ENVIRONMENTAL
Fact Sheet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

29 Hazen Drive, Concord, New Hampshire 03301 • (603) 271-3503 • www.des.nh.gov

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Arsenic Removal and Disposal for Public Water Systems

Arsenic occurs naturally in bedrock and groundwater sources across many parts of New Hampshire. Bedrock wells and occasionally deep gravel packed wells may contain concentrations of arsenic above the drinking water standard of 5.0 parts per billion (ppb), adopted by the State of New Hampshire, expected effective date July 1, 2021.

When arsenic is present in groundwater sources at levels above the drinking water standard, it is important to reduce the concentration in order to protect human health from long-term, chronic ingestion of this contaminant. Arsenic has no odor, taste or color when dissolved in water, so it must be analyzed by a laboratory to establish its presence or absence in your well. For more information on arsenic, please see fact sheet DWGB-3-2 "Arsenic in Drinking Water."

Arsenic is removed from drinking water by various treatment technologies, and residuals handling and disposal varies with the technology selected. Onsite discharge of liquid residuals from water treatment facilities are regulated under the state Underground Injection Control (UIC) requirements Env-Wq 402, Groundwater Discharge Permit and Registration rules. **All onsite discharges to the ground from arsenic water treatment facilities must be registered under the UIC program.** To find information about registration, visit www.des.nh.gov, or contact the UIC Program coordinator at (603) 271-2858 or uicprogramnh@des.nh.gov.

The public water system owner is responsible for ensuring that residuals are tested, treated and disposed of in accordance with these rules. For public water systems, treatment methods that remove arsenic and discharge backwash wastewater to the ground or surface waters with arsenic above ambient background levels are prohibited. Requirements for testing, treatment and management of these discharges and related residuals are detailed below for the most common treatment technologies. Please contact NHDES if the technology you are considering is not described here.

ADSORPTION TREATMENT
Liquid residuals (Backwash)

Adsorption media filters are typically "fluffed" by backwashing the filter with water. Backwashing filters for this purpose produces a wastewater with iron-arsenic fines (solids) which must be filtered or otherwise removed prior to being discharged onsite. This filtering is required due to the fact that, over time, these high arsenic-bearing solids could cause a "hot-spot" and exceed state soil and groundwater standards, which would require cleanup as a hazardous waste site. This discharge must be registered and at least a one-time sampling of the filtered backwash for total arsenic must be submitted as a

condition of this registration. This requires installation of a sampling tap on the backwash water line. At this time, NHDES is requiring a one-time sampling of the backwash for total arsenic. NHDES may request additional samples in the future, if needed, to verify the backwash does not violate UIC discharge requirements. Note that a treatment system that avoids a discharge by recycling filtered or settled backwash water to the front of the treatment train is NOT required to register or conduct sampling of the backwash.

Solid residuals (Spent adsorption media)
Arsenic is removed from the well water and adsorbed (retained) by the filter media. Spent adsorption media must be either removed and discarded as a non-hazardous or hazardous solid waste, or regenerated onsite with a caustic regenerant solution. If removed for disposal as solid waste, the media must be tested for arsenic using the Toxicity Characteristic Leaching Procedure (TCLP) and any other parameters required by the solid waste landfill that receives the waste. TCLP arsenic concentration must be less than 5 mg/L in order to be considered a nonhazardous waste. If the adsorption media is regenerated onsite, disposal of the concentrated liquid residuals must follow the requirements under anion exchange technology (see below). If the media is regenerated off-site, the regenerated media must be certified under NSF/ANSI standard 61 for its reuse in drinking water treatment.

OXIDATION/FILTRATION (GREENSAND)
Liquid residuals (Backwash)
Backwash from filters following oxidation/filtration of arsenic with iron and/or manganese must be settled or filtered prior to onsite discharge. This discharge must be registered with the UIC program and the filtered or clarified supernatant must be sampled for total arsenic. Note that a subsurface, in-ground tank will not be approved for use as a settling tank for arsenic containing solids. A treatment system that avoids a discharge by recycling filtered or settled backwash water to the front of the treatment train is NOT required to register or sample the backwash wastewater.

Solid residuals (Iron-arsenic solids)
Settled or filtered iron-arsenic solids must be tested using the TCLP method and any other tests required by the solid waste landfill that receives the waste, prior to transport and/or disposal as a solid waste. The results of the TCLP arsenic analysis must be less than 5 mg/L for transport or disposal as a nonhazardous waste.

ANION EXCHANGE
Treatment systems that apply rejuvenation of an exchange resin (or adsorption media) to concentrate arsenic in liquid residuals must collect all regenerant wastes for discharge to a publicly owned wastewater treatment works (POTW) or other approved disposal facility. A discharge permit must be filed with the local facility for this discharge. Some facilities may not allow discharges of this nature to occur, or apply stringent sampling requirements and effluent concentration limitations. Alternatively, discharge of concentrated brine residuals to a centralized subsurface wastewater system may be allowed on a case-by-case basis via waiver from Env-Wq 402. This option will be considered only for very small water systems such as schools or businesses, wherein all the water consumed and water treatment byproducts are reunited in a centralized discharge location, so that the mass of arsenic discharged is essentially the same as discharging natural, untreated groundwater to the system.

Arsenic bearing liquid residuals may be further concentrated onsite via precipitation or adsorption, with recycle of the treated regenerant to the front of the treatment train. Solids generated from residuals treatment must be tested and managed as described above under oxidation/filtration solids or spent adsorption media, respectively.

OTHER DESIGN AND COST CONSIDERATIONS

When considering arsenic treatment systems, the ongoing cost of disposing of liquids and solids associated with the treatment process needs to be fully considered as part of treatment design, prior to system approval or installation. Depending on the type and form of waste that is generated, the costs can be significantly different from one option to another. Different waste streams have different chemical characterization, transportation, and disposal requirements and associated costs. Also, the frequency with which liquids and solids need to be disposed of affects costs significantly. This is because many landfills assign disposal fees based on minimum weight, and contractors that haul wastes charge a significant mobilization fee. The frequency of disposal of liquids and solids is also a function of storage capacity at the treatment facility, as well as raw water quality including pH and potential interfering ions.

The design of any treatment process requiring strong oxidizing agents (such as chlorine), strong acids or bases, should incorporate appropriate spill and safety controls and training to ensure proper protection of employee health and safety as well as protection of the environment. All new construction or upgrades to small public water systems must comply with Env-Dw 405 and 406, Design Standards for Small Community and Non-Community Water Systems, respectively.

For More Information

Please contact the Drinking Water and Groundwater Bureau at (603) 271-2513 or dwgbinfo@des.nh.gov or visit our website at www.des.nh.gov.

Note: This fact sheet is accurate as of August 2019. Statutory or regulatory changes or the availability of additional information after this date may render this information inaccurate or incomplete.