

Guidelines for Group B
**Public Water System
Approval**

Reformatted May 2005
(Published July 1994)



DOH #331-077

Guideline for Group B
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Approval**

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For more information or additional copies of this publication contact:

Training and Outreach Section
Office of Drinking Water
Department of Health
PO Box 47828
Olympia, WA 98504-7828
360-236-3164

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Introduction

A safe and reliable drinking water supply is of fundamental importance to our health and well being. The purpose of this workbook is to assist in the design simple Group B public water systems with less than 15 services and consisting of a single well and pressure tank with one pressure zone and not providing treatment other than simple chlorine disinfection while ensuring that the requirements of providing a safe and reliable drinking water supply and protecting public health are met. ***Please note that as per Chapter 246-291-040 2 (b) WAC, Group B Public Water Systems, owners of systems with ten or more connections, with equalizing and/or ground level storage, or with special treatment requirements other than simple chlorine disinfection are required to hire a licensed professional engineer (P.E.) to design their systems and submit required documents to either the Department of Health or the local health jurisdiction..***

This workbook was designed for owners of rural residential water systems, which include most Group B applicants. This edition (1996) includes several significant changes from the previous workbook:

Satellite Management Agency requirements;
Design policies were changed in 1996 to allow up to 14 connections without required second source or standby storage; and
A single design table for internal and external usage and pressure tank sizing.

Using this workbook will help simplify water system design and analysis procedures and help assure compliance with the appropriate standards, requirements, and regulations. Equivalent information may be submitted in a different form if you choose. **As per WAC 246-291-040, all applications submitted to the Department of Health (DOH) for approval must be submitted by a licensed professional engineer (P.E.) unless the Department has delegated the authority to a local health jurisdiction to review plans and design reports or the local health jurisdiction has prescreened the application for completeness prior to forwarding to DOH for review.** We encourage all water system owners to obtain professional assistance in the design of their water system.

If your system provides water to a business or other non-residential use, or if this is an existing non-expanding system, the requirements for approval may vary. Restaurants, small businesses, churches, schools, and government agencies are examples of small public water systems with their own unique design needs. In these cases or for existing systems, contact the Department of Health (DOH) or your local health jurisdiction for special instructions.

If you plan to expand your system to serve more than 14 residences in the future, you are advised to proceed as if the system were a Group A public water system. Otherwise, you may find it far more difficult and expensive to meet your future system expansion plans, or even jeopardize your ability to expand at all (WAC 246-291-001 (3)).

DOH and local health jurisdictions share responsibility for administering drinking water regulations for Group B public water systems in some counties. Therefore, when the term "department" is used, it refers to whichever agency is responsible in that particular county. Also note that the DOH-Division of Drinking Water is a fee-supported program. This means that you will be charged a fee for the review and approval of the public water system application you submit to DOH. In some cases, local health jurisdictions may provide approvals for small systems. Local requirements and fees may vary. Contact your local health jurisdiction or this office for more specific information.

Finally, care should be taken in the completion of this workbook/application. Prior to submittal for approval, copies of all worksheets and forms should be made, and kept in your permanent records. Some of the information will be helpful in the maintenance and operation of your system, and may make it easier to finance and/or sell your property.

Group B Application Checklist

SECTION I

- PART A:** Basic Information
- PART B:** Ownership and Management
- PART C:** Source Site Information
- Water Right Permit (If needed)
 - Source Site Inspection
 - Wellhead Protection Inventory
 - Source Location & Protection Sketch
 - Sanitary Control Covenants (Signed, but not filed)

SECTION II

- PART D:** Water Source Construction Approval
- Well Log
 - Pump Test Results
 - Water Quality Test Results:
 - Coliform
 - Inorganic Chemical/Nitrate
 - *(Contact Local Health Department, RE: Specific Tests Required)
 - Volatile Organic Chemical/SOC/Pesticides/etc. *
 - *(Required if vulnerable)
 - Declaration/Restrictive Covenants-Filed
- PART E:** Financial Viability Worksheet
- PART F:** Pump and Pumphouse Information
- Pump Curve
- PART G:** Pressure Tank/Storage Facilities
- PART H:** Treatment (If applicable)
- PART I:** Distribution System
- PART J:** Reliability Information
- Generator Disconnect

Completed Water Facilities Inventory (WFI) Form

Water Line, Well Access, Pumphouse Access Easements Recorded

Title Notices Recorded

****NOTE:** All items listed in this workbook must be shown on the construction report (plans and specifications).

SECTION I

For help completing parts A through C of this workbook, refer to Appendix I, Basic System and Source Information.

PART A: Basic System Information

1. Name of Water System: _____
2. Well Site Address: _____
3. County: _____
4. Well Site Tax Parcel Number: _____

5. Legal Description of Well Site: _____(1/4), _____(1/4)
Section _____ Township _____ Range _____
Latitude _____ Longitude _____
Subdivision Name or Number _____

6. Year System Installed:

7. Located in Critical Water Supply Service Area: Yes: ____ No:
(Refer to Appendix I, Part A, #2 for additional information.)

Name of Coordinated Water System Plan or Abbreviated CWSP (if applicable):

If yes, Name of Existing System having priority for providing service:

Note: Must submit justification for developing new independent system.

If no, provide written verification that you have contacted each of the following about the possibility of service to determine if direct or satellite service could be provided:

- i. The public water system which has the service area containing the proposed system as identified in a DOH approved water system plan (if applicable).
- ii. Each existing public water system serving property within 1000 feet of the subject property (if not located within a CWSSA).
- iii. Available DOH-approved Satellite Management Agencies (SMA). NOTE: New systems must be owned or operated by an approved Satellite Management Agency where available.

SMA will own (yes/no), name of SMA _____

SMA will operate or (manage) (yes/no). Attach contract

SMA is not available to serve _____. Attach letter from SMA.

8. Number of Services: Existing _____ Proposed _____
Please provide Parcel Number and Address of Service:

(NOTE: Each customer or residential connection is a service, i.e., house, lot, apartment, mobile home space, or commercial hookup)

9. **Type of Service:** (Enter the number of service connections in each appropriate blank space, total should equal number of connections applying for)
Permanent ___ Temporary ___ Residential ___ Recreational ___ Commercial ___
10. **Vicinity and Service Area Sketch:**
(Sketch in the space provided below, or a simple map showing directions to the site and the area to be served by this system. Include at least two crossroads).

PART B: Ownership and Management

1. **Water System Owner:** Enter name of person(s), association or corporation. If an association or corporation has been formed, attach a copy of the association by-laws, joint use & maintenance agreement, or other documents providing information regarding future financial and maintenance responsibilities. If the system is owned by one or more individuals, **the owner(s) must attach and sign a statement of responsibility or complete Item #2 below for any maintenance or repairs involved in the continuing operation of the system.** See Appendix I, Part B for additional information.

Name _____

Address _____

Telephone Number (day) _____ (evening) _____

Water System Address (street address if different than above)

2. **Owner's Statement of Responsibility:**
I, the undersigned, do hereby attest that as the owner of this water system I am responsible for any maintenance or repairs involved in the continuing operation of this system

Signature _____

Date _____

3. **System Contact Person:** (if different than above)

Name _____

Address _____

Telephone Number (day) _____ (evening) _____

4. **Person Preparing This Workbook:**

Name _____

Company _____

Address _____

Telephone Number (day) _____ (evening) _____

5. Contact Person for Maintenance, Water Quality Sampling, Customer Notification, and Complaint Response: (if different than owner of system)

Name _____

Address _____

Telephone Number (day) _____ (evening) _____

NOTE: If this system is to be owned or operated by a Satellite Management Agency if available, please complete the following and attach a copy of the agreement.

6. Satellite Management Agency:

Name _____

Company _____

Address _____

Telephone Number (day) _____ (evening) _____

7. Owner's Statement Of Accuracy:

I, the undersigned, do hereby attest that I am the owner of this water system and that the information provided in this workbook is accurate to the best of my knowledge.

Signature _____

Date _____

PART C: Water Source Approval

(NOTE: If your water source is a spring or surface water, contact Washington Department of Health for special requirements)

1. **Water Right Permit:** (See Appendix I, Part C, #1 for requirements) Attach a copy of water right permit (if required).
 - a. Is irrigation provided from a separate source? Yes ___ No ___ (If yes, the source of irrigation is:

(NOTE: Source could be private wells or surface water, irrigation district.)

2. **Well Site Inspection Report:** All Group B Water Systems **must** have a well site inspection. (See Appendix I, Part C, #2 for requirements). No inspections will be conducted until after a formal application is received. Some local health departments offer this service. *If this service is not available from your local health department*, contact your DOH regional office to schedule an inspection. Attach a copy of the inspection report. If any improvements were recommended, attach receipts, work orders or photographs to show that the work was completed.

Answer the following:

- a. Date of Inspection: _____
- b. Name and Department Of Inspector: _____
- c. Recommendations and comments: _____

3. **Sanitary Control Zone:** The owner(s) of a public water system must prevent uses of the land within at least a 100 ft. radius around the well which could contaminate the water source.
 - a. **Site Protection Map:** (See Appendix I, Part C, #3 b for explanation)
Sketch in the space provided on page 11, or **attach** a detailed topographical map or plat clearly showing the well site, ground slope, a 600 ft. radius around the well, and distances from the well to property lines, buildings, roads and potential sources of contamination. (Note: **Either the sketch or the attached map should be of sufficient scale to accurately identify all of the required details noted above.**)

- b. **Wellhead Protection Inventory:** Please indicate if any of the following are present within a circular area around your water source having a minimum 600 foot radius. The 600 foot radius being equivalent to the ten year ground water travel time. The inventory is to be used as an educational and informational tool to ensure that drinking water is obtained from the highest quality source feasible. For additional information on this section, please refer to Appendix II, Part C, #3a.

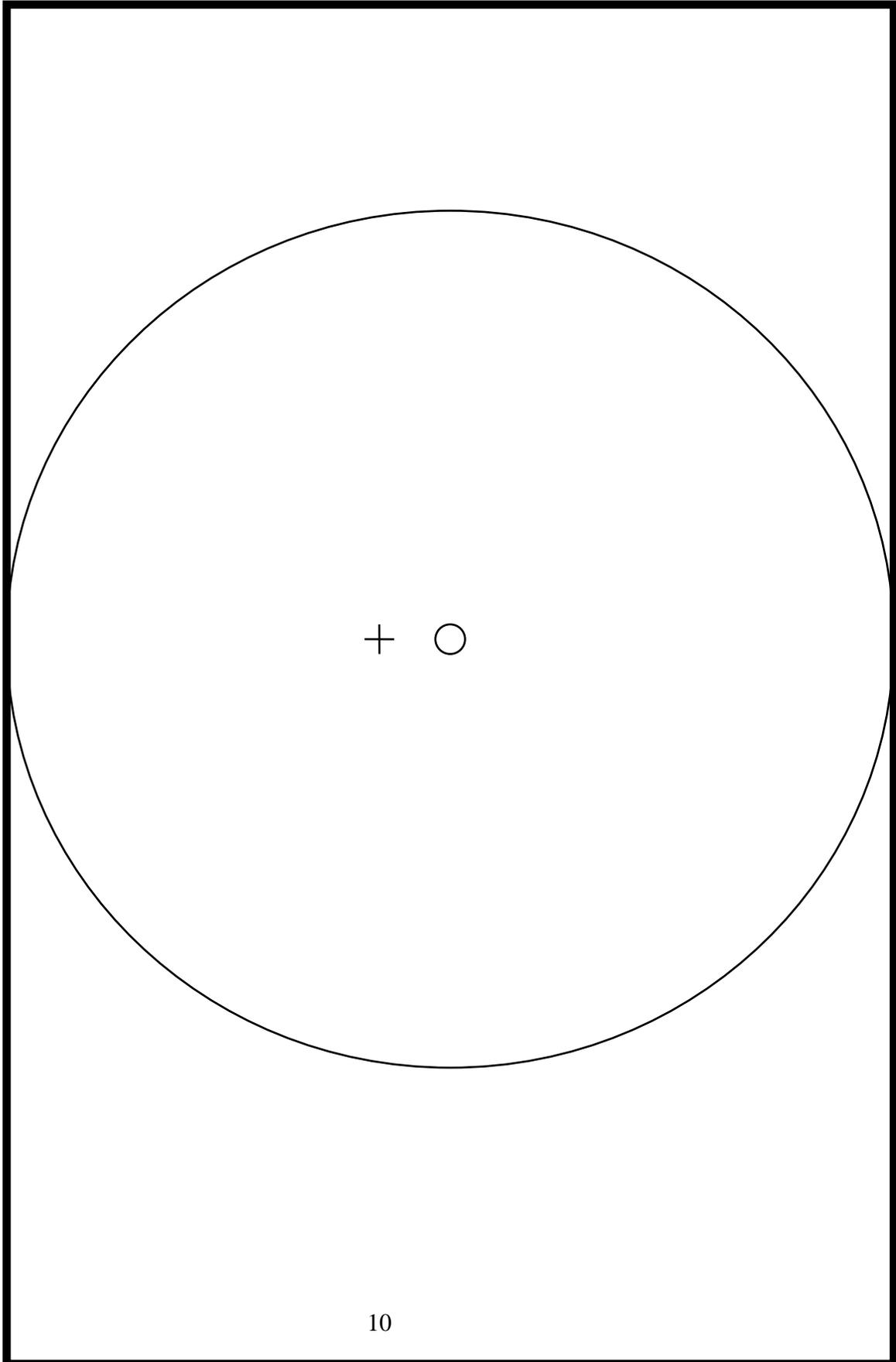
Please indicate these potential sources of contamination on the Site Protection Map.

	Yes	No	Unknown
Likely pesticide application (commercial agriculture & residential)	_____	_____	_____
Stormwater injection wells or disposal areas	_____	_____	_____
Other injection wells	_____	_____	_____
Abandoned ground water wells	_____	_____	_____
Landfills, dumps, disposal areas within 1000 ft. of the well	_____	_____	_____
Known hazardous materials site within 1000 ft. of the well	_____	_____	_____
Water sources with known water quality problems	_____	_____	_____
Population density greater than 1 house/acre	_____	_____	_____
Residential septic tanks and drainfields	_____	_____	_____
Underground and above ground storage tanks (identify # of tanks)	_____	_____	_____
Contents: Hazardous Waste _____ Nonhardous Waste _____ Nonwaste _____			
Sewer lines			

- c. **Sanitary Control Covenants:** Attach copies of any Declaration of Covenants or Restrictive Covenants that have been prepared to protect the water source from activities or practices that could cause contamination. For additional information refer to Appendix I, Part C-3a and the example covenants in Appendix III.

PLEASE NOTE: Covenants do not need to be filed with the County Auditor until the source has been completed.

- d. Site Protection Map (Refer to Appendix I, Part C, #3b):
Large circle should represent 600' radius around the well.



SECTION II

For help completing parts D through J of this workbook, refer to Appendix II, Group B Water System Design

PART D: Water Source Information

1. **Well Construction:**

a. Existing Well ___ New Well

b. **Well Log:** Attached ___ Not Available
(See Appendix II, Part D, #1 for explanation)

If well log is not available, please provide the following information, if known:

1. Well Depth

2. Casing Diameter ___ To What Depth? ___ Casing material?

3. Normal Or Static Water Level _____

4. Surface Seal? Yes ___ No ___ To Depth (Estimate) ___ Material?

5. Ground Surface Elevation (above mean sea level)

6. Screens /Perforations /None (Circle One) Depth (Estimate)?

(NOTE: All depths are relative to ground level)

c. **Well Tag Number:**

d. **Totalizing Source Meter:** Will be provided as per WAC 246-291-100, 2k: _____
On final construction report documentation that a totalizing source meter has been installed on each source is required. (As an ongoing operational requirement, this meter shall be read monthly and the reading recorded.)

e. How will water level measurements be made?
Permanent Airline ___ Tape ___ None ___ Other (Specify)

2. **Pump Test Results:** (See Appendix II, Part D #2 for explanation)

Complete Pump Test Form on page 13 and attach a copy as part of submittal

3. **Water Quality Tests:** (All water quality tests must be performed by state certified laboratories and results must be on state approved forms. For additional details refer to Appendix II, Part D #3.) Attach copies of the following test results:

a. **Bacteriological** (Coliform)

b. **Inorganic Chemical/Nitrate** (Contact local county health department for any additional or specific tests required in your area)

c. **Volatile Organic Chemical** (VOC) (If required by the department)

d. **Other Specific Tests/Analyses** (Check with approving authority to see if system is in an area of special concern)

4. a. **Declaration of Covenant:**

Include a copy of short plat showing covenants or Auditors File No.

b. **Restrictive Covenant:**

Include a copy of short plat showing covenants or Auditors File No.

c. **Well, Water-line, and Equipment Easements:**

Include a copy of short plat showing easements or Auditors File No.

PART E. Financial (Viability) Worksheet

Through the development of a projected budget, the goal of the Financial Viability Worksheet is to set in place plans, policies, and procedures that will enable the system owner(s) to have the ability to obtain sufficient funds, on a continuing basis, to cover the total cost of developing, constructing, operating and maintaining the system in compliance with State and Local drinking water regulations. Proposed rates must be adequate to cover any budget deficits identified in line 16. **In order to demonstrate the financial viability of this system the items highlighted in BOLD and Italics must be completed as accurately as possible. For more information refer to Appendix II, Part E.**

	Initial	After Full Development Development or Build-out
ANNUAL EXPENSES		
1. Wages & Benefits	\$ _____	\$ _____
2. <i>Electricity & other utilities</i>	\$ _____	\$ _____
3. Chemicals & Treatment	\$ _____	\$ _____
4. <i>Monitoring Costs</i>	\$ _____	\$ _____
5. <i>Materials, Supplies, & Repairs</i>	\$ _____	\$ _____
6. Taxes/Assessments	\$ _____	\$ _____
7. Insurance/Misc. Expenses	\$ _____	\$ _____
8. <i>Subtotal: Operating Expenses</i>	\$ _____	\$ _____
9. 10% Contingency	\$ _____	\$ _____
10. Principal & Interest Payments	\$ _____	\$ _____
11. <i>System Replacement</i>	\$ _____	\$ _____
12. <i>Total Revenue Required</i>	\$ _____	\$ _____
ANNUAL REVENUE FROM SOURCES OTHER THAN WATER RATES		
13. Hook Up/Other User Fees	\$ _____	\$ _____
14. Other Revenue	\$ _____	\$ _____
15. Total Non Water Rate Revenue	\$ _____	\$ _____
ANNUAL WATER RATE CALCULATIONS		
16. Budget Surplus/Deficit (Line 15 minus line 12, but not less than zero)	\$ _____	\$ _____
17. Number of Connections	_____	
18. Annual Water Rate* (Line 16 divided by Line 17) (* Note: If individual meters are used, this can be the average rate, with individual rates varying depending on usage.)	\$ _____	\$ _____

TABLE B – Required Pump Head

	Well pump	Pump #2 (booster pump if needed) ^π
Distance from pumping level in well to ground surface (well head)* ♦ Provide headloss if riser pipe length is greater than 100 feet.	___ FEET	___ FEET
Elevation difference from well head to point of delivery	___ FEET	___ FEET
Greatest headloss (Note: This number from hydraulic analysis-Table A)	___ FEET	___ FEET
Pressure residual head **	___ FEET	___ FEET
Total required pump head	___ FEET	___ FEET

* Also provide diameter of pipe, length and type of pipe used.

♦ Distance from pumping level in well to ground surface (Static water level + Drawdown)

** As a minimum 30 PSI = 70 FEET OF HEAD

If pumping to non-pressurized storage, the residual would be zero.

Also use this method if the source pump delivers to a storage tank where repumping is necessary; then a residual of 0 or close to 0 may be considered in pump sizing.

^π For Booster pumps a licensed Professional Engineer is required.

NOTE: For more than one source, repeat above calculations.

3. Required Pump

Total required pump head _____ ft.

Pump Rate _____ gpm

Select pump from pump catalog for _____ head and pump rate of _____ gpm.

4. Pump Specifications:

a. Type _____ b. Manufacturer

c. Model _____ d. RPM _____ e. Horsepower

f. Pump Rate (gpm) _____ g. Single phase/Three phase?

(Attach Pump Curve or Performance Chart)

5. Booster Pump:

(NOTE: If system design requires booster pumping, the system must be designed by a professional engineer.)

i. Pump rate _____ gpm.

ii. Required pump head

iii. Select pump from catalog for _____ head and well pump rate of _____ gpm.

a. Type _____ b. Manufacturer

c. Model _____ d. RPM _____ e. Horsepower

f. Pump Rate (gpm) _____ g. Single phase/Three phase?

(Attach Pump Curve or Performance Chart)

2. Storage Tank*:

(NOTE: If system design requires non-pressurized storage, the system must be designed by a professional engineer.)

- a. Manufacturer _____ Model
- b. Capacity (In Gallons)
- c. Dimensions: _____ L x _____ W x _____ H
- d. Material:
- e. Screened Venting Provided? Yes _____ No
- f. Tightly Sealed Access Provided? Yes _____ No
- g. Drain Provided? Yes _____ No

* **Note:** Tanks must be approved for drinking water contact by NSF, ANSI or equivalent. In addition, if different multiple tanks are utilized, the same information must be provided for each tank.

3. Calculations:

(NOTE: This section is intended to be utilized for any calculations necessary in the design of the system.)

PART H: Treatment

1. Chlorination for: Precaution _____ Bacteriological Quality

For hypochlorinators, please attach a completed *Hypochlorination Facilities for Small Systems Submittal Checklist*.

2. Additional Treatment: If treatment is required, please indicate what is to be treated and the treatment device that you have selected.

Note: All treatment systems other than simple chlorination must be designed by a licensed professional engineer in Washington state and must comply with NSF standards. For Iron/Manganese treatment, all the items on *Iron and Manganese Submittal Checklist*, available from DOH, must be addressed. For other types of treatment, include all calculations, design criteria and pilot study data with this workbook. **The treatment system must be inspected by the engineer after installation, and he or she must sign a completion of construction report prior to final approval.**

PART I: Distribution System

1. **System Diagram: Attach a detailed map or diagram including all of the following information:**
 - a. Property Lines, Individual Lot Lines, and Easement Locations
 - b. **Well Site** (*clearly marked*)
 - c. Utility Location (electrical)
 - d. Customer Services or Connections (Include parcel number and address)
 - e. Distribution Lines (including pipe lengths, pipe diameters, materials, valves, blow-offs, age and condition)
 - f. Elevation Differences (Provide topographic map when greater than 40 ft.)
 - g. Cross Connection Control Assemblies (location and type)
 - h. Home Irrigation/ Private Wells
 - i. Size of Lots Served (usually in acres or square feet)
 - j. Roads
 - k. Will individual service meters be provided? Yes _____ No
 - l. Location of totalizing source meter

PART J: Reliability

Generator Disconnect (Transfer Switch) Will be provided as per WAC 246-291-240(2):

On final construction report, documentation that a generator disconnect or transfer switch has been installed is required.

In addition to a generator disconnect, what provisions have been made to ensure system reliability during power outages, pump failures, or other system component failures?

Check the appropriate items below:

None

Intertie with another system (**Note:** May require revised water right)

Backup power source

Parallel Pumps

Stand-by storage with gravity feed

Other (Please List)

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Appendices

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APPENDIX I

Basic System and Source Information

The purpose of this appendix is to provide explanations of the attachments and other information requested in Section I of the Group B Workbook. Please note that Section I is to be completed prior to source development.

Definitions:

Several new terms have been introduced into these Appendices that were either not used in earlier versions of Group B design or now being used in place of terms that have historically been used. The use of these terms is intended for consistency with the Group A design standards as well as with the terms in common use nationwide. Each of the following terms are defined as used in these Appendices, and where appropriate, the associative historical term is presented:

Equivalent Residential Unit (ERU): This term represents the basic unit used in estimating water demands for water system developments. It relates to the previously used term, "connection", and refers to a point in a distribution system at which sufficient water would need to be delivered in order to satisfy the needs of an average household (residence). One household would therefore be equivalent to one ERU. For water service to other applications which were not individual households (such as apartments, recreational tracts, businesses, etc.) an estimate of the total water demand would relate to the equivalent amount of water used by a household. It is used as the design basis for the sizing of a water system.

Total Maximum Daily Demand (MDD-tot): This term represents the amount of water used by a development to meet the customer demands for the largest use day of any year. It carries the units of gallons per day per ERU, for the peak day's use. It is used for correlating the source capacity to the extent of the development and in sizing the minimum capability of source pumping. It can also be used whenever standby storage estimates are needed for some developments.

This term is further categorized as to whether the MDD is for strictly household uses (called internal demand, or **MDD-int**) or for outside uses such lawn watering, irrigation, etc. (called external use, or **MDD-ext**). The combination of MDD-int plus MDD-ext is the MDD-tot. For systems with separate irrigation sources and distribution piping, the sources, transmission, and distribution may be designed based on the respective service each is intended to provide (i.e., MDD-int can be used for the potable supply system and MDD-ext can be used for other sources used for irrigation (etc.) demands. If only one source supplies both demands (MDD-int + MDD-ext), or only one distribution system is used for both demands, then the design must account for the estimated Total Maximum Daily Demand (MDD-tot).

Peak Hourly Demand (PHD): This term replaces the historical term "Maximum Instantaneous Demand (MID). It represents the flow necessary to meet the peak periods of use during any day. It carries the units of gallons per minute and is used in determinations of well or booster pump sizing, distribution pipe sizing, and equalizing storage sizing.

Minimum Pump Capacity (MPC): This is the delivery capacity of a source pump necessary to meet the estimated MDD-tot (or the MDD-int, or MDD-ext, if separate systems are involved). It is based on a twenty-four hour pumping period. Therefore it is equal to MDD-tot divided by 1440 (the number of minutes in a day). It carries the units of gallons per minute.

Water Right Permit: As per Chapter 90.44.050 RCW, a water right permit obtained from the Washington Department of Ecology (Ecology), is required for all appropriations of public water except for wells used for the purposes of stock watering, single or group domestic supply, industrial uses and irrigation of lawn and/or garden not greater than 1/2 acres, provided that the water used shall not exceed 5000 gallons per day. This exception is principally used to provide single family dwellings with wells for their domestic needs without requiring a formal water right.

Group B Water System Development Checklist

DATE

APPLICANT:
ADDRESS:

DAY PHONE: _____ EVENING PHONE:

PROPOSED WATER SYSTEM NAME:

COUNTY:

LOCATION: a. Cross Roads
b. Quarter Section / Section / Township / Range
_____ S _____ T _____ R _____
1/4 1/4

SIZE: Number of Connections: _____

The items or documents checked below are necessary for formal state approval of all Group B public water systems, ranging from two to nine connections. State-certified laboratories must conduct all water quality tests. Fees will be charged for review and approval of this application and issuance of a system identification number. Some local health departments offer approvals for small systems. Requirements and fees may vary. **If this proposal is intended to gain approval for existing services and you do not propose to add any additional services, some of the following requirements may be waived. Contact your local health department or this office for more specific information.**

- Site Inspection Report
- Water Right Permit (if required)
- Well Log
- Pump/Aquifer Test of Well
- Totalizing Source Meter (Attach proof of installation)
- Completed Group B Workbook
- Generator Disconnect
- SMA Contact(s)
- Financial Viability Worksheet
- Vicinity and Service Area Sketch*
- System Layout Sketch*
- Protected Zone Sketch/Wellhead Protection Inventory*
(All sketches can be included in workbook)
- Declaration of Covenant
- Restrictive Covenant(Required of any neighbor £ 100 ft to the well)
- Informational Notices
- Water Facilities Inventory (WFI) Form
- Other: _____

WATER QUALITY TESTS:

- Bacteriological
- Complete Inorganic
- _____ Volatile Organic Chemicals (VOC)
- _____ Synthetic Organic Chemicals (SOC)
- _____ Radionuclides
- _____ Pesticides

Remarks/Notes: _____

Part A: Basic Information

1. System Information:

For the purpose of maintaining accurate records, please provide the information requested on the new or existing system as accurately and completely as possible. Please note that for item #5, the longitude and latitude can be obtained from a United States Geological Survey (U.S.G.S.) map of your area or a Global Positioning System, GPS, unit may be used.

2. Predevelopment Contacts:

As per WAC 246-291-140 (2) the developer of a proposed new system shall complete the following steps as applicable prior to developing a new water system:

- i. The developer shall ensure that the new system is owned or operated by a department-approved satellite management agency (SMA), or if a department-approved SMA is not available, that the proposed new system has a department-approved water system plan in accordance with WAC 246-291-140.**
- ii. Department approval of any system created after July 22, 1995 that is not owned or operated by a SMA shall be conditioned upon future management or ownership by a SMA, if such management or ownership can be made with reasonable economy and efficiency, or upon periodic review of the system's operational history to determine its ability to meet the department's financial viability and other operating requirements.**
- iii. If the proposed system is located within the boundaries of a critical water supply service area, the ability to develop an independent system shall be governed by the provisions of the Public Water System Coordination Act, chapter 70.116 RCW and chapter 246-293 WAC, and will be subject to the jurisdictional coordinated water system plan; or**
- iv. If the proposed system consists of a surface water or GWI source, ensure that the proposed system will be owned and operated by a department-approved satellite system management agency.**

The department will assist you in identifying **which Satellite Management Agencies** to contact.

In contacting the utilities, a standard contact letter should be developed and utilized. These letters need to be sent by certified or registered mail. A copy of the letters and the verification of mailing must be submitted to the department prior to submitting the design for approval. An example of a letter requesting information from other local purveyors is included as Exhibit A.

Part B: Ownership and Management

Include appropriate names, addresses and phone numbers, as indicated. Owner must sign statements of responsibility and accuracy.

Ownership Statement / Joint Use and Maintenance Agreement

Owners of small water systems should, at a minimum, **sign and attach a simple statement of responsibility** for any future costs incurred or maintenance required in the continuing operation of a water system. However, it is strongly *recommended* that a formal legal agreement be drawn up between parties sharing a water system. **A copy of any water users agreement that is implemented should be included with your application.**

A water user's agreement should include easements to system lots for the purpose of providing access for maintenance or repair to the well, pump, distribution lines, etc. It should also specify each customer's exact share (right) to the total amount of water available, their share of the maximum ½ acre that can be irrigated (see Water Right Permit, below) require installation of water meters, and provide for financial responsibility for future repairs, maintenance and testing. The agreement should address future transfers of those rights/responsibilities that accompany sale or transfer of ownership of lots served, and other considerations.

Any agreement should be filed on all lots served with the local county auditor and its provisions should "run with the land." A model water user's agreement (Exhibit B) is included with this Group B packet. Interested parties should consult with an attorney regarding its specific provisions.

Part C: Water Source Information

1. State Water Rights and Basic Water Demand Considerations

The sizing (design) of a Group B water system must recognize the State water rights requirements. If the water system intends to withdraw more than 5000 gallons per any day from any combination of sources to meet the Maximum Daily Demand (MDD) for the system, or intends to provide irrigation capacity for more than one-half acre throughout the system, a water right for that source must be obtained from the Department of Ecology.

Separate Irrigation Systems

The Group B system may be designed and constructed to have separate water sources and delivery systems for meeting the total domestic demands. The total maximum day water demand (hereafter termed MDD_{tot}) is the sum of the water needed for normal inside household uses (hereafter termed MDD_{int}) and that needed for any outside applications or external uses (hereafter termed MDD_{ext}). Normal external uses would primarily be irrigation of lawns and gardens or other miscellaneous uses which would not require a potable water. The total water demand estimate can, therefore, be represented as:

$$MDD_{tot} = MDD_{int} + MDD_{ext}$$

Internal Use Water Demand

Internal water uses for an average residential dwelling unit (1600 square footage floor space, two bathrooms, one laundry, three or four bedrooms, two car garage) can be generally expected to be relatively constant, regardless of location within the state (i.e., water uses for drinking, cooking, bathing, washing, etc. would be essentially the same for any typical residence in the state no matter what the climatic setting). Therefore, a single design estimate for internal water demand may be applicable throughout the state. Table 1 in Appendix II presents a value of 350 gallons per day per Equivalent Residential Unit (ERU) to meet the MDD_{int} .

External Use Water Demand

External water demands can be expected to vary depending on the extent of irrigation, or other similar uses, for any specific development. Climatic influences have been documented to be a primary factor influencing the degree of external water demands in residential applications. In Washington State, differences in external demands have been associated with the climatic differences which are separated by the Cascade Mountain Range (Eastern vs. Western Washington). In Eastern Washington, the average MDD_{ext} (external uses) is estimated at 900 gallons per day per ERU, and for Western Washington it is 400 gallons per day per ERU. Table 1 in Appendix II uses these criteria whenever a separate irrigation source and delivery system is to be designed for a Group B water system.

NOTE: These external use values (MDD_{ext}) would need to be added to the base internal use value (MDD_{int}) if the total water demand were to be satisfied from a single source through common distribution piping.

Conditions for Separate Irrigation Design

When a water system is designed with separate potable (internal use) and irrigation (external use) sources and distribution lines, and it is intended that the water to be used from the respective sources will not exceed the amounts for which a water right must be secured, several conditions must be satisfied before the department may approve any proposed design:

1. In addition to a totalizing source meter, all residential units, **except for developments with four or less ERUs total**, on the potable water system (internal uses only) must be required to have meters installed. (This is to allow for equitable charges for the water used and to encourage conservation of the water such that a water right may not be needed).
2. No more than one outside, **active**, hose bib or riser (for very limited outside use associated with normal residential lifestyle) per home may be connected to the potable water distribution system, and it must be fitted with a flow restriction device to allow for no more than one gallon per minute (gpm) flow.
3. A mechanism for providing disclosure to property purchasers regarding the conditions associated with the use of the water such that the need for a water right is mitigated.

NOTE: If no irrigation water is to be provided (i.e., no separate irrigation system provided), and the development is designed solely for internal residential uses, this must be disclosed to property purchasers through the title notice and it must be required that no external water uses will be allowed (except that associated with limited uses of the single outside, flow limited, hose bib. Also some Local Health Jurisdictions may have additional requirements. For any additional requirements, contact your Local Health Jurisdiction.

Multiple Group B Water System Design

For new source development, it should be recognized that there may be a substantial delay in obtaining a new water right. In addition, there are some basins within the state where applications for new water rights will be denied due to over appropriation of available water. Therefore the development of several Group B water systems in one development is allowed by both Departments of Ecology and Health with the following provision:

Each Group B water system is designed and operated to use less than 5,000 gallons per day (maximum day demand) and irrigate a total of less than ½ acre.

In addition, the following recommendations should be considered in the event that several Group B water systems are being developed in the same area.

- 1) It is recommended that a Water System Plan (WSP) for the entire development be developed and approved by DOH per Group A standards. The plan should show how all the Group B systems will be consolidated and operated as one system when water rights are received in the future. The WSP should also provide general concepts for the common Group B designs (pipe sizing, source and service metering requirements, construction standards). Available Satellite Management Agencies should be identified; covenants or other legally binding documents requiring consolidation should be presented; and documentation that water right applications have been submitted and received by DOE prior to development.
- 2) Fire-flow requirements vary. For more information, consult with your county fire marshal or county code enforcement official.
- 3) Each Group B system should have a completed Group B workbook prior to construction and the workbook should be consistent with the Group A WSP and include the covenant or other legally binding documents requiring consolidation when water rights are received.

NOTE: Some local health jurisdictions may have additional requirements. For any additional requirements, contact your local health jurisdiction.

Special Design Considerations – Development Restrictions

A Group B water system design may consider alternate mechanisms for maintaining withdrawals from the water sources below a maximum of 5000 gallons per day. For some systems it may be possible to provide sufficient storage to meet MDD requirements without drawing more than the amount at which a water right would need to be secured. In some instances, the development may through institutional, legally binding articles, restrict the use of water overall, or for the irrigation demands of the system; provided that proper disclosure of such restriction is incorporated with the property title. Other mechanisms may be introduced which have weight in law, and which are both reasonable and acceptable to the prospective development. Options may be presented which would run with the property in perpetuity, or more preferably, for such a time until full water rights may be secured.

2. Well Site Inspection Report

In compliance with WAC 173-160 and WAC 246-291-100 (2b), all Group B water system applicants must have their well sites inspected and approved prior to drilling.

A copy of the well site inspection report must accompany the application.

Contact either your local health department or the DOH Regional Office serving your area to arrange for a site inspection. If any repairs or improvements are requested, you must show proof that you have complied before your water system will be approved.

3. Sanitary Control Zone

Activities that occur on or near the ground surface near your well have been shown to affect the quality of the water beneath the surface. Protecting your water source from potential sources of contamination is *the* most important consideration in owning and operating a public water system.

Drinking Water Regulations (WAC 246-291-100) require that public water sources be surrounded by a sanitary control area in which activities that could contaminate the water source are not allowed. Current regulations specifies that the **minimum** area that must be protected is a one hundred foot radius circle about your well. In addition, an inventory of potential sources of contamination within a 600 foot radius of the well must be completed (WAC 246-291-100-2(e)). The department may occasionally require a larger area if necessary.

a. *Wellhead Protection Inventory:*

The purpose of the inventory is to identify past and present activities within 600 feet of the proposed well site. This distance is based on how far a contaminant could travel, in a typical aquifer, over a period of 10 years. The identification of potential sources of contamination serves as an advisory to the water system owner(s) that the potential for future contamination exists, and that it may be necessary to provide additional treatment in the future. The inventory is to be used as an educational and informational tool to protect the source of supply and ensure that drinking water is obtained from the highest quality source feasible. It should be noted, however, that the identification of potential sources of contamination within the 600 foot radius should not be viewed as a reason to deny the proposed well site if it is to be located in the best available site.

b. *Protective Covenants:*

A covenant is a written agreement that restricts the use of the property it is recorded on. Water System Owners use covenants as a legal tool to protect property from activities or practices that could contaminate their public water source.

There are two types of covenants used for this purpose. A **DECLARATION OF COVENANT** is used when the Water System Owner owns property in the sanitary control zone. The **RESTRICTIVE COVENANT** is used when any portion of the property within the sanitary control zone is owned by someone other than the Water System Owner. Sometimes both may be needed.

Most Water System Owners are required to provide an area of sanitary control within 100 feet of the public water source. In some cases, the department may increase, decrease or modify the shape of the sanitary control area.

- i. **Declaration of Covenant:** Declaration of Covenant must be drawn up by the owner of the land on which the well is located, declaring a 100 ft. protected zone around the well. This document must be signed (by the owner of the property where the well is located) in front of a notary and filed with the county auditor on the lot where the well is located. A map should be attached to the covenant showing the exact location of the well on the

property. This document could be included with a Joint Use & Maintenance Agreement mentioned in section B.

- ii. **Restrictive Covenant:** When all or part of the required sanitary control area is owned by someone other than the Water System Owner, the owner must obtain a restrictive covenant from that landowner. This document must be completed and signed and notarized by any other property owner whose land lies within the sanitary control zone (if any).

NOTE: All covenants must be properly filled out, signed and notarized, and then filed with the local County Auditor. Include copies of all covenants with this Group B application showing clearly the auditor's stamp of the county in which they were filed.

DOH has blank covenant documents available (examples have been included in Appendix III) for your convenience. The use of these exact forms are not required; however, an equivalent form acceptable to the department is required. **As is the case with any legal document, it is wise to consult with an attorney regarding specific provisions in the covenants.**

c. *Site Protection Sketch:*

As per WAC 246-291-100, all Group B applicants **must submit a detailed drawing of the area around the well** with their application. A circle should be drawn to scale around the well representing the 600 ft. radius. *Everything within the 600 foot radius should be included in the drawing* even if part of the zone lies in a neighbor's property. **If a landfill or hazardous waste disposal site is located within 1000 feet of the property it must be shown on the drawing.** (Note: A well cannot be constructed within 1000 feet of a landfill or hazardous waste disposal site pursuant to WAC 173-160.) Show distances from the well to property lines and roads, as well as distances from the well to any potential source of contamination as per the instructions in Part C, #3 a).

d. *Plats / Short Plats*

Protective covenants with restrictive language filed on the face of a final plat will be accepted in lieu of the required covenants.

NOTE: Some Local Health Jurisdictions may have additional or alternative requirements. For any additional or alternative requirements, contact your Local Health Jurisdiction.

Exhibit A – Sample Contact Letter

(Date)

(Name/Address of Water System Being Contacted)

To Whom It May Concern:

I am the owner of the property described below. I am considering developing a small public water system to serve this property. Prior to deciding whether to develop a separate system, I would appreciate finding out if you would provide service to this property.

In responding to this request for information, please provide the following information:

- (a) Would service be provided by extending your existing system or by satellite operation as a separate system?
- (b) Would you require ownership of this system or would you be willing to provide contract management and/or operation?
- (c) What design standards you would require for my system?
- (d) What other requirements do you have for providing service?
- (e) What is the estimated cost of providing service?
- (f) How soon could you provide service to my development?

I have enclosed a vicinity sketch to assist you in locating my property. The following is additional information to assist you in responding to my questions:

- (a) Property Tax Account Number: *(Number)*
- (b) Location: Quarter/Quarter Section, Section *(Number)*, Township *(Number)*, Range *(Number)*
- (c) Approximate Address: *(Address)*
- (d) Subdivision Name or Number: *(Name or Number)*
- (e) Number of Parcels To Be Served: *(Number)*
- (f) Average Lot Size: *(Number)* Acre(s)
- (g) Type of development (residential, commercial, etc.)

I would appreciate receiving a response to this request within fourteen (14) days. If you have any questions, please contact me at *(telephone number)*.

Sincerely yours,
(Signature)
(Name of Owner)
(Mailing Address)

Exhibit B – Sample Water User’s Agreement

WATER SYSTEM NAME:

Ownership of the Well and Waterworks

It is agreed by the parties that each of said parties shall be and is hereby granted an undivided one-half interest in and to the use of the well and water system to be constructed. Each party shall be entitled to receive a supply of water for one residential dwelling and shall be furnished a reasonable supply of potable and healthful water for domestic purposes.

Cost of Water System Construction

Both parties herein agree to share equally in the cost incurred in well site approval, well construction, design of the water system for approval by the Health Officer, and construction and/or installation of the waterworks equipment, the pumphouse and water distribution pipes, and initial well water quality tests.

Water System Design

This water system is designed to provide for _____ services. The design of the system is based on _____ gallons internal use per service per day and _____ gallons external use per service per day. Additional planning and design approvals must be obtained from the department prior to expanding beyond this number of services or whenever there are changes made to the system, such as adding a treatment system..

Cost of Maintenance of Water System

Each party hereto covenants and agrees that they shall equally share the maintenance and operational costs of the well and water system herein described. The expense of water quality sampling as required by the State of Washington and _____ county shall be shared equally by both parties. The parties shall establish and maintain a reserve account at a mutually agreed upon banking institution. Each party shall be entitled to receive an annual statement from said banking institution regarding the status of the reserve account. The monetary funds in the reserve account shall be utilized for the sole purpose of submitting water samples for quality analysis and maintaining, repairing or replacing the well and common waterworks equipment or appurtenance thereto.

Easement of Well Site And Pumphouse

There shall be an easement for the purpose of maintaining or repairing the well and appurtenances thereto, within 30 feet of the well site in any direction. Said easement shall allow the installation of well house, pumps, water storage reservoirs, pressure tanks, and anything necessary to the operation of the water system.

Water Line Easements

Smith grants Jones an easement for the use and purpose of conveying water from the well to the property of Jones. Said easement shall be five (5) feet in width and shall extend on, over, across, and underneath said strip of land from designated well site to common point as referred to. The centerline of said five (5) foot strip of land shall be the west line of the east 32 feet of the south 75 feet of Smith's _____ herein described. No permanent type of building shall be constructed upon the water line easement except as needed for the operation of the well and water system.

Maintenance and Repair of Pipelines

All pipelines in the water system shall be maintained so that there will be no leakage or seepage, or other defects which may cause contamination of the water, or injury, or damage to persons or property. Pipe material used in repairs shall meet approval of the Health Officer. Cost of repairing or maintaining common distribution pipelines shall be born equally by both parties. Each party in this agreement shall be responsible for the maintenance, repair, and replacement of pipe supplying water from the common water distribution piping to their own particular dwelling and property. Water pipelines shall not be installed within ___ feet of a septic tank or within 10 feet of sewage disposal drain field lines.

Prohibited Practices

The parties herein, their heirs, successors and/or assigns, will not construct, maintain or suffer to be constructed or maintained upon the said land and within 100 feet of the well herein described, so long as the same is operated to furnish water for public consumption, any of the following: septic tanks and drain fields, sewer lines, underground storage tanks, county or state roads, railroad tracks, vehicles, structures, barns, feeding stations, grazing animals, enclosures for maintaining fowl or animal manure, liquid or dry chemical storage, herbicides, insecticides, hazardous waste or garbage of any kind. The parties will not cross connect any portion or segment of the water system with any other water source without prior written approval of the County Department of Public Health and/or other appropriate governmental agency.

Water System Purveyor

Smith is designated "Purveyor" of the water system. The purveyor shall be responsible for arranging submission of all necessary water samples as required in the Washington Administrative Code, and _____ County Rules and Regulations No. _____ and handling emergencies such as system shutdown and repair. The purveyor shall provide his/her name, address and telephone number to the Health Officer and shall serve as a contact person to the Health Officer. The purveyor shall organize and maintain the water system records and notify the Health Officer and all parties, service connections and lots that are included in this agreement, of the water quality tests that are required by WAC 246-291 and _____ County Rules and Regulations No. _____. Water system records shall be available for review and inspection by all parties in this agreement and the Health Officer.

Provisions for Continuation of Water Service

The parties agree to maintain a continuous flow of water from the well and water system, herein described in accordance with public water supply requirements of the State of Washington and ___ County. In the event that the quality or quantity of water from the well becomes unsatisfactory as determined by the Health Officer, the parties shall develop a new source of water. Prior to development of, or connection to a new source of water, the parties shall obtain written approval from the Health Officer. Each undivided interest and/or party shall share equally in the cost of developing the new source of water and installing the necessary equipment associated with the new source.

Future Management

Approval of this public water system by the health jurisdiction was conditioned by future management or ownership by a state approved Satellite Management Agency. Health jurisdictions may enforce this provision if the system is not able to meet financial viability or other operating requirements.

Restriction on Furnishing Water to Additional Parties

It is further agreed by the parties hereto that they shall not furnish water from the well and water system herein above described to any other persons, properties or dwelling without prior consent of both properties and written approval from the _____ County Department of Public Health.

Restriction on Water Use

State water right laws prohibit this system from using more than 5000 gallons of water on any day. Also, the total amount of property which can be irrigated by the system cannot exceed 1/2 acre. In order to remain in compliance, the following parcel _____ is prohibited from using more than _____ gallons of water on any given day. Further, the total amount of yard, garden and other irrigation uses, by this property, cannot exceed _____ square feet.

Heirs, Successors and Assigns

These covenants and agreements shall run with the land and shall be binding on all parties having or acquiring any right, title, or interest in this land described herein or any part hereof, and it shall pass to and be for the benefit of each owner thereof.

Enforcement of Agreement on Non-Conforming Parties and Properties

The parties herein agree to establish the right to make reasonable regulations for the operation of the system, such as the termination of service if bills are not paid within forty-five days of the due date, additional charges for disconnection, reconnection, etc. Parties not conforming with the provisions of this agreement shall be subject to interest charges of ____% per annum together with all collection fees.

APPENDIX II

Group B Water System Design

The purpose of this section is to assist in the design of a small simple public water system and is primarily oriented for use by licensed designers. Included is information to help size and select a pump, distribution lines, pressure tanks, and simple chlorine disinfection systems using chemical feed pumps.

The first consideration and a potential limiting factor in small water system design is the capacity of your water source. The ultimate goal is to provide the quantity of water needed to meet the peak and daily demands of the water users at all times.

Part D: Water Source Information:

1. Well Log

The well log provides important information about the construction of your well and its vulnerability to contamination. It also contains information about your aquifer and sometimes your well capacity and pump setting. **A copy of the well log is required and must be included with this application** for all *new* systems and desired, if obtainable, for older *existing* systems (WAC 246-291-100 2(i)).

The Washington Department of Ecology (Ecology) requires well drillers to fill out the well log and file a copy with their office, with a copy going to the owner of the well and a third copy to be retained by the driller. If the owner's copy cannot be located, check with the company who drilled the well, the previous property owner, or with the Ecology to see if they have a copy on file.

If a well log is not available, as much information as is available regarding the well should be provided. The Department may require additional information prior to approving the source.

2. Totalizing Source Meters

Totalizing source meters are required (WAC 246-291-100 2(k)) on all new sources to accurately monitor the quantity of water produced which will assist in the management of water resources and withdrawal of ground water amount in conformance with the requirement of water rights. After the system is in operation, the owner must maintain a record of monthly meter readings. Individual service meters are recommended as these meters can provide information regarding the loss of water due to leakage in the distribution system.

3. Pump/Well Yield Test Results

Establishing well and/or pump capacity is critical to the formation of a small water system. A good well/pump test provides information regarding the capacity and reliability of your well, and also defines the area of influence of your well (WAC 246-291-100 2(c)). The duration of the pump test must be for a sufficient period of

time to ensure that the well can produce enough water to supply the required daily production of the system, but *never for less than four hours after drawdown has stabilized*. **A copy of the Well/Pump Test Report must be included with all applications.** For new systems, the results of this test are used to size and select your pump and storage system.

The purpose of the four hour pump test is to evaluate the capacity and reliability of the well. Special equipment is required to perform the pump test to ensure reliable and accurate results. The information will be used to determine the proper pump size, and to determine the ability of the water system to provide an adequate amount of water during peak demand, and whether equalizing storage is required. The minimum test pumping rate should be greater than the rate required for the water system by the Group B Guidelines. (See PHD in Table 1 of Part F of the Appendix)

In higher risk areas such as areas with potential seawater intrusion, Local Health Jurisdictions may have additional requirements. Prior to conducting a pump test the Local Health Jurisdiction should be contacted.

Existing water systems must make sure that test is conducted with the pump discharge disconnected from the distribution system and the pressure tanks so that unrestricted pump discharge can be measured.

Pump Test Procedure:

The pump test needs to run until drawdown stabilization (little or no fluctuation in water level) has been established for at least two hours. In no case should the total test time be conducted for less than four hours. At a minimum, pump test measurements should be made at the following time intervals: immediately after pumping begins; 10 minutes after pumping begins; 15 minutes after pumping begins; 30 minutes after pumping begins. Once stabilization has been determined, record the pumping level, drawdown and volume rate of water being drawn in gpm from the well in 30 minute intervals. When the last measurement has been taken and the pump has been turned off, monitor the time for the recovery of the static water level. **NOTE:** Air tests and bailer tests are not an approved method for testing well capacity.

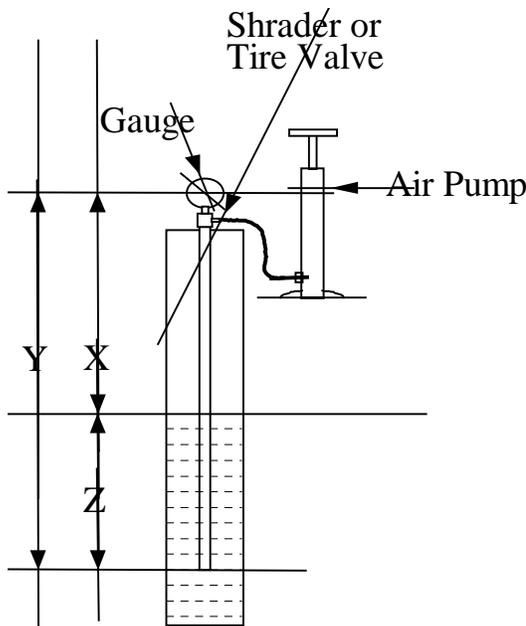
The first row in the column titled 'Remarks' is filled in as 'pump start time'. For additional entries, include comments such as the water color and temperature. Enter 'stabilization' at the time that the water level stabilizes. From this time, the test must continue for at least two hours. The last entry in this column should be 'pump shut-off time', which is the time that the pump test ended. The time between the pump start time and the pump shut-off time must be at least four hours.

The most effective way to determine the pump rate is by utilizing a pump with a metered discharge. If a meter is not used, measure the pumping rate by catching water from the pump discharge in containers of known capacity (an open 55 gallon drum or several 5 gallon buckets work great) and monitor the time it takes to fill the containers. The Volume Rate (in gpm) is the total gallons filled divided by the time it took to fill that many gallons (in minutes).

There are several ways to measure the water level and drawdown in a well. There must be access for a measuring line into the well in the space between the well casing and the pump column.

Two methods are:

1. **Air Line Method** – Use a ¼-inch pipe (or suitable copper tubing) terminating at the top of the pumping unit and record the length. Furnish a tee at the top end, and anchor the pipe securely at the well head. Install a pressure gauge and tire valve on the tee. The pressure gauge should be calibrated in increments of 1 psi or smaller. Pump air into the line until the pressure gauge reading remains constant; this will ensure that all water is evacuated from the tube. Record the pressure gauge reading using the conversion, a column of water that is 2.3 feet high will develop a pressure of one pound. This number is the static water level. Now start the pump. In the required intervals, check the pressure gauge reading. Subtract the lower reading from the higher reading to get the change in pressure and multiply by 2.3. This number is the drawdown in feet. Once the test is completed, the equipment used can be installed permanently for ongoing monitoring of the static water level. (See figure below)



$$X = Y - Z$$

EXAMPLE:

$$Y = 100 \text{ ft.}$$

$$Z = 15 \text{ psi} \\ = 15 \times 2.3 = 34.6 \text{ ft.}$$

$$X = 100 - 34.6 = 65.4 \text{ ft.}$$

2. **Flat Tape Method** – A measuring device can be rented from many rental companies. A flat tape level indicator uses an electrode which sets off an audible beep and a bright LED light when the end of the tape touches the water surface. The tape will usually have measurement increments in feet and inches. The first reading, prior to turning on the pump, is the static water level. As the pumping continues, the tape can be lowered to keep up with the water level and subsequent measurements in drawdown can be made. This method can only be used for the pump test and is not a method for ongoing monitoring of the static water level.

an adjacent well, the department may require that both wells be test pumped simultaneously to verify that the aquifer can adequately supply both wells.

The department recommends that the well be fitted such that future water level measurements can be facilitated.

4. Water Quality Tests

Water samples from your system must be submitted to state certified laboratories and **copies of current test results must be included with your application.**

Current regulations (WAC 246-291-100) require that all Group B water systems must have an initial **complete inorganic chemical and physical analysis** and a **bacteriological test**. The Department may require analyses for additional chemicals. Primary inorganic chemical and physical standards (WAC 246-291-330 (3)) are antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, nitrate (as N), nitrite (as N), selenium, sodium, thallium, and turbidity. Secondary chemical and physical standards are chloride, color, hardness, iron, manganese, silver, specific conductivity, sulfate*, total dissolved solids*, and zinc.

*Required only when specific conductivity exceeds 700 micromhos/centimeter.

Other water quality tests may be required, if the department determines they are necessary (WAC 246-291-300). Some groundwater contamination areas have been identified by the State. Water systems near these areas may be required to submit additional tests at a frequency determined by the department. Other water quality tests that may be required can include analyses for volatile organic chemicals (VOCs), synthetic organic chemicals (SOCs) or pesticides, and radionuclides.

After approval, a bacteriological sample must be submitted *annually* for analysis and at least one nitrate sample submitted *every three years*. Included with this application is a list of labs currently state certified to test for nitrates, as well as all analytes included in the complete inorganic chemical and physical analysis. A separate list of labs currently certified to perform the bacteriological test is also included.

5. Covenants:

For a description of the information required in this part, refer to Part 3a, Appendix I. In addition, examples of the protective covenants are provided at the end of Appendix III.

Part E: Financial Viability

Through development of a projected budget, the goal of the Financial Viability worksheet is to set in place plans, policies and procedures that will enable the system owner(s) to have the ability to obtain sufficient funds, on a continuing basis, to cover the total cost of developing, constructing, operating, and maintaining the system in compliance with State and Local drinking water regulations. **While all proposed systems must complete the Financial Viability worksheet, the worksheet is extremely important for those systems that are unable obtain the services of a qualified SMA. In these cases and as a minimum, the items highlighted in ***BOLD, ITALICS, and UNDERLINED*** must be completed as accurately as possible in order to prove financial viability. Although the elements identified maybe used by an SMA, it is recognized that such entities may demonstrate financial viability through other mechanisms.**

The rates calculated on the worksheet (Line 18) must be adequate to cover the operation and maintenance costs of the system and any budget deficits identified in line 16. It is important to remember that the line items on the Financial Viability worksheet are intended to be areas requiring consideration and may not be applicable a particular Group B water system and may be skipped if not applicable to your system. **(NOTE: Use the rate calculated after full development on the Notice To Future Property Owners.)**

In completing Part E of the workbook, information for the various line items may be obtained from various service providers. These could include equipment suppliers, chemical suppliers, tax assessor, utility companies, insurance agents, etc.

The following items are a brief explanation of each of the line items:

Annual Expenses (For One Full Year)

Line 1 Wages and Benefits: Includes all compensation to employees of your utility in which the work is related to the administration and operation of the utility, such as officers, directors, secretarial, operators, and meter-reading.

Line 2 Electricity and Other Utilities: Includes the cost of all electric power, water, telephone, and any other utility-related expenses incurred in producing and delivering water.

Line 3 Chemicals and Treatment: Includes the cost of all chemicals used in the treatment of water.

Line 4 Monitoring Costs: Includes all water monitoring costs incurred by the utility. This would include all costs associated with bacteriological, nitrate, inorganic chemical and any other types of monitoring required, or voluntarily conducted. In addition, this should include both in-house monitoring costs, and monitoring that is sent to an outside agency for analysis.

Line 5 Materials, Supplies and Repairs: Includes all materials, supplies, and replacement parts used in the operation and maintenance of the water system and in producing and delivering water to the customer.

Line 6 Taxes / Assessments: Your utility can incur a variety of taxes such as state utility tax, business and occupation (B&O) tax, property tax, etc. A summation of all taxes should be entered into line 6.

Line 7 Insurance/ Misc. Expenses: Insurance costs include all the coverage costs related to the operation and administration of the water system. Miscellaneous expenses are those water system expenses not previous included in Lines 1 through 6.

Line 8 Subtotal- Operating Expenses: This subtotal is the expense of running a Group B water system on a yearly basis and should include the costs identified in Lines 1 through 7.

Line 9 10 Percent Contingency: A Group B system should budget for unexpected expenses equaling 10 percent of their total annual operating expenses. A 10% contingency charge, built into the rates, will help prevent cash flow shortfalls. This contingency charge, when accumulated, will also enable the system to fund a reserve for other unexpected costs.

Line 10 Principal and Interest Payments (Debt Payment): Includes the annual costs of all short-term and/or long term system debt.

Line 11 System Replacement: Group B systems should start to generate funds to replace the system. This expense reflects the cost for replacing all major components of the water system assuming a 20 year life expectancy. 1/20th of the original cost of the system should be included in the budget.

Line 12 Total Revenue Required: Line 12 is the summation of Lines 8 through 11.

Annual Revenue from Sources other than Water Rates

Line 13 Hook Up / Other User Fees: Includes the fees to be charged to connect new users to the system and all other miscellaneous fees and charges for service provided other than for water service.

Line 14 Other Revenue: Includes all other revenues that do not apply to the categories above.

Line 15 Total Non Water Rate Revenue: Line 15 is the sum of Lines 13 and 14.

Annual Water Rate Calculations

Line 16 Budget Surplus (Deficit): Line 16 is the result of subtracting Line 12 from Line 15.

Line 17 Number of Connections: Line 17 is the total number of service connections served by your water system at initial development and after full development of the system.

Line 18 Annual Water Rate: The annual water rate for your system is calculated by dividing Line 16 by the number of service connections on your system. The rate calculated must be sufficient to cover all of the operation and maintenance costs for your system and can be charged on a monthly, bimonthly, semiannual or annual basis.

Part F: Source Capacity

The well, at a minimum, is expected to supply enough water to meet the estimated maximum daily demand (MDD) for the number of ERUs in your system (i.e. the water system design rate cannot exceed the minimum well capacity). For all new systems a **pump test** of the well must be performed to establish reliable well capacity. Although not mandatory the well should be capable of providing the required peak hourly demand (**PHD**) flow of your system. If, however, your well can only produce the maximum daily demand (**MDD**), but not the peak hourly demand, you will need to provide water storage. If water storage is required, but can not be provided with one or more simple pressure tanks, you must hire a professional engineer to design the storage tank and develop the specifications for its installation in the water system.

The *capacity of the well* (in gallons per minute), established from the pump test, along with *the required pump head* (in feet) (to be calculated in the next section), can then be used to select the proper pump size. If the pumping rate of the well is less than the required peak flow, storage is required.

The best information for determining the expected demands of a water system is usually from records of actual usage for an existing system, or from the meter records of a similar system (in size, nature, and climate) which could be used to estimate the expected demands to be used for design.

In the absence of information which may be more reflective of the demands expected for a given development, the design of the system is to be based on a maximum internal daily use, statewide, of 350 gallons per day (**MDD_{int}**) per Equivalent Residential Unit (**ERU**). The **MDD_{int}** per **ERU** design standards used in this appendix is based on internal domestic use only and does not account for the watering of lawn and garden spaces or other outside water uses. If additional uses or outside irrigation demands are required for the development, the system must be designed to a higher standard. These values are indicated in **Table 1** for the external uses prescribed for Western Washington (an additional 400 gpd/**ERU**) or Eastern Washington (an additional 900 gpd/**ERU**).

Fireflow requirements vary. Fireflows may be prohibitive in some areas. Fire protection may be *required* in other areas, but is not considered in this appendix. For more information, consult with your county fire marshal or county code enforcement official. **When fire flow is required, a professional engineer must be retained to perform a hydraulic analysis and design storage facilities.**

TABLE 1: GROUP B WATER SYSTEM SIZING CRITERIA

ERU = Equivalent Residential Unit (= service connection)

MDD_{int.} = Maximum Daily Demand for internal household uses, including very limited outside uses. This (gpd) demand differs from Eastern to Western Washington.

MDD_{ext.} = Maximum Daily Demand for uses of water outside of a household (lawn/gardening watering, (gpd) etc.). This demand differs between Eastern and Western Washington.

PHD = Peak Hourly Demand experienced by the systems' distribution piping. (gpm)

MDD_{TOT.} = Total Maximum Daily Demand. This is the sum of **MDD_{int.}** + **MDD_{ext.}** for the Group B system.

MDD_{TOT.} = MDD_{int} + MDD_{ext} (for potable water sources)

Min. Pump Capacity = (MDD_{TOT.}) Note: Based on 24 hrs per day use.

**NOTE: PHD used for equalizing storage, pipe sizing, booster pumps
MDD used for source capacity determinations, minimum pump sizing**

ERUs	PHD (gal./min.)	MDD_{int}(East/ West) (gpd)	MDD_{TOT.}(We st) (gpd)	MDD_{TOT.}(Eas t) (gpd)
1	15	350	750	1250
2	17	700	1500	2500
3	19	1050	2250	3750
4	21	1400	3000	5000
5	23	1750	3750	6250
6	25	2100	4500	7500
7	27	2450	5250	8750
8	29	2800	6000	10000
9	31	3150	6750	11250
10	33	3500	7500	12500
11	35	3850	8250	13750
12	37	4200	9000	15000
13	39	4550	9750	16250
14	41	4900	10500	17500

Knowing the MDD and PHD demands for *your* system, you can now proceed to determine the **required pump head**. The required pump head (usually expressed in feet) is the equivalent height of a column of water that the pump must work against in order to deliver the design flow at the desired pressure to a specified point.

The required pump head will depend on whether storage is required.

For a system that requires no storage, the required minimum pump head (also called the total operating head) includes the vertical distance from the pumping level in the well (static water level plus draw-down) to ground surface (A), plus any elevation difference between ground surface at the well head and the point of delivery (B), plus the maximum frictional losses that can

occur in the system (this is converted to an equivalent amount of head) (C), plus a residual head (70 ft.) necessary to maintain the required pressure of 30 psi at each residence (D). (See Fig. 1) To calculate the required pump head you will need to perform a *hydraulic analysis* in order to figure what the maximum headloss will be in your distribution system. To perform a hydraulic analysis you must first complete your system layout sketch, including elevation differences, pipe material, pipe diameter and distances of pipe runs. Use Table 2 to determine headloss for various PVC pipe diameters at varying maximum design (peak) flows. With this information complete your hydraulic analysis in the space provided. (*Table 2 headloss figures assume plastic (PVC) pipe is used - this is the most commonly available piping and results in the least headloss)

For systems with less than 5 ERUs and using **2 inch diameter or larger PVC pipe**, with a maximum length of pipe run of 1000 feet, **no** hydraulic analysis is necessary (use headloss = 0).

TRANSITORY GROUP B SYSTEM DESIGN CONSIDERATIONS

Water systems which serve transitory populations of less than 25 people per day, or more than 25 people but for fewer than 60 days each year, are considered as Group B systems. For these systems the design will be based on the flow needed to satisfy the basic demands associated with the nature of the transitory population. Estimates of demands that may be associated with transitory uses of water may be found from a variety of sources. Estimates which are derived from actual meter records for similar transitory uses are preferred for determining required source capacity or installed pump capacity. If historical information is not available for an area in which a transitory Group B system is being designed, then the following references may be used for estimating demands:

Washington State Plumbing Code Standards, most recent edition that is available.

Design and Construction of Small Water Systems: A Guide for Managers, published by the American Water Works Association, 1984.

Manual of Individual Water Supply Systems, U.S. Environmental Protection Agency, EPA-590/982-004, October 1982.

Some large transitory systems because of their size, potential complexity, and special nature (e.g., fairgrounds, open concert areas, airports, etc.) must be designed by a professional engineer. Smaller Group B transitory systems may be designed by local designers or health officials with the following criteria:

- * All designs will be based on a source delivery rate of 20 gpm, regardless of the rated capacity of the source.
- * A 10 psi friction pressure drop will be allowed in Transmission/Distribution lines. It is assumed that a single line from source to point of use will most often be used. A hydraulic analysis will not be needed provided that the lengths of lines do not exceed:
 - 2000 feet of 2" diameter pipe
 - 10,000 feet of 3" diameter pipe
 - Any length of 4" or larger diameter pipe

A professional engineer must be involved if the line lengths exceed these limits for the specified pipe diameter that is intended to be used.

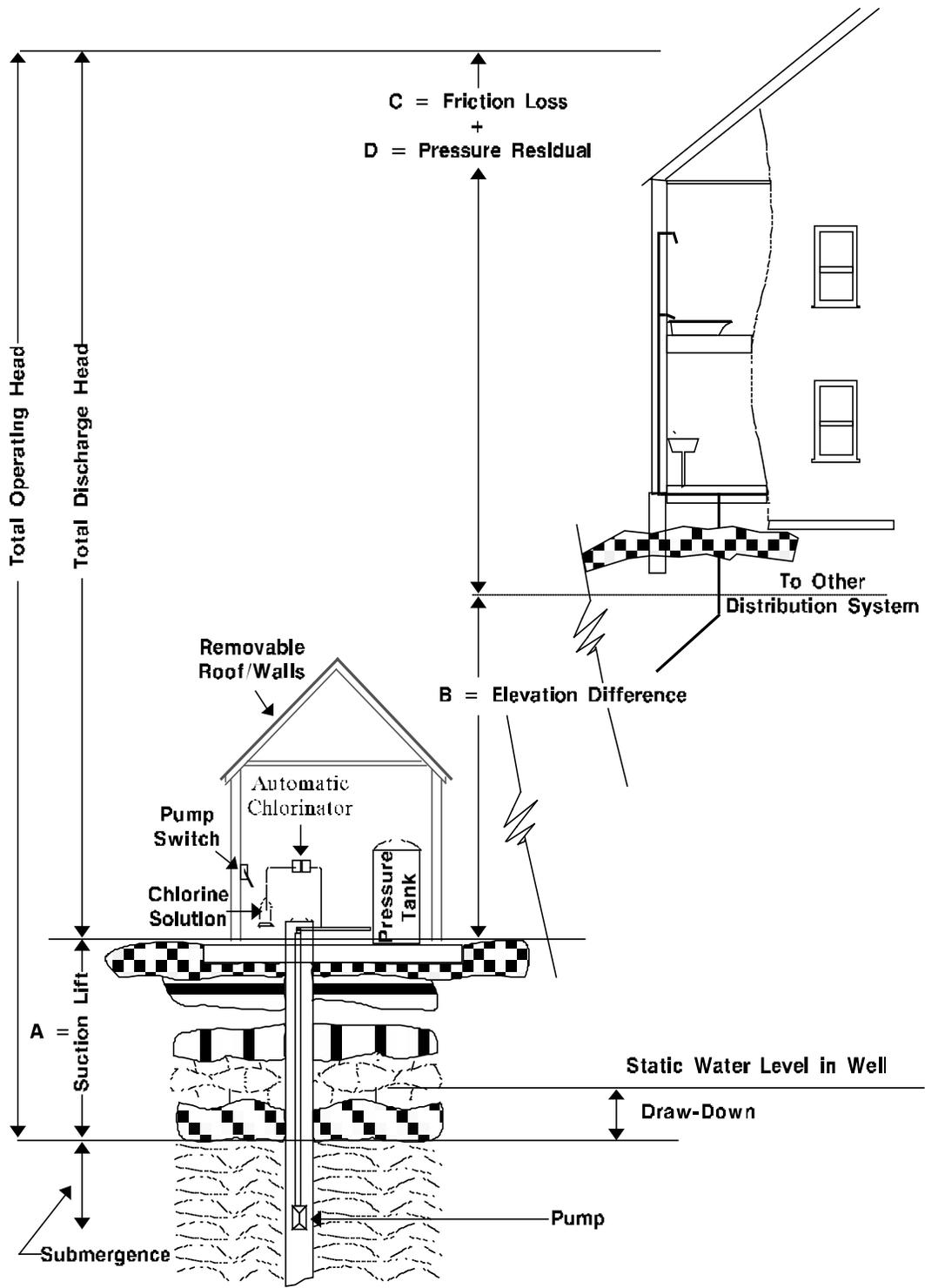


FIGURE 1

Required Pump Head

For Well Pump

Required Pump Head - expressed as follows:

$$\text{Total Operating Head} = A + B + C + D$$

A = Total well lift, from pumping level in well to ground surface, in ft.

B = System elevation difference, from point of discharge to point of delivery of water, in ft., if greater than 40 feet. (If less than 10 feet & specified pipe sizes are used, B = 0).

C = Friction losses, expressed in ft.

D = Pressure residual (30 psi), expressed in ft. (70 ft.)

A + B = Static Head (Total)

NOTE: B may be positive, negative or zero.

If zero, there is no effect.

If positive, it is added into the required pumphead as above.

If negative, it should be treated as zero unless greater than 50 ft., then will be subtracted.

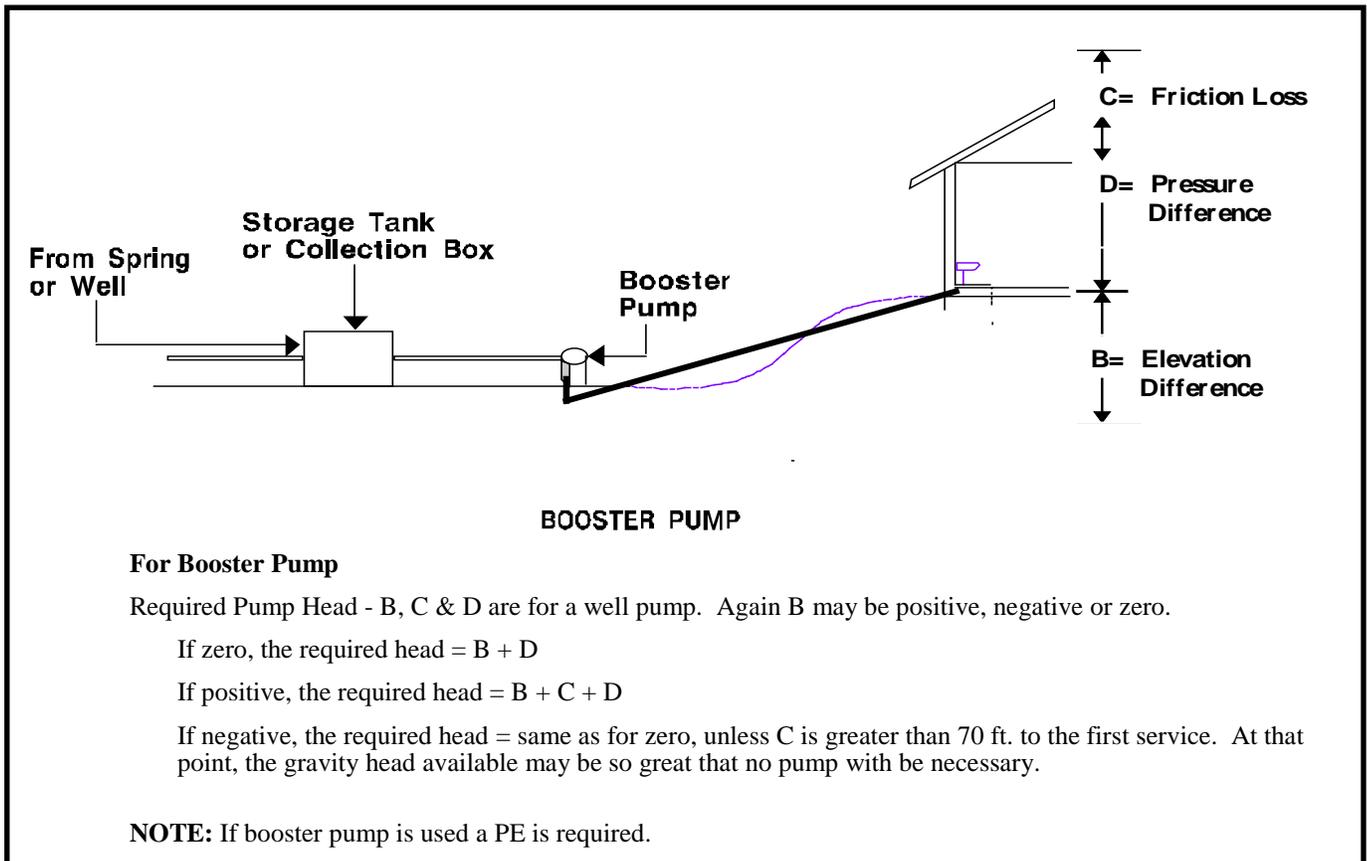


FIGURE 2

**TABLE 2
HEADLOSS ESTIMATES FOR VARIOUS PVC PIPE SIZES
AND SYSTEM PEAK HOURLY DEMANDS**

PIPE DIAMETER (INCHES)	ERUs	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	PHD gpm	15	17	19	21	23	25	27	29	31	33	35	37	39	41
	**HEADLOSS PER 100 FEET OF PVC PIPE (IN FEET)														
1*		14.7	18.6	22.8	27.5	32.5	37.9	43.7	49.9	56.4	63.4	70.7	78.4	86.4	94.8
1 1/4		5.0	6.3	7.7	9.3	11.0	12.8	14.8	16.8	19.1	21.4	23.9	26.5	29.2	32.0
1 1/2		2.0	2.6	3.2	3.8	4.5	5.3	6.1	6.9	7.9	8.8	9.8	10.9	12.0	13.2
1 3/4		1.0	1.2	1.5	1.8	2.1	2.5	2.9	3.3	3.7	4.2	4.6	5.1	5.7	6.2
2		0.5	0.6	0.8	0.9	1.1	1.3	1.5	1.7	1.9	2.2	2.4	2.7	3.0	3.2
3		0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5
4		0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
6		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

* PROVISION IS MADE IN THE HEADLOSS TABLE FOR ANALYSIS USING 1 INCH PIPE. HOWEVER, USE OF THIS OR SMALLER PIPE SIZES IS NOT RECOMMENDED, SINCE IT RESULTS IN VERY LARGE HEADLOSS, REQUIRING A LARGER, MORE EXPENSIVE PUMP IN MANY CASES. LARGER PIPE SIZES ARE ALWAYS BENEFICIAL DUE TO THE REDUCTION OF HEADLOSS.

** Values calculated using Hazen-Williams formula assuming smooth (PVC, ASTM D2241) pipe and a flow coefficient, C, of 150. Velocity not to exceed 7 feet/second.

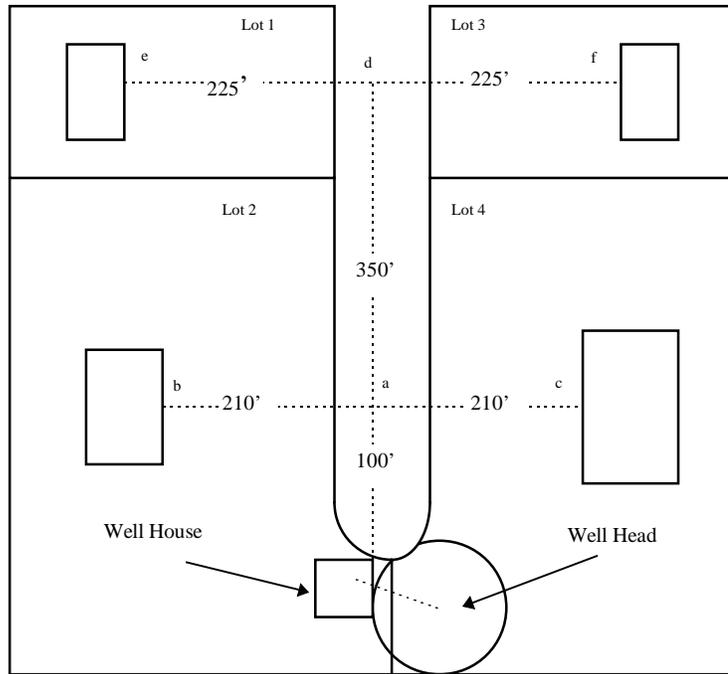
NOTE: For steel (galvanized) pipe (i.e., Hazen-Williams Coefficient of about 100) multiply the headloss values given in the foregoing Table 2 by a factor of two. {i.e., The specific headloss for steel pipe is approximately twice that associated with PVC pipe}

Example for pipe headloss calculations:

1. Refer to the system layout sketch below. The system is broken into links; a,b,c,d,e, etc. In the example, the analysis for the pairs of services 1 and 2, 3 and 4 are performed only once. This is because the pipe type, lengths and flows are the same for each of these pair. There is no need to repeat calculations unnecessarily.
2. Using information from your system layout sketch, enter the pipe information (material, diameter and length) for each link leading to a given connection into each of the appropriate columns in the hydraulic analysis table. Enter the number of services (connections) downline from each link in the next column. Enter the peak flow from Table 1 that corresponds to the number of downline services in the next column. Enter the headloss per 100 feet of pipe from Table 5 that corresponds to the peak flow for that diameter pipe in the next column. Multiply the headloss per 100 feet by the number of hundred feet of pipe in each link and enter that figure in the last column (example - 480 feet of pipe = 4.8 times headloss per 100 feet).
3. For each connection in your distribution system, add up the headloss associated with each link leading to that service and enter it in the chart under "TOTAL".
4. When the total headloss for each connection has been calculated, compare the values and use the greatest value obtained anywhere in your system for the headloss when completing Table B (Required Pump Head).

For further clarification of calculating headloss, refer to the following example problem.

EXAMPLE 1



3

TABLE A - Headloss

From:	To:	ERUs:	PH D	Diameter	Headloss per 100'	Length h	Total Headloss
Well	a	4	21	2"	0.9	100'	0.9
a	b,c	1	15	1 3/4"	1.0	210'	2.1
							Total of 3.0 feet
Well	a	4	21	2"	0.9	100'	0.9
a	d	2	17	1 1/2"	2.6	350'	9.1
d	e,f	1	15	1 1/4"	5.0	225'	11.25
							Total of 21.25 feet

Where: PHD = Peak Hourly Demand. The value used is from Table 1
 Headloss per 100 ft. = Friction loss through PVC pipe. These values are from Table 2. .
 Total Headloss = Headloss of the system at that point. To determine this figure multiply the friction loss by the length of pipe and divide this result by 100.

Having calculated what the maximum headloss will be in your distribution system, you can complete the section for well pumps in Table B to determine what the Required Pump Head is.

Pumping Equipment Selection

The Required Pump Head is the sum of the static head of the well, the residual head, and the greatest headloss determined in the hydraulic analysis.

The Static Head is the distance in feet from the water surface in the well during pumping to the point to which water service is to be delivered. In other words the Static Head is the summation of Static water level, the amount of drawdown during pumping and the increase in elevation between the well and the highest service connection.

The Residual Head is the pressure required at each connection in the system. The pressure required is 30 psi or 70 feet residual. (To convert psi to feet of water multiply by 2.307)

Headloss is the equivalent distance in feet that the pump must work against due to the resistance of pipe friction and similar causes.

As an example, if one were to assume that the well in Example 1 above was 250 feet deep with a static head of 220 feet, one could complete Table B below.

Table B – Required Pump Head

	WELL PUMP	PUMP #2 (BOOSTER PUMP IF NEEDED) [?]
DISTANCE FROM PUMPING LEVEL IN WELL TO GROUND SURFACE (WELL HEAD)	220 FEET	-----FEET
ELEVATION DIFFERENCE FROM WELL HEAD TO POINT OF DELIVERY	10 FEET	-----FEET
GREATEST HEADLOSS <small>(Note: This number from hydraulic analysis)</small>	11.25 FEET	-----FEET
PRESSURE RESIDUAL HEAD (30 PSI = 70 FEET OF HEAD)	70 FEET	-----FEET
TOTAL REQUIRED PUMP HEAD	311 FEET	-----FEET

[?] **For Booster pumps a licensed Professional Engineer is required.**

Knowing the required pump head (in feet) and the pump rate your well is capable of (in gpm), you can select the pump that best fits your needs. Enter the requested pump information in PARTS F-3 and 4 on page 16 of the workbook and attach pump curve and specifications.

Booster Pumps

In situations where booster pumping is performed, the calculation is the same as for a well pump sizing. Most frequently this calculation will be necessary when the storage requirement is so large (and expensive) that it cannot be provided utilizing a pressure tank. For booster pump sizing the second half of Table B should be completed. Enter the requested information in Part F, #5 on page 16 of the workbook and attach pump curve and specifications.

Pumphouses

If a pumphouse is to be provided, it should be installed above the surface of the ground (see Figure 3). The pumphouse floor should be watertight, preferably concrete, and should slope uniformly away in all directions from the well casing or pipesleeve. It should be unnecessary to use an underground discharge connection if the pumphouse is insulated and heated. For individual pumphouses, adequate lighting and a thermostatically controlled electric heater should be provided.

Pitless Adapter Units

Department of Health approved pitless adapters and units may be used if acceptable to local health jurisdictions. Pitless adapters and units shall comply with part 3.2.7.4 of the “Ten States Standards”, and with NSF Standard #56 or “Water Systems Council (WSC) Recommended Standards PAS-1”. Watertight well caps should comply with WSC Recommended Standards PAS-2. (Please contact the local Environmental Health jurisdiction or the State Drinking Water Regional Office closest to you for a copy of the state policy on Pitless Adapter Units and the current listing if approved devices.)

Typical Pumphouse

(Not Drawn to Scale)

NOTE:

- The roof may be one surface, sloping, with a hatch.
- There should normally be one foot access between the wall and equipment.
- Plumbing should be installed for pumping to waste.
- Where chlorination is practiced, provisions must be made for an adequate chlorine chamber.

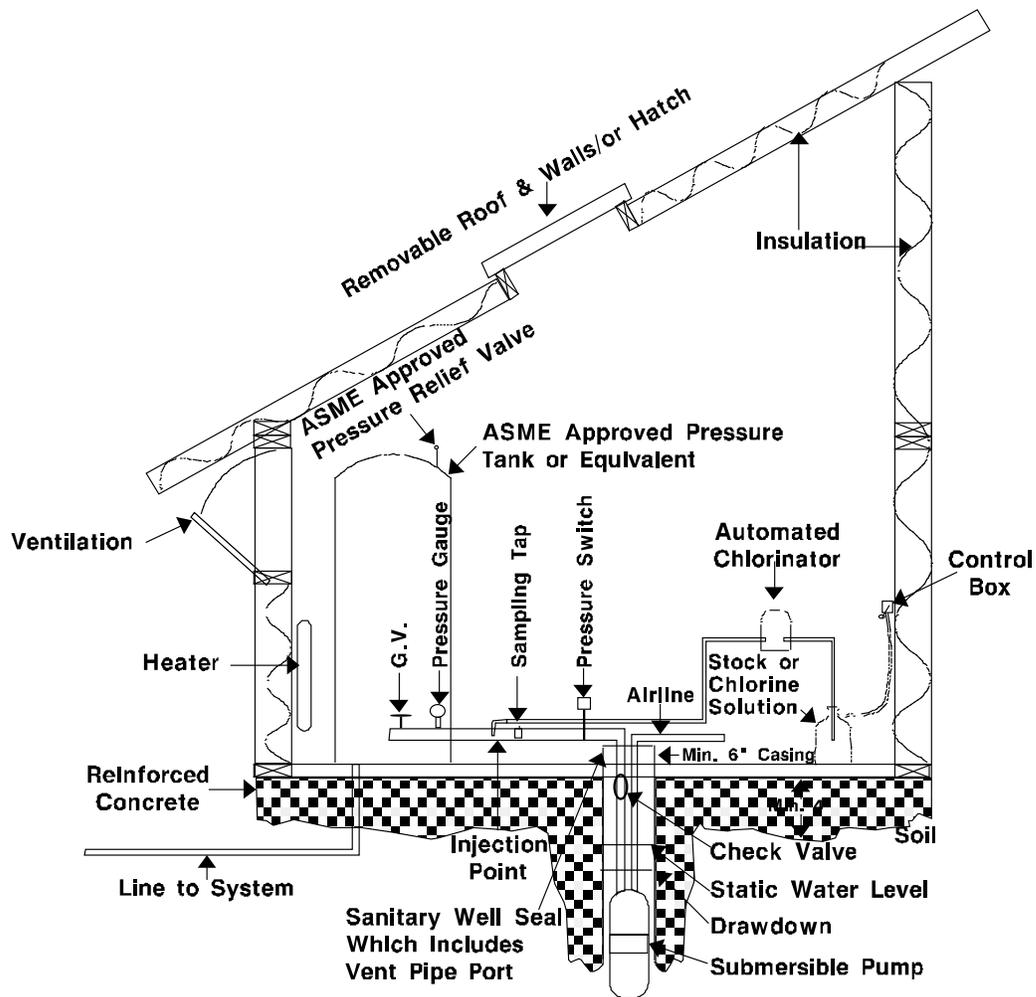


FIGURE 3

Part G: Pressure Tank/Storage Facilities

If the pumping rate capacity of your well is *less* than the required peak flow listed for the number of connections *you have* in the PHD Table (Table 1), you will need to provide storage. If nonpressurized storage is required a professional engineer must be consulted. The volume of storage (called equalizing storage) required can be calculated as follows:

$$\text{EQUALIZING STORAGE} = (\text{PHD} - \text{Installed Pump Capacity}) \times 60 \text{ MIN.}$$

As an example, if you are designing a 4-connection system and the installed pump rate of your well is 15 gpm, you will need $(21 \text{ gpm} - 15 \text{ gpm}) \times 60 \text{ minutes} = 360 \text{ gallons}$ of storage.

If storage is required, complete PART G - 2 on page 18 of the workbook.

1. Pressure Tanks

Pressure tanks are typically used in a system to provide pump motor protection from excessive cycling. (By storing (air) pressure and some water (a portion of which is called *working storage*, i.e. the volume that can be withdrawn between pumping cycles) in your system, they eliminate the need for your pump to turn on every time a small amount of water is used.

A pressure tank is generally used for pump protection. In systems of 14 or fewer connections, where only a **limited** amount of storage is necessary, storage can sometimes be provided by installation of additional pressure tanks.

All pressure tanks shall be equipped with a properly sized and installed pressure relief valve that has been approved by the American Society of Mechanical Engineers (ASME). A properly sized ASME relief valve will have a relieving capacity which will prevent a rise in pressure in the vessel of more than 10 percent above the maximum allowable working pressure. A properly installed ASME relief valve shall be located on the top of the tank or on the outlet piping as close as possible to the tank with no intervening valves.

The Department of Labor and Industries regulations (WAC 296-104) require that all pressure tanks over five cubic feet in volume (approximately 37.5 gallons) be constructed in accordance with the latest edition of the ASME code. However, the State Department of Health has established a policy whereby non-ASME code tanks may be approved as long as (1) no tank exceeds 120 gallons capacity; (2) the system pressure at the tank site does not exceed 100 psi; and, (3) a properly sized and installed ASME code pressure relief valve is specified. Whenever a system is approved with non-code tanks, a copy of the approval letter shall be sent to the Department of Labor and Industries for any follow-up action they may wish to pursue under their regulations.

There are two basic types of pressure tanks, classified as either "conventional" tanks or "bladder" tanks. Conventional tanks are those that allow air-water contact whereas bladder tanks have some type of membrane separating the air from the water. In either type, maintaining the proper air vs. water volume is important to the efficient operation of the tank. Some mechanism for recharging the pressure tank with air is needed. This is generally a system using a small compressor or snifter valve arrangement.

Pressure Tank Sizing

A. Bladder Tank Sizing:

Bladder tanks are mainly used for pump protection. The procedure for selecting or sizing bladder tanks differs from that used for conventional tanks in that the actual tank size is selected first and then the number of that size tank needed to provide pump protection is determined. The low operating pressure is calculated in a similar fashion as with conventional tanks, but the bladder tank must be precharged with air to a pressure of at least 5 psi below the low operating (cut-on) pressure for the system.

The sizing equation for bladder tanks is:

$$T_B \geq \frac{R \cdot Q_p}{N \cdot V_B}$$

Where: V_B = the total stated volume of an individual bladder tank, in gallons
 T_B = number of bladder tanks of size V_B required
 N^* = operating cycles of the pump motor per hour (as an example use $N = 4$ for single phase, higher horsepower pumps but never greater than 6 unless larger values can be justified by documented manufacturers guarantee)
 Q_p = the delivery capacity (pump rate) of your pump, in gallons per minute
 R = values can be found in TABLE 4

NOTE (N^*) Some pump motor manufacturers will warrant their motors for higher cycling rates, generally based on the number of starts per a 24 hour period. The average cycling time may be used for N by dividing the manufacturer's recommendation for the maximum allowable number of starts per day by 24.

Example: pump rate = 25 gpm. Use $N = 4$. Tank desired is 86 gal. (one of the most common sizes available). For 40/60 psi pressure range (From table 4), $R = 61.7$.

$$\begin{aligned} T_B &= 61.7 \times [25 / (4 \times 86)] \\ &= 4.48 \text{ (round off to next highest whole number)} \\ &= 5 \text{ Tanks Required (for pump motor protection)} \end{aligned}$$

TABLE 4
Values of R for Various Maximum and Minimum Pressure Tank Ranges

MAXIMUM PRESSURE (GAUGE)	55 p.s.i.	60 p.s.i.	65 p.s.i.	70 p.s.i.
MINIMUM PRESSURE (GAUGE)	R			
35 p.s.i.	58.1	49.8	44.3	40.4
40 p.s.i.	76.7	61.7	52.6	46.6
45 p.s.i.	114.1	81.5	65.2	55.5
50 p.s.i.	226.6	121.4	86.4	68.8

Although normally used for protection of pump motors, Bladder Tanks can in some instances be used for a limited amount of Equalizing Storage; especially if the installed pump capacity is within 20 percent of the Peak Hourly Demand (PHD). If Bladder Tanks are to be used for equalizing storage, the following determinations must be made:

For the number of Bladder Tanks determined necessary for pump motor protection (the calculation above), use the formula:

$$W_s = \frac{T_b(15)(V_b)}{R}$$

R

This can also be done by referring to estimates of working storage available in tanks provided by the tank suppliers. They may give a working storage estimate for individual tanks at various on/off pressure settings, which can then be multiplied by the number of tanks determined necessary for pump motor protection.

Once a value for Working Storage has been determined for the number of tanks needed to protect pumps, this value needs to be compared to the amount of Equalizing Storage which has been determined necessary. If the amount of Equalizing Storage needed is smaller than the working volume that is available for pump protection, then use the number of tanks calculated for pump protection. If the volume of Equalizing Storage is greater than the available working storage, then the working storage volume must be divided into the equalizing Storage volume to determine a multiplying factor which is then used to multiply the number of tanks needed for pump protection, T_b , to determine the number of tanks needed for Equalizing Storage.

EXAMPLE:

For the example given above where it was determined that five (5) 86-gallon tanks would be needed for pump protection and assuming an 8 ERU system is to be served (PHD = 29 gpm):

- 1. $V_w = (T_b)(15)(V_b)/R = (5)(15)(86)/61.7 = 104.5$ gallons available working storage**
- 2. $E.S. = (PHD - Q_p)(60) = (29 - 25)(60) = (4)(60) = 240$ gallons of equalizing storage**
- 3. $ES/V_w = \text{multiplying factor} = 240/104.5 = 2.3$**
- 4. Total number of 86 gallon tanks needed for Equalizing Storage = $2.3(T_b) = 2.3(5) = 11.5$ Tanks**
- 5. Select 12 tanks with a per-tank capacity of 86 gallons each (Total working storage = 250 gallons)**

B. Conventional Tank Sizing:

In sizing conventional tanks, the working storage is first calculated, then a table will be used to select the actual pressure tank size.

If a tank is sized for pump protection only, the following formula may be used:

$$\text{Available WORKING STORAGE, } V_w = \frac{(15)(Q_p)}{N}$$

Where: V_w = Working Storage, gallons (other terms have been previously defined)

When the tank is sized for pump protection and equalizing storage, the working storage calculated above must be compared to the equalizing storage as calculated above. If a Conventional tank is to be used for Equalizing Storage, then the volume calculated as necessary for storage must be used in place of the working storage needed for pump motor protection.

Once a value for *working storage* volume, or *equalizing storage* volume, has been determined, refer to TABLE 5 to select the *actual storage* tank size. For the selected pressure range, select the value in the corresponding vertical working storage column.

Before using this table you will need to determine what will be the minimum pressure setting. Minimum pressure setting (in psi) = [elevation difference from well head to point of delivery (in ft.) + maximum headloss in system (in ft.) + 70 ft. residual head] x .433. If this value is not an even increment of 10, select the next highest minimum pressure (example: min. press. setting = (0 + 9 + 70) x .433 = 34.2 psi so select 40/60 psi pressure range in TABLE 5.

Similarly, if you can't find the exact value you calculated for working storage in TABLE 5, it is suggested that you choose the next highest value in the table.

**TABLE 5
AVAILABLE HORIZONTAL / VERTICAL COMMERCIAL TANK SIZES**

PRESSURE RANGE LOW PRESSURE/ HIGH PRESSURE	AVERAGE WORKING STORAGE IN GALLONS (mid-pressure range)											
	25	50	75	100	150	200	250	300	350	400	450	500
30 / 50 (psi)	101	205	315	370	594	749	965	1110	1371	1517	1755	1874
40 / 60 (psi)	125	260	370	489	712	895	1060	1280	1510	1760	1960	2170
50 / 70 (psi)	137	280	390	515	712	1030	1183	1398	1636	1874	2112	2338
60 / 80 (psi)	150	300	436	535	806	1089	1371	1636	1874	2112	2610	2635

Example: Pump Rate = 25 gpm , P1/P2 = 40/60 psi, Seven ERUs.

For pump motor protection only, use formula, $V_w = (15)(Q_p)/N$

For Pump cycles of 6 per hour ($N = 6$); $V_w = (15)(25)/6 = 62.5$ gallons (use 75 gals. in Table 5 which gives a tank size of 370 gallons for 40/60 pressure range).

For seven connections, design flow is 27 gpm. Equalizing Storage required is $(27 - 25) \times 60 = 120$ gal (use 150 gallons in Table 5)

For 40 / 60 psi pressure range, tank selected is 712 gallons. (for $V_w = 150$ at 40/60 psi range)

If Equalizing Storage is to be supplied by the Pressure Tank, select a 712 gallon, or larger, tank.

2. Storage Tanks: (NOTE: If system design requires non-pressurized storage, the system must be designed by a licensed Professional Engineer.)

All storage tanks, distribution lines, and other surfaces of a public water system in direct contact with water must be constructed of materials that will not impart contaminants or impurities indirectly into the water. As a result, all system components must meet the requirements of either of the following two alternatives:

1. Product acceptability shall be established under the applicable ANSI/NSF Standard 60 or 61 and be certified to that effect by an ANSI-accredited listing agency, or;
2. Product shall have appeared on the final (May 8, 1989) EPA advisory listing entitled, "Report on Acceptable Drinking Water Additives".

Part H: Treatment

For information on chlorination or other treatment systems to be included in the water system, please contact the department.

If treatment equipment is provided, measures will be required to insure that the equipment is properly maintained and monitored. For all treatment systems an Operation and Maintenance (O & M) manual and the appropriate test kits will also be required.

Part I: Distribution System

In this section a sketch or system diagram is to be provided in order to determine the location of the various system components and their relation to each other. This sketch or diagram must be as accurate and complete as possible in order to determine that the system was properly designed and located. The sketch or diagram must include the items listed in Part I of the workbook.

With reference to the construction of the distribution system, all pipe, fittings, valves, and fire hydrants (if required) should conform to appropriate standards such as issued by the AWWA, APWA, UPC, and/or NSF (i.e. AWWA Standards C900-89, C901-88, C907-91, etc.). Any plastic pipe used in the system must comply with the applicable requirements of NSF standard Number 14. Special attention shall be given to selecting pipe materials which will protect against both internal and external pipe corrosion. Pipes and pipe fittings containing more than 8% lead shall not be used. All products in substantial contact with the water shall comply with ANSI/NSF standard Number 61.

The installation of all components of the distribution system must be accomplished according to good engineering practices as identified in manuals such as AWWA Manual 23, PVC Pipe - Design and Installation, the Pacific Northwest AWWA Section's Cross-Connection Control Manual, and the AWWA Standards for Disinfecting Wells, Water Mains and Water Storage Facilities.

Part J: Reliability

Owners of Group B public water systems shall ensure that their systems are constructed, operated and maintained to protect against failures. While it is hoped that the construction, operation, and maintenance of a Group B water system will minimize system failures, some system failures will occur. With this in mind, all Group B water system applicants must provide information on what provisions, if any, have been or will be made to ensure that their system is capable of providing an adequate quantity and quality of water in a reliable manner.

While there are no requirements in WAC 246-291 which compel the owner of a new or expanding Group B water system to provide any type of system back-up in the event of a system failure, there is a requirement under WAC 246-291-240 (2) for a generator disconnect. A generator disconnect or at least manual transfer switching device is required so that during emergency events source and/or booster pump facilities required for primary supply might be equipped with auxiliary power. Customers of Group B water systems have a right to know about the reliability of their system during periods of power outages, pump failures, or other system component failures.

APPENDIX III

Information Recorded on Property Titles

As a condition of system approval, certain documents must be recorded on property titles. These fall into two broad categories, including protective covenants and informational notices. Additionally, we recommend that ownership and maintenance agreements be recorded. Please be advised that county auditors have specific requirements for documents that are to be recorded. Prior to utilizing the example forms provided one should check with the applicable county auditor for the acceptable format to be utilized.

PROTECTIVE COVENANTS are required to prohibit placing certain potential sources of contamination in the vicinity of ground water and GWI sources in accordance with the provisions of WAC 246-291-100(2)(h) or WAC 246-291-110(3)(f)(ii), respectively. For the property containing the well, use the *Declaration of Covenant* form. Use the *Restrictive Covenant* form for any adjacent property(ies) which are within the required area of protection.

INFORMATIONAL NOTICES are to be recorded for each property which will be served by the public water system. This is intended to provide basic information which will be useful to future property owners. The *Notice To Future Property Owners* form is to be used for this purpose.

EXAMPLE – Notice to Future Property Owners

This property is served by a public water system which is subject to the provisions of Chapter 246-291 WAC. This system may also be subject to other state and local regulations. The system owner is responsible for maintaining this system in compliance.

The name of this system is: _____

Legal Description of the Property

The state Department of Health and local health departments share administration of the drinking water regulations. Therefore, when the term "department" is used, it refers to whichever agency regulates this particular system. You can contact the local health department to find out which agency is applicable.

This water system is designed to provide for _____ services. Additional planning and design approvals must be obtained from the department prior to expanding beyond this number of services or whenever there are changes made to the system, such as adding a treatment system..

Option A: Must be used if a water right has been issued at time of approval.

Please note that the design standards for this system account for domestic use and watering of a typical lawn and garden space only. The design assumes that all residences will be equipped with low flow plumbing fixtures and that all users will keep conservation in mind whenever they use this system.

At the time this water system was approved by the health department, a water right had been issued by the Washington State Department of Ecology authorizing a maximum withdrawal of _____ gallons per minute and an annual withdrawal of _____ acre feet from the well to be used for _____ purposes. Water users are expected to work together [cooperate] to insure that water withdrawals and uses do not exceed the conditions of the water right.

Option B: Must be used if a water right has not been issued at the time of approval and limited irrigation is permitted.

Please note that the design standards for this system account for domestic use and limited watering of a small lawn and garden space only. The design assumes that all residences will be equipped with low flow plumbing fixtures and that all users will keep conservation in mind whenever they use this system.

At the time this water system was approved by the health department, a water right had not been issued by the State of Washington for this system. Without a water right, total withdrawals from the well must be limited to less than 5000 gallons per day and total irrigation must be limited to less than 1/2 acre. Water users are expected to work together [cooperate] to insure the water system operates within these parameters. Failure to keep usage within the 5000 gallons per day limit may jeopardize the system's continued use of the well.

Option C: Must be used if a water right has not been issued at the time of approval and irrigation is not permitted.

Please note that the design standards for this system account for in-house domestic use and very limited outside water use. One hose bib with flow restriction per residence is permitted, but using this water system for lawn and garden space irrigation is not allowed . The design also assumes that all residences will be equipped with low flow plumbing fixtures and that all users will keep conservation in mind whenever they use this system.

At the time this water system was approved by the health department, a water right had not been issued by the State of Washington for this system. Without a water right, total withdrawals from the well must be limited to less than 5000 gallons per day and total irrigation must be limited to less than 1/2 acre. Water users are expected to work together [cooperate] to insure the water system operates within these parameters.

The penalty for any user who does not cooperate with the stipulations of this agreement shall be

Option D: Must be used if a water right has not been issued at the time of approval and separate irrigation is provided.

Please note that the design standards for this system account for in-house domestic use and very limited outside water use. One hose bib with flow restriction (not to exceed one gallon per minute) is permitted. The design assumes that all residences will be equipped with low flow plumbing fixtures, meters installed for all residential units, and that all users will keep conservation in mind whenever they use this system. Irrigation water is supplied by . The domestic and irrigation water will remain separate systems (i.e. no common connections).

Public water systems are subject to on-going requirements. These include periodic water quality monitoring, system maintenance and various recordkeeping. Prior to purchasing this property, it is recommended that you contact the department to determine whether this system is in compliance with applicable regulations. Fees may be charged by the department for providing **information on this public water system and other** various services.

The department maintains current information on this system to expedite retrieval of information for your use or for lending institutions which require information on the system as part of their loan approval process. Each time information changes, such as a change in the number of homes connected to the system; a change in owner/operator name, address or phone number; etc., the owner of your system must submit an updated *Water Facilities Report Form* to the department.

Group B public water systems are not required to have back-up facilities to cover power outages or other system failures. However, a generator disconnect or transfer switch must be installed in the electrical system. Contact the system owner for information regarding the reliability of this system.

This system (has/has not) been granted one or more waivers from specific provisions of the regulations. (Attach a brief summary of waivers, if any, which were granted.)

At the time this system is fully developed, the financial plan indicates an average cost of

_____/year per home to properly operate and maintain the system in compliance with state and local drinking water regulations. Costs are likely to increase over time. Current information on costs is available from the system owner.

WAC 246-291-140 (2) requires ownership and/or operation by a state-approved satellite management agency where available. **This water system is owned/or operated by _____ a state-approved SMA.**

If an approved SMA was not available at the time the system was developed, the system approval is conditioned upon future management or ownership by an SMA, if such management can be made with reasonable economy and efficiency, or upon periodic review of the system's operational history to determine its ability to meet the department's financial viability and other operating requirements.

SAMPLE: Declaration of Covenant

I (we) the undersigned, owner(s) in fee simple of the land described herein, hereby declare this covenant and place same on record.

I (we) the grantor(s) herein, am (are) the owner(s) in fee simple of (an interest in) the following described real estate situated in _____ County, State of Washington; to wit:

Legal Description of the Property containing the well. I.e. Lot 1 of Short Plat 1234 as recorded in volume 15 of short plats pages 12-14 Auditor's file No. 123456, Records of Fictitious County, Washington, as shown on and described on Attachment A".

on which the grantor(s) owns and operates a well and waterworks supplying water for public use located on said real estate, at:

Legal Description and specific location of well. I.e. 50 feet south and 100 feet east of the Northwest corner of Lot 2 of Short Plat 1234, as described and shown on Attachment "A".

and grantor(s) is (are) required to keep the water supplied from said well free from impurities which might be injurious to the public health.

It is the purpose of these grants and covenants to prevent certain practices hereinafter enumerated in the use of said grantor(s) water supply.

NOW, THEREFORE, the grantor(s) agree(s) and covenant(s) that said grantor(s), his (her) (their) heirs, successors and assigns will not construct, maintain, or suffer to be constructed or maintained upon the said land of the grantor(s) and within 100 (One Hundred) feet of the well herein described, so long as the same is operated to furnish water for public consumption, any potential source of contamination, such as septic tanks and drainfields, sewerlines, underground storage tanks, roads, railroad tracks, vehicles, structures, barns, feed stations, grazing animals, enclosures for maintaining fowl or animal manure, liquid or dry chemical storage, herbicides, insecticides, hazardous waste, or garbage of any kind or description.

These covenants shall run with the land and shall be binding to all parties having or acquiring any right, title, or interest in the land described herein or any part thereof, and shall inure to the benefit of each owner thereof.

WITNESS _____ hand _____ this _____ day of _____, 19_____.

_____(Seal)

_____(Seal)

Grantor(s)

State of Washington _____)
County of _____)

I, the undersigned, a Notary Public in and for the above named County and State, do hereby certify that on this _____ day of _____, 19_____, personally appeared before me _____ to me known to be the individual described in and who executed the within instrument, and acknowledge that he (they) signed and sealed the same as free and voluntary act and deed, for the uses and purposes therein mentioned.

GIVEN under my hand and official seal the day and year last above written.

Notary Public in and for the State of Washington, residing at

My Commission Expires: _____

SAMPLE: Restrictive Covenant

The grantor(s) herein is (are) the owner(s) of (an interest in) the following described real estate situated in _____ County, State of Washington:

Legal Description of neighbors property within the 100 foot control zone. I.e. Lot 1 of Short Plat 1234 as recorded in volume 15 of short plats pages 12-14 Auditor's file No. 1234567, Records of Fictitious County, Washington, as shown on and described on Attachment "A".

The grantee(s) herein, _____, own(s) and operate(s) a well and waterworks supplying water for public use, located upon the following described real estate situated in _____ County, State of Washington:

Legal Description and specific location of well. I.e. 50 feet south and 100 feet east of the Northwest corner of Lot 2 of Short Plat 1234, as described and shown on Attachment "A".

which well and waterworks is in close proximity to the land of the grantor(s), and said grantee(s) is (are) required to keep the water supplied from said well free from impurities which might be injurious to the public health.

It is the purpose of these grants and covenants to prevent certain practices hereinafter enumerated in the use of the said grantor(s) land which might contaminate said water supply.

NOW, THEREFORE, the grantor(s) agree(s) and covenant(s) that said grantee(s), its successors and assigns said covenants to run with the land for the benefit of the land of the grantee(s), that said his (her) grantor(s), (their) heirs, successors and assigns will not construct, maintain, or suffer to be constructed or maintained upon the said land of the grantor(s) and within 100 (One Hundred) feet of the well herein described, so long as the same is operated to furnish water for public consumption, any potential source of contamination, such as septic tanks and drainfields, sewerlines, underground storage tanks, roads, railroad tracks, vehicles, structures, barns, feed stations, grazing animals, enclosures for maintaining fowl or animal manure, liquid or dry chemical storage, herbicides, insecticides, hazardous waste, or garbage of any kind or description.

These covenants shall run with the land and shall be binding to all parties having or acquiring any right, title, or interest in the land described herein or any part thereof, and shall inure to the benefit of each owner thereof.

WITNESS _____ hand _____ this _____ day of _____, 19_____.

_____(Seal)

_____(Seal)

Grantor(s)

State of Washington)
County of _____)

I, the undersigned, a Notary Public in and for the above named County and State, do hereby certify that on this _____ day of _____, 19_____, personally appeared before me _____ to me known to be the individual described in and who executed the within instrument, and acknowledge that he (they) signed and sealed the same as free and voluntary act and deed, for the uses and purposes therein mentioned.

GIVEN under my hand and official seal the day and year last above written.

Notary Public in and for the State of Washington, residing at
My Commission Expires:_____

Return Address:

Auditor's Time Stamp

**EXAMPLE ONLY, NOT FOR FILING
DECLARATION OF COVENANT**

I (we) the undersigned, owner(s) in fee simple of the land described herein, hereby declare this covenant and place same on record.

I (we) the grantor(s) herein, am (are) the owner(s) in fee simple of (an interest in) the following described real estate situated in _____ County, State of Washington; to wit:

on which the grantor(s) owns and operates a well and waterworks supplying water for public use located on said real estate, at:

and grantor(s) is (are) required to keep the water supplied from said well free from impurities which might be injurious to the public health.

It is the purpose of these grants and covenants to prevent certain practices hereinafter enumerated in the use of said grantor(s) water supply.

NOW, THEREFORE, the grantor(s) agree(s) and covenant(s) that said grantor(s), his (her) (their) heirs, successors and assigns will not construct, maintain, or suffer to be constructed or maintained upon the said land of the grantor(s) and within 100 (One Hundred) feet of the well herein described, so long as the same is operated to furnish water for public consumption, any potential source of contamination, such as septic tanks and drainfields, sewerlines, underground storage tanks, roads, railroad tracks, vehicles, structures, barns, feed stations, grazing animals, enclosures for maintaining fowl or animal manure, liquid or dry chemical storage, herbicides, insecticides, hazardous waste, or garbage of any kind or description.

These covenants shall run with the land and shall be binding to all parties having or acquiring any right, title, or interest in the land described herein or any part thereof, and shall inure to the benefit of each owner thereof.

WITNESS _____ hand _____ this _____ day of _____, 19_____.

_____(Seal)

_____(Seal)

Grantor(s)

State of Washington)
County of _____)

I, the undersigned, a Notary Public in and for the above named County and State, do hereby certify that on this _____ day of _____, 19_____, personally appeared before me _____ to me known to be the individual described in and who executed the within instrument, and acknowledge that he (they) signed and sealed the same as free and voluntary act and deed, for the uses and purposes therein mentioned.

GIVEN under my hand and official seal the day and year last above written.

Notary Public in and for the State of Washington, residing at _____
My Commission Expires: _____

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Auditor's Time Stamp

**EXAMPLE ONLY, NOT FOR FILING
RESTRICTIVE COVENANT**

The grantor(s) herein is (are) the owner(s) of (an interest in) the following described real estate situated in _____ County, State of Washington:

The grantee(s) herein, _____, own(s) and operate(s) a well and waterworks supplying water for public use, located upon the following described real estate situated in _____ County, State of Washington:

which well and waterworks is in close proximity to the land of the grantor(s), and said grantee(s) is (are) required to keep the water supplied from said well free from impurities which might be injurious to the public health.

It is the purpose of these grants and covenants to prevent certain practices hereinafter enumerated in the use of the said grantor(s) land which might contaminate said water supply.

NOW, THEREFORE, the grantor(s) agree(s) and covenant(s) that said grantee(s), its successors and assigns said covenants to run with the land for the benefit of the land of the grantee(s), that said his (her) grantor(s), (their) heirs, successors and assigns will not construct, maintain, or suffer to be constructed or maintained upon the said land of the grantor(s) and within 100 (One Hundred) feet of the well herein described, so long as the same is operated to furnish water for public consumption, any potential source of contamination, such as septic tanks and drainfields, sewerlines, underground storage tanks, roads, railroad tracks, vehicles, structures, barns, feed stations, grazing animals, enclosures for maintaining fowl or animal manure, liquid or dry chemical storage, herbicides, insecticides, hazardous waste, or garbage of any kind or description.

These covenants shall run with the land and shall be binding to all parties having or acquiring any right, title, or interest in the land described herein or any part thereof, and shall inure to the benefit of each owner thereof.

WITNESS _____ hand _____ this _____ day of _____, 19_____.

_____(Seal)

_____(Seal)

Grantor(s)

State of Washington)
County of _____)

I, the undersigned, a Notary Public in and for the above named County and State, do hereby certify that on this _____ day of _____, 19_____, personally appeared before me _____ to me known to be the individual described in and who executed the within instrument, and acknowledge that he (they) signed and sealed the same as free and voluntary act and deed, for the uses and purposes therein mentioned.

GIVEN under my hand and official seal the day and year last above written.

Notary Public in and for the State of Washington, residing at _____
My Commission Expires: _____

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