A Note on the Clay Mineralogy of Four Samples from the Ringold Formation[1]

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THE RINGOLD Formation is a prominent geologic feature of central Washington (Merriam and Buwalda, 1917; Culver, 1937; Strand and Hough, 1952; Newcomb, 1958; Brown and McConiga, 1960; Brown and Brown, 1961). The White Bluffs area extending from Richland northward to Wahluke, along the Columbia River, includes the type location. These unconsolidated sediments of Pleistocene Age extend north and east from the White Bluffs, but are covered by younger sediments in much of that portion of the Columbia Basin that is being developed for irrigation (Gilkeson, 1958).

A special clay mineralogy can be inferred from the fact that material from pits dug into the Ringold Formation has been used by the U.S. Bureau of Reclamation to line canals in Block 20 of the Columbia Basin Irrigation Project. Four samples of horizons within the Ringold Formation were used to assay the clay mineral assemblage.

Sample 1 was collected at an elevation of 550 feet, from the site described by Strand and Hough (1952), in the NE ¼, SW ¼, Sec. 2, T. 13N., R. 27E., W.M. It was from a massive clay and silt horizon near the top of the bed, and beneath a thick series of well-bedded silts containing many concretions.

Sample 4 was collected at an elevation of 565 feet, from a site in the NE ¼, SW ¼, Sec. 1, T. 10N., R. 28E., W.M. It was from a distinctive white horizon, hard and massive, 4 to 5 feet thick. This horizon along with those immediately above and below it closely resembles horizons 601-580 in geologic section A described by Newcomb (1958: 331).

Sample 9 was collected at an elevation of 626 feet, from a site in the S ½, SW ¼, Sec. 25, T. 11N., R. 28E., W.M. It was from a horizon similar in gross morphology to that yielding sample 4.

Sample 22 was collected at an elevation of 715 feet, from a site along the Mesa-Ringold road, in the NE ¼, SW ¼, Sec. 11, T. 12N., R. 28E., W.M.

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TABLE 1. CLAY MINERALS IDENTIFIED IN FOUR SAMPLES FROM THE RINGOLD FORMATION

	Clay Minerals in Size Separates*		
Sample	$<0.2\mu$	$0.2\text{-}2\mu$	$2\text{-}5\mu$
1	M	M, I, (Ch, K)	M, I, (Ch, K)
4	M	M	M
9	M, (Ch)	M, I, K, Ch	I, K, M, Ch
22	M	M, I, Ch, K	M, I, K, Ch

* Ch = chlorite, I = illite, K = kaolinite, and M = montmorillonite. The order of listing was determined by the magnitude of the peaks on the X-ray trace. Parentheses are used if the identification was in doubt, or the peak magnitude was small.

These samples were freed of organic matter and iron, and size-separated (Kittrick and Hope, 1963). The separates were then calcium-saturated, glycerated, and examined by X-ray diffraction. Minerals with 18A spacings were recorded as montmorillonite, and those with 10A spacings as illite. Samples showing 14A and 7A spacings were potassium-saturated, and X-rayed after being heated to 400°C (to eliminate a 14A peak if it were due to vermiculite) and to 500°C (to eliminate a 7A peak if it were due to kaolinite). The results are summarized in Table 1; such minerals as quartz and feldspars are not listed.

Samples 1, 9, and 22 are similar in mineralogy with montmorillonite dominant, but associated with illite, chlorite, and kaolinite. Sample 4 has montmorillonite as the only clay mineral. The presence of montmorillonite in these horizons of the Ringold Formation seems to explain the suitability of the material used by the Bureau of Reclamation for lining canals.

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