Z-XM™ NITRATE TREATMENT SYSTEM

TECHNICAL MEMO

Z-XM™ Nitrate Treatment System

Configuration: PES, Skid System or Fabricated

Flow Range: 10 GPM or greater

Drinking Water Limits

EPA MCL: 10 mg/L measured as nitrogen, 45 mg/L as NO_3

EPA Analytical Method: EPA 353.2, 354.1 or 300.0

Z-XM™ Features:

- Media is NSF Standard 61 certified for use in drinking water applications.
- Can be incorporated into a blended water treatment system.
- Concentrates and removes other anion contaminants such as arsenic, uranium, and selenium.
- WRT service components: brine disposal of uranium rich brines.

Application:

WRT's nitrate removal system consists of utilizing a regenerable ion exchange media. Currently the media, trade named Z-XM™ is a nitrate selective synthetic ion exchange flow-through media. The media is a specialized strong base anion exchange resin of styrene-divinylbenzene base structure. The media is contained in a screened pressure vessel wherein untreated water is pumped down flow packed bed through the vessel for the service period. Following the recommended service interval measured in volume throughput, the pressure vessel is placed in a batch regeneration mode. Regeneration consists of contact with a calculated volume of concentrated sodium chloride brine for a specified time period. After a brief rinse period, the vessel is placed back into service. Waste brine containing nitrate contaminant is either collected for disposal or directed to a suitable wastewater discharge hub / sewer.

The WRT Z-XM™ nitrate removal process can be modified for reduced brine consumption and waste reduction using brine recycle and short rinse techniques depending upon the nitrate treatment objectives and starting nitrate concentrations.

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WRT Nitrate Removal Outline

- Configuration: Down flow packed bed contained within screened pressure vessels.
- Service duration: Dependent upon nitrate concentration and acceptable regeneration frequency. Typically 24 to 168 hours.
- Service Flow Rates 2 to 4 gpm per sq.ft.
- Recommended Resin Bed Depth: 36 inches, two vessels in series, lead – lag configuration.
- Backwash Expansion: 50 to 75% or around 1.5 to 2.0 gpm per sq.ft., which is very water temperature dependent.
- Regeneration Flow/Concentration: 0.25 to 1.0 gpm per sq.ft. @ 2 – 4% brine
- Pound of NaCl per Regeneration: 2 to 15 lbs. per cu.ft.
- Displacement Rinse Rate: Same as regeneration flow rate, 10 to 15 gals.per cu.ft.
- Fast Rinse Rate: Same as service flow rate, 30 to 60 gals. per cu.ft.
- Nitrate concentration range: Up to 500 mg/L. Other technologies may be better suited for nitrate concentrations in excess of 500 mg/L.
- Regeneration chemicals required: Concentrated sodium chloride brine.
- Pretreatment required: Prefiltration to less than 5 NTU TSS
- Operator requirements: On-site supervision during regeneration operations. Brine or dry salt delivery supervision.
- System operating effectiveness: Nitrate >200 mg/L
- System Limitations: Sulfate percent of anions >60 percent
- Residuals disposal: Collected for disposal, or discharged to a suitable wastewater hub, or sanitary sewer

Water quality data required in order to evaluate application:

- For budget cost estimate and evaluation: TDS, TSS (NTU), alkalinity, pH, sulfate, hardness, TOC, iron and silica.

Pilot Study Information

- Pilot testing on-site at well source using portable or trailer mounted pilot equipment.
- Unit includes 2-column filter unit, 6-inch diameter sized for 1.5 gpm.
- Typical duration: 5 days using on-site analytical testing. Third party analytical sampling can be provided.
- Pilot study description details and template available on the Marketing “Forms” folder.
- Pilot study equipment is currently available for installation.
- See Pilot Study Analytical Cost Estimate bulletin.

Nitrate Media Details

- Nitrate selective monovalent ion preferential strong base anion exchange resin.
- Supplied in chloride form.
  - Density: 42 lbs./cu. ft.
  - NSF Std. 61 certified.
- Can operate well in the presence of high sulfate concentrationsto 60% of anion load with minimal effect on nitrate capacity. Capacity is between 7 to 12 Kgr/cu. ft. nitrate ion.Nitrate selective Monitors and documents discharge compliance
- Easily regenerated using chloride brine solutions 4 to 8 percent concentration.
- Operating parameters:
  - Service Flow rate: 2 to 4 gpm/cu. ft.
  - Minimum bed depth: 24 inches, recommended bed depth: 36 inches.
  - Regeneration rate: 2 to 15 lbs. dry salt/ cu. ft.
  - Rinse volume: dependent on application.