Capital Improvement Project

Apple Valley and Burnsville: Alimagnet Lake Alum Treatment

Figure 1. A barge applies alum to Alimagnet Lake, October 2024. Courtesy of the City of Apple Valley.

Alimagnet Lake, split between the Cities of Apple Valley and Burnsville (Cities) and surrounded by city park land, is impaired for excess phosphorus. This has historically resulted in algae blooms and poor water quality conditions impacting recreation. The Vermillion River Watershed Joint Powers Organization (VRWJPO) and cities were awarded Clean Water Fund (CWF) dollars in 2017 and 2019 that addressed the phosphorus coming to the lake from subwatershed (external load) sources. Now the focus has turned to internal phosphorus load, meaning phosphorus from lake bottom sediment.

The VRWJPO and Cities conducted a feasibility study in 2023 to evaluate the potential for aluminum sulfate (alum) treatments to improve water quality in Alimagnet Lake. Alum is scientifically accepted as a safe and effective way to treat internal phosphorus loading in lakes. When applied, it chemically binds to phosphorus in the water column, forming a heavier particulate material (floc) that sinks to the bottom and prevents the nutrient from being resuspended. The study identified multiple priority areas of the lake for treatment, dosing recommendations, buffering estimates, locations for storing chemicals, barge entry points, costs, and pollutant reductions associated with the treatments.

The VRWJPO applied for and received FY23 and FY25CWF competitive grants from the Minnesota Board of Water & Soil Resources (BWSR) for alum treatments in Alimagnet Lake. The treatments are being applied following a split-dose methodology, with the first treatment taking place in 2024 and the second in 2026. Following treatments, the partners' consultant will monitor lake sediment conditions to inform dosing and quantify treatment efficacy. The first treatment took place during the week of Oct. 15, 2024. Soon after, water quality monitoring showed a threefold increase in water transparency compared to results from right before the treatment, indicating a significant reduction in algae. Over time, the phosphorus reduction could lead to the lake's removal from the state Impaired Waters List.

3/2025

Partners:

- VRWJPO
- City of Apple Valley
- City of Burnsville
- BWSR

Timeline:

- First split-dose treatment in 2024, second in 2026
- Lake sediment monitoring in 2025 and 2026

Location:

- Apple Valley and Burnsville

Subwatershed:

- North Creek

Costs and Contributions (Estimated):

- VRWJPO: $8,360 for in-kind grant administration/coordination; $37,000 cash match for engineering/technical assistance
- City of Apple Valley: Technical assistance
- City of Burnsville: Technical assistance
- BWSR: $25,000 from competitive Clean Water Fund for engineering/technical assistance; $332,000 from competitive Clean Water Fund for alum treatments

Benefits:

- Estimated to reduce phosphorus in Alimagnet Lake by 115 lbs. per year for 10-14 years, which would bring the in-lake concentrations to meet water quality standards. This could allow the lake to be de-listed from the Minnesota Impaired Waters List.
- Secchi disk transparency results improved from 2.26 feet before the treatment to 7.51 feet (bottom of lake) afterwards.
- Less phosphorus would reduce algae blooms, making this recreational lake more enjoyable for nearby residents and park users.

Figure 2. Algae bloom photograph, courtesy of the Minnesota Pollution Control Agency

Figure 3. Application of alum in Alimagnet Lake using a barge

Grants from the Clean Water Fund, one of four funds established by the Clean Water, Land & Legacy Amendment, support this project. Clean Water Stories can be found on the Minnesota Board of Water and Soil Resources website.

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