1. Primary Causes of Taste and Odor Problems

A. Algal Blooms (Especially Cyanobacteria)

- Warm water, sunlight, and excess nutrients (nitrogen and phosphorus) promote algal growth.
- Certain algae and cyanobacteria release **geosmin** and **2-methylisoborneol (MIB)**—harmless but very potent odor compounds.
- These produce:
  - "Earthy" or "musty" smells
  - Bitter or muddy taste
- Even at extremely low concentrations (parts per trillion), humans can detect them.

B. Seasonal Lake Turnover

- In fall and spring, water layers mix, stirring up sediments and organic matter.
- This may introduce:
  - Metallic or stale tastes
  - Musty or muddy odors

C. Decaying Organic Material

- Leaves, aquatic vegetation, and other organic debris decompose in the reservoir.
- Breakdown products can react with chlorine during treatment, creating taste-altering byproducts.

2. Issues Created for Municipal Systems

A. Treatment Challenges

Municipal systems relying on Lake Hartwell may struggle because:

- **Conventional treatment (coagulation, sedimentation, filtration)** does not remove geosmin or MIB effectively.
- Higher chemical doses—activated carbon, oxidants, or specialized filters—may be required.
- Treatment becomes more expensive and more variable throughout the year.

B. Disinfection Byproducts

- When organic-rich lake water mixes with chlorine, it can form **trihalomethanes (THMs)** and **haloacetic acids (HAAs)**.
- Utilities must balance:
  - Maintaining proper chlorine levels
  - Avoiding excessive byproduct formation

Taste or odor issues often indicate higher organic load, which increases the risk of these byproducts forming.

C. Customer Complaints and Public Perception

- Even if the water is **safe**, musty or earthy flavors lead consumers to believe the water is contaminated.
- This results in:
    - Loss of trust in municipal systems
    - More use of bottled water
    - Pressure on utilities to provide frequent public updates

3. Environmental Factors Unique to Lake Hartwell

A. Nutrient Runoff

Lake Hartwell receives runoff from:

- Agriculture
- Residential development
- Upstream wastewater discharges

This contributes to nutrient enrichment, fueling algal activity.

B. Warm Southeastern Climate

Long summers increase:

- Water temperature
- Algal growth cycles
- MIB/geosmin production

C. Hydrologic Variability

Droughts and heavy rains can both worsen taste and odor:

- **Drought** → lower water volume → concentrated nutrients
- **Heavy rain** → storm runoff carrying organic matter

4. What Utilities Commonly Do to Control Taste & Odor

A. Granular or Powdered Activated Carbon (GAC/PAC)

- Adsorbs MIB and geosmin
- Effective but costly, especially during bloom events

B. Ozonation or Advanced Oxidation

- Breaks down odor compounds
- Complex and energy-intensive

C. Source Management

- Algae monitoring
- Nutrient reduction programs
- Managing upstream pollution inputs

D. Optimizing Reservoir Withdrawals

If utilities have multi-level intakes, they may pull water from deeper or shallower layers depending on conditions.

5. Key Takeaways

- Taste and odor issues in Lake Hartwell water are generally caused by **natural organic compounds**, not harmful toxins.
- These problems are largely seasonal and influenced by algae growth and lake turnover.
- Though unpleasant, they usually **do not pose a health risk**.
- Municipal systems must adapt treatment strategies—sometimes significantly—to maintain water quality and reassure the public.