

# Minnesota Department of Health

Division of Environmental Health (651) 201-4700  
Drinking Water Protection Section  
625 North Robert Street  
P.O. Box 64975  
St. Paul, Minnesota 55164-0975



December 2005

## Plan Review Submittal for Nitrate Removal Anion Exchange System

Project Name \_\_\_\_\_

City/Township \_\_\_\_\_ County \_\_\_\_\_

Project Street Address \_\_\_\_\_

*If the street address is unknown, provide the distance and direction to the project from closest road intersection*

Public Water Supply I.D. Number \_\_\_\_\_ Unique Well Number \_\_\_\_\_

### Project Owner

Name \_\_\_\_\_ Phone ( ) \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

### Treatment System Designer

Name \_\_\_\_\_ Company/Firm \_\_\_\_\_ Phone ( ) \_\_\_\_\_

Address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

### The following information must be included with your plan submittal:

- Documentation that the owner: 1) has investigated options for an improved natural water source, including the feasibility of constructing a new well and why an improved source is not a viable solution to the nitrate issue, and 2) understands that they will have to enter into a compliance agreement which will include submitting records of at least daily monitoring of the nitrate concentration and submitting lab samples quarterly.

*(Submit documentation signed by the owner/operator with this form.)*

- A detailed drawing showing all system components, including: equipment, valves, sample taps, pipe materials and pipe sizes, fixtures served, and any other treatment - such as water softening. *(Submit with this form.)*
- Design criteria and calculations used to size the resin bed. *(Include with the drawing.)*
- Volume that can be treated prior to bed exhaustion. \_\_\_\_\_
- Method that will determine run length before resin bed regeneration. (Volume, gallons or time, days) \_\_\_\_\_
- Resin material: Product Manufacturer and Name \_\_\_\_\_ and Amount \_\_\_\_\_ (cu.ft.)
- Manufacturer and model of equipment, and listing of any NSF, UL, or other third party certifications.

• Flow Rates: Treatment \_\_\_\_\_ and Backwash \_\_\_\_\_

• Estimated peak daily water usage. \_\_\_\_\_

• Raw Water: Nitrates \_\_\_\_\_ (mg/l) Sulfates \_\_\_\_\_ (mg/l) Chloride \_\_\_\_\_ (mg/l)  
Iron \_\_\_\_\_ (mg/l) Manganese \_\_\_\_\_ (mg/l) Total Hardness \_\_\_\_\_ (mg/l)

\* See back for design and operation considerations to be addressed in the plan submittal.

## Prior Plan Review Required

This form provides information related to submitting plans for nitrate removal anion exchange systems to the Minnesota Department of Health for examination. Minnesota Rules, part 4720.0010, for water supply systems serving the public require that plans and specifications be submitted to the Minnesota Department of Health and be *approved prior to installation or alteration* of any water supply treatment system. The purpose of the plan review is to verify that the design complies with Minnesota rules and standards, and that no system is installed that may endanger public health.

**Penalties.** Please note that failure to comply with the plan approval requirement may result in administrative penalties, including monetary penalties.

## Design Considerations:

1. Unless at least two treatment units are provided, reserve treatment capacity is needed to prevent breakthrough. (Designs for systems which may have water use during regeneration must address untreated water bypass.)
2. The design capacity for nitrate and sulfate removal, expressed as  $\text{CaCO}_3$ , should not exceed 16,000 grains per cubic foot when the resin is regenerated with 10 pounds of salt per cubic foot, when operating at 2 to 3 GPM per cubic foot. If high chlorides or sulfates exist in the raw water, the exchange capacity of the resin should be reduced to account for this.
3. Regeneration should be based on the volume of water treated, and should occur automatically during the night.
4. The resins should be nitrate selective. If other resins are used, verify that resins will not cause "dumping" of nitrates into the treated water when the bed is exhausted, resulting in nitrate levels much higher than in the raw water.
5. A water meter should be installed on the influent side of the treatment equipment, and provision should be made to record the water used each day the system is operated for public use.
6. A sample tap is needed that will allow sampling of untreated water.
7. The backwash and regeneration water must discharge to the sanitary sewer. If discharge is to an on-site sewage treatment system, capacity must be verified.
8. The overflow line and backwash discharge line must discharge through an approved air gap.
9. Manual override of all automatic controls must be possible.
10. If some water bypasses treatment, a totaling meter and a proportioning, or regulating device, or flow regulating valves are needed.
11. Manufacturer's literature, operation and maintenance manual, and nitrate test kit are needed for the operator.

## Operational Considerations:

1. An equipment service contract should be provided.
2. Treatment equipment must be operated and maintained in accordance with the manufacturer's requirements and standard operating procedures.
3. Nitrate concentration in the treated water must be monitored daily, the results recorded, and a log of results maintained on the premises. A copy of the results must be sent to the Department monthly on a copy made from forms provided by the Department.