8/29/2024

MDT Salt Remediation Kick-off Meeting Notes

Attendees

Laura Fay – Western Transportation Institute (WTI), MSU
Claire Luby – MSU, Plant Sciences
Vaneza Callejas – CTC & Associates, Project Coordinator
Scott Brown – Montana Salinity Control Assoc., Director (Great Falls)
Darcy Goodson – MDT Project Champion, Reclamation Specialist
Joe Radonich - Tracy Deeds Supervisor, Erin/Aaron also in group) MDT Environ. Services
Michael Ivanoff – Missoula District Env. Eng. Specialist
Joe Weigand – FHWA Env. Protection Specialist
Doug McBroom – MDT Maintenance Operation Manager
Rebecca Ridenour – MDT Research Coordinator

Meeting Notes

Agenda:

1. Introductions
    a. Panel Chair
    b. Panel Members
    c. Research Team
    d. Research Project Manager
2. Project Management (Vaneza)
3. Review of Project Scope, Schedule (Laura)

*See slide deck: KickOffMeeting_MDTSaltTolerantPlants_08212024.pdf

4. Discussion (All)

- Doug feels this project presents a viable solution for remediation at stockpile sites but may not work for roadsides. Specifically, MDT is looking to sample/field test at the Plains, MT site.
- Scott, to what soil depth do plan to collect? They have found where chlorides are in the soil profile varies across the state. Laura – we will work to characterize each soil sampling location, and the soil sampling depth will likely vary based on material at each site.

- Scott, at a field site they found *Salicornia* growing really well, but it needs a lot of water (shallow water table). Extremely salt tolerant.
- Doug and Joe – keep soil sampling of roadsides in the soil sampling plan.
- Modify soil sampling timing to occur in late winter/early spring 2025. There was approval from the technical panel to extend the soil sampling task to accommodate this.
- Doug – can soils from the field be used in the greenhouse study? Claire – yes, we will just need to get them. Doug – we can help provide equipment to get the soil quantities you need. Want to make sure the greenhouse study results can be applied in the field. Likely harvest soil from the Plains, MT site. MDT will provide a report on soil testing from the Plains, MT site.
- Joe - Will the analytical methods help tell us how many plants are needed to clean up a site? Yes, one of the goals of the greenhouse study is to look at the plant biomass/chloride uptake.
- Doug – MDT will help with traffic control at soil sampling sites and will provide access to stockpile locations.
- Monthly to quarterly meetings will be held at everyones convenience.

5. Next Steps (All)

- Kick-off meeting notes and slide deck will be submitted.
- Vaneza will work to schedule the next meeting for Nov./Dec. 2024

Remediation of Deicer Contaminated Soils Using Native Montana Plants

Laura Fay & Claire Luby

August 29, 2024

Introductions

Vaneza Callejas – CTC & Associates

MDT Staff

Technical Panel

Research Team

- Laura Fay
- Claire Luby
- Tom Raske (Graduate Student)

Project Objective

Assess the feasibly of using salt tolerant plants to remediate contaminated soils around salt storage facilities and in the near road environment.

Accomplished through soil testing, determination of feasible plant species, determining remediation potential of plants, and testing feasibility of use in the field.

Background

- MDT stores upwards of 1M pounds of road salt at over 120 facilities across the state.
- MDT is working to cover all salt and salt-sand stockpiles.
- Salt can leach from these piles.
- Once salt leaves the stockpiles it will remain in the environment affecting soil, water, flora, and fauna.

Background

- Direct impacts of salt include contaminated surface and ground water
  - Contaminated wells
- Browning of leaves/needles to death of plants
- Current remediation methods, like Reverse Osmosis, are costly and time sensitive

Background

- Use of halophytes (salt-tolerant plants) and harvesting or mowing of above ground plant tissues has been shown to be an effective method to remediate soils (remove salt from soils).
- Plants species used is very important
  - Montana Salinity Control Assoc. ID'ed many plant options
- Greenhouse studies have proven the concept
  - Remediation potential of 2-38%*
- Field results have not yet confirmed greenhouse findings

Background

- Salt concentration in soils and water vary seasonally
  - Lower chloride concentrations in the fall (we are here!)
  - Spiking concentrations in the winter
  - Decreasing concentrations in late spring/summer

  *Recommend sampling early Spring 2025

Benefits & Business Case

- Reduce impacts from winter maintenance operations
- Reduce salt in the environment
- Opportunities for nurseries and seed producers
- Inform decisions about selected plant species on MDT projects
- Use in other reclamation projects within and outside of MDT

Research Plan

Task 0: Project Management

Task 1: Identify Potential Plant Species

Task 2: Soil Sampling

Task 3: Greenhouse Study

Task 4: Field Deployment

Task 5: Final Report

Task 0: Project Management

- ☑ Kick-off Meeting
- ❑ Quarterly to monthly check-in conference calls with Technical Panel
- ❑ Provide meeting notes
- ❑ Provide Quarterly Progress Reports

Task 1: Identify Potential Plant Species

- Conduct an extensive evaluation of viable plant species (native and non-native), salt tolerant and uptake salt into above ground plant tissue.
    - Review literature searches and Montana Salinity Control Assoc. ID'd plant

- Deliverable: Task 1 Report

Task 2: Soil Sampling

- 2.1 ID Soil Sampling Locations
  - Work with MDT staff to ID key locations for soil sampling
    - Salt/Sand storage facilities, high salting zones along roadways, etc.
    - Create GIS of layer of infrastructure, sampling sites, salt concentration data
    - Use USDA and NRCS data where needed
  - Up to 5 DOT sites and 3-5 roadsides

Task 2: Soil Sampling

2.2 Soil Sampling

- 2.2.1 Develop soil sampling protocol
  - Review and approval by Technical Panel
- 2.2.2 Soil Sample Collection
  - 1-2 week field campaign
  - Early Spring 2025
- 2.2.3 Soil Chloride Analysis
- Deliverable: Task 2 Report (Modify timeline of Task 2?)

Task 3: Greenhouse Study

- 3.1 Develop Greenhouse Testing Plan
  - Review and approval by Technical Panel
- 3.2 Plant Seeds
  - MSU Plant Growth Center greenhouse facility
  - MT soil
- 3.3 Salt Treatments
  - Two salt exposure scenarios – 1) mimic legacy contamination (salt in soil media), 2) mimic salt exposure from precipitation events (salt in water)

Task 3: Greenhouse Study

- 3.4 Data Collection
  - Assess plant growth (height, dry matter weight) and performance
  - Harvest plant tissue (leaves, stem, root) determine where salt is stored (measure chloride)

- Deliverable: Task 3 Report

Task 4: Field Deployment

- 4.1 Field Site Selection
  - Work with MDT staff to ID location(s)
- 4.2 Develop Field Test Plan
  - Plot design, soil type, seeds, watering, fertilizer/compost, timing, etc.
  - Review and approval by Technical Panel

Task 4: Field Deployment

- 4.3 Field Deployment
  - Planting timing depends on the species
  - Soil sample at time of planting (chloride)
  - Photos
- 4.4 Soil Sampling and Plant Harvest
  - Collect soil sample and above ground plant tissues
  - Test all samples for chloride concentration
  - Photos

Task 5: Final Report

- Report will detail all tasks efforts (MDT format)
  - Introduction and Purpose, Implementation Summary, Implementation Recommendations, Performance Measures Reporting, Project Summary Report, Data Management Plan, Poster, PPT presentation, and recorded webinar of presentation.

- Deliverable: Task 5 Draft Final Report

MDT & Technical Panel Involvement

- Attend meetings
- Review deliverables and provide constructive feedback
- MDT input on soil sampling locations and field test sites
  - Support as needed with traffic control, signage, permits during roadside sampling
  - Access to MDT sites (soil sampling and field deployment)
  - Data

Other Collaborators

- Montana State University statistical support, GIS mapping, and laboratory facilities.
- Technical Panel expertise.

Products

- [x] Deliverable No. 1: Kick-Off Meeting
- [ ] Deliverable No. 2: Monthly Check-In Calls
- [ ] Deliverable No. 3: Quarterly Reports
- [ ] Deliverable No. 4: Task 1 Report - Draft Identified Plant Species
- [ ] Deliverable No. 5: Task 2 Report - Draft Soil Sampling Results
- [ ] Deliverable No. 6: Draft Green House Test Design
- [ ] Deliverable No. 7: Task 3 Report - Report of Finding, Recommendations
- [ ] Deliverable No. 8: Technical Panel Meeting (decision-point meeting)
- [ ] Deliverable No. 9: Draft Final Report
    - Deliverable No. 10: Data Management Plan
    - Deliverable No. 11: Final Report
    - Deliverable No. 12: Performance Measures Report
    - Deliverable No. 13: Implementation Report
    - Deliverable No. 14: Project Summary Report
    - Deliverable No. 15: Project Poster
    - Deliverable No. 16: Final Presentation
    - Deliverable No. 17: Project Webinar

Risks

- Inherent risk is greenhouse and field studies
- Identify, assess, report issues they occur

Implementation

- If deemed feasible, deploy across state, share with other agencies inside and outside of the state.
- Publish paper(s) to disseminate information
- Present findings at a conference
- Changes in operations will be recommended as are needed
    - Plant species and planting methods
    - Plant needs – watering, fertilizer
    - Mowing

Project Schedule

2 years

Task	Month																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
0 Project Management																								
Kick-Off	X																							
Update Calls				X			X				X			X			X					X		
Close-Out																							X	
1 Identify Potential Plant Species																								
2 Soil Sampling																								
3 Green House Study																								
4 Field Deployment																								
5 Report & Project Close-Out Deliverables																								

Contacts

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