LAYNE CHRISTENSEN COMPANY

WATER TREATMENT DIVISION

Water Quality Issues?

Radium, Arsenic, Nitrate, Perchlorate, Iron, Manganese, Hydrogen Sulfide, VOCs.... This is only a partial list of potential water quality problems, but they are of crucial importance as regulations tighten and compliance deadlines approach.

Your concerns about groundwater quality are Layne's concerns as well. The Water Treatment Division has been resolving water quality problems for over a half century, installing thousands of treatment systems throughout North America.

As a leader in the development of groundwater resources, Layne Christensen Company is also committed to groundwater purity. The Research & Development team of our Water Treatment Division focuses on refining and expanding the water treatment methods we currently employ.

The science of water treatment is dynamic, and optimum solutions are unique to each situation. Layne Christensen Company engineers have the experience, innovation and commitment to evaluate and deliver effective, efficient water treatment solutions for your situation.

Contact your regional
Layne Christensen Company
Water Treatment representative:

Western . . . . . (800) 336-5374
Central . . . . . (800) 407-4449
Eastern . . . . . (800) 269-4590
Southern . . . . . (800) 359-3824

E-mail: wtd@laynechristensen.com

IRON, MANGANESE AND H_2S

Adsorption/Oxidation Filtration

Many contaminants are best removed from potable water through adsorption. These contaminants range from aesthetic nuisances such as iron and manganese to health-threatening compounds such as hydrogen sulfide, arsenic and radium. LayneOx™ promotes adsorption, oxidation and precipitation of iron and manganese.

LayneOx™

This high-rate, granular filter media removes iron, manganese, radium and hydrogen sulfide from water supplies. LayneOx™ is a catalytic media that works with chlorine to oxidize and then precipitate contaminants onto the media.

- High surface loading rates for economical treatment
- Co-precipitate arsenic or radium
- Filter media has long service life
- Backwash restores media's catalytic activity

ARSENIC

The New Regulatory MCL for Arsenic

Arsenic occurs naturally in rocks, soil, water, air and biota, in concentrations ranging from 0.1 to 40 ppm. Over 100 years ago, arsenic was identified as a carcinogen. For this reason, the USEPA has established a MCL for arsenic, effective in 2006, of 10 ppb (10µg/L), the USGS survey estimates that over six percent of all municipal water supplies are non-compliant with the USEPA arsenic standard.

Adsorption Media & LayneOx™ Media

Layne Christensen offers high-capacity adsorption media used for the removal of arsenic. The arsenic adsorption media, when spent, can typically be disposed of as a non-hazardous waste.

LayneOx™ co-precipitates arsenic with iron in a filtration process which can be backwashed to regain capacity for many years of repeated use.

RADIUM

The New Regulatory MCL for Radium

A known carcinogen, radium and its isotopes exist naturally in groundwater. Radium in potable water is regulated through the USEPA, with a Maximum Contaminant Level (MCL) of 5 pCi/L.

RSC for Radium Removal

Layne Christensen Company and Dow Chemical Company have combined their expertise to provide **Dowex® Radium Selective Complexer** (RSC) for radium removal from groundwater.

- No liquid wastes
- High surface loading rate
- High capacity medium

HMO with LayneOx™ is a hydrous manganese oxide process that helps adsorb and co-precipitate radium from water. **Softening** is also possible as a radium treatment method. Layne Christensen's engineers can evaluate and recommend the optimal treatment method for you.

NITRATE AND PERCHLORATE

Removal Through Ion Exchange

Nitrate contaminates ground water as a result of nitrogen-based fertilization methods used in agriculture. Perchlorate, an accelerant in rocket fuel, has been found at unsafe levels in twenty states, and is a candidate for regulatory control. In drinking water, both nitrate and perchlorate present potentially fatal health risks. The USEPA has responded with a MCL for nitrate of 10 ppm (10 mg/L) and recommends that states control perchlorate levels at or below 4 ppb.

Amberpack® Ion Exchange Resin

Amberpack® ion exchange resins remove contaminants amenable to treatment by ion exchange, including nitrate and perchlorate. Advanced Amberpack¨ utilizes a patented Fractal Distribution Technology for maximum treatment with minimum waste. This process has the potential to reduce the liquid waste volume from ion exchange processes by 90 percent.

VOLATILE ORGANIC COMPOUNDS

Air Strippers Remove VOCs & Radon

Exposure to Volatile Organic Compounds (VOCs) in drinking water presents a long list of significant health risks, and the USEPA has imposed strict MCLs to assure public safety. For VOCs the maximum contaminant level varies, depending on the compound.

Custom-designed Air Strippers

The USEPA recommends air stripping for the removal of VOCs in potable water systems. Layne Christensen Company provides custom-designed and pre-engineered tower systems with a wide variety of sizes, materials, and packing media to meet the specific needs of each installation.

- Computer sizing and design
- Pre-engineered and custom systems
- Over 400 installed systems
- Largest manufacturer of air stripping towers in the US

LAYNE TECHNOLOGIES

Membranes

This 5.4 MGD reverse osmosis system removes dissolved solids in municipal drinking water. Membrane technology was determined to be the most efficient treatment method for the site.

UF/NF/RO Membrane Filtration

Membrane filtration is an effective method for the purification of groundwater, surface water, and wastewater. Through microfiltration, ultrafiltration, nanofiltration or reverse osmosis, membrane filtration technology effectively satisfies municipal and industrial requirements for:

- Removal of viruses and microbes such as cryptosporidium and Giardia (4.0 LRV), for compliance with the LT2ESWTR
- Reduced THM precursors and disinfection by-products, for compliance with the Disinfection By-products Rule
- Reduced fluoride, radium/radionuclides, arsenic, nitrate, and total dissolved solids (TDS)
- Groundwater replenishment and re-use in secondary and tertiary effluent, or in Title 22 water
- High purity demineralization
- Desalinization in shoreline and tidal-influenced intakes
- Reduced hardness through nanofiltration
- Improved aesthetics through reduction of color, taste and odor

Pressure Filters

2.0 MGD Advanced Amberpack® Municipal System for the reduction of nitrate in potable water. *Photo Courtesy- Southern California Water Company*

Filtration Media Used in Pressure Filters

Layne Christensen's engineers can evaluate which filtration media may be used for an application. A full range of ion exchange, filtration, catalytic filtration and adsorption media are available.

Ion Exchange – Anion resins, cation resins, and selective ion resins are available for various applications. Advanced Amberpack® Municipal Fractal design can decrease waste and increase production yields.
Adsorption Media – Adsorption media for radium and arsenic removal are used in pump-and-treat applications.
Catalytic Media – LayneOx™ catalytic media provides enhanced filtration in many applications. Alternatively, coated media is used where appropriate. Exchanges in existing systems are also possible.
Filtration Media – Traditional sand, anthracite, or green sand media are used in many applications. Evaluation of existing media performance and changes to media are also performed by Layne Christensen District Offices.

Aeration & Air Stripping

This air stripping facility removes VOCs from 21 MGD of drinking water in Dayton, Ohio

Air Strippers for VOCs & Radon Removal

Layne Christensen's Water Treatment Division pioneered the concept of packed column air strippers for the removal of VOCs from potable water. Today, Layne Christensen is the largest manufacturer of air stripping towers in the US, with over 400 installations. Custom designed and pre-engineered tower systems are available in a wide variety of sizes and materials. A variety of packing media are also available for a variety of contamination situations.

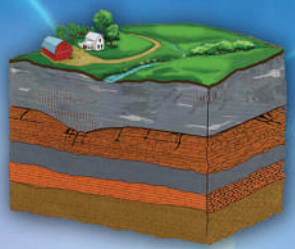
- Computer designed and sized
- Both pre-engineered and custom designed systems available
- Largest manufacturer of air stripping towers in the US
- Towers available in aluminum, stainless steel, coated carbon steel, and fiberglass reinforced plastic

Layne®

Layne®

Services for High-Capacity Water Supply

Identify
Water Resources



Develop
Well Systems

Purify
Water Supplies

Maintain
System Efficiencies

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