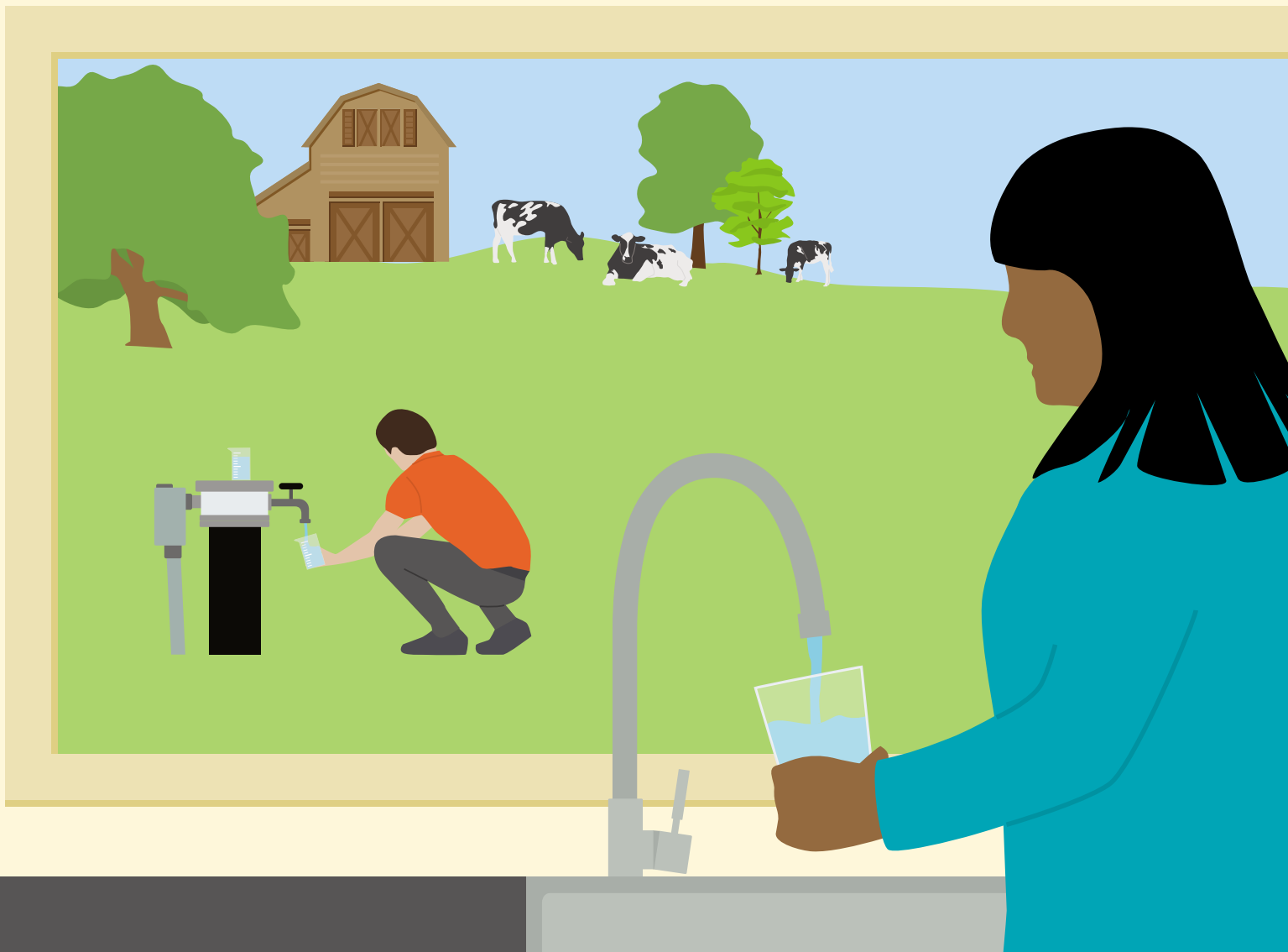


From Source To Tap

State Policies to Improve Drinking Water Quality
in Private Well Systems



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Introduction

To learn more about how environmental and public health professionals can use policy to promote safer drinking water in private wells, see our fact sheet, [Closing the Water Quality Gap](#); our policymaking guide, [Navigating Unfamiliar Waters](#); and our case studies, [Improving Well Water Quality and Well Stewardship](#).

The quality of drinking water from private wells can be adversely impacted by a wide range of factors and at different points in a physical system – from contaminants that leach into the groundwater supply, to ineffective water treatment equipment installed under a kitchen sink.

State policies play an important role in addressing these issues because private wells are not subject to drinking water standards set by the federal Safe Drinking Water Act (SDWA).¹

The purpose of this fact sheet and the related infographic is to provide environmental and public health professionals with a map that identifies state-level policy tools to improve well water quality and that shows how those tools relate to various aspects of the drinking water system. To that end, this fact sheet is organized into three sections addressing how policy can be applied to each of the major physical components of private drinking water systems, moving from source to tap: *groundwater, wells and related infrastructure*, and *indoor plumbing*. This framework tracks state codes, which typically treat each of these physical components separately for purposes of regulation.

Additionally, within each section of the fact sheet, the policy tools are grouped based on who or what they regulate, including the following:



Water & Water Quality – for example, water testing requirements or health-based standards for contaminants in drinking water.



Land Use & Infrastructure – for example, restrictions on where or how hazardous materials must be stored, or standards for the materials and methods used to construct wells and plumbing systems.



People & Industries – for example, professional standards for well drillers, plumbers, and other people who work directly on private well systems, or marketing regulations for companies that manufacture and sell products intended for use in those systems.

There are specific examples from jurisdictions around the country of each of the policy tools identified in the following sections. Although this fact sheet focuses on state-level policy, we have flagged key areas where local policies can have an impact, as well as opportunities for states to partner with local governments on implementation and enforcement.

Groundwater

In 2015, over 40 million people in the United States relied on groundwater from private wells for domestic uses like drinking, cooking, and bathing.²

The quality of groundwater can be affected by 2 categories of contaminants: those that occur naturally in soils and bedrock, such as radon and arsenic, and those that are introduced by human activities, such as nitrates and bacteria from farming operations and septic systems.^{3,4} When contaminants like these are present in groundwater beyond a safe level, private well users can suffer health issues such as gastrointestinal illness, reproductive problems, and neurological disorders.^{3,5}

The following are ways that states can regulate water and water quality, land use and infrastructure, and people and industries to safeguard groundwater for domestic uses. A range of state agencies may be tasked with implementing and enforcing groundwater polices. Common examples include state departments of environmental protection, natural resources, agriculture, and health; or specialized water resources boards or commissions. Because regulatory contexts vary by state, environmental and public health professionals interested in policies for improving well water quality should consult a local attorney licensed in their state to identify what state protections exist and what additional policies or strategies may be helpful in their jurisdiction.





Water & Water Quality

Establish health-based **water quality standards** for aquifers that supply drinking water.

A *water quality standard* is a provision of law describing the desired condition of a water body.⁶ A water quality standard can be numeric (eg, a maximum acceptable level of contaminants in a water body) or narrative (eg, an expression that a water body must be free from certain negative conditions).⁶ In general, states enforce water quality standards by requiring any facility that discharges a pollutant to a regulated water body to obtain a permit imposing conditions or restrictions on the discharge.

EXAMPLE: In Arizona, with limited exceptions, any facility that discharges a pollutant to an aquifer used for drinking water must obtain a permit from the state Department of Environmental Quality.⁷ Facilities subject to this requirement range from underground injection wells for oil and gas production, to manure lagoons where pollutants may leach into groundwater.⁸ To obtain a permit, a facility must show that a discharge will not result in the violation of state water quality standards or, if contaminant levels in the aquifer already exceed the standards, that the discharge will not further degrade groundwater quality.⁹ The water quality standards for aquifers directly incorporate the maximum contaminant levels for drinking water set by the SDWA.¹⁰ Additionally, a narrative standard prohibits the presence of pollutants in aquifers used for drinking water “in a concentration which endangers human health.”¹¹

Create a statewide **groundwater monitoring network** to collect data on groundwater quality.

A *groundwater monitoring network* is a set of wells located throughout a state from which samples are routinely taken to assess the quality and quantity of groundwater and to track changes over time.¹² The wells could include public and private water supply wells, as well as dedicated monitoring wells above regionally important aquifers or near sources of contamination. Sampling data can inform groundwater management decisions and facilitate enforcement of water quality standards.¹³

EXAMPLE: Wisconsin law requires the state Department of Natural Resources to work in partnership with other agencies to monitor and sample groundwater.¹⁴ The sampling must be conducted for contaminants regulated under the SDWA and other substances “of public health or welfare concern.”¹⁵ Samples are taken from a statewide network of wells located near sources of contamination, such as fertilizer storage facilities, septic systems, and landfills.¹⁶ The primary purpose of sampling is to determine whether state groundwater quality standards have been violated, and if so, whether any preventive or remedial enforcement action is necessary.¹⁷



Local Policy Opportunity

State agencies can partner with local government officials on groundwater monitoring and data collection.



Local Policy Opportunity

States typically delegate authority to regional districts or other local agencies to develop, implement, and enforce groundwater management plans.

Develop regional **groundwater management plans** to ensure the long-term sustainability of aquifers.

States can mandate such plans with the goal of sustaining groundwater supply and protecting water quality. Among other things, plans can regulate rates of groundwater pumping, which can help prevent the movement of contaminants into areas of an aquifer from which well water is drawn.

EXAMPLE: California's Sustainable Groundwater Management Act mandates the designation of local "groundwater sustainability agencies" (GSAs) tasked with developing and implementing sustainable management plans for priority groundwater basins that are experiencing high demand and water shortages.¹⁸ Any existing local agency or coalition of local agencies can opt to become a GSA.¹⁹ Under the law, "sustainable groundwater management" means the management of water in a manner that avoids "significant and unreasonable" adverse effects such as saltwater intrusion, depletion of groundwater supply, and degradation of water quality.²⁰



Land Use & Infrastructure

Establish minimum **setback distances** or **buffer zones** between wells and land uses that are potential sources of groundwater contamination.

A *setback* is the minimum distance required by law between 2 structures or between a structure and a specified place (such as a property line) or piece of infrastructure. A *buffer zone* is an area separating 2 distinct land uses that mitigates the effects of 1 land use on the other.²¹ Setbacks and buffer zones can be used to protect water supply wells from potential sources or routes of contamination, such as improperly abandoned wells, septic systems, or facilities for storing hazardous materials.

EXAMPLE: The Alabama Water Pollution Control Act requires "confined animal feeding operations" to maintain a 500-foot buffer between a water supply well and any structure used for animal confinement or waste storage and treatment.²² The Act authorizes the Alabama Department of Environmental Management to enter and inspect an animal feeding operation to ensure compliance with this and other requirements.²³

Require property owners to **seal abandoned wells**.

Abandoned wells can serve as routes for pollutants like agricultural runoff, contaminated surface water, and pests to enter the groundwater, which can compromise water quality in nearby wells. To prevent this, states can require property owners to have abandoned wells sealed by a licensed well driller and can adopt standards that set appropriate methods for well sealing.



Local Policy Opportunity

To the extent that state law allows, local governments can include setbacks or buffer zones in their zoning codes or other planning ordinances to protect well water quality.



Local Policy Opportunity

States often authorize local governments to adopt design regulations for septic systems that exceed state standards, or delegate authority to local health officials to license and inspect septic systems.



Local Policy Opportunity

To the extent that state law allows, a local government can require compliance with agricultural best practices as a condition of approval for certain land use or development permits.

EXAMPLE: Under Minnesota law, a property owner must have a licensed well and boring contractor seal any unused well unless the property owner obtains a permit to maintain the well from the state health department.²⁴ The state has developed detailed regulations governing the materials and methods used to seal an abandoned well – for example, what types of grout must be used to fill the space surrounding a well casing.²⁵

Adopt design and construction standards for facilities and infrastructure that are potential sources of groundwater contamination.

Design and construction standards set minimum requirements for the way certain types of buildings and infrastructure must be built. Such requirements can address, among other things, materials and methods of construction, where certain structural elements must be located, or whether certain types of equipment must be installed. States can use design and construction standards to minimize the risk of groundwater contamination from hazardous storage facilities, septic systems, landfills, and many other potential sources of contamination.

EXAMPLE: Michigan law establishes mandatory construction standards for facilities used to store bulk quantities of fertilizer. The standards require the installation of watertight lining to cover earthen floors or, alternatively, monitoring devices capable of detecting any leak before it reaches the groundwater supply.²⁶

EXAMPLE: New Hampshire law establishes design standards for “on-site wastewater management systems” – commonly known as septic systems – including a requirement that a leach field be located 4 feet above the seasonal high-water table to prevent groundwater contamination.²⁷ The law also prohibits the installation of septic systems within a “protective radius” around private water wells.²⁸

People & Industries

Adopt best management practices for agricultural producers.

Best management practices are recommended actions that agricultural producers can take to benefit water quality. Such practices can address, for example, the storage and use of pesticides, fertilizers, and animal wastes; and the timing and rates of irrigation.²⁹

EXAMPLE: The Minnesota Groundwater Protection Act directs the state Department of Agriculture to work in consultation with local water planning authorities to develop best management practices for the use of agricultural chemicals on farms.³⁰ Among other things, the best management practices address the rates, method, and timing of fertilizer applications to minimize nitrate contamination in groundwater.³¹

Impose **taxes or fees** on substances that adversely impact groundwater quality and **earmark the funds** for purposes related to groundwater monitoring and protection.

States can impose taxes and fees on such substances as pesticides and commercial fertilizers; the proceeds can go toward programs related to groundwater monitoring and protection, or to assist low-income families with well repairs, maintenance, or water treatment costs. Taxes and fees can take many different forms but could include, for example, licensing fees for manufacturers and dealers, product registration fees, or taxes on the sale or distribution of certain products. Depending on the amount of the tax or fee, this approach could have the added benefit of discouraging the use of pesticides and commercial fertilizers on farms.³²

EXAMPLE: In Iowa, any person who registers a nitrogen-based fertilizer product for sale in the state must pay a “groundwater protection fee” to the Iowa Department of Agriculture and Land Stewardship (IDALS).³³ The amount of the charge is based on the percentage of nitrogen contained in the product – for example, an 82% nitrogen solution is taxed at a rate of \$0.75 per ton.³⁴ Additionally, a pesticide dealer must pay IDALS a registration fee for every pesticide distributed or sold in the state.³⁵ The proceeds of the groundwater protection fee and pesticide registration fees are deposited in a “groundwater protection fund,” with amounts earmarked for grants to counties to support the testing and sealing of private rural water supply wells, among other purposes.³⁶

Adopt **mandatory disease reporting requirements** for illnesses associated with groundwater contamination.

States can require health providers and clinical laboratories to report certain types of poisonings and conditions to state or local health departments to facilitate disease surveillance.^{37,38} Examples of conditions that are associated with groundwater contamination include pesticide poisonings and methemoglobinemia, or “blue baby” syndrome, which can be caused by nitrates in groundwater.³⁹

EXAMPLE: Nebraska law requires physicians, hospitals, and laboratories to report cases of methemoglobinemia and poisonings from exposure to agricultural chemicals like herbicides, pesticides, and fertilizers to the local health department or, if there is none in the area, to the state Department of Health and Human Services.⁴⁰



Local Policy Opportunity

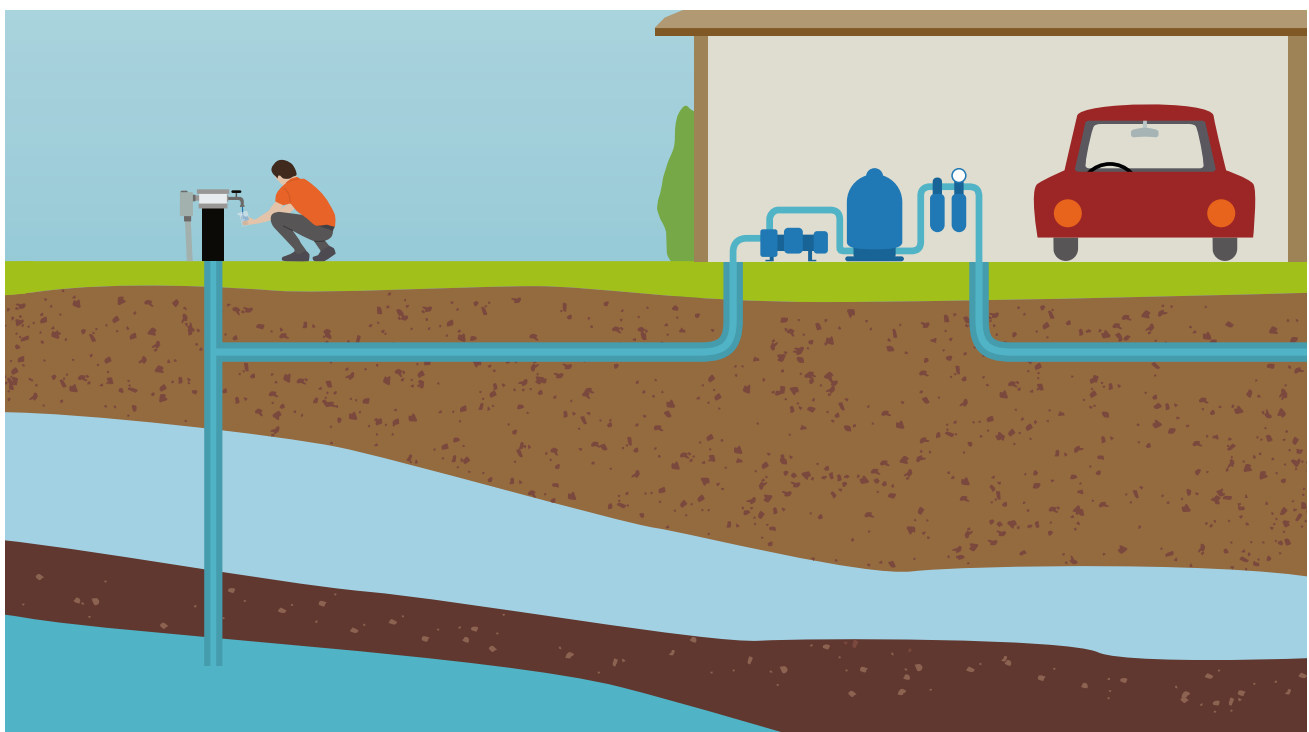
States can partner with local health departments on disease reporting and surveillance.

Wells & Related Infrastructure

Private wells account for the vast majority (98%) of domestic water systems that are not covered by the federal Safe Drinking Water Act.²

The quality of drinking water from private wells depends directly on the proper construction, repair, and maintenance of wells and related infrastructure, such as pumps, pressure storage tanks, and water treatment equipment. Improper construction or maintenance of any of these elements can result in the failure to remove contaminants from well water, the introduction of new contaminants into the system, or both.⁴¹⁻⁴³

The following are ways that states can regulate water and water quality, land use and infrastructure, and people and industries to ensure wells and related infrastructure are safely constructed and maintained. A variety of state entities may be tasked with administering laws related to wells and well construction. Common examples include departments overseeing environment, health, and consumer protection; professional licensing boards; and state engineers. Because regulatory contexts vary by state, environmental and public health professionals interested in policies for ensuring well safety in their communities should consult a local attorney licensed in their state to identify what state protections exist and what additional policies or strategies may be helpful in their jurisdiction.





Water & Water Quality

Extend federal **drinking water standards** to private wells.

The health-based drinking water standards established under the SDWA apply only to “public water systems” that have at least 15 service connections or serve an average of at least 25 people for at least 60 days per year.⁴⁴ States can expand, or otherwise amend, the definition of “public water system” so that private wells are also subject to the federal drinking water standards.

EXAMPLE: The New Jersey Safe Drinking Water Act⁴⁵ adopts the drinking water standards set by the SDWA, but applies them to both public and *nonpublic* water systems – including private wells.⁴⁶ To enforce the standards, the law requires property owners to have private well water tested by a state-certified laboratory when a well is constructed. The property owner must share the test results with the local health department as a requirement of finalizing a permit to operate the well.⁴⁷ If the well water does not meet the state’s drinking water standards, the local health department must not issue a permit for the well until the owner has installed treatment equipment that will effectively address the contaminants present in the well, in accordance with state guidelines.⁴⁸



Local Policy Opportunity

States can partner with local health officials to implement and enforce state drinking water standards for private wells.



Local Policy Opportunity

To the extent that state law allows, local governments can adopt ordinances that expand well testing requirements to include contaminants of regional concern or, if the state does not require well testing, an ordinance that establishes local well testing requirements.

Require periodic or event-based **testing of well samples** for defined contaminants.

States can require property owners or licensed well drillers to test well samples regularly or when a well is constructed or modified, or when a property is sold. Well testing allows a property owner or prospective buyer to make an informed decision about whether to install treatment equipment. As a best practice, states can require mandatory well tests to be completed by state-certified laboratories and can require analysis for a specific set of contaminants. Further, states can direct laboratories to report the results to a state agency to facilitate data collection and surveillance. States can also extend well testing requirements to rental properties, for example, by requiring landlords to test well samples periodically and report the results to the tenant.⁴⁹

EXAMPLE: South Dakota requires testing of well water samples by state-approved laboratories upon the completion of a new well.⁵⁰ In general, a licensed well driller is responsible for collecting the sample. However, the owner is responsible for collecting the sample if the well driller does not install the well pump. At a minimum, the laboratory must analyze the water sample for nitrate, coliform bacteria, sodium, conductivity, and sulfate. The well driller or owner must submit the test results to the South Dakota Department of Environment and Natural Resources within 30 days.⁵¹



Land Use & Infrastructure

Adopt a well construction code that sets minimum standards for well location, drilling, construction, repairs, and abandonment.

States can ensure the long-term safety of wells and reduce the risk of contamination by adopting well construction codes. These codes set standards for well siting and the materials and methods used in well drilling, construction, repairs, and abandonment (well sealing). The elements of the water system covered by a well construction code typically include the well itself and related infrastructure like water pumps to move water out of a well, along with pressure storage tanks, which may be located in a basement or utility room inside a home.^{52–54} A well construction code can also set standards for well disinfection and water treatment equipment, such as filters and water softeners.^{53,55,56}

EXAMPLE: The New Jersey Subsurface and Percolating Waters Act⁵⁷ and related regulations establish construction standards for private wells; minimum distance requirements between wells and sources of contamination; and requirements for well “decommissioning” (abandonment).⁵⁸ In addition to setting construction standards that are specific to private wells, such as requiring well casings and other materials to meet third-party standards for quality and safety, the Act extends additional standards developed for *public* water systems to all private wells.⁵⁹ Those additional standards address well disinfection and treatment equipment, such as point-of-entry treatment devices, water softeners, and carbon filters.⁶⁰

Adopt permitting requirements for new and modified wells.



Local Policy Opportunity

States may delegate authority to local health officials to administer well permitting requirements or partner with local health officials on well permitting and inspections.

States can require a licensed well driller to obtain a permit before drilling or constructing a new well or modifying an existing well. Permits can facilitate ongoing inspections, monitoring, and enforcement of well standards by state and local agencies and can help officials track data related to water wells such as location, depth, and construction.

EXAMPLE: In Connecticut, a licensed well driller must apply for a permit from the Plumbing and Piping Work Examining Board before “commencing work on any water-supply well.”⁶¹ The board is a specialized licensing agency within the Connecticut Department of Consumer Protection.⁶² The board may issue a permit only after confirming that the well conforms with the state’s well drilling code. Additionally, the well driller must submit the permit to the local governing body or board of health in the jurisdiction where the well is located for a signature confirming that the well conforms with the state’s public health code.⁶³ Finally, after completing the well, the well driller must provide the property owner, the examining board, and the Connecticut Department of Energy and Environmental Protection with a record including the well location and depth, local geologic conditions, water levels, and amount of well casing.⁶⁴

Establish programs providing grants or loans to property owners for well testing, water treatment, and well construction, repair, and sealing.

States can ensure that safe drinking water is accessible and affordable to everyone by establishing programs to help fund or finance improvements to private well systems necessary to protect health and safety.

EXAMPLE: Minnesota law establishes a Housing Finance Agency authorized to provide “rehabilitation loans” to low-income homeowners to help finance home improvements necessary for the health and safety of the dwelling, including well construction, repair, and sealing.^{65,66} Additionally, the Minnesota Department of Agriculture runs an “agriculture best management practices loan program” in partnership with local governments to provide financing to rural landowners for the installation of water treatment equipment, well sealing, and other practices to remediate groundwater pollution.⁶⁷



People & Industries

Require professional licensing for people who drill, construct, and repair water wells.

States can prohibit a person from drilling, constructing, or repairing a water well unless that person has obtained a license from the state to provide such services. Professional licensing helps ensure that well drillers (sometimes called well contractors) have the training and education necessary to perform the work competently. As a best practice, states can require well drillers to complete continuing education as a condition of maintaining a license to ensure well drillers stay up to date with technological changes and best practices. Additionally, states can define what types of services well drillers are authorized to provide, such as, for example, installing water pumps and treatment equipment. States may also create specialized licenses for water pump and treatment installers.

EXAMPLE: Tennessee has adopted laws requiring well drillers and “installers” to be licensed by the Tennessee Department of Environment and Conservation.⁶⁸ An “installer” is any person who installs or repairs well pumps or filters and water treatment devices.⁶⁹ To obtain a well drillers’ or installers’ license an individual must be at least 18 years of age, have a minimum of 2 years’ experience in the field for which the license is sought, complete at least grade 10 in high school or submit proof of equivalent achievement, and pass an exam administered by the state Board of Groundwater Management.⁷⁰ Licensees must complete at least 5 credit hours of continuing training annually to maintain or renew a license.⁷¹

Require **certification for laboratories** that collect, test, and analyze well water samples.

Certification helps ensure that water testing laboratories will provide accurate results and information to consumers. Additionally, states can require that people who analyze well water samples have an understanding of treatment systems sufficient to recommend appropriate corrective actions to consumers when a well is contaminated.

EXAMPLE: Rhode Island's Office of Private Well Water Contamination within the Department of Health has adopted licensing requirements for "well water purification companies," including water samplers (individuals who collect representative samples), analytical laboratories (which analyze samples using accepted and appropriate methodologies), and interpreters (individuals who interpret results, form opinions, and report conclusions using professional judgment based on existing standards).⁷² Among other things, licensed interpreters must possess "working knowledge" about water treatment systems⁷³ and may provide guidance to property owners about "what actions, if any, are needed to treat or modify the water's chemical composition" when a well is contaminated.⁷⁴

Prohibit **unfair and deceptive advertising of water treatment products** and mandate **performance standards for such products**.

In general, advertising is unfair and deceptive if it is not truthful or if it misleads consumers. A performance standard ensures that a product functions as intended and advertised.⁷⁵ States can use these policy tools to protect consumers and keep ineffective water treatment products out of the marketplace.

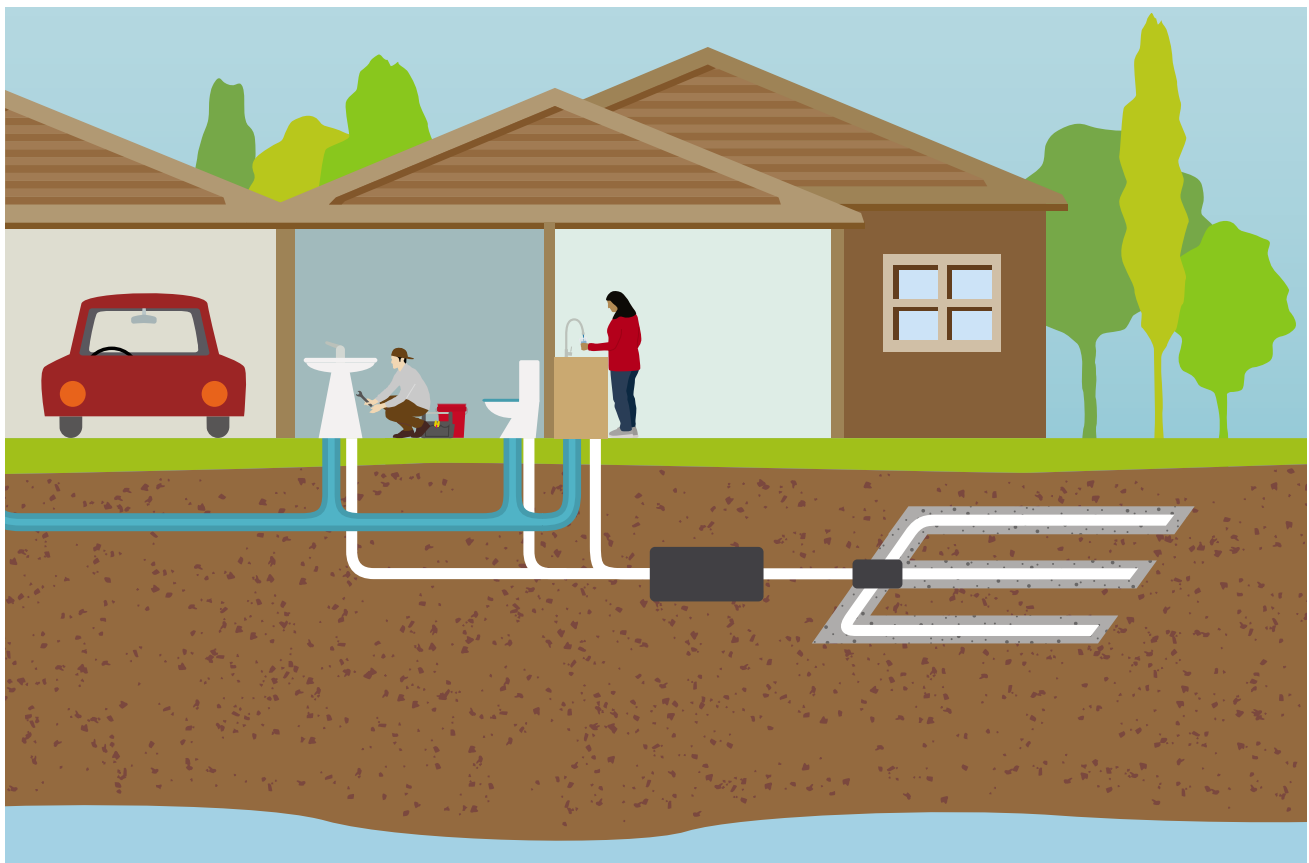
EXAMPLE: In California, a person or company is prohibited from making advertising claims that a water treatment device has health or safety benefits unless the device has been registered with the State Water Resources Control Board and has been certified by an accredited, third-party organization to show that the device will effectively reduce contaminants by the amount claimed.⁷⁶ Additionally, a person or company must not sell or distribute a water treatment device unless the registration and certification requirements are satisfied.⁷⁷

Indoor Plumbing

Private well systems encompass indoor plumbing, which delivers pumped groundwater from a pressure storage tank to the tap, where it is available to people who occupy a residence for uses like drinking, cooking, and bathing.⁷⁸

As with wells and related infrastructure, it is essential that plumbing systems are properly constructed using safe materials to prevent the introduction of contaminants to drinking water.

The following are ways that states can regulate water and water quality, land use and infrastructure, and people and industries to ensure plumbing systems are properly constructed and maintained. A range of state agencies may be tasked with implementing and enforcing policies related to indoor plumbing. Common examples include departments of environmental protection and health, and professional licensing boards. Because regulatory contexts vary by state, environmental and public health professionals interested in policies to improve the safety of indoor plumbing should consult a local attorney licensed in their state to identify what state protections exist and what additional policies or strategies may be helpful in their jurisdiction.





Water & Water Quality

Require **tap sampling** for lead and copper in private drinking water systems.

The SDWA and one of its implementing regulations, the “Lead and Copper Rule,” require public water systems to monitor the levels of lead and copper in tap water and notify consumers of the results.⁷⁹ This type of monitoring is one way to know if lead and copper are being introduced into drinking water through the plumbing system. Unfortunately, however, the Lead and Copper Rule does not apply to households served by private wells. States can fill this regulatory gap by extending tap water monitoring requirements to all water systems – both public and nonpublic. Alternatively, states can require certified water testing laboratories to collect private well water samples both at the well head and at the tap.

EXAMPLE: New Jersey law defines specific locations from which well water samples must be collected by certified laboratories to comply with the state’s Private Well Testing Act.⁸⁰ If there is no water treatment system on the property, samples must be taken “from a primary cold water, non-aerated spigot or tap, that draws from, or feeds water to the potable water system for the subject property.”⁸¹ If “the purposes of testing is to determine whether the source of a contaminant is the water source or the plumbing, a first draw sample shall be collected from an area of the plumbing where the water has been motionless for at least six hours,” and the results must be compared with a sample collected at a location prior to the water treatment system.⁸²



Land Use & Infrastructure

Adopt a **plumbing code** to set minimum standards for the installation and maintenance of plumbing systems.

States can ensure the long-term safety of indoor plumbing and reduce the risk of contamination by adopting a mandatory plumbing code. Among other things, plumbing codes can implement a federal rule prohibiting the use of materials in plumbing systems with lead content above a safe level.⁸³

EXAMPLE: Under the Alabama Lead Ban Act of 1988, it is “unlawful for any person constructing, installing, or repairing a drinking water system or plumbing to provide drinking water to use any pipe, solder or flux which is not lead-free in the construction, installation or repair of such system or plumbing.”⁸⁴ The law defines “lead-free” as “[a] solder or flux containing not more than 0.2 percent lead and pipes, fittings, joints, or liners containing not more than eight percent lead.”⁸⁵



Local Policy Opportunity

States may delegate authority to local governments to implement and enforce statewide plumbing codes, and may authorize local governments to adopt plumbing standards that exceed state requirements.



People & Industries

Require **professional licensing** for plumbers.

States can require licensing to ensure individuals who do plumbing work have the adequate skills and training to protect public health. States can also define the scope of work that licensed plumbers may engage in, for example, whether plumbers are authorized to install water treatment equipment.

EXAMPLE: The Rhode Island Plumbing License Law⁸⁶ prohibits individuals from engaging in various conduct related to “plumbing” without an appropriate license issued by the Rhode Island Department of Labor and Training.⁸⁷ “Plumbing” means work related to fittings, fixtures, and appliances located within a building or structure or within 5 feet of its outer walls that connect the building to a public or private water supply.⁸⁸ The state updated the Plumbing License Law in 2016 to include new licensing requirements for water treatment and filtration professionals.⁸⁹ “Commercial water-filtration/treatment-system work” means “any alteration, installation or repair of water-filtration/treatment systems in which the piping exceeds one and one-half inches (1.5”) or the flow rate exceeds eighty (80) gallons per minute.”⁹⁰

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