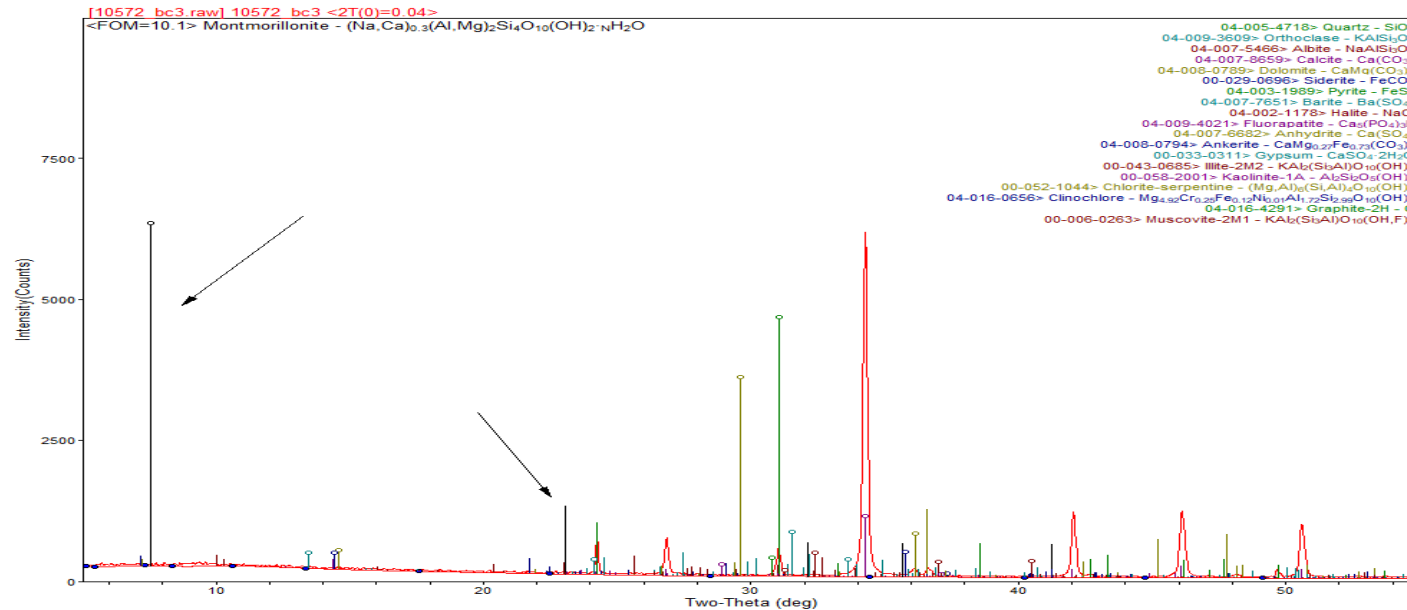


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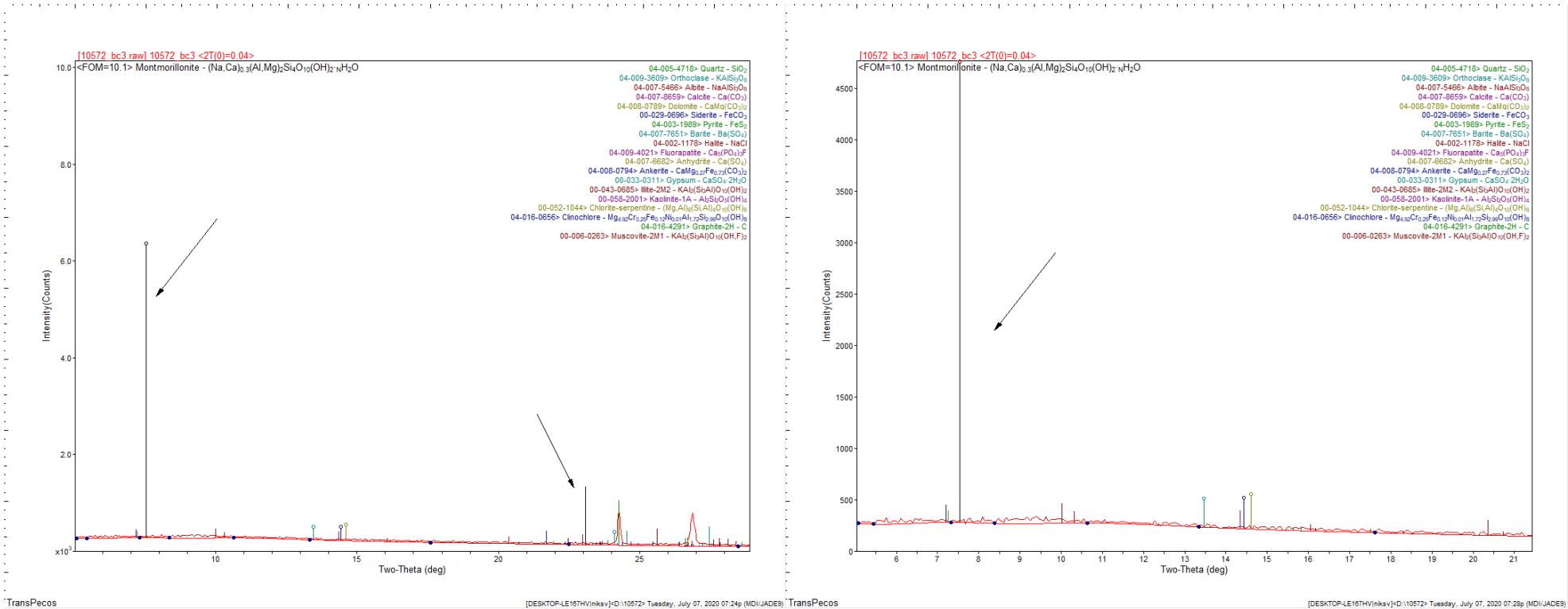
Quantification of Bentonite (Montmorillonite)

The two arrows point to the primary and secondary peak of Montmorillonite. The far left peak is the primary peak. The lines that show each crystal phase are the corresponding angles of refraction of the x-rays. These lines are called Bragg lines. The image below is the full diffractogram of the sample. The large red peak that is shown below is calcite.



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The images below are the same image as the previous slide with the exception that we have zoomed in and focused on the primary section that has the identifying Bragg lines for Montmorillonite. In the image we can see no discernible peaks that rise above a background noise level. The image on the left is focused on the clay region of the scan. The image on the right shows that there is no defined peak above a background noise level.



SAN MATEO - EXHIBIT P

Incorporating XRF with XRD data

- Montmorillonite chemical structure: $(\text{Na}, \text{Ca})_{0.3}(\text{Al}, \text{Mg})_2\text{Si}_4\text{O}_{10}(\text{OH})_2(\text{H}_2\text{O})$
- After the XRD is examined, we focus on the chemical signatures of the samples. Primarily we are looking at excess of Na in a sample. The reason for Na is because we can equate the amount used in plagioclase and halite easier than trying to equate the amount of Al and Mg in clays.
- Aluminum phyllosilicates can be complicated chemical structures. Illite tends to have Fe as a major component and Chlorite with Mg.
- Looking at the XRF data, we do not see any large amounts of Na besides the one sample that has halite. The small amounts of Na in the remaining samples can be attributed to the small amounts of plagioclase that was detected in the XRD scans.

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Conclusion

- XRD scan showed no discernable peak above the baseline noise level that is normally associated with XRD diffractograms.
- When XRF is incorporated we do not have an excess of Na that would be attributed to Bentonite (Montmorillonite).
- The clays seen in the samples with higher clay amount samples were predominately illite and chlorites, to see exact percentages including kaolinite, further clay separation would be required.