NEW HAMPSHIRE DEPARTMENT OF Environmental Services

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Well Development by Hydro-fracturing

Hydro-fracturing, commonly referred to as hydro-fracking, is a well development process that has been used commonly in the water well industry since the 1990s. Hydro-fracturing involves using direct displacement specialized high pressure pumps to inject water under high pressure into a bedrock formation via the well. Since a liquid cannot be compressed, the hydraulic pressures exert force against the borehole and any fractures or fissures along the borehole. This process is intended to flush and remove fine particles and rock fragments from existing bedrock fractures and/or increase the size and extent of existing fractures; resulting in an increased flow of water and a larger network of water bearing fractures supplying water to the well.

Only licensed water well contractors are authorized to hydro-fracture wells in New Hampshire. If you are thinking about having your well hydro-fractured, it is generally advisable to first consult with several water well contractors. These professionals will help you evaluate your water supply needs and the probability of success in your geographic area to help you determine whether hydro-fracturing is a viable choice for your well. The equipment capabilities of different contractors and the types of contracts offered are other considerations. The procedure is often used to increase well yields of new deep drilled wells with marginal or inadequate production rates. It may also be applied to older existing wells that have progressively diminished recovery rates over time, which is usually caused by mineralization and incrustation of rock fractures.

Given recent environmental concerns about “fracking,” it is important to note that drinking water well hydro-fracking, while similar to oil well hydro-fracking, does not utilize acids, petroleum (diesel) or polymers as lubricating agents nor use propping mixtures such as sand and plastic pellets. **To date, NHDES has no recorded environmental degradation as a result of drinking water well hydro-fracking.**

Surging is another, less common method used for developing well yields in bedrock wells. This method employs the principal of raising and dropping a free falling weight (surge block) in the well. The rhythmic action of the drill string pushes water into bedrock fractures and then pulls water out of the fractures. This surging action flushes and removes fine particles and rock fragments from existing bedrock fractures, resulting in an increased flow of water to the well.

It is illegal and dangerous to put dynamite or dry ice in a well.

The Hydro-fracturing Process involves the installation of one or two inflatable or mechanical packer(s) that is placed in the well bore at least 50 feet below the well casing and drive shoe seal, and at least 60 feet below the ground surface to ensure that the process does not “break” the seal or allow surface water contaminants to enter the well. The packer is inflated or locked into position and clean potable water is pumped through the packer under pressure. Most applications require between 500 and 3,500 pounds per square inch (psi) pressure and a flow rate between 5 to 45 gallons per minute or more (the higher the pressure, the lower the delivery rate). If successful, pressure will steadily rise to a maximum level as the rock formation resists flow, then pressure will suddenly drop off and stabilize at a lower level. The drop in pressure indicates that the formation is accepting water and the resistance to flow is diminished. When utilizing one packer, the packer is set near the top of the well but at a safe distance below the drive shoe seal. After the initial pressurization sequence, the packer is released and lowered further into the hole, and the process is repeated as many times as necessary. Commonly, three pressure sequences are performed. Water is then pumped (referred to as chasing or flooding) into the formation for 5 to 30 minutes. Generally, 1,000 to 2,000 gallons of water or more are pumped into the bedrock formation during multiple settings of the packer in the borehole.

Zone isolation hydro-fracturing uses a two-packer system where the packers are placed in series and water is pumped into the isolated zone between the packers. This system can be more effective because it concentrates hydraulic pressure within a small area, typically 20- to 50-foot intervals, and individual fractures can be isolated and hydraulically developed. With this method, defined zones are isolated within the well starting within a specified section of the well targeted by the water well contractor from the drilling log. Each successive pressure sequence stresses one interval higher than the last. In this way, all potential water bearing fractures, or fracture zones, are worked independently within the section of the well bore being developed. This differs from the single-packer, multiple sequence method, which probably only affects the weakest, least resistant point(s) in the well. Zone isolation hydro-fracturing is a much more expensive and time-consuming procedure, and is generally used only on very difficult wells or public supply wells where a larger flow of water is desired.

Hydro-fracking of wells that have a high iron content or in plasticized shales have shown a high success rate of cleaning out mineral deposits and reestablishing water flow to the borehole.

Yield Testing

Well yield increases, if successful, are generally modest and may constitute a significant increase if the original well yield was very low. A typical well yield after hydro-fracturing is 1 to 10 gpm. Water well contractors report a high success rate utilizing the procedure. In some instances, due to geologic conditions, hydro-fracturing will not increase well yield.

Many water well contractors do not include yield testing as part of their hydro-fracturing contract because injection water volumes are large enough that it may require an extended period of time to allow the bedrock aquifer to reach equilibrium. If the yield test is conducted immediately after the well is hydro-fractured, the amount of water injected into the bedrock formation must be a consideration to avoid an over-estimation of the increased well yield.

For More Information about well development you may call the Water Well Board at (603) 271-1974 or the NHDES Drinking Water and Groundwater Bureau at (603) 271-2513. Or visit des.nh.gov.

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