Seasonal Turnover In Wisconsin's Wastewater Treatment Lagoons

WISCONSIN DEPT. OF NATURAL RESOURCES

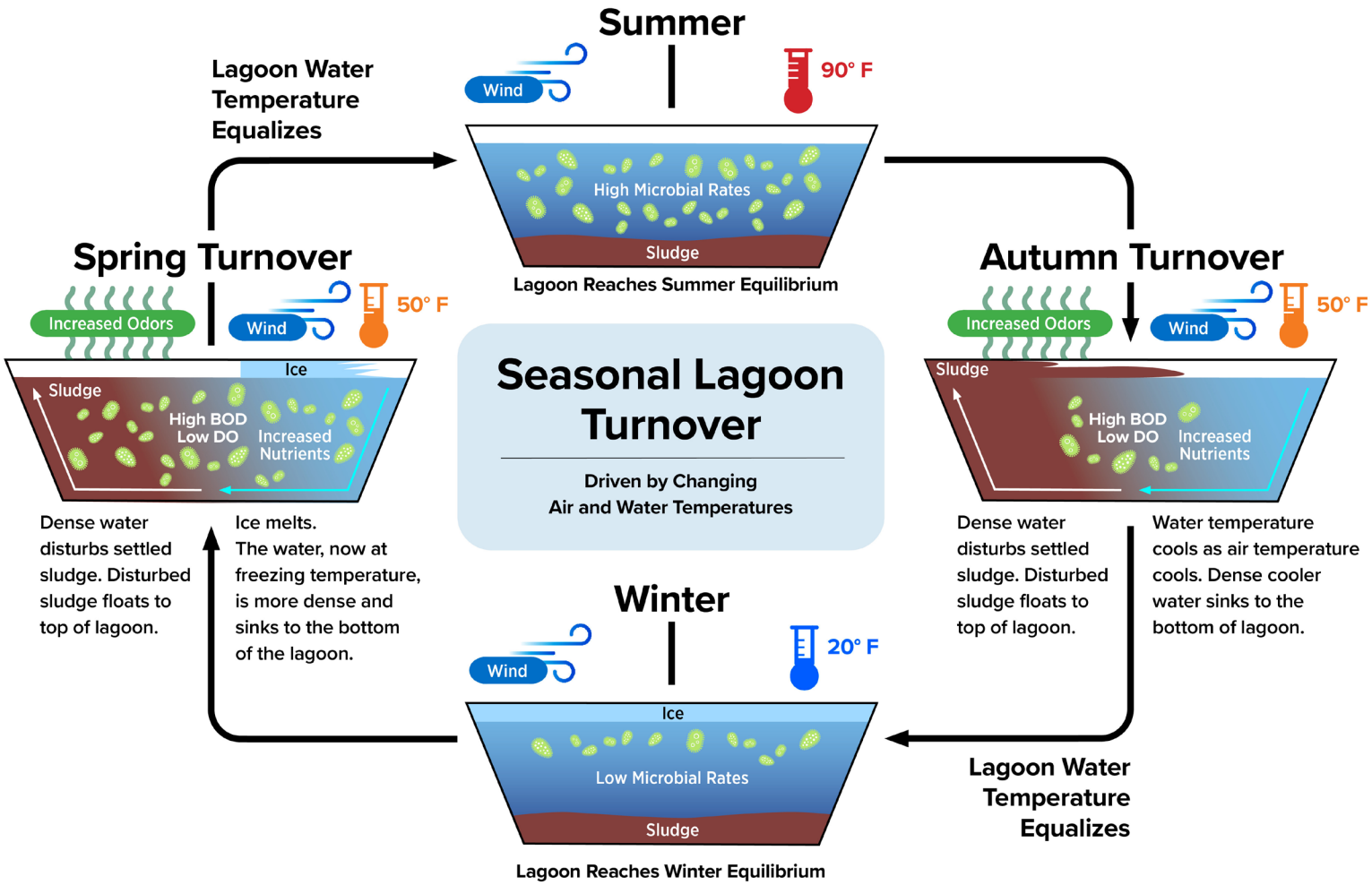
Understanding And Addressing The Impacts Of Municipal Lagoon Turnover

What Is Lagoon Turnover?

Lagoon turnover occurs when the upper layer of water sinks to the bottom of the lagoon, and the lower layer of water, with some sludge, rises to the top of the lagoon. During warmer months, lagoons become more active, and during cooler months, lagoons become less active. **Lagoon turnover typically lasts 3 – 14 days.** Lagoon turnover lasting longer than a couple of weeks can indicate that there are underlying issues, and appropriate steps should be taken to support recovery.

SYMPTOMS OF LAGOON TURNOVER

- **Strong, sulfurous odor**
- **Dark or murky water**
- **Floating sludge**
- **Increased total suspended solids (TSS) and biochemical oxygen demand (BOD) in effluent**
- **Low dissolved oxygen (DO)**



August 2025
EPA-832F25003
PUB-WY-124

Nutrient Removal During Wastewater Lagoon Turnover

In addition to causing higher BOD and TSS, seasonal turnover can also affect nitrogen and phosphorus removal. In the fall, decreased microbial activity and a slowed conversion of nitrogen species in ammonia can lead to elevated levels of nitrogen and phosphorus in effluent. In the spring, as ice melts and water layers mix, nitrogen and phosphorus can be released from sediment into the water column. Elevated nutrient levels can fuel algal blooms, leading to poor water quality and reduced oxygen levels. To restore nutrient removal processes, efforts should be focused on resolving prolonged lagoon turnover.

Frozen lagoon in winter. / ***Photo Credit:*** *Wisconsin DNR*

Lagoon in spring. / ***Photo Credit:*** *Mike Beck, ERG*

What Can Be Done?

If the lagoon is experiencing seasonal turnover, consider monitoring effluent trends to determine when to cease discharge and when it is appropriate to resume discharge.

To resolve a turned lagoon that has not recovered after 3 to 14 days, consider:

- Circulating lagoon water within cells to prevent layers of different temperatures and environments within the lagoons.
- Adding aeration to the lagoon to increase dissolved oxygen.
- Decreasing the flow/load to the affected cell by increasing loading on other cells at the plant, if these cells have excess capacity.
- Recirculating effluent into the affected cell if the cell has excess capacity.
- Checking with Wisconsin Department of Natural Resources (DNR) compliance staff regarding the addition of chemicals to aid in sludge settling (e.g., pH adjustment).
- Addressing any other underlying issues such as short-circuiting, indirect discharge or too much accumulated sludge.

ADDITIONAL RESOURCES:

Technical Assistance through EPA WaterTA:
https://www.epa.gov/water-infrastructure/forms/water-technical-assistance-request-form

Troubleshooting Manual for Small, Facultative, Partial-Mix Aerated, and Complete-Mix Aerated Wastewater Lagoons:
https://www.epa.gov/system/files/documents/2024-02/lagoon-troubleshooting-manual.pdf

Changing Temperatures Can Set Back Wastewater Lagoons:
https://www.rcap.org/changing-temperatures-can-set-back-wastewater-lagoons/

Preparing for Lagoon Turnover:
https://extension.okstate.edu/programs/waste-management/site-files/docs/articles/preparing-for-lagoon-turnover-a.pdf

Wisconsin DNR Ponds, Lagoons, and Natural Systems Study Guide:
https://dnr.wisconsin.gov/sites/default/files/topic/OpCert/StudyGuidePonds.pdf

This document is intended solely as guidance and does not contain any mandatory requirements except where requirements found in statute or administrative rule are referenced. Any regulatory decisions made by the Department of Natural Resources in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts.

This resource was developed in collaboration with EPA's Office of Wastewater Management.
Find more resources at www.epa.gov/lagoons.

EPA United States Environmental Protection Agency