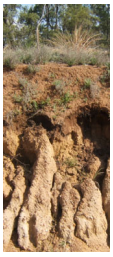
Demonstration 1



Soil and Water Interactions

1

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Dispersive Soils

- Structurally unstable in water, breaking down to constituent parts – sand, silt and clay
- Emerson Aggregate Test commonly used to identify problem soils
- Slaking vs. Dispersion – both problematic
- Mechanical dispersion

2

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Unstable Soils

What do you notice about the 3 different soil/water interactions?

3

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Dispersive Soil Problems

- Highly erodible if exposed
- Hardsetting and low permeability
- May generate turbid runoff and include attached nutrients or metals (piggy-backing)
- Severe rilling of exposed (vertical) surfaces
- High risk of tunnel erosion or piping when used for earthworks

4

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Sodic Soils

- All sodic soils are dispersive but not all dispersive soils are sodic
- Cation Exchange Capacity (CEC) (K^+, Na^+, H^+, Ca^{++}, Mg^{++}, Al^{+++}) dominated by sodium (Exchangeable Sodium Percentage - ESP)
- Fluting is a common indicator of sodic soils

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Management in Soil

(1) Expose only by necessity

(2) Cover with non dispersive soil before applying further treatments (erosion controls) or revegetation

(3) Soil Amelioration:

- Gypsum application can significantly improve soil stability (dry preferred to liquid form)
- Blending best approach at application rates 5 – 35 t/ha

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Management in Water

- Turbid water in sediment basins etc.
- Require flocculants to enhance settling and improve water clarity:
  - Gypsum (calcium sulphate) - ~50mg/L
  - Alum (aluminium sulphate)
  - Poly Aluminium Chloride (PAC)
  - Poly Acrylamide (PAM, i.e. Zetag)
  - Other proprietary compounds (Phoslock)

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Image: Strategic Environmental and Engineering Consulting (SEEC)


Sediment pond following 4-hours flocculation with 'Ultrion'