Petro-Canada Oil & Gas

BULK AND CLAY X-RAY DIFFRACTION ANALYSES OF SIX SAMPLES OF SOLIDS FROM PC et al HANGING STONE 103/15-27-084-09W4 LOCATION

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X-RAY DIFFRACTION ANALYSIS

Six sand samples, recovered from PC et al Hanging Stone 103/15-27-084-09W4 location, were analyzed by Agat Laboratories for determination of bulk and clay mineralogy (after cleaning in Dean Stark unit). XRD analysis identifies crystalline material only. The following table provides further sample information:

Sample #	Depth (m)	Location
1	307.06m	103/15-27-084-09W4
2	311.50m	103/15-27-084-09W4
3	316.00m	103/15-27-084-09W4
4	323.65m	103/15-27-084-09W4
5	340.30m	103/15-27-084-09W4
6	332.00m	103/15-27-084-09W4

The clay fraction (less than 3μm) of samples were separated from the bulk fraction in an ultrasonic bath, using sodium metaphosphate as a deflocculating agent. The separated material was then centrifuged. Weight percentage were measured for both bulk and clay fractions of the samples. Prepared samples were analyzed using X-ray diffraction (XRD) technique.

The XRD results (Table 1) indicate that samples #1, #2 and #3 consists mainly of quartz (silicon dioxide, SiO_2), with lesser amounts of plagioclase feldspar (sodium calcium aluminum silicate, $Na[AlSi_3O_8]$ - $Ca[Al_2Si_2O_8]$), illite ($KAl_2(OH)_2[AlSi_3(O,OH)_{10}]$), chlorite ($(Mg,Fe)_5Al(AlSi_3)O_{10}(OH)_9$), kaolinite (aluminum silicate hydroxide, $Al_4Si_4O_{10}[OH]_8$) and potassium feldspar (potassium aluminum silicate, $K[SiAl_3O_8]$). Minor amounts of mixed-layer clays (illite/smectite or chlorite/smectite),

dolomite (magnesium calcium carbonate, $CaMg[CO_3]_2$) and trace pyrite (iron sulfide, FeS_2) are also present.

Samples #4, #5 and #6 consists mainly of quartz (silicon dioxide, SiO_2), with lesser amounts of dolomite (magnesium calcium carbonate, $CaMg[CO_3]_2$), plagioclase feldspar (sodium calcium aluminum silicate, $Na[AlSi_3O_8]$ - $Ca[Al_2Si_2O_8]$), illite ($KAl_2(OH)_2[AlSi_3(O,OH)_{10}]$), chlorite ($(Mg,Fe)_5Al(AlSi_3)O_{10}(OH)_9$), kaolinite (aluminum silicate hydroxide, $Al_4Si_4O_{10}[OH]_8$) and potassium feldspar (potassium aluminum silicate, $K[SiAl_3O_8]$). Minor amounts of calcite (calcium carbonate, $CaCO_3$), mixed-layer clays (illite/smectite or chlorite/smectite) and trace pyrite (iron sulfide, FeS_2) are also present.

The analysis suggests that six samples are mainly composed of framework sand (62%-90% - quartz, plagioclase feldspar and potassium feldspar), with lesser amounts of clay (10%-26% - illite, chlorite, kaolinite and mixed-layer) and minor to lesser amounts of dolomite (1%-21% – diagenetic cement and possible detrital framework components?). Minor calcite cement was detected in sample 4.5.6 and trace pyrite was detected in sample 1.2.3.4. The pyrite is a probable diagenetic mineral as well. The clay minerals are found in the interstitial matrix and in argillaceous lithoclasts. If loose in the matrix these clay minerals are highly migratable. The minor amounts of mixed-layer clays suggest moderate potential for fresh water sensitivity problems.