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Geochemical and mineralogic data from  
the Lamprecht and Felder uranium deposits,  
Live Oak County, Texas

By

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Introduction

The uranium deposits in the Lamprecht and Felder mines are parts of a continuous roll-type orebody in the Miocene Oakville Sandstone, Ray Point uranium district, Live Oak County, south Texas (fig. 1). Published studies of these deposits (Klohn and Pickens, 1970; Galloway, 1977; Galloway and others, 1979; Goldhaber and others, 1979, 1982; Reynolds and others, 1980, 1982; Ludwig and others, 1982) have focused primarily on depositional environment of the host beds, on stratigraphic and structural settings, on the geochemistry of modern ground waters, on abundances, distribution, and textures of the iron disulfide ( $\text{FeS}_2$ ) minerals, on uranium-lead and sulfur isotope systematics, and on sulfidization and mineralization processes. Genetic models for uranium mineralization of the Felder and Lamprecht deposits are given by Galloway (1981) and by Goldhaber and others (1982).

We present here the full data set of geochemical analyses and mineralogic data for samples from the Lamprecht and Felder deposits. These analyses were made in the Analytical Laboratories of the U.S. Geological Survey, in Denver, or in commercial laboratories. Analyses from commercial laboratories were made available to us by the Wyoming Mineral Corporation (WMC). In addition, the relative abundances of pyrite and marcasite are listed for all samples from the Felder deposit and most samples from the Lamprecht deposit. This report complements our earlier studies of the Felder and Lamprecht deposits which summarize some of the analytical data but which, for the most part, do

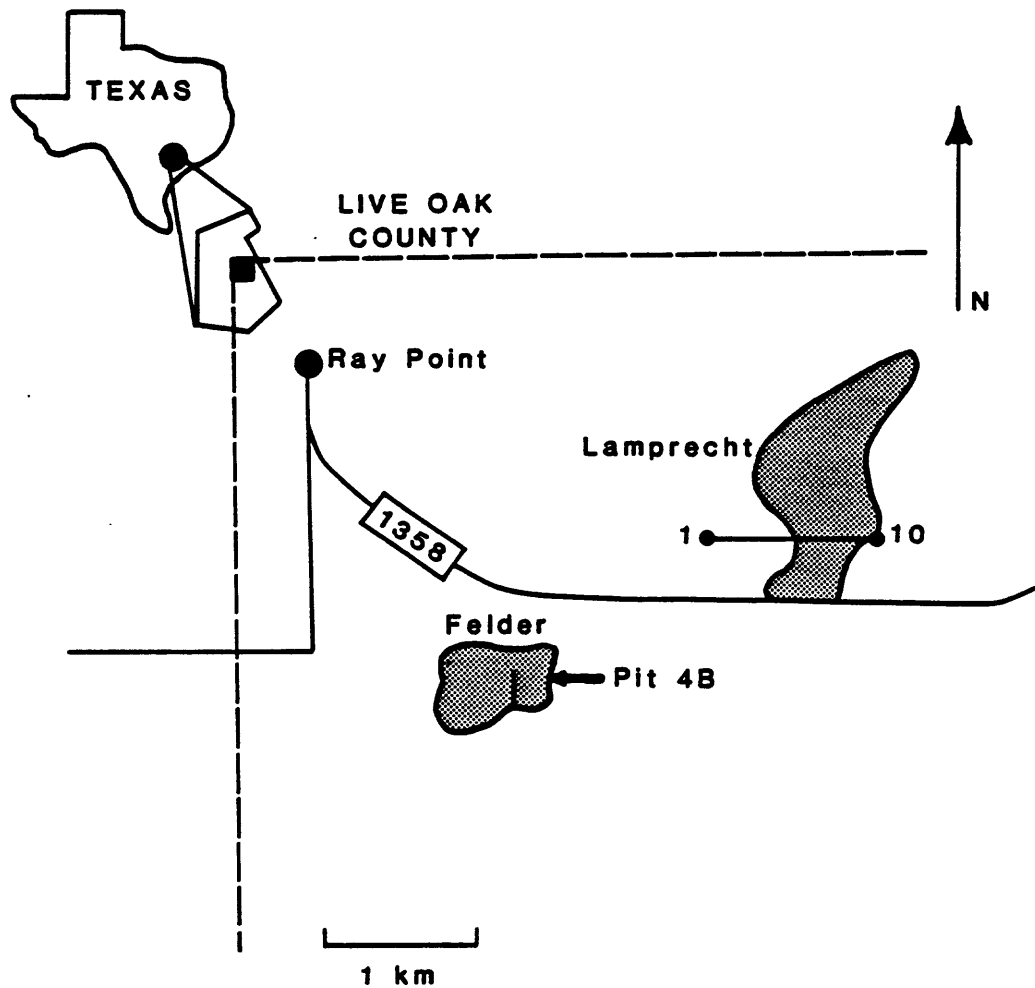


Figure 1.--Location map of the Felder uranium deposit, pit 4B, and the Lamprecht uranium deposit. Stippled areas represent the extent of uranium mineralization of each deposit. Core fence between cores 1 and 10 in the Lamprecht deposit is shown by line across the deposit. (Modified from Galloway and others, 1979).

not contain complete data sets of the analytical results. In particular, this report is intended to supplement the paper by Goldhaber and others (1982) in which the origin of the uranium deposits in the Ray Point district is discussed.

### Sampling and analytical methods

Samples of the Oakville Sandstone in the vicinity of the Lamprecht deposit were obtained by core drilling methods. Ten cores along a line that spanned 1.6 km across the deposit (fig. 2) yielded 195 samples. Sixty-four samples from the Felder deposit were collected from the wall of open pit 4B and represent a transect of about 105 m across the deposit (fig. 3).

Results for samples from the Lamprecht deposit are given in Tables 1 through 4. Sulfur (S), molybdenum (Mo), selenium (Se), and uranium (U) contents, sulfur isotopic composition<sup>1</sup>, and relative abundances (visually estimated) of pyrite and marcasite in numerous samples are listed in Tables 1-1 through 1-10 for cores 1 through 10 respectively. Actual uranium values for the Lamprecht deposit are not given at the request of WMC but rather are listed as greater than or less than 50 ppm with samples containing greater than 50 ppm U arbitrarily defined as mineralized.

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<sup>1</sup>The sulfur isotopic compositions ( $\delta^{34}\text{S}$ ) are expressed as the per mil variation between the ratio of  $^{32}\text{S}/^{34}\text{S}$  in the sample to that of a standard (Cañon Diablo troilite) as determined from the relationship

$$\delta^{34}\text{S}_{\text{sample}} = \left[ \frac{\left( \frac{^{32}\text{S}}{^{34}\text{S}} \right)_{\text{sample}}}{\left( \frac{^{32}\text{S}}{^{34}\text{S}} \right)_{\text{standard}}} - 1 \right] \times 1000$$

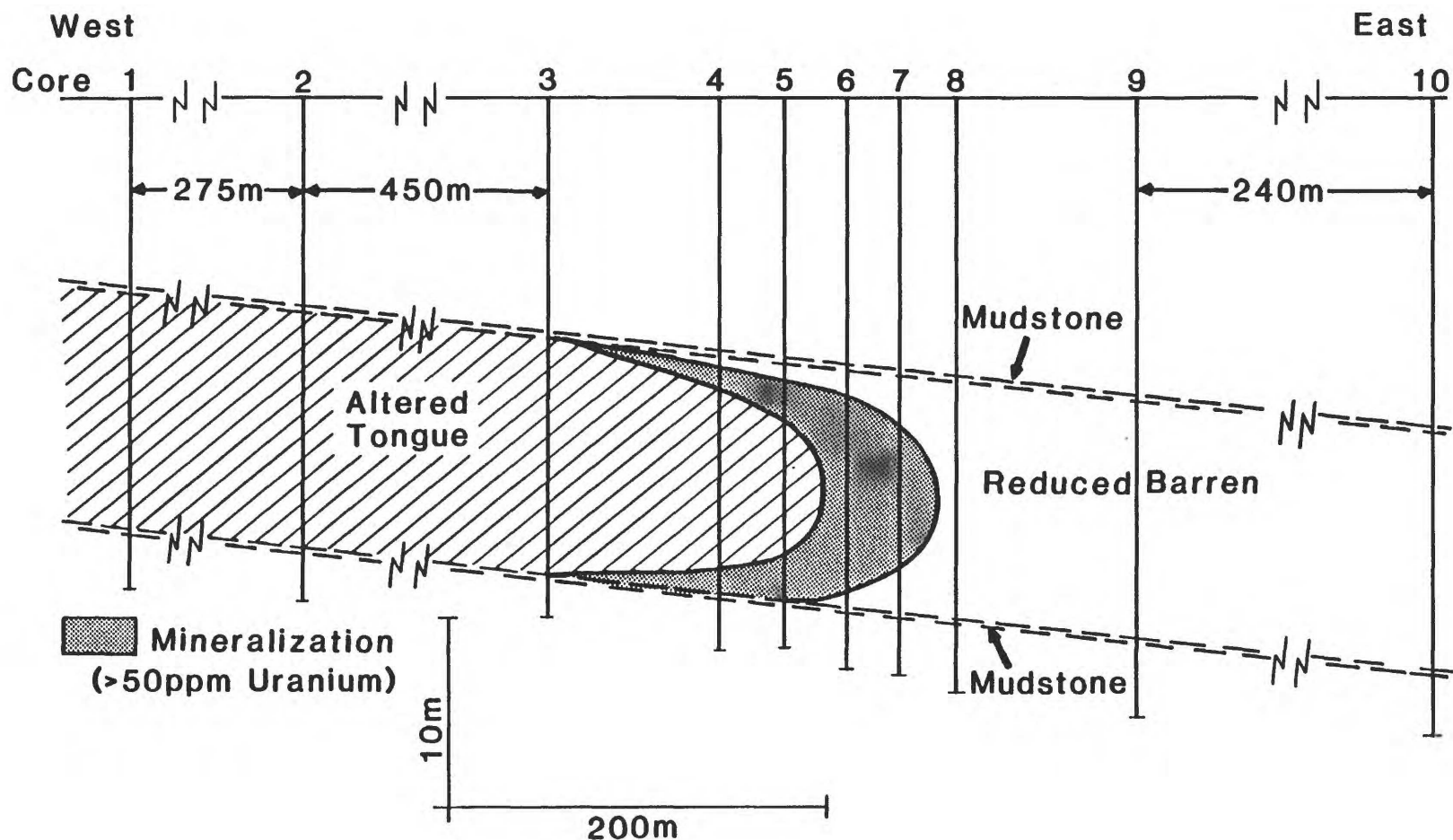


Figure 2.--Cross section of the Lamprecht deposit showing core holes and major geochemical zones. Mineralized ground is arbitrarily defined as that containing greater than 50 ppm uranium.

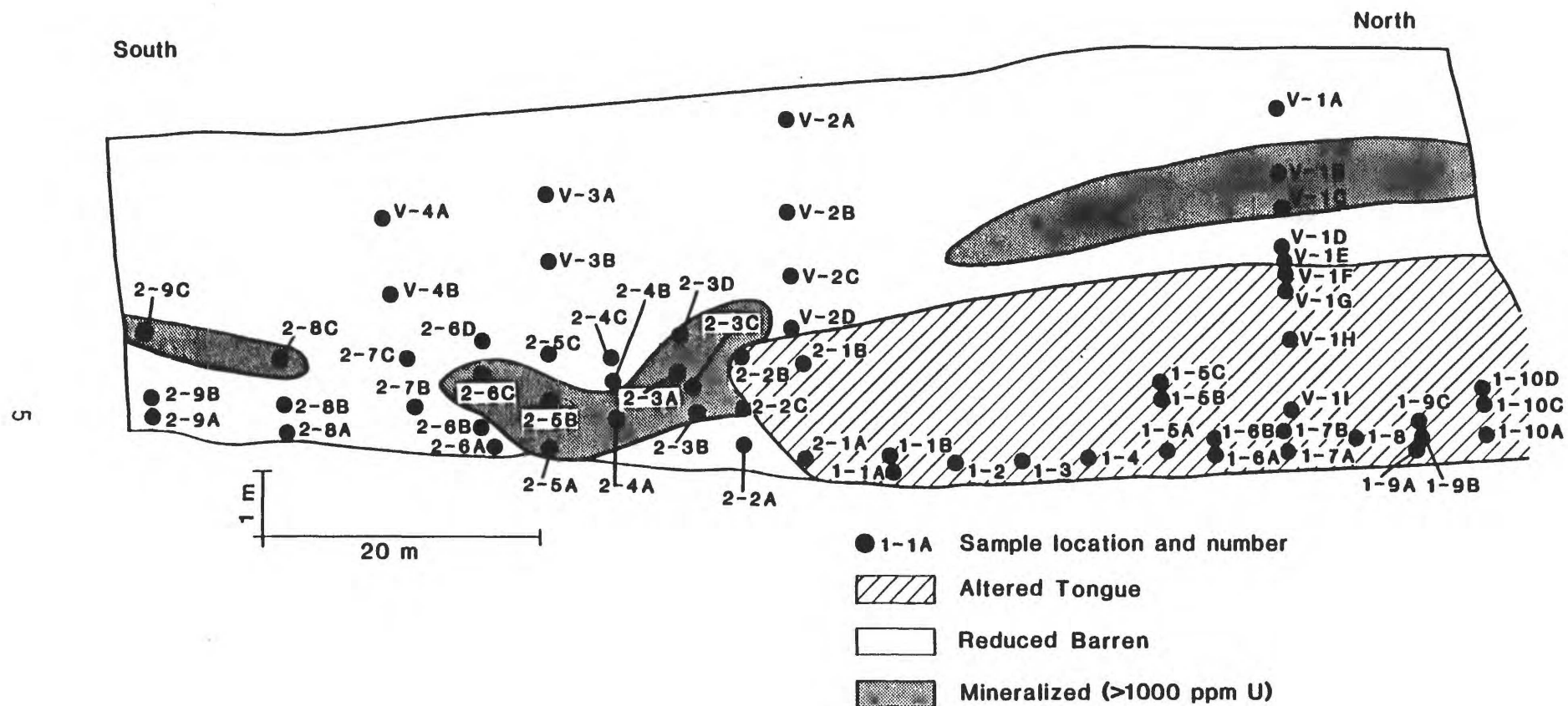


Figure 3.--Cross section of pit 4B in the Felder deposit showing sampling locations, sample numbers, and major geochemical zones. Mineralized ground is arbitrarily defined as that containing greater than 1000 ppm uranium.

In numerous samples, sulfur was determined by induction furnace techniques; those samples are noted in Tables 1-1 through 1-10 with an asterisk (\*). Sulfur contents in the remaining samples were calculated from the weight percent  $\text{FeS}_2$  in a heavy mineral separate (determined by WMC) using equation (1):

$$\%S = \% \text{FeS}_2 \times \frac{64 \text{g S/mole FeS}_2}{120 \text{g FeS}_2/\text{mole FeS}_2} \quad (1)$$

where % S is the weight percent sulfur in the sample, %  $\text{FeS}_2$  is the weight percent pyrite in the heavy mineral separate. Results from those samples in which sulfur was determined by both methods reveal that most calculated values are less than the sulfur content determined by induction furnace techniques.

Major elements determined by X-ray fluorescence in 26 Lamprecht samples are listed in Table 2; pyrite-marcasite ratios by X-ray diffraction analyses in Table 3; and organic carbon by induction furnace techniques in Table 4.

Results for samples from the Felder deposit are given in Tables 5 and 6. Uranium contents, determined by delayed neutron techniques, organic carbon (carbonate carbon removed by acid leach prior to analyses) and sulfur determinations by induction furnace techniques, relative pyrite-marcasite abundances by visual estimations, and sulfur isotopic compositions, are given in Table 5. Mineralized samples listed in Table 5 are arbitrarily defined as containing more than 1000 ppm uranium. Data from semiquantitative 6-step spectroscopy are listed in Table 6. Semiquantitative spectrographic analytical determinations are identified with geometric brackets, the boundaries of which are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of these brackets 1.0, 0.7, 0.5, 0.3, 0.2,

0.15, 0.1, etc. Reported value precision is approximately plus or minus one bracket at 68 percent, or two brackets at 95 percent confidence.

In Table 6, the symbol "N" indicates the element was not detected at the limit of determination or at the value shown; and "L" indicates that although the element was detected, it was below the limit of determination or below the value shown. The detection limits for spectrographic analyses in the USGS laboratories are shown in Table 7.

Silicon content in all of the samples occurred in indeterminate amounts greater than 10 percent. The following elements were not detected by semiquantitative spectrographic means in any of the Felder samples; phosphorous, silver, arsenic, gold, bismuth, cadmium, palladium, platinum, antimony, tellurium, tungsten, zinc, cerium, germanium, hafnium, indium, lithium, rhenium, tantalum, thorium, and thallium.

#### Acknowledgments

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Table 1-1.--Analyses of sample from Core 1, Lamprecht deposit, south Texas  
 [--, not determined; S, sandstone; r, reduced barren rock; \*\*, percent  
 pyrite of the iron disulfide mineral population]

| Sample Description |           |                                   | U   | Se<br>ppm | Mo | S<br>% | $\delta^{34}\text{S}$<br>per mil | Pyrite** |
|--------------------|-----------|-----------------------------------|-----|-----------|----|--------|----------------------------------|----------|
| Number             | Depth (m) | Lithology and<br>Geochemical zone |     |           |    |        |                                  |          |
| GP-1-20            | 65.2-66.1 | Sr                                | <50 | 2         | 2  | 0.83   | -13.5                            | 50       |

Table 1-2.--Analyses of samples from Core 2, Lamprecht deposit, south Texas  
 [--, not determined; S, sandstone; M, mudstone; r, reduced barren;  
 m, mineralized; a, altered tongue; \*, sulfur contents determined by  
 induction furnace techniques; \*\*, percent pyrite of the iron disulfide  
 mineral population]

| Sample Description |           |                                   | U   | Se<br>ppm | Mo | S<br>% | $\delta^{34}\text{S}$<br>per mil | Pyrite** |
|--------------------|-----------|-----------------------------------|-----|-----------|----|--------|----------------------------------|----------|
| Number             | Depth (m) | Lithology and<br>Geochemical zone |     |           |    |        |                                  |          |
| GP-2-1             | 66.4-67.1 | Sa                                | <50 | <2        | 2  | 0.69*  | +19.2                            | 90       |
| 2-2                | 67.1-67.7 | Sr                                | <50 | 2         | 2  | 1.19   | -3.4                             | 60       |
| 2-3                | 67.7-67.8 | Sr                                | <50 | 3         | 2  | 0.71   | --                               | 40       |
| 2-4                | 67.8-68.6 | Mm                                | >50 | 100       | 16 | 0.76   | -18.3                            | 50       |

Table 1-3.--Analyses of samples from Core 3, Lamprecht deposit, south Texas  
 [--, not determined; S, sandstone; M, mudstone; r, reduced barren;  
 m, mineralized; a, altered tongue; \*, sulfur contents determined by  
 induction furnace techniques; \*\*, percent pyrite of the iron disulfide  
 mineral population]

| Sample Description |           |                                   |     |           |    |        |                                  |          |
|--------------------|-----------|-----------------------------------|-----|-----------|----|--------|----------------------------------|----------|
| Number             | Depth (m) | Lithology and<br>Geochemical zone | U   | Se<br>ppm | Mo | S<br>% | $\delta^{34}\text{S}$<br>per mil | Pyrite** |
| GP-3-8             | 62.5-63.1 | Mr                                | <50 | <2        | 2  | 0.34   | --                               | 90       |
| 3-9                | 63.1-63.7 | Mr                                | <50 | <2        | 2  | 0.17   | --                               | 100      |
| 3-10               | 63.7-64.0 | Mr                                | <50 | <2        | 2  | 1.00   | --                               | 90       |
| 3-11               | 64.0-64.6 | Sr                                | <50 | <2        | 6  | 0.43   | --                               | 70       |
| 3-12               | 64.6-64.9 | Mr                                | <50 | <2        | 2  | 1.00   | --                               | 80       |
| GP-3-13            | 64.9-65.5 | Sr                                | <50 | 2         | 6  | 0.56   | --                               | 40       |
| 3-14               | 65.5-65.8 | Sr                                | <50 | 2         | 8  | 0.68   | --                               | 35       |
| 3-15               | 65.8-66.4 | Sr                                | <50 | 3         | 16 | 1.31*  | -18.1                            | 15       |
| 3-16               | 66.4-67.1 | Sr                                | <50 | 8         | 24 | 1.39   | --                               | 15       |
| 3-17               | 67.1-67.5 | Sm                                | >50 | 15        | 80 | 0.93   | --                               | 20       |
| GP-3-18            | 67.5-68.3 | Sa                                | <50 | 200       | 4  | 0.85*  | +2.8                             | 45       |
| 3-19               | 68.3-68.9 | Sa                                | <50 | 100       | 4  | 0.28   | --                               | 65       |
| 3-20               | 68.9-69.5 | Sa                                | <50 | 60        | <2 | 0.30   | +26.6                            | 80       |
| 3-21               | 69.5-70.1 | Sa                                | <50 | 30        | <2 | 0.81   | --                               | 90       |
| 3-22               | 70.1-70.7 | Sa                                | <50 | 15        | <2 | 0.06   | --                               | 85       |
| GP-3-23            | 70.7-71.3 | Sa                                | <50 | 12        | 2  | 0.29   | --                               | 85       |
| 3-24               | 71.3-71.9 | Sa                                | <50 | 12        | 2  | 0.15   | --                               | 80       |
| 3-25               | 71.9-72.5 | Sa                                | <50 | 10        | 2  | 0.56*  | +17.5                            | 85       |
| 3-26               | 73.0-73.8 | Sa                                | <50 | 10        | 4  | 0.63   | +16.3                            | 90       |
| 3-27               | 73.8-74.4 | Sa                                | <50 | 8         | 2  | 0.20   | --                               | 70       |
| GP-3-28            | 74.4-75.2 | Sr                                | <50 | 20        | 12 | 0.31   | --                               | 50       |
| 3-29               | 75.2-75.6 | Mm                                | >50 | 150       | 46 | 2.65*  | -44.75                           | 45       |
| 3-30               | 75.6-75.9 | Mr                                | <50 | 3         | 4  | 0.14   | --                               | 65       |

Table 1-4.--Analyses of samples from Core 4, Lamprecht deposit, south Texas  
[--, not determined; S, sandstone; M, mudstone; r, reduced barren;  
m, mineralized; a, altered tongue; \*, sulfur contents determined by  
induction furnace techniques; \*\*, percent pyrite of the iron disulfide  
mineral population]

| Sample Description |           |                                   |     |           |     |        |                                  |          |
|--------------------|-----------|-----------------------------------|-----|-----------|-----|--------|----------------------------------|----------|
| Number             | Depth (m) | Lithology and<br>Geochemical zone | U   | Se<br>ppm | Mo  | S<br>% | $\delta^{34}\text{S}$<br>per mil | Pyrite** |
| GP-4-1             | 62.8-63.4 | Sr                                | <50 | <2        | <2  | 0.51*  | --                               | 60       |
| 4-2                | 63.4-64.0 | Sr                                | --  | --        | --  | 0.25   | --                               | --       |
| 4-3                | 64.4-64.2 | Sr                                | <50 | <2        | 2   | 1.58*  | --                               | 10       |
| 4-4                | 64.2-65.1 | Sr                                | <50 | <2        | 4   | 0.38   | --                               | 70       |
| 4-5                | 65.1-65.7 | Mr                                | <50 | <2        | 4   | 2.18*  | -34.2                            | 95       |
| GP-4-6             | 65.7-66.3 | Mr                                | <50 | <2        | 4   | 0.73   | --                               | 95       |
| 4-7                | 66.3-66.8 | Mr                                | <50 | <2        | 2   | 2.11*  | --                               | 90       |
| 4-8                | 66.8-67.5 | Sr                                | <50 | <2        | 4   | 0.68   | -25.9                            | 60       |
| 4-9                | 67.5-68.1 | Sr                                | <50 | <2        | 12  | 1.51*  | -27.9                            | 20       |
| 4-10               | 68.1-68.7 | Sr                                | <50 | <2        | 8   | 0.94   | -28.0                            | 20       |
| GP-4-11            | 68.7-69.3 | Sr                                | <50 | <2        | 10  | 1.60*  | --                               | 40       |
| 4-12               | 69.3-70.0 | Sm                                | >50 | 5         | 30  | 0.94   | --                               | 30       |
| 4-13               | 70.0-70.4 | Sr                                | <50 | 12        | 26  | 1.75*  | -27.5                            | 25       |
| 4-14               | 70.4-71.0 | Sm                                | >50 | 20        | 18  | 0.51   | --                               | 30       |
| 4-15               | 71.0-71.6 | Sa                                | <50 | 300       | 2   | 0.59*  | +9.9                             | 90       |
| GP-4-16            | 71.6-72.2 | Sa                                | <50 | 400       | 6   | 0.15   | --                               | --       |
| 4-17               | 72.2-72.8 | Sa                                | <50 | 200       | 2   | 1.75*  | +19.2                            | 80       |
| 4-18               | 72.8-73.5 | Sa                                | <50 | 80        | <2  | 0.73   | --                               | 95       |
| 4-19               | 73.6-74.1 | Sa                                | <50 | 70        | <2  | 0.58   | +26.1                            | 95       |
| 4-20               | 74.1-74.7 | Sa                                | <50 | 100       | 2   | 0.17   | --                               | 95       |
| GP-4-21            | 74.7-75.1 | Sa                                | <50 | 30        | 2   | 0.99*  | +15.0                            | 95       |
| 4-22               | 75.1-75.7 | Sa                                | <50 | 100       | 10  | 0.21   | --                               | 90       |
| 4-23               | 75.7-76.5 | Sa                                | <50 | 100       | 2   | 0.59*  | +17.1                            | 80       |
| 4-24               | 76.5-77.1 | Sa                                | <50 | 200       | 6   | 0.40   | --                               | 65       |
| 4-25               | 77.1-77.4 | Sr                                | <50 | 600       | 4   | 1.07*  | -37.0                            | 50       |
| GP-4-26            | 77.4-77.7 | Sm                                | >50 | 120       | 610 | 0.101  | -28.8                            | 50       |
| 4-27               | 77.7-78.3 | Sm                                | >50 | 12        | 100 | 1.07*  | -31.9                            | 70       |

Table 1-5.--Analyses of samples from Core 5, Lamprecht deposit, south Texas  
 [--, not determined; S, sandstone; M, mudstone; r, reduced barren;  
 m, mineralized; a, altered tongue; \*, sulfur contents determined by  
 induction furnace techniques; \*\*, percent pyrite of the iron disulfide  
 mineral population]

| Sample Description |           |                                   | U   | Se  | Mo  | S     | $\delta^{34}\text{S}$ | Pyrite** |
|--------------------|-----------|-----------------------------------|-----|-----|-----|-------|-----------------------|----------|
| Number             | Depth (m) | Lithology and<br>Geochemical zone |     |     |     |       |                       |          |
|                    |           |                                   |     | ppm |     | %     | per mil               |          |
| GP-5-1             | 66.1-67.1 | Mr                                | <50 | <2  | 4   | 0.24  | --                    | 90       |
| 5-2                | 67.1-67.7 | Mr                                | <50 | <2  | 2   | 1.99* | --                    | 60       |
| 5-3                | 67.7-68.3 | Mr                                | <50 | <2  | 4   | 0.24  | --                    | 75       |
| 5-4                | 68.3-68.9 | Sr                                | <50 | <2  | 6   | 1.13* | -26.8                 | 30       |
| 5-5                | 68.9-69.5 | Sr                                | <50 | <2  | 12  | 0.91  | --                    | 20       |
| GP-5-6             | 69.5-70.1 | Sr                                | <50 | <2  | 12  | 0.68  | --                    | 30       |
| 5-7                | 70.1-70.7 | Sr                                | <50 | 2   | 26  | 0.94  | --                    | 30       |
| 5-8                | 70.7-71.3 | Sm                                | >50 | 8   | 60  | 1.65* | -33.5                 | 20       |
| 5-9                | 71.3-71.6 | Sm                                | >50 | 12  | 44  | 0.52  | --                    | 20       |
| 5-10               | 71.6-72.2 | Sm                                | >50 | 25  | 36  | 0.41  | --                    | 15       |
| GP-5-11            | 72.2-72.8 | Sa                                | <50 | 300 | 14  | 0.37  | --                    | 85       |
| 5-12               | 72.8-73.5 | Sa                                | <50 | 250 | 6   | 0.87* | +8.3                  | 80       |
| 5-13               | 73.5-74.1 | Sa                                | <50 | 600 | 4   | 1.07  | --                    | 75       |
| 5-14               | 74.1-74.7 | Sa                                | <50 | 600 | 6   | 0.57  | --                    | 85       |
| 5-15               | 74.7-75.3 | Sa                                | <50 | 200 | 4   | 1.29* | +18.7                 | 90       |
| GP-5-16            | 75.3-75.9 | Sa                                | <50 | 100 | 2   | 0.12  | --                    | 90       |
| 5-17               | 75.9-76.5 | Sm                                | >50 | 200 | 2   | 0.20  | --                    | 95       |
| 5-18               | 76.5-77.1 | Sa                                | <50 | 250 | 8   | 0.58  | --                    | 95       |
| 5-19               | 77.1-77.4 | Sm                                | >50 | 250 | 10  | 0.36  | --                    | 85       |
| 5-20               | 77.4-77.7 | Sm                                | >50 | 800 | 12  | 0.26  | --                    | 75       |
| GP-5-21            | 77.7-78.0 | Sm                                | >50 | 800 | 16  | 0.30  | --                    | 35       |
| 5-22               | 78.0-78.6 | Sm                                | >50 | 100 | 200 | 2.40* | -44.5                 | 35       |
| 5-23               | 78.6-79.2 | Mm                                | >50 | 10  | 14  | 0.06  | --                    | 55       |

Table 1-6.--Analyses of samples from Core 6, Lamprecht deposit, south Texas  
 [--, not determined; S, sandstone; M, mudstone; r, reduced barren;  
 m, mineralized; \*, sulfur contents determined by induction furnace  
 techniques; \*\*, percent pyrite of the iron disulfide population]

| Sample Description |           |                                   |     |           |     |        |                                  |          |
|--------------------|-----------|-----------------------------------|-----|-----------|-----|--------|----------------------------------|----------|
| Number             | Depth (m) | Lithology and<br>Geochemical zone | U   | Se<br>ppm | Mo  | S<br>% | $\delta^{34}\text{S}$<br>per mil | Pyrite** |
| GP-6-4             | 69.2-69.8 | Sr                                | <50 | 15        | 8   | 1.08*  | --                               | 55       |
| 6-5                | 69.8-70.4 | Sr                                | <50 | 15        | 8   | 0.69   | -27.7                            | 50       |
| 6-6                | 70.4-71.0 | Sr                                | <50 | 8         | 60  | 1.88*  | -26.1                            | 25       |
| 6-7                | 71.0-71.6 | Sm                                | >50 | 2         | 65  | 0.15   | --                               | 30       |
| 6-8                | 71.6-72.2 | Sm                                | >50 | 8         | 18  | 0.91   | -28.7                            | 25       |
| GP-6-9             | 72.2-72.8 | Sm                                | >50 | <2        | 20  | 0.51   | --                               | 30       |
| 6-10               | 72.8-73.5 | Sm                                | >50 | 10        | 120 | 1.39*  | -36.7                            | 45       |
| 6-11               | 73.5-74.1 | Sm                                | >50 | 10        | 95  | 1.05   | -43.9                            | 45       |
| 6-12               | 74.1-74.7 | Sm                                | >50 | 2         | 65  | 2.33*  | --                               | 35       |
| 6-13               | 74.7-75.3 | Sm                                | >50 | 8         | 85  | 0.78   | --                               | 35       |
| GP-6-14            | 75.3-75.9 | Sm                                | >50 | 10        | 180 | 1.00*  | -44.2                            | 25       |
| 6-15               | 75.9-76.5 | Sm                                | >50 | 10        | 100 | 0.15   | --                               | 30       |
| 6-16               | 76.5-77.1 | Sm                                | >50 | 5         | 70  | 0.72*  | --                               | 25       |
| 6-17               | 77.1-77.7 | Sm                                | >50 | 8         | 200 | 0.22   | --                               | 45       |
| 6-18               | 77.9-78.6 | Sm                                | >50 | 2         | 50  | 0.95*  | --                               | --       |
| GP-6-19            | 78.6-79.2 | Sm                                | >50 | 2         | 100 | 0.52   | --                               | 50       |
| 6-20               | 79.2-79.6 | Mm                                | >50 | <2        | 210 | 2.25*  | --                               | 35       |

Table 1-7.--Analyses of samples from Core 7, Lamprecht deposit, south Texas  
 [--, not determined; S, sandstone; M, mudstone; r, reduced barren;  
 m, mineralized; \*, sulfur contents determined by induction furnace  
 techniques; \*\*, percent pyrite of the iron disulfide population]

| Sample Description |           |                                   | U   | Se | Mo  | S<br>% | $\delta^{34}\text{S}$<br>per mil | Pyrite** |
|--------------------|-----------|-----------------------------------|-----|----|-----|--------|----------------------------------|----------|
| Number             | Depth (m) | Lithology and<br>Geochemical zone |     |    |     |        |                                  |          |
| GP-7-1             | 67.1-67.4 | Sr                                | <50 | 8  | 2   | 1.45*  | --                               | 30       |
| 2                  | 67.4-68.0 | Mr                                | <50 | <2 | 2   | 0.89   | --                               | 65       |
| 3                  | 68.0-68.6 | Mr                                | <50 | <2 | 2   | 0.25   | --                               | 75       |
| 4                  | 68.6-69.2 | Mr                                | <50 | 2  | 4   | 2.90*  | -26.8                            | 75       |
| 5                  | 69.2-69.8 | Sr                                | <50 | <2 | 10  | 0.67   | --                               | 60       |
| GP-7-6             | 69.8-70.4 | Sr                                | <50 | 2  | 4   | 1.14   | --                               | 30       |
| 7                  | 70.4-71.0 | Sr                                | <50 | 2  | 6   | 1.04*  | --                               | 25       |
| 8                  | 71.0-71.6 | Sm                                | >50 | <2 | 26  | 0.31   | --                               | 15       |
| 9                  | 71.6-72.2 | Sm                                | >50 | <2 | 320 | 0.79   | --                               | 15       |
| 10                 | 72.8-73.5 | Sm                                | >50 | <2 | 60  | 1.55*  | --                               | 15       |
| GP-7-11            | 73.5-74.1 | Sm                                | >50 | <2 | 80  | 0.46   | --                               | 10       |
| 12                 | 74.1-74.7 | Sm                                | >50 | <2 | 150 | 1.20   | --                               | 35       |
| 13                 | 74.7-75.3 | Sm                                | >50 | 2  | 44  | 1.20*  | --                               | 35       |
| 14                 | 75.3-75.6 | Sm                                | >50 | 2  | 110 | 1.82   | --                               | 50       |
| 15                 | 75.6-76.2 | Sm                                | >50 | 2  | 240 | 0.56   | -46.0                            | 10       |
| GP-7-16            | 76.8-77.4 | Sm                                | >50 | <2 | 65  | 0.85*  | --                               | 30       |
| 17                 | 77.4-78.0 | Sm                                | >50 | 2  | 65  | 1.69   | --                               | 30       |
| 18                 | 78.0-78.6 | Sm                                | >50 | <2 | 120 | 0.24   | --                               | 30       |
| 19                 | 78.6-79.2 | Sm                                | >50 | <2 | 46  | 1.09*  | -39.2                            | 40       |
| 20                 | 79.2-79.9 | Sr                                | <50 | <2 | 32  | 0.16   | --                               | 25       |
| GP-7-21            | 79.9-80.5 | Sr                                | <50 | <2 | 42  | 0.20   | --                               | 30       |
| 22                 | 80.5-81.2 | Sr                                | <50 | 2  | 18  | 1.31*  | --                               | 20       |
| 23                 | 81.2-81.4 | Mr                                | <50 | <2 | 6   | 0.15   | --                               | 40       |

Table 1-8.--Analyses of samples from Core 8, Lamprecht deposit, south Texas  
 [--, not determined; S, sandstone; M, mudstone; r, reduced barren;  
 m, mineralized; \*, sulfur contents determined by induction furnace  
 techniques; \*\*, percent pyrite of the iron disulfide mineral population]

| Sample Description |           |                                   |     |           |     |        |                                  |          |
|--------------------|-----------|-----------------------------------|-----|-----------|-----|--------|----------------------------------|----------|
| Number             | Depth (m) | Lithology and<br>Geochemical zone | U   | Se<br>ppm | Mo  | S<br>% | $\delta^{34}\text{S}$<br>per mil | Pyrite** |
| GP-8-1             | 67.1-68.0 | Sr                                | <50 | <2        | 2   | 0.05   | --                               | 40       |
| 2                  | 68.0-68.1 | Sr                                | <50 | <2        | 2   | 0.07   | --                               | --       |
| 3                  | 68.1-68.9 | Mr                                | <50 | <2        | 2   | 0.60   | --                               | 55       |
| 4                  | 68.9-69.8 | Mr                                | <50 | <2        | 4   | 0.43   | --                               | 85       |
| 5                  | 69.8-70.2 | Mr                                | <50 | <2        | 4   | 0.44   | --                               | 70       |
| GP-8-6             | 70.2-70.7 | Sr                                | <50 | 2         | 4   | 0.93*  | -24.4                            | 75       |
| 7                  | 70.7-71.6 | Sr                                | <50 | 2         | 4   | 1.07   | --                               | 45       |
| 8                  | 71.6-71.9 | Sr                                | <50 | 2         | 8   | 1.13   | --                               | 15       |
| 9                  | 71.9-73.5 | Sr                                | <50 | <2        | 18  | 1.15   | --                               | 5        |
| 10                 | 73.0-73.3 | Sm                                | >50 | <2        | 50  | 0.51   | -38.2                            | 5        |
| GP-8-11            | 73.3-73.8 | Sm                                | >50 | 2         | 100 | 1.38*  | -38.1                            | 30       |
| 12                 | 73.8-75.0 | Sm                                | >50 | <2        | 180 | 0.95   | --                               | 30       |
| 13                 | 75.0-75.7 | Sm                                | >50 | 2         | 70  | 0.54   | --                               | 30       |
| 14                 | 75.7-76.4 | Sm                                | >50 | 2         | 50  | 1.39   | --                               | 20       |
| 15                 | 76.4-77.1 | Sm                                | >50 | <2        | 50  | 0.83*  | -43.6                            | 45       |
| GP-8-16            | 77.1-77.3 | Sm                                | >50 | 2         | 70  | 0.51   | -45.5                            | 30       |
| 17                 | 77.3-78.0 | Sm                                | >50 | <2        | 60  | 0.42   | -44.8                            | 30       |
| 18                 | 78.0-78.6 | Sm                                | >50 | <2        | 100 | 0.73   | -46.3                            | 15       |
| 19                 | 78.6-79.1 | Sm                                | >50 | <2        | 100 | 0.65   | --                               | 20       |
| 20                 | 79.1-79.7 | Sr                                | <50 | 2         | 80  | 0.95*  | -40.2                            | 30       |
| GP-8-21            | 79.7-80.3 | Sm                                | >50 | <2        | 40  | 0.30   | --                               | 20       |
| 22                 | 80.3-80.9 | Sr                                | <50 | 2         | 44  | 0.28   | --                               | 25       |
| 23                 | 80.9-81.4 | Sr                                | <50 | <2        | 36  | 0.58   | --                               | 20       |
| 24                 | 81.4-81.8 | Sr                                | <50 | <2        | 26  | 1.44   | --                               | 35       |
| 25                 | 81.8-81.9 | Sr                                | <50 | <2        | 40  | 1.22   | -42.2                            | 45       |
| GP-8-26            | 81.9-82.6 | Mr                                | <50 | <2        | 4   | 0.07   | --                               | 10       |

Table 1-9.--Analyses of samples from Core 9, Lamprecht deposit, south Texas  
 [--, not determined; S, sandstone; M, mudstone; r, reduced barren;  
 m, mineralized; \*, sulfur contents determined by induction furnace  
 techniques; \*\*, percent pyrite of the iron disulfide mineral population]

| Sample Description |           |                                   |     |           |     |        |                                  |          |
|--------------------|-----------|-----------------------------------|-----|-----------|-----|--------|----------------------------------|----------|
| Number             | Depth (m) | Lithology and<br>Geochemical zone | U   | Se<br>ppm | Mo  | S<br>% | $\delta^{34}\text{S}$<br>per mil | Pyrite** |
| GP-9-1             | 38.6-39.3 | Sr                                | <50 | <2        | 2   | 1.04*  | --                               | 70       |
| 2                  | 39.3-40.2 | Sr                                | <50 | <2        | <2  | 0.41   | --                               | 90       |
| 3                  | 57.0-57.9 | Sr                                | <50 | <2        | 6   | 0.70   | --                               | 25       |
| 4                  | 57.9-58.5 | Sr                                | <50 | <2        | 6   | 0.75   | --                               | 25       |
| 5                  | 68.3-69.2 | Sr                                | <50 | <2        | <2  | 0.31   | --                               | 25       |
| GP-9-6             | 69.2-70.1 | Sr                                | <50 | 2         | 2   | 0.14   | -25.2                            | 20       |
| 7                  | 70.1-70.9 | Sr                                | <50 | <2        | 2   | 0.64*  |                                  | 20       |
| 8                  | 70.9-71.3 | Mr                                | <50 | 2         | 2   | 1.27   | --                               | 75       |
| 9                  | 71.3-71.9 | Mr                                | <50 | <2        | 4   | 0.48   | --                               | 80       |
| 10                 | 71.9-72.8 | Sr                                | <50 | <2        | 4   | 0.82   | --                               | 40       |
| GP-9-11            | 72.8-73.8 | Sr                                | <50 | 2         | 2   | 1.48   | --                               | 25       |
| 12                 | 73.8-74.4 | Sr                                | <50 | <2        | 6   | 1.20   | --                               | 15       |
| 13                 | 74.4-75.3 | Sr                                | <50 | <2        | 8   | 0.95   | --                               | 15       |
| 14                 | 75.3-75.9 | Sr                                | <50 | 2         | 6   | 1.31   | --                               | 20       |
| 15                 | 75.9-76.8 | Sr                                | <50 | <2        | 18  | 0.89   | -0.6                             | 60       |
| GP-9-16            | 76.8-77.4 | Sm                                | >50 | <2        | 70  | 1.86*  | -14.1                            | 45       |
| 17                 | 77.4-78.3 | Sr                                | <50 | 2         | 22  | 0.57   |                                  | 25       |
| 18                 | 78.3-78.9 | Sr                                | <50 | 5         | 30  | 0.42   | --                               | 25       |
| 19                 | 78.9-79.9 | Sr                                | <50 | 2         | 42  | 1.69   | --                               | 18       |
| 20                 | 79.9-80.5 | Sr                                | <50 | <2        | 34  | 1.60*  | --                               | 18       |
| GP-9-21            | 80.5-80.9 | Sr                                | <50 | <2        | 50  | 0.24   | --                               | 30       |
| 22                 | 80.9-81.4 | Sr                                | <50 | <2        | 110 | 0.14   | --                               | 50       |
| 23                 | 81.4-82.0 | Sr                                | <50 | <2        | 20  | 0.28   | --                               | 20       |
| 24                 | 82.0-82.9 | Sr                                | <50 | <2        | 10  | 0.39   | --                               | 25       |
| 25                 | 82.9-83.5 | Sr                                | <50 | <2        | 10  | 1.10*  | -49.4                            | 70       |
| GP-9-26            | 83.5-84.1 | Sr                                | <50 | <2        | 100 | 0.52   | --                               | 25       |
| 27                 | 84.1-84.4 | Sr                                | <50 | 2         | 22  | 0.52   | --                               | 40       |
| 28                 | 84.4-85.0 | Mr                                | <50 | <2        | 14  | 0.17   | --                               | 40       |

Table 1-10.--Analyses of samples from Core 10, Lamprecht deposit, south Texas  
 [--, not determined; S, sandstone; M, mudstone; C, calcareous mudstone;  
 r, reduced barren; \*, sulfur contents determined by induction furnace  
 techniques; \*\*, percent pyrite of the iron disulfide mineral population]

| Sample Description |           |                                   |     |           |    |        |                                  |          |
|--------------------|-----------|-----------------------------------|-----|-----------|----|--------|----------------------------------|----------|
| Number             | Depth (m) | Lithology and<br>Geochemical zone | U   | Se<br>ppm | Mo | S<br>% | $\delta^{34}\text{S}$<br>per mil | Pyrite** |
| GP-10-1            | 75.3-75.4 | Cr                                | <50 | <2        | 6  | 0.47   | --                               | 15       |
| 2                  | 75.7-76.0 | Cr                                | <50 | <2        | 2  | 0.43   | --                               | 40       |
| 3                  | 76.2-77.0 | Sr                                | <50 | <2        | 4  | 0.08   | --                               | 45       |
| 4                  | 77.1-77.7 | Mr                                | <50 | <2        | 6  | 0.56   | --                               | 50       |
| 5                  | 77.7-78.3 | Mr                                | <50 | <2        | 2  | 0.96   | -27.1                            | 85       |
| GP-10-6            | 78.3-78.9 | Mr                                | <50 | <2        | 2  | 0.42   | --                               | 80       |
| 7                  | 78.9-79.6 | Sr                                | <50 | <2        | 2  | 0.28   | --                               | 70       |
| 8                  | 79.6-80.2 | Sr                                | <50 | <2        | 2  | 0.55   | --                               | 35       |
| 9                  | 80.2-80.8 | Sr                                | <50 | <2        | 2  | 0.64   | --                               | 25       |
| 10                 | 80.8-81.4 | Sr                                | <50 | <2        | 2  | 1.07*  | -24.1                            | 20       |
| GP-10-11           | 81.4-82.0 | Sr                                | <50 | <2        | 4  | 1.13   | --                               | 10       |
| 12                 | 82.0-82.9 | Sr                                | <50 | <2        | 2  | 1.05   | --                               | 5        |
| 13                 | 82.9-83.4 | Sr                                | <50 | <2        | 4  | 1.20*  | -25.5                            | 15       |
| 14                 | 83.4-83.7 | Cr                                | <50 | <2        | 4  | 0.85   | --                               | 5        |
| 15                 | 83.8-84.4 | Sr                                | <50 | <2        | 8  | 0.16   | --                               | 15       |
| GP-10-16           | 84.4-85.0 | Sr                                | <50 | <2        | 6  | 0.13   | --                               | 15       |
| 17                 | 85.0-85.6 | Sr                                | <50 | <2        | 14 | 0.55   | --                               | 10       |
| 18                 | 85.6-86.3 | Sr                                | <50 | <2        | 30 | 1.46*  | -32.2                            | 15       |
| 19                 | 86.3-86.7 | Sr                                | <50 | 8         | 16 | 0.72   | --                               | 5        |
| 20                 | 87.5-88.1 | Sr                                | <50 | 2         | 24 | 0.35   | --                               | 10       |
| GP-10-21           | 88.7-89.6 | Sr                                | <50 | 10        | 36 | 1.51*  | -44.2                            | 30       |
| 22                 | 90.5-90.9 | Sr                                | <50 | <2        | 8  | 1.08*  | -41.7                            | 40       |
| 23                 | 90.9-91.1 | Mr                                | <50 | <2        | 16 | 0.16   | --                               | 50       |

Table 2.--Major element analyses from select samples, Lamprecht deposit,  
south Texas  
 [\* , total iron; P<sub>2</sub>O<sub>5</sub> content of all samples is less than one percent]

| Sample<br>Number | Al <sub>2</sub> O <sub>3</sub> | SiO <sub>2</sub> | CaO | TiO <sub>2</sub> | Fe* | K <sub>2</sub> O |
|------------------|--------------------------------|------------------|-----|------------------|-----|------------------|
|                  | %                              |                  |     |                  |     |                  |
| GP-1-21          | 13                             | 57               | 3.2 | 0.50             | 4.2 | 2.4              |
| 2-2              | 4.9                            | 74               | 5.3 | 0.20             | 1.5 | 1.5              |
| 2-4              | 13                             | 57               | 3.8 | 0.5              | 5.4 | 2.3              |
| 2-5              | 15                             | 59               | 2.8 | 0.6              | 3.9 | 2.4              |
| 3-13             | 6.6                            | 57               | 8.6 | 0.4              | 1.9 | 1.6              |
| GP-3-18          | 6.0                            | 72               | 6.1 | 0.3              | 1.2 | 1.7              |
| 3-26             | 5.8                            | 76               | 4.4 | 0.2              | 1.6 | 1.8              |
| 3-29             | 13                             | 62               | 1.0 | 0.6              | 4.8 | 2.4              |
| 4-5              | 17                             | 58               | 2.8 | 0.6              | 4.8 | 2.1              |
| 4-10             | 6                              | 65               | 7.4 | 0.3              | 1.3 | 1.6              |
| GP-4-13          | 6                              | 67               | 7.8 | 0.3              | 1.5 | 1.6              |
| 4-15             | 5.9                            | 72               | 8.8 | 0.2              | 0.7 | 1.6              |
| 4-17             | 5.0                            | 72               | 3.8 | 0.1              | 1.3 | 1.6              |
| 4-21             | 5.1                            | 71               | 4.9 | 0.2              | 1.4 | 1.7              |
| 4-23             | 5.1                            | 75               | 3.2 | 0.2              | 0.8 | 1.7              |
| GP-4-27          | 12                             | 60               | 1.9 | 0.6              | 3.2 | 2.2              |
| 5-4              | 6.6                            | 59               | 9.5 | 0.4              | 2.0 | 1.6              |
| 5-8              | 5.8                            | 70               | 6.8 | 0.3              | 1.7 | 1.5              |
| 5-15             | 5.8                            | 74               | 4.7 | 0.2              | 1.6 | 1.7              |
| 5-22             | 5.3                            | 66               | 7.5 | 0.2              | 2.2 | 1.5              |
| GP-9-6           | 5.2                            | 62               | 9.0 | 0.2              | 0.7 | 1.6              |
| 9-7              | 5.9                            | 70               | 8.5 | 0.2              | 1.0 | 1.7              |
| 9-25             | 5.5                            | 72               | 4.6 | 0.2              | 1.1 | 1.8              |
| 10-13            | 4.9                            | 64               | 9.8 | 0.3              | 1.7 | 1.4              |
| 10-21            | 5.4                            | 71               | 4.8 | 0.2              | 1.6 | 1.5              |
| GP-10-22         | 5.1                            | 69               | 7.8 | 0.2              | 1.3 | 1.5              |

Table 3.--Comparison of visual and X-ray diffraction estimates of relative marcasite abundance

| Deposit<br>sample number | % Marcasite of total FeS <sub>2</sub>                 |                               |
|--------------------------|-------------------------------------------------------|-------------------------------|
|                          | X-ray Diffraction <sup>1/</sup> <sup>2/</sup><br>Data | Visual Estimate <sup>3/</sup> |
| <u>Felder</u>            |                                                       |                               |
| F4B-1-5B                 | 37 (7)                                                | 40                            |
| F4B-1-9A                 | 66 (4)                                                | 60                            |
| F4B-1-10A                | 22 (4)                                                | 40                            |
| F4B-V-1H                 | 4 (4)                                                 | 5                             |
| <u>Lamprecht</u>         |                                                       |                               |
| GP-6-9                   | 82 (7)                                                | 70                            |
| GP-6-10, 11              | 64 (5)                                                | 60                            |
| GP-10-11                 | 93 (5)                                                | 90                            |

<sup>1/</sup>Based on the marcasite peak at  $51.9^{\circ}2\theta$ , and pyrite peak at  $56.3^{\circ}2\theta$  (Cu K $\alpha$  radiation). Raw data were corrected via a calibration plot prepared from known mixtures of pure pyrite and marcasite.

<sup>2/</sup>Numbers in parentheses are the number of X-ray traces run on a single mount that were averaged.

<sup>3/</sup>Average of three independent observers.

Table 4.--Analyses of organic carbon contents <sup>1/</sup> of select samples  
from the Lamprecht deposit, south Texas  
 [\*amounts given as weight percentages]

| Sample Number | Organic Carbon Content* |
|---------------|-------------------------|
| GP-1-21       | .02                     |
| GP-2-2        | .01                     |
| GP-2-4        | .01                     |
| GP-2-5        | <.01                    |
| GP-3-13       | <.01                    |
| GP-3-18       | <.01                    |
| GP-3-26       | <.01                    |
| GP-3-29       | <.01                    |
| GP-4-5        | <.01                    |
| GP-4-13       | <.01                    |
| GP-4-10       | <.01                    |
| GP-4-15       | <.01                    |
| GP-4-17       | <.01                    |
| GP-4-21       | <.01                    |
| GP-4-23       | <.01                    |
| GP-4-27       | <.01                    |
| GP-5-4        | <.01                    |
| GP-5-8        | <.01                    |
| GP-5-15       | <.01                    |
| GP-5-22       | <.01                    |
| GP-9-6        | <.01                    |
| GP-9-7        | <.01                    |
| GP-9-25       | <.01                    |
| GP-10-13      | <.01                    |
| GP-10-21      | <.01                    |
| GP-10-22      | <.01                    |

<sup>1/</sup>Carbonate carbon removed by acid leach prior to analyses.

Table 5.--Analyses of samples from the Felder deposit, south Texas  
 [--, not determined; S, sandstone; M, mudstone; r, reduced  
 barren; m, mineralized; a, altered tongue; \*\*, percent pyrite of the  
 iron disulfide mineral population; \*\*\*, organic carbon contents]

| Sample<br>Number | Lithology and<br>Geochemical Zone | U<br>ppm | C***<br>% | S    | $\delta^{34}\text{S}$<br>per mil | Pyrite** |
|------------------|-----------------------------------|----------|-----------|------|----------------------------------|----------|
| F4B-1-1A         | Mr                                | 56       | 0.03      | 0.64 | -28.8                            | 40       |
| 1-1B             | Mr                                | 580      | 0.04      | 1.82 | --                               | 30       |
| 1-2              | Ma                                | 28       | 0.07      | 0.28 | --                               | 70       |
| 1-3A             | Ma                                | 50       | 0.05      | 0.38 | +4.2                             | 55       |
| 1-4              | Sr                                | 176      | 0.04      | 0.66 | --                               | 55       |
| F4B-1-5A         | Sa                                | 7        | 0.01      | 0.22 | --                               | 70       |
| 1-5B             | Sa                                | 9        | 0.00      | 0.38 | +1.5                             | 60       |
| 1-5C             | Ma                                | 16       | --        | --   | --                               | --       |
| 1-6A             | Ma                                | 10       | 0.02      | 0.14 | --                               | 60       |
| 1-6B             | Sa                                | 9        | 0.01      | 0.28 | --                               | 60       |
| F4B-1-7A         | Ma                                | 5        | 0.02      | 0.16 | +10.5                            | 70       |
| 1-7B             | Sa                                | 10       | 0.00      | 0.16 | +1.5                             | 60       |
| 1-8              | Sa                                | 2        | 0.03      | 0.22 | --                               | 80       |
| 1-9A             | Sa                                | 7        | 0.02      | 0.22 | -5.2                             | 30       |
| 1-9B             | Sa                                | 9        | 0.01      | 0.26 | --                               | 70       |
| F4B-1-9C         | Sa                                | 4        | 0.01      | 0.54 | --                               | 80       |
| 1-10A            | Sa                                | 2        | 0.04      | 0.20 | +20.6                            | 60       |
| 1-10C            | Ma                                | 8        | 0.01      | 0.28 | --                               | 60       |
| 1-10D            | Ma                                | 4        | 0.06      | 0.10 | --                               | 85       |
| 1-11             | Sa                                | 2        | 0.03      | 0.20 | +12.2                            | 80       |
| F4B-2-1A         | Mr                                | 93       | --        | --   | --                               | --       |
| 2-1B             | Sa                                | 42       | 0.04      | 0.30 | --                               | 55       |
| 2-2A             | Mr                                | 136      | --        | --   | --                               | 50       |
| 2-2B             | Sr                                | 37       | 0.00      | 0.38 | --                               | 60       |
| 2-2C             | Sa                                | 39       | 0.07      | 0.16 | -5.2                             | 50       |
| F4B-2-3A         | Sm                                | 1410     | 0.01      | 2.26 | --                               | 15       |
| 2-3B             | Sm                                | 1830     | 0.11      | 0.44 | --                               | 50       |
| 2-3C             | Sm                                | 1550     | 0.00      | 1.12 | --                               | 20       |
| 2-3D             | Mm                                | 1620     | --        | --   | --                               | 30       |
| 2-4A             | Sm                                | 1320     | 0.06      | 1.07 | -36.9                            | 40       |
| F4B-2-4B         | Sr                                | 467      | 0.00      | 0.40 | --                               | 25       |
| 2-4C             | Mr                                | 42       | 0.08      | 1.12 | --                               | 35       |
| 2-5A             | Mm                                | 1580     | 0.03      | 9.02 | -44.2                            | 10       |
| 2-5B             | Sm                                | 1120     | 0.06      | 1.16 | --                               | 15       |
| 2-5C             | Mr                                | 469      | 0.00      | 1.43 | --                               | 25       |

Table 5.--Analyses of samples from Felder deposit,  
south Texas--continued

| Sample<br>Number | Lithology and<br>Geochemical Zone | U<br>ppm | C***<br>% | S<br>% | $\delta^{34}\text{S}$<br>per mil | Pyrite** |
|------------------|-----------------------------------|----------|-----------|--------|----------------------------------|----------|
| F4B-2-6A         | Sr                                | 322      | 0.03      | 1.66   | -47.4                            | 15       |
| 2-6B             | Sr                                | 297      | 0.02      | 2.40   | --                               | 10       |
| 2-6C             | Sm                                | 1880     | 0.03      | 5.42   | -37.1                            | 30       |
| 2-6D             | Sr                                | 152      | 0.01      | 0.74   | --                               | 35       |
| 2-7B             | Sr                                | 79       | 0.02      | 0.44   | -34.7                            | 20       |
| F4B-2-7C         | Mr                                | 113      | 0.00      | 1.34   | --                               | 30       |
| 2-8A             | Sr                                | 536      | 0.02      | 0.82   | -36.4                            | 30       |
| 2-8B             | Sr                                | 315      | 0.05      | 1.01   | -34.4                            | 20       |
| 2-8C             | Sm                                | 2180     | 0.04      | 8.94   | --                               | 30       |
| 2-9A             | Sr                                | 80       | 0.01      | 1.38   | -36.6                            | 10       |
| F4B-2-9B         | Sr                                | 86       | 0.04      | 1.30   | --                               | 35       |
| 2-9C             | Mm                                | 2020     | --        | --     | --                               | 30       |
| F4B-V-1A         | Sr                                | 468      | 0.02      | 3.06   | -36.6                            | 15       |
| V-1B             | Sm                                | 1300     | 0.01      | --     | -45.6                            | 25       |
| V-1C             | Sm                                | 1240     | 0.03      | 1.19   | -30.7                            | 20       |
| F4B-V-1D         | Sr                                | 573      | --        | --     | +13.2                            | 35       |
| V-1E             | Sr                                | 134      | 0.05      | 0.70   | --                               | 80       |
| V-1F             | Ma                                | 32       | --        | --     | --                               | --       |
| V-1G             | Ma                                | 4        | --        | --     | --                               | --       |
| V-1H             | Sa                                | 7        | 0.02      | 0.22   | +1.9                             | 90       |
| F4B-V-1I         | Sa                                | 6        | 0.02      | 0.24   | --                               | 65       |
| V-2A             | Sr                                | 115      | 0.03      | 1.39   | --                               | 15       |
| V-2B             | Sr                                | 100      | 0.02      | 1.46   | --                               | 25       |
| V-2C             | Sr                                | 153      | 0.03      | 0.62   | -33.9                            | 30       |
| V-2D             | Sr                                | 755      | 0.01      | 0.94   | --                               | 20       |
| F4B-V-3A         | Sr                                | 93       | 0.02      | 1.96   | --                               | 25       |
| V-3B             | Sr                                | 75       | 0.07      | 1.78   | -35.5                            | 20       |
| V-4A             | Sr                                | 74       | 0.00      | 1.65   | --                               | 20       |
| V-4B             | Sr                                | 56       | 0.05      | 1.36   | -45.0                            | 20       |

Table 6.--Semiquantitative 6-step spectrographic analyses of samples  
from the Felder deposit, south Texas

| Sample<br>number | F4B-<br>1-1A | 1-1B | 1-2  | 1-3A | 1-4  | 1-5A | 1-5B | 1-5C | 1-6A |
|------------------|--------------|------|------|------|------|------|------|------|------|
| <hr/>            |              |      |      |      |      |      |      |      |      |
| %                |              |      |      |      |      |      |      |      |      |
| Al               | 3            | 7    | 5    | 5    | 5    | 5    | 7    | 6    | 5    |
| Na               | 1            | 1    | 1    | 1.5  | 1.5  | 1    | 1.5  | 1.5  | 1.5  |
| K                | 2            | 3    | 2    | 3    | 2    | 2    | 3    | 3    | 2    |
| Fe               | 1            | 7    | 1    | 1.5  | 2    | 1    | 5    | 7    | 1    |
| Mg               | 0.1          | 0.5  | 0.15 | 0.15 | 0.2  | 0.1  | 0.2  | 1    | 0.1  |
| Ca               | 10           | 2    | 5    | 6    | 7    | 5    | 7    | 2    | 10   |
| Ti               | 0.15         | 0.3  | 0.2  | 0.15 | 0.15 | 1.5  | 0.2  | 0.5  | 0.15 |
| <hr/>            |              |      |      |      |      |      |      |      |      |
| ppm              |              |      |      |      |      |      |      |      |      |
| B                | L            | 20   | 20   | L    | 20   | L    | 20   | 50   | L    |
| Ba               | 500          | 1500 | 700  | 500  | 1000 | 700  | 1500 | 500  | 500  |
| Be               | N            | 1.5  | N    | N    | N    | N    | N    | 1.5  | N    |
| Co               | L            | 20   | 5    | 5    | 5    | N    | 5    | 15   | N    |
| Cr               | 15           | 50   | 15   | 15   | 20   | 10   | 30   | 100  | 15   |
| Cu               | 5            | 15   | 7    | 7    | 7    | 3    | 10   | 15   | 3    |
| Ga               | 7            | 15   | 10   | 10   | 10   | 10   | 15   | 30   | 10   |
| La               | N            | L    | N    | N    | N    | N    | L    | L    | N    |
| Mn               | 300          | 150  | 150  | 200  | 150  | 100  | 200  | 100  | 200  |
| Mo               | 7            | 20   | N    | N    | 7    | N    | L    | L    | N    |
| Nb               | L            | L    | L    | L    | L    | L    | L    | 10   | L    |
| Ni               | 5            | 20   | 5    | 7    | 7    | L    | 7    | 30   | L    |
| Pb               | 10           | 20   | 15   | 15   | 15   | 20   | 15   | 15   | 15   |
| Sc               | L            | 7    | L    | 5    | 5    | L    | 7    | 15   | 5    |
| Sr               | 100          | 200  | 200  | 100  | 100  | 200  | 150  | 300  | 100  |
| V                | 30           | 100  | 30   | 50   | 50   | 30   | 70   | 200  | 30   |
| Y                | 15           | 30   | 20   | 20   | 20   | 15   | 20   | 30   | 15   |
| Yb               | 1.5          | 3    | 2    | 2    | 2    | 2    | 3    | 3    | 1.5  |
| Zr               | 70           | 200  | 150  | 100  | 100  | 100  | 200  | 300  | 200  |

Table 6.--Semiquantitative 6-step spectrographic analyses of samples  
from the Felder deposit, south Texas--continued

| Sample<br>number | F48-<br>1-6B | 1-7A | 1-7B | 1-8  | 1-9A | 1-9B | 1-9C | 1-10A | 1-10C |
|------------------|--------------|------|------|------|------|------|------|-------|-------|
| <hr/>            |              |      |      |      |      |      |      |       |       |
| %                |              |      |      |      |      |      |      |       |       |
| AT               | 5            | 5    | 5    | 5    | 5    | 3    | 7    | 5     | 5     |
| Na               | 1            | 1.5  | 1.5  | 1    | 1    | 1    | 2    | 1     | 1     |
| K                | 2            | 3    | 2    | 2    | 2    | 2    | 3    | 2     | 2     |
| Fe               | 1            | 1    | 1.5  | 1    | 1    | 1    | 2    | 1     | 1     |
| Mg               | 0.1          | 0.1  | 0.15 | 0.15 | 0.1  | 0.1  | 0.2  | 0.1   | 0.1   |
| Ca               | 7            | 5    | 10   | 7    | 7    | G    | G    | 10    | 3     |
| Ti               | 0.15         | 0.1  | 0.3  | 0.15 | 0.2  | 0.15 | 0.3  | 0.15  | 0.2   |
| <hr/>            |              |      |      |      |      |      |      |       |       |
| ppm              |              |      |      |      |      |      |      |       |       |
| B                | L            | 20   | 20   | 20   | 20   | L    | 30   | L     | L     |
| Ba               | 700          | 1000 | 700  | 700  | 700  | 500  | 1000 | 700   | 1000  |
| Be               | N            | N    | N    | N    | N    | N    | N    | N     | N     |
| Co               | L            | L    | L    | L    | L    | L    | 5    | L     | L     |
| Cr               | 15           | 10   | 150  | 15   | 150  | 20   | 50   | 15    | 15    |
| Cu               | 3            | 5    | 5    | 3    | 7    | 3    | 7    | 5     | 5     |
| Ga               | 7            | 10   | 10   | 10   | 7    | 7    | 15   | 10    | 10    |
| La               | N            | L    | N    | N    | N    | L    | L    | N     | L     |
| Mn               | 200          | 100  | 300  | 150  | 300  | 300  | 300  | 300   | 150   |
| Mo               | N            | N    | N    | N    | N    | N    | N    | N     | N     |
| Nb               | L            | L    | L    | L    | L    | L    | L    | L     | L     |
| Ni               | 5            | L    | L    | L    | L    | L    | 5    | L     | L     |
| Pb               | 10           | 15   | 15   | 15   | 15   | 15   | 15   | 15    | 15    |
| Sc               | 5            | L    | 5    | L    | L    | 7    | 10   | L     | 5     |
| Sr               | 100          | 300  | 100  | 100  | 100  | 150  | 200  | 100   | 200   |
| V                | 30           | 30   | 70   | 30   | 50   | 50   | 70   | 30    | 30    |
| Y                | 15           | 15   | 15   | 15   | 10   | 20   | 20   | 20    | 15    |
| Yb               | 1.5          | 2    | 2    | 2    | 2    | 2    | 3    | 2     | 1.5   |
| Zr               | 100          | 100  | 300  | 100  | 150  | 500  | 200  | 100   | 100   |

Table 6.--Semiquantitative 6-step spectrographic analyses of samples  
from the Felder deposit, south Texas--continued

| Sample<br>number | F4B-<br>1-100 | 1-11 | 2-1A | 2-1B | 2-2A | 2-2B | 2-2C | 2-3A  | 2-3B |
|------------------|---------------|------|------|------|------|------|------|-------|------|
| <u>%</u>         |               |      |      |      |      |      |      |       |      |
| Al               | 7             | 5    | G    | 5    | G    | 5    | 5    | 3     | 7    |
| Na               | 2             | 1    | 0.7  | 1.5  | 1    | 1    | 2    | 0.7   | 1    |
| K                | 3             | 2    | 3    | 3    | 3    | 2    | 3    | 1.5   | 3    |
| Fe               | 3             | 1.5  | 7    | 1    | 10   | 1    | 1.5  | 2     | 2    |
| Mg               | 0.3           | 0.15 | 1    | 0.1  | 1    | 0.1  | 0.15 | 0.007 | 0.3  |
| Ca               | 5             | 7    | 2    | 7    | 2    | 5    | G    | 5     | 2    |
| Ti               | 0.3           | 0.2  | 0.3  | 0.1  | 0.3  | 0.2  | 0.2  | 0.1   | 0.2  |
| <u>ppm</u>       |               |      |      |      |      |      |      |       |      |
| B                | 30            | 20   | 50   | L    | 50   | L    | L    | L     | 20   |
| Ba               | 1000          | 1000 | 500  | 700  | 300  | 700  | 700  | 700   | 1000 |
| Be               | N             | N    | 1.5  | N    | 1.5  | N    | N    | N     | N    |
| Co               | 5             | L    | 30   | L    | 20   | L    | N    | 7     | 10   |
| Cr               | 100           | 20   | 150  | 10   | 100  | 10   | 30   | 5     | 50   |
| Cu               | 10            | 5    | 20   | 5    | 20   | 3    | 7    | 7     | 10   |
| Ga               | 15            | 10   | 30   | 10   | 30   | 7    | 10   | 5     | 10   |
| La               | L             | L    | L    | N    | L    | N    | N    | N     | N    |
| Mn               | 150           | 200  | 70   | 150  | 70   | 150  | 300  | 100   | 70   |
| Mo               | L             | N    | N    | N    | N    | N    | N    | 5     | L    |
| Nb               | L             | L    | L    | L    | L    | L    | L    | L     | L    |
| Ni               | 7             | 5    | 30   | 5    | 20   | 5    | 5    | 7     | 10   |
| Pb               | 15            | 15   | 30   | 15   | 20   | 15   | 10   | 10    | 15   |
| Sc               | 10            | 7    | 15   | L    | 15   | L    | 5    | N     | 7    |
| Sr               | 500           | 100  | 300  | 100  | 300  | 200  | 150  | 200   | 500  |
| V                | 70            | 50   | 200  | 30   | 200  | 20   | 70   | 30    | 70   |
| Y                | 30            | 30   | 30   | 15   | 30   | 20   | 20   | 15    | 20   |
| Yb               | 3             | 2    | 3    | 1.5  | 3    | 2    | 2    | 1.5   | 2    |
| Zr               | 300           | 150  | 200  | 70   | 150  | 70   | 100  | 70    | 200  |

Table 6.--Semiquantitative 6-step spectrographic analyses of samples  
from the Felder deposit, south Texas--continued

| Sample<br>number | F48-<br>2-3C | 2-3D | 2-4A | 2-4B | 2-4C | 2-5A | 2-5B | 2-5C | 2-6A |
|------------------|--------------|------|------|------|------|------|------|------|------|
| <hr/>            |              |      |      |      |      |      |      |      |      |
| %                |              |      |      |      |      |      |      |      |      |
| Al               | 3            | 10   | 5    | 2    | 3    | 2    | 2    | 3    | 2    |
| Na               | 1            | 0.7  | 0.7  | 0.7  | 1    | 0.7  | 0.7  | 0.7  | 0.7  |
| K                | 1.5          | 3    | 1.5  | 1.5  | 2    | 1.5  | 1.5  | 1.5  | 1.5  |
| Fe               | 2            | 5    | 2    | 0.7  | 0.7  | 7    | 1.5  | 2    | 2    |
| Mg               | 0.15         | 0.7  | 0.15 | 0.07 | 0.15 | 0.07 | 0.07 | 0.1  | 0.07 |
| Ca               | G            | 1    | 3    | 7    | G    | 3    | 5    | 5    | 7    |
| Ti               | 0.2          | 0.2  | 0.15 | 0.1  | 0.15 | 0.1  | 0.15 | 0.2  | 0.15 |
| <hr/>            |              |      |      |      |      |      |      |      |      |
| ppm              |              |      |      |      |      |      |      |      |      |
| B                | L            | 30   | L    | N    | N    | N    | N    | 20   | L    |
| Ba               | 500          | 200  | 700  | 500  | 300  | 500  | 500  | 500  | 500  |
| Be               | N            | N    | N    | N    | N    | N    | N    | N    | N    |
| Co               | 10           | 15   | 10   | 5    | L    | 20   | 7    | 7    | 7    |
| Cr               | 20           | 70   | 10   | 7    | 15   | 10   | 7    | 15   | 5    |
| Cu               | 15           | 15   | 15   | 5    | 7    | 20   | 10   | 15   | 10   |
| Ga               | 5            | 20   | 5    | L    | 5    | 5    | L    | 5    | L    |
| La               | N            | N    | N    | N    | N    | N    | N    | N    | N    |
| Mn               | 500          | 70   | 100  | 150  | 300  | 150  | 100  | 150  | 150  |
| Mo               | 3            | 3    | 3    | L    | L    | 100  | 50   | 30   | 5    |
| Nb               | N            | L    | L    | N    | N    | N    | L    | L    | N    |
| Ni               | 20           | 30   | 7    | 5    | 7    | 20   | 5    | 7    | 7    |
| Pb               | 20           | 15   | 15   | N    | N    | 20   | 10   | 10   | 10   |
| Sc               | 5            | 10   | L    | N    | 5    | L    | L    | 5    | N    |
| Sr               | 150          | 200  | 200  | 70   | 150  | 150  | 150  | 200  | 70   |
| V                | 50           | 100  | 30   | 30   | 30   | 50   | 30   | 50   | 20   |
| Y                | 20           | 20   | 15   | 10   | 20   | 20   | 10   | 15   | 10   |
| Yb               | 2            | 2    | 2    | 1    | 1.5  | 2    | 1.5  | 2    | 1.5  |
| Zr               | 150          | 100  | 100  | 70   | 70   | 100  | 100  | 200  | 100  |

Table 6.--Semiquantitative 6-step spectrographic analyses of samples  
from the Felder deposit, south Texas--continued

| Sample<br>number | F4B-<br>2-6B | 2-6C | 2-6D | 2-7B | 2-7C | 2-8A | 2-8B | 2-8C | 2-9A |
|------------------|--------------|------|------|------|------|------|------|------|------|
| <hr/>            |              |      |      |      |      |      |      |      |      |
| %                |              |      |      |      |      |      |      |      |      |
| Al               | 2            | 3    | 2    | 2    | 3    | 2    | 2    | 2    | 2    |
| Na               | 0.7          | 0.7  | 0.7  | 1    | 0.7  | 0.7  | 0.7  | 0.7  | 0.7  |
| K                | 1.5          | 2    | 2    | 2    | 1.5  | 2    | 2    | 2    | 2    |
| Fe               | 5            | 3    | 1    | 0.7  | 1.5  | 1    | 1.5  | 7    | 2    |
| Mg               | 0.07         | 0.1  | 0.07 | 0.07 | 0.1  | 0.07 | 0.1  | 0.15 | 0.1  |
| Ca               | 7            | 5    | 7    | 6    | 5    | 5    | 7    | 3    | 3    |
| Ti               | 0.1          | 0.15 | 0.1  | 0.1  | 0.15 | 0.15 | 0.1  | 2    | 0.15 |
| <hr/>            |              |      |      |      |      |      |      |      |      |
| ppm              |              |      |      |      |      |      |      |      |      |
| B                | N            | L    | N    | N    | L    | N    | L    | L    | L    |
| Ba               | 500          | 700  | 500  | 300  | 500  | 500  | 500  | 500  | 500  |
| Be               | N            | N    | N    | N    | N    | N    | N    | N    | N    |
| Co               | 7            | 20   | 5    | 5    | 7    | 5    | 7    | 30   | 10   |
| Cr               | 10           | 10   | 7    | 7    | 10   | 7    | 7    | 150  | 10   |
| Cu               | 7            | 15   | 5    | 7    | 7    | 15   | 10   | 20   | 70   |
| Ga               | 5            | L    | 5    | 5    | 5    | 5    | 5    | 10   | 5    |
| La               | N            | N    | N    | N    | N    | N    | N    | 50   | N    |
| Mn               | 200          | 100  | 150  | 300  | 150  | 100  | 200  | 1500 | 150  |
| Mo               | 20           | 1000 | 30   | 20   | 200  | 50   | 500  | 70   | 50   |
| Nb               | L            | L    | L    | N    | L    | N    | N    | 20   | L    |
| Ni               | 15           | 20   | 7    | 10   | 10   | 5    | 7    | 20   | 7    |
| Pb               | 10           | 15   | N    | N    | 10   | 10   | 10   | 30   | 15   |
| Sc               | N            | L    | L    | L    | L    | L    | L    | 10   | L    |
| Sr               | 70           | 200  | 70   | 100  | 200  | 150  | 100  | 200  | 200  |
| V                | 20           | 50   | 20   | 30   | 30   | 30   | 30   | 300  | 50   |
| Y                | 10           | 10   | 10   | 10   | 15   | 15   | 15   | 30   | 10   |
| Yb               | 1.5          | 1.5  | 1    | 1.5  | 2    | 1.5  | 1.5  | 5    | 1    |
| Zr               | 70           | 150  | 70   | 70   | 150  | 70   | 100  | 1500 | 70   |

Table 6.--Semiquantitative 6-step spectrographic analyses of samples  
from the Felder deposit, south Texas--continued

| Sample<br>number | F48-<br>2-9B | 2-9C | V-1A | V-1B | V-1C | V-1D | V-1E | V-1F | V-1G |
|------------------|--------------|------|------|------|------|------|------|------|------|
| <hr/>            |              |      |      |      |      |      |      |      |      |
| %                |              |      |      |      |      |      |      |      |      |
| Al               | 3            | 7    | 5    | 5    | 5    | 5    | 7    | 6    | 6    |
| Na               | 0.7          | 0.7  | 1    | 1    | 1    | 1    | 1.5  | 0.7  | 0.7  |
| K                | 2            | 3    | 2    | 2    | 2    | 2    | 2    | 3    | 3    |
| Fe               | 2            | 5    | 3    | 5    | 3    | 1.5  | 1.5  | 10   | 10   |
| Mg               | 0.1          | 1    | 0.1  | 0.15 | 0.15 | 0.15 | 0.15 | 1.5  | 1    |
| Ca               | 3            | 1    | 7    | 7    | 10   | 10   | 0.7  | 1.5  | 1.5  |
| Ti               | 0.15         | 0.3  | 0.15 | 0.2  | 0.15 | 0.15 | 0.2  | 0.5  | 0.5  |
| <hr/>            |              |      |      |      |      |      |      |      |      |
| ppm              |              |      |      |      |      |      |      |      |      |
| B                | L            | 50   | 20   | 20   | 20   | 20   | 20   | 50   | 30   |
| Ba               | 500          | 300  | 1000 | 1000 | 1000 | 1000 | 1000 | 500  | 300  |
| Be               | N            | 1.5  | N    | N    | N    | N    | N    | 1.5  | 1.5  |
| Co               | 20           | 20   | 7    | 10   | 10   | 10   | 7    | 20   | 10   |
| Cr               | 10           | 70   | 30   | 15   | 30   | 30   | 20   | 100  | 100  |
| Cu               | 7            | 20   | 7    | 7    | 7    | 10   | 10   | 20   | 20   |
| Ga               | 5            | 20   | 10   | 10   | 10   | 10   | 10   | 30   | 30   |
| La               | N            | N    | N    | N    | L    | L    | N    | L    | N    |
| Mn               | 150          | 100  | 150  | 150  | 200  | 100  | 70   | 100  | 100  |
| Mg               | 300          | 100  | 50   | 30   | 7    | 20   | 20   | 5    | N    |
| Nb               | L            | L    | L    | L    | L    | L    | L    | L    | L    |
| Ni               | 20           | 50   | 10   | 10   | 10   | 10   | 7    | 50   | 30   |
| Pb               | 10           | 20   | 15   | 15   | 20   | 30   | 15   | 15   | 15   |
| Sc               | L            | 10   | 5    | 5    | 7    | 5    | L    | 20   | 15   |
| Sr               | 200          | 200  | 100  | 100  | 150  | 100  | 100  | 200  | 200  |
| V                | 30           | 150  | 70   | 50   | 70   | 70   | 50   | 200  | 150  |
| Y                | 15           | 30   | 15   | 15   | 20   | 15   | 20   | 20   | 20   |
| Yb               | 1.5          | 3    | 2    | 2    | 2    | 2    | 2    | 3    | 3    |
| Zr               | 100          | 100  | 200  | 70   | 200  | 100  | 150  | 150  | 100  |

Table 6.--Semiquantitative 6-step spectrographic analyses of samples  
from the Felder deposit, south Texas--continued

| Sample<br>number | F48-<br>V-1H | V-1I | V-2A | V-2B | V-2C  | V-2D | V-3A | V-3B | V-4A |
|------------------|--------------|------|------|------|-------|------|------|------|------|
| <u>%</u>         |              |      |      |      |       |      |      |      |      |
| Al               | 10           | 5    | 3    | 3    | 2     | 3    | 3    | 3    | 2    |
| Na               | 3            | 1    | 1    | 0.7  | 1     | 1    | 0.7  | 0.7  | 1    |
| K                | 3            | 2    | 2    | 2    | 2     | 2    | 1.5  | 2    | 2    |
| Fe               | 3            | 1    | 2    | 1.5  | 1     | 1.5  | 2    | 2    | 2    |
| Mg               | 0.3          | 0.1  | 0.01 | 0.01 | 0.007 | 0.01 | 0.07 | 0.1  | 0.1  |
| Ca               | 10           | 7    | 5    | 5    | 10    | 7    | 7    | 7    | 5    |
| Ti               | 0.3          | 0.1  | 0.15 | 0.15 | 0.15  | 0.15 | 0.1  | 0.15 | 0.15 |
| <u>ppm</u>       |              |      |      |      |       |      |      |      |      |
| B                | 20           | L    | L    | L    | N     | L    | L    | L    | 20   |
| Ba               | 1000         | 1000 | 700  | 700  | 500   | 700  | 500  | 500  | 500  |
| Be               | N            | N    | N    | N    | N     | N    | N    | N    | N    |
| Co               | 5            | L    | 10   | 5    | 5     | 7    | 5    | 7    | 7    |
| Cr               | 70           | 10   | 15   | 15   | 7     | 7    | 7    | 7    | 7    |
| Cu               | 10           | 7    | 50   | 15   | 7     | 15   | 7    | 10   | 10   |
| Ga               | 20           | 7    | 7    | 5    | 5     | 5    | 5    | 5    | 5    |
| La               | L            | N    | N    | N    | N     | N    | N    | N    | N    |
| Mn               | 150          | 150  | 150  | 150  | 300   | 200  | 100  | 100  | 100  |
| Mo               | L            | N    | 70   | 10   | 7     | 7    | 150  | 50   | 300  |
| Nb               | L            | L    | L    | L    | L     | L    | L    | L    | L    |
| Ni               | 7            | L    | 10   | 5    | 7     | 7    | 7    | 10   | 10   |
| Pb               | 15           | 15   | 15   | 10   | 10    | 15   | 10   | 10   | 10   |
| Sc               | 10           | L    | 5    | L    | N     | L    | L    | L    | L    |
| Sr               | 100          | 200  | 200  | 200  | 70    | 100  | 70   | 100  | 200  |
| V                | 70           | 70   | 50   | 30   | 30    | 70   | 30   | 30   | 30   |
| Y                | 20           | 15   | 30   | 15   | 10    | 15   | 15   | 15   | 15   |
| Yb               | 3            | 1.5  | 3    | 2    | 1     | 1.5  | 1.5  | 1.5  | 1.5  |
| Zr               | 150          | 70   | 100  | 100  | 100   | 150  | 70   | 100  | 70   |

Table 6.--Semiquantitative 6-step spectrographic analyses of samples  
from the Felder deposit, south Texas--continued

| Sample<br>number | F4B-<br>V-4B |
|------------------|--------------|
| <hr/>            |              |
| <u>%</u>         |              |
| Al               | 3            |
| Na               | 0.7          |
| K                | 2            |
| Fe               | 1.5          |
| Mg               | 0.1          |
| Ca               | 7            |
| Ti               | 0.15         |
| <br><u>ppm</u>   |              |
| B                | N            |
| Ba               | 500          |
| Be               | N            |
| Co               | 7            |
| Cr               | 10           |
| Cu               | 7            |
| Ga               | 5            |
| La               | N            |
| Mn               | 150          |
| Mo               | 100          |
| Nb               | L            |
| Ni               | 10           |
| Pb               | 10           |
| Sc               | L            |
| Sr               | 100          |
| V                | 30           |
| Y                | 10           |
| Yb               | 1            |
| Zr               | 100          |

Table 7.--Approximate visual lower limits of determination for the elements  
analysed by the 6-step Spectrographic Method at the Denver Laboratory  
[from Meyers and others, 1961]

| REVISED December 1967 |            |         |     |         |      |
|-----------------------|------------|---------|-----|---------|------|
| Element               | %          | Element | ppm | Element | ppm  |
| Si                    | 0.002      | Cr      | 1   | Rh      | 2    |
| Al                    | 0.001      | Cu      | 1   | Ru      | 10   |
| Fe                    | 0.001      | Dy      | 50  | Sb      | 150  |
| Mg                    | 0.002      | Er      | 50  | Sc      | 5    |
| Ca                    | 0.002      | Eu      | 100 | Sn      | 10   |
| Na                    | 0.05       | Ga      | 5   | Sr      | 5    |
| K                     | 0.7        | Gd      | 50  | Sm      | 100  |
| Ti                    | 0.0002     | Ge      | 10  | Ta      | 200  |
| P                     | 0.2        | Hf      | 100 | Tb      | 300  |
|                       |            | Ho      | 20  | Te      | 2000 |
|                       | <u>ppm</u> | In      | 10  | Th      | 200  |
| Mn                    | 1          | Ir      | 50  | Tl      | 50   |
|                       |            | La      | 30  | Tm      | 20   |
| Ag                    | 0.5        | Li      | 50  | U       | 500  |
| As                    | 1000       | Lu      | 30  | V       | 7    |
| Au                    | 20         | Mo      | 3   | W       | 100  |
| B                     | 20         | Nb      | 10  | Y       | 10   |
| Ba                    | 1.5        | Nd      | 70  | Yb      | 1    |
|                       |            | Ni      | 5   | Zn      | 200  |
| Be                    | 1          | Os      | 50  | Zr      | 10   |
| Bi                    | 10         | Pb      | 10  |         |      |
| Cd                    | 20         | Pd      | 1   |         |      |
| Ce                    | 150        | Pr      | 100 |         |      |
| Co                    | 3          | Pt      | 30  |         |      |
|                       |            | Re      | 30  |         |      |