Mitigate Dust Emission Hotspots

February 8, 2023

Implementing dust control measures on exposed portions of the Great Salt Lake lakebed would reduce the impacts of dust on human health.

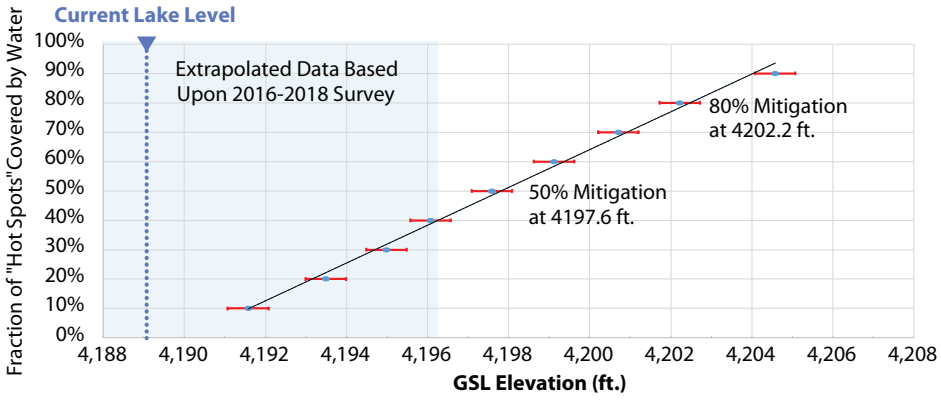
Summary

Dust plumes from the Great Salt Lake lakebed have increased in frequency and severity as the lake has receded. These dust episodes pose an immediate health risk to all residents along the Wasatch Front due to inhalation of particulate matter (i.e., PM_{10}) and high concentrations of arsenic, which could increase the risk of certain cancers. Dust hotspots exist in all four quadrants of the lake and represent about 9% of the exposed lakebed. Over time, the fraction of the lakebed capable of producing dust will increase as the protective surface crust that formed as the lake receded gradually erodes.

Key Facts and Insights

- **Dust Hotspots** – The number of dust hotspots is linearly related to lake elevation and will decrease by approximately 6.4% per foot of lake-level rise. 50% of the dust hotspots occur at elevations below 4,198 feet. 80% occur at elevations below 4,202 ft.
- **Air Quality Linkages** – Dust from GSL will likely lead to violations of the National Ambient Air Quality Standards (NAAQS) established by the U.S. EPA. Designation as non-attainment for PM_{10} will trigger a mandatory and costly State Implementation Plan (SIP).
- **Human Health Linkages** – Dust from GSL can adversely impact human health due to high PM_{10} concentrations (acute exposure risk) and high arsenic concentrations in the dust (chronic exposure risk).
- **Snowpack Linkages** – A shrinking GSL produces less lake-effect snow and increases the dust deposited on the snowpack. The dust significantly darkens the snow, increasing the spring melt rate of the snowpack by several weeks.
- **Implementing Dust Control Measures is Expensive** - The Los Angeles Department of Water and Power has spent more than $2.5 billion on federally-mandated dust mitigation efforts at Owens (Dry) Lake due to violations of the NAAQS for PM_{10}. Great Salt Lake is 15 times larger than Owens lake.

Figure 20: Great Salt Lake Dust "Hot Spot" Elevation Survey Extrapolated for Current Lake Level



Note: Utilizing DCMs other than water requires capital costs of $20 - $30M per mi² with additional ongoing maintenance costs of $0.2 - $0.5M per mi² per year. The surface area of current dust hotspots exceeds 75 mi² but could increase to 200 mi² in a decade as the protective surface crusts begin to erode.
Source: Analysis by Kevin Perry, 2022

Expert Assessment Scorecard Results

	Low				High
Benefits					
Water brought to the lake	**1**	2	3	4	5
Air quality improvements	1	2	3	4	**5**
Biological health	1	2	**3**	4	5
Costs, Challenges, and Adaptations	Low				High
Financial cost*	1	**2**	**3**	4	5
Agriculture changes	1	**2**	3	4	5
Extractive industry changes	1	**2**	3	4	5
Cultural shift	**1**	2	3	4	5
Feasibility	Low				High
Speed of implementation	**1**	2	3	4	5
Legal/regulatory feasibility	1	2	3	4	**5**

*Cost is dependent upon chosen dust mitigation technique
Source: Great Salt Lake Strike Team

Policy Options

Dust control measures (DCMs) have been studied extensively at Owens (Dry) Lake. DCMs mitigate dust by 1) physically covering the dust hotspots with water or gravel, 2) treating the surface to strengthen the protective surface crust, and 3) installing vegetation or structures to reduce wind speeds near the surface of the lakebed. Specific DCMs that could be applied to GSL include, but are not limited to:

- Raising the water levels for the lake as a whole
- Strategically raising the water levels in Farmington and Bear River Bays using berms
- Levelized flooding of the worst dust emission areas
- Applying crushed gravel to the worst dust emission areas
- Strategic seasonal flooding to reform surface crusts
- Applying a surface crust-generating solution using aircraft on a seasonal basis
- Installing managed vegetation systems (e.g., drip irrigation systems)
- Installing physical barriers such as snow fences
- Ongoing mitigation costs
- No improvements for Great Salt Lake ecosystems, brine shrimp, or mineral extraction.