



Closure of Drinking Water Filter Backwash Lagoons

Water Protection Program fact sheet
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Introduction

Filter backwash lagoons are holding areas for sludge waste created during the drinking water treatment process and are generally permitted by the Missouri Department of Natural Resources under Missouri permit MO-G64. When a water system plans to close a filter backwash lagoon, it is required to submit to the department a closure plan for approval prior to initiating closure activities. The closure plan should detail how the water system plans to dewater the lagoon, remove and dispose of sludge and demolish the lagoon structure.

In accordance with 10 CSR 20-6.010(12)(A), persons who cease operation or plan to cease operation of waste, wastewater and sludge handling and treatment facilities shall close the facilities in accordance with a closure plan approved by the department.

Closure plan activities should be completed to prevent any unlawful pollutants from entering waters of the state and it should create a permanent record of the date and time, volume and methods of removal and disposal of such substances maintained by the water system. Before the permit can be terminated, closure is usually conducted in three phases:

1. Lagoon Dewatering
2. Sludge Disposal
3. Demolition of the lagoon structure

This fact sheet outlines the elements of the closure plan to be submitted to the department.

Absolutely no closure activities, including draining, dismantling or construction, can begin before the closure plan is approved and required permits are issued.

Technical Requirements

Lagoon Dewatering

The wastewater may be discharged through the permitted outfall pipe of the lagoon, in accordance with permit conditions and effluent limitations. Monitoring of the effluent's permitted parameters should be done at a minimum of once per day during the dewatering phase to ensure permit limits are being met. Great care should be taken by the operator to cease discharge before reaching the sludge blanket, so that no sludge is released to the receiving waters. The remaining residuals may be left inside the basin for drying, or could be placed in a water-tight roll-off container or open top tank. Under no circumstances should residual sludge be removed from the permitted basin and placed directly on the ground for drying.

If wastewater is to be removed from the basin, three options are available for dewatering:

1. Discharge to the sanitary sewer system of a permitted wastewater treatment facility (upon approval of continuing authority).
2. Discharge to a receiving stream in accordance with a MO-G640000 permit.
3. Irrigation onto approved land application (see irrigation requirements below for further details). If discharging from permitted outfalls, be sure not to discharge any solids into the receiving stream. If minimal or no wastewater is to be removed from the basin, mix the wastewater with sludge to be removed. This should be completed prior to sampling and testing for the analytes in Table 1: Sampling Requirements.

Irrigation requirements

A separate permit is not required for irrigation of overlying lagoon water. Prior to application, the permittee must obtain approval of the method and location of the application. The irrigation plan should be included with the closure plan for the facility and the following minimum restrictions must be included:

1. Irrigation shall not occur within 1,000 feet of biocriteria reference streams, or streams or lakes listed as an outstanding national resource water* or their tributaries; 300 feet of a sinkhole, wetland, or losing stream*; 100 feet from a well or waters of the state; 150 feet from dwellings; and 50 feet from the property line or drainage ditch.

* Identified or described in 10 CSR 20, Chapter 7. These regulations are available at many libraries and online at sos.mo.gov/adrules/csr/current/10csr/10c20-7a.pdf.

2. Irrigation shall not occur on field slopes exceeding 20 percent.
3. Irrigation shall not occur during frozen, snow covered, or saturated soil conditions.
4. Irrigation may not occur at night.
5. Irrigation rates shall not cause surface ponding or runoff from the application site.
6. The water shall be applied using equipment that can spread it uniformly over the entire application site.
7. The Irrigation site should be well vegetated during application.

Sludge Disposal

Several options are available for disposal of the sludge. Residual sludge may be removed from the basin and taken to a permitted wastewater treatment facility or sanitary landfill, or land applied. Only after the material testing results are available can land application of the sludge or leaving material in place inside the basin be considered. Land application of sludge must be done in accordance with the conditions of the permit, at agronomic rates, using appropriate best management practices as needed.

Backwash basin sludge may be hauled to a sanitary landfill, land applied, left in place or directed through the wastewater treatment facility.

For sludge land applied, the operator or engineer must meet agronomic loading rates (see guidance calculations to determine loading rates). Land application shall not exceed the most restrictive of the following criteria:

1. Less than 3,000 pounds of nitrogen per acre.
2. Effective Neutralizing Material (ENM) amount to raise soil pH per soil test recommendations for crop needs.
3. Metal limitations in the University Extension publication WQ 425, Tables 3 and 4.
4. Pesticide amounts not to exceed 10 percent of the application rate on the pesticide label.
5. No more than 4,000 pounds of cumulative aluminum per acre.

For sludge left in place and incorporated into the lagoon berms the operator/engineer must meet agronomic loading rates (see guidance calculations on page 1 to determine loading rates). Sludge must be mixed with native soil at a ratio of no less than 1:1 sludge to soil and shall not exceed the most restrictive of the following criteria:

1. Less than 3,000 pounds of nitrogen per acre.
2. Effective Neutralizing Material amount to raise soil pH per soil test recommendations for crop needs.
3. Metal limitations in the University Extension publication WQ 425, Tables 3 and 4.
4. Pesticide amounts not to exceed 10 percent of the application rate on the pesticide label.
5. No more than 4,000 pounds of cumulative aluminum per acre.

First, quantification of sludge in the backwash basin is required. To do this the surface area of the basins or area of land application (acres), total sludge volume (gallons), and total weight of wet sludge (tons) must be calculated. Total sludge volume is found by using the current operating sludge depth. A composite sample of sludge must be collected to determine the percentage of solids, which is necessary to calculate total dry weight of backwash basin sludge. The recommended method for composite sampling is to collect and combine seven to 20 individual grab samples of the same volume. The samples should be collected during the same week and from various locations in the sludge layer of the lagoon so as to obtain a composite sample representative of the contents of the entire lagoon. Composite sludge and soil samples shall be tested for the nutrients, metals and other parameters as listed in Table 1 below if the sludge is to be left in-place or land applied. The result of the sludge and soil analyses will be used to determine agronomic loading rates. The following calculations may be used as guidance in quantifying backwash basin sludge and analytes:

$\text{Weight of Sludge (tons)} \times \frac{\% \text{ Solids}}{100} = \text{Total dry weight of sludge (tons)}$
$\frac{\text{Total dry weight of sludge (tons)}}{\text{Applied surface area (acres)}} = \frac{\text{Total dry tons}}{\text{acre}}$
$\frac{\text{Analyte (mg/kg)}}{453,592 \text{ (mg/kg)}} \times 907 \text{ (kg/ton)} = \text{Loading (lb/ton)}$
$\frac{\text{Total dry tons}}{\text{Acres}} \times \text{Loading (lb/ton)} = \text{Total Loading (lbs/acre)}$

Table 1: Sampling Requirements

Sludge and Soil Testing Requirements					
Sludge			Soil		
Nutrients	Metals	Other	Nutrients	Metals	Other
TKN	Aluminum (Al)	ENM (Lime Sludge)	Phosphorus (P)	Aluminum, (Al) (if AL used in treatment)	pH (salt test)
Phosphorus (P)	Arsenic (As)	Pesticides (if present in raw water supply)	Potassium, (K)		CEC (Cation Exchange Capacity)
Potassium (K)	Cadmium (Cd)				
	Chromium (Cr)				
	Copper (Cu)				
	Lead (Pb)				
	Mercury (Hg)				
	Molybdenum (Mo)				
	Nickel (Ni)				
	Selenium (Se)				
	Zinc (Zn)				

Sludges to be land applied shall be tested at least once per year during land application periods for the above nutrients and metals, excluding phosphorus, potassium and pesticides (unless found in raw water supply). In addition, any lime sludge to be land applied shall be tested at least once per year, prior to or during land application periods, for ENM per MU guide G9102 and G9107, published by the University of Missouri Extension. WQ 426: Best Management Practices for Biosolids Land Application also includes land application restrictions.

Permit Requirements

Land disturbance permits – If closure activities related to the demolition of the lagoon or other facility structures will result in a land disturbance of one or more acres, a Land disturbance permit (MO-RA00000) must be obtain prior to the commencement of work. Land disturbances include, not only clearing, grubbing, excavating, and grading that result in the destruction of the root zone, but also any other incidental root zone destruction caused by heavy equipment, staging areas, and stockpile areas. Sites where less than one cumulative acre of land is disturbed are exempt from permit requirements; however, narrative and numeric water quality criteria must still be met during all phases of the project.

Demolition of the Lagoon Structure

After the required amount of residual sludge is removed from the basin, the remaining sludge should be incorporated into the soil evenly as the berms are pushed inward to prevent release of any of the sludge material outside of the working area. The area should be graded so stormwater drains away from the site, preventing pooling. After grading is complete, the area should be seeded with native grasses. Vegetation must be established on the site before the work can be considered complete and the permit can be terminated.

Completion of Work and Termination of Permit

After the approved closure plan has been fully executed, the disturbed site graded, and a minimum of 70 percent vegetative density established on the entire site, the MO-G640000 permit must be terminated. The permittee must complete a *Form H – Application for Termination of a General Permit* and submit it to the appropriate Department of Natural Resources regional office. The Form H must be submitted with an original wet-ink signature of a city official or corporate executive having responsibility for environmental matters at the facility. If a land disturbance permit was obtained for demolition of the lagoon or other facility structures, it must also be terminated. The same requirements for vegetative density as above also apply to the termination of a land disturbance permit.

Until a MO-G640000 or Land Disturbance Permit has been officially terminated in the department's permits database and until the permittee has received written notification the permit has been terminated, all applicable permit conditions and reporting requirements must continue to be complied with by the permittee.

- MO-G640000 permits – Quarterly discharge monitoring reports must be submitted by the due date. If the discharge from the lagoon was eliminated before the beginning of the quarter, these reports must state “no-discharge” for the quarter. Annual sludge and land application reports, due by Jan. 28 each year, must also continue to be submitted until notification of permit termination has been received. Annual operating fees, billed by the Department of Natural Resources, must also be paid in full before a permit can be terminated. Failure to submit any required reports will result in a letter of warning, at the minimum, and failure to pay annual operating fees will prevent permit termination.
- Land disturbance permits – Site inspections, including assessment of best management practices and examination of outfalls and the receiving stream, followed by a brief written report, must be conducted at least every seven days at areas where there are unstabilized disturbances. After an area is stabilized, inspections and reports must be completed once per month. These reports do not need to be submitted to the department but must be kept on file for inspection upon request.
- Land disturbance site inspections must be conducted and all records must be kept until official notification of permit termination has been received by the permittee. Failure to conduct inspections and maintain records is a violation of the permit.

Guidance and Assistance

For assistance, contact the Missouri Department of Natural Resources' Water Protection Program at 573-751-1300 or your local regional office.

Kansas City Regional Office 816-251-0700
Northeast Regional Office 660-385-8000
St. Louis Regional Office 314-416-2960
Southeast Regional Office 573-840-9750
Southwest Regional Office 417-891-4300

For More Information

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