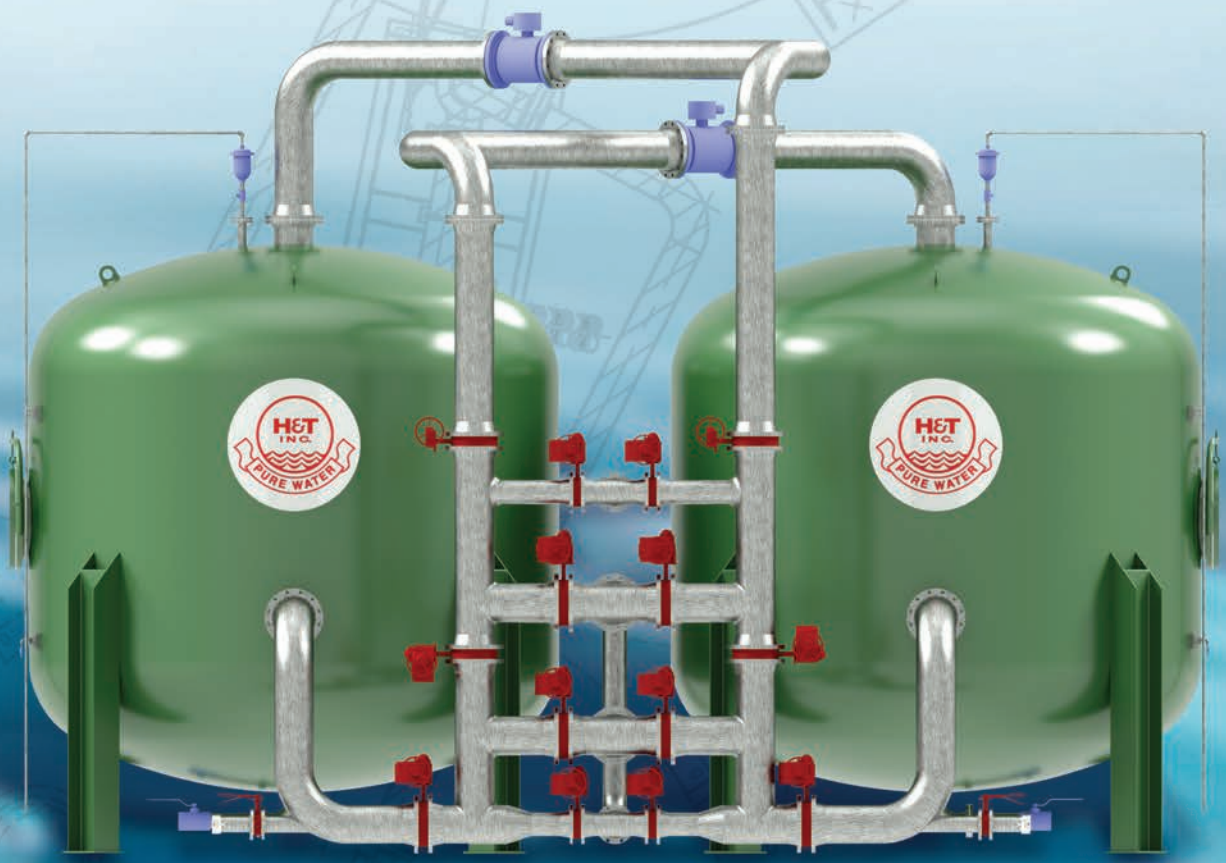
Hungerford & Terry

Perchlorate
Treatment Systems



H&T INC. PURE WATER

Recognized Internationally,
Engineered to Last a Lifetime

...For the Removal of Trace Levels of Perchlorate in Drinking Water

About Perchlorate...

Where does Perchlorate come from?

Perchlorate is commonly found in our world through advancements in technology. It can be found in many forms from solid fuel rocket engines, explosives, automobile airbag deployment initiators and emergency signal flares, to pyrotechnic fireworks displays, bleaching agents in the paper industry, dyes in the textile industry and the common match stick. Perchlorate can also be found naturally in certain soil compositions around the world and in nitrogen-based fertilizers. All of which find their way into the global food supply through ground water sources.

What are the human health impacts?

Perchlorate is among the acknowledged group of toxins called “Endocrine Disrupters” with its base component perchloric acid. Salts such as ammonium perchlorate, magnesium perchlorate, sodium perchlorate and potassium perchlorate have been introduced into our environment in its application as previously discussed.

The main impact to human health is through the thyroid gland. The perchlorate ion competes with the iodine uptake of the thyroid gland. This restricted iodide uptake potentially leads to a reduction in thyroid hormones resulting in hypothyroidism. Short term high exposure results in typical eye and skin irritation, coughing, nausea etc. Long term exposure could result in neuro-developmental defects due to decreased thyroid hormones (hyphothyroidism) that may lead to adverse skin, cardiovascular and pulmonary system issues, as well as nervous system disorders.

Regulations and Treatment Options

The EPA has committed to propose a National Primary Drinking Water Regulation for perchlorate by Q4 2025. A final regulation is targeted for Q2 2027.

There are several treatment options currently to reduce perchlorate in ground water. Each of these treatment options have their pros & cons and should be evaluated by the client to determine which affords the best performance and cost benefits.

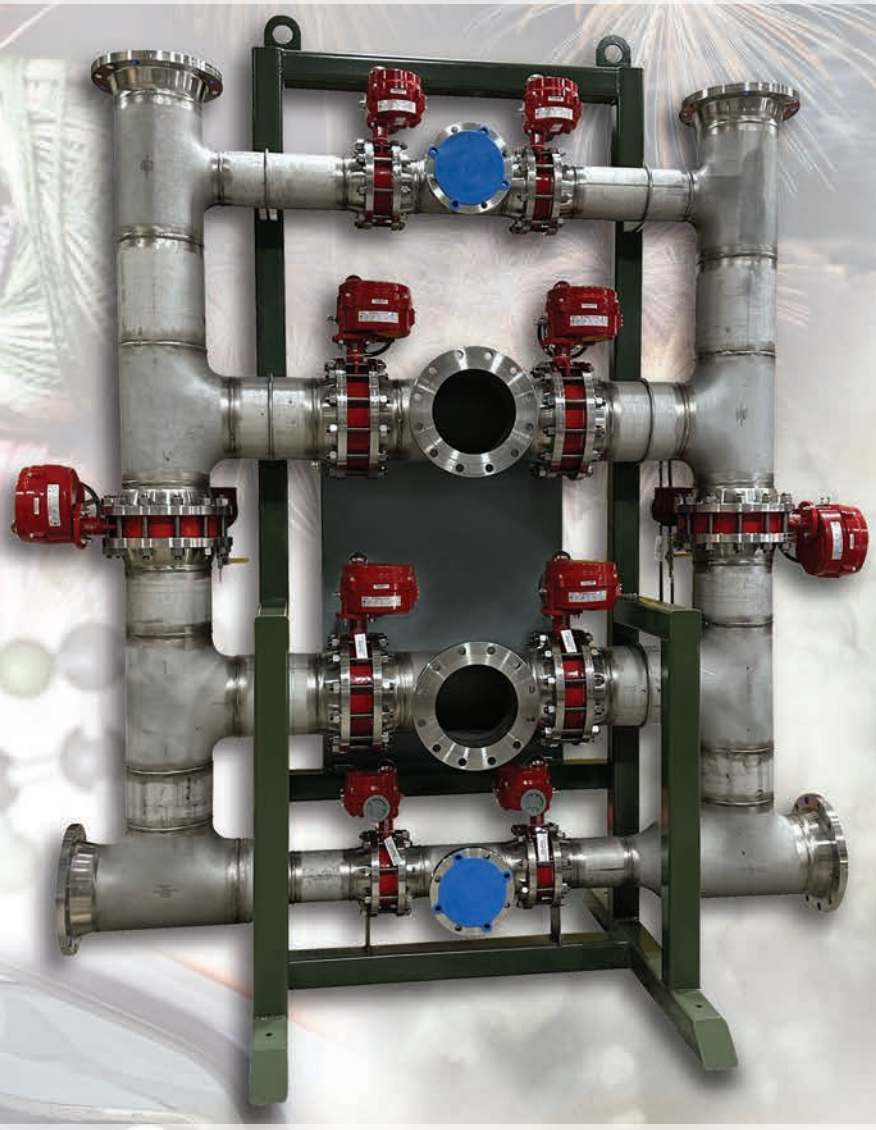
Biological Technology – Although the most environmentally accepted by the public, it is a very slow process with possible ecological risk and climatic restrictions that impact plant growth. Impractical for high capacity design.

Membrane Technology – Only RO membrane treatment is suitable for perchlorate removal due to the smallest pore size of all membrane types, but it has very high capital and O&M costs. The high volume of the concentrated reject stream makes it undesirable for large scale service. Pretreatment for high TDS may be required.

Carbon (GAC) – Carbon has been proven to be effective at reducing many contaminants found in drinking water sources. This ability is both a positive and negative as carbon is non-selective and its adsorption sites intended for perchlorate will also adsorb other competing contaminants found in the water. Depending on the concentration levels of the other contaminants, this competition could result in shortened media service life. Disposal of exhausted carbon should only be through incineration. Landfill may cause perchlorate to desorb and contaminate local areas.

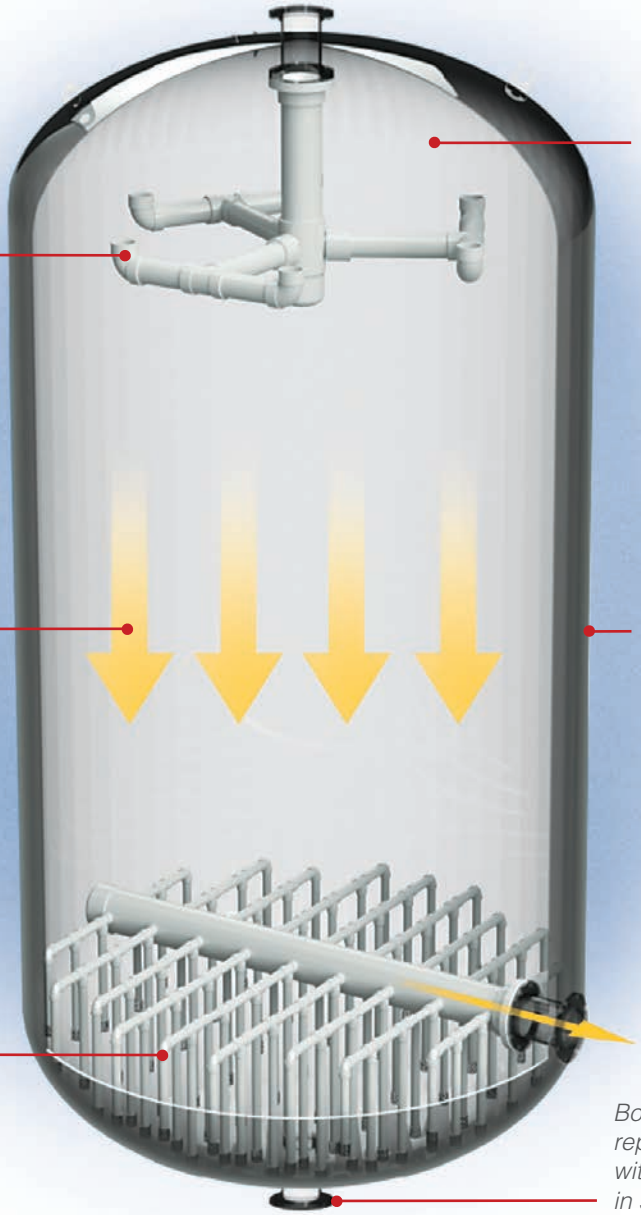
Ion Selective Resin – (Single Use Resin) Unlike regenerable ion resin where a large brine waste stream is created, single use resin is a proven technology for large scale systems containing both high and low concentration perchlorate contamination. The high affinity for perchlorate reduces long-term operating costs due to few competing contaminants resulting in longer media life. Short contact time requirements allow for smaller vessel size, lower media volumes and reduced overall system footprint requirements.

Utilizing our standard valve nest design for all size systems, the required flow configuration for treatment, backwash and sluicing are easily managed. The choice of manual or automatically operated pneumatic or electric valve actuator options are available. Manual override gearboxes for automated valves are available upon request.



Using over 100 years of H&T engineering experience designing water treatment systems, our Perchlorate removal system incorporates single-use ion selective resin assembled in a Lead / Lag vessel configuration. This design allows for achieving effluent goals with continuous service even during exhausted media replacement. H&T's capacity to produce smaller rural water treatment systems, and multi MGD plants for larger cities, makes us the smart choice when considering your design options.

The H&T Difference – A Superior Uniform Distribution System



Easy internal lining application

Sch. 80 PVC pipe for strength and corrosion prevention

Efficient performance and long bed life requires even distribution of flow and underdrain collection to prevent channeling

Fewer vessel wall penetrations required

Utilizing varying length drop down strainer piping, the contour of the bottom head is followed for uniform collection of treated water

Bottom head sluice port for easy replacement of exhausted media with no "Hide Out Zones" as found in some competitors' designs

Hungerford & Terry, Inc.

A Leader in Providing Application-Specific Water Treatment Solutions

For more than 100 years, H&T has met the challenge of new regulations with a vast array of water treatment solutions.

H&T advanced water treatment solutions include systems that remove iron, manganese, hydrogen sulfide, arsenic, radium, nitrate, sodium, perchlorate, hardness, color, PFAS/PFOS and other contaminants for municipal, industrial, and government facilities worldwide.

Hungerford & Terry, Inc. also designs and manufactures complete demineralizer systems, forced draft and vacuum degasifiers, condensate polishers, and specialized treatment systems.

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