

13. X-RAY MINERALOGY STUDIES – LEG 1

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Semi-quantitative analyses of the crystalline components in sediments can be made by the use of X-ray powder diffraction techniques. The method used for this study is called the method of mutual standards, mutual ratios, or multiple ratios. It has been in use approximately twenty years by a number of industry and governmental laboratories, and is particularly useful for semi-quantitative ranking of relative mineral abundances. The percentage given in the analyses constitutes the per cent of those crystalline components defined to constitute 100 per cent of the sediment in question. Consequently, minerals not included in the calibration matrix may be present in the sediment but are ignored in calibrating the sum of the components. In addition, amorphous materials are excluded.

The minerals for which calibrations are presently available are given at the head of the data tables. The X-ray diffraction peaks used for quantitative analyses fall within the 2θ values for copper radiation given under the value called *window*. The *factors* given in the calibration table are the linear calibration constants normalized against quartz. All minerals detected are utilized in calculating the concentration of those minerals present, but the data output only lists those mineral abundances that are greater than the threshold per cent values listed in the calibration table.

The term *diffuse scattering* in the calibration table refers to the percentage fraction of the total scattered radiation which is not Bragg scattering, and, here, is considered to be diffuse scattering. The analytical system involved used a lithium fluoride diffracted beam monochromator which excludes everything but the copper $K\alpha$ radiation. Consequently, the non-Bragg scattering is contributed by true diffuse plus air scattering, and low angle direct beam scattering caused by the mosaic spread of the monochromator. Variations of the value of diffuse scattering give an indication of the amount of amorphous material in the specimen. This amorphous material consists of moisture resulting from capillary condensation, the organic amine reagent used to expand expandable clays, volcanic glass, opal, and amorphous clay minerals. The instrumental background of diffuse scattering can be approximated from the values for very high calcite content samples.

The bulk mineralogy analytical data presented here are obtained from carefully ground sediment samples that have been washed free of sea salts. Consequently,

diffraction patterns show little or no trace of halite and gypsum. The samples were ground under *n*-butanol for two hours in alumina motor-driven mortar and pestle grinders. The samples were then moistened with water and treated with tri-*n*-hexyl amine acetate according to the method of Rex and Bauer (1965). Moistening the specimen prior to the use of amine reagent is essential as water acts as a catalyst. The X-ray diffraction spacing for montmorillonite produced by the use of the amine reagent is 18.0 Å which is the same value obtained with glycerol. This reagent expands corrensite and rectorite in the same fashion as does glycerol.

The calibration factor for plagioclase is based on the assumption that they are sodic or intermediate in composition. The mica calibration is based on very fine grained sedimentary potassium mica such as is typical of the acid insoluble fractions of limestone called illite by some workers. The phillipsite used was obtained from Sylvania Guyot. The clinoptilolite was provided by Dr. R. Hay. The cristobalite standard is a diagenetic alteration product of the recrystallization of diatomite from the Monterey Formation, Lompoc, California. The remainder of the standard mineral specimens are from relatively conventional sources of mineral standards, such as museums, Ward's Scientific Supply, and personal collections.

The presence or absence of a mineral in these computer prepared lists does not necessarily indicate that this mineral is truly present or absent from the sediment in question. It instead represents the present degree of development of recognition criteria in the computer programs employed at this point in time to interpret the digital X-ray diffraction patterns obtained of the specimens under analysis. Further improvement in the computer software should improve our ability to recognize and measure mineral abundances. However, all of the analog diffraction patterns interpreted here have been checked by direct inspection to monitor the progress of the computer program development.

The interpretation of the less than 2 micron and of the 2 through 10 micron carbonate free fractions is still underway.

Intermineral interferences are handled by spectrum stripping techniques with a sequence of successive steps based on interpeak intensity ratios directly

analogous to those used in manual calculations. This technique is dependent on minimizing preferred orientation which is primarily controlled by careful particle size control and by the specimen mounting technique.

ANALYTICAL COMMENTS

The absence of chlorite in all these samples is primarily a sensitivity problem. Low crystallinity chlorite is common but not abundant in the clay fractions of Gulf of Mexico sediments and is not recorded in the bulk sample diffraction patterns.

Rhodochrosite is a strikingly abundant mineral in the Atlantic sediments of Leg 2. Here in Leg 1 it occurs in very minor amounts in Holes 1, 3, 4, 5, 6, and 7. In all cases the concentrations are so low that no additional diffraction lines are available for supplementary identification reducing the certainty of the identification.

The abundance of cristobalite in a number of chert beds indicates a close mineralogical parallelism to California diatomite alteration which involves the opal to cristobalite to quartz transformation. The X-ray data indicate that many deep sea cherts are currently

in the metastable intermediate sedimentary cristobalite stage.

Site 6 is notable for the high abundance of montmorillonite among the crystalline components. Additional analytical work is being carried on the samples from this site to verify the preliminary results, especially the suspect absence of phillipsite which should accompany montmorillonite.

Direct X-ray sensitivity for phillipsite is no better than 10% because of interference of kaolinite and microcline. Techniques are being modified with the introduction of a strong acid dissolution step to try to increase sensitivity by determining the amount of phillipsite by difference.

REFERENCE

Rex, R.W. and Bauer, W.R., 1965. New amine reagents for X-ray determination of expandable clays in dry samples. In *Clays and Clay Minerals*. W.F. Bradley and S.W. Bailey (Eds.). Great Britain (Pergamon Press) 13, 411.

TABLE 1a*
Calibration Table for Minerals Under Investigation (Cu K α Radiation)

	Mineral	Window		Factor	Threshold
39	Diffuse Scattering	0.0	0.0	0.0	0.0
2	Calcite	29.25	29.85	1.92	1.00
3	Dolomite	30.45	31.25	2.00	1.00
5	Anhydrite	25.15	25.75	0.91	1.00
1	Quartz	26.45	26.95	1.00	1.00
7	K-Feldspar	27.35	27.79	1.50	1.00
8	Plagioclase	27.80	28.15	1.50	1.00
9	Kaolinite	12.00	12.85	2.65	1.00
10	Mica	8.50	9.20	2.65	1.00
11	Chlorite	5.70	6.49	2.65	1.00
13	Montmorillonite	4.50	5.40	3.58	1.00
15	Pyrite	56.00	56.70	2.27	1.00
16	Apatite	32.20	32.40	7.08	1.00
17	Barite	28.65	28.85	3.04	1.00
18	Siderite	31.90	32.20	1.10	1.00
19	Palygorskite	8.20	8.50	5.00	1.00
20	Rhodochrosite	31.26	31.40	1.92	1.00
21	Clinoptolite	9.71	9.99	3.33	1.00
22	Phillipsite	16.40	16.70	19.20	1.00
23	Cristobalite	21.30	21.90	9.50	1.00
24	Hematite	33.20	33.30	3.00	1.00
25	Aragonite	45.65	46.00	5.88	1.00
26	Corrensite	2.50	2.99	1.32	1.00
27	Rectorite	3.00	3.70	1.32	1.00

*For Sites 1-5 and 6A-7A.

TABLE 2
Results of X-ray Diffraction Analysis of Samples from Leg 1

Hole 1P:

Core	Section	Depth	Diff	Calc	Dolo	Anhy	Quar	K-Fe	Plag	Kaol	Mica	Chlo	Mont	Pyri	Apat	Bari	Side	Paly	Rhod	Clin	Phil	Cris	Hema	Arag	Corr	Rect
1	1	12	89.9	28.7	8.6	0.0	20.8	2.2	3.9	6.6	9.4	0.0	19.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	1	75-76	89.0	31.9	7.4	0.0	20.7	3.3	3.1	9.6	7.6	0.0	14.5	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	1	133-135	88.7	32.2	8.2	0.0	22.5	3.7	4.7	7.4	8.2	0.0	13.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	2	77	89.0	26.6	5.6	0.0	25.5	4.6	3.4	7.0	9.2	0.0	16.3	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	2	128-130	89.2	18.9	9.6	0.0	26.0	0.0	4.3	6.4	13.8	0.0	15.7	1.9	0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	3	86-88	91.2	27.7	9.0	0.0	33.8	3.3	3.9	8.5	12.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0
1	3	112-114	89.7	28.4	7.3	0.0	23.0	3.2	3.8	8.0	8.1	0.0	16.2	0.0	0.0	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	4	76-78	89.8	3.0	11.8	0.0	24.8	3.3	3.0	5.5	9.4	0.0	36.1	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	4	132-134	90.9	3.4	11.3	0.0	28.7	0.0	3.4	11.5	11.2	0.0	30.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	5	77-79	90.0	12.5	9.8	0.0	26.8	3.3	4.8	11.4	15.4	0.0	16.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	5	132-134	90.8	11.8	14.0	0.0	32.1	0.0	4.7	17.8	19.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	6	68-70	89.8	9.4	9.7	0.0	26.1	4.4	4.5	7.8	11.7	0.0	26.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	6	135-137	88.7	6.7	18.9	0.0	29.6	3.3	3.8	13.8	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Maximum Concentrations ^a

Diff	Calc	Dolo	Anhy	Quar	K-Fe	Plag	Kaol	Mica	Chlo	Mont	Pyri	Apat	Bari	Side	Paly	Rhod	Clin	Phil	Cris	Hema	Arag	Corr	Rect
90.8	28.7	11.8	0.0	29.6	3.7	4.7	11.5	15.4	0.0	26.5	1.9	0.0	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
90.9	31.9	14.0	0.0	32.1	4.4	4.7	13.8	19.6	0.0	30.4	2.0	0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
91.2	32.2	18.9	0.0	33.8	4.6	4.8	17.8	20.0	0.0	36.1	2.5	0.0	0.0	0.0	0.0	3.9	0.0	0.0	0.0	0.0	1.6	0.0	0.0

^aThe largest three values for each mineral are presented for each hole.

Hole 1:

[illegible]

Hole 1:

Core	Section	Depth	Diff	Calc	Dolo	Anhy	Quar	K-Fe	Plag	Kaol	Mica	Chlo	Mont	Pyri	Apat	Bari	Side	Paly	Rhod	Clin	Phil	Cris	Hema	Arag	Corr	Rect
2	1	55-57	82.3	5.7	28.2	0.0	36.6	2.5	8.4	7.7	10.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2	9-11	83.5	4.3	25.9	0.0	44.3	2.8	6.6	8.1	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2	74-76	81.5	4.6	29.6	0.0	40.5	2.0	6.8	6.7	9.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	3	12-14	81.4	6.2	24.4	0.0	37.7	3.6	6.5	9.8	11.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	3	59-61	85.2	5.1	24.7	0.0	34.2	4.0	5.1	12.7	13.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1	10-12	80.0	2.6	35.0	0.0	33.1	3.9	7.7	6.7	11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1	73-75	84.2	9.0	20.5	0.0	31.5	1.8	5.1	13.0	15.5	0.0	0.0	1.3	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	1	12-14	79.4	1.0	22.7	0.0	45.2	4.2	9.3	5.9	6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	0.0	0.0
5	1	97-99	87.7	0.0	16.1	0.0	41.5	4.5	7.3	13.2	17.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	2	7-9	85.1	1.7	23.7	0.0	38.6	4.2	6.4	7.6	10.6	0.0	0.0	1.6	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	3.2	0.0	0.0
6	1	9-10	83.6	11.4	24.2	0.0	28.4	3.6	4.6	13.1	14.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	2	18-20	84.6	8.6	24.7	0.0	28.9	2.7	6.3	12.5	15.2	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	2	75-77	84.2	10.2	26.1	0.0	29.0	3.8	6.9	11.1	12.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	3	8-10	84.9	11.8	23.7	0.0	29.2	3.6	5.5	10.2	14.5	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	3	75-77	84.7	9.8	23.7	0.0	31.3	4.8	6.6	10.6	10.5	0.0	0.0	1.5	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	2	4-6	87.5	6.6	23.6	0.0	33.6	4.6	5.8	12.5	11.6	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	2	78-80	84.6	10.9	22.0	0.0	30.8	3.5	7.1	11.6	14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	3	3-5	85.3	12.6	24.2	0.0	31.2	0.0	7.2	12.6	12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	3	80-82	83.1	10.3	23.8	0.0	30.8	4.2	6.8	11.9	12.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	4	7-9	86.2	4.4	22.7	0.0	35.0	4.9	6.9	12.0	11.9	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	4	74-76	84.7	10.3	23.3	0.0	31.4	3.5	5.5	12.2	13.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	5	4-6	86.5	11.6	21.5	0.0	30.5	3.8	5.3	12.4	14.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	5	72-74	83.7	10.3	23.0	0.0	26.8	3.4	6.8	12.9	12.5	0.0	0.0	0.0	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	6	2-4	85.8	10.7	22.8	0.0	28.2	3.1	6.2	12.0	15.4	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	6	76-78	85.1	10.9	22.5	0.0	30.3	3.2	5.8	13.0	13.1	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	7	3-5	85.4	10.1	24.7	0.0	29.9	1.9	5.9	11.0	15.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	7	74-76	85.0	11.4	23.5	0.0	26.5	3.7	6.7	11.6	15.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	2	10-12	87.7	6.5	19.9	0.0	35.4	5.0	9.6	11.2	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	2	74-76	88.4	3.2	21.7	0.0	37.2	3.6	8.6	11.7	14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	3	6-8	87.7	0.0	19.2	0.0	35.1	5.5	8.3	12.9	19.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	3	74-76	87.0	6.1	22.3	0.0	38.0	4.4	7.6	10.6	9.7	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	4	6-8	85.0	7.2	24.2	0.0	35.6	5.1	6.7	11.6	9.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	4	74-76	84.6	12.3	23.3	0.0	30.5	3.1	7.2	9.9	13.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	5	9-11	86.1	10.5	20.8	0.0	34.0	5.1	8.1	8.8	9.3	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	5	74-76	85.9	9.3	17.2	0.0	37.7	5.2	8.0	12.4	9.3	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	6	6-8	85.3	11.2	20.9	0.0	29.8	5.1	6.7	9.9	15.4	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	6	74-76	87.7	4.1	19.2	0.0	36.4	5.2	7.1	13.7	12.2	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	7	8-10	86.4	9.1	23.2	0.0	34.0	3.6	7.8	13.6	8.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	7	74-76	87.8	4.9	17.6	0.0	38.6	5.3	6.4	12.5	10.9	0.0	0.0	2.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

[illegible]

Hole 2:

Core	Section	Depth	Diff	Calc	Dolo	Anhy	Quar	K-Fe	Plag	Kaol	Mica	Chlo	Mont	Pyri	Apat	Bari	Side	Paly	Rhod	Clin	Phil	Cris	Hema	Arag	Corr	Rect
4	2	9-11	85.2	79.7	7.4	0.0	5.1	0.0	0.0	0.0	6.1	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	2	74-76	86.1	76.2	8.7q	0.0	11.2	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Maximum Concentrations

Diff	Calc	Dolo	Anhy	Quar	K-Fe	Plag	Kaol	Mica	Chlo	Mont	Pyri	Apat	Bari	Side	Paly	Rhod	Clin	Phil	Cris	Hema	Arag	Corr	Rect
88.2	82.4	5.2	0.0	13.3	2.0	1.8	4.8	4.6	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.3	0.0	0.0
88.3	86.2	7.4	0.0	13.6	2.8	3.6	5.1	4.6	0.0	0.0	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.2	0.0	0.0
89.6	87.1	8.7	1.7	17.7	3.3	3.7	5.1	6.1	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.8	0.0	0.0

Hole 3:

Core	Section	Depth	Diff	Calc	Dolo	Anhy	Quar	K-Fe	Plag	Kaol	Mica	Chlo	Mont	Pyri	Apat	Bari	Side	Paly	Rhod	Clin	Phil	Cris	Hema	Arag	Corr	Rect
1	1	31-33	89.8	6.6	19.7	0.0	30.6	3.6	5.3	13.9	20.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	1	70-72	90.0	10.6	19.7	0.0	31.3	0.0	2.8	13.3	21.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	1	110-115	89.5	12.3	15.3	0.0	33.0	0.0	3.7	16.4	19.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	2	12-13	87.7	11.5	18.5	0.0	27.6	3.2	4.8	14.8	19.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	2	75-77	89.8	6.6	19.9	0.0	32.3	2.9	3.0	14.5	18.0	0.0	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	1	53-55	88.7	15.9	13.0	0.0	17.9	2.7	3.0	10.2	14.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.9	0.0	0.0	0.0
2	1	105-107	74.8	4.3	20.6	0.0	49.2	6.7	10.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.3	0.0	0.0	0.0
2	2	42-43	88.8	12.1	19.0	0.0	35.2	2.6	5.1	13.5	12.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2	67-69	87.0	8.8	17.9	0.0	32.8	4.9	7.2	13.1	15.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	3	10-12	88.3	11.6	21.3	0.0	33.7	3.6	5.4	11.1	13.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	3	44-46	82.1	4.8	19.6	0.0	45.0	5.4	8.3	5.2	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.7	0.0	0.0	0.0
2	3	139-141	71.6	0.0	6.2	0.0	68.9	4.9	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.6	0.0	0.0	0.0
3	2	6-8	88.1	26.3	17.5	0.0	23.0	4.8	6.8	9.9	9.1	0.0	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	2	120-122	87.9	64.3	2.8	0.0	15.7	3.0	3.1	5.9	5.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	1	7-9	90.3	51.5	0.0	0.0	31.8	0.0	4.4	7.1	0.0	0.0	0.0	5.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	1	101-103	89.3	48.3	2.7	0.0	15.2	3.1	3.2	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.5	0.0	0.0	0.0
5	1	41-43	88.3	58.1	6.5	0.0	18.5	2.3	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.6	0.0	0.0	0.0
5	1	92-94	88.1	57.4	6.3	0.0	19.1	0.0	2.8	0.0	5.3	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.3	0.0	0.0	0.0
5	2	11-13	86.3	34.6	12.8	0.0	27.0	3.8	7.9	5.4	5.2	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0
5	2	75-77	84.1	59.6	10.8	0.0	9.7	0.0	3.8	0.0	0.0	0.0	0.0	0.0	10.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.4	0.0	0.0	0.0
5	3	11-13	84.7	72.3	5.5	0.0	7.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	0.0	0.0	0.0
5	3	77-79	82.7	72.3	8.4	0.0	5.0	0.0	0.0	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	10.2	0.0	0.0	0.0
5	4	6-8	86.4	64.6	2.2	0.0	17.2	0.0	3.2	4.7	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	0.0	0.0	0.0
5	4	78-80	85.6	55.8	2.8	0.0	21.4	0.0	5.3	4.4	0.0	0.0	0.0	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.5	0.0	0.0	0.0

Hole 3:

Core	Section	Depth	Diff	Calc	Dolo	Anhy	Quar	K-Fe	Plag	Kaol	Mica	Chlo	Mont	Pyri	Apat	Bari	Side	Paly	Rhod	Clin	Phil	Cris	Hema	Arag	Corr	Rect
5	5	25-27	85.6	67.9	6.2	0.0	6.2	0.0	0.0	3.5	0.0	0.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.1	0.0	0.0
5	5	29-30	83.0	50.1	11.6	0.0	8.5	0.0	2.1	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.7	0.0	0.0
6	1	37-39	82.0	53.0	5.8	0.0	6.2	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.8	0.0	0.0
6	1	49-51	86.1	70.2	7.8	1.2	6.7	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	9.7	0.0	0.0
6	2	4-6	85.0	79.5	3.6	0.0	4.8	0.0	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	7.8	0.0	0.0
6	2	80-81	86.6	50.1	6.9	0.0	11.7	2.0	2.4	0.0	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.1	0.0	0.0
7	1	28-30	85.1	65.8	5.0	0.0	13.0	2.8	2.4	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.9	0.0	0.0
7	1	85-87	79.7	78.9	5.5	0.0	4.4	1.1	0.0	0.0	0.0	0.0	0.0	5.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.9	0.0	0.0
7	2	3-5	86.8	55.4	3.6	0.0	18.3	1.8	2.8	4.5	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	9.9	0.0	0.0
7	2	78-80	88.6	60.9	4.8	0.0	25.6	0.0	0.0	6.6	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	3	24-26	86.1	56.9	4.4	0.0	19.2	0.0	4.7	6.0	7.1	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	3	49-51	80.3	50.5	16.3	0.0	1.1	0.0	0.0	3.0	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	25.2	0.0	0.0
7	4	6-8	85.8	55.6	7.5	0.0	18.9	1.7	4.0	4.3	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	0.0	0.0
7	4	104-109	79.6	58.0	11.4	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	2.7	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	24.9	0.0	0.0
8	1	120-122	89.9	68.1	4.4	2.6	14.3	0.0	0.0	0.0	8.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	2	12-13	88.0	69.1	2.1	0.0	16.8	0.0	2.0	7.9	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	2	104-106	85.3	78.1	0.0	0.0	11.7	0.0	1.7	4.5	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	3	15-17	87.9	72.6	0.0	0.0	11.4	0.0	0.0	6.6	6.3	0.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	3	45-47	83.6	78.2	0.0	0.0	12.2	0.0	1.9	3.1	0.0	0.0	0.0	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	4	9-11	91.4	38.4	0.0	0.0	30.4	5.4	5.8	11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.0	0.0	0.0
8	4	73-75	84.8	70.8	4.0	0.0	7.8	0.0	2.5	5.0	4.0	0.0	0.0	2.6	0.0	0.0	1.2	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	5	7-9	83.4	74.6	2.4	0.0	9.8	0.0	0.0	4.2	5.6	0.0	0.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	5	77-79	91.5	62.7	4.2	0.0	21.4	0.0	0.0	9.0	0.0	0.0	0.0	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	6	25-27	90.3	61.6	3.1	0.0	14.5	2.9	0.0	0.0	0.0	0.0	0.0	2.9	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.7	0.0	0.0
8	6	69-71	89.0	78.0	0.0	0.0	16.0	3.3	0.0	0.0	0.0	0.0	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	2	12-13	93.3	0.0	7.5	0.0	51.7	0.0	0.0	17.9	22.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	2	72-74	92.4	0.0	6.7	0.0	52.0	0.0	7.9	13.7	19.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	3	13-15	93.4	0.0	11.8	0.0	38.6	5.8	5.7	18.2	14.8	0.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	3	74-76	91.2	14.3	9.2	0.0	40.1	6.0	5.4	12.4	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	3	131-133	89.1	0.0	0.0	0.0	6.8	0.0	0.0	13.4	0.0	0.0	0.0	4.3	0.0	0.0	0.0	0.0	0.0	0.0	36.0	35.9	0.0	3.0	0.0	0.0
9	4	12-14	91.4	0.0	7.7	0.0	43.4	6.2	8.6	17.1	11.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7	0.0	0.0
9	4	CTCH*	92.3	22.8	5.0	0.0	40.0	0.0	3.5	12.0	0.0	0.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.4	0.0	0.0
9	5	11-13	90.7	36.0	7.5	0.0	28.6	0.0	4.6	9.5	10.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	5	74-76	91.4	20.0	11.4	0.0	38.4	3.8	7.4	9.1	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	6	7-9	91.7	0.0	12.3	0.0	44.7	6.8	4.6	15.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.9	0.0	0.0
9	6	79-81	91.9	0.0	14.0	0.0	41.1	0.0	8.0	14.3	17.9	0.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	7	9-11	92.0	16.7	5.6	0.0	30.0	0.0	5.8	10.1	8.4	0.0	23.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	7	66-71	84.5	0.0	0.0	0.0	1.0	0.0	0.0	5.1	0.0	0.0	93.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	7	75-77	91.0	6.8	8.8	0.0	45.5	0.0	7.9	16.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.8	0.0	0.0

*CTCH = core catcher

Hole 3:

Core	Section	Depth	Diff	Calc	Dolo	Anhy	Quar	K-Fe	Plag	Kaol	Mica	Chlo	Mont	Pyri	Apat	Bari	Side	Paly	Rhod	Clin	Phil	Cris	Hema	Arag	Corr	Rect
10	2	6-8	90.6	13.6	7.1	0.0	26.3	0.0	12.5	0.0	10.4	0.0	20.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	2	75-77	90.5	20.2	4.2	0.0	37.2	6.1	11.0	10.8	10.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	1	CTCH*	94.3	10.3	7.5	0.0	27.6	5.9	18.6	13.9	16.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*CTCH = core catcher

Maximum Concentrations

Diff	Calc	Dolo	Anhy	Quar	K-Fe	Plag	Kaol	Mica	Chlo	Mont	Pyri	Apat	Bari	Side	Paly	Rhod	Clin	Phil	Cris	Hema	Arag	Corr	Rect
93.3	78.2	19.9	0.0	51.7	6.2	11.0	17.1	20.3	0.0	20.0	5.0	7.1	0.0	1.0	0.0	2.0	0.0	0.0	0.0	0.0	25.1	0.0	0.0
93.4	78.9	20.6	1.2	52.0	6.7	12.5	17.9	21.0	0.0	23.5	5.2	8.3	0.0	1.2	0.0	2.1	0.0	0.0	0.0	0.0	25.2	0.0	0.0
94.3	79.5	21.3	2.6	68.9	6.8	18.6	18.2	22.9	0.0	93.9	5.2	10.7	0.0	1.3	0.0	2.6	0.0	36.0	35.9	1.2	32.8	0.0	0.0

Hole 4:

Core	Section	Depth	Diff	Calc	Dolo	Anhy	Quar	K-Fe	Plag	Kaol	Mica	Chlo	Mont	Pyri	Apat	Bari	Side	Paly	Rhod	Clin	Phil	Cris	Hema	Arag	Corr	Rect
1	1	26-28	69.5	97.5	1.4	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	1	75-77	69.9	96.4	2.5	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	2	28-30	71.0	95.7	2.6	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	2	108-110	88.7	34.4	0.0	0.0	27.2	2.8	0.0	16.6	16.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	3	9-11	89.2	33.7	0.0	0.0	29.7	3.0	2.9	17.0	11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	3	74-76	91.0	0.0	0.0	0.0	38.9	5.8	8.6	25.2	21.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	4	9-11	90.8	17.9	0.0	0.0	34.2	5.7	5.8	18.1	18.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	4	75-77	90.7	22.9	3.1	0.0	33.9	3.4	5.1	15.6	12.7	0.0	0.0	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	5	91-93	91.5	9.7	0.0	0.0	42.5	0.0	8.6	19.2	20.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	6	5-7	90.2	0.0	0.0	0.0	40.3	4.0	8.7	24.5	22.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	6	75-77	91.7	0.0	0.0	0.0	46.4	6.9	6.9	24.6	15.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	6	75-77	91.7	0.0	0.0	0.0	46.4	6.9	6.9	24.6	15.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	1	4-6	89.4	41.9	0.0	0.0	11.8	0.0	0.0	0.0	13.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.7	0.0	0.0	0.0	0.0	0.0	0.0
2	1	88-90	66.9	95.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	1	124-126	75.5	85.4	0.0	0.0	2.8	0.0	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.0	0.0	0.0	0.0	9.2	0.0	0.0	0.0	0.0	0.0	0.0
3	2	120-122	75.4	93.2	1.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	1	13-15	75.3	91.5	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.6	0.0	0.0	0.0	0.0

Hole 4:

Maximum Concentrations

Diff	Calc	Dolo	Anhy	Quar	K-Fe	Plag	Kaol	Mica	Chlo	Mont	Pyri	Apat	Bari	Side	Paly	Rhod	Clin	Phil	Cris	Hema	Arag	Corr	Rect
91.0	95.7	2.5	0.0	40.3	5.7	8.6	24.5	20.1	0.0	0.0	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
91.5	96.4	2.6	0.0	42.5	5.8	8.6	24.6	21.4	0.0	0.0	3.3	0.0	0.0	0.0	0.0	2.5	9.2	0.0	0.0	0.0	0.0	0.0	0.0
91.7	97.5	3.1	0.0	46.4	6.9	8.7	25.2	22.5	0.0	0.0	3.5	0.0	0.0	0.0	0.0	2.8	32.7	0.0	6.6	0.0	0.0	0.0	0.0

Hole 4A:

Core	Section	Depth	Diff	Calc	Dolo	Anhy	Quar	K-Fe	Plag	Kaol	Mica	Chlo	Mont	Pyri	Apat	Bari	Side	Paly	Rhod	Clin	Phil	Cris	Hema	Arag	Corr	Rect
1	1	10-12	73.4	92.4	1.4	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	1	95-97	73.9	93.6	1.8	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	2	108-111	68.4	98.4	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	3	8-10	73.1	85.7	5.8	0.0	3.2	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0
1	3	66-68	68.1	86.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	9.4	0.0	0.0	0.0	0.0	0.0
2	1	32-34	86.7	73.8	1.8	0.0	4.2	1.4	0.0	0.0	6.5	0.0	12.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	1	91-93	76.8	98.4	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Maximum Concentrations

Diff	Calc	Dolo	Anhy	Quar	K-Fe	Plag	Kaol	Mica	Chlo	Mont	Pyri	Apat	Bari	Side	Paly	Rhod	Clin	Phil	Cris	Hema	Arag	Corr	Rect
73.9	93.6	1.8	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
76.8	98.4	1.8	0.0	3.2	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
86.7	98.4	5.8	0.0	4.2	1.4	0.0	0.0	6.5	0.0	12.3	3.9	0.0	0.0	0.0	0.0	0.0	3.1	9.4	0.0	0.0	0.0	0.0	0.0

Hole 5:

Core	Section	Depth	Diff	Calc	Dolo	Anhy	Quar	K-Fe	Plag	Kaol	Mica	Chlo	Mont	Pyri	Apat	Bari	Side	Paly	Rhod	Clin	Phil	Cris	Hema	Arag	Corr	Rect
1	1	13-15	80.5	11.1	6.8	0.0	42.2	5.0	13.7	8.8	9.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	1	79-81	86.8	9.0	5.3	0.0	33.4	3.9	9.8	15.5	21.5	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	2	74-76	82.5	88.7	2.0	0.0	6.4	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	3	19-21	77.4	88.6	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	4.0	3.2	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	3	87-89	81.2	90.6	2.5	0.0	3.5	1.2	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	1	32-34	70.6	95.2	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	1	94-97	75.4	82.2	1.1	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	2.7	0.0	0.0	0.0	0.0	0.0	10.9	0.0	0.0	0.0	0.0	0.0	0.0
3	1	12-14	78.9	68.4	0.0	0.0	3.0	0.0	0.0	2.2	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	23.9	0.0	0.0	0.0	0.0	0.0	0.0

Hole 5:

Core	Section	Depth	Diff	Calc	Dolo	Anhy	Quar	K-Fe	Plag	Kaol	Mica	Chlo	Mont	Pyri	Apat	Bari	Side	Paly	Rhod	Clin	Phil	Cris	Hema	Arag	Corr	Rect
3	1	38-40	93.1	0.0	0.0	0.0	22.1	0.0	0.0	0.0	14.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	63.8	0.0	0.0	0.0	0.0	0.0	0.0
3	1	71-73	89.2	0.0	0.0	0.0	13.7	0.0	2.7	0.0	12.5	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	69.7	0.0	0.0	0.0	0.0	0.0	0.0

Maximum Concentrations

Diff	Calc	Dolo	Anhy	Quar	K-Fe	Plag	Kaol	Mica	Chlo	Mont	Pyri	Apat	Bari	Side	Paly	Rhod	Clin	Phil	Cris	Hema	Arag	Corr	Rect
86.8	88.7	2.5	0.0	22.1	1.2	2.7	2.2	12.5	0.0	0.0	2.8	0.0	0.0	0.0	0.0	0.0	23.9	0.0	0.0	0.0	0.0	0.0	0.0
89.2	90.6	5.3	0.0	33.4	3.9	9.8	8.8	14.1	0.0	0.0	3.6	0.0	0.0	0.0	0.0	1.7	63.8	0.0	0.0	0.0	0.0	0.0	0.0
93.1	95.2	6.8	0.0	42.2	5.0	13.7	15.5	21.5	0.0	0.0	4.0	3.2	0.0	0.0	0.0	2.5	69.7	0.0	0.0	0.0	0.0	0.0	0.0

Hole 5A:

Core	Section	Depth	Diff	Calc	Dolo	Anhy	Quar	K-Fe	Plag	Kaol	Mica	Chlo	Mont	Pyri	Apat	Bari	Side	Paly	Rhod	Clin	Phil	Cris	Hema	Arag	Corr	Rect
1	0	CTCH*	80.4	0.0	0.0	0.0	13.7	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	85.1	0.0	0.0	0.0	0.0	0.0
3	1	CTCH*	82.7	61.5	3.5	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	7.5	0.0	23.0	0.0	0.0	0.0	0.0	0.0

*CTCH = core catcher

Maximum Concentrations

Diff	Calc	Dolo	Anhy	Quar	K-Fe	Plag	Kaql	Mica	Chlo	Mont	Pyri	Apat	Bari	Side	Paly	Rhod.	Clin	Phil	Cris	Hema	Arag	Corr	Rect
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80.4	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.0	0.0	0.0	0.0	0.0
82.7	61.5	3.5	0.0	13.7	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	7.5	0.0	85.1	0.0	0.0	0.0	0.0

TABLE 1b*
Calibration Table for Minerals Under Investigation (Cu K α Radiation)

Mineral	Window		Factor	Threshold
Diffuse Scattering	0.0	0.0	0.0	0.0
Calcite	29.00	29.60	1.92	1.00
Dolomite	30.80	31.15	2.00	1.00
Aragonite	45.65	46.00	5.88	1.00
Siderite	31.90	32.20	1.10	1.00
Rhodochrosite	31.26	31.40	1.92	1.00
Anhydrite	25.15	25.75	0.91	1.00
Quartz	26.45	26.95	1.00	1.00
Cristobalite	21.30	21.90	9.50	1.00
K-Feldspar	27.35	27.79	1.50	1.00
Plagioclase	27.80	28.15	1.50	1.00
Kaolinite	12.00	12.85	2.65	1.00
Mica	8.50	9.20	2.65	1.00
Chlorite	5.70	6.49	2.65	1.00
Montmorillonite	4.50	5.40	3.58	1.00
Corrensite	2.50	2.99	1.32	1.00
Rectorite	3.00	3.70	1.32	1.00
Palygorskite	8.20	8.50	5.00	1.00
Sepiolite	7.20	7.60	5.00	1.00
Clinoptilolite	9.71	9.99	3.33	1.00
Phillipsite	16.40	16.70	19.20	1.00
Hematite	33.20	33.30	3.00	1.00
Pyrite	56.20	56.45	2.27	1.00
Apatite	32.20	32.40	7.08	1.00
Barite	28.65	28.85	3.04	1.00

*For Site 6.

TABLE 2 - Continued

Hole 6:

[illegible]

Hole 6:

Core	Section	Depth	Diff	Calc	Dolo	Anhy	Quar	K-Fe	Plag	Kaol	Mica	Chlo	Mont	Pyri	Apat	Bari	Side	Paly	Rhod	Clin	Phil	Cris	Hema	Arag	Corr	Rect
1	3	6-8	0.0	0.0	0.0	0.0	29.0	4.7	5.2	23.0	14.6	4.6	18.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	3	80-82	0.0	0.0	0.0	0.0	29.0	5.2	6.0	18.4	13.0	8.4	19.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	4	35-37	0.0	0.0	0.0	0.0	28.6	5.1	4.2	22.7	17.4	5.3	16.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	1	40-42	0.0	0.0	0.0	0.0	20.7	4.3	3.7	14.8	14.2	15.3	26.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	1	100-102	0.0	0.0	0.0	0.0	18.4	4.1	2.7	12.1	11.7	11.2	39.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2	24-26	0.0	0.0	0.0	0.0	16.3	2.9	3.9	6.9	9.8	7.7	42.6	0.0	0.0	0.0	0.0	0.0	0.0	10.3	0.0	0.0	0.0	0.0	0.0	0.0
2	2	80-82	0.0	0.0	0.0	0.0	16.5	4.7	3.9	13.5	9.1	7.0	38.4	0.0	0.0	0.0	0.0	0.0	0.0	6.6	0.0	0.0	0.0	0.0	0.0	0.0
2	3	20-22	0.0	0.0	0.0	0.0	15.5	3.9	3.9	14.4	11.1	6.6	38.5	0.0	0.0	0.0	0.0	0.0	0.0	5.7	0.0	0.0	0.0	0.0	0.0	0.0
2	3	71-73	0.0	2.5	0.0	0.0	19.1	4.0	4.0	13.1	16.7	6.5	25.3	0.0	0.0	0.0	0.0	0.0	0.0	8.2	0.0	0.0	0.0	0.0	0.0	0.0
2	4	7-9	0.0	2.0	0.0	0.0	15.5	3.7	4.4	14.0	9.0	9.5	35.7	0.0	0.0	0.0	0.0	0.0	0.0	5.7	0.0	0.0	0.0	0.0	0.0	0.0
2	4	74-76	0.0	1.9	0.0	0.0	16.6	4.7	3.7	14.1	10.6	2.6	38.8	0.0	0.0	0.0	0.0	0.0	0.0	6.6	0.0	0.0	0.0	0.0	0.0	0.0
2	5	28-30	0.0	4.6	0.0	0.0	17.4	1.8	3.6	5.5	7.8	2.7	51.0	0.0	0.0	0.0	0.0	0.0	0.0	5.2	0.0	0.0	0.0	0.0	0.0	0.0
2	5	76-78	0.0	0.0	0.0	0.0	14.1	3.3	4.0	11.2	11.5	5.9	44.4	0.0	0.0	0.0	0.0	0.0	0.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0
2	6	6-8	0.0	0.0	0.0	0.0	16.4	2.4	4.7	10.9	14.4	2.6	39.5	0.0	0.0	0.0	0.0	0.0	0.0	8.7	0.0	0.0	0.0	0.0	0.0	0.0
2	6	75-77	0.0	0.0	0.0	0.0	19.2	6.6	5.1	15.2	12.3	7.6	33.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	2	15-17	0.0	0.0	0.0	0.0	16.7	3.0	1.7	11.5	15.0	14.1	37.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	3	29-31	0.0	40.4	0.0	0.0	8.2	1.8	1.5	3.9	6.1	3.3	30.1	0.0	0.0	0.0	0.0	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0
3	3	142-144	0.0	22.8	3.8	0.0	7.2	0.0	0.0	4.1	20.1	3.1	34.8	0.0	0.0	0.0	0.0	0.0	0.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0
3	4	2-4	0.0	5.8	0.0	0.0	16.1	1.4	1.6	4.2	5.5	4.7	54.3	0.0	0.0	0.0	0.0	0.0	0.0	5.9	0.0	0.0	0.0	0.0	0.0	0.0
3	4	102-104	0.0	16.8	0.0	0.0	19.4	2.0	2.6	4.6	6.7	2.0	38.3	0.0	0.0	0.0	0.0	0.0	0.0	7.1	0.0	0.0	0.0	0.0	0.0	0.0
4	1	16-18	0.0	42.4	3.5	0.0	3.3	1.9	0.66	2.9	5.2	2.9	33.2	0.0	0.0	0.0	0.0	0.0	0.0	3.6	0.0	0.0	0.0	0.0	0.0	0.0
4	1	74-76	0.0	22.5	0.0	0.0	5.2	2.6	1.3	3.5	5.9	1.9	53.2	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0
4	2	10-12	0.0	45.1	0.0	0.0	3.5	1.0	0.70	3.1	3.7	3.4	37.0	0.0	0.0	0.0	0.0	0.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0
4	2	70-72	0.0	85.2	0.0	0.0	0.88	0.0	0.0	1.1	2.3	2.3	7.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	2	144-146	0.0	60.3	0.0	0.0	10.3	1.4	0.94	2.4	4.9	8.3	12.3	0.0	0.0	0.0	0.0	0.0	0.0	6.2	0.0	0.0	0.0	0.0	0.0	0.0
4	3	8-10	0.0	62.9	0.0	0.0	5.5	1.4	1.9	2.6	2.6	4.3	15.2	0.0	0.0	0.0	0.0	0.0	0.0	3.2	0.0	0.0	0.0	0.0	0.0	0.0
4	3	78-80	0.0	87.7	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0	9.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	1	7-9	0.0	4.2	0.0	0.0	11.5	1.1	1.1	3.4	7.3	5.3	65.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	1	59-61	0.0	87.6	0.0	0.0	0.91	0.0	0.0	0.0	0.0	0.0	11.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	2	10-12	0.0	58.6	0.0	0.0	2.4	1.3	1.3	3.2	4.8	4.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	2	124-126	0.0	53.6	0.0	0.0	3.6	1.2	0.83	0.0	3.7	5.1	27.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6	0.0	0.0	0.0	0.0	0.0	0.0
6	1	9-11	0.0	56.7	0.0	0.0	10.0	1.3	2.2	3.1	3.9	3.9	13.7	0.0	0.0	0.0	0.0	0.0	0.0	4.9	0.0	0.0	0.0	0.0	0.0	0.0
6	1	35-37	0.0	67.6	0.0	0.0	5.3	0.5	0.5	0.0	2.8	1.9	21.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Maximum Concentrations

Diff	Calc	Dolo	Anhy	Quar	K-Fe	Plag	Kaol	Mica	Chlo	Mont	Pyri	Apat	Bari	Side	Paly	Rhod	Clin	Phil	Cris	Hema	Arag	Corr	Rect
0.0	85.2	0.0	0.0	33.9	5.2	6.0	22.7	17.4	11.2	53.2	0.0	0.0	0.0	0.0	0.0	0.0	8.2	0.0	0.0	0.0	0.0	0.0	0.0
0.0	87.6	3.5	0.0	34.3	5.8	6.1	23.0	18.1	14.1	54.3	0.0	0.0	0.0	0.0	0.0	0.0	8.7	0.0	0.0	0.0	0.0	0.0	0.0
0.0	87.7	3.8	0.0	35.1	6.6	9.7	23.9	20.1	15.3	65.8	0.0	0.0	0.0	0.0	0.0	0.0	10.3	0.0	0.0	0.0	0.0	0.0	0.0

Hole 6A:

[illegible]

Maximum Concentrations

[illegible]

Hole 7:

[illegible]

Hole 7:

Core	Section	Depth	Diff	Calc	Dolo	Anhy	Quar	K-Fe	Plag	Kaol	Mica	Chlo	Mont	Pyri	Apat	Bari	Side	Paly	Rhod	Clin	Phil	Cris	Hema	Arag	Corr	Rect
1	6	15-17	92.2	0.0	0.0	0.0	27.2	0.0	7.0	21.7	23.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.1	0.0	0.0	0.0	0.0
1	6	74-76	91.7	0.0	0.0	0.0	33.2	0.0	7.4	31.9	27.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Maximum Concentrations

Diff	Calc	Dolo	Anhy	Quar	K-Fe	Plag	Kaol	Mica	Chlo	Mont	Pyri	Apat	Bari	Side	Paly	Rhod	Clin	Phil	Cris	Hema	Arag	Corr	Rect
92.2	4.5	1.4	0.0	33.2	0.0	7.0	28.9	29.5	0.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
92.5	73.4	4.2	0.0	34.3	0.0	7.1	31.9	29.8	0.0	0.0	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.1	0.0	0.0	0.0	0.0
93.5	83.9	4.6	0.0	36.7	5.3	7.4	32.5	30.2	0.0	0.0	3.9	10.7	0.0	0.0	0.0	1.2	0.0	0.0	20.1	0.0	0.0	0.0	0.0

Hole 7A:

Core	Section	Depth	Diff	Calc	Dolo	Anhy	Quar	K-Fe	Plag	Kaol	Mica	Chlo	Mont	Pyri	Apat	Bari	Side	Paly	Rhod	Clin	Phil	Cris	Hema	Arag	Corr	Rect
2	1	13-15	89.5	0.0	0.0	0.0	33.6	5.7	3.6	26.0	26.6	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	1	91-93	87.5	0.0	0.0	0.0	28.0	3.2	0.0	32.7	18.6	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	0.0	0.0	0.0	0.0
2	1	141-142	93.7	0.0	0.0	0.0	30.2	0.0	0.0	33.7	36.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2	12-14	92.0	0.0	0.0	0.0	27.8	3.7	0.0	33.5	35.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1	12-14	92.8	0.0	0.0	0.0	29.2	5.9	0.0	34.1	30.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1	75-77	91.9	0.0	0.0	0.0	36.0	0.0	0.0	34.9	29.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	2	20-22	92.6	5.4	0.0	0.0	21.9	4.5	0.0	47.9	20.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	2	76-78	93.7	0.0	0.0	0.0	30.5	0.0	0.0	45.9	23.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Maximum Concentrations

Diff	Calc	Dolo	Anhy	Quar	K-Fe	Plag	Kaol	Mica	Chlo	Mont	Pyri	Apat	Bari	Side	Paly	Rhod	Clin	Phil	Cris	Hema	Arag	Corr	Rect
92.8	0.0	0.0	0.0	30.5	4.5	0.0	34.9	30.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
93.7	0.0	0.0	0.0	33.6	5.7	0.0	45.9	35.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
93.7	5.4	0.0	0.0	36.0	5.9	3.6	47.9	36.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	0.0	0.0	0.0	0.0