

## Science and Technology Program Research

Salton Sea Authority Dust Suppression Research Briefing February 25, 2021

## Science and Technology Program Research

- Dust suppression at the Salton Sea
  - Step 1 Literature Review
  - Step 2 Stakeholder Outreach
  - Step 3 Field testing for a specific measure
    - Enzyme Induced Carbonate Precipitation (EICP)
    - Microbially Induced Carbonate Precipitation (MICP)

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## Literature Review – Scoping to reduce impacts of fugitive dust

• Literature review aimed at identifying existing research, and where additional research is needed, on two topics at the Salton Sea:

 Reducing impacts of fugitive dust on Reclamation's lands at the Sea, and

2. Understanding the impacts of a receding Sea on Colorado River supplies.



Scoping of future research opportunities to reduce impacts of fugitive dust on Reclamation's lands at the Salton Sea and understand impacts of a receding Salton Sea on the Colorado River Basin

Science and Technology Program Research and Development Office Final Report No. ST-2020-20043-01



U.S. Department of the Interior

September 2020

Project website link: https://www.usbr.gov/research/ projects/detail.cfm?id=20043

# Literature Review Chapter 2 – Dust Suppression

- Dust Control Measures from Salton Sea Air Quality Mitigation Program
- Dust Control Measures evaluated for Owens Lake
  - National Academy of Science, Engineering, and Medicine Report, 2020
- Other Dust Control Measures
  - Chemical Dust Suppressants
  - Enzyme-Induced Carbonate Precipitation (EICP)
  - Microbially-Induced Carbonate Precipitation (MICP)



#### Dust Control Measures at Owens Lake

- Best Available Control Measures (BACMs)
  - Shallow flooding
  - Dynamic management with shallow flooding
  - Brine with shallow flooding as backup
  - Tillage with shallow flooding as backup
  - Managed vegetation
  - Gravel cover



Dust control using the brine BACM Source: NASEM 2020, Effectiveness and Impacts of Dust Control Measures for Owens Lake; Photo courtesy of Stephanie Johnson, National Academies



Managed vegetation BACM at Owens Lake Source: NASEM 2020, Effectiveness and Impacts of Dust Control Measures for Owens Lake; Photo courtesy of Valerie Eviner, OLSAP member



### Dust Control Measures at Owens Lake

- Dust Control Measures evaluated that are not currently BACMs
  - Precision surface wetting
  - Artificial roughness (4 types)
  - Shrubs: modification of managed vegetation
  - Cobbles
  - Sand fences
  - Solar panels
- Dust Control Measures not evaluated
  - Chemical stabilizers/soil binders
  - Biocrusts



Engineered solid roughness elements test at Owens Lake Source: NASEM 2020, Effectiveness and Impacts of Dust Control Measures for Owens Lake; Photo in report from Holder, 2019d



Cobbles and boulders at Owens Lake as part of the Land Art Project

Source: NASEM 2020, Effectiveness and Impacts of Dust Control Measures for Owens Lake; Photo courtesy of Valerie Eviner, OLSAP member



## Other Dust Control Measures discussed in the Literature Review

- Chemical Dust Suppressants (7 categories)
- Enzyme-Induced Carbonate Precipitation (EICP)
- Microbially-Inducted Carbonate Precipitation (MICP)
- Next Steps
  - Stakeholder Outreach
  - Field Testing EICP/MICP



### **Bio-cementation of Salton Sea Soils**

- Field test of bio-cementation on Salton Sea soils
  - EICP and MICP implemented as dust control mechanisms
- Induce CaCO<sub>3</sub> precipitation by hydrolysis of urea
  - Urease enzyme catalyzes hydrolysis, enables CaCO<sub>3</sub> precipitation
- ~10 years of research in bio-cementation at ASU





## **NASA Wind Tunnel Testing**





### **Previous Field Trials**

#### **Untreated Plot**



#### Treated Plot



#### RSI Apache Junction Landfill Field Trial





### **Important Issues**

- Treatment Method
- Level of Treatment
- Durability
- NH<sub>4</sub>CL by-product
- Impact of constituents in Playa soils
- Lifecycle cost and environmental impacts



Pictured above: EICP Treated AZ Silt



### **Dust Control Measure Research Discussion**

- Are there any concerns with field testing that should be considered?
- Are there concerns with Dust Control Measures specific to the Salton Sea?
- Are there Dust Control Measures would you like to see prioritized for additional research?
- Potential locations for future field testing?
- Other research needs at the Salton Sea?



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