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Information: New Hampshire Water Well Association

Information in this document is provided in good faith to inform the public about groundwater and water wells. Well owners should ensure that their well contractor has obtained permits (if required) and has referred to local codes, rules, regulations and laws for site selection, construction, maintenance and operation of water wells and water system equipment.

SOLUTIONS TO IRON PROBLEMS

An elevated level of iron is a common water quality issue for New Hampshire well owners. Red staining in plumbing fixtures is the usual indication that there is an iron problem. Iron occurs naturally in groundwater and is dissolved from the rocks and minerals in both bedrock and sand & gravel aquifers. The US Environmental Protection Agency (EPA) does not consider elevated iron concentrations in drinking water to be a health problem. Some iron is a beneficial and necessary nutrient in most adult diets.

Water containing iron that comes straight from a well will usually have iron in a dissolved form. The iron may then become oxidized once it is exposed to oxygen in the air. Agitating the water or adding oxidants such as clothes bleach or other home cleaners containing chlorine can accelerate this process. As the water becomes oxidized, it can stain plumbing fixtures and clothes. The EPA has recommended an upper concentration limit of 0.3 parts per million (ppm or milligrams per liter [mg/L]) for dissolved iron. There are several treatment methods available.

Water Softeners

For situations with iron concentrations up to 2 or 3 ppm, typical water softeners (using salt [NaCl] brine for regeneration) are likely to be effective. The sodium resins in these systems actually prefer the iron to the “hardness” elements such as calcium and magnesium. If the iron concentrations are greater than 5 ppm iron then the treatment equipment must be specially designed to ensure that the “backwash” regeneration cycle is strong enough to remove and wash away the iron that is collected out of the raw water. Iron treatment with a water softener works best when the pH of the water is near neutral (pH = 7).

Oxidation Treatment (chlorine – ozone)

Higher concentrations of dissolved iron may require a more aggressive oxidation treatment to convert dissolved iron into ferric (oxidized) iron that can be trapped by a filter. Aeration methods add oxygen to the water by vigorously blowing air into the water or by cascading the water over trays. In an ozone-based or chlorine-based treatment, raw water is placed in contact with either ozone gas or chlorine. Most residential iron treatment systems use a solution of calcium hypochlorite or sodium hypochlorite as the chlorine source for the treatment. Chlorine systems may also include a treatment with activated carbon to remove residual chlorine before the treated water enters the domestic drinking water supply.

Filter media resin beads

The most common method of iron treatment uses an oxidizing filter media comprised of manganese oxide coated resin pellets or beads that provide both an oxidizing environment and filtering capacity. Oxygen is released from the manganese oxide coating to oxidize the dissolved iron in the raw water passing through the beads. The oxidized iron particles are trapped in the resin bed (usually contained in a vertical cylinder) until removed during the backwash cycle when the coating is regenerated with potassium permanganate. The iron particles must be flushed out during the backwash cycle so that the resin bed does not become clogged. These systems work best when the water pH is above 7.5.

Polyphosphate

Polyphosphate treatments do not remove iron (or manganese) from the raw water. They reduce staining by retaining these metals in solution and preventing oxidation. This method is only effective for levels of iron and manganese less than about 1 ppm and if the water will not be heated. Heating releases the metals and allows oxidation to occur.

Water quality problems are not always straightforward to solve. Be sure to get advice from a well contractor or water conditioning specialist. ALWAYS have a water test done to measure the iron level and to check for other aspects of water quality so that the correct iron treatment system can be selected.

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