Subsoil Salinity Tool (SST) Version 3.0 – Insights into Producing More Robust Guidelines with Lower Remediation Volumes

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Salinity impacts represent one of the largest environmental contaminant footprints from historical oil and gas activities, and ensuring the protection of relevant receptors while also minimizing the amount of landfilled soil is thus of prime importance. The new Version 3.0 update to the Subsoil Salinity Tool (SST) facilitates this by incorporating a variety of new algorithms, each of which further refines and optimizes the guidelines generated for important chloride-related receptors and pathways. This presentation discusses these updated algorithms, and how they help to produce more robust guidelines with frequently lower remediation volumes compared to the previous Version 2.5.3 of the SST. Some of these updated algorithms include consideration of deeper water-table effects for the root-zone pathway, an enhanced mixing model for dugouts for livestock watering and irrigation, a more complex algorithm for lateral transport toward aquatic receptors, and an enhanced mixing model for the domestic use aquifer (DUA) pathway. A more complex and refined method for deriving drainage rates has also been incorporated, involving the use of additional parameters and influencing a wide range of pathways. In most cases, these updated / enhanced algorithms reduce some of the inherent conservatism from the previous models, thus providing more robust guidelines which are frequently higher than those derived in the previous version. This presentation will also provide some examples of chloride guidelines derived by the updated Version 3.0 of the SST compared to the previous Version 2.5.3, including implications for remediation volumes in selected cases.

Several of these algorithm changes for chloride also influence the generation of sodium and SAR (Sodium Adsorption Ratio) guidelines, a key addition to Version 3.0 compared to previous versions. This presentation will also provide examples of SAR and sodium guidelines derived by these updated algorithms and their implications for site remediation. By considering both chloride and SAR/sodium aspects, the use of the updated Version 3.0 Subsoil Salinity Tool thus allows sites to be remediated as efficiently as possible, allowing low-risk soils to be kept out of landfills while simultaneously ensuring that all environmental receptors are protected.

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Greg Huber has a Master of Science from the University of Calgary in Chemical and Petroleum Engineering, including a focus on topics such as water-based polymers, water treatment, and contaminated soil remediation. He has worked as a professional engineer and project manager for more than 20 years, and has been working with Equilibrium Environmental since 2005. He is involved in a wide range of risk assessment, guideline development, remediation, and research projects related to contaminants such as salinity, chloride, SAR, sodium, boron, metals, hydrocarbons, and PAH's in soil and groundwater. He is also involved in transport modeling and algorithm development for the Subsoil Salinity Tool, and has been teaching the SST course since 2011.