Acid drainage from black slates of the Halifax Formation: is there need for further work?

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Sulphidic, black slates of the Halifax Formation have been recognized for some time as a source for acid drainage in parts of Nova Scotia. At the Halifax International Airport (HIA), disruption of the black slates during construction activities has resulted in high acid run off causing fish kills and a decrease in water quality in nearby streams.

In the past, acid production from the black slates has been attributed to pyrite. However, our studies indicate pyrrhotite is the predominant sulphide mineral at the HIA whereas pyrite and marcasite are less abundant. The predominance of pyrrhotite also has been confirmed in other areas of Nova Scotia underlain by the Halifax Formation. Oxidation tests on mineral samples from the HIA concur with results from the literature in that the oxidation rate of pyrrhotite is substantially faster than pyrite (with and without the presence of *Thiobacillus* bacteria). Therefore, initial short-term acid drainage may be higher than expected when pyrrhotite-rich, rather than pyrite-rich slate, is disturbed. Obviously then, it is important to outline pyrrhotite-rich areas within the Halifax Formation, an aspect that has been overlooked in the past.

Since pyrrhotite is a magnetic mineral, we are using magnetic susceptibility of rocks to assess the relative potential for acid drainage. Detailed magnetic susceptibility measurements on drill core, field samples and powders have been conducted and the data show a useful correlation with chemical analyses and mineralogical observations.