Environmental Impacts of Oil and Gas Brine Applications for Dust and Ice Control in New York

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Transportation agencies are required to treat roads for dust and ice control to ensure adequate safety for travelers. This is commonly achieved through application of solid and liquid chemicals. These materials can be conventional rock salt, brine from rock salt, natural brine, or oil and gas brine. Due to the high cost of treating roads for the removal of snow and ice, in states with active oil and gas wells such as New York, the potential for using this brine to control dust or ice on roads is currently being explored.

Environmental concerns exist over the use of conventional oil and gas brines due to their potential high total dissolved solids and metals concentrations. If oil and gas brine is applied to roadways for dust or ice control, there is the potential for runoff to impact receiving water or roadside soil. The environmental impact of the leaching of chemical components from soil impacted with oil and gas brine applied for transportation purposes is unknown.

The goal of this work was to determine the potential for components found in the following brines (Figure 1) to leach from soil to groundwater.

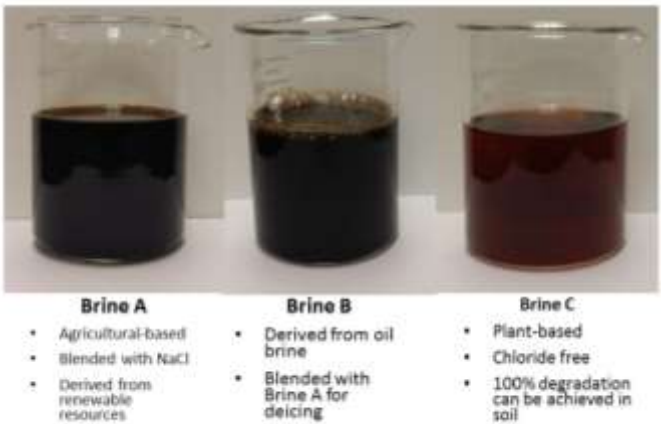

Figure 1. Brines used for deicing in New York.

Toxicity characteristic leaching potential (TCLP) tests were conducted to compare the potential for the release of metals from the three brines. Samples containing different soil to brine ratios were analyzed for the potential to leach certain metals from soil to groundwater. Figure 2 shows the metal concentrations found in the leachate for each of the three brines (initial conditions are 200 g of soil: 100 mL of brine).

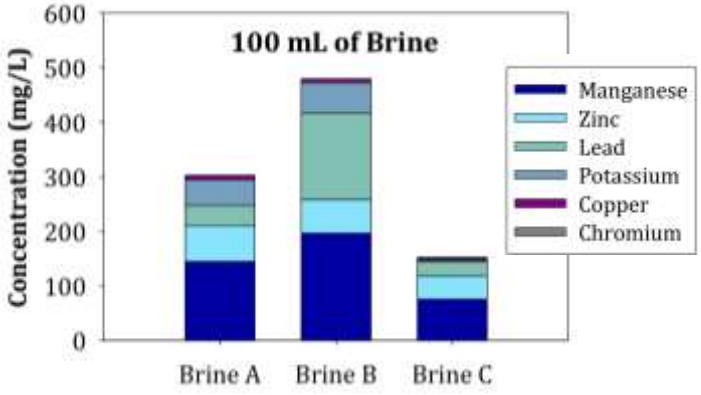

Figure 2. Metal concentrations (mg/L) in leachate from Brines A - C, 200g soil: 10 mL brine.

Results show that Brine B (oil-based brine) has the highest potential to impact the environment through the leaching of metals. Manganese was found at the highest concentration in the leachate, followed by zinc and lead. This pattern was also seen in Brines A and C, although at lower concentrations. Brine C showed the least potential to leach metals from a soil/brine mixture.

Results from the leaching tests all experimental conditions show that result in concentrations of certain metals would be found in groundwater that are elevated above the primary or secondary maximum contaminant levels set forth by the USEPA.

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