

Calcium Humate Reduces Disposal Costs by Lowering Electrical Conductivity and Sodium Absorption Ratio in Potassium Silicate based Drilling Waste

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The salinity of drilling waste plays a pivotal role in selecting the waste management method and subsequent cost for waste disposal. Endpoints for salinity have been set by the AENV and adopted by the ERCB in Directive 50, Drilling Waste Management. Disposal methods are subsequently determined by the initial soil and final soil/waste salinity endpoints as measured by increases in;

- electrical conductivity (EC)
- sodium absorption ratio (SAR)
- sodium content

A major factor in the salinity of the drill waste is the choice of drilling fluid additives. The challenge for advanced gel chem systems is the need to provide adequate shale inhibition without producing drilling waste with excessively high salinity values. Potassium silicate has proven to be a highly effective shale inhibitor with a lower EC vs. other commonly used potassium additives. However, SAR values for potassium silicate drill waste are high, the result of the silicate precipitating calcium and magnesium. Historically, SAR has been lowered by the use of gypsum and/or epsom salts. The decrease in SAR comes at the expense of higher EC values.

This paper reviews the technical collaboration between suppliers, service companies and operator that led to the development of humic substances as a superior waste amendment. The chemistry of certain humic substances allows this negatively charged macromolecule to absorb and release metal cations. Calcium humate has been shown to improve the salinity characteristics of water-based drilling waste and more specifically, potassium silicate based drilling waste. Amendment testing was done on a wide variety of drill waste samples obtained from leases across Alberta. Final testing and field trial work focused on drill waste and subsoil obtained from leases near Claresholm, Alberta.

Potassium silicate drill waste amended with calcium humate showed sharp drops in SAR and EC. Subsoil mixed with 3:1 with drill waste showed a decrease up to 15% for EC and 30% for SAR. The addition of a small percentage of calcium humate resulted in drill waste that would qualify for land spreading or require a lower ratio for mix-bury-cover.

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While living on his parent's family farm, Russel obtained his bachelor's degree in Chemistry in 1994 from the University of Lethbridge Alberta. Beginning his career in the field as a technician, Russel worked under various titles for a succession of environmental firms. In 2005, he and his partners established Summit Liability Solutions. Summit is an environmental assessment service firm that focuses on pre-drilling, drilling waste, reclamation, remediation and spill release environmental assessment services for the oil and gas industry primarily in Western Canada. Serving as Chairman and Vice-chair of the Petroleum Services Association of Canada's Environmental Committee for several years, Russel has participated in industry formed working groups related to the re-writing of Directive 50. He was also involved in the Provincial Governments initial presentation and implementation of the Water for Life Strategy. In 2004 he received the Distinguished Service Award for his service over the previous years to PSAC. When not working Russel will be enjoying the outdoors golfing, hiking, camping, softball, and spending time developing his acreage.