

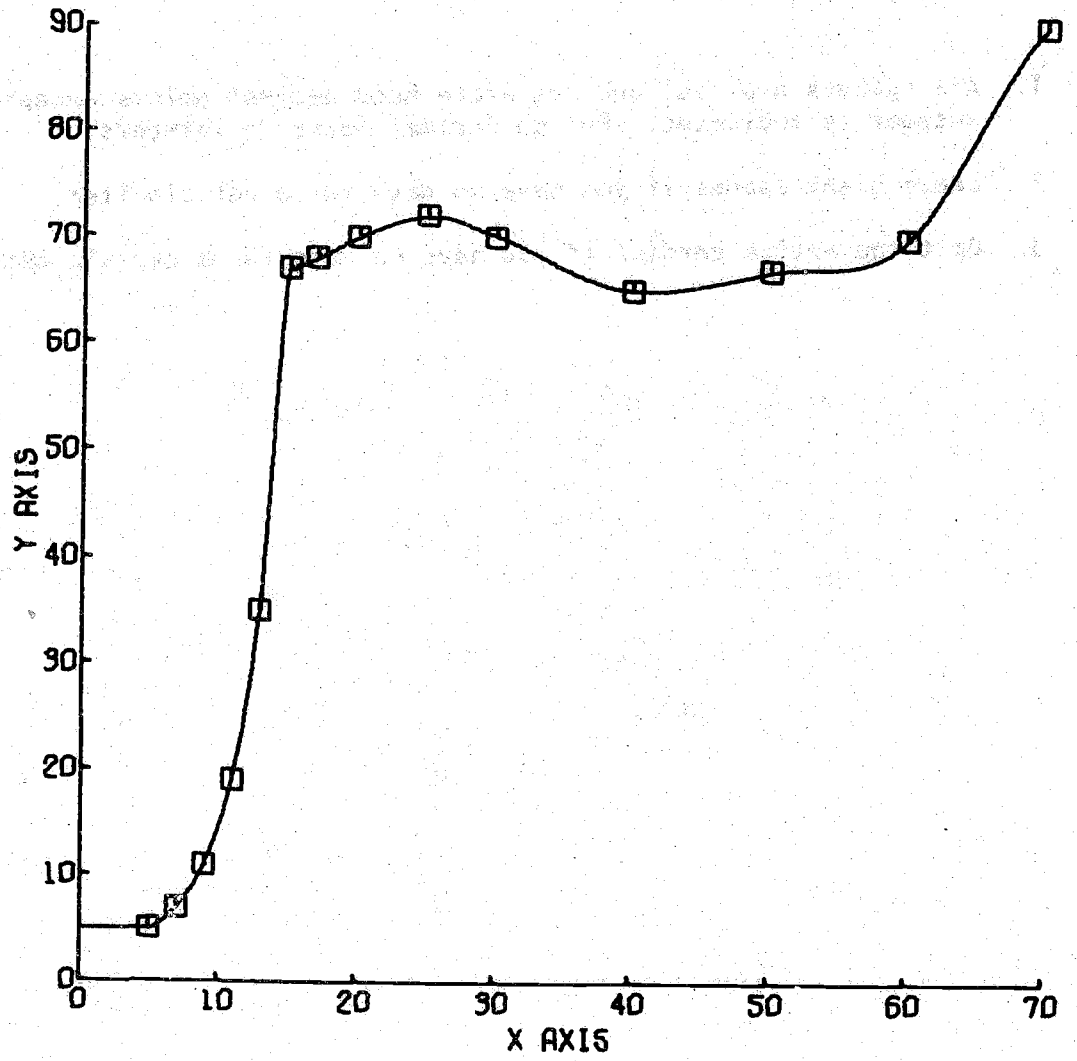
INTERNAL REPORT 100

PROGRAM SINGER: A MINERAL INVENTORY SYSTEM

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Notes for Program SINGER:

1. All numbers are real and therefore need decimal points except where integer is indicated. Put no decimal point in integers.
2. Leave blank spaces if you have no data for a certain item.
3. Omit the entire card(s) if you have no data for a certain category.



Program SINGER: Input

* Before punching data cards, punch these cards:

| | | |
|----------------|--------|--|
| Green job card | Col. 1 | JOB NUMBER, GM30000, T100, P1. |
| | 31 | SINGER MIKE |
| Card 2 | | REQUEST, TAP, VRN=P701, DI, IN, FILES=37-39. |
| Card 3 | | BEGIN(PEARL, TAP, TAP) |
| Card 4 | | (7-8-9 end of record card) |

Punch the following cards (weights are in grams).

A. Texture

| | | |
|--------|-----------|------------------------------|
| Card 5 | Col. 1-4 | Sample no. (integer) |
| | 11-12 | Month of sampling (integer) |
| | 13-14 | Day of sampling (integer) |
| | 15-16 | Year of sampling (integer) |
| | 21-30 | Fraction weight, clay |
| | 31-40 | Dilution factor, clay |
| | 41-50 | Fraction weight, fine silt |
| | 51-60 | Dilution factor, fine silt |
| | 61-70 | Fraction weight, medium silt |
| | 71-80 | Dilution factor, medium silt |
| Card 6 | Col. 1-10 | Weight, coarse silt |
| | 11-20 | Weight, very coarse sand |
| | 21-30 | Weight, coarse sand |
| | 31-40 | Weight, medium sand |
| | 41-50 | Weight, fine sand |
| | 51-60 | Weight, very fine sand |

B. Oven Dry Weight

| | | |
|--------|-----------|------------|
| Card 7 | Col. 1-10 | Wet weight |
| | 11-20 | Dry weight |

C. pH

| | | |
|--------|-----------|----|
| Card 8 | Col. 1-10 | pH |
|--------|-----------|----|

D. Water Repellancy (record time in seconds)

| | | |
|---------|-----------|-------------------|
| Card 9 | Col. 1-4 | no. of replicates |
| | 11-20 | Time #1 |
| | 21-30 | Time #2 |
| | 31-40 | Time #3 |
| | 41-50 | Time #4 |
| | 51-60 | Time #5 |
| | 61-70 | Time #6 |
| | 71-80 | Time #7 |
| Card 10 | Col. 1-10 | Time #8 |
| | 11-20 | Time #9 |
| | 21-30 | Time #10 |
| | 31-40 | Time #11 |

E. Water Retention (Water retained at (ATM) in percent)

| | | | |
|---------|------|-------|-----|
| Card 11 | Col. | 1-10 | .1 |
| | | 11-20 | .3 |
| | | 21-30 | .5 |
| | | 31-40 | 1. |
| | | 41-50 | 5. |
| | | 51-60 | 10. |
| | | 61-70 | 15. |

F. Mineralogy: ALL INTEGERS (see appendix for code)

| | | | | |
|---------|------|-------|-------------------|----|
| Card 12 | Col. | 1-2 | Major clay | #1 |
| | | 3-4 | | #2 |
| | | 5-6 | | #3 |
| | | 7-8 | | #4 |
| | | 9-10 | Major fine silt | #1 |
| | | 11-12 | | #2 |
| | | 13-14 | | #3 |
| | | 15-16 | | #4 |
| | | 17-18 | Major medium silt | #1 |
| | | 19-20 | | #2 |
| | | 21-22 | | #3 |
| | | 23-24 | | #4 |
| | | 25-26 | Major coarse silt | #1 |
| | | 27-28 | | #2 |
| | | 29-30 | | #3 |
| | | 31-32 | | #4 |
| | | 33-34 | Minor clay | #1 |
| | | 35-36 | | #2 |
| | | 37-38 | | #3 |
| | | 39-40 | | #4 |
| | | 41-42 | Minor fine silt | #1 |
| | | 43-44 | | #2 |
| | | 45-46 | | #3 |
| | | 47-48 | | #4 |
| | | 49-50 | Minor medium silt | #1 |
| | | 51-52 | | #2 |
| | | 53-54 | | #3 |
| | | 55-56 | | #4 |
| | | 57-58 | Minor coarse silt | #1 |
| | | 59-60 | | #2 |
| | | 61-62 | | #3 |
| | | 63-64 | | #4 |

G. Sample Number and Carbon

| | | | |
|---------|------|-------|----------------------------|
| Card 13 | Col. | 1 | 1 (integer) |
| | | 4-8 | Sample no. (alphanumeric) |
| | | 11-20 | one normal of $K_2Cr_2O_7$ |
| | | 21-30 | grams of soil |
| | | 31-40 | mls $FeSO_4$ for sample |
| | | 41-50 | mls $FeSO_4$ for blank |

Punch one card 13 for each subsample whether or not you have carbon data.

H. Nitrogen

| | | |
|---------|--------|---------------------|
| Card 14 | Col. 1 | 2 (integer) |
| | 11-20 | grams of soil |
| | 21-30 | ml. acid for sample |
| | 31-40 | ml. acid for blank |
| | 41-50 | acid normality |

I. Iron and Aluminum

| | | |
|---------|--------|--|
| Card 15 | Col. 1 | 3 (integer) |
| | 11-20 | Wt., soil cit-dithionate |
| | 21-30 | Wt., soil oxalate |
| | 31-40 | Wt., soil pyrophosphate |
| | 41-50 | Iron cit-dithionate ($\mu\text{g/ml}$) |
| | 51-60 | Iron oxalate ($\mu\text{g/ml}$) |
| | 61-70 | Iron pyrophosphate ($\mu\text{g/ml}$) |
| | 71-80 | Aluminum cit-dithionate ($\mu\text{g ml}$) |

| | | |
|---------|-----------|---|
| Card 16 | Col. 1-10 | Aluminum oxalate ($\mu\text{g/ml}$) |
| | 11-20 | Aluminum pyrophosphate ($\mu\text{g/ml}$) |
| | 21-30 | Dilution factor, Iron cit-dithionate |
| | 31-40 | Dilution factor, Iron oxalate |
| | 41-50 | Dilution factor, Iron pyrophosphate |
| | 51-60 | Dilution factor, Aluminum cit-dithionate |
| | 61-70 | Dilution factor, Aluminum oxalate |
| | 71-80 | Dilution factor, Aluminum pyrophosphate |

| | | |
|---------|-----------|--|
| Card 17 | Col. 1-10 | Blank Iron cit-dithionate ($\mu\text{g/ml}$) |
| | 11-20 | Blank Iron oxalate ($\mu\text{g/ml}$) |
| | 21-30 | Blank Iron pyrophosphate ($\mu\text{g/ml}$) |
| | 31-40 | Blank Aluminum cit-dithionate ($\mu\text{g/ml}$) |
| | 41-50 | Blank Aluminum oxalate ($\mu\text{g/ml}$) |
| | 51-60 | Blank Aluminum pyrophosphate ($\mu\text{g/ml}$) |

J. NH_4 Saturation - Method 1

| | | |
|---------|--------|---------------------|
| Card 18 | Col. 1 | 4 (integer) |
| | 11-20 | Weight of soil |
| | 21-30 | Size, leachate (ml) |
| | 31-40 | Size, aliquot (ml) |
| | 41-50 | Total acid (ml) |
| | 51-60 | Blank acid (ml) |
| | 61-70 | Acid normality |

K. NH_4 Saturation - Method 2

| | | |
|---------|--------|------------------------|
| Card 19 | Col. 1 | 5 (integer) |
| | 11-20 | Weight of soil (grams) |
| | 21-30 | Size, leachate (ml) |
| | 31-40 | Dilution factor, Ca |
| | 41-50 | Dilution factor, Mg |

K. NH₄ Saturation - Method 2 Cont'd

| | | |
|---------|------------------------------|---|
| Card 19 | Col. 51-60 61-70 71-80 | Dilution factor K Dilution factor Na Ca (µg/ml) |
| Card 20 | Col. 1-10 11-20 21-30 | Mg (µg/ml) K (µg/ml) Na (µg/ml) |

L. Exchangeable Hydrogen

| | | |
|---------|-----------------------------------|---|
| Card 21 | Col. 1 11-20 21-30 31-40 | 6 (integer) Weight of soil Total acid (ml) Blank acid (ml) |
|---------|-----------------------------------|---|

M. Organic Matter Fractionation

| | | |
|---------|---|--|
| Card 22 | Col. 1 11-20 21-30 31-40 41-50 51-60 61-70 71-80 | 7 (integer) Weight of soil Volume (ml) Aliquot #1 (ml) Aliquot #2 (ml) ml FeSO ₄ for sample mls FeSO ₄ for blank mls FeSO ₄ for sample |
| Card 23 | Col. 1-10 | mls FeSO ₄ for blank |

If there are duplicate analyses, go back to G (carbon) and keep repeating until duplicate analyses are complete. Then continue.

N. Means for Duplicate Analyses

| | | |
|---------|--------|-------------|
| Card 24 | Col. 1 | 8 (integer) |
|---------|--------|-------------|

Return to card #5 for next set of samples. At end of all data,

| | |
|---------|---------------------------|
| Card 25 | (6-7-8-9 end of job card) |
|---------|---------------------------|

Program SINGER: Output

Data for Program CHART (weights are in grams, MEQ = milli-equivalents).

| | | |
|--------|------------|------------------------------------|
| Card 1 | Col. 2-10 | SAMPLE NØ. |
| | 21-24 | Sample no. |
| | 31-24 | DATE |
| | 41-42 | month |
| | 43-44 | day |
| | 45-46 | year |
| Card 2 | Col. 2-8 | TEXTURE |
| | 11-20 | Fraction weight, clay |
| | 21-30 | Percent, clay |
| | 31-40 | Dilution factor, clay |
| | 41-50 | Fraction weight, fine silt |
| | 51-60 | Percent, fine silt |
| | 61-70 | Dilution factor, fine silt |
| | 71-80 | Fraction weight, medium silt |
| Card 3 | Col. 11-20 | Percent, medium silt |
| | 21-30 | Dilution factor, medium silt |
| | 31-40 | Weight, coarse silt |
| | 41-50 | Percent, coarse silt |
| | 51-60 | Weight, total silt |
| | 61-70 | Percent, total silt |
| | 71-80 | Weight, very coarse sand |
| Card 4 | Col. 11-20 | Percent, very coarse sand |
| | 21-30 | Weight, coarse sand |
| | 31-40 | Percent, coarse sand |
| | 41-50 | Weight, medium sand |
| | 51-60 | Percent, medium sand |
| | 61-70 | Weight, fine sand |
| | 71-80 | Percent, fine sand |
| Card 5 | Col. 11-20 | Weight, very fine sand |
| | 21-30 | Percent, very fine sand |
| | 31-40 | Total weight, sand |
| | 41-50 | Total percent, sand |
| | 51-60 | Total weight, (clay + sand + silt) |
| Card 6 | Col. 2-9 | ØVEN DRY |
| | 11-20 | Percent change in weight |
| | 21-30 | Wet weight |
| | 31-40 | Dry weight |
| Card 7 | Col. 2-3 | pH |
| | 11-20 | pH |
| Card 8 | Col. 2-10 | REPELLANCY |
| | 11-20 | Mean penetration time in seconds |
| | 21-30 | Standard deviation of mean |
| | 31-40 | no. of replicates |

| | | |
|--------|------------|---------|
| Card 8 | Col. 41-50 | Time #1 |
| | 51-60 | Time #2 |
| | 61-70 | Time #3 |
| | 71-80 | Time #4 |

| | | |
|--------|------------|----------|
| Card 9 | Col. 11-20 | Time #5 |
| | 21-30 | Time #6 |
| | 31-40 | Time #7 |
| | 41-50 | Time #8 |
| | 51-60 | Time #9 |
| | 61-70 | Time #10 |
| | 71-80 | Time #11 |

(Time in seconds)

| | |
|---------|-----------|
| Card 10 | Col. 2-10 |
| | 11-20 |
| | 21-30 |
| | 31-40 |
| | 41-50 |
| | 51-60 |
| | 61-70 |
| | 71-80 |

(Water in percent)

RETENTION H₂O retained at:

.1 ATM
.3 ATM
.5 ATM
1. ATM
5. ATM
10. ATM
15. ATM

| | |
|---------|----------|
| Card 11 | Col. 2-9 |
| | 11-12 |
| | 13-14 |
| | 15-16 |
| | 17-18 |
| | 19-20 |
| | 21-22 |
| | 23-24 |
| | 25-26 |
| | 27-28 |
| | 29-30 |
| | 31-32 |
| | 33-34 |
| | 35-36 |
| | 37-38 |
| | 39-40 |
| | 41-42 |
| | 43-44 |
| | 45-46 |
| | 47-48 |
| | 49-50 |
| | 51-52 |
| | 53-54 |
| | 55-56 |
| | 57-58 |
| | 59-60 |
| | 61-62 |
| | 63-64 |
| | 65-66 |
| | 67-68 |
| | 69-70 |

MINERALS

| | |
|-------------------|----|
| Major clay | #1 |
| | #2 |
| | #3 |
| | #4 |
| Major fine silt | #1 |
| | #2 |
| | #3 |
| | #4 |
| Major medium silt | #1 |
| | #2 |
| | #3 |
| | #4 |
| Major coarse silt | #1 |
| | #2 |
| | #3 |
| | #4 |
| Minor clay | #1 |
| | #2 |
| | #3 |
| | #4 |
| Minor fine silt | #1 |
| | #2 |
| | #3 |
| | #4 |
| Minor medium silt | #1 |
| | #2 |
| | #3 |
| | #4 |
| Minor coarse silt | #1 |
| | #2 |

| | | |
|-------------------------------------|---|--|
| Card 11 | Col. 71-72 73-74 | Minor coarse silt #3 #4 |
| (See appendix for code of minerals) | | |
| Card 12 | Col. 2-11 21-24 | SAMPLE NØ. Sample no. and letter |
| Card 13 | Col. 2-7 11-20 21-30 31-40 41-50 51-60 61-70 71-80 | CARBØN Percent, organic matter Percent, reactive organic matter Correction factor Correction factor' One normal of $K_2Cr_2O_7$ Weight of soil mls $FeSO_4$ |
| Card 14 | Col. 11-20 | mls $FeSO_4$ for blank |
| Card 15 | Col. 2-9 11-20 21-30 31-40 41-50 51-60 | NITRØGEN Percent, nitrogen Weight of soil Acid for sample (ml) Acid for blank (ml) Acid normality |
| Card 16 | Col. 2-9 11-20 21-30 | CARB/NIT Ratio Percent Carbon/percent nitrogen Percent carbon |
| Card 17 | Col. 2-6 11-20 21-30 31-40 41-50 51-60 61-70 71-80 | FE-AL Weight soil cit-dithionate Weight soil oxalate Weight soil pyrophosphate Iron cit-dithionate ($\mu\text{g/ml}$) Iron oxalate ($\mu\text{g/ml}$) Iron pyrophosphate ($\mu\text{g/ml}$) Blank iron cit-dithionate ($\mu\text{g/ml}$) |
| Card 18 | Col. 11-20 21-30 31-40 41-50 51-60 61-70 71-80 | Blank iron oxalate ($\mu\text{g/ml}$) Blank iron pyrophosphate ($\mu\text{g/ml}$) Dilution factor, iron cit-dithionate Dilution factor, iron oxalate Dilution factor, iron pyrophosphate Percent, iron cit-dithionate Percent, iron oxalate |
| Card 19 | Col. 11-20 21-30 31-40 41-50 51-60 61-70 71-80 | Percent iron pyrophosphate Aluminum cit-dithionate ($\mu\text{g/ml}$) Aluminum oxalate ($\mu\text{g/ml}$) Aluminum pyrophosphate ($\mu\text{g/ml}$) Blank Aluminum cit-dithionate ($\mu\text{g/ml}$) Blank Aluminum oxalate ($\mu\text{g/ml}$) Blank Aluminum pyrophosphate ($\mu\text{g/ml}$) |

| | | |
|---------|--|---|
| Card 20 | Col. 11-20 21-30 31-40 41-50 51-60 61-70 | Dilution factor, Aluminum cit-dithion Dilution factor, Aluminum oxalate Dilution factor, Aluminum pyrophospha Percent, Aluminum cit-dithionate Percent, Aluminum oxalate Percent, Aluminum pyrophosphate |
| Card 21 | Col. 2-10 11-20 21-30 31-40 41-50 51-60 61-70 | FE-AL PERCENT Percent, Primary Iron Percent, Amorph Iron Percent, Primary Aluminum Percent, Amorph Aluminum Percent, Organic Iron Percent, Organic Aluminum |
| Card 22 | Col. 2-10 11-20 21-30 31-40 41-50 51-60 61-70 71-80 | NH ₄ - METH 1 cation exchange capacity (MEQ/100g) Weight of soil Size leachate (ml) Size aliquot (ml) Acid for sample (ml) Acid for blank (ml) Acid normality |
| Card 23 | Col. 2-10 11-20 21-30 31-40 41-50 51-60 61-70 71-80 | NH ₄ - METH 2 Weight of soil Size leachate (ml) Sum of bases (µg/ml) Ca (MEQ/100g) Ca (µg/ml) Dilution factor, Ca Mg (MEQ/100g) |
| Card 24 | Col. 11-20 21-30 31-40 41-50 51-60 61-70 71-80 | Mg Dilution factor, Mg Na (MEQ/100g) Na (µg/ml) Dilution factor, Na K (MEQ/100g) K (µg/ml) |
| Card 25 | Col. 11-20 | Dilution factor K |
| Card 26 | Col. 2-3 11-20 21-30 31-40 41-50 | EH exchangeable hydrogen (MEQ/100g) Weight of soil Acid total (ml) Acid for blank (ml) |
| Card 27 | Col. 2-9 11-20 21-30 | SOIL CEC Total cation exchange capacity (MEQ/l) Percent base saturation |

| | | |
|---------|------------|----------------------------|
| Card 28 | Col. 2-8 | ØRGANIC |
| | 11-20 | Weight of soil |
| | 21-30 | Volume (ml) |
| | 31-40 | Aliquot #1 (ml) |
| | 41-50 | Aliquot #2 (ml) |
| | 51-60 | mls FeSØ4 for sample #1 |
| | 61-70 | mls FeSØ4 for sample #2 |
| | 71-80 | mls FeSØ4 for blank #1 |
| | | |
| Card 29 | Col. 11-20 | mls FeSØ4 for blank #2 |
| | 21-30 | Ratio Humic /Fulvic |
| | 31-40 | Humic acid (ml) |
| | 41-50 | Fulvic acid (ml) |
| | 51-60 | Total carbon (percent) |
| | 61-70 | Humic acid carbon percent |
| | 71-80 | Extractable carbon percent |

If there are duplicate analyses for the same sample, there will be repeats of Cards 11-28 for all duplicates. Then

| | | |
|---------|-----------|---|
| Card 30 | Col. 2-9 | AVERAGES |
| | | |
| Card 31 | Col. 2-7 | CARBØN |
| | 11-20 | Average organic matter (percent) |
| | 21-30 | Average reactive organic matter (percent) |
| | | |
| Card 32 | Col. 2-9 | NITRØGEN |
| | 11-20 | Average percent nitrogen |
| | | |
| Card 33 | Col. 2-9 | CARB/NIT |
| | 11-20 | Average ratio carbon/nitrogen |
| | 21-30 | Average percent carbon |
| | | |
| Card 34 | Col. 2-6 | FE-AL |
| | 11-20 | Average percent, iron cit-dithionate |
| | 21-30 | Average percent, iron oxalate |
| | 31-40 | Average percent, iron pyrophosphate |
| | 41-50 | Average percent, Aluminum cit-dithionate |
| | 51-60 | Average percent, Aluminum oxalate |
| | 61-70 | Average percent, Aluminum pyrophosphate |
| | | |
| Card 35 | Col. 2-10 | FE-AL PERCENT |
| | 11-20 | Average percent, primary iron |
| | 21-30 | Average percent, amorph iron |
| | 31-40 | Average percent, primary aluminum |
| | 41-50 | Average percent, amorph aluminum |
| | 51-60 | Average percent, organic iron |
| | 61-70 | Average percent, organic aluminum |

| | | |
|---------|--|--|
| Card 36 | Col. 2-10 11-20 | NH ₄ -METH 1 Average cation exchange capacity (MEQ/100g) |
| Card 37 | Col. 2-10 11-20 21-30 31-40 41-50 51-60 | NH ₄ -METH 2 Average Ca (MEQ/100g) Average Mg (MEQ/100g) Average Na (MEQ/100g) Average K (MEQ/100g) Average sum of bases (µg/ml) |
| Card 38 | Col. 2-3 11-20 | EH Average exchangeable hydrogen (MEQ/100g) |
| Card 39 | Col. 2-9 11-20 21-30 | SOIL CEC Average soil cation exchange capacity (MEQ/100g) Average base saturation (percent) |
| Card 40 | Col. 2-8 11-20 21-30 31-40 | ORGANIC Average ratio Humic/Fulvic Average Humic acid (ml) Average fulvic acid (ml) |

Appendix -- MINERALOGY Code

- 01 = Vermiculite
- 02 = Chlorite
- 03 = Intergrades
- 04 = Al-vermiculite
- 05 = Montmorillonite
- 06 = Kaolinite
- 07 = Illite
- 08 = Amorphous
- 09 = Na-Feldspars
- 10 = Ca-Feldspars
- 11 = K-Feldspars
- 12 = Quartz
- 13 = Cristobalite
- 14 = Other primary minerals