




# **Evaluation of Probable Benefits and Costs**

## **Amendment of Chapter 173-160 WAC Minimum Standards for Construction and Maintenance of Wells**

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For  
Amendment of Chapter 173-160 WAC  
Minimum Standards for Construction and  
Maintenance of Wells

## 1. Conclusions

The Department of Ecology (Ecology) has determined that the probable benefits of the rule amendment greatly exceed the probable costs.

### Quantified Values:

- The quantified benefit estimate is \$655,000 annually.
- Ecology is unable to identify any significant costs from this rule amendment.

### Unquantified Values:

- Improved standards and our ability to manage water and reduce toxic threats by having capped wells and using non-toxic materials during construction and decommissioning wells.

Ecology has determined that the benefits associated with the rule amendment greatly exceed any probable costs. Ecology does not believe that any of the unquantified values will offset the net benefits of the amendment.

## 2. Purpose of this Analysis

Ecology is issuing this Cost Benefit Analysis (CBA) and Least Burdensome Alternative Analysis, under Chapter 34.05 RCW. Ecology will use the information developed in this analysis to ensure that the rule is consistent with legislative policy.

As required in the RCW 34.05.328(1) (d), before adopting the rule amendments, the director of Ecology must make the following determination:

*Determine that the probable benefits of the rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented;*

To fulfill the statutory requirement, this cost benefit analysis evaluates whether or not the probable benefits resulting from the amendments are greater than the probable costs. The analysis relies upon both qualitative and quantitative methods and concludes that the probable benefits of the amendments exceed the probable costs.

### **3. Background**

The changes to the existing rule (Chapter 173-160 WAC) will amend the well construction standards. The well construction standards specify conditions required in order to protect the ground water resource and the health, safety, and welfare of the public. These changes maintain consistency with the well drilling statute, correct typographical and technical errors, and update the rule to be current with technology advances, changes in the drilling industry, and current statute. The proposed amendments are in response to requests from well drillers and the Technical Advisory Group (TAG) for Ecology to clarify the existing rule.

Ecology uses the TAG to advise them on current industry standards and changes in materials and technology in the well construction industry. The TAG is composed of industry representatives and regulatory advisors (Chapter 18.104.190). TAG helped develop the rule language, which the group discussed and approved in TAG meetings.

### **4. Comparison of the Rule**

The purpose of a cost benefit analysis is to analyze the difference between conditions with and without the amendments. A comparison requires a baseline scenario describing the situation without the amendments. This analysis uses conditions under the current Chapter 173-160 WAC as the baseline. Table 1 of the Appendix provides details of existing rule language and the changes.

#### **4.1 Impacts on Ground Water and Surface Water**

Proper well construction reduces toxic threats and helps manage water resources. Improperly constructed wells can deplete an already stressed ground water resource.

Updating rule language when industry standards change can have a significant role in reducing the amount of pollution getting into the ground water resource, thus reducing the toxic threat to this resource.

## 4.2 Proposed Impacts on Wells, Construction and Standards

Chapter 173-160 WAC changes primarily clarify rule language and definitions. These changes have either no economic impacts or no measurable impacts. These clarifications of rule language are listed in Table 1 of the Appendix and are exempt from this analysis under RCW 34.05.328 (5)(b)(iv).

Other changes to Chapter 173-160 WAC include:

- A new electronic option to file a well report with Ecology on the construction or decommissioning of a well.
- Use of certified materials.
- Clarification on capping wells.
- Standards for decommissioning hand dug wells.

WAC 173-160-141: New subsection (5) allows an individual to submit an electronic well report under Ecology procedures and authorizes the digital signature in the electronic report as an original signature.

WAC 173-160-214: This requirement keeps consistent with industry standards of using tested and certified materials in the well drilling process. It states:

- “(1) At no time shall a product be used for drilling a water well where the product contains any material that:
- (a) is toxic or polluting;
  - (b) develops odor or color changes in the water; or
  - (c) serves as a microbial nutrient.
- (2) Any organic materials that fosters or promotes any undesired organic growth or has the potential to degrade water quality shall not be employed in the construction of a water supply well. This includes, but is not limited to, bran, hulls, grains, starches, and proteins, unless NSF/ANSI (National Sanitation Foundation/American National Standards Institute) approved.”

WAC 173-160-216: “(1) All polymers and additives used in any well shall be certified by NSF/ANSI approval standards for use in potable water supply wells, or equivalent standards as approved by the department. The product shall be clearly labeled as meeting these standards.

(2) Polymers and additives must be designed and manufactured to meet industry standards to be non-degrading and must not act as a medium which will promote growth of micro-organisms.”

WAC 173-160-221: The language further clarifies the use of certified materials for the well drilling process. It states:

“All bentonite used in any well shall be certified by NSF/ANSI approval standards for use in potable water supply wells, or equivalent standards as approved by the department. The product shall be clearly labeled as meeting these standards.”

WAC 173-160-291: This requirement keeps consistent with industry standards of the well drilling process and clarifies existing statutes of RCW 18.104.040(5) and WAC 173-160-291(3) and 173-160-301.

“All drilled wells shall be capped to prevent contamination of the aquifer. The cap shall be designed for that purpose and consist of metal or PVC material that is mechanically secured or welded to the casing.”

WAC 173-160-381: This new provision only clarifies existing language.

“Dug wells twenty feet or greater in depth (i) Static water level twenty feet or less from land surface. Decommission by placing chlorinated sand or pea gravel to twenty feet below land surface. Remainder of the well shall be filled with either unhydrated bentonite, neat cement, neat cement grout, or concrete to within 3 feet of land surface.”

WAC 173-160-430: This new provision only clarifies existing language.

“The casing shall be resistant to the corrosive effects of the surrounding formations, earth, and water and shall be impervious to any contaminants encountered.”

## **5. Quantification of the Benefits and Costs**

Quantification of the benefits and costs is necessary to determine that the probable benefits of the proposed amendments are greater than the costs. However, some benefits or costs are difficult to quantify accurately, or cannot be quantified. In these cases, this analysis intends to be conservative, estimating the lower benefit bounds and upper cost bounds of the amendments.

All the benefits and costs quantified are one time benefits and costs in a well's lifetime. In this analysis, Ecology assumes that, to reduce toxic threats to ground water and thus provide for the safety and health of the public, standards for constructing and maintaining wells and regulating the licensing of well contractors and operators are essential. The complete and overall economic benefits of a safe water resource are beyond the scope of this analysis in magnitude.

The TAG proposed all changes to the current rule to maintain standard industry practices.

## 5.1 The Costs

The primary costs associated with this rule are minimal, if they exist, and are primarily associated with complying with industry standards.

WAC 173-160-221: NSF/ANSI certification of all bentonite. Ecology was unable to determine if “uncertified” materials were even available for purchase, and therefore cannot foresee any costs associated with the rule amendment.

WAC 173-160-381: Decommissioning of hand dug wells. Minor changes in the rule do not change the intent of the rule or add significant cost to properly decommission hand dug wells. If costs exist, Ecology believes they would be below the minimum threshold to quantify.

WAC 173-160-291: Wells must be capped. The language change clarifies existing statutes of RCW 18.104.040(5) and WAC 173-160-291(3) and 173-160-301. Minor changes in the rule do not change the intent of the rule or add significant cost to proper construction of a well. Ecology knows there are a few cases where drillers do not cap newly constructed wells. By clarifying this language, Ecology assumes all wells will comply with industry standards for well drilling while adding no cost to the drillers.

## 5.2 The Benefits

WAC 173-160-381: Decommissioning a well will no longer require a welded cap on any well casing left in the ground. Ecology estimates 200 decommissioned wells per year would save \$25/well or \$5,000 in total.

WAC 173-160-420: This amendment allows well drillers to notify and report to Ecology electronically. Although much of the benefits associated with this method of reporting would be in the form of efficiency and speed, there would be some minimal benefits of not having to prepare and mail the information. Ecology estimates these benefits for about 13,000 wells per year, total up to \$650,000<sup>1</sup> annually to well drillers. Processing within Ecology has tremendous efficiency gains.

WAC 173-160-291: Wells must be capped. The language change clarifies existing statutes of RCW 18.104.040(5) and WAC 173-160-291(3) and 173-160-301. Capping wells can significantly reduce the amount of pollution getting into the ground water resource, thus reducing the toxic threat to this resource. One open wellhead can pose a significant threat to the entire aquifer. Ecology is unable to quantify this benefit to the public, however one well allowing contamination by lacking a cap can have hundreds of thousands of dollars to

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<sup>1</sup> Estimated savings to drillers for electronic reporting \$50 per well. Bill Lum, Well Drilling Coordinator Department of Ecology.

millions of dollars in cleanup and remediation costs. In most cases, contaminated wells cannot be completely cleaned up and the toxic threat persists well into the future.

### **5.3 Summary of Costs and Benefits**

The amendments for well construction under Chapter 173-160 WAC are being done to maintain consistency with changes in drilling technology and industry practices, to clarify the existing rule, and to correct typographical and technical errors. This rule amendment makes minimal changes to well drilling standards and rules.

Ecology has determined that proper well construction by technically competent individuals has enormous health benefits to the people of Washington State and its groundwater resource. The reduced requirements of not having to cap decommissioned wells and allowing electronic reporting to Ecology can have net benefits estimated at \$655,000 annually.

Ecology is unable to identify any significant costs in this rule. If costs exist, they are below a minimal cost threshold, are already practiced as a part of consistent industry standards, or are already dictated by current statute. We do not analyze how any costs, if they exist, might be passed on to customers. The rule clarification will help to improve our ability to manage water and reduce toxic threats by having skilled drillers properly constructing wells. Although we cannot quantify the overall benefit for having safe wells, it is clear that the benefits of this rule significantly outweigh the costs.

## **6. Least Burdensome Analysis**

RCW 34.05.328 (1)(e) requires Ecology to perform a Least Burdensome Analysis to:

*“Determine, after considering alternative versions of the rule and the analysis required under (b), (c), and (d) of this subsection, that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives stated under (a) of this subsection.”*

These rules directly impact well drillers in Washington. Drillers are concerned with the specific construction changes that will impact how wells are constructed. Future well owners, local and state agencies (Health), and consultants/engineers could also have an interest.

The program has utilized the TAG which was established by the 1993 legislature to assist Ecology in the development of these rules. This group, chaired by Ecology, consists of:

- six licensed drillers.
- two health agency staff
- two Ecology staff

- one engineer.
- one hydrogeologist.

This group started work on revising the rules in 2006. Ecology has conducted a series of continuing education workshops to get driller input on potential rule changes. Further involvement included mailings and public workshops. Members of the drilling community examined other possible versions of the rule, however the proposed amendments are the least burdensome alternative for the well drillers and those who receive their services.

## APPENDIX

**Table 1. Chapter 173-160 WAC—Standards for construction and maintenance of wells**

CURRENT LANGUAGE	PROPOSED RULE LANGUAGE	STATUS	EFFECT OF CHANGE	ECONOMIC IMPACT
<b>WAC 173-160-010 What is the purpose of this regulation?</b>				
WAC 173-160-010(2)(c) Injection wells regulated in chapter 173-218 WAC. Exception: Injection wells used to withdraw ground water and remediation wells that are used to inject any substance to remediate, clean up, or control potential or actual contamination may be regulated by chapter 173-218 and 173-160 WAC.	<del>(2)(c) Injection wells regulated in chapter 173-218 WAC. Exception: Injection wells used to withdraw ground water and remediation wells that are used to inject any substance to remediate, clean up, or control potential or actual contamination may be regulated by chapter 173-218 and 173-160 WAC.</del>	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This was moved to the new section 010(4) but the text remains the same.	There is no change in effect from the existing rule.
WAC 173-160-010(4) New provision.	(4) <u>The following wells are regulated under this chapter and may be regulated under 173-218 WAC: Injection wells used to dispose of water which has been withdrawn for heating or cooling purposes and remediation wells that are used to inject any substance to remediate, clean up, or control potential or actual contamination.</u>	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This was moved from 010(2)(c) in the existing rule.	There is no change in effect from the existing rule.
<b>WAC 173-160-111 What are the definitions of specific words as used in this chapter?</b>				
WAC 173-160-111(13) New	(13) <u>“Confining layer or confining</u>	Clarification.	This provides a	There is no change in

CURRENT LANGUAGE	PROPOSED RULE LANGUAGE	STATUS	EFFECT OF CHANGE	ECONOMIC IMPACT
definition.	<u>formation</u> ” means a layer of <u>low hydraulic conductivity material that significantly limits vertical movement of groundwater</u> .	Exempt: RCW 34.05.328 (5)(b)(iv).	definition for the term used in rule.	effect from the existing rule.
WAC 173-160-111(14) "Consolidated formation" means any geologic formation in which the earth materials have become firm and cohesive through natural rock forming processes. Such rocks commonly found in Washington include basalt, granite, sandstone, shale, conglomerate, and limestone. An uncased bore hole will normally remain open in these formations.	(14) "Consolidated formation" means any geologic formation in which the earth materials have become firm and cohesive through natural rock forming processes. Such rocks commonly found in Washington include basalt, granite, sandstone, shale, conglomerate, and limestone. <del>An uncased bore hole will normally remain open in these formations.</del>	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This was an ambiguous sentence so it was deleted.	There is no change in effect from the existing rule.
WAC 173-160-111(15) "Constructing a well" or "construct a well" means:(a) Boring, digging, drilling, or excavating a well;(b) Installing casing, sheeting, lining, or well screens, in a well;(c) Drilling a geotechnical soil boring; or(d) Installing an environmental investigation well. “Constructing a well” or “construct a well” includes the alteration of an existing well.	(15) "Constructing a well" or "construct a well" means:(a) Boring, digging, drilling, or excavating a well;(b) Installing casing, sheeting, lining, or well screens, in a well;(c) Drilling a geotechnical soil boring; (d) Installing an environmental investigation well; or (e) <u>Alteration of an existing well.</u> <del>“Constructing a well” or “construct a well” includes the alteration of an existing well.</del>	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This was added as a new item instead of using an unnumbered phrase.	There is no change in effect from the existing rule.
WAC 173-160-111(41) New definition.	(41) <u>“NSF/ANSI” means the National Sanitation</u>	Clarification. Exempt:	This provides a definition for the	There is no change in effect from the

CURRENT LANGUAGE	PROPOSED RULE LANGUAGE	STATUS	EFFECT OF CHANGE	ECONOMIC IMPACT
	<u>Foundation/American National Standards Institute.</u>	RCW 34.05.328.	acronym used in this chapter.	existing rule.
WAC 173-160-111(43) "PTFE" means polytetrafluoroethylene casing material such as Teflon. The use of the term Teflon is not an endorsement for any specific PTFE product.	<del>(43) "PTFE" means polytetrafluoroethylene casing material such as teflon. The use of the term teflon is not an endorsement for any specific PTFE product.</del>	Clarification. Exempt: RCW 34.05.328.	This was deleted from the water well section since it is not pertinent.	There is no change in effect from the existing rule.
WAC 173-160-111(48) "Temporary surface casing" is a length of casing (at least four inches larger in diameter than the nominal size of the permanent casing) which is temporarily installed during well construction to maintain an annular space for later placement of the surface seal as described in WAC 173-160-275, 173-160-285, 173-160-305, and 173-160-315. The temporary surface casing shall be removed before well completion.	(48) "Temporary surface casing" is a length of casing (at least four inches larger in diameter than the nominal size of the permanent casing) which is temporarily installed during well construction to maintain an annular space for later placement of the surface seal as described in <u>WAC 173-160-231</u> <del>WAC 173-160-275, 173-160-285, 173-160-305, and 173-160-315.</del> The temporary surface casing shall be removed before well completion.	Clarification. Exempt: RCW 34.05.328.	The other sections were deleted because temporary surface casing really only applies to WAC 173-160- 231.	There is no change in effect from the existing rule.
<b>WAC 173-160-121 What should I know about drilling wells that require water right permits?</b>				
WAC 173-160-121(1) Unless a ground water withdrawal is exempt from the permit requirements under RCW 90.44.050, a well cannot be drilled without the well owner first obtaining a water permit from the	(1) Unless a ground water withdrawal is exempt from the permit requirements under RCW 90.44.050, a well cannot be drilled without the well owner first obtaining a water <u>right</u> permit	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This clarifies that it is a water "right" permit.	There is no change in effect from the existing rule.

CURRENT LANGUAGE	PROPOSED RULE LANGUAGE	STATUS	EFFECT OF CHANGE	ECONOMIC IMPACT
department authorizing the use of water from the well.	from the department authorizing the use of water from the well.			
<b>WAC 173-160-131 What should the well owner know about water metering?</b>				
WAC 173-160-131 The department may require water users to measure the quantity of water withdrawn from wells, to record water use, and/or to report the water use information to the department. Until the department develops specific metering and reporting requirements, these requirements may be provided for in individual water permits or as otherwise ordered by the department for specific wells and ground water use.	WAC 173-160-131 The department may require water users to measure the quantity of water withdrawn from wells, to record water use, and/or to report the water use information to the department. Until the department develops specific metering and reporting requirements, these requirements may be provided for in individual water <u>right</u> permits or as otherwise ordered by the department for specific wells and ground water use.	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This clarifies that it is a water “right” permit.	There is no change in effect from the existing rule.
<b>WAC 173-160-141 What are the requirements regarding water well reports?</b>				
WAC 173-160-141(1) Anyone who constructs or decommissions a well is required to submit a complete report on the construction, alteration, or decommissioning of the well to the water resources program within thirty days after completion of a well, or after the drilling equipment has left the site. Submission of well report to consulting firms does not	(1) Anyone who constructs or decommissions a well is required to submit a complete report on the construction, <del>alteration</del> , or decommissioning of the well to the water resources program within thirty days after completion of a well, or after the drilling equipment has left the site. <u>The report must be an accurate</u>	Change.  Clarification. Exempt: RCW	This requires well drillers to keep notes, on paper, in the field as the well is drilled and to make the notes available to the inspector.  “alteration” is	There is a change in effect from the existing rule since there is the cost of the paper to keep notes.  There is no change in the effect from the existing rule.

CURRENT LANGUAGE	PROPOSED RULE LANGUAGE	STATUS	EFFECT OF CHANGE	ECONOMIC IMPACT
meet the well contractor's obligation of this section.	<u>summation of the data collected in the field taken from field notes written as the well was constructed or decommissioned. Field notes must be available at all times during construction or decommissioning for review by state and local inspectors and kept until the well report is submitted.</u> Submission of a well report to consulting firms does not meet the well contractor's obligation under <u>of</u> this section.	34.05.328 (5)(b)(iv).	included in the definition of well construction.	
WAC 173-160-141(2)(f) Construction date;	(2)(f) Construction <u>or</u> decommissioning date;	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	Well reports are already applied to decommissioned wells so this clarifies this subsection.	There is no change in effect from the existing rule.
WAC 173-160-141(3) The well report must show the license number and signature of the person who constructed the well. If this is an unlicensed person, exempted under RCW 18.104.180(3), the report shall show the license number and signature of the licensed operator who witnessed the drilling. Water well reports for wells constructed by trainees shall have the signature and license of the trainee and the	(3) The well report must <u>include one of the following:</u> (a) the license number and signature of the person who constructed <u>or</u> decommissioned the well. (b) the <u>license number and signature of the trainee and the licensed operator under chapter 18.104 RCW.</u> (c) the <u>license number and signature of an exempted individual as defined under RCW 18.104.180(3).</u> (d) the signature of	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This was reformatted from a narrative to a bulleted list.	There is no change in effect from the existing rule.

CURRENT LANGUAGE	PROPOSED RULE LANGUAGE	STATUS	EFFECT OF CHANGE	ECONOMIC IMPACT
licensed operator.	<del>the individual exempted under RCW 18.104.180(1). If this is an unlicensed person, exempted under RCW 014.180(2), the report shall show the license number and signature of the licensed operator who witnessed the drilling. Water well reports for wells constructed by trainees shall have the signature and license of the trainee and the licensed operator.</del>			
WAC 173-160-141(5). New provision.	(5) <u>This rule shall allow an individual to submit an electronic report in accordance with department procedures. The use of a digital signature in the electronic report will be authorized as a substitute for an original signature under subsection (3) of this section.</u>	Change.	This is a new section which allows for electronic signature.	There is a change in effect from the existing rule which is a benefit for well drillers. There is a cost savings to filling out the well report electronically and to store information electronically in the online system, which saves the use of an envelope, stamp, the time it takes to mail the report, and time and gas to drive to post office (\$50).
<b>WAC 173-160-151 Does the department require prior notice and fees for well constructing, reconstructing, or decommissioning a</b>				

CURRENT LANGUAGE	PROPOSED RULE LANGUAGE	STATUS	EFFECT OF CHANGE	ECONOMIC IMPACT
<b>water well?</b>				
<p>WAC 173-160-151(1) Yes. The property owner, owner's agent, or water well operator shall notify the department of their intent to begin well construction, reconstruction-alteration, or decommissioning procedures at least seventy-two hours before starting work.</p>	<p>(1) Yes. The property owner, owner's agent, or water well operator shall notify the department of their intent to begin well construction <del>reconstruction-alteration</del>, or decommissioning procedures at least seventy-two hours before starting work.</p>	<p>Clarification. Exempt: RCW 34.05.328(5)(b)(iv).</p>	<p>The definition of construction now includes alteration of a well.</p>	<p>There is no change in effect from the existing rule.</p>
<p>WAC 173-160-151(5) If drilling results in an unusable well (dry hole), there is no additional fee for a second attempt, provided: (a) A subsequent attempt at constructing a new well is made immediately; and (b) The unusable well(s) is properly decommissioned before drilling equipment leaves the well site; and (c) The department is notified of all decommissionings; and (d) A well report describing the decommissioning process is submitted to the department in accordance with this chapter.</p>	<p>(5) If drilling results in an unusable well <del>(dry hole, there is)</del>: <u>(a) A notice of intent and fee for decommissioning will apply for each unusable well, (b) No additional notice of intent or fee to construct a water well for a second attempt, each subsequent unusable well is required,</u> provided: <u>(ai) A subsequent attempt at constructing a new well is made immediately; and</u> <u>(bij) The unusable well(s) is properly decommissioned before drilling equipment leaves the well site; and</u> <u>(eiii) The driller follows all requirements under WAC 173-160-040(2) ; and</u> <u>(iv) The department is notified of</u></p>	<p>Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).</p>	<p>This is a clarification of the sequence of events and reiterates that they should be in compliance with local requirements.</p>	<p>There is no change in effect from the existing rule.</p>

CURRENT LANGUAGE	PROPOSED RULE LANGUAGE	STATUS	EFFECT OF CHANGE	ECONOMIC IMPACT
	all decommissionings; (v) A well report describing the decommissioning process is submitted to the department in accordance with this chapter.			
<b>WAC 173-160-171 What are the requirements for the location of the well site and access to the well?</b>				
WAC 173-160-171(1) The proposed water well shall be located on high ground that is not in the floodway,	(1) The proposed water well shall be located <del>on high ground where it is not subject to ponding and</del> is not in the floodway, <u>except as provided in chapter 86.16 RCW.</u>	Change.  Clarification of RCW 86.16. Exempt: RCW 34.05.328 (5)(b)(iv).	Drilling can't be done now where there will be standing water (ponding).  RCW 86.16 clarifies that if you have a family farm you can drill in the floodway to replace drinking water supply.	There is a change in effect from the existing rule. This change gives well drillers the ability to drill in areas that are not in the floodway and where there is no ponding.  There is no change in effect for clarification of RCW 86.16.
WAC 173-160-171(3)(c) All public water supply wells shall be located by the department of health or the local health jurisdiction.	(3)(c) All public water supply wells <u>locations</u> shall be <del>located</del> <u>approved</u> by the department of health or the local health <del>authority</del> <u>jurisdiction</u> or other department of <u>health designee</u> .	Change.	This allows for a third party designee to approve the well location.	There is a change in the effect in the existing rule. There is a cost savings to use a designee since work would take less time and well location approval would be more timely.

CURRENT LANGUAGE	PROPOSED RULE LANGUAGE	STATUS	EFFECT OF CHANGE	ECONOMIC IMPACT
WAC 173-160-171(3)(c)(i) Before construction begins, site approval must be obtained from the department of health, or the local health authority.	(3)(c)(i) Before construction begins, <u>final</u> site approval must be obtained from the department of health, or the local health <del>authority</del> <u>jurisdiction</u> .	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	The Department of Health (DOH) previously approved the site plans.	There is no change in effect from the existing rule.
<b>WAC 173-160-191 What are the design and construction requirements for completing wells?</b>				
WAC 173-160-191(2) All well components must be of sufficient strength to withstand the normal forces to which they are subjected during and after construction.	(2) All well components must be of sufficient strength to withstand the <del>normal</del> <u>typical</u> forces to which they are subjected during and after construction.	Clarification. Exempt: RCW 34.05.(5)(b)(i v).	The word “typical” replaces “normal” since it is a more appropriate term for these forces.	There is no change in effect from the existing rule..
WAC 173-160-191(11) All liners must be of sufficient strength to withstand normal forces exerted upon the liner material during installation and operation.	(11) All liners must be of sufficient strength to withstand <del>normal</del> <u>typical</u> forces exerted upon the liner material during installation and operation.	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	The word “typical” replaces “normal” since it is a more appropriate term for these forces.	There is no change in effect from the existing rule.
<b>WAC 173-160-201 What are the casing and liner requirements?</b>				
WAC 173-160-201(2) The casing shall withstand normal forces which act upon it during and after installation. It shall be resistant to the corrosive effects of the surrounding formations, earth, and water and shall be impervious to any contaminants encountered.	(2) The casing shall withstand <del>normal</del> <u>typical</u> forces which act upon it during and after installation. It shall be resistant to the corrosive effects of the surrounding formations, earth, and water and shall be impervious to any contaminants encountered.	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	The word “typical” replaces “normal” since it is a more appropriate term for these forces	There is no change in effect from the existing rule.
WAC 173-160-201(9) Minimum specifications for plastic casing and plastic liner pipe for water wells are	<del>(9) Minimum specifications for plastic casing and plastic liner pipe for water wells shown in Table 2..</del>	Clarification. Exempt: RCW	This was moved to become (10) below.	There is no change in effect from the existing rule.

<b>CURRENT LANGUAGE</b>	<b>PROPOSED RULE LANGUAGE</b>	<b>STATUS</b>	<b>EFFECT OF CHANGE</b>	<b>ECONOMIC IMPACT</b>
shown in Table 2		34.05.328 (5)(b)(iv).		
WAC 173-160-201(10) Steel casing larger than twenty inches shall have a minimum wall thickness of 0.375 inches.	<del>(10) Steel casing larger than twenty inches shall have a minimum wall thickness of 0.375 inches.</del>	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This was moved to become (9) below.	There is no change in effect from the existing rule.
WAC 173-160-201(9) Moved from old (10)	<u>(9) Steel casing larger than thirty inches shall have a minimum wall thickness of 0.375 inches.</u>	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This was renumbered.	There is no change in effect from the existing rule.
WAC 173-160-201(10) Moved from old (9)	<u>(10) Minimum specifications for plastic casing and plastic liner pipe for water wells are shown in Table 2</u>	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This was renumbered.	There is no change in effect from the existing rule.
<b>STEEL CASING AND STEEL LINER</b> WAC 173-160-201(11) All steel casing and steel liner must be new or, in like new condition, and be structurally sound.	<del><b>STEEL CASING AND STEEL LINER</b></del> (11) <u>Steel casing and steel liner:</u> All steel casing and steel liner must be new or, in like new condition, and be structurally sound.	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This was reformatted..	There is no change in effect from the existing rule.
<b>PLASTIC CASING AND PLASTIC LINER</b> WAC 173-160-201(12) Plastic, fiberglass, PVC, SR, ABS, CPVC or other type of nonmetallic well casing or liner must be	<del><b>PLASTIC CASING AND PLASTIC LINER</b></del> (12) <u>Plastic casing and plastic liner:</u> Plastic, fiberglass, PVC, SR, ABS, CPVC or other type of nonmetallic well casing or liner	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This was reformatted.	There is no change in effect from the existing rule.

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manufactured and installed to conform with ANSI/ASTM F 480-81, or the most recent revision.	must be manufactured and installed to conform with ANSI/ASTM F 480-81, or the most recent revision.			
WAC 173-160-201(12)(c) All plastic casing must be installed only in an oversized drill hole without driving. The oversized hole must be a diameter of at least 4 inches larger than the outside diameter of the plastic casing or coupling hubs, whichever is larger. Plastic casing and liner must be of sufficient strength to withstand breakage or collapse when installed and while the well is pumped. Plastic casing and liner must meet ASTM potable water standards.	(12)(c) All plastic casing must be installed only in an oversized drill hole without driving. The oversized hole must be a diameter of at least <u>4-four</u> inches larger than the outside diameter of the plastic casing or coupling hubs, whichever is larger. Plastic casing and liner must be of sufficient strength to withstand breakage or collapse when installed and while the well is pumped. Plastic casing and liner must meet ASTM potable water	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	Number 4 was written out to be consistent with the numbers in the rest of the rule text.	There is no change in effect from the existing rule.
WAC 173-160-201(12)(d) All plastic casing or liner must be new or, in like new condition and clearly marked by the manufacturer showing nominal size, class, type of plastic material, SDR, ASTM designation, and have a National Sanitation Foundation (NSF) seal of approval for use in potable water supplies.	(12)(d) All plastic casing or liner must be new or, in like new condition and clearly marked by the manufacturer showing nominal size, class, type of plastic material, SDR, ASTM designation, and have a <del>National Sanitation Foundation</del> (NSF) seal of approval for use in potable water supplies.	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	“National Sanitation Foundation” was replaced with the acronym “NSF”.	There is no change in effect from the existing rule.
<b>CONCRETE CURBING</b> WAC 173-160-201(13)The	<del>CONCRETE CURBING</del> (13) <u>Concrete curbing</u> : The concrete	Clarification. Exempt:	This was reformatted. .	There is no change in effect from the

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concrete used to make curbing must consist of clean, hard and durable aggregate with not less than five sacks (ninety-four pounds per sack) of portland cement per cubic yard of concrete.	used to make curbing must consist of clean, hard and durable aggregate with not less than five sacks (ninety-four pounds per sack) of portland cement per cubic yard of concrete.	RCW 34.05.328 (5)(b)(iv).		existing rule.
<b>WAC 173-160-214 What are the limitations for use of drilling materials?</b>				
WAC 173-160-214 New Section	<u>(1) At no time shall a product contain materials that: (a) Are toxic or polluting;</u> <u>(b) Develop odor or color changes in the water; or</u> <u>(c) Serve as a microbial nutrient.</u> <u>(2) Organic materials that foster or promote undesired organic growth or have the potential to degrade water quality shall not be employed in the construction of a water supply well. This includes, but is not limited to, bran, hulls, grains, starches, and proteins, unless NSF/ANSI approved.</u>	Change.	(2) is a new requirement for materials other than bentonite. This requires NSF/ANSI certification where it was previously not required.	There is a change in effect from the existing rule. Well drilling wholesale suppliers were called to find out if uncertified products were available for bentonite/polymers. Based on these calls it was confirmed that uncertified materials are not currently available in WA.
<b>WAC 173-160-216 What are the standards for use of polymers and additives?</b>				
WAC 173-160-216 New Section	<u>(1) All polymers and additives used in any well shall be certified by NSF/ANSI approval standards for use in potable water supply wells, or equivalent standards as</u>	Change.	Previously additives had to be certified and now polymers also have to be certified. This	There is a change in effect from the existing rule. Well drilling wholesale suppliers were called

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	<u>approved by the department. The product shall be clearly labeled as meeting these standards. (2) Polymers and additives must be designed and manufactured to meet industry standards to be nondegrading and must not act as a medium which will promote growth of microorganisms.</u>		requires NSF/ANSI certification where it was previously not required.	<p>to find out if uncertified products were available for bentonite/polymers.</p> <p>Based on these calls it was confirmed that uncertified materials are not currently available in WA.</p>
<b>WAC 173-160-221 What are the standards for sealing materials?</b>				
<p>WAC 173-160-221(1)(a) Bentonite sealant: (a) Bentonite used to prepare slurries for sealing, or decommissioning shall be specifically designed for this purpose. At no time shall the grout slurry contain materials that are toxic, polluting, develop odor or color changes, or serve as a microbacterial nutrient. All bentonite slurries shall be prepared and installed according to the manufacturer's instructions. All additive must be certified by a recognized certification authority such as the NSF. Active solids content (bentonite) shall be twenty percent by weight or greater in all</p>	<p>(1)(a) Bentonite sealant:(a) Bentonite used to prepare slurries for sealing, or decommissioning shall be specifically designed for this purpose. <del>At no time shall the grout slurry contain materials that are toxic, polluting, develop odor or color changes, or serve as a microbacterial nutrient.</del> All bentonite slurries shall be prepared and installed according to the manufacturer's instructions. <del>All additive must be certified by a recognized certification authority such as the NSF.</del> Active solids content (bentonite) shall be twenty percent by weight or greater in all bentonite slurries.</p>	<p>Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).</p>	<p>Deleted language was moved to WAC 173-160-214 and 216 above. Previously additives needed to be certified and now bentonite needs to be certified. This requires NSF/ANSI certification where it was previously not required.</p>	<p>There is no change in effect from the existing rule.</p>

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<p>bentonite slurries. The active solids shall be checked by using the following formula:</p> $\frac{\text{Weight of bentonite (lbs.)}}{\text{Weight of bentonite (lbs.)} + (\text{gallons of water} \times 8.33 \text{ lbs./gal})} \times 100 = \% \text{ solids}$ <p>Example: <math>\frac{105 \text{ lbs. of bentonite}}{105 \text{ lbs. bentonite} + (50 \text{ gallons of water} \times 8.33 \text{ lbs./gal})} \times 100 = 20\% \text{ solids}</math></p>	<p>The active solids shall be checked by using the following formula:</p> $\frac{\text{Weight of bentonite (lbs.)}}{\text{Weight of bentonite (lbs.)} + (\text{gallons of water} \times 8.33 \text{ lbs./gal})} \times 100 = \% \text{ solids}$ <p>Example: <math>\frac{105 \text{ lbs. of bentonite}}{105 \text{ lbs. bentonite} + (50 \text{ gallons of water} \times 8.33 \text{ lbs./gal})} \times 100 = 20\% \text{ solids}</math></p>	<p>Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).</p>	<p>Clarifies the formula to match the size of bags that are sold.</p>	<p>There is no change in the effect of the existing rule due to the clarifications in the formula.</p>
<p>WAC 173-160-221(1)(b) Unhydrated bentonite - - pelletized, granulated, powder, or chip bentonite may be used in the construction of seals or in decommissioning of wells. The bentonite material shall be specifically designed for sealing or decommissioning and be within the industry tolerances for dry western sodium bentonite. Polymer additives must be designed and manufactured to meet industry standards to be nondegrading and must not act as a medium which will promote growth of microorganisms. All unhydrated bentonite used for sealing or decommissioning must be free of organic polymers. Placement</p>	<p>(1)(b) Unhydrated bentonite – <u>including</u> pelletized, granulated, powder, or chip bentonite may be used in the construction of seals or in decommissioning of wells. The bentonite material shall be specifically designed for sealing or decommissioning and be within the industry tolerances for dry western sodium bentonite. <del>Polymer additives must be designed and manufactured to meet industry standards to be nondegrading and must not act as a medium which will promote growth of microorganisms. All unhydrated bentonite used for sealing or decommissioning must be free of organic polymers.</del></p>	<p>Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).</p>	<p>The polymer additive language was moved to WAC 173-160-216 above.</p>	<p>There is no change in effect from the existing rule.</p>

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of bentonite shall conform to the manufacturer's specifications and result in a seal free of voids or bridges.	Placement of bentonite shall conform to the manufacturer's specifications and result in a seal free of voids or bridges.			
WAC 173-160-221(1)(c). New Provision	(1)(c) <u>All bentonite used in any well shall be certified by NSF/ANSI approval standards for use in potable water supply wells, or equivalent standards as approved by the department. The product shall be clearly labeled as meeting these standards.</u>	Change.	Previously additives needed to be certified and now bentonite needs to be certified. This requires NSF/ANSI certification where it was previously not required.	There is a change in effect from the existing rule. Well drilling wholesalers suppliers were called to find out if uncertified products were available for bentonite/polymers.  Based on these calls it was confirmed that uncertified materials are not currently available in WA.
WAC 173-160-221(3)(b) All hydrated sealing materials shall be placed by tremmying the mixture from the bottom of the annular space to the surface in one continuous operation.	(3)(b) All hydrated sealing materials shall be placed by <del>tremmying</del> <u>tremying</u> the mixture from the bottom of the annular space to the surface in one continuous operation	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This is a correction to a typographical error.	There is no change in effect from the existing rule .
<b>WAC 173-160-231 What are the standards for surface seals?</b>				
WAC 173-160-231(2) Sealing material must be placed in an open annular space that is a minimum of	(2) Sealing material must be placed in an open annular space that is a minimum of four inches	Change.	This restricts the timing of when the sealing material is	There is no cost. This is more protective of the environment.

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four inches greater in diameter than the nominal size of the permanent casing.	greater in diameter than the nominal size of the permanent casing. <u>The annular space must be kept at least one-half full of sealing material whenever the production casing is advanced.</u>		applied, but there is no cost because the same amount of material is used.	
<b>173-160-241 What are the Requirements for formation sealing?</b>				
WAC 173-160-241(2)(a) A drill hole at least four inches greater in diameter than the nominal size of the permanent well casing shall extend from the land surface into the clay bed or other confining formation located directly above the aquifer to be developed. The annular space shall be filled with bentonite (slurry or unhydrated), neat cement grout, or neat cement to form a watertight seal between the permanent casing and all significant confining formations encountered during drilling. If bentonite slurry, neat cement grout, or neat cement is used to seal the annular space it must be placed by either pumping or tremmying the seal material from the lowest clay bed or other confining formation of significance encountered, to land surface. The	(2)(a) A drill hole at least four inches greater in diameter than the nominal size of the permanent well casing shall extend from the land surface into the clay bed or other confining formation located directly above the aquifer to be developed. The annular space shall be filled with bentonite (slurry or unhydrated), neat cement grout, or neat cement to form a watertight seal between the permanent casing and all significant confining formations encountered during drilling. If bentonite slurry, neat cement grout, or neat cement is used to seal the annular space it must be placed by either pumping or <del>tremmying</del> <u>tremmying</u> the seal material from the lowest clay bed or other confining formation of	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This is a correction to a typographical error.	There is no change in effect from the existing rule.

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drill hole shall be kept open through the use of a temporary casing or any other drilling method that stabilizes the bore hole wall. See Figure 1.	significance encountered, to land surface. The drill hole shall be kept open through the use of a temporary casing or any other drilling method that stabilizes the bore hole wall. See Figure 1.			
<b>WAC 173-160-261 How do I seal dug wells?</b>				
The surface seal of all dug wells shall be constructed to effectively seal the annular space between the undisturbed native material of the upper well hole and the well curbing, which may consist of (concrete tile, steel pipe or liner). The seal depth shall be at least eighteen feet from land surface or to within three feet of the bottom in dug wells that are less than twenty-one feet in depth. Dug wells may be sealed with cement, neat cement, bentonite, or neat cement grout. A cap shall be placed on all dug wells. Except during maintenance, the cap shall remain in place. The cap shall prevent entry of pollutants, insects, and mammals into the well. See Figure 3.	The surface seal of all dug wells shall be constructed to effectively seal the annular space between the undisturbed native material of the upper well hole and the well curbing, which may consist of <del>(concrete tile, steel pipe or liner)</del> . The seal depth shall be at least eighteen feet from land surface or to within three feet of the bottom in dug wells that are less than twenty-one feet in depth. Dug wells may be sealed with cement, neat cement, bentonite, or neat cement grout. A cap shall be placed on all dug wells. Except during maintenance, the cap shall remain in place. The cap shall prevent entry of pollutants, insects, and mammals into the well. See Figure 3.	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This is a correction to a typographical error.	There is no change in effect from the existing rule.

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<b>WAC 173-160-281 What are the construction standards for artificial gravel-packed wells?</b>				
<p>WAC 173-160-281 In gravel-packed wells, the gravel mixture shall be placed around the screen so that bridging or size separation does not occur. The gravel pack must be clean, and chemically stable. All gravel and water used must be disinfected with at least fifty parts per million (ppm) chlorine for a contact time of at least thirty minutes. Rinse water containing chlorine is a pollutant. Chlorine in the rinse water must be allowed to dissipate and the water must be discharged in a safe manner consistent with the intent of the Water Pollution Control Act, chapter 90.48 RCW. See Figure 5.</p>	<p><u>Wells must be constructed in accordance with sealing standards under this chapter.</u> In gravel-packed wells, the gravel mixture shall be placed around the screen so that bridging or size separation does not occur. The gravel pack must be clean, and chemically stable. All gravel and water used must be disinfected with at least fifty parts per million (<del>ppm</del>) chlorine for a contact time of at least thirty minutes. Rinse water containing chlorine is a pollutant. Chlorine in the rinse water must be allowed to dissipate and the water must be discharged in a safe manner consistent with the intent of the Water Pollution Control Act, chapter 90.48 RCW. <del>See Figure 5.</del></p>	<p>Clarification. Exempt: RCW 34.05.328.</p>	<p>The language was added to clarify the sealing standards for this section which were implied in the current rule.</p> <p>The abbreviation “ppm” is not used anywhere else in the rule so was deleted.</p> <p>Figure 5 was deleted because it was confusing and out-of-date.</p>	<p>There is no change in effect from the existing rule.</p>
<b>WAC 173-160-291 What are the standards for the upper terminal of water wells?</b>				
<p>WAC 173-160-291(3) All wells shall be equipped with an access port that allows for the measurement of the depth to water surface, or with</p>	<p>(3) <u>All drilled wells shall be capped to prevent contamination of the aquifer. The cap shall be designed for that purpose and</u></p>	<p>Clarification. Exempt: RCW 34.05.328</p>	<p>The existing rule implies that you need a plastic or metal cap in order to</p>	<p>There is no change in effect from the existing rule.</p>

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<p>a pressure gage that indicates the shut-in pressure of a flowing artesian well. See Figure 6. The access ports and pressure gages or other openings in the cover are sealed or capped to prevent entrance of surface water or foreign material into the well.</p>	<p><u>consist of metal or plastic material that is mechanically secured or welded to the casing</u>. All wells shall be equipped with an access port that allows for the measurement of the depth to water surface, or with a pressure gage that indicates the shut-in pressure of a flowing artesian well. See Figure 6. The access ports and pressure gages or other openings in the cover are sealed or capped to prevent entrance of surface water or foreign material into the well.</p>	<p>(5)(b)(iv).</p>	<p>meet the other requirements of the rule.</p>	
<p><b>WAC 173-160-381 What are the standards for decommissioning a well?</b></p>				
<p>WAC 173-160-381(1) Cased wells. Remove all liners, debris, and obstructions from the well casing, except well screens and packers. All cased water wells, shall be decommissioned in one of the following ways:</p>	<p>(1) Cased wells. Remove all liners, debris, <u>accumulated sediments</u>, and obstructions from the well casing, except well screens and packers. All cased water wells, <u>including driven and jetted wells</u> shall be decommissioned in one of the following ways:</p>	<p>Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).</p>	<p>To comply with the other decommissioning requirements (160-381(3)(a), sediment would need to be removed so this is a clarification. This language clarifies that driven and jetted wells are types of cased water wells.</p>	<p>There is no change in effect from the existing rule.</p>

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WAC 173-160-381(1)(a)(iv) The casing may be cut off at a maximum of five feet below land surface. A steel cap shall be welded on the casing or	(1)(a)(iv) The casing may be cut off at a maximum of five feet below land surface, <u>or</u> <del>A steel cap shall be welded on the casing or</del>	Change.	This eliminates the requirement for steel caps.	There is a change in effect from the existing rule. This is a benefit to well drillers since they will no longer need to weld a steel cap on the casing which takes time and money.
WAC 173-160-381(1)(b) Withdraw the casing and fill the bore hole with neat cement grout, neat cement, unhydrated bentonite, or bentonite slurry as the casing is being withdrawn	(1)(b) Withdraw the casing and fill the bore hole with <u>concrete</u> , neat cement grout, neat cement, unhydrated bentonite, or bentonite slurry as the casing is being withdrawn	Change.	This allows the well driller to now use concrete.	There is a change in effect from the existing rule. This is a benefit which allows the well driller more flexibility in what materials can be used.
WAC 173-160-381(2) Uncased wells - Remove all liners, debris, and obstructions. Seal uncased wells with concrete, neat cement grout, neat cement, or bentonite	(2) Uncased wells - Remove all liners, debris, <u>accumulated sediments</u> , and obstructions. Seal uncased wells with concrete, neat cement grout, neat cement, or bentonite	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	To comply with the other decommissioning requirements (160-381(3)(a), sediment would need to be removed so this is a clarification.	There is no change in effect from the existing rule.
WAC 173-160-381(3)(a)(i) Remove all debris and obstructions that impede decommissioning or that may contaminate the aquifer from within the dug well.	(3)(a)(i) Remove all debris, <u>accumulated sediments</u> and obstructions that impede decommissioning or that may contaminate the aquifer from within the dug well.	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	To comply with the other decommissioning requirements (160-381(3)(a), sediment would need to be	There is no change in effect from the existing rule.

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			removed so this is a clarification.	
WAC 173-160-381(3)(a)(iv) Dug wells that are not cast-in-place must have a minimum of three feet of sealing material in contact with native soil below land surface.	(3)(a)(iv) Dug wells that are not cast-in-place must have a minimum of three feet of sealing material in contact with native soil below land surface. <del>Bentonite slurry shall not be used to decommission dug wells.</del>	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This language is already included in section 381(3)(a)(iii).	There is no change in effect from the existing rule.
WAC 173-160-381(b), (c) and (d) Dug wells that are dry at any time during the year and that are less than twenty feet in depth shall be sealed from the bottom to within three feet of land surface. (c) Dug wells that have a static water level of ten feet from land surface or less and a depth of less than twenty feet may be decommissioned by installing clean chlorinated sand or pea gravel to a maximum depth of ten feet below land surface. The remainder of the well shall be filled with either unhydrated bentonite, neat cement, neat cement grout, or concrete. (d) Dug wells that have a static water level over ten feet and a depth of less than twenty feet from land surface may be decommissioned by installing clean chlorinated sand or	<del>(b) Dug wells that are dry at any time during the year and that are less than twenty feet in depth shall be sealed from the bottom to within three feet of land surface.</del> <del>(c) Dug wells that have a less than twenty feet deep.</del> <u>(i) Dry Wells (dry at any time of the year). Decommission by placing unhydrated bentonite, neat cement, neat cement grout or concrete from the bottom to within three feet of land surface.</u> <del>(ii) Static water level of ten feet or less from land surface, or less and a depth of less than twenty feet may be decommissioned.</del> <u>Decommission by installing placing clean chlorinated sand or pea gravel to a maximum depth of ten feet below land surface. The remainder of the</u>	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This is a formatting change which provides a different way to explain the same requirement.	There is no change in effect from the existing rule.

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<p>pea gravel to twenty feet below land surface. The remainder of the well shall be filled with either unhydrated bentonite, neat cement, neat cement grout, or cement.</p>	<p>well shall be filled with <del>either</del> unhydrated bentonite, neat cement, neat cement grout or concrete to <u>within three feet of land surface.</u> <del>(d) Dug wells that have a (iii) Static water level over of greater than ten feet and a depth of twenty feet from land surface may be decommissioned from land surface. Decommission by installing placing</del> clean chlorinated sand or pea gravel to the static level. The remainder of the well shall be filled with <del>either</del> unhydrated bentonite, neat cement, neat cement grout or <u>concrete to within three feet of land surface.</u></p>			
<p>WAC 173-160-381(e) and (f). Dug wells with static levels twenty feet or less from the land surface and that are greater than twenty feet deep may be decommissioned by placing chlorinated sand or pea gravel to twenty feet below land surface. The remainder of the well, to a maximum of three feet below land surface, shall be filled with unhydrated bentonite, neat cement, neat cement grout, or concrete.</p>	<p>(ce) Dug wells <del>with static levels</del> twenty feet or <del>less</del> greater in depth. (i) <u>Static water level twenty feet or less from land surface, and that are greater than twenty feet deep may be decommissioned.</u> Decommission by placing chlorinated sand or pea gravel to twenty feet below land surface. The remainder of the well <del>to a maximum of three feet below land surface,</del> shall be filled with unhydrated bentonite, neat cement,</p>	<p>Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).</p>	<p>This is a formatting change which provides a different way to explain the same requirement.</p>	<p>There is no change in effect from the existing rule.</p>

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	<p>neat cement grout or concrete <u>to within three feet of land surface.</u>  (iiif) <del>Dug wells with</del> <u>Static water levels below greater than</u> twenty feet from land surface. <u>These wells</u> may be decommissioned by placing chlorinated sand or pea gravel to the static level and then placing alternating layers of sealing material and chlorinated sand or pea gravel to within twenty feet of land surface. The alternating layers of sand or pea gravel must be a maximum of five feet thick. The minimum thickness of the sealing <del>material</del> layers must be five feet. The remainder of the <del>dug</del> well shall be filled with unhydrated bentonite, neat cement, neat cement grout or concrete to a <del>maximum of within</del> three feet <del>below of</del> land surface.</p>			
<p>WAC 173-160-381(5)(a) Sealing material placed below the water level shall be piped directly to the point of application or placed by means of a dump bailer or pumped through a tremie tube. As the sealing material is placed, the existing well tile may be</p>	<p>(5)(a) Sealing material placed below the <del>static</del> water level shall be piped directly to the point of application or placed by means of a dump bailer or pumped through a tremie tube. As the sealing material is placed, the existing well tile may be encapsulated into</p>	<p>Clarification.  Exempt:  RCW 34.05.328 (5)(b)(iv).</p>	<p>An ambiguous term was deleted.</p>	<p>There is no change in effect from the existing rule.</p>

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encapsulated into the seal material. If concrete, neat cement grout, bentonite, bentonite slurry, or neat cement is used to seal below the static water level in the well, the material shall be placed from the bottom up by methods that avoid segregation or dilution of the material. When used to place concrete, neat cement, neat cement grout, or bentonite slurry the discharge end of the tremie tube shall be submerged in the sealing material to avoid breaking the seal while filling the annular space.	the seal material. If concrete, neat cement grout, bentonite, bentonite slurry, or neat cement is used to seal below the static water level in the well, the material shall be placed from the bottom up by methods that avoid segregation or dilution of the material. When used to place concrete, neat cement, neat cement grout, or bentonite slurry the discharge end of the tremie tube shall be submerged in the sealing material to avoid breaking the seal while filling the annular space.			
<b>WAC 173-160-410 What are the specific definitions for words in this chapter?</b>				
WAC 173-160-410(1) New definition.	<u>(1) "Confining layer or confining formation" means a layer of low hydraulic conductivity material that significantly limits vertical movement of groundwater.</u>	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This provides a definition for the term as it is used in rule.	There is no change in effect from the existing rule.
WAC 173-160-410(3) "Geotechnical soil boring" or "boring" means an uncased well drilled for the purpose of obtaining soil samples to ascertain structural properties of the subsurface.	(3) "Geotechnical soil boring" or "boring" means <del>an uncased</del> a well drilled for the purpose of obtaining soil samples <u>or information</u> to ascertain structural properties of the subsurface.	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This clarifies the existing definition to make it clear that cased and uncased wells are included.	There is no change in effect from the existing rule.
WAC 173-160-410(11). New definition.	<u>(11) "PTFE" means polytetrafluoroethylene casing</u>	Clarification. Exempt:	This was moved from the other	There is no change in effect from the

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	<u>materials such as teflon. The use of the term teflon is not an endorsement for any specific PTFE product.</u>	RCW 34.05.328 (5)(b)(iv).	definition in section 111(43).	existing rule.
WAC 173-160-410(19). New definition.	<u>(19) “Vibrating wire piezometer” is a down hole instrument that measures water pore pressure and converts it to an electronic signal.</u>	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This provides a definition for the term as it is used in the existing rule.	There is no change in effect from the existing rule.
<b>WAC 173-160-420 What are the general construction requirements for resource protection wells?</b>				
WAC 173-160-420(5)(c)(i). The well tag shall be permanently attached to the outer well casing and be visible above land surface for all wells which have been completed above land surface. For wells completed below land surface, the well tag shall be attached to the well casing or to any permanent and protected portion of the vault.	(5)(c) and 5(c)(i) The well tag shall be permanently attached to: (i) <del>The outer</del> well casing and be visible above land surface for all wells which have been completed above land surface. <del>For wells completed below land surface, the well tag shall be attached to</del>	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This clarifies the existing provision. The deleted language was moved to (5)(c)(ii).	There is no change in effect from the existing rule.
WAC 173-160-420(5)(c)(ii). For wells completed below land surface, the well tag shall be attached to the well casing or to any permanent and protected portion of the vault.	(5)(c)(ii) <u>The well casing or to any permanent and protected portion of the vault for wells completed below land surface.</u>	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This clarifies the existing provision.	There is no change in effect from the existing rule.
WAC 173-160-420(5)(c)(iii). New provision.	(5)(c)(iii) <u>A prominent system component visible above land surface for ground source heat</u>	Change.	Now those constructing these borings only have to	There is a change in effect from the existing rule. This is a

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	<u>pump borings.</u>		apply the tag at the manifold.	benefit. Ecology supplies the well tags so there is a savings in the time it takes to apply the tag where it was previously applied to each bore hole and now only applied to the manifold.
WAC 173-160-420(9)(b) The fee for an environmental investigation well in which ground water is sampled or measured is forty dollars for the construction of up to four environmental investigation wells per project, ten dollars for each additional environmental investigation well constructed on a project with more than four wells. There is no fee for soil or vapor sampling purposes.	(9)(b) The fee for an environmental investigation well in which ground water is sampled or measured is forty dollars for the construction of up to four environmental investigation wells per project, <u>and</u> ten dollars for each additional environmental investigation well constructed on a project with more than four wells. There is no fee for soil or vapor sampling purposes.	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	The same fees apply as in the existing rule.	There is no change in effect from the existing rule.
WAC 173-160-420(9)(d) The fee to decommission a resource protection well, except for an environmental investigation well, is twenty. There is no fee to decommission an environmental investigation well or a geotechnical soil boring	(9)(d) The fee to decommission a resource protection well, except for an environmental investigation well, is twenty dollars <u>per well</u> . There is no fee to decommission an environmental investigation well or a geotechnical soil boring.	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This clarifies that the fee to decommission a resource protection well is twenty dollars for each well.	There is no change in effect from the existing rule.
WAC 173-160-420(9)(e) The fee to decommission a ground source heat	(9)(e) The fee to decommission a ground source heat pump boring or	Clarification. Exempt:	This clarifies that the fee to decommission	There is no change in effect from the

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pump boring or a grounding well is twenty dollars.	a grounding well is twenty dollars per well.	RCW 34.05.328 (5)(b)(iv).	a ground source heat pump is twenty dollars for each well	existing rule.
<u>WAC 173-160-420(9)(f) – New subsection</u>	<u>(9)(ef) Under some circumstances, it may be necessary to construct more resource protection wells or geotechnical soil borings than originally anticipated. When additional resource protection wells are constructed on a site for which a notice of intent and fee were submitted, a second notice and fee shall be submitted within twenty-four hours after all wells have been completed or as soon as the final number of wells to be constructed is determined, whichever is sooner. When additional geotechnical soil borings are needed, the borings may be completed. A follow-up notice of intent shall be submitted to the department within twenty-four hours after all borings are constructed. Notification to construct multiple wells or geotechnical soil borings within the same quarter/quarter section, township, and range may be</u>	<u>Exempt: RCW 34.05.328 (5)(b)(iv).</u>	<u>This takes language from 420(9)(e) and creates a new provision 420(9)(f).</u>	<u>There is no change in effect from the existing rule.</u>



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	<u>decommissioning for review by state and local inspectors and kept until the well report is submitted.</u>		This requires the well driller to keep notes, on paper, in the field as the well is drilled and make it available to the inspector.	there is a cost of the paper to keep notes.
WAC 173-160-420(10)(b) This applies to all resource protection wells and geotechnical soil borings.	<del>(10)(b) This applies to all resource protection wells and geotechnical soil borings</del> (10)(be) The resource protection well and geotechnical soil boring report must be made on a form provided by the department, or a reasonable facsimile of the form, as approved by the department.	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This eliminates redundancy.	There is no change in effect from the existing rule.
WAC 173-160-420(10)(d). The well report must show the license number and signature of the person who constructed the well. If this is an unlicensed person, exempted under RCW 18.104.180(2), the report shall show the license number and signature of the licensed individual who witnessed the drilling. Resource protection reports for wells constructed by trainees shall have the signature and license number of the trainee and licensed operator.	<del>(10)(d) The well report must show the license number and signature of the person who constructed the well. If this is an unlicensed person, exempted under RCW 18.104.180(2), the report shall show the license number and signature of the licensed individual who witnessed the drilling. Resource protection reports for wells constructed by trainees shall have the signature and license number of the trainee and licensed operator.</del> include one of the	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This we reformatted from narrative to bulleted list.	There is no change in effect from the existing rule.

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	<u>following: (i) the license number and signature of the person who constructed the well. (ii) the license number and signature of the trainee and the licensed operator under Chapter 18.104 RCW. (iii) the license number and signature of an exempted individual as defined under RCW 18.104.180(3).</u>			
WAC 173-160-420(10)(e). New provision.	<u>(10)(e) This rule shall allow an individual to submit electronic reports in accordance with department procedures. The use of a digital signature in the electronic reports will be authorized as a substitute for an original signature under (d) this subsection.</u>	Change.	This new section allows for electronic signature.	There is a change in effect from the existing rule. This is a benefit to well drillers in that there is a cost savings of filling out the well report electronically and to store information electronically in the online system, which saves the cost of an envelope, stamp, time to mail the report, and time and gas to go to the post office (\$50).
<b>WAC 173-160-430 What are the minimum casing standards?</b>				
WAC 173-160-430(1) The casing may not effect or interfere with the	<u>(1) The casing may not effect affect or interfere with the</u>	Clarification. Exempt:	This clarifies the types of casing well	There is no change in effect from the

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chemical, physical, radiological, or biological constituents of interest.	chemical, physical, radiological, or biological constituents of interest. <u>The casing shall be resistant to the corrosive effects of the surrounding formations, earth, and water and shall be impervious to any contaminants encountered.</u>	RCW 34.05.328 (5)(b)(iv).	drillers may already use to meet existing requirements in the rule.	existing rule.
WAC 173-160-430(2) The casing shall also withstand normal forces which act upon it during and after installation. All resource protection well casing shall conform to ASTM Standards, or at least 304 or 316 stainless steel, PTFE, or Schedule 40 PVC casing.	(2) The casing shall <del>also</del> withstand <del>normal</del> -typical forces which act upon it during and after installation. All resource protection well casing shall conform to ASTM Standards, or at least 304 or 316 stainless steel, PTFE, or Schedule 40 PVC casing.	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	The word “typical” replaces “normal” since it is a more appropriate term for these forces.	There is no change in effect from the existing rule.
<b>WAC 173-160-442 What are the limitations for use of drilling materials?</b>				
WAC 173-160-442 New section.	(1) <u>At no time shall a product contain materials that: (a) Are toxic or polluting; (b) Develop odor or color changes in the water; or (c) Serve as a microbial nutrient.</u> (2) <u>Organic materials which foster or promote undesired organic growth or have the potential to degrade water quality shall not be employed in the construction of a resource protection well. This includes, but is not limited to,</u>	Change.	(2) is a new requirement for materials other than bentonite. This requires NSF/ANSI certification where it was previously not required.	There is a change in effect from the existing rule. Well drilling wholesalers suppliers were called to find out if uncertified products were available for bentonite/polymers.  Based on calls to

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	<u>bran, hulls, grains, starches, and proteins unless NSF/ANSI approved.</u>			major wholesale suppliers we confirmed that uncertified materials are not currently available in WA.
<b>WAC 173-160-444 What are the standards for use of polymers and additives?</b>				
WAC 173-160-444 New section.	<u>(1) All polymers and additives used in any well shall be certified by NSF/ANSI approval standards for use in potable water supply wells, or equivalent standards as approved by the department. The product shall be clearly labeled as meeting these standards . (2) Polymers and additives must be designed and manufactured to meet industry standards to be nondegrading and must not act as a medium which will promote growth of microorganisms.</u>	Change.	Previously additives had to be certified and now polymers also have to be certified. This requires NSF/ANSI certification where it was previously not required.	There is a change in effect from the existing rule. Well drilling wholesalers suppliers were called to find out if uncertified products were available for bentonite/polymers.  Based on these calls it was confirmed that uncertified materials are not currently available in WA.
<b>WAC 173-160-450 What are the well sealing requirements?</b>				
WAC 173-160-450(2) After the permanent casing has been set in final position, the filter pack (optional) and sealing material shall be placed in the open bore hole	(2) After the permanent casing has been set in final position, the filter pack (optional) and sealing material shall be placed in the open bore hole annular space that	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This clarifies the types of sealants that can be used.	There is no change in effect from the existing rule.

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<p>annular space that must be a minimum of four inches greater in diameter than the nominal size of the permanent casing. After installing the filter pack (optional) a layer of bentonite shall be placed on top of the filter pack to maintain separation between the seal material and the screened interval. Insure that placement will not disturb the filter pack. The remaining annular space shall be filled to land surface in a continuous operation with bentonite, neat cement, or cement grout. If a cement, or bentonite slurry is used as the sealant, it shall be installed with a tremie tube and pumped from the top of the bentonite plug (above the filter pack) to land surface. Use only potable water to hydrate the mixture.</p>	<p>must be a minimum of four inches greater in diameter than the nominal size of the permanent casing. After installing the filter pack (optional) a layer of bentonite shall be placed on top of the filter pack to maintain separation between the seal material and the screened interval. Insure that placement will not disturb the filter pack. The remaining annular space shall be filled to land surface in a continuous operation with bentonite, neat cement, or <u>neat cement grout</u>. If a <u>neat cement, neat cement grout</u> or bentonite slurry is used as the sealant, it shall be installed with a tremie tube and pumped from the top of the bentonite plug (above the filter pack) to land surface. Use only potable water to hydrate the mixture.</p>			
<p>WAC 173-160-450(3) The completed annular space shall fully surround the permanent casing, be evenly distributed, free of voids, and extend from the permanent casing to undisturbed or recompacted soil.</p>	<p>(3) The completed annular <u>seal space</u> shall fully surround the permanent casing, be evenly distributed, free of voids, and extend from the permanent casing to undisturbed or recompacted soil.</p>	<p>Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).</p>	<p>This clarifies that the seal shall surround the permanent casing and is consistent with the use of this terminology in other</p>	<p>There is no change in effect from the existing rule.</p>

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<p>WAC 173-160-450(4)(a)(i) All sealing materials used shall conform to one of the following minimum requirements:(a) <b>Bentonite sealants:</b> Bentonite used to prepare slurries for sealing, or decommissioning shall be specifically designed for this purpose. At not time shall grout slurry contain materials that are toxic, polluting, develop odor or color changes, or serve as a micro-bacterila nutrient. All bentonite slurries shall be preparad and installed according to the manufacturer’s instructions. All additives must be certified by a recobnized certification authority such as NSF. Active solids content (bentonite) shall be twenty percent by weight or grater in all bentonite slurries.</p>	<p><u>(4)(a)(i)</u> All sealing materials used shall conform to one of the following minimum requirements: (a) <b>Bentonite sealants:</b> Bentonite used to prepare slurries for sealing, or decommissioning shall be specifically designed for this purpose. <del>At not time shall grout slurry contain materials that are toxic, polluting, develop odor or eolor changes, or serve as a micro-bacterial nutrient.</del> All bentonite slurries shall be prepared and installed according to the manufacturer's instructions. <del>All additives must be certified by a recognized certification authority such as NSF.</del> Active solids content (bentonite) shall be twenty percent by weight or greater in all bentonite slurries. <u>The active solids shall be checked by using the following formula:</u></p> $\frac{\text{Weight of bentonite (lbs.)}}{\text{Weight of bentonite (lbs.)} + (\text{gallons of water} \times 8.33 \text{ lbs./gal})} \times 100 = \% \text{ solids}$ <p><u>Example: (50 405 lbs. of</u></p>	<p>Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).</p> <p>Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).</p>	<p>sections of the rule.</p> <p>Deleted language was moved to WAC 173-160-442 and 444 above. Previously additives needed to be certified and now bentonite needs to also be certified. This requires NSF/ANSI certification where it was previously not required.</p> <p>Clarifies the formula to match the size of bags that are sold. Makes language</p>	<p>There is no change in effect from the existing rule.</p> <p>There is no change in effect from the existing rule</p>

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	<u>bentonite X 100 = 20% solids)</u> <del>divided by (50 lbs. bentonite +</del> <del>(24 gallons of water x 8.33</del> <u>lbs./gal).</u>		consistent with the formulas in other sections of the rule.	
<p>WAC 173-160-450(4)(a)(ii) Unhydrated bentonite--pelletized, granulated, powder, or chip bentonite may be used in the construction of seals or in decommissioning of wells. The bentonite material shall be specifically designed for sealing or decommissioning and be within the industry tolerances for dry western sodium bentonite. Polymer additives must be designed and manufactured to meet industry standards to be nondegrading and must not act as a medium which will support or promote the growth of micro-organisms. All unhydrated bentonite used for sealing or decommissioning must be free of organic polymers. Placement of bentonite shall conform to the manufacturer's specifications and result in a seal free of voids or bridges.</p>	<p>(4)(a)(ii) Unhydrated bentonite--pelletized, granulated, powder, or chip bentonite may be used in the construction of seals or in decommissioning of <del>resource protection</del> wells. The bentonite material shall be specifically designed for sealing or decommissioning and be within the industry tolerances for dry western sodium bentonite. <del>Polymer additives must be designed and manufactured to meet industry standards to be nondegrading and must not act as a medium which will support or promote the growth of micro-organisms.</del> Placement of bentonite shall conform to the manufacturer's specifications and result in a seal free of voids or bridges.</p>	<p>Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).</p>	<p>The polymer additive language above was moved.</p>	<p>There is no change in effect from the existing rule.</p>
<p>WAC 173-160-450 (4)(a)(iii) New provision.</p>	<p><u>(4)(a)(iii) All bentonite used in any well shall be certified by</u></p>	<p>Change.</p>	<p>Previously additives needed to be</p>	<p>There is a change in effect from the</p>

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	<p><u>NSF/ANSI approval standards for use in potable water supply wells, or equivalent standards as approved by the department. The product shall be clearly labeled as meeting these standards.</u></p>		<p>certified and now bentonite needs to be certified. This requires NSF/ANSI certification where it was previously not required.</p>	<p>existing rule. Well drilling wholesalers suppliers were called to find out if uncertified products were available for bentonite/polymers.</p> <p>Based on these call it was confirmed that uncertified materials are not currently available in WA.</p>
<p>WAC 173-160-450(4)(b)(iii) Concrete sealants consist of clean, hard and durable aggregate with not less than five sacks (ninety-four pounds per sack) of Portland cement per cubic yard of concrete sealant and water, (A) The maximum diameter of aggregate particles may not exceed 1 ½ inches, but in any case may not exceed 1/5 the minimum width of the casing thickness. (B) The ratio of coarse aggregate to fine aggregate (passing No. 4 U.S. Standard Sieve) must be approximately 1 ½ to 1 by volume, but in any case, may not exceed 2 to 1 nor be less than 1 to 2.</p>	<p><u>4(b)(iii) Expanding agents, such as aluminum powder, may be used at a rate not exceeding 0.075 ounce (1 level teaspoon) per sack (ninety-four pounds per sack) of dry cement. The powder may not contain polishing agents. High-alumina cement and portland cement of any type must not be mixed together.</u> <del>Concrete sealants consist of clean, hard and durable aggregate with not less than five sacks (ninety-four pounds per sack) of Portland cement per cubic yard of concrete sealant and water. (A) The maximum diameter of aggregate</del></p>	<p><del>Deleted and replaced with provision 4(b)(iv).</del></p>	<p>This was deleted because it was in an inappropriate section of the rule and duplicates other requirements. <u>Provision 4(b)(iv) was renumbered to 4(b)(iii).</u></p>	<p>There is no change in effect from the existing rule.</p>

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	<p>particles may not exceed 1 ½ inches, but in any case may not exceed 1/5 the minimum width of the casing thickness. (B) The ratio of coarse aggregate to fine aggregate (passing No. 4 U.S. Standard Sieve) must be approximately 1 ½ to 1 by volume, but in any case, may not exceed 2 to 1 nor be less than 1 to 2.</p>			
<p><b>WAC 173-160-453 What are the minimum standards for construction of ground source heat pump borings?</b></p>				
<p>WAC 173-160-453(1) General requirements. (a) Applicability of minimum standards. The minimum standards set forth herein apply to all ground source heat pump borings as defined in WAC 173-160-111, constructed by a licensed operator.</p>	<p>(1) General requirements. (a) Applicability of minimum standards. The minimum standards set forth herein apply to all ground source heat pump borings as defined in WAC 173-160-111. <del>constructed by a licensed operator.</del></p>	<p>Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).</p>	<p>A licensed operator is more broadly required so the language was deleted.</p>	<p>There is no change in effect from the existing rule.</p>
<p>WAC 173-160-453(2)(c)(ii) The water supply well is not a public water supply well and the reduced set back is adequate to protect against encroachment on the well and can provide adequate protection against potential contamination. The reduced set back shall be no more than seventy-five feet.</p>	<p>(2)(c)(ii) The water supply well is not a public water supply well and the reduced set back is adequate to protect against encroachment on the well and can provide adequate protection against potential contamination. The reduced set back shall be no <del>more</del> less than seventy-five feet.</p>	<p>Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).</p>	<p>This clarifies the set back language.</p>	<p>There is no change in effect from the existing rule.</p>

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WAC 173-160-453(3)(b) In a closed-loop ground source heat pump boring, the material used to make up the heat exchange loop that is placed into the ground must be able to withstand the typical forces which act upon it during and after construction. It shall be resistant to the corrosive effects of the surrounding formations, earth, water, and heat exchange fluids within the pipe.	(3)(b) In a closed-loop ground source heat pump boring, the material used to make up the heat exchange loop that is placed into the ground must be able to withstand the <del>normal</del> <u>typical</u> forces which act upon it during and after construction. It shall be resistant to the corrosive effects of the surrounding formations, earth, water, and heat exchange fluids within the pipe.	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	The word “typical” replaces “normal” since it is a more appropriate term for these forces.	There is no change in effect from the existing rule.
WAC 173-160-453(3)(d) All fluids used in the construction and testing of ground source heat pump borings will be handled and utilized in a manner that does not contaminate the ground or surface waters of the state.	(3)(d) All fluids used in the construction and testing of ground source heat pump borings will be handled and utilized in a manner that does not contaminate the ground <u>water</u> or surface waters <del>of the state</del> .	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This is a clarification to use consistent terminology.	There is no change in effect from the existing rule.
WAC 173-160-453(3)(e) Bore hole size. The hole size for ground source heat pump borings must be of sufficient size to allow placement of the heat exchange loop and tremie pipe, but in no case shall the bore hole diameter be less than six inches when one inch loop pipe is installed. When a loop pipe greater than one inch is utilized, the size of the bore hole will be determined by ecology.	(3)(e) Bore hole size. The hole size for ground source heat pump borings must be of sufficient size to allow placement of the heat exchange loop and, <del>tremie pipe</del> but in no case shall the bore hole diameter be less than six inches <del>when one inch loop pipe is installed.</del> <del>When a loop pipe greater than one inch is utilized, the size of the bore hole will be</del>	Change.	This is a performance standard rather than a specific diameter.	There is a change in effect from the existing rule. This is a benefit that is a cost savings because the well drillers are allowed more flexibility.

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	<del>determined by ecology - tremie tube to the bottom of the hole</del>			
WAC 173-160-453(3)(f). New provision.	(3)(f) <u>No more than one heat exchange loop can be placed in one bore hole.</u>	Change.	Ecology does not know of a situation where this has occurred, however this is included to ensure it does not occur in the future.	There is a change in effect but since the situation hasn't yet occurred it is not definable.
WAC 173-160-453(3)(f)(i) Sealing must be done with an active solids content bentonite grout slurry (minimum twenty percent active solids by weight) per WAC 173-160-221. Use of controlled density fill (CDF) is prohibited.	(3)(fg)(i) Sealing must be done with an active solids content bentonite grout slurry (minimum twenty percent active solids by weight) per WAC 173-160-221. Use of controlled density fill (CDF) <u>and fly ash is prohibited.</u>	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	Under the existing rule well drillers can't use sealants that contaminate. This clarifies that fly ash is prohibited.	There is no change in effect from the existing rule.
WAC 173-160-453(3)(f)(iii) Slurry mixes of bentonite grout shall be installed by pumping through a tremie pipe in a continuous operation using a positive displacement method. Polymer additives designed to retard swelling are acceptable for use with the bentonite grout per WAC 173-160-221(1)(a). The tremie pipe will extend the full depth of the bore hole before pumping begins. Minimum slurry volume used must be equal to or exceed the calculated annulus	(3)(gf)(iii) <del>Slurry</del> Mixes of bentonite <del>grout</del> <u>slurry</u> shall be installed by pumping through a tremie <del>pipe</del> <u>tube</u> in a continuous operation using a positive displacement method. Polymer additives designed to retard swelling are acceptable for use with the bentonite <del>grout</del> <u>slurry</u> per WAC <del>-173-160-221(1)(a)</del> <u>173-160-450</u> . The <del>tremie pipe</del> <u>tube</u> will extend <u>to</u> the full depth of the bore hole before pumping begins. Minimum slurry volume used	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This clarifies language so that consistent terminology is used.	There is no change in effect from the existing rule.

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volume of the bore hole. Grouting material shall surround all pipes remaining in the bore hole to land surface.	must be equal to or exceed the calculated annulus volume of the bore hole. Grouting material shall surround all pipes remaining in the bore hole to land surface.			
WAC 173-160-453(3)(g) Grouting of permanently cased bore hole. Grouting of cased bore holds shall be sealed in accordance with this chapter. Exception: When the casing is perforated from bottom to land surface and is pressure grouted in accordance with WAC 173-160-381 (1)(a).	(3)(g) Grouting of a permanently cased bore hole, <del>Grouting of the cased bore holes</del> shall be sealed in accordance with this chapter. Exception: When the casing is perforated from bottom to land surface and is pressure grouted in accordance with WAC 173-160-381 (1)(a).	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This eliminates redundancy.	There is no change in effect from the existing rule.
<b>WAC 173-160-456 What are the minimum standards for construction of grounding wells?</b>				
WAC 173-160-456 (1) General requirements. Grounding wells (cathodic protection wells or anode wells – These wells must be constructed in accordance with the provisions of Part One--General Requirements for Water Well Construction, chapter 173-160 WAC.	<del>(1) General requirements.</del> Grounding wells (or cathodic protection wells or anode wells) – <del>These wells</del> must be constructed in accordance with the provisions of Part One--General Requirements for Water Well Construction, chapter 173-160 WAC.	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This eliminates an unnecessary heading.	There is no change in effect from the existing rule.
WAC 173-160-456(7) Grounding wells twenty-five feet in depth or less are exempt from these regulations, however, commingling of aquifers is still prohibited.	(7) Grounding wells twenty-five feet in depth or less are exempt from <u>all notice, licensing, fees, and reporting requirements</u> of these regulations, however,	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This clarifies the exemptions for certain grounding wells.	There is no change in effect from the existing rule.

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	commingling of aquifers is still prohibited.			
WAC 173-160-456 (8) Driven grounding rods installed to a depth of twenty-five feet or less are exempt from these regulations.	(8) Driven grounding rods installed to a depth of twenty-five feet or less are exempt from <u>all notice, licensing, fees, and reporting requirements</u> of these regulations.	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This clarifies the exemptions for certain driven grounding rods.	There is no change in effect from the existing rule.
<b>WAC 173-160-457 How are Vibrating Wire Piezometers constructed?</b>				
WAC 173-160-457 New section	<u>(1) The borehole containing the vibrating wire piezometers shall have a minimum diameter at least four inches larger than the diameter of the instrument. (2) When sealing with a grout or slurry, the borehole shall be grouted from the bottom up via a tremie tube. The tremie tube may be left within the bore hole provided: It meets casing standards, is filled completely with grout and the annular requirements of this section are met. (3) UngROUTED tubing, piping, liner, or casings shall not be left in the bore hole upon completion. (4) Individual transducers may be sand packed provided that the sand pack is not more than five feet in</u>	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv). New section with no new requirements.	Because these are becoming more common, Ecology wants to include a section dedicated to vibrating wire piezometers. The requirements included in this section are identical to those for other resource protection wells.	There is no change in effect from the existing rule.

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	<u>thickness. (5) Sealing between sand packed transducers shall be designed and constructed to prohibit flow between monitored zones. At no time shall a vibrating wire piezometer borehole connect aquifers.</u>			
<b>WAC 173-160-458 What sealing materials are allowed for sealing Vibrating Wire Piezometers?</b>				
WAC 173-160-458 New section.	<u>(1) Vibrating wire piezometers shall be sealed using materials as allowed in WAC 173-160-450; or sealing materials as designed and recommended by the manufacturer provided that the material, when placed, provides a permeability of <math>1 \times 10^{-7}</math> cm/sec or less. The licensed driller or engineer shall provide documentation from the manufacturer demonstrating that the sealing material meets the permeability requirements of this section. (3) The use of bentonite products intended for use as drilling fluids, low solids content bentonite mixtures, fly ash, and hydrated lime are prohibited as additives or sealants.</u>	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv). New section with no new requirements.	Because these are becoming more common, Ecology wants to include a section dedicated to vibrating wire piezometers. The requirements included in this section are identical to those for other resource protection wells.	There is no change in effect from the existing rule.
<b>WAC 173-160-460 What is the decommissioning process for resource protection wells?</b>				

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WAC 173-160-460(1) Resource protection wells and geotech soil borings that were not constructed in accordance with these regulations, or for which a drilling report required under this section is missing, shall be decommissioned in one of the following ways:	(1) <del>For resource protection wells and geotech</del> <u>geotechnical soil borings that were not constructed in accordance with these regulations, or for which a drilling report required under this section is missing</u> <del>shall be decommissioned,</del> <u>remove all debris, accumulated sediment, equipment and obstructions from the well casing, except well screens and packers, and decommission in one of the following ways:</u>	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	To comply with the other decommissioning requirements (WAC 173-160-460), sediment etc. would need to be removed so this is a clarification.	There is no change in effect from the existing rule.
WAC 173-160-460(1)(a)(iii). The remainder of the casing shall be filled with cement grout, neat cement, or bentonite slurry;	(1)(a)(iii) The remainder of the casing shall be filled with <u>neat</u> cement grout, neat cement, or bentonite slurry; or	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This clarifies the type of filler that is to be used.	There is no change in effect from the existing rule.
WAC 173-160-460(1)(b) Withdraw the casing and fill the bore hole with cement grout, neat cement, or bentonite as the casing is being withdrawn.	(1)(b) Withdraw the casing and fill the bore hole with <u>neat</u> cement grout, neat cement, <u>bentonite</u> or bentonite <u>slurry</u> as the casing is being withdrawn.	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv)	This clarifies the type of filler that is to be used.	There is no change in effect from the existing rule.
WAC 173-160-460(2) New provision.	(2) <u>For resource protection wells and geotechnical soil borings that were constructed in accordance with these regulations, remove all debris, accumulated sediment, equipment and obstructions from</u>	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	To comply with the other decommissioning requirements (173-160-460), sediment, etc. would need to	There is no change in effect from the existing rule.

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	<u>the well casing, except well screens and packers and then decommission in one of the following ways:</u>		be removed so this is a clarification.	
WAC 173-160-460(2) Wells with an inside casing diameter equal to or greater than one inch and constructed in accordance with these regulations as verified through a field examination and review of the drilling report shall be decommissioned by filling the casing from bottom to land surface with bentonite, cement grout, or neat cement.	(a <del>2</del> ) Wells with an inside casing diameter equal to or greater than one inch and constructed in accordance with these regulations as verified through a field examination and review of the drilling report shall be decommissioned by filling the casing from bottom to land surface with bentonite, <u>bentonite slurry</u> , <u>neat cement grout</u> , or neat cement.	Change.  Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This allows the well driller to now use bentonite slurry.  This clarifies that it is “neat” cement grout.	There is a change in effect from the existing rule. This is a benefit that allows the well driller more flexibility in the choice of products.  There is no change in effect from the existing rule.
WAC 173-160-460(3) Wells with an inside casing diameter less than one inch shall be decommissioned by pressure grouting the entire casing length.	(b <del>3</del> )Wells with an inside casing diameter less than one inch shall be decommissioned by pressure grouting the entire casing length <u>with bentonite slurry, neat cement grout, or neat cement.</u>	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	This clarifies the specific type of materials the well driller must use to pressure grout the well as defined in (WAC 173-160-450).	There is no change in effect from the existing rule.
WAC 173-160-460(4) Vibrating wire piezometers installed per WAC 173-160-450 are exempt from decommissioning procedures.	(c <del>4</del> ) Vibrating wire piezometers installed <del>per</del> <u>to meet or exceed the sealing requirements of WAC 173-160-450, WAC 173-160-457 and WAC 173-160-458</u> are exempt from <del>these</del> <u>the decommissioning procedures and decommissioning</u>	Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).	New sections were added about vibrating wire piezometers, references were updated, and language consistent	There is no change in effect from the existing rule.

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	<p><u>reporting requirements provided here.</u></p>		<p>with the new sections (173-160-457 and 458) was included.</p> <p>“and decommissioning reporting requirements provided here” clarifies that once the installation is complete no further reporting is required.</p>	
<p>WAC 173-160-460(6) Geotechnical soil borings, or boring, shall be decommissioned by sealing from bottom to land surface with bentonite, bentonite slurry, cement grout, or neat cement. Sealing material placed below the static water level shall be piped directly to the point of application or placed by means of a dump bailer or pumped through a tremie tube. If cement, neat cement grout or neat cement is used to seal below the static water level in the well, the material shall be placed from the bottom up by methods that avoid segregation or</p>	<p>(e) Geotechnical soil borings, or boring, shall be decommissioned by sealing from bottom to land surface with bentonite, bentonite slurry, <u>neat</u> cement grout, or neat cement. Sealing material placed below the static water level shall be piped directly to the point of application or placed by means of a dump bailer or pumped through a tremie tube. If <del>cement, bentonite slurry,</del> <u>neat</u> cement grout, or neat cement is used to seal below the <del>static</del> water level in the well, the material shall be placed from the bottom up by methods that avoid</p>	<p>Clarification. Exempt: RCW 34.05.328 (5)(b)(iv).</p>	<p>“Neat” was added and “static” was deleted for clarification.</p> <p>Cement was an inappropriate material so it was deleted and “bentonite slurry” was inserted. This expanded the materials that a well driller can use when decommissioning a well.</p>	<p>There is a change in effect from the existing rule which is a benefit that allows the well driller more flexibility in the choice of products.</p>

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<p>dilution of the material. When used to place grout, the discharge end of the tremie tube shall be submerged in grout to avoid breaking the seal while filling the annular space. Provided the material does not dilute or segregate and the resulting seal is free of voids, sealing material may be hand poured above the static water level.</p>	<p>segregation or dilution of the material. When used to place <u>bentonite slurry, neat cement or neat cement</u> grout, the discharge end of the tremie tube shall be submerged in the <u>bentonite slurry, neat cement or neat cement</u> grout to avoid breaking the seal while filling the annular space. Provided the material does not dilute or segregate and the resulting seal is free of voids, sealing material may be hand poured above the static water level.</p>			