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Southeastern Section - 64th Annual Meeting (19–20 March 2015)

Paper No. 2

Presentation Time: 8:00 AM-12:00 PM

PALAGONITE ALTERATION OF THE BLUE DRAGON FLOW, CRATERS OF THE MOON NATIONAL MONUMENT, IDAHO

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The purpose of this research was to study the weathering and alteration products on the surface of the Blue Dragon lava flow which is located in Craters of the Moon National Park in Idaho. Of particular interest is the alteration of basaltic glass to palagonite in a terrestrial setting, which is primarily a weathering product as opposed to palagonite associated with hyaloclastite.

Palagonitization of Blue Dragon Lava is observed as dark brown alteration product surrounding plagioclase and olivine phenocrysts and along fractures within the basaltic glass. These are particularly distinctive because they are surrounded by glass that has been altered to a deep blue color; hence the name Blue Dragon Lava. The palagonite-coated phenocrysts exhibit a greater resistance to surface weathering compared to adjacent blue-coated glass. Lava samples were further analyzed using polarized light microscopy and a Tescan MIRA-3 SBU scanning electron microscope (SEM) equipped with a backscattered electron detector and an energy-dispersive x-ray spectrometer (EDS).

Optically isotropic and opaque palagonite surrounds phenocrysts in an orange basaltic glass in thin section. Backscatter SEM images suggest that the palagonite is compositionally zoned with higher atomic number elements positioned adjacent to phenocrysts. This was verified with SEM/EDS spot analysis results where FeO and TiO₂ are higher by a factor of two within 5 mm of the phenocryst-palagonite boundary. More subtle palagonite zoning is apparent 10 to 30 mm farther from the phenocrysts boundaries. While glass values SiO₂, Al₂O₃, TiO₂, MgO, FeO, CaO, Na₂O, K₂O, and P₂O₅ are relatively constant, the same oxides may vary by a factor of five in adjacent palagonite. Oxides of Fe, Ti, and Mg are enriched in palagonite whereas SiO₂, Al₂O₃, CaO, Na₂O, K₂O are depleted. With the exception of MgO, the above results are consistent with initial development of amorphous "gel" palagonite described for hyaloclastite alteration in the literature.

Session No. 28--Booth# 2

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Friday, 20 March 2015: 8:00 AM-12:00 PM

Ballroom (Chattanooga Hotel & Conference Center)

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