

Environment Business



Soil Chemistry for Remediation of Salt-Affected Soils

Salt is a common soil contaminant encountered in Western Canada. It can be associated oil and gas activities, introduced to the environment from spills of high salt content produced water. Once in the soil, salt is persistent and mobile resulting in long term effects that may gradually expand over time. The chemical nature of salt and its interaction with soil particles is important to understand when designing an assessment or remediation program for these soils. This course will cover fundamental soil chemistry and physics related to salt-affected in soils, and then will review the Salt Contamination Remediation and Assessment Guidelines (SCARG) and the Assessing Drilling Waste Disposal Areas Guidelines. The review of SCARG will include an overview of salt-affected soil assessment and remediation procedures.

1. Soluble Salts in Soils
 - A. General Grouping of Salt-Affected Soils
 - B. Soil Genesis
 - C. Source of Salts in Soils
 - D. Characteristics of Water that Salinize Soils
2. Effects of Soil Salinity on Vegetation
3. Fundamentals of Soil Chemistry of Salt Affected Soils
 - A. Methods of Expressing Concentrations of Dissolved Salts
 - B. Electrical Conductivity and Salinity Categories
 - C. Solubility Product Constants and Solubility of Salts
 - D. Carbonate Equilibria
4. Principles of Cation Exchange
 - A. Cation Exchange in Soils
 - B. Exchange Equations
5. Flocculation and Dispersion of Clays
 - A. Electric Double Layer Theory
 - B. Flocculation and Dispersion of Clay
6. Soil Physical Properties and Salts
 - A. Architecture of Soil
 - B. Some Important Physical Properties
 - C. Aggregate Stability

- D. Hydraulic Conductivity in Salt Affected Soils
 - E. Salt Effects on Infiltration Rate
7. Salt Contamination Assessment and Remediation Guidelines
- A. Introduction
 - B. Overview of Site Assessment and Remediation Procedures
 - C. Remediation Procedures
 - D. Site Assessment
 - E. Soil Remediation Options
 - F. Site Specific Risk Assessment
8. Assessing Drilling Waste Disposal Areas
- A. Introduction
 - B. Compliance Options
 - C. G50 Equivalent Salinity Guidelines

Instructor

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Sheila Luther has over 18 years of experience working on environmental assessment and research projects with a focus on soil reclamation, assessment of contamination, and remediation. She currently works as a senior soil scientist with Matrix Solutions Inc. Her work experience includes assessment and remediation of contaminated soils, pre-construction and post-reclamation assessments for oil and gas industry sites, environmental monitoring, literature reviews, technology transfer, and research on soil-water-contaminant interactions. Her current responsibilities include staff supervision, project coordination, client liaison, report review, design and management of remediation programs.