



WATER

QUALITY SERIES

Wastewater Pond Operation, Maintenance, and Repair

Wastewater ponds, or lagoons, are common for treating and disposing wastewater from individual homes. The homeowner, occupant, or service provider is responsible for day-to-day operation, maintenance, and repairs of wastewater ponds. This bulletin is a guide for doing these tasks.

Operation

Operating a pond includes tasks done at least monthly and more frequently some times of the year. The operator should make a monthly operation assessment of the following items.

Control vegetation. Vegetation on pond embankments should be healthy, vigorous, perennial grass. Inside the fence and embankment, grass should not be taller than 6 inches. Tall vegetation drapes into the water and restricts airflow. Evaluate and adjust the mowing schedule to meet the 6-inch-maximum goal. Outside the embankment, the perennial grass should be healthy and vigorous for protection, but a limitation on height is not so important.

Observe and record water color. The water's color is directly related to pH and dissolved oxygen and is a good indication of the pond's health. Table 1 lists water colors and corresponding interpretations. A change to a less-desirable color has a cause and may require correction. Record water color on a chart with water depth.

Observe and record water level. The pond should be equipped with a post having markings to check water depth. Record depth at the same time each month in order to monitor changes. This provides information for normal operation of the pond, for changes and trends, and provides a record in case of a problem. Records should be maintained for at least 5 years showing water levels and the dates measured.

Adjust supplemental water. Wastewater ponds sometimes need added water to maintain the minimum 3-foot depth. The method for adding water must be controllable. During periods of high rainfall or when approaching the 5-foot maximum depth, supplemental water is shut off or diverted. The best pond depth is 3 to 5 feet. A 2-foot distance, or freeboard, above the 5-foot depth to the top of the berm is essential to contain a large rain.

Check for problems and needed repair. Warning signs include odor, profuse algae bloom, and high water levels. These problems may be caused by excess sludge accumulation, but there are other causes. The monthly operation assessment must include watching for needed repairs.

Maintenance

Maintenance includes items done on a routine schedule: annually, seasonally, monthly, or another schedule.

Caution: always be careful to minimize exposure to wastewater by wearing protective clothing and waterproof gloves. After working with wastewater, thoroughly wash hands or shower and disinfect any breaks in skin.

Mow vegetation. The top and waterside of the embankment should be mowed to keep grass shorter than 6 inches. Cut to 3 inches often enough so no more than half of the growth is removed at each mowing. Mow cool-season grasses like fescue every 2 weeks in cool months and monthly when it is hot. Mow so clippings discharge away from the water. Total removal of clippings is a good option.

Outside the embankment, mowing should be planned to stimulate a dense, healthy grass cover. Mow cool-season grasses in early May and mid-June. Mow warm-season types (native species) in early July and mid-August.

Burn all areas as needed to control accumulation of residue, usually every 3 or 4 years for warm-season grasses and 5 or 6 years for cool-season grasses. Burn when new growth is just beginning. Always follow safety precautions.

Control rooted plants in water. The pond should be free of rooted vegetation to help avoid mosquitos, aquatic animals, and sludge accumulation. A minimum water depth of 3 feet helps prevent rooted plants from growing.

Rooted plants along the edges may be controlled in two ways. First, dig them up or pull them out. This works best when plants first get started. After plants become established, this is a formidable task.

Table 1. Color as an Indicator of Pond Condition

COLOR	CONDITIONS	SYMPTOM OR CAUSE
Dark sparkling green	Good	pH and dissolved oxygen (DO) ideal.
Dull green to yellow	Not so good	DO and pH are dropping. Blue-green algae type becoming predominant.
Gray to black	Very bad	Pond is septic. Anaerobic conditions prevail.
Tan to brown	OK if brown algae (not found in Kansas)	Not good in Kansas, means erosion or inflow of surface water.

Second, use herbicides labeled for target plants that protect algae. Apply with "wick" directly to plants. Broadcast spraying risks getting chemicals in the water, requires more product, and should be used only after careful evaluation.

Control floating plants. Sunlight must penetrate the water to reach dispersed, single-cell algae. Algae produce oxygen essential for bacteria to make ponds function well. Anytime floating plants like water lilies, duck weed, or "moss" intercept light, dispersed algae don't thrive, and the pond can begin to smell due to lack of oxygen.

Floating plants can be physically removed or controlled with herbicides. Always act when plants first appear. Select a herbicide for the specific plants to be controlled that does not harm single-cell algae or the environment. Control with herbicides adds organic load, which may cause odor.

Check fence and gate. Check the fence and gate at least yearly to be sure it is in good repair. There should not be any holes or gaps greater than 2 inches at the bottom of the fence or around the gate. Look for sags, damage, or holes larger than 8 square inches. The fence must keep children and animals out of the pond area.

Check sludge. For best pond performance, maintain at least 18 inches of water above the sludge. Measure the sludge accumulation at the same point at least yearly, preferably near the center of the pond. A stick with a towel wrapped tightly around it is lowered into the water, and the water level marked. After a few minutes, pull the stick out slowly. Solids clinging to the towel show the sludge level. Measure the distance from the surface mark to the sludge solids, record the result, and compare with previous levels.

Remove trees and woody plants. Trim or remove trees shading the pond's east, south, and west sides. Sunlight must reach the pond surface throughout the year, and wind must move freely across the surface. Photosynthesis by algae and air exchange at the water surface are the only ways oxygen enters water. Remove all trees within 30 feet and shrubs within 15 feet of the embankment to keep roots out of the berm. Keep tree leaves out of the pond because they add biomass and sludge.

Repairs

Repairs are unscheduled work that must be done soon to prevent damage, malfunction, or possible failure of the pond.

Repair fence and gate. The fence should not be more than 2 inches from the ground with barbed wire at the bottom. If large animals are around, two strands of barbed wire should top the fence to discourage them from reaching over it. Holes in the fence or gate must be repaired so animals and children cannot get through. Make sure the gate fits well, closes the opening when shut, and opens easily. Check that hinges are secure and locking prevents unauthorized entry.

Repair leaks or seeps. The embankment may leak because of construction or damage from vegetation or animals. Any leakage must be corrected through repair of the embankment and sealing the inside surface of the pond. KDHE guidelines specify ponds should leak no more than 1/4 inch per day. Leakage can be controlled by compaction, bentonite clay, or correct soil amendment additives.

Fill erosion and reseed. The embankment must be maintained at the original top-height elevation and surface shape. Any time there is erosion or damage to the embankment, the affected area must be filled, compacted, leveled, and reseeded to a perennial grass. Mulching helps control erosion until vegetation is established. Repeated seeding may be required, unless the area is watered, to ensure a good grass cover.

Emergency dewatering. Under normal operation and weather conditions, a pond's water depth should not exceed 5 feet. Sometimes short-term conditions, such as extra water use or a long wet spell, may result in excess water. When a pond has too much water, pumping the excess to an on-site, grassed area without runoff may be an option, but it must be approved by the local health department. People and animals should be kept out of the area where wastewater is applied until the ground is dry (at least 72 hours).

If dewatering is required more than once in several years, the cause needs to be evaluated. If wastewater production has increased, a pond may need to be enlarged, reconstructed, or a second cell added.

Ponds must not have discharge lines or indiscriminate overflow. A NPDES permit from KDHE is required for discharging ponds.

Remove sludge. There is disagreement about the best method to handle sludge accumulation. If there is access to livestock-waste-handling equipment, pumping a few loads of sludge off the bottom every few years may be a good option. This controls sludge accumulation and delays rebuilding or completely cleaning the pond. Having a septage hauler do the same is possible but expensive. Requirements for proper sludge disposal are found in the EPA's 40 CFR Part 503, covering allowable techniques and required record keeping. Check requirements of the county permitting agency.

When a pond is full of sludge, cleanout is expensive. If space is available, it is considerably cheaper and easier to rebuild than to clean a pond and haul the sludge away.

Other Sources of Information

Details for those who design and construct ponds are in the companion bulletin *Wastewater Pond Design and Construction*, MF-1044. Several Extension bulletins are available for details about grass management, aquatic weed control, fences, and other onsite wastewater components. Check with the local Extension or health office.

G. Morgan Powell

Extension Natural Resources Engineer

Barbara Dallemand

Extension Assistant Specialist, Onsite Wastewater

Ann Mayo

Lyon County Sanitarian

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

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