Title: Stratigraphy, Sedimentology, and Geochemistry of Missoula Flood Rhythmites in the Northern Willamette Valley, Oregon.

A detailed stratigraphic, sedimentologic, and geochemical study was performed on Missoula Flood deposits at two sites in the northern Willamette Valley, Oregon: along Greeley Avenue in north Portland and near the town of Dayton, Yamhill County.

The Missoula Floods were a series of late Pleistocene (15,300-12,700 years b.p.) glacial outburst floods that left significant slackwater deposits in the Willamette Valley of Oregon.

The 21.9 m stratigraphic exposure at Greeley Avenue contains at least 25 rhythmite couplets (graded flood beds) ranging from 0.07 m to 4.13 m thick (average = 0.91 m ± 0.94 m). Particle size varies from silt to gravelly sand with boulders up to 45 cm in diameter, indicative of a variable and high-energy depositional environment.

The 14.6 m stratigraphic exposure near Dayton, Oregon contains least 30 rhythmite couplets ranging from 0.28 m to 0.97 m thick. Average thickness of the
upper 13 beds is 0.34 m ± 0.06 m, and average thickness of the lower 17 beds is 0.60 m ± 0.15 m. Particle size for rhythmite bed bottom sections range in graphic mean from 6.90 φ (0.0086 mm) ± 1.77 φ to 4.63 φ (0.041 mm) ± 1.07 φ; Inclusive Graphic Standard Deviation ranges from ± 0.93 φ (moderately sorted) to ± 2.23 φ (very poorly sorted). Rhythmite bed top sections range in graphic mean from 6.00 φ (0.0156 mm) ± 2.01 φ to 6.87 φ (0.0088 mm) ± 1.70 φ; Inclusive Graphic Standard Deviation ranges from ± 1.66 φ (poorly sorted) to ± 2.01 φ (very poorly sorted).

Instrumental Neutron Activation Analysis (INAA) results at Dayton show increases in iron (3.49 % ± 0.04 % to 5.61 % ± 0.05 % by weight), and scandium (13.90 ppm ± 0.05 ppm to 19.25 ppm ± 0.09 ppm) with a corresponding decrease of chromium (71.99 ppm ± 1.78 ppm to 43.72 ppm ± 1.46 ppm) through time.

The chemical transition may represent the stripping of glaciogenic loess of the Palouse Silt Formation and establishment of well-defined Columbia River Basalt Group (CRBG) bedrock flood pathways in the source areas of eastern Washington.