

**OPERATION and MAINTENANCE PLAN**  
 USDA - NATURAL RESOURCES CONSERVATION SERVICE

**DENITRIFYING BIOREACTOR (Code 605)**

Landowner/Operator: \_\_\_\_\_ Program: \_\_\_\_\_

Location: Section \_\_\_\_ T \_\_\_\_ N R \_\_\_\_\_ Prepared By: \_\_\_\_\_ Date: \_\_\_\_\_

County: \_\_\_\_\_ Reviewed with Landowner/Operator By: \_\_\_\_\_ Date: \_\_\_\_\_

A properly operated and maintained Denitrifying Bioreactor is an asset to your farm. Properly operated and maintained, it will reduce nitrate-nitrogen levels in the drainage water leaving the bioreactor and benefit downstream water users.

You must operate and maintain this practice for at least \_\_\_\_\_ years to meet NRCS or other program requirements. The life of this installation can be assured and usually increased by following this operation and maintenance plan.

The following information is important for operating and maintaining your bioreactor and monitoring its performance. The elevations are referenced to the benchmark used during installation and documented on your engineering plans. The weir elevation or setting refers to the top of the stop boards in the water control structure (WCS). Head is the difference in elevation between the water surface at the inlet and the outlet.

**Bioreactor ID:** \_\_\_\_\_ **Design Data**

Design bioreactor flow rate: \_\_\_\_\_ cfs Design Head: \_\_\_\_\_ feet

Subsurface drain (tile) grade: \_\_\_\_\_ %

**As-built Data**

Inlet WCS Rim Elevation \_\_\_\_\_ Outlet WCS Rim Elevation \_\_\_\_\_  
 Inlet WCS Flow Line Elevation \_\_\_\_\_ Outlet WCS Flow Line Elevation \_\_\_\_\_  
 Bioreactor Inlet Elevation \_\_\_\_\_ Bioreactor Outlet Elevation \_\_\_\_\_

**Operating Settings**

The planned stop board (weir) settings for the inlet and outlet water control structures are shown in Table 1. Typically, if the higher water table resulting from the inlet water control structure will not impact cropland, the inlet weir setting will not have to be adjusted during the year.

The weir settings can be adjusted based on the actual performance of your bioreactor and weather conditions. It is important to maximize flow through the bioreactor by maintaining the stop boards on the inlet water control structure at the planned setting or higher. Lower the stop boards only if needed to improve drainage for field work or crop performance and raise them as soon as practicable when the need has passed.

**Table 1. Operating settings for a Denitrifying Bioreactor for Spring-planted annual crops**

Condition	Initial Settings (feet-inches below rim)		Revised Settings (feet-inches below rim)	
	Inlet WCS Weir	Outlet WCS Weir	Inlet WCS Weir	Outlet WCS Weir
Fallow				
Spring Field Work				
Growing season				
Fall Field Work				

## Operation and Maintenance

The following tasks are required to properly operate and maintain this practice to obtain good performance:

1. Maintain records of water control structure weir settings and water level elevations entering and leaving the bioreactor, as well as rainfall, if available, using the attached data form or equivalent. The data should be collected each time you visit the site but at least biweekly from March 1 to November 30. If flow stops, there is no need to visit the site until flow resumes. This information will be important in documenting the operation of this installation and adjusting the weir settings to optimize performance. Provide a copy to NRCS annually, if requested, to assist in the evaluation of this conservation practice. Information obtained by NRCS will not be reported to anyone without the owner's written permission except in a form where the location or owner cannot be identified. Since the Denitrifying Bioreactor is a new conservation practice, this information may help optimize design and performance parameters.
2. Obtain at least one set of water samples (inlet and outlet) suitable for testing for nitrate-nitrogen annually for the first three years of operation. These samples should be collected during May-June when the bioreactor is operating with bypass flow, typically within 2 days of a large precipitation event. Testing for other contraminants is optional but highly desirable. Water quality test strips for nitrate are an inexpensive way to test nitrate levels, but laboratory testing is preferred. Consult with your NRCS or SWCD conservationist if you need assistance.
3. Inspect the water control structures and outlet pipe, if present, after major precipitation events and at least twice annually to identify repair and maintenance needs. Repair or replace components as needed to maintain proper function. The stop boards shall be protected from exposure to sunlight at all times and the gaskets replaced as needed to minimize leakage in the water control structure.
4. Inspect the drainage system connected to the bioreactor at least twice annually and promptly repair blowouts, damaged or missing surface inlets, etc., to avoid sediment and trash transport into the bioreactor. Remove debris and trash accumulated in the water control structures that might impair water flow.
5. Avoid damage to the bioreactor and water control structures by farm equipment. Mark the water control structures so they are visible to prevent damage by equipment. Fence the bioreactor foot print or mark with sentry posts which will be visible above the vegetation to avoid equipment travel over the bioreactor except as needed for maintenance.
6. Maintain the required depth of cover over all pipes and structures. Promptly repair any settlement or soil loss from erosion along drain pipes and structures.
7. Eradicate or otherwise remove all rodents or burrowing animals found near the bioreactor. Immediately repair any damage caused by their activity.
8. For a bioreactor designed with an open top, monitor the level of the wood chips and add more chips if they settle below the level of the ground surface.
9. For a bioreactor designed with a soil cap over the wood chip chamber, monitor to make sure that the soil over the wood chips does not settle below the level of the natural ground in the area. Make sure that the ground on top of the wood chips does not become ponded with water. Contact NRCS for assistance if settlement becomes a problem. More wood chips may need to be added, or additional soil.
10. Control tree and bush growth near the bioreactor by hand cutting, mowing, or application of approved herbicides.
11. Avoid using fire near components made of plastic.

## Additional Requirements



## Bioreactor Water Control Structure Record Sheet

Your Operation & Maintenance Plan describes the settings of the water control structures (WCS) for various conditions.

Please record the control board settings and water level each time you visit the site.

Performance of the bioreactor can be determined by testing water samples from the inlet and outlet. Testing at least once a year is recommended to monitor performance and results can be used to optimize weir settings for maximum performance.

Frequent observation and recording of water levels can provide insight into how your field and drainage system reacts to varying precipitation.