



biottta®
BIOTREATMENT
PACKAGED PLANTS



FOR MUNICIPAL DRINKING WATER

**AN ENVIRONMENTALLY-FRIENDLY SOLUTION
FOR THE REMOVAL OF INORGANIC AND ORGANIC
CONTAMINANTS FROM GROUNDWATER**



THE FUTURE OF DRINKING WATER TREATMENT IS HERE!

Groundwater is the primary water source for most communities in North America. With an increasing need to provide treatment for a growing list of contaminants, limited support staff, and shrinking operating budgets, water utilities face many hardships. Fortunately, biottta® leverages nature to offer an affordable and sustainable solution for wellhead treatment of inorganic and organic contaminants.

The fixed-bed, dual stage biotreatment solution cultivates a robust environment for microbiological organisms to destroy contaminants or reduce them to non-harmful forms. Developed specifically for drinking water applications, the fixed-bed treatment process consistently addresses contaminants at low levels, intermittent or continuous operation. The dual-bed design assimilates a complete packaged biotreatment plant with the dependability required for protecting public health.

Increasing demands for high quality drinking water results in the need for treatment technologies that are capable of meeting these demands in a cost-effective manner. Biological drinking water treatment is one technology that has the potential to address many of these needs. This technology is based on the ability of natural, harmless microorganisms to efficiently catalyze the biochemical oxidation or reduction of drinking water contaminants and produce biologically stable water.

Benefits of choosing biottta® include:

- > Multiple contaminant removal in a single integrated treatment process with proven performance;
- > Sustainable design resulting in low energy consumption and high water recovery rates;
- > The treatment process does not require extensive operator experience or attention;
- > No hazardous waste residual, concentrated waste, or brine discharge; process is environmentally friendly;
- > Low plant life cycle costs.



Example of a full scale demonstration plant.

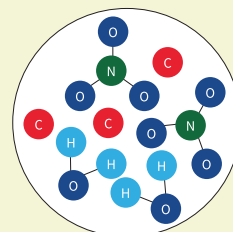


Example of a skid-mounted two stage treatment installation.

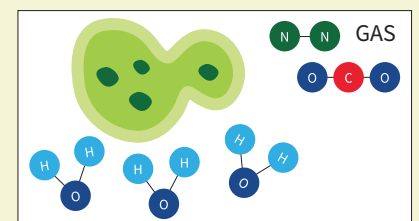
How biottta® works

Naturally – occurring treatment processes are accelerated in the bioreactor where microorganisms present in the raw water are given precise levels of food and nutrients to enhance their capabilities of removing contaminants. The vessels contain granular activated carbon which creates an ideal environment for the bacteria to reproduce and thrive. The microbes destroy the contaminants or reduce them to no harmful forms and the result is clean, safe drinking water.

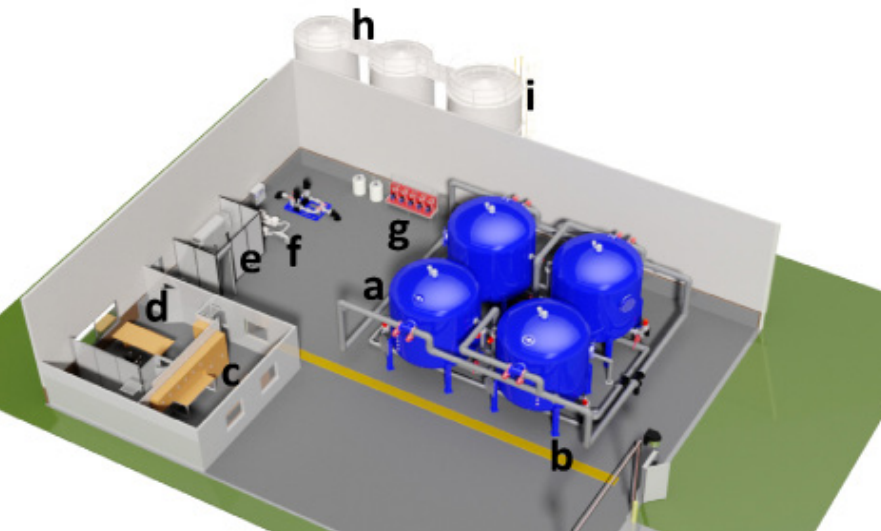
NITRATE WATER



RAW WATER



TREATED WATER



- a. anoxic Bioreactor
- b. aerobic Biofilter
- c. wet lab
- d. office
- e. motor control center
- f. blower and water pump
- g. chemical pumps
- h. bulk chemical storage
- i. water storage tanks

biottha® addresses a wide range of contaminants to below observable levels using the fixed bed treatment which fosters microbial specialization across a wide range of redox conditions. A few of the contaminants tested and addressed by biottha are listed in the table to the right.

Typical Drinking Water Treatment Results

Inorganics

Nitrate NO ₃	< 1 mg/L N
Perchlorate ClO ₄	< 0.2 µg/L
Hexavalent Chromium Cr VI	< 0.5 µg/L
Total Chromium Cr	< 5 µg/L

Volatile Organic Compounds

Dibromo Chloropropane (DBCP)	< 0.1 µg/L
Trichlorethylene (TCE)	< 0.1 µg/L
Tetrachlorethylene (PCE)	< 0.1 µg/L
Carbon Tetrachloride (CTET)	< 0.1 µg/L
1,1-Dichloroethene (1,1-DCE)	< 0.1 µg/L
1,2,3-Trichloropropane (1,2,3-TCP)	< 0.005 µg/L

Qualitative Characteristic

Turbidity	< 0.3 NTU
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Groundwater supplies requiring a few hundred thousand gallons per day to a few million gallons per day are addressed with the combination of model sizes and multiplying treatment trains.

The biottha® packaged plants are offered in three models: 8, 10, and 12 corresponding to the diameter of the vertical pressure vessels.

The biottha® 8 model is delivered on a pre-manufactured skid which includes process pipes, controls and instrumentation for reduced engineering and site integration.

The biottha® 10 and 12 models are delivered with less pre-manufactured equipment with the benefit of a reduced footprint for larger installations.

biottha® 8 Skid-Mounted Series

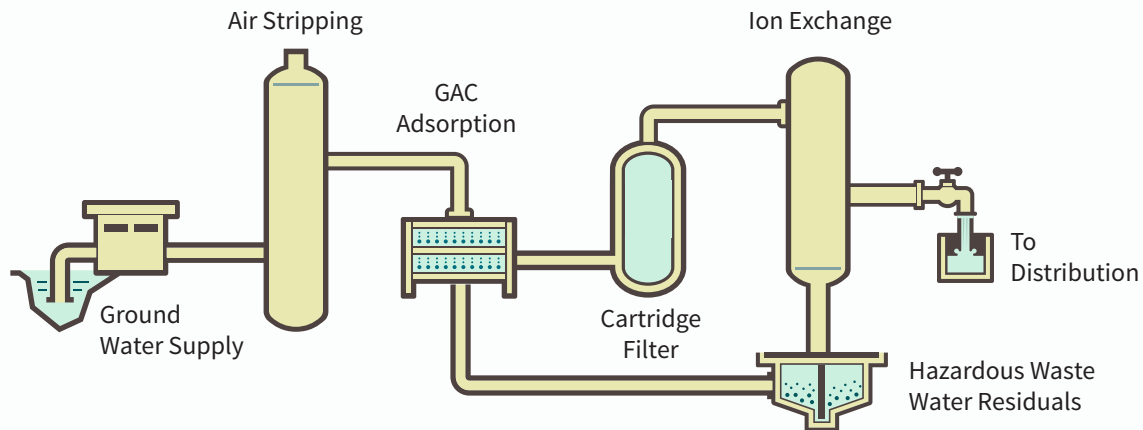
- Pre-engineered packaged plants
- Rapid installation with packaged skid equipment
- Multiplicity in plant design
- 90 point Factory Acceptance Test (FAT)

biottha® 10 and 12 Modular Series

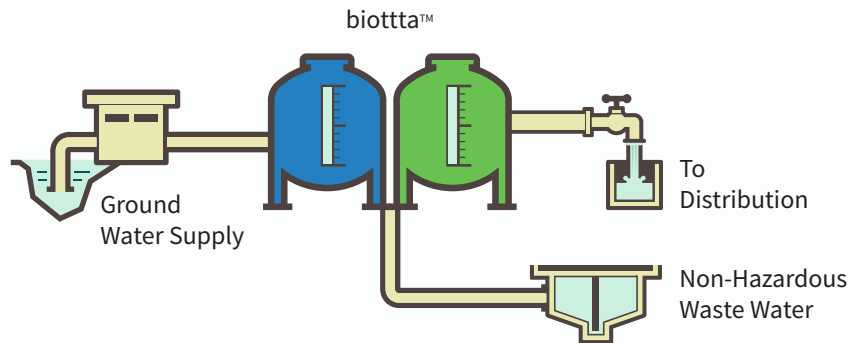
- Flexibility with site installation
- Advanced engineering
- Lowest equipment capital per gallon
- Compact footprint

TRADITIONAL GROUNDWATER TREATMENT VS. biotta®

Traditional Groundwater Treatment of Multiple Contaminants



biotta® Process for Multiple Contaminant Removal



Standard Features

- Remote operation, controls, and data management
- Positive feedback of process valves, water flow, and chemical delivery
- NSF International (NSF 61) components
- Underwriters Laboratory (UL) electrical control panel
- Air wash and scour
- Annual service agreement
- Performance guarantee
- Responsive delivery of nutrients

Optional Features

- Wastewater management system for up to 99.5% water recovery
- Waste wash water equalization tank
- Mechanical seismic calculations
- American Society of Mechanical Engineers (ASME) vessels
- Booster pump package
- Higher pressure rating options from 100 to 150 psi
- Exterior installation
- Plant operation or extended service agreement

biotta® is patented under U.S. Patent Nos. 9,580,341 and 9,856,160, with other patents pending.



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