Office of Drinking Water

Guidance for Local Government: Physical and Potable Water Availability

Considerations When Approving Water Sources for Individual Homes and Other One- and Two-Party Water Systems not Covered by the State's Group B Public Water System Rule

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1. Introduction

This guidance was developed by the Department of Health (DOH) at the request of local environmental public health directors. The purpose is to assist and improve local government's understanding of public health considerations of potable and physical adequacy when approving new sources of water for individual homes (RCW 19.27.097) and other one- and two-party water systems not covered by the state's Group B rule (WAC 246-291-005). This guidance does not apply to any water system covered by the state's Group A rules or Group B rules.

This document replaces the potable and physical portions of *Guidelines for Determining Water Availability for New Buildings*, April 1993, Department of Ecology (Ecology) Publication 93-27. Local government may need to coordinate with Ecology to ensure that the intended water supply meets adequacy criteria.

DOH **does not** provide regulatory oversight or approval of sources for individual homes and other one- and two-party water systems not covered by the state's Group B rule. This guidance reflects DOH's opinion on factors related to potable supply and public health. We encourage local governments to adopt their own ordinance that reflects the values and circumstances of their local jurisdiction.

As a matter of public health policy and the safety and reliability of water sources, DOH believes that every individual in the state, regardless of the type of water system at their home or place of business should be supplied by the highest quality source feasible. To that end, individual homes and other one- and two-party water systems not covered by the state's Group B rule should obtain their potable water from the following sources, listed in order of preference.

1. From a Group A municipal water supplier that has demonstrated technical, managerial, and financial capacity in an approved planning document.

2. From a non-municipal Group A regulated public water system with an approved design, certified operator, and green operating permit with available capacity within the identified service area.

3. From a Group B system with an approved design, operated by a Satellite Management Agency (as applicable) with available groundwater source capacity.

4. From an individual or two-party drilled well designed and approved to local standards that abide by or are similar to the DOH Group B Design Guidelines.

5. From a spring, dug well, or surface water source (i.e. lake, river). We consider these surface or near-surface options high-risk and only applicable to individual homes, where the individual homeowner assumes all the risk of failure of the water treatment system.

6. From an alternative water supply based on the principles and guidelines within this document (an alternative source is any source that is not a conventional ground or surface water source. This includes collected rainwater, water hauled to a home, or desalinated seawater). We consider this option high-risk and only applicable to individual homes, where the individual homeowner assumes all the risk of failure of the alternative supply.

This guidance does not address whether water from a source is legally allowed. Do not take anything in this guidance as DOH's determination on the legal adequacy/availability of water. When making a water adequacy determination, local government should evaluate whether there is a legal, physical, and potable water supply to support the land use decision (*Whatcom County, Hirst (Eric)* v: *W Wash. Growth Mgmt. Hr'gs Bd.,* No. 91475-3). Different departments within local government (such as planning, building, and environmental health) have a role in ensuring all adequacy criteria is met. Inquiries regarding the legal availability of water should be directed to either the county or Ecology.

Topics covered in this guidance include regulatory considerations for the design of individual homes and other one- and two-party water systems not covered by the state's Group B rule using conventional or alternative sources of water supply; minimum daily water quantity considerations; minimum water quality testing requirements; construction standards for wells and cisterns; and considerations for monitoring and assurance of potable supply to ensure protection of public health. Additionally, the Appendix provides an overview for the design of Group B water systems.

2. Sources

This chapter introduces the different types of sources potentially available for individual homes and other one- and two-party water systems not covered by the state's Group B rule. These sources include ground water, surface or near surface water, and alternative sources.

Conventional Sources

Ground Water

Ground water means all waters that exist beneath the land surface or beneath the bed of any stream, lake, or reservoir, or any other body of surface water within the boundaries of the state (RCW 90.44.035).

For domestic use (not including irrigation or other uses), the ground water permit exemption (RCW 90.44.050) allows the use of up to 5,000 gallons per day (gpd) for single or multiple homes without obtaining a permit. Ground water permits granted by Ecology must authorize any ground water withdrawals exceeding 5,000 gpd. Additionally, multiple exempt wells for a single development that exceed 5,000 gpd are not allowed; they must have a water right. Certain watersheds under Ecology's instream flow rules or subject to other legal agreements have mitigation requirements, daily limits, or reserved amounts of water for permit-exempt wells that may differ from the 5,000 gpd exemption. Consult with Ecology for further guidance on any such limitations.

Construct wells in adherence with the Water Well Construction Standards (Chapter 173-160 WAC). All sources of water carry a risk of inorganic and organic contamination. Initial sampling and ongoing monitoring should be conducted for new and existing wells for quality and suitable quantity (see the Appendix and Chapter 3). Depending on the water quality test results and flow rate, treatment and/or storage may be necessary. Wells may also require testing for surface water influence. Wells that have a screened interval fifty feet or less from the ground surface at the wellhead, and are located within 200 feet of a freshwater surface water body, may be drawing from a Ground Water Source under the Direct Influence of Surface Water (GWI). Consult (DOH Publication 331-230) for hydraulic connectivity before approving for public use. Ranney wells, infiltration galleries, and springs must also be tested. Confirmed GWI sources require treatment similar to surface water sources. Local restrictions may require well construction setbacks from surface water sources or salt water bodies.

Surface Water

For the purpose of this document, surface water means any body of water, whether fresh or marine, flowing or contained in natural or artificial depressions for significant periods of the year, including natural and artificial lakes, ponds, rivers, streams, swamps, marshes, tidal waters, GWI wells, and many springs. Surface water sources are open to contamination from human and animal waste and other pollution. Surface water and near surface water sources (springs, dug wells) are particularly susceptible to contamination by organisms such as disease-causing bacteria, viruses, and parasites. Surface water systems are demanding on both the operator and

the approving authority because they require higher levels of expertise and attention to operate safely. This includes operation of filtration and disinfection equipment as well as frequent monitoring. Through issuance of a surface water permit, Ecology must authorize use of any surface water source. Other conditions may apply to ensure the continuing adequacy of the supply for current and future water users.

Alternative Sources

For the purpose of this guidance, an alternative source is any source that is not a conventional ground or surface water source as described above. Local ordinances/alternative water supply programs should develop stringent standards that define what actions are required for the alternative supply to meet those standards, with the overall goal of promoting a safe and reliable water supply that protects public health and minimizes risk.

Topics addressed in any local ordinance/alternative water supply program should include design and construction, operation and maintenance, an implementation and enforcement plan, and monitoring and reporting. **Local health jurisdictions approving alternative water sources should plan for additional resources and personnel to provide ongoing oversight and assurance of public health and safety.** In almost every case, a licensed professional engineer with experience related to the proposed technology should design the water system and prepare an operations and maintenance plan. Additional considerations for alternative water supply programs are identified later in this chapter.

Guidance presented below describes construction, operational, and regulatory considerations associated with the use of alternative sources. Do not take this guidance as DOH endorsement on the use of an alternative source. These water sources pose a greater health risk compared to a drilled well due to risk of contamination, complex oversight/maintenance, and/or reliability concerns. Unless a home is receiving potable water from a regulated Group A or B public water system, ground water from a drilled well constructed according to state well construction standards (WAC 173-160) represents a better source for individual water supplies and other one- and two-party water systems not covered by the state's Group B rule because of its reliability, quality, and relative ease of use. In areas where it is deemed by Ecology or the local government that water is not legally available from a groundwater source, the local jurisdiction and the applicant should explore groundwater mitigation options with Ecology before considering approval of an alternative water supply.

Use of Cisterns

A cistern (storage tank) is an integral part of a trucked water and/or rainwater catchment alternative water supply system. For individual homes and other one- and two-party water systems not covered by the state's Group B rule, DOH defers to a local government's authority to accept the use of an alternative water source as proof of water adequacy for issuance of a building permit. To reduce the health risk associated with the use of a cistern storing trucked water and rainwater catchment, local ordinances should include a requirement for an advanced level of water treatment, including filtration and disinfection capable of achieving 2-log removal

of *Cryptosporidium*, 3-log removal/inactivation of *Giardia,* and 4-log removal/inactivation of viruses before entry into a home or other premises (point of entry treatment).

A professional engineer familiar with filtration and disinfection treatment should design the treatment processes and Operations and Maintenance (O&M) plan. Local government should require the O&M plan be recorded on the parcel deed/covenant to ensure each future owner knows how to operate and maintain their treatment system.

Trucked water, rainwater collection, and combined systems all need sufficiently sized cisterns in order to meet per capita/daily/weekly/monthly consumption requirements. The Appendix and Chapter 3 discuss minimum consumption requirements. We give considerations for the use of these alternative sources below.

Trucked Water

Trucked water is any water conveyed by a hauler from a source to a connection, owner, or storage tank by means other than transmission and distribution pipes. DOH does not regulate or certify water haulers. DOH Publication 331-063 provides guidance on proper disinfection of trucks for the transport of water. It is the responsibility of any water system owner receiving hauled water to ensure that their supplier is observing these procedures. Despite these procedures, regular, repeated loading, transport, and delivery of trucked water over many years is highly susceptible to contamination. Trucked water might also be stored in a cistern for an unpredictable length of time, which creates a higher likelihood of bacteriological growth. Local governments considering trucked water as an approved water supply should consider the inherent contamination risk and the reliability of local hauling companies to ensure the regular delivery of water and adopt ordinances that limit such risk. Legal availability issues should also be considered, which could potentially arise if the trucked water is from another water basin.

Considerations for local government when adopting ordinances for the regulation of trucked water include the following.

- Requirements that the applicant evaluate all other preferred sources of water and found that no other viable source was available. Preferred sources should include, 1) connection to an existing public water system, 2) connection to a neighboring well, 3) drilling a new well.
- Licensing requirements for commercial and private water haulers.
- Minimum equipment and disinfection requirements for commercial and private water haulers.
- Periodic sanitary inspections of commercial water hauling equipment.
- Local oversight and regulation of water haulers and their equipment.
- Requirements for the use of backflow prevention devices when filling trucks and cisterns.
- Recordkeeping of the metered quantity and quality of all water received from the original source and deliveries of water.

- Requirements that identify the acceptable source of water from which haulers may fill up, including any permission from state or local government or a public water system (DOH advises that any hauled water originate from an approved source of a public water system).
- Approved areas of the county where hauled water may be delivered.
- Contract agreements between public water systems and the hauler to ensure water is available from the water system to meet long-term demand of the haulers customers.
- Notice on the property title, recorded at the county, that the home relies on an alternative water source.
- Cistern design requirements by professional engineers or other technical experts with experience designing alternative water systems.
- Operation and Maintenance plan recorded at the county to ensure future owners are aware of basic operation, monitoring, maintenance, and any reporting requirements required by county.
- Minimum storage capacity requirements of the cistern in combination of trucked water delivery (schedule and volume) to meet daily, weekly, monthly, and/or annual demand.
- Minimum demand calculations/requirements according to designing engineer's recommendations or local government requirements.
- Minimum treatment requirements - consider requiring point-of-entry treatment providing a minimum 4-log inactivation of viruses, to mitigate the high risk of contamination during transport, delivery and storage.
- Periodic water quality testing and reporting to local government, according to the design engineer's recommendations or local government requirements.
- Requirements that any water quality tests required by local government are performed by a state approved public health lab.

Rainwater Collection

Local governments should consider both quality and quantity when considering adoption of an ordinance for use of rainwater as a sole source in individual homes and other one- and two-party water systems not covered by the state's Group B rule.

It is costly to size a cistern big enough to accommodate a sole-source rainwater collection system capable of meeting consumption requirements discussed in Chapter 3 during periods of drought in all but the wettest parts of the state. Rainwater collection systems should not be designed on the assumptions that average annual rainfall will meet household demand throughout the year. Local government allowing rainwater catchment should adopt a trucked water program to supplement their potable rainwater program in order to meet demand during the dry season or drought years.

Rainwater collected from rooftops may contain human pathogens such as bacteria, viruses, and protezoans originating from birds, mammals, or other sources of fecal matter that would require proper treatment. The water collected off rooftops is considered surface water, requiring filtration and disinfection treatment to satisfying the surface water treatment rule. Rainwater stored in a cistern should be treated upon entry into the home (point of entry treatment) in order to reduce exposure to contaminants and minimize health risk.

Considerations for local government when adopting ordinances for the regulation of rainwater catchment for individual homes include:

- Requirements that the applicant evaluate all other preferred sources of water and found that no other viable source was available. Preferred sources should include 1) connection to an existing public water system, 2) connection to a neighboring well, 3) drilling a new well.
- Any approvals from Ecology regarding the use of rainwater without the need for a water right permit.
- Compliance with minimum industry standards for materials and equipment used to design and store rainwater.
- Restrictions on the use of certain materials and equipment used to capture and store rainwater. Site plans on the location of storage tanks, setbacks, or other design requirements that limit sources of contamination to a rainwater storage tank such as septic drainfields, stormwater trenches, etc.
- Rainfall catchment water budget calculations estimating the predicted collected rainfall projections for potable use.
- Notice on the property title, recorded at the county, that the home relies on an alternative water source.
- Local oversight and regulation of rainwater catchment systems.
- Cistern design requirements by professional engineers or other technical experts with experience designing rainwater catchment water systems.
- Operation and Maintenance plan recorded at the county to ensure future owners are aware of basic operation, monitoring, maintenance and any reporting requirements required by county.
- Design criteria for rainfall occurrence (i.e., 10-year, 25-year, or 50-year drought rainfall distribution), which will enable prediction of the duration and volume of trucked water needed to supplement rainfall to meet the engineer's recommendations or the jursidication's minimum water supply requirements.
- Minimum storage capacity requirements of the cistern to meet daily, weekly, monthly, and/or annual demand based on locally adopted rainfall design criteria—consider adopting at least the ten-year drought as design criteria.
- Minimum demand calculations/requirements according to designing engineer's recommendations or local government requirements.

- Identification of an emergency source of supply when sufficient rainfall cannot meet demand such as a local filling station or trucked water contract with a local hauler.
- Minimum treatment requirements—DOH advises point-of-entry treatment including filtration and disinfectiontreatment satisfying the surface water treatment rule. See WAC 246-290 Part 6.
- Periodic water quality testing and reporting to local government, according to the design engineer's recommendations or local government requirements.
- Requirements that any water quality tests required by local government are performed by a state approved public health lab.

Combined Sources Stored in Cisterns

Trucked water may be feasible on a year-round basis, but it is likely the most expensive year-round water supply option. Applicants seeking to reduce operating costs will consider rainfall catchment in combination with trucked water. Rainfall catchment is not a feasible option without constructing a very large cistern capable of supplying the average daily demand during extended drought. Applicants seeking to reduce initial construction costs and increase the reliability of their water supply will consider trucked water in combination with rainfall catchment Local governments allowing cisterns should establish baseline criteria/protocol to ensure the reliable transitions between rainwater and trucked water sources. This can range from ensuring the availability of trucked water during seasonally dry periods; design that accounts for the worst-case water quality, changes in water chemistry from one type of supply to another and its corrosive impact on the storage cistern, components of water delivery, and the need to alter the treatment process.

Seawater Reverse Osmosis

Although seawater is subject to water right law, Ecology does not require a water right permit at this time. However, local governments looking to develop approval conditions for seawater as a source for individual systems should consider the reliability and operational expertise required for operation of the treatment system required to provide potable water including desalination and disinfection. Desalinated seawater should be disinfected to accomplish 4-log virus inactivation.

Greywater and Stormwater Reuse

DOH does not approve direct potable reuse of greywater or stormwater as a public drinking water supply at this time. Greywater means domestic type flows from bathtubs, showers, bathroom sinks, washing machines, dishwashers, and kitchen or utility sinks. Greywater does not include flow from a toilet or urinal. Stormwater refers to rainwater runoff not collected by a rainwater catchment system.

State rules do not allow use of greywater and stormwater for indoor non-potable use where residents have access to plumbing systems for repairs or modifications (WAC 51-56-1500) due to the health risk associated with cross connection between the potable and non-potable water

system. However, use for outdoor subsurface irrigation (such as for lawns, shrubs, or trees) limits human contact and can be considered, especially when that use would reduce the demand for potable water. Counties must adopt Chapter 246-274 WAC, Greywater Reuse for Subsurface Irrigation, before issuing approvals/permits (WAC 246-274-007). S trict enforcement of local building codes, emphasizing permitting and inspection to assure avoidance, elimination, and control of cross connections between potable and non-potable outdoor subsurface irrigation plumbing.

3. Water Quantity and Quality

Water Quantity

The water supply for an individual home and other one- and two-party water systems not covered by the state's Group B rule should be reliable and adequate for all expected water uses. For a single family home the domestic in-home demand includes, but is not limited to, some incidental outdoor uses such as car washing, minimal irrigation of potted plants, and other insignificant outdoor use. It does not include the irrigation of up to ½ acre of lawn or non-commercial garden as allowed under the ground water permit exemption.

DOH recommends the water supply capacity of an individual home or other one- and two-party water systems not covered by the state's Group B rule follow the criteria for Group B water systems. To ensure an individual home doesn't run out of water, DOH recommends that local jurisdictions avoid adopting an ordinance for domestic in-home demand that calls for less than 350 gpd/home under maximum daily demand and 200 gpd/home as the long-term average daily demand, whether the source is from a well or alternative water supply such as rainwater or trucked in to fill a cistern (see Appendix A). See the Group B Design Guidelines for well pumping test guidance.

Based on our experience, in-home domestic water demand generally increases with the size of the home. The success of an aggressive indoor and outdoor water conservation program/standards is dependent on individual consumer values and attitudes towards conservation. Consumers may not always select high efficiency plumbing fixtures and appliances. Outdoor water uses are dependent on landscape design, soil type, and average summer temperatures. Landscaping can consume thousands of gallons per day during the summer. Look to EPA's WaterSense certification program for guidance and selection of water efficient products that reduce outdoor and indoor use.

Source and/or service meters may be necessary to validate the water quantity design assumptions or compliance with a water right. Local jurisdictions may consider establishing an ordinance requiring meter installation for individual homes to substantiate water quantity limits or conditions recorded on the parcel deed/covenant.

Water Quality

It is not enough to have water in sufficient quantity. Water, regardless of the source, must be deemed both safe and reliable before it can be put to potable use. This necessitates sampling requirements designed to determine if the water quality from a source is safe. These initial tests will help to determine if the source water needs any treatment.

If an individual source exceeds a primary MCL, indicates coliform contamination, or is a surface water or alternative source of supply, then the local health jurisdiction should ensure the source is provided the appropriate treatment and ensure appropriate on-going monitoring is implemented. WAC 246-290-351 summarizes monitoring for groundwater disinfection, WAC

246-290-455 summarizes monitoring for chemical removal treatment plants, and WAC 246-290 Part 6 describes surface water treatment monitoring.

Initial Sampling

Sampling to determine the initial water quality of a source is essential to its assessment. Contaminants of concern that have been found in many areas of the state include coliform, nitrate, iron, manganese, and arsenic. Initial sampling for private wells should include, at a minimum, coliform and nitrate due to their acute health risk. The three other contaminants of concern (arsenic, iron, and manganese) are naturally occurring inorganic contaminants found in many areas of the state. As a result we recommend initial sampling, especially in areas where its presence has been previously discovered in ground water, to establish baseline levels that can inform well owners as to whether they might consider treatment. In addition, we advise initial tests for volatile and/or synthetic organic chemicals if the area has any history of organic contamination, or land use in the area indicate current or past application, storage, or disposal of organic chemicals. For wells located near salt water we recommend initial testing for chloride. We also recommend sampling for uranium in northeastern Washington and any other locations where local government is aware of uranium or radon (a byproduct of uranium decay) in groundwater.

Table 3.1: DOH Recommendations for Water Quality Testing

	Testing Frequency	Why Test	Where to Test
Coliform, Nitrate	Initial sample and annual	Acute contaminant; high short-term health exposure risk	All areas of the state
Arsenic	Initial sample*	Primary chronic contaminant; long-term exposure risk	All areas where known/suspected contamination
Iron, Manganese	Initial sample*	Non-acute secondary contaminant; aesthetics	All areas where known/suspected contamination
VOC's/SOC's	Initial sample*	Primary chronic contaminant; long-term exposure risk	All areas where known/suspected contamination
Chloride	Initial sample*	Primary chronic contaminant; long-term exposure risk or aesthetics at low levels	Coastal areas where known/suspected contamination (sea water intrusion)
Uranium	Initial sample*	Primary chronic contaminant; long-term exposure risk	NE Washington or areas where known/suspected contamination

**Ongoing monitoring based on initial test concentration.*

DOH publication 331-349 provides information regarding water quality testing for private wells. The publications below describe common sampling procedures.

- DOH publication 331-219—General sampling procedure.
- DOH publication 331-222—Nitrate sampling procedure.
- DOH publication 331-225—Coliform Distribution System Sampling Procedure.

Treatment

Local Health Jurisdictions considering a treatment waiver may wish to reference the DOH publications below for specific information on different contaminants.

- DOH publication 334-156—Arsenic and your private well.
- DOH publication 331-056—Radionuclides in drinking water.
- DOH publication 331-177—Lead in drinking water.
- DOH publication 331-178—Copper in drinking water.
- DOH publication 331-214—Nitrate in drinking water.

On-Going Monitoring

Regardless of the testing done to establish the initial water quality, any system relying on treatment to produce safe and reliable drinking water is dependent upon proper operation. Ensuring treatment processes continue to function properly requires an on-going monitoring program implemented by the local health jurisdiction. Based on the source, contaminant(s) of concern, intended use, and type of treatment, the testing may differ in terms of frequency and composition.

We recommend local health jurisdictions implement a standard for on-going coliform and nitrate, even for individual water systems that provide no treatment. We recommend no less than annual testing for coliform and nitrate.

Point of Use and Point of Entry Options

Point of Entry (POE) equipment treats all the water used in the house or premise. Point of Use (POU) systems treat water at a single tap, such as a kitchen sink faucet. DOH does not approve POU or POE treatment options for public water systems. For individual homes, POU options exist to treat some contaminants. However, authorities considering approval of POU treatment should weigh the inherent risk associated with knowing that some plumbing fixtures within a house will have non-potable water. This situation is unacceptable if the contaminant poses an acute health risk, such as surface water, coliform, and nitrate. Additionally, POU systems that exist "out of sight, out of mind" may not be monitored or operated with the same vigilance as other options. Therefore POE treatment is typically preferable to POU. See Chapter 2 for additional information to consider for alternative water supplies.

Certain constituents in the untreated water supply may have a significant impact on how well a particular POU or POE device functions. Before approving either of these options the local health jurisdiction exercising authority to approve treatment should determine which untreated water quality parameters (such as pH, alkalinity, total dissolved solids, sulfate, silica, etc.) should be analyzed. Consider requiring that POU and POE equipment be certified by NSF International, a not-for-profit public health and safety company that tests home water treatment systems.

Approval Conditions, Liability, and Title

Treatment of drinking water requires consistent action on the part of the owner. There is no amount of planning or design that makes a treatment system "foolproof". Any system design should include the operation and maintenance activities that are necessary to ensure that the treatment will continue to perform as originally designed. The initial owner and all future owners should be able to ensure that these activities are consistently performed to maintain water adequacy. See Chapter 2 for additional information to consider for alternative water supplies.

Design assumptions, maintenance and operating requirements, and approval conditions associated with a surface or alternative source should be disclosed on the property title to ensure that information essential to the long-term safety and reliability of the source and treatment are communicated between the current and future owner.

4. Construction Standards

This chapter describes some of the design and construction standards necessary for individual homes and other one- and two-party water systems not covered by the state's Group B rule relying on a well as their source of supply. Local health jurisdictions may adopt their own regulations that offer broader design options and/or impose increased regulation to protect against public health risks.

Wells

The local health department should inspect all well sites before drilling. A copy of the well log must be provided to verify construction characteristics, vulnerability to contamination, and aquifer information. Construct wells according the standards identified in WAC 173-160. The well casing must extend at least six inches above the finished ground surface, or at least six inches above the pump house finished floor. The top of the well casing must be at least 24 inches above the 100-year flood elevation. Minimum water quality tests must be conducted (see Chapter 3). The well must provide sufficient water to meet peak hourly demand if there isn't any supplemental stored-water (known as equalizing storage), and must provide water to meet maximum daily demand if there is adequate equalizing storage.

Pressure Tanks

Pressure tanks are a type of tank containing pressurized air and water separated by a membrane (bladder), commonly used as part of a water system. They help maintain a desired range of water pressure in the water system, minimize pump cycling, and protect against water hammer if sized appropriately in conjunction with the pump. As water pressure changes, the volume of air in a bladder pressure tank contracts or expands. Bladder pressure tanks do not provide any useful water storage capacity. On average, a bladder pressure tank lasts five to seven years.

Simple Fixes for Wellhead Openings

Damaged wellheads can contaminate the drinking water supply. Replace damaged well seal/casing cap and repair damaged well casing. Repairs should be durable and watertight. Ensure the opening around the electrical conduit entering the well casing is sealed. Install an inverted, screened well casing vent if one is not present and replace straight, open well vents with inverted screened vents. Cover the vent opening with a non-corrodible 24-mesh screen to exclude insects, rodents, and other small animals. Eliminate rodents from the well house and area around the wellhead. For more detailed explanations of these fixes, refer to *Simple Fixes for Wellhead Openings* (DOH 331-232)

Cistern Hatches and Vents

Cisterns must have adequate sanitary protection to prevent the water supply from being contaminated. Water storage facilities should have dedicated screened vents designed to allow air in and out to balance internal pressures when water levels change. Vents should be constructed and maintained to avoid plugging or air restriction from ice build-up. Access hatches should be weatherproof and exclude entry of bats, insects, birds, and other animals. An

access hatch should be locked to prevent unauthorized access. The edge or framed portion of the opening should extend at least four inches and preferably six inches above the surrounding roof or ground surface to prevent surface water from entering the cistern. The lid should be sturdy, of durable construction, overlap the framed portion at least two inches, and form a watertight seal. Designs of access hatches on buried tanks must keep out dirt, debris, and surface runoff. For more detailed explanations refer to DOH 331-249 and DOH 331-250.

Appendix

Group B Public Water Systems

This Appendix discusses availability considerations for public water systems covered by the state's Group B rules (WAC 246-291). Group B Public Water Systems range in size up to 14 connections and servie fewer than 25 people. New or expanding water systems designed and intended to serve ten or more dwelling units must follow the Group A public water system approval process (WAC 246-291-200(2)). In counties where DOH is the approving authority, DOH will not approve any Group B public water system source that requires treatment for a primary Maximum Contaminant Level (MCL) contaminant. Further, WAC 246-291 does not allow approval of springs, surface water/rainfall catchment, dug wells, wells found to be under the direct influence of surface water, and trucked water as a Group B water supply.

It is permissible for a local health jurisdiction with their own Group B ordinance to issue a waiver from any limitation of the state Group B rule. The waiver would grant them the option/discretion to consider alternative water supply options that the state cannot consider. A local health jurisdiction wishing to allow the use of alternative water sources should adopt a Group B ordinance that meets or exceeds the DOH standards for the protection of public health and safety.

Local health jurisdictions may accept primary responsibility for the approval of Group B water systems through a Joint Plan of Responsibility (JPR) with DOH (WAC 246-291-030), which could potentially allow for the approval of alternative sources listed in Chapter 2, subject to mutual agreement. If a local health jurisdiction wishes to unilaterally allow for the approval of alternative sources for a Group B system that the state cannot consider, it should adopt its own local ordinance.

Water Quantity

Minimum Design Standards

For Group B water systems, the Maximum Day Demand (MDD) is the maximum single-day demand the water supply must meet. It consists of in-home domestic demand, outdoor demand, nonresidential demand, and all leaks throughout the water system.

WAC 246-291-125 (4) specifies the minimum source capacity per dwelling connected to a Group B water system. Sources must demonstrate this capacity to meet the minimum standard for long-term reliability and public-health protection. The results from the well's pump test must prove it can meet the minimum capacity requirements established in Table A.1. Peak hourly demand for dwellings is tabulated in Table A.2.

Table A.1—Standards for Minimum Source Capacity and Minimum MDD for Residential Service Connections

County	Gallons per day per dwelling unit
Clallam, Clark, Cowlitz, Grays Harbor, Island, Jefferson, King, Kitsap, Lewis, Mason, Pacific, Pierce, San Juan, Skamania, Skagit, Snohomish, Thurston, Wahkiakum, and Whatcom	750
Adams, Asotin, Benton, Chelan, Columbia, Douglas, Ferry, Franklin, Garfield, Grant, Kittitas, Klickitat, Lincoln, Okanogan, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman, and Yakima	1,250

Table A.2—Guide for Minimum Residential Peak Hourly Demand

Number of dwelling units	Peak hour demand (gpm)
2	23
3	26
4	28
5	31
6	34
7	36
8	39
9	41

Because residential MDD and Peak Hour Demand (PHD) includes indoor and outdoor uses, the actual demand could be considerably higher than the minimum values listed in Tables A.1 or A.2. The design engineer should strongly consider whether the minimum values in these tables are sufficient to meet the expected demands of future customers. The effect of under-estimating the MDD or PHD includes low pressure, summertime water rationing, dissatisfied customers, and increased vulnerability to backsiphonage of non-potable water into the distribution system.

Water Efficiency and Water Meters

Source meters are required for all Group B water systems. In addition to the source meter requirement, DOH recommends service meters for Group B public water systems because:

1. Collecting metered data provides an important tool to promote a safe and reliable supply of water especially during water shortages, droughts, and emergencies. Systems

that regularly analyze metered water usage are in a better position to make decisions about long and short-term water supply strategies.

2. Customers on public water systems that use the most water have a greater impact on the water supply and increase operation and maintenance costs such as increased wear and tear on infrastructure, the need for more chemicals for water treatment, increased storage capacity to meet peak demand, increased pump horsepower, and higher energy costs.

3. Home consumption can only be identified through individual water meter records and indicate how much water each home is using, thus making it easier to establish water reduction targets and the ability to identify leaks that may damage private property.

4. Metering information is necessary to demonstrate compliance with a water right, if required.

Water Quality

It is not enough to have water in sufficient quantity. Water, regardless of the source, must be deemed both safe and reliable before it can be put to potable use. This necessitates sampling requirements designed to determine if the water quality from a source is safe and reliable. These initial tests will help to determine if the source water needs any treatment.

If a Group B source exceeds an primary MCL, indicates coliform contamination, or is a surface water or alternative source of supply, then the local health jurisdiction with approval authority must ensure the source is provided the appropriate treatment and ensure the appropriate on-going monitoring is implemented. WAC 246-290-310 tabulates inorganic MCLs. For sources requiring treatment, the approval process may require initial pilot testing of the proposed treatment process (which may involve substantial water quality data collection) to ensure that the technology is appropriate and the design engineer has the information necessary to properly design the treatment process.

Initial Sampling

Sampling to determine the initial water quality of a source is essential to its assessment. DOH requires initial sampling for Group B wells for complete inorganic chemical analysis and coliform analysis. In addition, initial tests for volatile and/or synthetic organic chemicals should be made in an area with history of organic contamination, or land use in the area indicate current or past application, storage, or disposal of organic chemicals. We also call for uranium analysis in northeastern Washington and any other locations where local government is aware of uranium or radon (a byproduct of uranium decay) in groundwater.

WAC 246-291-170 describes the minimum initial water quality analysis that must be performed for public water sources. The publications below describe common sampling procedures.

- DOH publication 331-219—General sampling procedure.
- DOH publication 331-222—Nitrate sampling procedure.
- DOH publication 331-225—Coliform Distribution System Sampling Procedure.

Treatment

As previously mentioned, DOH will not approve wells with contaminant concentrations exceeding a primary MCL for Group B water systems. Local Health Jurisdictions considering a treatment waiver may wish to reference the DOH publications below for specific information on different contaminants.

- DOH publication 334-156—Arsenic and your private well.
- DOH publication 331-056—Radionuclides in drinking water.
- DOH publication 331-177—Lead in drinking water.
- DOH publication 331-178—Copper in drinking water.
- DOH publication 331-214—Nitrate in drinking water.

On-Going Monitoring

Regardless of the testing done to establish the initial water quality, any system relying on treatment to produce safe and reliable drinking water is dependent upon proper operation. Ensuring treatment processes continue to function properly requires an on-going monitoring program implemented by the local health jurisdiction exercising approval authority for treatment. Based on the source, contaminant(s) of concern, intended use, and type of treatment, the testing may differ in terms of frequency and composition. DOH engineers are available to consult with local health staff considering approval of treatment and establishing associated on-going monitoring expectations.

We recommend any local health jurisdiction exercising on-going monitoring authority within its jurisdiction include a standard for on-going coliform and nitrate, even for Group B water systems that provide no treatment. We recommend no less than annual testing for coliform (from distribution system) and nitrate (from each source).

Construction Standards

Described below are some of the design and construction standards necessary for Group B water systems relying on a well as their source of supply. Local health jurisdictions may adopt their own regulations that offer broader design options and/or impose increased regulation to protect against public health risks. All materials used in substantial contact with drinking water must be listed under NSF 61. Any additives/chemicals used in drinking water treatment must be listed under NSF 60. All water system components must comply with the federal standards for "lead free".

Wells

The local or state health department should inspect all well sites before drilling. A copy of the well log must be provided to verify construction characteristics, vulnerability to contamination, and aquifer information. Construct wells according the standards identified in WAC 173-160. The well casing must extend at least six inches above the finished ground surface, or at least six inches above the pump house finished floor. The top of the well casing must be at least 24 inches above the 100-year flood elevation. Minimum water quality tests must be conducted (see Chapter 4). The well must provide sufficient water to meet MDD and PHD with or without a supplemental stored-water supply (known as equalizing storage).

Pump Test

A pump test is required for all Group B water systems to ensure the source can meet demand under any conditions encountered throughout the year and over the life of the well. The pump test must provide the static water level, sustainable yield, drawdown, recovery rate, and duration of pumping. The test must be long enough to demonstrate the well can produce the minimum supply requirements defined in WAC 246-291-125 (4)(d) and recover to at least 95 percent of pre-pumping levels within a normal 24-hour operational period.

If the Group B well pump test indicates a well yield of 5.0 gpm or less, the design must include a contingency plan describing short and long-term measures to restore water to consumers if the supply becomes inadequate to meet demand (WAC 246-291-140). The plan should identify how the system will continue to provide at least 350 gpd per residence of safe drinking water. Maintaining this minimum level of supply presumes the community is capable of prohibiting all outdoor water use, and that distribution system leakage is virtually nonexistent.

Reference to State Plumbing Code Regulations

All water system designs must comply with locally adopted national model codes including the Uniform Plumbing Code (UPC). The UPC includes details regarding installation and construction of system components more detailed than the scope of this document. However, there are calculations in the UPC related to water usage that you may find useful when assessing adequacy. These tables are found in the DOH *Group B Water System Design Guidelines* (DOH 331-467).

System Pressure and Atmospheric Storage

Public water systems must provide at least 30 psi during PHD conditions along property lines adjacent to distribution mains and at the point of service to each customer connected to the distribution system. Distribution system pressure should not exceed 100 psi. Base well pump selection on pump test results. If the well can produce at least the anticipated PHD, select a well pump capable of pumping at a rate equal to or greater than the PHD and within the capacity of the well. A well and well pump capable of satisfying the PHD eliminates the need for equalizing storage. If the well cannot produce at least the PHD, then include an atmospheric (unpressurized) storage tank and booster pump (if necessary) to maintain at least 30 psi during PHD conditions.