Contaminated Soil and Groundwater, Assessment and Remediation 6th – 8th December, 2023 at the Capital on Park, Sandton, Johannesburg, SA and Live Online

Description

The environmental condition of properties is an important issue in redevelopment, financing and transactions. All stakeholders must be aware of potential environmental liabilities. This detailed three-day course provides information on approaches and methodologies based on Environmental Chemistry required for assessing and remedying contaminated soil and groundwater by the phased structure of ESA, RA and remediation.

Applicable Environmental Chemistry concepts and principles, along with fundamentals of soil and groundwater properties and fate and transport of contaminants in porous media, will be provided to be employed in the standard procedures outlined in phased structured ESA, including sampling and analysis, Human Health RA and exposure control. Conventional and innovative soil and groundwater remediation methods will be discussed, along with cleanup requirements.

Case examples will be introduced and worked on by participants as the topics are covered.

Course Outline:

- Environmental Site Assessment phased structure
- Environmental Chemistry Basics
- Human Health Risk Assessment
- Soil and Groundwater Properties
- Fate and Transport of Toxic Metals and Organic Contaminants
- Soil and Groundwater Sampling
- Remediation Technologies and Selection Criteria

Course Objectives

By the end of this training course, the participants will be able to:

- Understand the phased structure of Environmental Site Assessment (ESA), Risk Assessment (RA) and Remediation requirements
- Support your projects using the necessary Environmental Chemistry knowledge
- Understand the basics of fate and transport of contaminants in porous media
- Construct a Conceptual Site Model and devise Sampling and Analysis Plan
- · Evaluate and select appropriate remediation technologies for contaminated soil and groundwater

Who Should Attend:

- Environmental Engineers and Technologists
- Project Managers
- Regulatory personnel (National, provincial and municipal)
- Geologists
- Consultants and Soil Scientists



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Contaminated Soil and Groundwater, Assessment and Remediation Course 2023 AGENDA

DAY I - Environmental Chemistry of Contaminants, Soil and Groundwater Welcome, Introduction, Course Preview, Learning

Outcomes and the Assessment Method. Environmental Chemistry Basics

- Overview of Contaminants
- Concept of Source-Pathway-Receptor
- Soil and groundwater as transport and exposure pathways
- Physical Reactions (adsorption, volatilization, cation exchange)
- Chemical reactions (Oxidation, Precipitation)
- Biological Reactions
- Clay and organic matter in the soil

Toxic Metals

- Toxic properties of heavy metals
- Sorption/desorption of heavy metals in subsurface
- Chemical precipitation
- Bioaccumulation and biomagnifications of metals

Organic contaminants

- Petroleum hydrocarbons and chlorinated solvents
- Sorption
- Biodegradation
- Volatilization
- Light and Dense Non-Aqueous Phase Liquids (LNAPL/DNAPLS)

Soil Environment

- Physical properties of soil
- Hydraulic properties of soil/porous media
- Overview of physical, chemical and biological interactions of contaminants in porous media

Groundwater

- Overview of hydrogeology
- Types of aquifers
- Unsaturated zone; hydraulic properties
- Aquifer properties and discharge rates
- Mapping groundwater flow

Contaminant Fate and Transport in Subsurface Environment

- Advection, diffusion and dispersion
- Reactions and decay
- Retardation
- Contaminant transport in vadose zone
- Contaminant transport in the saturated zone
- Introduction to models and software
- Example simplified models

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DAY II - Soil and Groundwater Remediation Technologies

Conceptual Site Models

- Source-Pathway-Receptor concept
- Contaminant Source characterization
- Transport and exposure pathways
- Receptors characterization
- Example conceptual site models

Human Health Risk Assessment and Risk-Based Remediation

- Human Health Risk Assessment Framework
- Threshold and non-threshold contaminants
- Human health risk assessment
- Development of risk-based criteria
- Risk-based remediation
- Example calculations

Contaminated Soil Remediation

- Physical/Chemical Treatment Technologies
- Soil Vapor Extraction
- Solidification/Stabilization
- Chemical Oxidation
- Soil Flushing
- Soil washing
- Electrokinetic Separation
- Biological Treatment Technologies: Biofarming, Bioventing, Phytoremediation

Groundwater Remediation

- Monitored Natural Attenuation
- Air Stripping
- Air Sparging
- Pump and Treat System
- Permeable reactive barriers (Zero-valent-iron)
- Application of Nano-Materials to in-situ remediation of groundwater
- Examples to be worked on by participants, Question and Answer Session

DAY III - Environmental Site Assessment

Phase I and II Environmental Site Assessment Standards

Phase I ESA

- Legislative requirement
- Provincial guidelines for site assessment
- · Identify potential environmental concerns and activity
- Determine whether Phase II ESA needed

Phase II ESA

Background study

- Review of existing information
- Preliminary site characterization
- Development of a detailed work plan for Phase II ESA
- Soil and Groundwater Sampling

Sampling plans for soil and groundwater

- QA/QC project plans and samples
- Soil sampling methods and equipment
- Groundwater monitoring wells

Phase II ESA Report - Case Example

 Questions and Answers and Feedback to Participants on Achievement of Learning Outcomes



DR Kym L. Morton - an international groundwater and surface water consulting company which specializes in supporting complex mining and power operations world wide using accurate and integrated water management techniques.

Lead consultant on water management strategy for mining, power and industrial applications, an international expert on mine dewatering design for underground and open pit. Kym is a thought leader on the reduction of water risk for all types of operations and integrates accurate mine/industrial water management with community upliftment.

Expert in:

- Mine water interception, dewatering design for complex underground mines and depressurization of slopes.
- Advanced tailings dam monitoring for risk reduction
- Transition from open pit to underground design
- Pollution prevention and remediation designs
- Groundwater risk reduction.
- Data management techniques from site collection to practical use in decision making at board level
- Visualization of geo-spatial data for decision making
- Researching and managing deep groundwater 300m to 4.5 km



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