | 6.66 | 0.95 | 1.19 | 0.40 | 0.24 | 0.04 | 12.5 |
| 5565 | 58.8 | 8.72 | 4.39 | 3.62 | 5.78 | 1.12 | 1.33 | 0.43 | 0.26 | 0.04 | 12.1 |
| 5595 | 62.6 | 9.76 | 4.38 | 2.57 | 4.24 | 1.29 | 1.42 | 0.47 | 0.27 | 0.04 | 10.2 |
| 5625 | H | H | H | H | H | H | H | H | H | H | H |
| 5655 | H | H | H | H | H | H | H | H | H | H | H |
| 5685 | 65.4 | 8.90 | 3.99 | 2.55 | 3.69 | 1.24 | 1.30 | 0.43 | 0.26 | 0.04 | 9.63 |
| 5715 | 66.7 | 8.53 | 3.68 | 2.56 | 3.60 | 1.25 | 1.30 | 0.42 | 0.35 | 0.03 | 9.12 |
| 5745 | 73.7 | 7.84 | 3.32 | 1.42 | 1.99 | 1.13 | 1.18 | 0.39 | 0.26 | 0.03 | 7.74 |
| 5775 | 73.5 | 7.31 | 3.10 | 1.53 | 2.33 | 0.99 | 1.12 | 0.36 | 0.29 | 0.02 | 7.86 |
| 5805 | 71.9 | 7.46 | 3.26 | 1.76 | 3.01 | 1.01 | 1.13 | 0.37 | 0.29 | 0.03 | 7.94 |
| 5835 | 71.7 | 7.89 | 3.41 | 1.48 | 2.93 | 1.13 | 1.20 | 0.39 | 0.34 | 0.03 | 8.27 |
| 5865 | 69.2 | 8.27 | 3.59 | 1.95 | 2.85 | 1.26 | 1.24 | 0.41 | 0.24 | 0.03 | 8.83 |
| 5895 | 70.8 | 8.71 | 3.61 | 1.73 | 2.18 | 1.21 | 1.30 | 0.43 | 0.37 | 0.03 | 8.34 |
| 5925 | 69.2 | 7.22 | 3.19 | 2.67 | 3.71 | 1.06 | 1.07 | 0.36 | 0.28 | 0.03 | 8.83 |
| 5955 | 69.2 | 6.02 | 2.75 | 3.23 | 4.39 | 0.86 | 0.90 | 0.29 | 0.19 | 0.03 | 9.62 |
| 5985 | 76.0 | 7.52 | 3.03 | 1.45 | 1.22 | 1.01 | 1.10 | 0.37 | 0.20 | 0.02 | 6.98 |
| 6015 | 76.4 | 7.23 | 2.87 | 1.54 | 1.30 | 1.00 | 1.08 | 0.36 | 0.20 | 0.02 | 7.03 |
| 6045 | 69.4 | 6.30 | 2.89 | 3.27 | 4.20 | 0.82 | 0.94 | 0.31 | 0.18 | 0.03 | 9.53 |
| 6075 | 75.0 | 7.03 | 2.83 | 1.73 | 2.00 | 1.02 | 1.06 | 0.34 | 0.22 | 0.02 | 7.02 |
| 6105 | 71.4 | 8.29 | 3.44 | 1.85 | 2.48 | 1.21 | 1.27 | 0.39 | 0.29 | 0.03 | 7.87 |
| 6135 | 72.2 | 8.21 | 3.51 | 1.77 | 1.99 | 1.15 | 1.27 | 0.40 | 0.30 | 0.03 | 7.68 |
| 6165 | 69.0 | 8.43 | 3.73 | 2.03 | 3.19 | 1.13 | 1.29 | 0.41 | 0.31 | 0.03 | 8.63 |
| 6195 | 70.9 | 8.31 | 3.61 | 1.60 | 2.81 | 1.08 | 1.24 | 0.40 | 0.30 | 0.03 | 8.41 |
| 6225 | 68.4 | 8.50 | 3.63 | 1.97 | 3.28 | 1.19 | 1.27 | 0.41 | 0.28 | 0.03 | 8.89 |
| 6255 | 67.6 | 8.63 | 3.89 | 2.26 | 3.50 | 1.11 | 1.26 | 0.43 | 0.24 | 0.03 | 8.84 |
| 6285 | 68.2 | 8.50 | 3.76 | 2.07 | 3.45 | 1.20 | 1.32 | 0.42 | 0.29 | 0.03 | 8.78 |
| 6315 | 68.3 | 8.51 | 3.75 | 2.04 | 3.48 | 1.25 | 1.28 | 0.42 | 0.29 | 0.03 | 8.61 |
| 6345 | 71.2 | 8.64 | 3.77 | 1.81 | 2.07 | 1.35 | 1.32 | 0.43 | 0.31 | 0.03 | 7.48 |
| 6375 | 71.0 | 8.58 | 3.78 | 1.86 | 2.22 | 1.32 | 1.31 | 0.42 | 0.31 | 0.03 | 7.52 |
| 6405 | 60.8 | 9.76 | 4.53 | 3.42 | 4.15 | 1.36 | 1.54 | 0.47 | 0.32 | 0.04 | 10.9 |
| 6435 | 71.1 | 8.45 | 3.62 | 1.80 | 2.28 | 1.23 | 1.31 | 0.42 | 0.30 | 0.03 | 7.47 |
| 6465 | 68.0 | 8.17 | 3.69 | 2.55 | 3.64 | 1.07 | 1.26 | 0.40 | 0.28 | 0.03 | 8.73 |
| 6495 | 67.5 | 8.58 | 3.85 | 2.41 | 3.25 | 1.08 | 1.30 | 0.42 | 0.26 | 0.03 | 8.74 |
| 6525 | 68.7 | 8.16 | 3.74 | 2.40 | 3.27 | 1.03 | 1.21 | 0.40 | 0.26 | 0.03 | 8.18 |
| 6555 | 65.0 | 8.84 | 3.98 | 2.97 | 3.72 | 1.12 | 1.32 | 0.43 | 0.29 | 0.03 | 9.60 |
| 6585 | 55.2 | 6.15 | 3.38 | 5.97 | 8.78 | 0.86 | 0.86 | 0.30 | 0.24 | 0.04 | 15.3 |
| 6615 | 71.4 | 7.49 | 3.43 | 2.14 | 2.66 | 0.97 | 1.10 | 0.37 | 0.27 | 0.03 | 7.84 |
| 6645 | 74.5 | 7.24 | 3.33 | 1.55 | 1.80 | 0.92 | 1.08 | 0.36 | 0.24 | 0.03 | 7.16 |
| 6675 | 70.3 | 8.87 | 3.90 | 1.69 | 1.71 | 1.13 | 1.39 | 0.44 | 0.26 | 0.03 | 8.66 |
| 6705 | 71.7 | 7.24 | 3.21 | 2.08 | 2.99 | 0.93 | 1.06 | 0.36 | 0.23 | 0.03 | 7.94 |
| 6735 | 65.5 | 7.51 | 3.58 | 3.12 | 4.60 | 0.98 | 1.17 | 0.37 | 0.27 | 0.03 | 9.83 |
| 6765 | 66.1 | 7.64 | 3.70 | 2.62 | 3.89 | 1.05 | 1.20 | 0.37 | 0.29 | 0.03 | 10.1 |
| 6795 | 65.8 | 6.79 | 3.20 | 2.20 | 5.07 | 0.94 | 1.07 | 0.34 | 0.27 | 0.03 | 9.34 |
| 6825 | 65.9 | 8.37 | 3.76 | 2.17 | 3.26 | 1.19 | 1.39 | 0.41 | 0.36 | 0.03 | 10.6 |
| 6855 | 60.8 | 8.05 | 4.06 | 3.33 | 5.20 | 1.11 | 1.31 | 0.40 | 0.32 | 0.04 | 12.3 |
| 6885 | 66.3 | 8.51 | 4.15 | 2.01 | 2.96 | 1.20 | 1.43 | 0.43 | 0.30 | 0.04 | 10.8 |

Table 2. continued

| Depth | $SiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | MgO | CaO | $Na_2O$ | $K_2O$ | $TiO_2$ | $P_2O_5$ | MnO | LOI |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6915 | 66.1 | 8.44 | 4.13 | 1.99 | 2.93 | 1.20 | 1.43 | 0.41 | 0.30 | 0.04 | 11.1 |
| 6945 | 65.5 | 6.79 | 3.19 | 2.19 | 5.11 | 0.91 | 1.07 | 0.35 | 0.27 | 0.03 | 11.2 |
| 6975 | 68.8 | 7.04 | 3.14 | 1.65 | 3.22 | 1.08 | 1.26 | 0.36 | 0.36 | 0.02 | 10.9 |
| 7005 | 69.6 | 8.10 | 3.52 | 1.38 | 2.11 | 1.18 | 1.38 | 0.41 | 0.37 | 0.02 | 10.6 |
| 7035 | 66.1 | 7.31 | 3.12 | 1.85 | 4.13 | 1.14 | 1.31 | 0.37 | 0.42 | 0.03 | 11.8 |
| 7065 | 62.5 | 6.01 | 2.59 | 3.30 | 6.58 | 0.98 | 1.06 | 0.30 | 0.40 | 0.03 | 12.0 |
| 7095 | 63.4 | 5.56 | 2.44 | 3.93 | 6.36 | 0.88 | 0.96 | 0.28 | 0.35 | 0.02 | 11.7 |
| 7125 | 61.0 | 6.12 | 2.69 | 3.44 | 7.26 | 0.96 | 1.08 | 0.32 | 0.41 | 0.03 | 12.2 |
| 7155 | 62.1 | 6.39 | 2.82 | 2.75 | 7.10 | 0.99 | 1.15 | 0.33 | 0.44 | 0.02 | 12.0 |
| 7185 | 61.4 | 4.89 | 2.16 | 3.98 | 8.27 | 0.75 | 0.84 | 0.25 | 0.39 | 0.02 | 13.3 |
| 7205 | 61.9 | 4.49 | 2.04 | 3.34 | 9.32 | 0.72 | 0.78 | 0.23 | 0.43 | 0.02 | 13.0 |
| 7275 | 63.2 | 4.97 | 2.42 | 3.12 | 6.31 | 0.72 | 0.85 | 0.26 | 0.36 | 0.02 | 12.4 |
| 7305 | 67.7 | 4.44 | 2.08 | 3.15 | 5.62 | 0.65 | 0.77 | 0.23 | 0.37 | 0.02 | 11.0 |
| 7335 | 73.3 | 3.77 | 1.95 | 2.53 | 4.34 | 0.58 | 0.64 | 0.20 | 0.30 | 0.02 | 8.87 |
| 7365 | 79.3 | 2.38 | 1.37 | 2.30 | 3.82 | 0.36 | 0.39 | 0.12 | 0.19 | 0.01 | 7.27 |
| 7395 | 73.9 | 2.45 | 1.25 | 3.15 | 5.22 | 0.38 | 0.42 | 0.13 | 0.18 | 0.01 | 10.6 |
| 7425 | 77.3 | 2.32 | 1.10 | 2.71 | 4.36 | 0.34 | 0.37 | 0.13 | 0.23 | 0.01 | 9.03 |
| 7455 | 75.0 | 2.21 | 1.12 | 3.32 | 5.27 | 0.34 | 0.38 | 0.12 | 0.20 | 0.01 | 9.80 |
| 7485 | 73.4 | 2.64 | 1.23 | 3.30 | 5.39 | 0.40 | 0.43 | 0.14 | 0.29 | 0.01 | 10.2 |
| 7515 | 71.9 | 3.14 | 1.50 | 3.02 | 4.94 | 0.48 | 0.55 | 0.16 | 0.32 | 0.02 | 11.4 |
| 7545 | 70.6 | 2.50 | 1.12 | 3.85 | 6.34 | 0.34 | 0.42 | 0.13 | 0.28 | 0.01 | 12.5 |
| 7575 | 68.7 | 2.01 | 0.99 | 4.55 | 7.26 | 0.28 | 0.34 | 0.11 | 0.26 | 0.01 | 13.8 |
| 7605 | 72.2 | 1.72 | 0.83 | 4.19 | 6.51 | 0.23 | 0.29 | 0.1 | 0.21 | 0.01 | 11.9 |
| 7635 | 79.6 | 1.55 | 0.77 | 2.81 | 4.30 | 0.22 | 0.25 | 0.09 | 0.18 | < 0.01 | 8.42 |
| 7665 | 78.9 | 1.26 | 0.64 | 3.17 | 4.86 | 0.19 | 0.19 | 0.08 | 0.15 | < 0.01 | 9.10 |
| 7695 | 79.9 | 1.22 | 0.61 | 2.98 | 4.55 | 0.17 | 0.18 | 0.07 | 0.15 | < 0.01 | 8.52 |
| 7725 | 77.1 | 1.34 | 0.67 | 3.23 | 4.97 | 0.19 | 0.20 | 0.07 | 0.16 | < 0.01 | 10.3 |
| 7755 | 75.9 | 1.15 | 0.57 | 3.39 | 5.34 | 0.19 | 0.18 | 0.07 | 0.17 | < 0.01 | 11.5 |
| 7785 | 61.2 | 2.09 | 1.02 | 4.48 | 7.41 | 0.32 | 0.35 | 0.11 | 0.20 | 0.01 | 20.4 |
| 7815 | 65.8 | 2.11 | 0.86 | 4.29 | 7.46 | 0.25 | 0.28 | 0.1 | 0.25 | 0.01 | 16.3 |
| 7845 | 56.7 | 2.18 | 0.90 | 2.06 | 14.8 | 0.26 | 0.47 | 0.10 | 0.67 | 0.01 | 19.4 |
| 7875 | 62.0 | 1.30 | 0.64 | 4.04 | 10.5 | 0.18 | 0.22 | 0.07 | 0.29 | 0.01 | 18.9 |
| 7905 | 65.1 | 1.63 | 0.74 | 5.13 | 9.28 | 0.21 | 0.27 | 0.09 | 0.37 | 0.01 | 15.5 |
| 7935 | 60.8 | 1.76 | 0.82 | 5.79 | 10.7 | 0.22 | 0.29 | 0.1 | 0.60 | 0.01 | 16.7 |
| 7965 | 68.4 | 1.48 | 0.78 | 4.94 | 8.14 | 0.20 | 0.23 | 0.08 | 0.29 | 0.01 | 13.3 |
| 7995 | 77.0 | 1.71 | 0.92 | 2.86 | 5.22 | 0.20 | 0.26 | 0.09 | 0.24 | 0.01 | 9.20 |
| 8025 | 77.4 | 1.38 | 0.70 | 3.10 | 5.76 | 0.22 | 0.21 | 0.08 | 0.82 | < 0.01 | 8.74 |
| 8055 | 76.2 | 1.52 | 0.81 | 3.44 | 5.70 | 0.20 | 0.23 | 0.09 | 0.28 | 0.01 | 9.76 |
| 8085 | 71.5 | 1.53 | 0.83 | 4.22 | 7.14 | 0.20 | 0.23 | 0.09 | 0.41 | < 0.01 | 11.3 |
| 8115 | 73.6 | 1.83 | 0.98 | 3.56 | 6.21 | 0.23 | 0.26 | 0.11 | 0.58 | 0.01 | 10.0 |
| 8145 | 63.3 | 2.74 | 1.60 | 4.15 | 8.50 | 0.39 | 0.46 | 0.15 | 1.53 | 0.01 | 13.7 |
| 8175 | 78.2 | 1.75 | 1.01 | 2.66 | 4.55 | 0.25 | 0.27 | 0.1 | 0.37 | 0.01 | 8.41 |
| 8205 | 83.4 | 1.34 | 0.76 | 2.11 | 3.43 | 0.21 | 0.22 | 0.08 | 0.18 | < 0.01 | 6.22 |
| 8235 | 88.5 | 1.21 | 0.69 | 1.15 | 1.94 | 0.19 | 0.20 | 0.07 | 0.15 | < 0.01 | 4.00 |
| 8265 | 76.5 | 1.40 | 0.77 | 3.60 | 5.79 | 0.19 | 0.24 | 0.08 | 0.16 | 0.01 | 9.29 |
| 8295 | 78.9 | 1.59 | 0.93 | 2.72 | 4.74 | 0.21 | 0.26 | 0.09 | 0.28 | 0.01 | 7.75 |
| 8325 | 83.9 | 1.46 | 0.89 | 1.95 | 3.33 | 0.21 | 0.23 | 0.09 | 0.22 | 0.01 | 5.79 |

Table 2. continued

| Depth | $SiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | MgO | CaO | $Na_2O$ | $K_2O$ | $TiO_2$ | $P_2O_5$ | MnO | LOI |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8355 | 81.1 | 1.20 | 0.67 | 2.73 | 4.50 | 0.19 | 0.18 | 0.07 | 0.17 | < 0.01 | 7.41 |
| 8385 | 71.1 | 1.39 | 0.76 | 4.63 | 7.48 | 0.19 | 0.21 | 0.08 | 0.20 | 0.01 | 11.8 |
| 8415 | 71.7 | 1.26 | 0.70 | 4.63 | 7.43 | 0.18 | 0.20 | 0.07 | 0.20 | 0.01 | 11.6 |
| 8445 | 68.9 | 1.75 | 0.99 | 4.59 | 8.18 | 0.24 | 0.29 | 0.10 | 0.31 | 0.01 | 12.2 |
| 8475 | 67.1 | 2.02 | 1.07 | 4.58 | 8.60 | 0.28 | 0.34 | 0.12 | 0.45 | 0.01 | 12.9 |
| 8505 | 67.5 | 1.51 | 0.82 | 5.08 | 8.72 | 0.20 | 0.24 | 0.08 | 0.27 | 0.01 | 13.3 |
| 8535 | 67.7 | 1.32 | 0.73 | 5.24 | 8.86 | 0.17 | 0.21 | 0.07 | 0.20 | < 0.01 | 13.5 |
| 8565 | 65.3 | 2.37 | 1.22 | 4.87 | 8.86 | 0.29 | 0.39 | 0.13 | 0.44 | 0.01 | 13.6 |
| 8595 | 54.9 | 2.19 | 1.37 | 6.58 | 12.6 | 0.24 | 0.38 | 0.12 | 1.41 | 0.01 | 17.3 |
| 8625 | 53.7 | 2.00 | 1.23 | 6.88 | 12.5 | 0.25 | 0.35 | 0.11 | 0.97 | 0.01 | 19.5 |
| 8655 | 66.5 | 1.04 | 0.61 | 5.74 | 9.11 | 0.16 | 0.15 | 0.06 | 0.25 | < 0.01 | 14.7 |
| 8685 | 60.9 | 1.44 | 0.72 | 6.33 | 10.0 | 0.17 | 0.24 | 0.07 | 0.29 | 0.01 | 17.9 |
| 8715 | 54.8 | 1.17 | 0.52 | 8.10 | 12.8 | < 0.15 | 0.15 | 0.06 | 0.22 | < 0.01 | 20.4 |
| 8745 | 70.6 | 1.22 | 0.68 | 4.59 | 7.45 | 0.20 | 0.20 | 0.08 | 0.27 | < 0.01 | 12.5 |
| 8775 | 36.5 | 1.53 | 0.93 | 11.6 | 18.1 | 0.15 | 0.26 | 0.08 | 0.38 | 0.01 | 28.1 |
| 8805 | 40.6 | 1.42 | 0.81 | 10.8 | 17.1 | 0.17 | 0.24 | 0.08 | 0.35 | 0.01 | 26.2 |
| 8835 | 50.2 | 1.07 | 0.63 | 9.41 | 14.3 | < 0.15 | 0.17 | 0.06 | 0.26 | 0.01 | 21.8 |
| 8865 | 60.7 | 1.11 | 0.73 | 7.17 | 10.9 | < 0.15 | 0.18 | 0.07 | 0.23 | 0.01 | 16.8 |
| 8895 | 68.2 | 1.21 | 0.78 | 5.37 | 8.53 | 0.17 | 0.21 | 0.07 | 0.35 | < 0.01 | 13.1 |
| 8925 | 64.0 | 1.56 | 1.02 | 5.69 | 9.85 | 0.18 | 0.28 | 0.09 | 0.50 | 0.01 | 14.3 |
| 8955 | 62.1 | 1.13 | 0.75 | 6.55 | 10.7 | 0.16 | 0.19 | 0.07 | 0.38 | 0.01 | 15.8 |
| 8985 | 75.6 | 1.23 | 0.69 | 3.87 | 6.28 | 0.16 | 0.22 | 0.08 | 0.38 | < 0.01 | 9.54 |
| 9015 | 75.4 | 2.10 | 1.09 | 3.21 | 5.48 | 0.27 | 0.38 | 0.12 | 0.44 | 0.01 | 9.02 |
| 9045 | 68.3 | 2.48 | 1.25 | 4.37 | 7.59 | 0.27 | 0.44 | 0.14 | 0.58 | 0.01 | 11.8 |
| 9075 | 65.1 | 2.57 | 1.34 | 5.08 | 8.40 | 0.29 | 0.45 | 0.15 | 0.59 | 0.02 | 12.9 |
| 9105 | 79.1 | 1.87 | 0.91 | 2.73 | 4.45 | 0.25 | 0.32 | 0.11 | 0.38 | 0.01 | 7.56 |
| 9135 | 80.0 | 2.41 | 1.09 | 2.32 | 3.99 | 0.31 | 0.38 | 0.14 | 0.31 | 0.01 | 6.88 |
| 9165 | 82.1 | 1.42 | 0.69 | 2.32 | 3.85 | 0.22 | 0.22 | 0.08 | 0.20 | 0.01 | 7.03 |
| 9195 | 67.1 | 1.67 | 0.84 | 4.76 | 7.39 | 0.27 | 0.27 | 0.1 | 0.25 | 0.01 | 15.2 |
| 9225 | 77.8 | 2.48 | 1.24 | 2.60 | 4.08 | 0.36 | 0.42 | 0.14 | 0.31 | 0.01 | 7.85 |
| 9255 | 64.8 | 1.58 | 0.75 | 6.12 | 9.20 | 0.24 | 0.25 | 0.09 | 0.29 | 0.01 | 14.6 |
| 9285 | 59.7 | 1.83 | 0.85 | 7.11 | 10.7 | 0.27 | 0.28 | 0.10 | 0.32 | 0.01 | 16.6 |
| 9315 | 73.9 | 3.88 | 1.83 | 2.23 | 4.48 | 0.50 | 0.61 | 0.21 | 0.42 | 0.02 | 8.78 |
| 9345 | 57.7 | 2.80 | 1.33 | 6.70 | 10.3 | 0.38 | 0.44 | 0.15 | 0.45 | 0.02 | 16.5 |
| 9375 | 74.1 | 2.48 | 1.14 | 3.53 | 5.42 | 0.31 | 0.37 | 0.13 | 0.31 | 0.01 | 9.35 |
| 9405 | 71.9 | 2.35 | 1.21 | 4.02 | 6.17 | 0.33 | 0.38 | 0.13 | 0.30 | 0.01 | 10.4 |
| 9435 | 64.7 | 1.85 | 0.87 | 6.09 | 9.09 | 0.25 | 0.27 | 0.09 | 0.23 | 0.01 | 14.5 |
| 9465 | 72.1 | 2.37 | 1.06 | 4.12 | 6.21 | 0.29 | 0.34 | 0.12 | 0.26 | 0.01 | 10.7 |
| 9495 | 67.7 | 1.62 | 0.77 | 5.54 | 8.14 | 0.20 | 0.23 | 0.09 | 0.18 | 0.01 | 13.4 |
| 9525 | 67.9 | 1.88 | 0.90 | 5.34 | 7.91 | 0.25 | 0.28 | 0.10 | 0.19 | 0.01 | 13.0 |
| 9555 | 59.9 | 2.27 | 1.14 | 6.74 | 10.1 | 0.29 | 0.37 | 0.12 | 0.24 | 0.02 | 16.1 |
| 9585 | 43.7 | 2.88 | 1.37 | 9.86 | 15.1 | 0.31 | 0.48 | 0.15 | 0.35 | 0.02 | 22.8 |
| 9615 | 56.3 | 2.64 | 1.31 | 7.30 | 11.2 | 0.32 | 0.45 | 0.14 | 0.37 | 0.02 | 17.1 |
| 9645 | 61.2 | 2.06 | 0.95 | 6.72 | 10.1 | 0.28 | 0.34 | 0.11 | 0.28 | 0.01 | 15.7 |
| 9675 | 57.2 | 2.00 | 0.97 | 7.52 | 11.3 | 0.27 | 0.33 | 0.11 | 0.30 | 0.02 | 17.6 |
| 9705 | 66.7 | 1.68 | 0.79 | 5.77 | 8.57 | 0.29 | 0.27 | 0.1 | 0.21 | 0.01 | 13.6 |
| 9735 | 56.7 | 1.74 | 0.78 | 7.95 | 11.8 | 0.27 | 0.28 | 0.1 | 0.18 | 0.02 | 18.2 |

Table 2. continued

| Depth | $SiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | MgO | CaO | $Na_2O$ | $K_2O$ | $TiO_2$ | $P_2O_5$ | MnO | LOI |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9765 | 54.8 | 2.83 | 1.15 | 7.59 | 11.8 | 0.48 | 0.49 | 0.14 | 0.34 | 0.02 | 17.8 |
| 9795 | 75.1 | 2.82 | 1.17 | 3.21 | 5.13 | 0.48 | 0.47 | 0.15 | 0.27 | 0.02 | 8.45 |
| 9825 | 73.5 | 3.13 | 1.39 | 3.46 | 5.45 | 0.52 | 0.53 | 0.18 | 0.32 | 0.02 | 8.71 |
| 9855 | 79.5 | 3.01 | 1.28 | 2.36 | 3.70 | 0.55 | 0.52 | 0.17 | 0.26 | 0.02 | 6.40 |
| 9885 | 78.7 | 2.33 | 0.98 | 3.01 | 4.54 | 0.40 | 0.38 | 0.13 | 0.19 | 0.01 | 7.60 |
| 9915 | 80.6 | 1.57 | 0.67 | 2.99 | 4.49 | 0.28 | 0.24 | 0.09 | 0.15 | 0.01 | 7.50 |
| 9945 | 77.6 | 2.23 | 0.99 | 3.21 | 4.86 | 0.37 | 0.35 | 0.12 | 0.22 | 0.01 | 8.34 |
| 9975 | 76.6 | 2.27 | 1.01 | 3.38 | 5.15 | 0.39 | 0.36 | 0.12 | 0.22 | 0.02 | 8.69 |
| 10005 | 73.5 | 3.62 | 1.60 | 3.25 | 5.17 | 0.71 | 0.59 | 0.20 | 0.32 | 0.02 | 8.48 |
| 10035 | 65.7 | 3.83 | 1.67 | 4.81 | 7.61 | 0.72 | 0.64 | 0.21 | 0.29 | 0.03 | 11.5 |
| 10065 | 65.2 | 2.79 | 1.15 | 5.55 | 8.37 | 0.57 | 0.44 | 0.15 | 0.24 | 0.02 | 13.0 |
| 10095 | 61.7 | 4.38 | 1.80 | 5.67 | 8.56 | 0.87 | 0.74 | 0.23 | 0.27 | 0.03 | 12.8 |
| 10125 | 76.1 | 4.61 | 2.07 | 2.29 | 3.52 | 0.84 | 0.78 | 0.25 | 0.25 | 0.02 | 6.14 |
| 10155 | 77.1 | 5.12 | 2.30 | 2.06 | 2.81 | 1.08 | 0.82 | 0.30 | 0.19 | 0.03 | 5.41 |
| 10185 | 68.1 | 2.91 | 1.30 | 4.96 | 7.40 | 0.56 | 0.46 | 0.17 | 0.19 | 0.03 | 11.6 |
| 10215 | 71.7 | 2.98 | 1.29 | 4.17 | 6.20 | 0.56 | 0.47 | 0.17 | 0.21 | 0.02 | 9.84 |
| 10245 | 65.4 | 3.74 | 1.60 | 5.16 | 7.67 | 0.70 | 0.62 | 0.21 | 0.29 | 0.03 | 11.8 |
| 10275 | 69.3 | 4.82 | 2.16 | 3.53 | 5.61 | 0.86 | 0.81 | 0.27 | 0.44 | 0.03 | 8.57 |
| 10305 | 62.1 | 4.87 | 2.22 | 4.97 | 7.81 | 0.92 | 0.83 | 0.28 | 0.49 | 0.03 | 11.5 |
| 10335 | 59.9 | 4.93 | 2.12 | 5.55 | 8.67 | 1.00 | 0.80 | 0.27 | 0.48 | 0.03 | 12.7 |
| 10365 | 57.1 | 4.96 | 2.30 | 6.13 | 9.54 | 0.96 | 0.80 | 0.27 | 0.48 | 0.04 | 13.9 |
| 10395 | 57.4 | 5.43 | 2.18 | 5.98 | 9.19 | 1.15 | 0.84 | 0.29 | 0.56 | 0.03 | 13.4 |
| 10425 | 56.6 | 5.90 | 2.53 | 5.89 | 9.05 | 1.19 | 0.90 | 0.31 | 0.45 | 0.04 | 13.4 |
| 10455 | 61.2 | 6.79 | 2.66 | 4.70 | 7.00 | 1.29 | 1.06 | 0.33 | 0.43 | 0.04 | 10.7 |
| 10485 | 67.1 | 5.58 | 2.42 | 3.70 | 5.84 | 1.02 | 0.88 | 0.30 | 0.43 | 0.03 | 8.84 |
| 10515 | 52.5 | 4.11 | 1.96 | 7.60 | 11.3 | 0.83 | 0.61 | 0.21 | 0.39 | 0.03 | 17.8 |
| 10545 | 59.2 | 3.92 | 1.97 | 6.16 | 9.45 | 0.75 | 0.61 | 0.21 | 0.44 | 0.03 | 14.5 |
| 10575 | 63.0 | 4.00 | 2.01 | 5.15 | 8.26 | 0.70 | 0.63 | 0.21 | 0.47 | 0.03 | 12.6 |
| 10605 | 56.4 | 4.33 | 2.10 | 6.53 | 10.2 | 0.88 | 0.66 | 0.23 | 0.40 | 0.04 | 15.2 |
| 10635 | 52.4 | 5.61 | 2.56 | 6.83 | 10.7 | 1.08 | 0.88 | 0.29 | 0.36 | 0.04 | 15.9 |
| 10665 | 54.0 | 5.62 | 2.60 | 6.33 | 10.2 | 1.22 | 0.88 | 0.29 | 0.33 | 0.04 | 14.9 |
| 10695 | 54.8 | 5.68 | 3.02 | 5.67 | 10.3 | 1.16 | 0.93 | 0.31 | 0.35 | 0.05 | 14.3 |
| 10725 | 57.7 | 5.76 | 2.47 | 5.67 | 9.21 | 1.22 | 0.96 | 0.31 | 0.31 | 0.04 | 12.8 |
| 10755 | 65.8 | 5.40 | 2.24 | 4.12 | 6.60 | 1.13 | 0.89 | 0.28 | 0.28 | 0.03 | 9.69 |
| 10785 | 65.3 | 5.76 | 2.34 | 4.19 | 6.59 | 1.21 | 0.93 | 0.30 | 0.27 | 0.03 | 9.68 |
| 10815 | 49.0 | 5.20 | 2.43 | 7.73 | 12.2 | 1.05 | 0.83 | 0.28 | 0.25 | 0.04 | 17.3 |
| 10845 | 49.6 | 5.17 | 2.39 | 7.68 | 12.0 | 1.05 | 0.83 | 0.28 | 0.26 | 0.04 | 17.2 |
| 10875 | 57.6 | 4.26 | 2.10 | 6.17 | 10.1 | 0.84 | 0.68 | 0.23 | 0.25 | 0.03 | 14.5 |
| 10905 | 55.2 | 5.92 | 2.71 | 6.03 | 9.78 | 1.32 | 0.92 | 0.32 | 0.26 | 0.05 | 13.6 |
| 10935 | 53.7 | 5.85 | 2.78 | 6.16 | 10.4 | 1.28 | 0.94 | 0.32 | 0.39 | 0.05 | 14.2 |
| 10965 | 57.8 | 6.63 | 2.86 | 5.04 | 8.44 | 1.45 | 1.06 | 0.36 | 0.53 | 0.04 | 11.5 |
| 10995 | 58.4 | 6.32 | 2.80 | 5.10 | 8.35 | 1.33 | 1.02 | 0.35 | 0.30 | 0.04 | 11.9 |
| 11025 | 56.7 | 6.25 | 2.82 | 5.65 | 9.05 | 1.35 | 1.01 | 0.34 | 0.27 | 0.05 | 12.8 |
| 11055 | 62.4 | 7.08 | 3.09 | 3.98 | 6.31 | 1.44 | 1.16 | 0.38 | 0.36 | 0.03 | 9.32 |
| 11085 | 47.1 | 6.06 | 2.75 | 7.61 | 12.3 | 1.36 | 0.94 | 0.32 | 0.42 | 0.05 | 17.2 |
| 11115 | 51.8 | 6.28 | 2.92 | 6.66 | 10.4 | 1.34 | 0.98 | 0.34 | 0.37 | 0.05 | 14.8 |
| 11145 | 46.8 | 5.98 | 2.70 | 7.87 | 12.5 | 1.28 | 0.90 | 0.31 | 0.31 | 0.06 | 17.7 |

Table 2. continued

| Depth | $SiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | MgO | CaO | $Na_2O$ | $K_2O$ | $TiO_2$ | $P_2O_5$ | MnO | LOI |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 11175 | 50.2 | 6.26 | 2.91 | 7.07 | 11.0 | 1.32 | 0.96 | 0.33 | 0.47 | 0.06 | 15.4 |
| 11205 | 53.5 | 6.04 | 2.67 | 6.31 | 10.2 | 1.26 | 0.95 | 0.34 | 0.61 | 0.05 | 14.1 |
| 11235 | 46.7 | 5.75 | 2.51 | 7.86 | 12.5 | 1.27 | 0.87 | 0.31 | 0.45 | 0.05 | 17.5 |
| 11265 | 59.7 | 7.05 | 3.25 | 4.47 | 7.01 | 1.47 | 1.14 | 0.40 | 0.44 | 0.05 | 10.1 |
| 11295 | 40.2 | 4.85 | 2.35 | 8.96 | 15.6 | 0.92 | 0.78 | 0.27 | 0.95 | 0.04 | 21.4 |
| 11325 | 57.7 | 5.58 | 2.61 | 5.39 | 8.99 | 1.03 | 0.89 | 0.30 | 0.52 | 0.04 | 13.0 |
| 11355 | 57.9 | 5.83 | 2.78 | 4.83 | 9.03 | 1.14 | 0.96 | 0.33 | 0.35 | 0.04 | 12.5 |
| 11385 | 61.1 | 7.35 | 3.31 | 3.92 | 6.59 | 1.48 | 1.18 | 0.41 | 0.37 | 0.04 | 9.33 |
| 11415 | 61.7 | 6.08 | 2.67 | 4.49 | 7.50 | 1.21 | 0.98 | 0.34 | 0.28 | 0.04 | 10.6 |
| 11445 | 60.9 | 5.63 | 2.53 | 4.25 | 8.56 | 1.20 | 0.90 | 0.32 | 0.27 | 0.04 | 11.3 |
| 11475 | 64.7 | 6.09 | 2.69 | 3.29 | 6.65 | 1.32 | 0.97 | 0.35 | 0.30 | 0.03 | 9.28 |
| 11505 | 63.7 | 6.33 | 2.95 | 3.86 | 6.47 | 1.36 | 1.00 | 0.37 | 0.28 | 0.04 | 9.56 |
| 11535 | 59.9 | 7.50 | 3.63 | 4.35 | 6.95 | 1.59 | 1.17 | 0.46 | 0.29 | 0.06 | 10.7 |
| 11565 | 57.7 | 7.66 | 3.63 | 4.18 | 8.04 | 1.65 | 1.20 | 0.47 | 0.42 | 0.05 | 12.1 |
| 11595 | 55.1 | 7.28 | 3.54 | 3.76 | 9.95 | 1.54 | 1.14 | 0.43 | 0.41 | 0.05 | 13.2 |
| 11625 | 61.3 | 6.40 | 3.15 | 3.53 | 8.14 | 1.38 | 0.97 | 0.38 | 0.30 | 0.04 | 11.2 |
| 11655 | 57.4 | 6.92 | 3.30 | 2.95 | 10.3 | 1.45 | 1.05 | 0.40 | 0.36 | 0.04 | 12.6 |
| 11685 | 53.5 | 7.63 | 3.86 | 3.28 | 11.0 | 1.59 | 1.18 | 0.46 | 0.47 | 0.06 | 13.3 |
| 11715 | 54.8 | 6.45 | 3.10 | 2.63 | 12.6 | 1.35 | 0.99 | 0.37 | 0.33 | 0.04 | 14.0 |
| 11745 | 51.5 | 6.51 | 3.15 | 3.04 | 13.9 | 1.38 | 0.99 | 0.36 | 0.41 | 0.04 | 15.5 |
| 11775 | 51.7 | 7.63 | 4.03 | 4.16 | 10.8 | 1.70 | 1.16 | 0.46 | 0.33 | 0.06 | 14.2 |
| 11805 | 58.9 | 8.45 | 4.25 | 3.24 | 7.36 | 1.79 | 1.24 | 0.51 | 0.27 | 0.06 | 10.5 |
| 11835 | 60.3 | 10.6 | 5.25 | 2.44 | 5.32 | 2.21 | 1.56 | 0.66 | 0.33 | 0.07 | 8.13 |
| 11865 | 53.9 | 7.38 | 3.55 | 3.48 | 11.0 | 1.49 | 1.13 | 0.43 | 0.48 | 0.05 | 13.7 |
| 11895 | 51.3 | 6.76 | 3.18 | 3.35 | 13.5 | 1.40 | 1.03 | 0.38 | 0.46 | 0.04 | 15.6 |
| 11925 | 54.5 | 6.69 | 3.23 | 3.22 | 12.0 | 1.33 | 1.02 | 0.37 | 0.38 | 0.04 | 14.2 |
| 11955 | 54.5 | 8.81 | 3.94 | 2.71 | 9.69 | 1.79 | 1.38 | 0.51 | 0.45 | 0.04 | 12.3 |
| 11985 | 49.7 | 7.31 | 3.67 | 3.77 | 12.5 | 1.45 | 1.10 | 0.41 | 0.41 | 0.05 | 15.6 |
| 12005 | 56.6 | 8.36 | 3.71 | 3.02 | 8.74 | 1.67 | 1.28 | 0.47 | 0.42 | 0.04 | 11.9 |
| 12015 | 63.2 | 8.32 | 3.66 | 2.60 | 5.70 | 1.42 | 1.29 | 0.46 | 0.37 | 0.04 | 9.22 |
| 12035 | 55.2 | 8.41 | 3.87 | 3.09 | 9.24 | 1.72 | 1.31 | 0.47 | 0.42 | 0.05 | 12.2 |
| 12055 | 56.6 | 8.69 | 3.88 | 3.09 | 8.51 | 1.78 | 1.32 | 0.48 | 0.41 | 0.05 | 11.7 |
| 12075 | 48.9 | 6.82 | 3.79 | 5.23 | 12.3 | 1.43 | 1.03 | 0.38 | 0.35 | 0.06 | 16.9 |
| 12105 | 51.7 | 7.91 | 4.26 | 4.49 | 10.2 | 1.65 | 1.19 | 0.44 | 0.36 | 0.06 | 14.6 |
| 12135 | 54.8 | 8.13 | 4.10 | 4.30 | 8.57 | 1.66 | 1.20 | 0.45 | 0.35 | 0.06 | 13.1 |
| 12165 | 55.7 | 8.19 | 3.92 | 3.82 | 8.48 | 1.64 | 1.25 | 0.46 | 0.35 | 0.05 | 12.8 |
| 12195 | 52.1 | 8.52 | 4.04 | 3.75 | 10.2 | 1.78 | 1.25 | 0.46 | 0.34 | 0.05 | 14.5 |
| 12225 | 51.1 | 8.77 | 4.10 | 3.93 | 9.47 | 1.78 | 1.30 | 0.48 | 0.33 | 0.05 | 16.0 |
| 12255 | 55.1 | 10.2 | 4.42 | 3.57 | 7.19 | 2.01 | 1.56 | 0.57 | 0.35 | 0.05 | 11.9 |
| 12285 | 58.4 | 10.7 | 4.31 | 3.20 | 5.57 | 2.14 | 1.65 | 0.61 | 0.29 | 0.05 | 10.2 |
| 12315 | 60.0 | 11.1 | 4.26 | 2.72 | 4.78 | 2.21 | 1.73 | 0.62 | 0.36 | 0.04 | 9.24 |
| 12345 | 54.0 | 9.37 | 4.23 | 3.89 | 8.39 | 1.83 | 1.45 | 0.52 | 0.35 | 0.05 | 12.8 |
| 12375 | 51.3 | 8.77 | 4.19 | 4.34 | 9.94 | 1.71 | 1.36 | 0.50 | 0.34 | 0.05 | 14.5 |
| 12405 | 46.9 | 8.08 | 4.20 | 4.68 | 11.1 | 1.56 | 1.20 | 0.43 | 0.34 | 0.05 | 18.2 |
| 12435 | 47.8 | 7.42 | 3.63 | 4.20 | 11.0 | 1.48 | 1.18 | 0.42 | 0.35 | 0.06 | 19.3 |
| 12465 | 54.2 | 8.29 | 3.89 | 3.88 | 9.47 | 1.55 | 1.34 | 0.46 | 0.40 | 0.05 | 13.2 |
| 12495 | 55.3 | 8.20 | 3.73 | 3.93 | 9.17 | 1.60 | 1.30 | 0.46 | 0.36 | 0.05 | 13.1 |

Table 2. continued

| Depth | $SiO_2$ | $Al_2O_3$ | $Fe_2O_3$ | MgO | CaO | $Na_2O$ | $K_2O$ | $TiO_2$ | $P_2O_5$ | MnO | LOI |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12525 | 58.0 | 9.65 | 3.92 | 3.43 | 6.80 | 1.85 | 1.51 | 0.53 | 0.35 | 0.04 | 10.9 |
| 12555 | 60.1 | 9.22 | 3.78 | 3.14 | 6.74 | 1.71 | 1.44 | 0.51 | 0.32 | 0.04 | 10.4 |
| 12585 | 58.5 | 9.94 | 3.99 | 3.00 | 6.16 | 1.96 | 1.54 | 0.56 | 0.34 | 0.04 | 10.9 |
| 12615 | 60.4 | 7.97 | 3.34 | 3.14 | 7.18 | 1.57 | 1.26 | 0.46 | 0.30 | 0.04 | 11.4 |
| 12645 | 56.4 | 6.43 | 3.09 | 4.22 | 9.04 | 1.20 | 1.01 | 0.36 | 0.26 | 0.04 | 15.0 |
| 12675 | 51.0 | 4.64 | 2.60 | 3.86 | 10.9 | 1.09 | 0.73 | 0.27 | 0.21 | 0.04 | 21.9 |
| 12705 | 54.2 | 5.78 | 3.06 | 3.78 | 11.4 | 1.17 | 0.91 | 0.33 | 0.25 | 0.04 | 16.6 |
| 12735 | 53.9 | 6.07 | 3.20 | 3.74 | 12.2 | 1.18 | 0.99 | 0.35 | 0.29 | 0.05 | 15.3 |
| 12765 | 53.8 | 7.72 | 3.59 | 3.36 | 9.74 | 1.52 | 1.20 | 0.42 | 0.29 | 0.05 | 15.1 |
| 12795 | 49.9 | 7.39 | 3.76 | 4.74 | 12.1 | 1.34 | 1.14 | 0.39 | 0.30 | 0.05 | 16.5 |
| 12825 | 47.7 | 6.64 | 3.44 | 3.87 | 10.7 | 1.47 | 1.04 | 0.37 | 0.27 | 0.05 | 21.8 |
| 12855 | 52.7 | 8.01 | 4.03 | 4.00 | 10.5 | 1.54 | 1.29 | 0.45 | 0.30 | 0.05 | 14.4 |
| 12885 | 57.5 | 7.93 | 3.58 | 3.23 | 8.98 | 1.51 | 1.29 | 0.45 | 0.31 | 0.04 | 12.3 |
| 12915 | 57.8 | 7.68 | 3.72 | 3.20 | 8.79 | 1.45 | 1.29 | 0.43 | 0.29 | 0.05 | 12.2 |
| 12945 | 58.0 | 7.65 | 3.85 | 3.30 | 8.47 | 1.42 | 1.29 | 0.44 | 0.28 | 0.05 | 12.2 |
| 12975 | 58.9 | 6.82 | 3.62 | 3.25 | 9.20 | 1.25 | 1.15 | 0.39 | 0.25 | 0.05 | 12.3 |
| 13005 | 59.4 | 5.94 | 3.05 | 2.76 | 10.6 | 1.12 | 1.01 | 0.33 | 0.24 | 0.04 | 12.6 |
| 13035 | 62.9 | 8.21 | 3.29 | 2.62 | 6.61 | 1.58 | 1.34 | 0.46 | 0.33 | 0.04 | 9.74 |
| 13065 | 63.2 | 7.89 | 3.51 | 2.47 | 6.63 | 1.48 | 1.29 | 0.43 | 0.29 | 0.04 | 9.63 |
| 13095 | 66.0 | 7.19 | 3.30 | 2.46 | 5.87 | 1.36 | 1.16 | 0.40 | 0.25 | 0.04 | 8.92 |
| 13125 | 63.2 | 7.42 | 3.83 | 2.94 | 6.36 | 1.42 | 1.20 | 0.42 | 0.26 | 0.05 | 10.1 |
| 13155 | 65.5 | 7.62 | 3.69 | 2.57 | 5.46 | 1.46 | 1.20 | 0.43 | 0.27 | 0.04 | 8.80 |
| 13185 | 59.5 | 7.97 | 3.88 | 2.83 | 6.90 | 1.55 | 1.28 | 0.45 | 0.27 | 0.05 | 12.0 |
| 13215 | 56.2 | 8.29 | 4.28 | 3.76 | 8.10 | 1.53 | 1.30 | 0.45 | 0.29 | 0.06 | 12.5 |
| 13245 | 50.9 | 8.00 | 4.50 | 5.14 | 9.68 | 1.49 | 1.24 | 0.44 | 0.27 | 0.06 | 15.0 |

Table 3. Abundances of sedimentary components and other derived parameters in bulk cuttings from the OCS P-0315-1 well (in weight %). The quantity "sum" represents the sum of detritus+silica+apatite+dolomite+calcite derived from data in Table 2 using formulas in Table1; this sum is consistently less than 100% due to the presence of $H2O^-$ and organic matter. Values listed in columns 2 through 6 have been normalized to sum to 100%. See text for comments on negative numbers and problems with the calcite-dolomite partition.

| Depth | Detritus | Silica | Apatite | Dolomite | Calcite | Sum | Silica/ Silica+Carb. | Silica/ Silica+Detritus |
|---|---|---|---|---|---|---|---|---|
| 1405 | 16 | 7 | -0.1 | 12.2 | 65.1 | 102.8 | 0.08 | 0.31 |
| 1435 | 18 | 12 | 0.0 | 11.6 | 58.0 | 99.3 | 0.15 | 0.41 |
| 1465 | 64 | 14 | -0.3 | 6.3 | 16.1 | 95.1 | 0.38 | 0.18 |
| 1495 | 47 | 11 | -0.2 | 8.8 | 33.5 | 97.5 | 0.21 | 0.19 |
| 1525 | 46 | 12 | -0.2 | 8.1 | 33.5 | 96.5 | 0.23 | 0.21 |
| 1555 | 30 | 10 | -0.1 | 11.9 | 48.4 | 99.5 | 0.14 | 0.25 |
| 1585 | 37 | 11 | -0.2 | 10.6 | 41.2 | 99.3 | 0.18 | 0.24 |
| 1615 | 47 | 13 | -0.2 | 8.8 | 32.0 | 95.3 | 0.24 | 0.21 |
| 1645 | 32 | 13 | -0.1 | 10.3 | 44.7 | 99.4 | 0.19 | 0.28 |
| 1675 | 25 | 9 | -0.1 | 11.9 | 54.6 | 102.6 | 0.12 | 0.26 |
| 1705 | 33 | 12 | -0.2 | 10.0 | 45.7 | 99.3 | 0.17 | 0.26 |
| 1735 | 41 | 14 | -0.2 | 9.3 | 35.9 | 95.7 | 0.24 | 0.25 |
| 1765 | 51 | 14 | -0.2 | 7.2 | 28.0 | 95.1 | 0.28 | 0.21 |
| 1795 | 46 | 13 | -0.2 | 8.0 | 33.3 | 96.5 | 0.23 | 0.21 |
| 1825 | 53 | 13 | -0.2 | 12.3 | 21.3 | 95.1 | 0.28 | 0.20 |
| 1855 | 55 | 12 | -0.2 | 12.2 | 20.4 | 93.8 | 0.27 | 0.18 |
| 1885 | 44 | 13 | -0.1 | 12.5 | 30.8 | 98.1 | 0.23 | 0.23 |
| 1915 | 39 | 14 | -0.1 | 13.6 | 34.4 | 96.7 | 0.22 | 0.26 |
| 1945 | 42 | 12 | -0.2 | 13.9 | 31.6 | 97.2 | 0.21 | 0.23 |
| 1975 | 45 | 15 | -0.2 | 13.8 | 26.1 | 97.7 | 0.27 | 0.25 |
| 2005 | 27 | 10 | 0.0 | 17.6 | 44.8 | 96.4 | 0.14 | 0.27 |
| 2035 | 39 | 14 | -0.1 | 17.5 | 29.3 | 95.2 | 0.23 | 0.26 |
| 2065 | 29 | 12 | -0.1 | 22.0 | 36.8 | 97.9 | 0.17 | 0.30 |
| 2095 | 28 | 15 | 0.0 | 26.6 | 30.2 | 97.7 | 0.21 | 0.36 |
| 2125 | 35 | 17 | 0.0 | 22.5 | 25.9 | 95.7 | 0.25 | 0.32 |
| 2155 | 35 | 18 | -0.1 | 26.9 | 20.3 | 97.7 | 0.28 | 0.34 |
| 2185 | 41 | 21 | -0.1 | 29.9 | 8.3 | 94.7 | 0.36 | 0.34 |
| 2215 | 39 | 21 | -0.1 | 33.1 | 6.9 | 96.3 | 0.35 | 0.35 |
| 2245 | 52 | 31 | -0.3 | 9.2 | 7.2 | 90.7 | 0.66 | 0.37 |
| 2275 | 56 | 32 | -0.3 | 5.1 | 6.8 | 88.6 | 0.73 | 0.36 |
| 2305 | | | | | | | | |
| 2335 | 64 | 23 | 0.0 | 4.0 | 9.7 | 90.5 | 0.62 | 0.26 |
| 2365 | 23 | 14 | -0.1 | 9.3 | 54.7 | 94.0 | 0.17 | 0.37 |
| 2385 | 30 | 16 | 0.0 | 8.3 | 45.7 | 90.4 | 0.23 | 0.34 |
| 2415 | 30 | 13 | 0.0 | 13.0 | 43.8 | 87.7 | 0.18 | 0.30 |
| 2445 | 27 | 11 | 0.1 | 29.4 | 32.5 | 88.2 | 0.15 | 0.30 |
| 2475 | 25 | 10 | 0.1 | 23.4 | 40.8 | 89.6 | 0.14 | 0.29 |
| 2505 | 33 | 9 | 0.2 | 43.0 | 14.8 | 86.3 | 0.14 | 0.22 |
| 2535 | 36 | 9 | 0.2 | 43.7 | 11.1 | 90.6 | 0.15 | 0.21 |
| 2565 | 29 | 10 | 0.1 | 29.9 | 30.5 | 90.2 | 0.15 | 0.26 |
| 2595 | 46 | 12 | 0.2 | 17.5 | 24.7 | 89.4 | 0.22 | 0.20 |
| 2625 | 26 | 6 | 0.4 | 54.2 | 13.8 | 90.4 | 0.08 | 0.18 |
| 2655 | 29 | 8 | 0.2 | 48.4 | 14.0 | 91.3 | 0.11 | 0.21 |

Table 3. continued

| Depth | Detritus | Silica | Apatite | Dolomite | Calcite | Sum | Silica/ Silica+Carb. | Silica/ Silica+Detritus |
|---|---|---|---|---|---|---|---|---|
| 2685 | 35 | 9 | 0.2 | 32.5 | 22.8 | 88.6 | 0.15 | 0.21 |
| 2715 | 23 | 11 | 0.3 | 45.3 | 20.4 | 93.4 | 0.14 | 0.31 |
| 2745 | 38 | 9 | 0.2 | 40.8 | 11.5 | 91.3 | 0.15 | 0.19 |
| 2775 | 50 | 11 | 0.2 | 25.9 | 12.9 | 89.8 | 0.22 | 0.18 |
| 2805 | 56 | 13 | 0.2 | 16.4 | 14.8 | 89.7 | 0.30 | 0.19 |
| 2835 | 38 | 8 | 0.3 | 43.3 | 9.8 | 90.5 | 0.14 | 0.18 |
| 2865 | 45 | 9 | 0.3 | 36.5 | 8.8 | 90.2 | 0.17 | 0.17 |
| 2895 | 52 | 11 | 0.3 | 27.9 | 9.3 | 88.6 | 0.22 | 0.17 |
| 2925 | 51 | 11 | 0.3 | 24.9 | 12.1 | 85.3 | 0.23 | 0.18 |
| 2955 | 28 | 4 | 0.3 | 62.2 | 5.0 | 91.7 | 0.06 | 0.13 |
| 2985 | 48 | 8 | 0.3 | 36.7 | 7.5 | 88.1 | 0.15 | 0.14 |
| 3015 | 43 | 7 | 0.3 | 40.8 | 9.1 | 89.7 | 0.12 | 0.14 |
| 3045 | 49 | 10 | 0.4 | 33.9 | 7.0 | 88.1 | 0.19 | 0.16 |
| 3075 | 59 | 12 | 0.6 | 21.7 | 6.9 | 86.9 | 0.30 | 0.17 |
| 3105 | 61 | 14 | 0.4 | 16.7 | 7.3 | 85.8 | 0.37 | 0.19 |
| 3135 | 27 | 7 | 0.3 | 62.2 | 3.7 | 89.1 | 0.09 | 0.20 |
| 3165 | 36 | 9 | 0.3 | 49.2 | 5.6 | 88.9 | 0.14 | 0.19 |
| 3195 | 31 | 8 | 0.4 | 53.5 | 6.9 | 90.1 | 0.12 | 0.21 |
| 3225 | 30 | 11 | 0.3 | 50.2 | 8.5 | 89.9 | 0.16 | 0.28 |
| 3255 | 39 | 9 | 0.3 | 46.1 | 5.5 | 89.2 | 0.15 | 0.19 |
| 3285 | 51 | 14 | 0.4 | 29.0 | 4.8 | 87.2 | 0.30 | 0.22 |
| 3315 | 49 | 12 | 0.3 | 28.1 | 10.8 | 87.3 | 0.23 | 0.19 |
| 3345 | 64 | 21 | 0.5 | 11.8 | 3.3 | 86.2 | 0.58 | 0.25 |
| 3375 | 74 | 20 | 0.3 | 4.8 | 1.5 | 84.2 | 0.76 | 0.21 |
| 3405 | 67 | 26 | 0.5 | 4.6 | 1.8 | 85.9 | 0.80 | 0.28 |
| 3435 | 55 | 29 | 0.5 | 14.3 | 1.9 | 87.2 | 0.64 | 0.34 |
| 3465 | 62 | 29 | 0.4 | 7.6 | 1.8 | 85.4 | 0.75 | 0.32 |
| 3495 | 58 | 37 | 0.4 | 2.5 | 2.0 | 85.2 | 0.89 | 0.39 |
| 3525 | 57 | 35 | 0.3 | 3.9 | 2.8 | 86.0 | 0.84 | 0.38 |
| 3555 | 47 | 34 | 0.4 | 15.3 | 3.2 | 87.5 | 0.65 | 0.42 |
| 3585 | 52 | 34 | 0.4 | 11.4 | 2.3 | 87.0 | 0.71 | 0.40 |
| 3615 | 60 | 33 | 1.1 | 5.4 | 0.4 | 86.9 | 0.85 | 0.36 |
| 3645 | 54 | 35 | 0.9 | 9.4 | 1.0 | 87.1 | 0.77 | 0.39 |
| 3675 | 54 | 39 | 0.4 | 5.2 | 0.5 | 87.6 | 0.87 | 0.42 |
| 3705 | 56 | 40 | 0.4 | 3.3 | 0.4 | 87.2 | 0.91 | 0.42 |
| 3735 | 50 | 46 | 0.4 | 2.0 | 1.0 | 87.4 | 0.94 | 0.48 |
| 3765 | 51 | 45 | 0.4 | 2.2 | 1.2 | 87.6 | 0.93 | 0.47 |
| 3795 | 56 | 37 | 0.3 | 5.2 | 1.4 | 88.2 | 0.85 | 0.40 |
| 3825 | 58 | 36 | 0.2 | 5.0 | 1.0 | 89.8 | 0.86 | 0.38 |
| 3855 | 68 | 27 | -0.2 | 5.1 | 0.2 | 90.4 | 0.84 | 0.29 |
| 3885 | 63 | 30 | 0.0 | 6.7 | 0.6 | 91.3 | 0.80 | 0.32 |
| 3915 | 63 | 32 | -0.1 | 4.4 | 0.2 | 91.2 | 0.88 | 0.34 |
| 3945 | 69 | 26 | -0.3 | 5.8 | -0.7 | 90.8 | 0.84 | 0.27 |
| 3975 | 71 | 25 | -0.3 | 5.3 | -0.6 | 90.5 | 0.84 | 0.26 |
| 4005 | 76 | 20 | -0.3 | 4.7 | 0.1 | 91.9 | 0.81 | 0.21 |
| 4035 | 72 | 25 | -0.2 | 4.2 | -0.3 | 91.2 | 0.86 | 0.25 |
| 4065 | 74 | 22 | -0.4 | 5.4 | -0.8 | 91.3 | 0.83 | 0.23 |

Table 3. continued

| Depth | Detritus | Silica | Apatite | Dolomite | Calcite | Sum | Silica/ Silica+Carb. | Silica/ Silica+Detritus |
|---|---|---|---|---|---|---|---|---|
| 4095 | 78 | 19 | -0.4 | 5.3 | -1.5 | 90.6 | 0.83 | 0.19 |
| 4125 | 76 | 21 | -0.4 | 4.9 | -1.4 | 90.9 | 0.86 | 0.22 |
| 4155 | 75 | 23 | -0.4 | 3.9 | -1.2 | 90.6 | 0.90 | 0.23 |
| 4185 | 69 | 27 | -0.1 | 3.8 | 0.6 | 91.2 | 0.86 | 0.28 |
| 4215 | 72 | 24 | -0.1 | 4.4 | -0.6 | 91.1 | 0.86 | 0.25 |
| 4245 | 76 | 20 | -0.3 | 6.2 | -1.8 | 91.2 | 0.82 | 0.21 |
| 4275 | 68 | 28 | -0.2 | 5.2 | -0.8 | 91.0 | 0.86 | 0.29 |
| 4305 | 70 | 26 | -0.3 | 5.7 | -1.1 | 90.9 | 0.85 | 0.27 |
| 4335 | 68 | 28 | -0.1 | 4.6 | -0.6 | 90.9 | 0.87 | 0.29 |
| 4365 | 68 | 28 | -0.1 | 5.8 | -1.1 | 91.2 | 0.86 | 0.29 |
| 4395 | 71 | 25 | -0.2 | 5.0 | -1.4 | 91.2 | 0.88 | 0.26 |
| 4425 | 68 | 28 | -0.2 | 6.3 | -1.5 | 91.2 | 0.86 | 0.29 |
| 4455 | 70 | 26 | -0.2 | 6.6 | -1.7 | 90.2 | 0.84 | 0.27 |
| 4485 | 69 | 26 | 0.1 | 5.3 | -0.2 | 89.8 | 0.83 | 0.27 |
| 4515 | 69 | 26 | -0.1 | 4.8 | 0.6 | 89.9 | 0.83 | 0.28 |
| 4545 | 62 | 32 | -0.1 | 5.2 | 0.8 | 90.9 | 0.84 | 0.34 |
| 4575 | 63 | 34 | 0.1 | 3.1 | 0.2 | 90.7 | 0.91 | 0.35 |
| 4605 | 59 | 35 | 0.1 | 5.1 | 0.6 | 91.0 | 0.86 | 0.37 |
| 4635 | 57 | 35 | 0.1 | 6.8 | 1.1 | 91.4 | 0.82 | 0.38 |
| 4665 | 57 | 39 | 0.0 | 3.4 | 0.8 | 91.2 | 0.90 | 0.41 |
| 4695 | 55 | 38 | 0.1 | 5.4 | 2.0 | 90.8 | 0.84 | 0.41 |
| 4725 | 59 | 37 | 0.1 | 3.1 | 1.1 | 91.2 | 0.90 | 0.39 |
| 4755 | 64 | 33 | 0.0 | 2.6 | 0.5 | 90.7 | 0.91 | 0.34 |
| 4785 | 61 | 34 | 0.0 | 3.3 | 1.5 | 91.1 | 0.88 | 0.36 |
| 4815 | 60 | 35 | 0.1 | 4.4 | 1.1 | 90.2 | 0.86 | 0.37 |
| 4845 | 60 | 34 | 0.1 | 4.0 | 1.0 | 90.1 | 0.87 | 0.36 |
| 4875 | 59 | 36 | 0.0 | 4.2 | 0.6 | 90.9 | 0.88 | 0.38 |
| 4905 | 58 | 38 | 0.0 | 3.3 | 1.4 | 90.8 | 0.89 | 0.39 |
| 4935 | 54 | 41 | 0.0 | 3.1 | 1.7 | 91.2 | 0.89 | 0.43 |
| 4965 | 51 | 43 | 0.0 | 4.2 | 1.7 | 91.6 | 0.88 | 0.46 |
| 4995 | 55 | 39 | -0.1 | 4.4 | 1.6 | 91.5 | 0.87 | 0.42 |
| 5025 | 59 | 36 | -0.1 | 5.6 | 0.3 | 91.3 | 0.86 | 0.38 |
| 5055 | 56 | 37 | 0.1 | 7.4 | 0.3 | 91.2 | 0.83 | 0.40 |
| 5085 | 53 | 41 | 0.1 | 5.0 | 1.8 | 91.4 | 0.86 | 0.44 |
| 5115 | 54 | 40 | 0.1 | 4.4 | 1.5 | 91.4 | 0.87 | 0.42 |
| 5145 | 55 | 39 | 0.1 | 5.3 | 1.4 | 91.6 | 0.85 | 0.41 |
| 5175 | 57 | 37 | 0.1 | 5.5 | 0.3 | 91.5 | 0.86 | 0.39 |
| 5205 | 58 | 36 | 0.0 | 5.4 | 0.4 | 91.5 | 0.86 | 0.38 |
| 5235 | 63 | 32 | -0.1 | 3.7 | 1.3 | 91.2 | 0.86 | 0.33 |
| 5265 | 62 | 33 | -0.1 | 3.2 | 1.4 | 91.9 | 0.88 | 0.35 |
| 5295 | 59 | 36 | 0.0 | 4.9 | 0.9 | 91.9 | 0.86 | 0.38 |
| 5325 | 58 | 36 | 0.0 | 5.2 | 0.6 | 92.0 | 0.86 | 0.38 |
| 5355 | 57 | 37 | -0.1 | 5.2 | 0.9 | 91.9 | 0.86 | 0.39 |
| 5385 | 56 | 36 | -0.1 | 7.2 | 0.4 | 92.0 | 0.83 | 0.39 |
| 5415 | 55 | 37 | 0.0 | 7.1 | 0.3 | 91.9 | 0.83 | 0.40 |
| 5443 | 53 | 40 | 0.0 | 6.3 | 0.3 | 92.1 | 0.86 | 0.43 |
| 5473 | 43 | 31 | 0.0 | 19.0 | 7.3 | 91.6 | 0.54 | 0.42 |

Table 3. continued

| Depth | Detritus | Silica | Apatite | Dolomite | Calcite | Sum | Silica/ Silica+Carb. | Silica/ Silica+Detritus |
|---|---|---|---|---|---|---|---|---|
| 5505 | 49 | 35 | 0.0 | 11.1 | 5.0 | 92.2 | 0.68 | 0.41 |
| 5535 | 50 | 32 | -0.1 | 13.8 | 4.1 | 92.6 | 0.64 | 0.39 |
| 5565 | 53 | 31 | 0.0 | 13.2 | 2.8 | 91.7 | 0.66 | 0.37 |
| 5595 | 59 | 31 | -0.1 | 7.4 | 2.8 | 92.4 | 0.75 | 0.34 |
| 5625 | | | | | | | | |
| 5655 | | | | | | | | |
| 5685 | 54 | 37 | -0.1 | 7.7 | 1.6 | 92.7 | 0.80 | 0.41 |
| 5715 | 51 | 40 | 0.2 | 7.9 | 1.1 | 93.2 | 0.81 | 0.44 |
| 5745 | 47 | 49 | 0.0 | 2.7 | 1.1 | 93.8 | 0.93 | 0.51 |
| 5775 | 44 | 51 | 0.1 | 3.5 | 1.3 | 93.5 | 0.91 | 0.54 |
| 5805 | 45 | 49 | 0.1 | 4.6 | 2.0 | 93.8 | 0.88 | 0.52 |
| 5835 | 47 | 47 | 0.2 | 3.0 | 2.5 | 93.7 | 0.89 | 0.50 |
| 5865 | 50 | 43 | -0.1 | 5.1 | 1.5 | 92.6 | 0.87 | 0.47 |
| 5895 | 52 | 43 | 0.2 | 3.8 | 0.6 | 93.4 | 0.91 | 0.45 |
| 5925 | 43 | 47 | 0.1 | 9.1 | 0.9 | 93.9 | 0.82 | 0.52 |
| 5955 | 36 | 51 | 0.0 | 12.4 | 0.7 | 94.2 | 0.80 | 0.59 |
| 5985 | 45 | 53 | -0.1 | 3.0 | -0.4 | 94.2 | 0.95 | 0.54 |
| 6015 | 43 | 54 | -0.1 | 3.6 | -0.5 | 94.4 | 0.95 | 0.56 |
| 6045 | 37 | 50 | -0.1 | 12.4 | 0.3 | 94.6 | 0.80 | 0.57 |
| 6075 | 42 | 53 | 0.0 | 4.6 | 0.2 | 94.3 | 0.92 | 0.56 |
| 6105 | 49 | 45 | 0.1 | 4.6 | 0.9 | 94.0 | 0.89 | 0.48 |
| 6135 | 49 | 46 | 0.1 | 4.2 | 0.2 | 93.6 | 0.91 | 0.49 |
| 6165 | 50 | 42 | 0.1 | 5.4 | 1.8 | 93.5 | 0.85 | 0.46 |
| 6195 | 50 | 45 | 0.1 | 3.3 | 2.2 | 93.6 | 0.89 | 0.47 |
| 6225 | 51 | 42 | 0.0 | 5.1 | 2.2 | 93.1 | 0.85 | 0.45 |
| 6255 | 52 | 40 | -0.1 | 6.4 | 2.0 | 93.5 | 0.83 | 0.44 |
| 6285 | 51 | 41 | 0.0 | 5.6 | 2.2 | 93.4 | 0.84 | 0.45 |
| 6315 | 51 | 41 | 0.0 | 5.4 | 2.4 | 93.5 | 0.84 | 0.45 |
| 6345 | 52 | 44 | 0.1 | 4.2 | 0.3 | 93.6 | 0.91 | 0.46 |
| 6375 | 51 | 44 | 0.1 | 4.5 | 0.4 | 93.7 | 0.90 | 0.46 |
| 6405 | 59 | 29 | 0.0 | 11.6 | 0.2 | 92.2 | 0.71 | 0.33 |
| 6435 | 51 | 44 | 0.1 | 4.2 | 0.7 | 93.5 | 0.90 | 0.47 |
| 6465 | 49 | 42 | 0.0 | 8.0 | 1.3 | 93.9 | 0.82 | 0.46 |
| 6495 | 52 | 40 | 0.0 | 7.2 | 1.0 | 93.2 | 0.83 | 0.44 |
| 6525 | 49 | 43 | 0.0 | 7.3 | 1.0 | 93.6 | 0.84 | 0.47 |
| 6555 | 53 | 37 | 0.0 | 9.8 | 0.4 | 93.1 | 0.78 | 0.41 |
| 6585 | 37 | 36 | 0.1 | 25.7 | 1.7 | 94.0 | 0.57 | 0.49 |
| 6615 | 45 | 48 | 0.1 | 6.4 | 0.4 | 93.6 | 0.88 | 0.52 |
| 6645 | 43 | 53 | 0.0 | 3.7 | 0.3 | 93.5 | 0.93 | 0.55 |
| 6675 | 54 | 43 | -0.1 | 3.5 | 0.1 | 92.2 | 0.92 | 0.44 |
| 6705 | 43 | 49 | 0.0 | 6.2 | 1.2 | 93.9 | 0.87 | 0.53 |
| 6735 | 45 | 42 | 0.1 | 11.2 | 1.5 | 93.2 | 0.77 | 0.48 |
| 6765 | 47 | 43 | 0.1 | 8.9 | 1.5 | 91.7 | 0.81 | 0.48 |
| 6795 | 42 | 46 | 0.1 | 7.3 | 4.8 | 91.2 | 0.79 | 0.53 |
| 6825 | 52 | 40 | 0.2 | 6.3 | 1.4 | 90.7 | 0.84 | 0.44 |
| 6855 | 50 | 36 | 0.2 | 12.3 | 2.1 | 90.9 | 0.71 | 0.42 |
| 6885 | 53 | 40 | 0.1 | 5.4 | 1.5 | 90.5 | 0.85 | 0.43 |

Table 3. continued

| Depth | Detritus | Silica | Apatite | Dolomite | Calcite | Sum | Silica/ Silica+Carb. | Silica/ Silica+Detritus |
|---|---|---|---|---|---|---|---|---|
| 6915 | 52 | 41 | 0.1 | 5.4 | 1.5 | 90.1 | 0.86 | 0.44 |
| 6945 | 42 | 46 | 0.1 | 7.2 | 4.9 | 90.9 | 0.79 | 0.52 |
| 6975 | 44 | 49 | 0.4 | 4.4 | 2.5 | 90.2 | 0.88 | 0.53 |
| 7005 | 50 | 46 | 0.3 | 2.5 | 1.3 | 90.2 | 0.92 | 0.48 |
| 7035 | 46 | 45 | 0.5 | 5.3 | 3.7 | 90.0 | 0.83 | 0.50 |
| 7065 | 37 | 45 | 0.5 | 13.2 | 4.2 | 91.5 | 0.72 | 0.55 |
| 7095 | 34 | 47 | 0.4 | 16.4 | 2.1 | 92.6 | 0.72 | 0.59 |
| 7125 | 37 | 43 | 0.6 | 13.8 | 5.2 | 91.7 | 0.70 | 0.54 |
| 7155 | 39 | 43 | 0.6 | 10.2 | 6.7 | 91.6 | 0.72 | 0.53 |
| 7185 | 29 | 48 | 0.6 | 16.9 | 5.4 | 92.9 | 0.68 | 0.62 |
| 7205 | 27 | 50 | 0.7 | 13.9 | 8.9 | 93.3 | 0.68 | 0.65 |
| 7275 | 31 | 51 | 0.5 | 13.1 | 4.1 | 89.6 | 0.75 | 0.62 |
| 7305 | 27 | 57 | 0.6 | 13.2 | 2.5 | 92.0 | 0.78 | 0.68 |
| 7335 | 23 | 65 | 0.5 | 10.4 | 1.7 | 92.8 | 0.84 | 0.74 |
| 7365 | 14 | 75 | 0.3 | 9.8 | 1.2 | 95.0 | 0.87 | 0.84 |
| 7395 | 15 | 69 | 0.3 | 14.0 | 1.7 | 94.0 | 0.82 | 0.83 |
| 7425 | 14 | 73 | 0.4 | 11.8 | 1.1 | 94.8 | 0.85 | 0.84 |
| 7455 | 13 | 71 | 0.3 | 14.8 | 1.2 | 95.2 | 0.82 | 0.84 |
| 7485 | 16 | 68 | 0.5 | 14.5 | 1.4 | 94.5 | 0.81 | 0.81 |
| 7515 | 19 | 66 | 0.6 | 13.2 | 1.3 | 92.5 | 0.82 | 0.78 |
| 7545 | 15 | 66 | 0.5 | 17.3 | 1.7 | 94.3 | 0.77 | 0.82 |
| 7575 | 12 | 65 | 0.5 | 20.9 | 1.6 | 94.6 | 0.74 | 0.85 |
| 7605 | 10 | 69 | 0.4 | 19.1 | 1.2 | 95.5 | 0.77 | 0.87 |
| 7635 | 9 | 77 | 0.3 | 12.6 | 0.6 | 95.8 | 0.85 | 0.90 |
| 7665 | 7 | 77 | 0.3 | 14.4 | 0.8 | 96.4 | 0.84 | 0.91 |
| 7695 | 7 | 78 | 0.3 | 13.5 | 0.7 | 96.4 | 0.85 | 0.92 |
| 7725 | 8 | 76 | 0.3 | 14.8 | 0.8 | 95.0 | 0.83 | 0.91 |
| 7755 | 7 | 76 | 0.3 | 15.8 | 1.0 | 94.5 | 0.82 | 0.92 |
| 7785 | 13 | 62 | 0.4 | 22.2 | 2.4 | 87.4 | 0.71 | 0.82 |
| 7815 | 13 | 64 | 0.5 | 20.2 | 2.8 | 91.7 | 0.73 | 0.83 |
| 7845 | 13 | 54 | 1.6 | 9.1 | 22.1 | 91.2 | 0.63 | 0.80 |
| 7875 | 8 | 63 | 0.6 | 19.5 | 9.1 | 91.4 | 0.69 | 0.89 |
| 7905 | 10 | 62 | 0.8 | 23.7 | 3.5 | 95.2 | 0.70 | 0.87 |
| 7935 | 10 | 57 | 1.3 | 26.9 | 3.9 | 95.0 | 0.65 | 0.85 |
| 7965 | 9 | 66 | 0.6 | 22.8 | 2.0 | 95.8 | 0.73 | 0.88 |
| 7995 | 10 | 75 | 0.5 | 12.8 | 2.1 | 95.2 | 0.83 | 0.88 |
| 8025 | 8 | 75 | 1.9 | 13.9 | 1.0 | 96.6 | 0.83 | 0.90 |
| 8055 | 9 | 74 | 0.6 | 15.5 | 1.4 | 96.2 | 0.81 | 0.89 |
| 8085 | 9 | 69 | 0.9 | 19.3 | 1.7 | 95.7 | 0.77 | 0.89 |
| 8115 | 11 | 71 | 1.3 | 16.1 | 1.3 | 95.3 | 0.80 | 0.87 |
| 8145 | 17 | 58 | 3.7 | 19.1 | 2.0 | 91.9 | 0.73 | 0.78 |
| 8175 | 10 | 76 | 0.8 | 11.9 | 1.1 | 94.9 | 0.85 | 0.88 |
| 8205 | 8 | 82 | 0.3 | 9.3 | 0.8 | 96.2 | 0.89 | 0.91 |
| 8235 | 7 | 87 | 0.3 | 4.8 | 0.5 | 96.5 | 0.94 | 0.93 |
| 8265 | 8 | 74 | 0.3 | 16.3 | 1.4 | 96.8 | 0.81 | 0.90 |
| 8295 | 9 | 77 | 0.6 | 12.1 | 1.5 | 95.8 | 0.85 | 0.89 |
| 8325 | 8 | 82 | 0.4 | 8.5 | 0.9 | 96.4 | 0.90 | 0.91 |

Table 3. continued

| Depth | Detritus | Silica | Apatite | Dolomite | Calcite | Sum | Silica/ Silica+Carb. | Silica/ Silica+Detritus |
|---|---|---|---|---|---|---|---|---|
| 8355 | 7 | 79 | 0.3 | 12.2 | 1.2 | 96.9 | 0.86 | 0.92 |
| 8385 | 8 | 69 | 0.4 | 21.2 | 1.8 | 96.5 | 0.75 | 0.89 |
| 8415 | 7 | 70 | 0.4 | 21.2 | 1.6 | 96.8 | 0.75 | 0.91 |
| 8445 | 10 | 65 | 0.6 | 20.9 | 3.0 | 96.1 | 0.73 | 0.86 |
| 8475 | 12 | 63 | 1.0 | 20.8 | 3.5 | 95.5 | 0.72 | 0.84 |
| 8505 | 9 | 65 | 0.5 | 23.3 | 2.8 | 96.3 | 0.71 | 0.88 |
| 8535 | 8 | 65 | 0.4 | 24.0 | 2.7 | 96.7 | 0.71 | 0.90 |
| 8565 | 14 | 60 | 0.9 | 22.1 | 3.4 | 95.4 | 0.70 | 0.81 |
| 8595 | 13 | 50 | 3.3 | 30.5 | 3.5 | 94.9 | 0.59 | 0.79 |
| 8625 | 12 | 50 | 2.3 | 32.4 | 3.6 | 93.9 | 0.58 | 0.81 |
| 8655 | 6 | 65 | 0.5 | 26.6 | 1.7 | 96.6 | 0.70 | 0.92 |
| 8685 | 9 | 59 | 0.6 | 29.8 | 1.9 | 94.5 | 0.65 | 0.87 |
| 8715 | 7 | 52 | 0.4 | 37.7 | 2.6 | 96.6 | 0.57 | 0.89 |
| 8745 | 7 | 69 | 0.6 | 21.3 | 1.6 | 95.6 | 0.75 | 0.91 |
| 8775 | 9 | 33 | 0.8 | 54.6 | 3.1 | 95.7 | 0.36 | 0.78 |
| 8805 | 8 | 37 | 0.7 | 50.6 | 3.4 | 96.1 | 0.41 | 0.82 |
| 8835 | 6 | 48 | 0.5 | 43.6 | 1.9 | 97.2 | 0.51 | 0.89 |
| 8865 | 6 | 59 | 0.5 | 33.2 | 1.4 | 97.1 | 0.63 | 0.90 |
| 8895 | 7 | 66 | 0.8 | 24.7 | 1.4 | 96.7 | 0.72 | 0.90 |
| 8925 | 9 | 61 | 1.1 | 26.2 | 2.7 | 96.2 | 0.68 | 0.87 |
| 8955 | 7 | 60 | 0.8 | 30.3 | 2.3 | 96.8 | 0.65 | 0.90 |
| 8985 | 7 | 73 | 0.8 | 17.6 | 1.0 | 97.0 | 0.80 | 0.91 |
| 9015 | 12 | 71 | 0.9 | 14.2 | 1.3 | 95.5 | 0.82 | 0.85 |
| 9045 | 15 | 63 | 1.2 | 19.6 | 2.0 | 95.3 | 0.74 | 0.81 |
| 9075 | 15 | 59 | 1.3 | 23.0 | 1.6 | 95.2 | 0.71 | 0.80 |
| 9105 | 11 | 76 | 0.8 | 12.0 | 0.7 | 96.0 | 0.86 | 0.87 |
| 9135 | 14 | 74 | 0.6 | 9.8 | 1.2 | 96.1 | 0.87 | 0.84 |
| 9165 | 8 | 80 | 0.4 | 10.3 | 1.0 | 96.3 | 0.88 | 0.91 |
| 9195 | 10 | 66 | 0.5 | 22.4 | 1.2 | 93.1 | 0.74 | 0.87 |
| 9225 | 15 | 73 | 0.6 | 11.2 | 0.7 | 94.8 | 0.86 | 0.83 |
| 9255 | 9 | 61 | 0.6 | 28.1 | 0.9 | 96.7 | 0.68 | 0.87 |
| 9285 | 11 | 55 | 0.6 | 32.6 | 1.1 | 96.8 | 0.62 | 0.84 |
| 9315 | 23 | 65 | 0.7 | 8.8 | 2.4 | 93.3 | 0.85 | 0.74 |
| 9345 | 17 | 50 | 0.9 | 30.7 | 1.4 | 94.9 | 0.61 | 0.75 |
| 9375 | 15 | 69 | 0.6 | 15.6 | 0.7 | 95.4 | 0.81 | 0.82 |
| 9405 | 14 | 67 | 0.6 | 18.0 | 0.9 | 95.4 | 0.78 | 0.83 |
| 9435 | 11 | 60 | 0.4 | 27.8 | 1.0 | 96.8 | 0.68 | 0.85 |
| 9465 | 14 | 67 | 0.5 | 18.4 | 0.8 | 95.9 | 0.78 | 0.83 |
| 9495 | 9 | 64 | 0.3 | 25.3 | 0.7 | 96.6 | 0.71 | 0.87 |
| 9525 | 11 | 64 | 0.3 | 24.3 | 0.9 | 96.4 | 0.72 | 0.85 |
| 9555 | 13 | 54 | 0.4 | 30.9 | 1.3 | 95.9 | 0.63 | 0.80 |
| 9585 | 17 | 35 | 0.6 | 45.3 | 2.4 | 96.2 | 0.42 | 0.68 |
| 9615 | 15 | 49 | 0.7 | 33.3 | 1.6 | 96.1 | 0.58 | 0.76 |
| 9645 | 12 | 56 | 0.5 | 30.6 | 1.2 | 96.8 | 0.64 | 0.82 |
| 9675 | 12 | 52 | 0.6 | 34.5 | 1.3 | 96.5 | 0.59 | 0.82 |
| 9705 | 10 | 63 | 0.4 | 26.3 | 0.9 | 97.0 | 0.70 | 0.87 |
| 9735 | 10 | 52 | 0.3 | 36.4 | 1.3 | 97.4 | 0.58 | 0.84 |

Table 3. continued

| Depth | Detritus | Silica | Apatite | Dolomite | Calcite | Sum | Silica/ Silica+Carb. | Silica/ Silica+Detritus |
|---|---|---|---|---|---|---|---|---|
| 9765 | 16 | 46 | 0.6 | 34.4 | 2.1 | 96.6 | 0.56 | 0.74 |
| 9795 | 16 | 68 | 0.4 | 13.8 | 1.2 | 95.8 | 0.82 | 0.81 |
| 9825 | 18 | 65 | 0.5 | 14.8 | 1.1 | 95.9 | 0.80 | 0.78 |
| 9855 | 18 | 72 | 0.4 | 9.6 | 0.8 | 96.2 | 0.87 | 0.80 |
| 9885 | 13 | 73 | 0.3 | 12.9 | 0.7 | 97.1 | 0.84 | 0.84 |
| 9915 | 9 | 77 | 0.2 | 13.2 | 0.6 | 97.6 | 0.85 | 0.90 |
| 9945 | 13 | 72 | 0.4 | 14.0 | 0.7 | 96.8 | 0.83 | 0.85 |
| 9975 | 13 | 71 | 0.4 | 14.8 | 0.8 | 96.8 | 0.82 | 0.84 |
| 10005 | 21 | 64 | 0.5 | 13.6 | 1.2 | 95.8 | 0.81 | 0.75 |
| 10035 | 22 | 55 | 0.4 | 20.9 | 1.8 | 95.9 | 0.71 | 0.71 |
| 10065 | 16 | 57 | 0.4 | 24.8 | 1.2 | 96.6 | 0.69 | 0.78 |
| 10095 | 25 | 48 | 0.3 | 24.6 | 1.6 | 96.4 | 0.65 | 0.65 |
| 10125 | 27 | 63 | 0.3 | 8.6 | 1.0 | 95.1 | 0.87 | 0.70 |
| 10155 | 30 | 62 | 0.1 | 7.2 | 0.5 | 95.3 | 0.89 | 0.67 |
| 10185 | 17 | 60 | 0.2 | 21.9 | 1.1 | 96.7 | 0.72 | 0.78 |
| 10215 | 17 | 63 | 0.3 | 18.2 | 0.9 | 96.6 | 0.77 | 0.79 |
| 10245 | 22 | 54 | 0.4 | 22.5 | 1.0 | 96.3 | 0.70 | 0.71 |
| 10275 | 28 | 55 | 0.7 | 14.4 | 1.3 | 95.0 | 0.78 | 0.66 |
| 10305 | 29 | 48 | 0.8 | 21.3 | 1.6 | 94.8 | 0.67 | 0.62 |
| 10335 | 29 | 45 | 0.8 | 23.9 | 1.7 | 95.5 | 0.64 | 0.61 |
| 10365 | 29 | 42 | 0.8 | 26.7 | 1.8 | 95.5 | 0.59 | 0.59 |
| 10395 | 32 | 40 | 1.0 | 25.7 | 1.5 | 95.7 | 0.60 | 0.56 |
| 10425 | 35 | 38 | 0.6 | 25.1 | 1.8 | 95.3 | 0.58 | 0.52 |
| 10455 | 40 | 39 | 0.5 | 19.0 | 1.3 | 95.2 | 0.66 | 0.50 |
| 10485 | 33 | 50 | 0.6 | 14.9 | 1.5 | 94.9 | 0.75 | 0.60 |
| 10515 | 24 | 40 | 0.6 | 34.1 | 1.3 | 95.6 | 0.53 | 0.62 |
| 10545 | 23 | 48 | 0.8 | 27.3 | 1.4 | 95.7 | 0.62 | 0.67 |
| 10575 | 23 | 51 | 0.8 | 22.5 | 1.8 | 95.4 | 0.68 | 0.69 |
| 10605 | 25 | 43 | 0.6 | 28.9 | 2.1 | 95.7 | 0.58 | 0.63 |
| 10635 | 33 | 34 | 0.4 | 29.7 | 2.6 | 95.5 | 0.52 | 0.51 |
| 10665 | 33 | 36 | 0.4 | 27.4 | 3.1 | 95.1 | 0.54 | 0.52 |
| 10695 | 34 | 37 | 0.4 | 24.3 | 4.9 | 94.8 | 0.56 | 0.52 |
| 10725 | 34 | 39 | 0.3 | 24.0 | 3.0 | 95.9 | 0.59 | 0.54 |
| 10755 | 32 | 49 | 0.3 | 16.9 | 2.1 | 95.5 | 0.72 | 0.61 |
| 10785 | 34 | 47 | 0.2 | 17.0 | 2.0 | 95.8 | 0.71 | 0.58 |
| 10815 | 30 | 32 | 0.2 | 34.1 | 3.2 | 95.9 | 0.46 | 0.51 |
| 10845 | 30 | 33 | 0.2 | 33.8 | 3.0 | 96.0 | 0.47 | 0.52 |
| 10875 | 25 | 45 | 0.3 | 27.2 | 3.2 | 95.9 | 0.59 | 0.64 |
| 10905 | 35 | 36 | 0.2 | 25.7 | 3.3 | 95.5 | 0.55 | 0.51 |
| 10935 | 34 | 35 | 0.5 | 26.4 | 3.8 | 95.2 | 0.54 | 0.50 |
| 10965 | 39 | 36 | 0.8 | 20.8 | 2.8 | 94.9 | 0.61 | 0.48 |
| 10995 | 37 | 38 | 0.2 | 21.2 | 3.0 | 94.9 | 0.61 | 0.51 |
| 11025 | 37 | 36 | 0.2 | 23.7 | 2.9 | 95.5 | 0.58 | 0.50 |
| 11055 | 42 | 40 | 0.3 | 15.5 | 2.1 | 94.2 | 0.69 | 0.49 |
| 11085 | 36 | 27 | 0.6 | 33.2 | 3.5 | 95.4 | 0.42 | 0.43 |
| 11115 | 37 | 31 | 0.4 | 28.7 | 2.6 | 95.1 | 0.50 | 0.46 |
| 11145 | 35 | 27 | 0.3 | 34.3 | 3.5 | 95.9 | 0.42 | 0.44 |

Table 3. continued

| Depth | Detritus | Silica | Apatite | Dolomite | Calcite | Sum | Silica/ Silica+Carb. | Silica/ Silica+Detritus |
|---|---|---|---|---|---|---|---|---|
| 11175 | 37 | 30 | 0.7 | 30.5 | 2.4 | 95.4 | 0.47 | 0.45 |
| 11205 | 35 | 34 | 1.0 | 27.0 | 2.5 | 95.3 | 0.53 | 0.49 |
| 11235 | 34 | 28 | 0.7 | 34.6 | 3.1 | 95.4 | 0.42 | 0.45 |
| 11265 | 42 | 37 | 0.5 | 18.0 | 2.0 | 93.7 | 0.65 | 0.47 |
| 11295 | 29 | 24 | 2.0 | 40.4 | 4.6 | 95.2 | 0.35 | 0.46 |
| 11325 | 33 | 40 | 0.9 | 23.0 | 2.8 | 94.7 | 0.61 | 0.55 |
| 11355 | 35 | 40 | 0.4 | 20.3 | 4.8 | 94.2 | 0.61 | 0.53 |
| 11385 | 44 | 38 | 0.3 | 15.2 | 2.9 | 93.8 | 0.68 | 0.46 |
| 11415 | 36 | 43 | 0.2 | 18.4 | 3.0 | 95.0 | 0.67 | 0.54 |
| 11445 | 33 | 43 | 0.2 | 17.5 | 5.6 | 94.8 | 0.65 | 0.57 |
| 11475 | 36 | 46 | 0.3 | 12.7 | 4.5 | 94.0 | 0.73 | 0.56 |
| 11505 | 38 | 44 | 0.2 | 15.3 | 2.8 | 94.2 | 0.71 | 0.54 |
| 11535 | 45 | 36 | 0.1 | 17.1 | 2.6 | 94.3 | 0.64 | 0.44 |
| 11565 | 46 | 33 | 0.4 | 16.2 | 4.9 | 94.0 | 0.61 | 0.42 |
| 11595 | 44 | 32 | 0.4 | 14.5 | 9.6 | 93.3 | 0.57 | 0.42 |
| 11625 | 38 | 41 | 0.2 | 13.7 | 6.8 | 94.3 | 0.67 | 0.52 |
| 11655 | 41 | 35 | 0.3 | 10.6 | 12.4 | 93.9 | 0.61 | 0.46 |
| 11685 | 46 | 29 | 0.6 | 12.0 | 12.9 | 93.2 | 0.54 | 0.39 |
| 11715 | 38 | 34 | 0.3 | 9.3 | 17.6 | 93.9 | 0.56 | 0.47 |
| 11745 | 39 | 31 | 0.5 | 11.3 | 18.8 | 93.9 | 0.50 | 0.44 |
| 11775 | 46 | 27 | 0.2 | 16.3 | 10.5 | 92.9 | 0.50 | 0.37 |
| 11805 | 51 | 31 | 0.0 | 11.3 | 6.6 | 93.4 | 0.64 | 0.38 |
| 11835 | 64 | 25 | 0.0 | 6.2 | 5.2 | 93.2 | 0.69 | 0.28 |
| 11865 | 44 | 30 | 0.6 | 13.0 | 12.2 | 93.6 | 0.54 | 0.40 |
| 11895 | 40 | 29 | 0.6 | 12.6 | 17.1 | 94.1 | 0.50 | 0.42 |
| 11925 | 40 | 33 | 0.4 | 12.0 | 14.8 | 94.2 | 0.55 | 0.45 |
| 11955 | 53 | 26 | 0.4 | 8.6 | 12.2 | 92.7 | 0.55 | 0.32 |
| 11985 | 44 | 26 | 0.4 | 14.6 | 14.6 | 92.5 | 0.47 | 0.37 |
| 12005 | 50 | 29 | 0.4 | 10.3 | 9.5 | 93.0 | 0.60 | 0.37 |
| 12015 | 50 | 37 | 0.3 | 8.3 | 4.9 | 93.2 | 0.74 | 0.42 |
| 12035 | 51 | 28 | 0.4 | 10.7 | 10.3 | 92.7 | 0.57 | 0.35 |
| 12055 | 52 | 28 | 0.3 | 10.4 | 9.0 | 93.3 | 0.59 | 0.35 |
| 12075 | 41 | 27 | 0.3 | 21.9 | 10.2 | 93.6 | 0.45 | 0.40 |
| 12105 | 48 | 26 | 0.3 | 17.8 | 8.5 | 93.0 | 0.50 | 0.35 |
| 12135 | 49 | 28 | 0.2 | 16.7 | 5.9 | 93.1 | 0.56 | 0.37 |
| 12165 | 49 | 29 | 0.2 | 14.3 | 7.0 | 93.0 | 0.58 | 0.37 |
| 12195 | 51 | 24 | 0.2 | 13.8 | 10.6 | 92.9 | 0.50 | 0.32 |
| 12225 | 54 | 22 | 0.1 | 14.8 | 9.0 | 91.4 | 0.48 | 0.29 |
| 12255 | 61 | 21 | 0.1 | 12.0 | 5.7 | 93.0 | 0.54 | 0.25 |
| 12285 | 64 | 22 | -0.1 | 9.9 | 3.8 | 93.5 | 0.62 | 0.26 |
| 12315 | 67 | 23 | 0.0 | 7.3 | 3.5 | 93.4 | 0.68 | 0.25 |
| 12345 | 56 | 23 | 0.1 | 14.0 | 6.9 | 93.3 | 0.52 | 0.29 |
| 12375 | 53 | 22 | 0.2 | 16.5 | 8.6 | 93.3 | 0.47 | 0.30 |
| 12405 | 50 | 21 | 0.2 | 19.1 | 10.0 | 90.5 | 0.41 | 0.29 |
| 12435 | 47 | 25 | 0.3 | 17.4 | 11.2 | 89.0 | 0.46 | 0.34 |
| 12465 | 50 | 27 | 0.3 | 14.5 | 8.6 | 93.5 | 0.54 | 0.35 |
| 12495 | 49 | 28 | 0.2 | 14.7 | 7.9 | 94.0 | 0.56 | 0.37 |

Table 3. continued

| Depth | Detritus | Silica | Apatite | Dolomite | Calcite | Sum | Silica/ Silica+Carb. | Silica/ Silica+Detritus |
|---|---|---|---|---|---|---|---|---|
| 12525 | 58 | 26 | 0.1 | 11.5 | 5.1 | 94.0 | 0.61 | 0.31 |
| 12555 | 55 | 29 | 0.1 | 10.3 | 5.7 | 94.6 | 0.65 | 0.35 |
| 12585 | 60 | 26 | 0.1 | 9.4 | 5.2 | 92.9 | 0.64 | 0.30 |
| 12615 | 48 | 35 | 0.1 | 11.0 | 6.4 | 93.5 | 0.67 | 0.42 |
| 12645 | 39 | 37 | 0.1 | 17.3 | 6.9 | 92.5 | 0.60 | 0.48 |
| 12675 | 30 | 40 | 0.2 | 17.7 | 12.0 | 86.5 | 0.58 | 0.57 |
| 12705 | 35 | 37 | 0.2 | 15.5 | 12.5 | 92.4 | 0.57 | 0.51 |
| 12735 | 36 | 35 | 0.2 | 14.9 | 13.9 | 94.0 | 0.55 | 0.49 |
| 12765 | 47 | 29 | 0.1 | 12.5 | 10.9 | 91.5 | 0.56 | 0.38 |
| 12795 | 44 | 26 | 0.2 | 19.0 | 11.3 | 94.2 | 0.46 | 0.37 |
| 12825 | 43 | 28 | 0.2 | 16.6 | 11.9 | 86.4 | 0.50 | 0.40 |
| 12855 | 48 | 26 | 0.1 | 15.2 | 10.4 | 93.6 | 0.51 | 0.35 |
| 12885 | 47 | 32 | 0.1 | 11.5 | 9.5 | 94.0 | 0.60 | 0.40 |
| 12915 | 46 | 33 | 0.1 | 11.5 | 9.3 | 93.4 | 0.61 | 0.42 |
| 12945 | 46 | 33 | 0.1 | 12.0 | 8.4 | 93.2 | 0.62 | 0.42 |
| 12975 | 41 | 37 | 0.1 | 12.2 | 9.8 | 93.9 | 0.63 | 0.48 |
| 13005 | 35 | 41 | 0.1 | 10.2 | 13.5 | 94.4 | 0.63 | 0.54 |
| 13035 | 49 | 36 | 0.2 | 8.3 | 6.6 | 94.4 | 0.71 | 0.43 |
| 13065 | 47 | 38 | 0.1 | 7.8 | 7.1 | 93.8 | 0.72 | 0.45 |
| 13095 | 43 | 43 | 0.0 | 8.1 | 5.6 | 94.0 | 0.76 | 0.50 |
| 13125 | 44 | 40 | 0.1 | 10.4 | 5.3 | 93.5 | 0.72 | 0.47 |
| 13155 | 46 | 41 | 0.1 | 8.4 | 4.6 | 93.8 | 0.76 | 0.48 |
| 13185 | 49 | 35 | 0.0 | 9.7 | 6.9 | 91.5 | 0.67 | 0.41 |
| 13215 | 50 | 29 | 0.1 | 14.0 | 6.6 | 92.8 | 0.59 | 0.37 |
| 13245 | 48 | 25 | 0.0 | 21.0 | 6.0 | 92.7 | 0.48 | 0.34 |

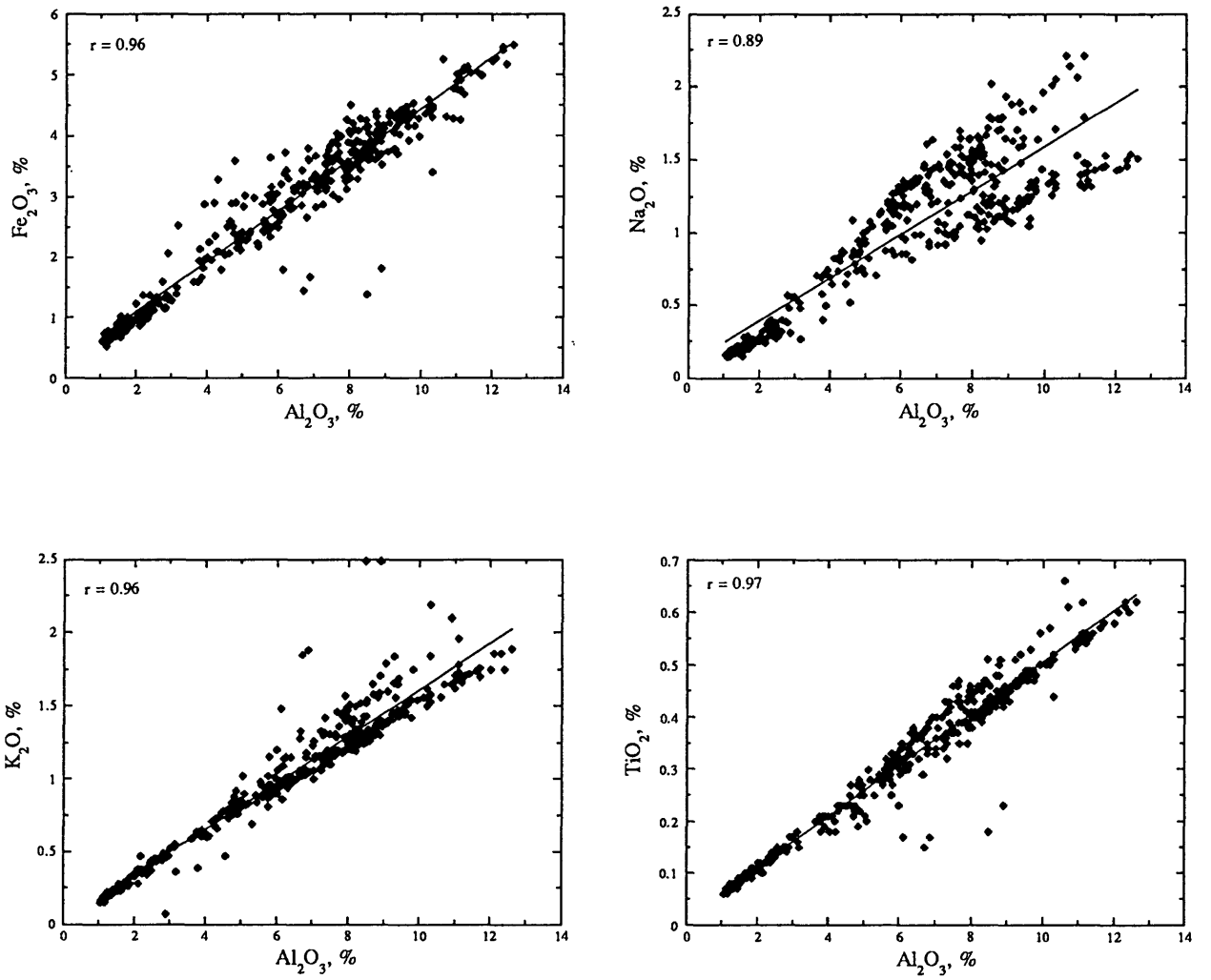


Figure 2. $Al_2O_3$ versus other major oxides in bulk cuttings from the OCS 0315-1 well. Correlations were calculated by least-squares linear regression; "r" is the correlation coefficient.

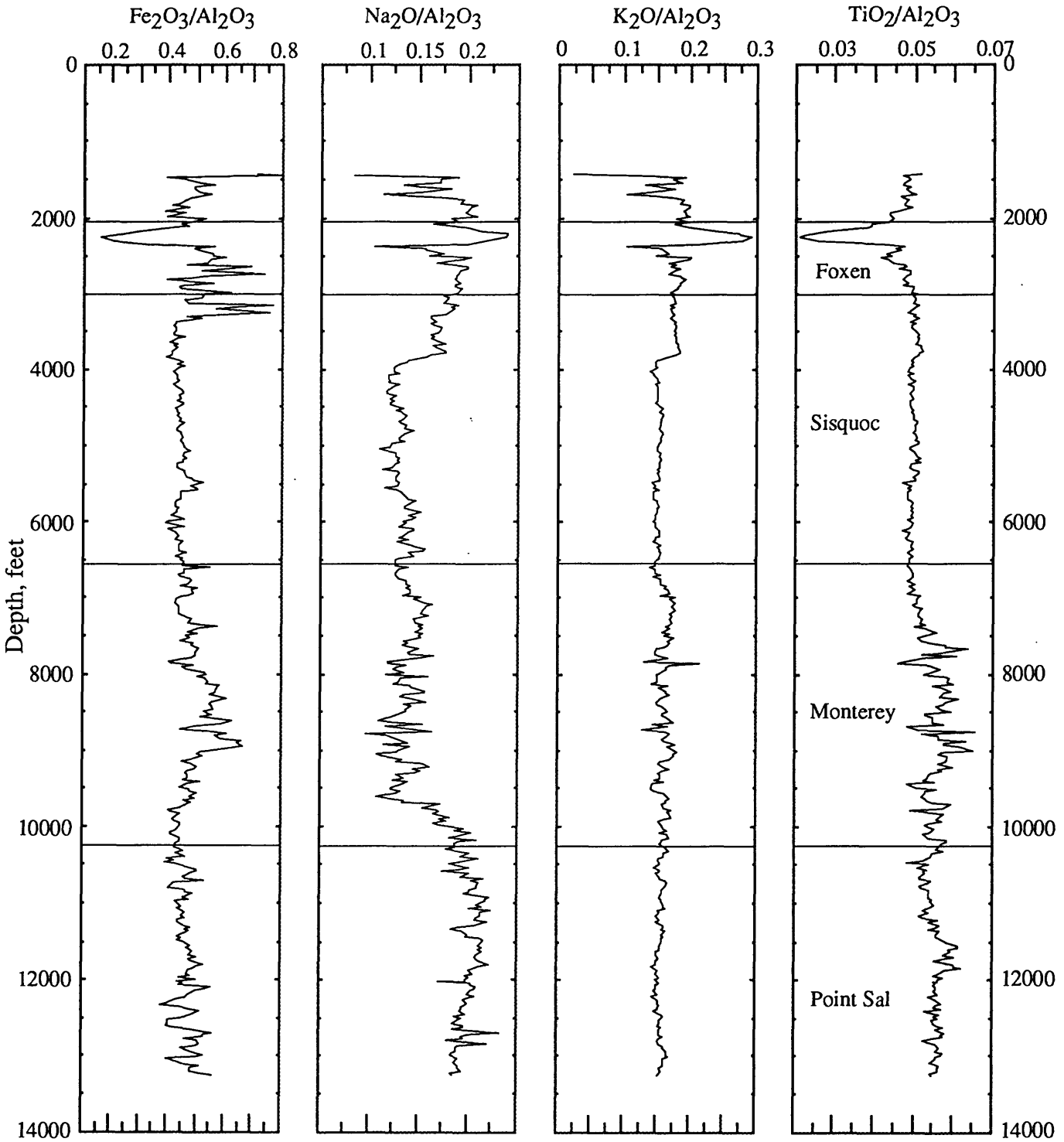


Figure 3. Oxide ratios versus depth in bulk cuttings from the OCS 0315-1 well.

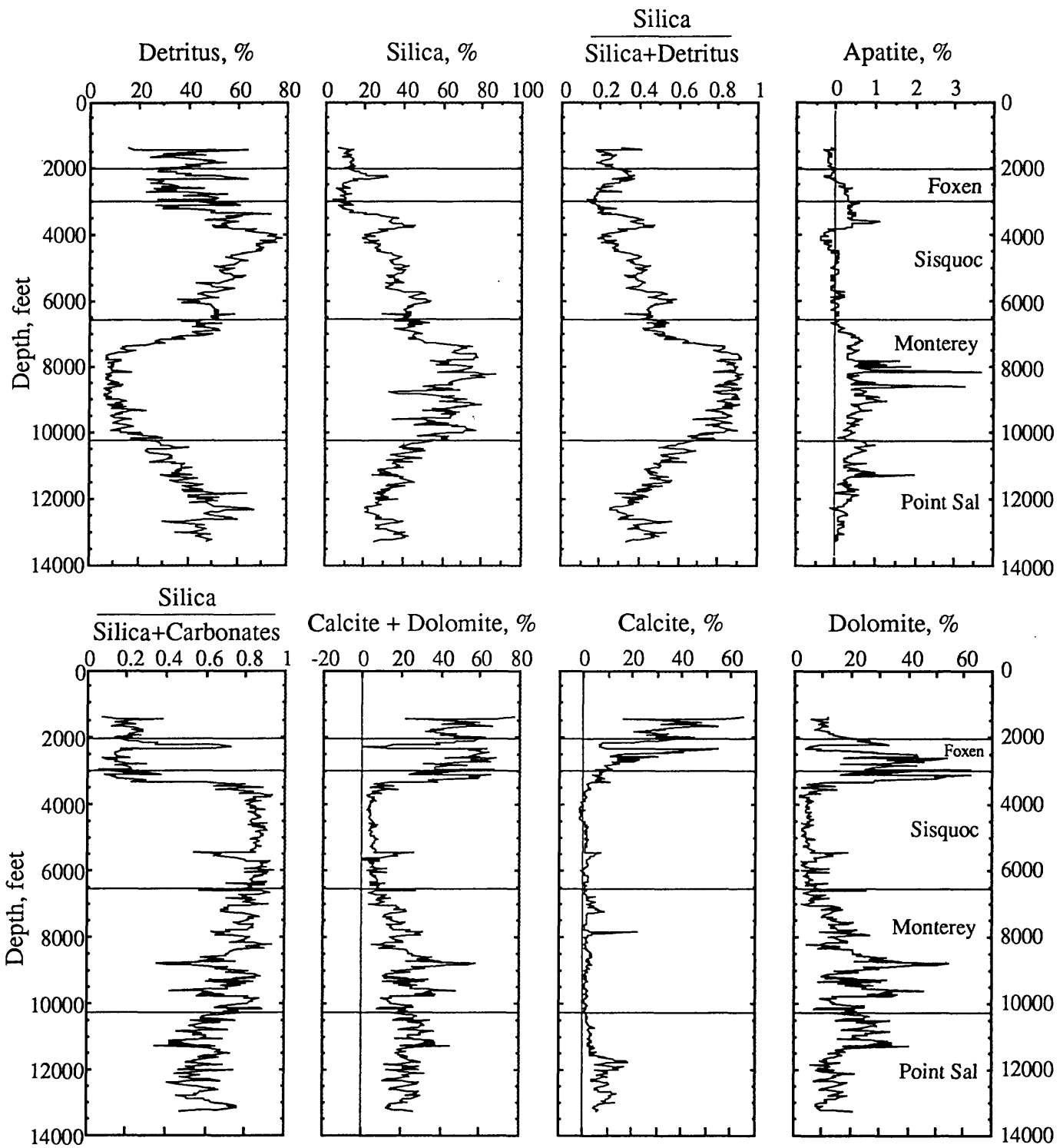


Figure 4. Summary of sedimentary components and selected parameters vs. depth in bulk cuttings from the OCS 0315-1 well.

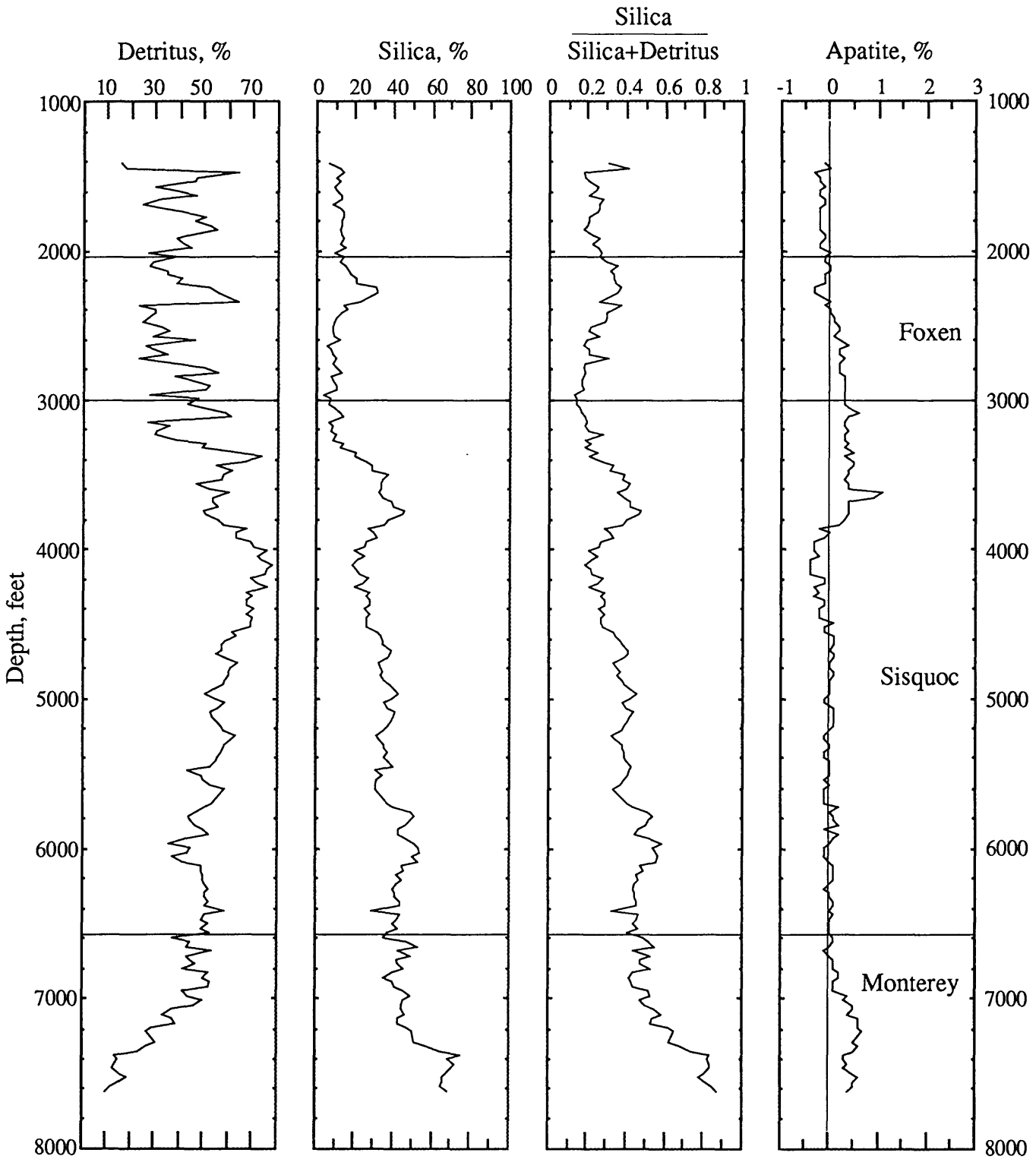


Figure 5A. Detritus, silica, silica/(silica + detritus) and apatite vs. depth in the OCS 0315.1 well from 1405 to 7605 ft.

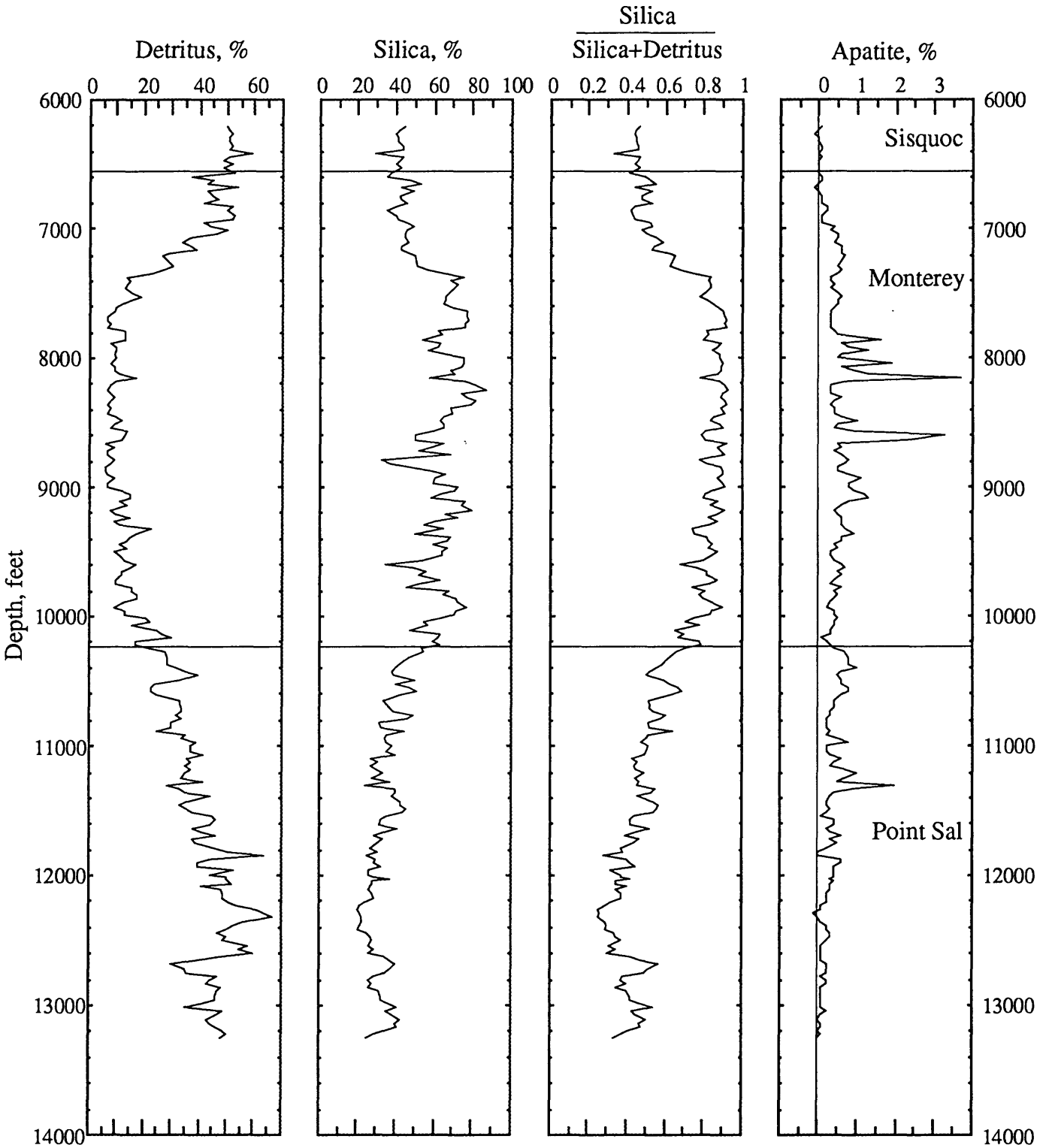


Figure 5B. Detritus, silica, silica/(silica + detritus), and apatite vs. depth in the OCS 0315-1 well from 6195 to 13241 ft.

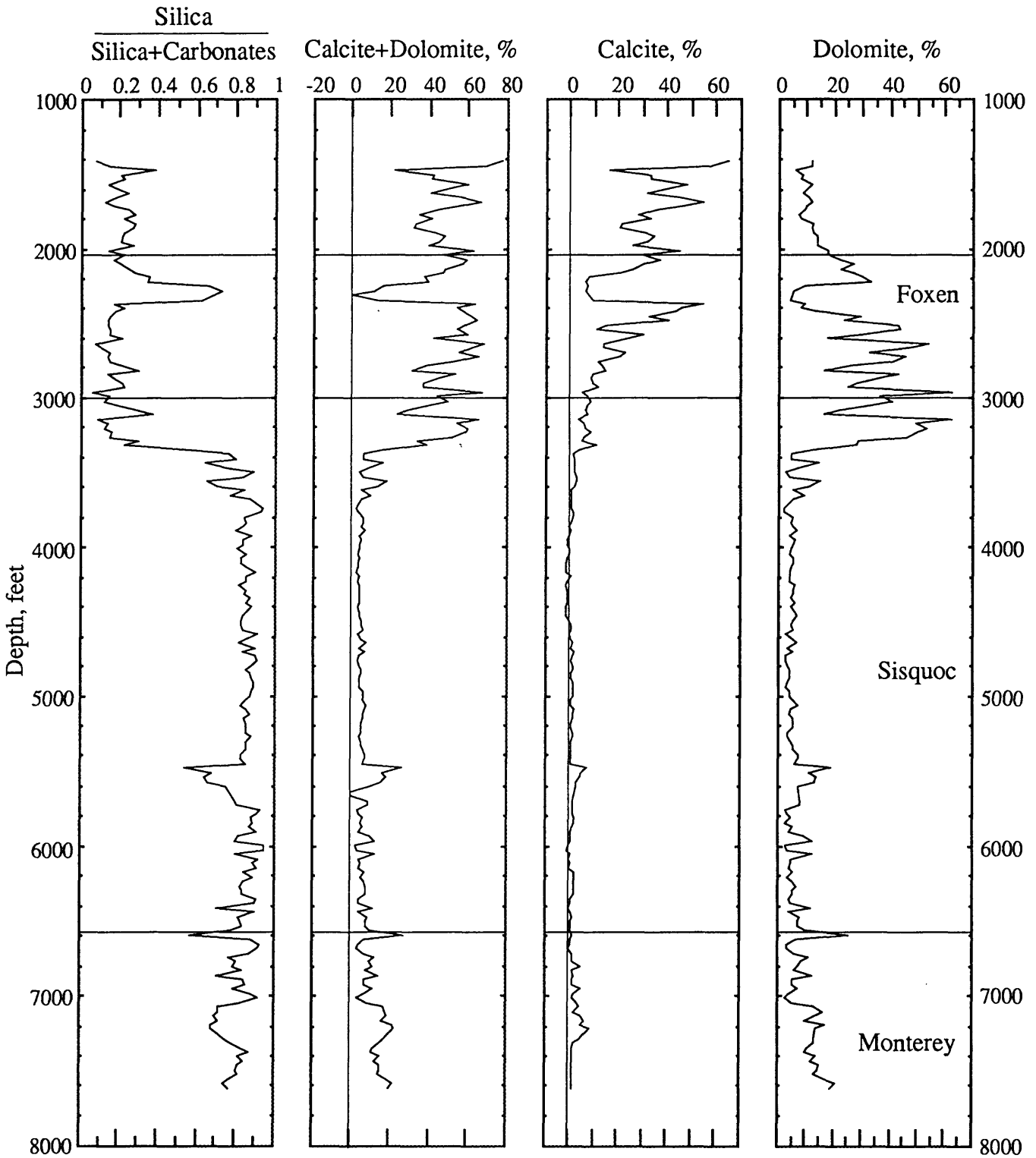


Figure 6A. Silica/(silica + carbonates), calcite + dolomite, calcite, dolomite vs. depth in the OCS 0315-1 well from 1405 to 7605 ft.

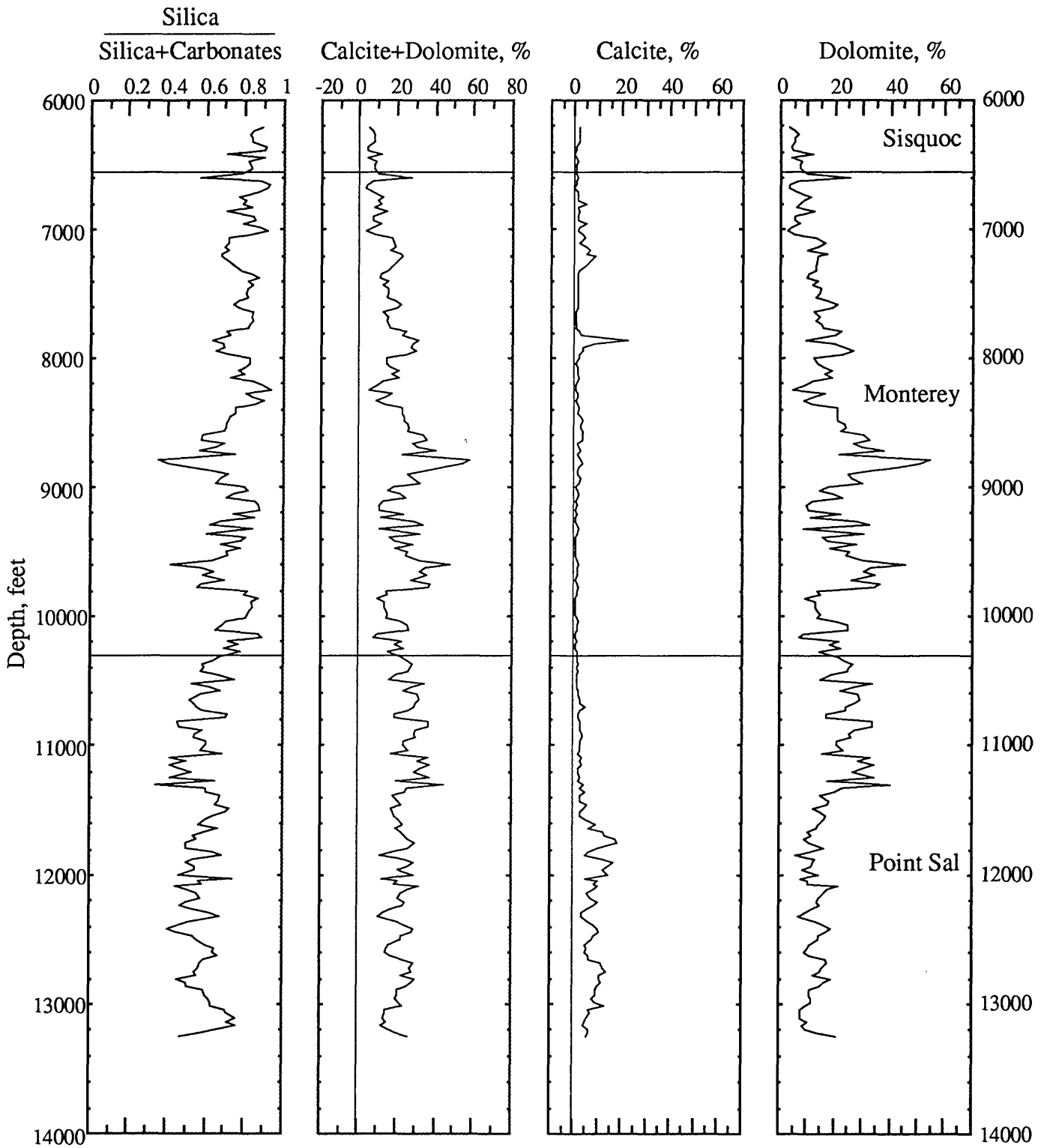


Figure 6B. Silica/(silica + carbonates), calcite + dolomite, calcite, and dolomite vs. depth in the OCS 0315-1 well from 6195 to 13241 ft.

ACKNOWLEDGMENTS

We gratefully thank Texaco U.S.A., and especially C. Michael Clayton and Robert Moll, for their generous release of the cuttings and paleontology data on this well. A preliminary version of the manuscript was reviewed by James F. Herring of the U.S. Geological Survey (Denver, Colorado) and Margaret A. Keller of the U.S. Geological Survey (Menlo Park, California). David F. Siems was project leader for major oxide analyses.

REFERENCES

California Divison of Oil and Gas, 1974, California Oil and Gas Fields, South, Central Coastal, and Offshore California: California Division of Oil and Gas Report No. TR12, v. 2.

Isaacs, C. M., 1980, Diagenesis in the Monterey Formation examined laterally along the coast near Santa Barbara, California: Stanford University unpublished Ph.D. thesis, 329 p.

Isaacs, C. M., 1987, Use of well cuttings for determining compositional trends in the Monterey Formation, California [abs.]: American Association of Petroleum Geologists Bulletin, v. 71, p. 570-571.

Isaacs, C. M., and Tomson, J. T., 1990, Reconnaissance study of petroleum source-rock characteristics of core samples from the Sisquoc and Monterey Formations in a north-south subsurface transect across the onshore Santa Maria basin and in surface sections along the Santa Barbara-Ventura coast, southern California: U.S. Geological Survey Open-File Report 89-108, 43 p.

Isaacs, C. M., Jackson, L. L., Stewart, K. C., and Scott, N., 1989a, Analytical reproducibility and abundances of major oxides, total carbon, organic carbon, and sedimentary components of Miocene and early Pliocene cuttings from the Point Conception Deep Stratigraphic Test Well, OCS-Cal 78-164 No. 1, offshore Santa Maria basin, southern California: U.S. Geological Survey Open-File Report 87-75, 28 p.

Isaacs, C. M., Stewart, K. C., and Jackson, L. L., 1986, Evaluating compositional trends in Miocene-Pliocene strata of south-central coastal California [abs], in Carter, L. M. H., ed., USGS Research on Energy Resources - 1986 Program and Abstracts: U.S. Geological Survey Circular 974, p. 30.

Isaacs, C. M., Taggart, J. E., Jr., Jackson, L. L., and Scott, N., 1989b, Analytical reporducibillity and abundances of major elements and sedimentary components in cores from the Sisquoc, Monterey, and Point Sal Formations, Union Newlove 51 well, Orcutt oil field, onshore Santa Maria basin, California: U.S. Geological Survey Open-File Report 89-459, 23 p.

Isaacs, C. M., Tomson, J. H., Stewart, K. C. Jackson, L. L., 1990, Abundances of major elements and sedimentary components of cuttings from the Foxen Mudstone and the Sisquoc, Monterey, and Point Sal Formations in the Union Hobbs 22 well, and

preliminary comparison with cores from the Union Newlove 51 well, Orcutt oil field, onshore Santa Maria basin, California: U.S. Geological Survey Open-File Report 89-466, 22 p.

Isaacs, C. M., Tomson, J. H., Stewart, K. C. Jackson, L. L., 1992, Abundances of major elements and sedimentary components in cuttings from the Repetto, Sisquoc, and Monterey Formations, OCS P-0188 H-1 and H-2 wells, Hondo oil field, offshore Santa Barbara-Ventura basin, southern California: U.S. Geological Survey Open-File Report 92-383, 46 p.

Murata, K. J., Friedman, I., and Cremer, M., 1972, Geochemistry of diagenetic dolomites in Miocene marine formations of California and Oregon: U.S. Geological Survey Professional Paper 724, p. C1-C12.

Taggart, J. E., Jr., Lindsay, J. R., Scott, B. A., Vivit, D. V. Bartel, A. J., and Stewart, K. C., 1987, Analysis of geologic materials by wavelength-dispersive X-ray fluorescence spectromety in Baedecker, P. A., ed., Methods for Geochemical Analysis: U.S. Geological Survey Bulletin 1770, p. E1-E19.

Taggart, J. E., Jr., and Wahlberg, J. S., 1980a, A new in-muffle automatic fluxer design for casting glass discs for X-ray fluorescence analysis: Federation of Analytical Chemists and Spectroscopy Societies Meeting, Philadelphia, Pa., September 1980.

Taggart, J. E., Jr., and Wahlberg, J. S., 1980b, New mold design for casting fused samples, in Rhodes, J. R., ed., Twenty-eighth annual conference on applications of X-ray analysis: Advances in X-ray analysis, v. 23, p. 257-261.

Taggart, J. E., Lichte, F. E., and Wahlberg, J. S., 1981, Methods of analysis of samples using X-ray fluorescence and induction-coupled plasma spectroscopy, in Lipman, P. W., ed., The 1980 eruptions of Mount St. Helens, Washington: U.S. Geological Survey Professional Paper 1250, p. 683-687.

Williams, B., 1985, Big finds spur push off California: Oil and Gas Journal, v. 83, no. 2, p. 55-64.