

Enhanced Nutrient Removal (ENR) Technologies



OUR MISSION

ENR's mission is to provide sustainable, cost-effective, and environment-friendly nutrient removal solutions for wastewater streams. Whether there is an existing plant struggling to meet limits or a proposed plant in a sensitive location with stringent limits, we promote the best solution for our client.

OUR FILTER

Our Patented Upflow Filter is an engineered solution that meets low Total Nitrogen (TN) requirements for a variety of wastewater applications. Our proprietary "Denite" filter has been developed, tested, and operated to meet our client's need for an economical and environmentally sustainable nitrogen removal solution.

- **Chemical free** – No chemical additives required
- **Passive System** – No moving parts, minimal energy and maintenance requirements
- **Economical** – Low capital and life cycle cost

DENITRIFICATION

$\text{NO}_3 + \text{Organic Matter} \rightarrow \text{N}_2 + \text{CO}_2 + \text{OH} + \text{H}_2\text{O}$

Typical wastewater streams contain organic nitrogen and ammonia. A well-designed, properly operating wastewater treatment system will convert most of the total nitrogen into nitrate. Many systems are capable of denitrifying a portion of the nitrate, but remaining levels are often too high to meet a limit of 10 mg/L (drinking water standard) or less of TN. In certain sensitive locations even lower limits are required to protect surface or ground water sources. In these applications our Denite filter is used to reduce the remaining nitrate, achieving up to 99% nitrate removal.

The ENR Denite filter uses a wood-based media as a carbon source and creates an anoxic environment that causes heterotrophic bacteria to use the oxygen molecules from the nitrate (NO_3) to consume the carbon. Nitrogen gas is then released into the atmosphere. This completes the nitrogen cycle, removing it from the waste-stream.

FILTER DESCRIPTION

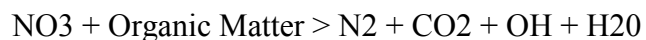
The ENR denitrification process was developed as an engineered solution for reducing total nitrogen (TN) in nitrate laden effluent from primary aerobic wastewater treatment systems. By integrating our single pass de-nitrification filter containing a carbon reactive media into a wastewater treatment process where ammonia has been nitrified, the combined process is

capable of achieving an additional 75% reduction in TN beyond the reduction achieved by typical wastewater treatment plants. Overall, TN reductions of between 90 and 95 percent for the total treatment process can be expected given typical residential strength influent characteristics with sufficient alkalinity present.

Unlike conventional denitrification systems that require chemical carbon feed systems, the ENR denitrification system does not use chemicals. The ENR Denite system's operational cost is considerably less than conventional systems because it does not require additional controls, instrumentation and is less operator intense. The ENR Denite filter typically is delivered under pressure via a dosing system then following denitrification, the effluent is conveyed via gravity to a discharge tank.

Denitrification

When nitrite and ammonia have been fully nitrified in the primary treatment plant, the effluent is pumped to the denitrification filter. Under anoxic conditions, heterotrophic bacteria within the carbonaceous media contained in the denitrification filter use nitrate as an oxygen source to consume available free carbon and thereby convert the nitrate to nitrogen gas.



The de-nitrified treated effluent then gravity flows into an effluent dosing tank for disposal.

Integration of Filter

ENR has experience designing a denitrification filter to work in conjunction with an existing primary wastewater treatment plant as well as designing a complete new plant. In the case of existing plants, ENR is accustomed to working as a team with established engineers to provide the engineering necessary to implement the denitrification technology.

Site Configuration

The ENR Denitrification Filter can be installed at grade (shallow walled structure) or below grade, depending upon site requirements and layout. The choice in configuration provides the Owner with options for integrating the solution into their existing or future operations. The Denitrification Filter can also be installed in phases to accommodate future capacity needs.

Applications

Standard design criteria for residential strength waste are based on a final effluent of less than 5 mg/L. In commercial, industrial, or agricultural applications the systems are designed based on parameters given by our client or their engineers. Each system is engineered to be efficient and appropriate for the specific project's influent stream and target treatment levels.

PROJECTS

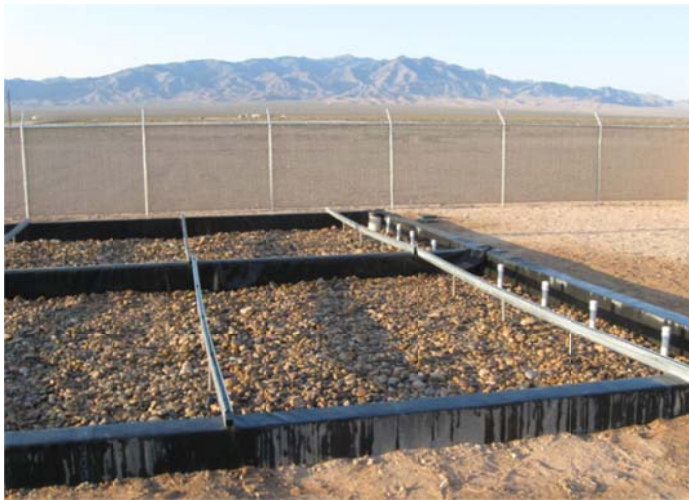
Commercial Applications

Shadow Ridge Subdivision

Design Flow: 30,000 gallons per day

Waste Type: Residential

The Denite system was designed to de-nitrify effluent from an Orenco AdvanTex primary treatment system. The treatment system is required to achieve less than 10 mg/l Total Nitrogen (TN) prior to discharge, The Shadow Ridge Subdivision is located in Mohave County, Arizona. The first phase of the subdivision includes 71 residential home sites. Each home will have it's own septic tank effluent pump system (STEP) which will remove solids from the waste stream and transport effluent via a small diameter collection system to a centralized treatment plant.



Encantado Resort

Design Flow: 20,000 gallons per day

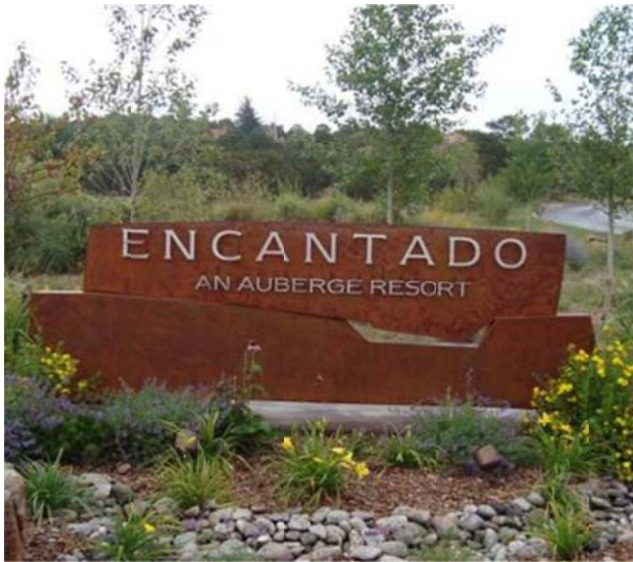
Waste Type: Resort with Restaurants and Spa

The IWS Denitrification Filter was first permitted and installed in Santa Fe County, New Mexico in August, 2008.

The New Mexico project consists of a wastewater treatment facility for a high-end resort. The system was designed for a maximum daily flow of 20,000 gpd and consists of 60,000 gallons of primary settling tankage followed by a recirculating packed media filter, a denitrification filter, a dose tank and subsurface disposal fields.

Since the start-up of the wastewater treatment system with denitrification filter, samples have been taken monthly by a certified operator. All analytical data submitted was tested by a New Mexico laboratory certified for analytical testing of wastewater and its constituents. All testing data was completed within required holding times and tested to EPA or other third party standards.

On average, total nitrogen removal for this system is 93%, with an average TN effluent concentration of 3.5 mg/L.



Seascape

Design Flow: 5,000 gpd

Waste Type: Restaurant and Comfort Station

The wastewater treatment system serves a restaurant, two cabins, and public restrooms on the pier. Treatment system includes a grease interceptor for kitchen flows, septic tanks, recirculation tank, Aerobic Treatment System, the ENR Denite Filter, and UV disinfection.



Residential

Single-Family Residence Polishing Filter

ENR Technologies has worked closely with Orenco Systems®, Inc. to provide a scaled unit for single family residences with flows up to 500 gallons per day. The Denite unit is a polishing filter designed to follow AdvanTex® or other aerobic-process nitrifying treatment systems to meet Total Nitrogen limits of less than 10 mg/L. The vessel receives nitrified effluent via pressure as in the commercial process. There are no moving parts or chemical additives, media life-span is estimated to be ten to twenty years depending on loading. The passive nature of the filter is ideal for the single family residence application.



CONTACT US

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