

**Whitehorse - Tuesday, September 11, 2018**

**Session #3 - Revegetation in Northern Environments**

**Time** 155pm-215pm

**Topic** **Nutrient Deficiencies in Peat-Mineral Reclamation Soils Containing Excess Soluble Calcium and Sulphate in North Eastern Alberta**

**Abstract** The objective of this study was to evaluate impacts of three reclamation soil materials containing variable amounts of soluble calcium and sulphate S on soil quality and *Pinus contorta* (lodgepole pine) growth in a terrestrial boreal ecosystem. A 13 year old stand of *P. contorta* displayed various symptoms and degrees of nutrient deficiency on a reclaimed tailings sand dyke at an oil sands mining operation in northeastern Alberta, Canada. Three distinct zones of variable growth corresponded to three different reclamation soil amendments that were placed in 1992. The poorest growth occurred on soil from a peat-mineral mix containing marl, the intermediate growth on a peat-mineral mix of shallow origin, and the best growth on native upland forest floor soil. Transects were established in each of these three zones to survey the vegetation and soil characteristics in each of these areas. Soil samples were collected at survey locations along each transect and analyzed for salinity and soluble cations, reaction, available nutrients, and hydrophobicity in 2005. Soil moisture profiles to 160 cm were collected at each survey location during the 2006 growing season. Results indicated a negative logarithmic relationship among pine height with soluble calcium and available sulphate-S. These relationships were stronger than indicators typically linked to poor peat amendment quality such as available phosphate-P, nitrate N and sodium adsorption ratio. Indicators that showed stronger relationships with pine height than soluble calcium or sulphate-S were also strongly correlated with soluble calcium and sulphate-S, including CaCO<sub>3</sub> and electrical conductivity.

**Presenter(s)** Collen Middleton, Golder Associates Ltd

**Bio(s)** Collen Middleton, P.Biol., RT(Ag), is an Associate Soil and Reclamation Scientist at Golder with 13 years of soil and terrain inventory and reclamation planning experience. Collen has worked extensively in Western Canada on reclamation projects and he has conducted soil survey and soil assessment work in the field as far away as southern Europe and West Africa. Collen has represented clients as a subject matter expert at major industrial development regulatory hearings. He currently serves on the Board of Directors with the Alberta Society of Professional Biologists and is based in Calgary.