



## **NRU/SRU SYSTEMS FOR NITRATE / SULFATE REDUCTION**

Nitrate levels in excess of 45 mg/l as Nitrate or 10 mg/l expressed as Nitrogen-N can be a health issue when in drinking water. The source of nitrates in water is caused by the breakdown of nitrogen based fertilizers, animal waste and rotting vegetation by certain microorganisms in soil. Rain then transports the nitrates through the soil into ground water (wells) and into lakes and rivers (surface water). Once consumed, they change to nitrites which enter the bloodstream and reduce the oxygen carrying ability of the blood— a condition called methemoglobinemia. Most healthy adults have enzymes that repair this condition whereas infants, the elderly and people with compromised immune systems do not.

Drinking water with a sulfate level in excess of 250 mg/l may also cause a health issue. The source of sulfate in water is rain water that comes in contact with sulfate based minerals and rocks such as gypsum , Glauber's salt and Epsom Salt. Water with high levels of sulfate often has a medicinal taste causing humans and livestock to drink less water than they should and has a laxative effect that further dehydrates. At very high levels copper plumbing corrosion is common.

Both Nitrate and sulfate are negatively charged molecules as they exist in water and may be easily reduced to almost non-existence through the use of anion exchange resins. These resins are very similar to those used within water softeners. The completed units look exactly like a water softener. In applications where there is hardness in the water and there is no iron or manganese, we are able to put softening resin and the nitrate or sulfate resin in the same media tank. The economics of doing this is excellent—one piece of equipment rather than two and the same regeneration chemical (sodium chloride or potassium chloride) is used for both with the hardness exchanged for the sodium or potassium and the nitrate or sulfate exchanged for the chloride. Further, we balance the resin quantity of each to minimize equipment cost and more effectively use the regeneration chemical.

Because health issues are involved, it is imperative that each system is built to address the chemistry of the raw water. A one size fits all simply doesn't work. Additionally we insist on putting a meter on all units. As a final safety step we employ resins that have superior holding ability for either nitrate or sulfate so that there will never be "dumping" of these compounds into the treated water stream even if they are run beyond their capacity.

Systems are available in single media tank where there is a 2 hour period every few days at time when it is anticipated that there will be no water use (see right side photo) or a twin media tank system that will provide 24/7 treated water with no untreated water possible. Sizes range in flow rates from those for home to 100's of gallons per minute for hotels, restaurants, apartment buildings, etc.

Because each system is tailored to the application, pricing can be quoted only after a water analysis is provided and a design calculated.