

An Alternative Protocol for Closing Salt-Impacted Sites on Native Grasslands

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Rationale

- Established native prairie vegetation has value and should be preserved
- Soil with salt above generic guidelines may or may not result in adverse effects
- Avoid net negative environmental benefit



Native Prairie Protocol=

- Alternative Path to Closure for Salt-Impacted Sites on Native Grasslands
- Current Scope:
 - Salt impacts
 - Native grassland ecosystems
 - Eco-contact exposure pathway



Technical Steering Committee

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Generic Salt Guidelines

- Not Risk-Based
- Don't Distinguish Natural Salts from Anthropogenic
- Not a Good Predictor of Adverse Effect























Native Prairie Protocol

- Step #1 Demonstrate Applicability
- Step #2 No Current Adverse Effects
 Plant community
- Step #3 No Future Adverse Effects
 Plant community
- Step #4 Other Exposure Pathways
 DUA, FAL, Livestock watering



Step #1 -Applicability

- Natural grassland ecosystem
- Applicable to salts



Adverse Effects (Plant Community)

- Reclamation Criteria for Wellsites... for Native Grasslands
- Must pass Detailed Site Assessment (DSA)



Adverse Effects (Plant Community)

- Demonstrate that upward migration of salts back up into the root zone is unlikely
- Two Methods Used with a Weight of Evidence Approach:
 - Step #3a. Natural salt profile
 - Step #3b. Water table depth



Step 3a. Natural Salt Profile

- Investigating techniques to link:
 - the distribution of naturally occurring salts in the soil profile to
 - The tendency for long-term upward salt migration



Step 3a. Sulphate as Pedogenic Tracer

- Pros:
 - Widely occurring in prairie soils
 - Not normally associated with anthropogenic impact
- Cons
 - Some potential interactions with soil
 - Possible contribution from fertilizer use





Step 3a – Natural Sulphate Profile

- Generate profiles of sulphate vs. depth:
 - In undisturbed areas
 - 1+ adjacent to impacted area(s) (APECs)
 - 2+ in background areas





Step 3a –Sulphate Profile Interpretation

- Test A: Decrease in sulphate from 1 m to surface
- Test B: "Sulphate Maximum" > 1.0 m depth
- Test C: Surface sulphate concentration > background sulphate from deeper samples





Step 3a \overline{T} Profile Interpretation

Outcome – Salt Movement Direction	Test A	Test B	Test C
Definitive Downward	Pass	Pass	Pass
Probable Downward	Pass	Any	Any
Upwards	Fail	Any	Any
Ambiguous	Any Other Outcome		



Step 3b – Water Table Depth

- Demonstrate Water Table >= 2m via:
 - Monitoring wells; or,
 - Borehole observations



Step 3 $_{\overline{\mathrm{T}}}$ Weight of Evidence Assessment

Scenario	Step 3a Profile Results		Step 3b	Pass Step 3?
	APECs	Background		
1	Definitive Downward	Definitive Downward	Not Required	Yes
2	Definitive or Probable Downwards	Any Results	Pass	Yes
3	Definitive or Probable Downwards	Any Results	Fail	No
4	Any Upward Results	Any Results	Not Required	No



Alternative Closure Protocol Requirements – Other Pathways

Pathway	Approach	
Eco-Contact	Native Prairie Protocol	
Domestic Use Aquifer	SST or Tier 2C Approach	
Freshwater Aquatic Life	SST or Tier 2C Approach	
Livestock/ Dugouts	SST or Tier 2C Approach	



Current Status and Next Steps

- 2018 Scientific Rationale document currently under regulatory review
- Positive regulatory feedback so far
- Expectation of regulatory adoption streamline closure of such sites
- Anything in this presentation could change prior to implementation!