



**Chapter 173-218 WAC  
Chapter 173-216 WAC**

**Benefit, Cost, and Evaluation for the Proposed  
Amendments to Underground Injection Control  
Program and State Waste Discharge Permit Program**

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# **Benefit, Cost, and Evaluation for the Proposed Amendments to Underground Injection Control Program and State Waste Discharge Permit Program**

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## **EXECUTIVE SUMMARY**

When proposing a new administrative rule for consideration, the Washington State Department of Ecology (Ecology) is required by RCW 34.05.328(1) (d) to determine whether the probable benefits exceed the probable costs. This document fulfills this requirement for the proposed amendments of Chapter 173-218 WAC -- Underground Injection Control Program and Chapter 173-216 WAC--State waste discharge permit program.

The proposed rule amendments can be expected to affect municipalities, industry, and commerce. This cost benefit analysis analyzes the probable benefits and probable costs of the proposed rule amendments and concludes that the probable benefits resulting from adoption of the proposed rule amendments should be at least \$21 million greater than the probable costs. The proposed rule amendments are also expected to be the least burdensome to those required to comply without sacrificing the general goals and specific objectives of the rule making.

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## 1. Background

Due to revisions of the federal UIC rule in 1999, Washington State Department of Ecology (Ecology) is updating chapter 173-218 WAC -- Underground Injection Control (UIC) Program and Chapter 173-216 WAC--State Waste Discharge Permit Program. The federal revision included definition changes and the nation-wide ban of two types of UIC wells. Ecology needs to incorporate the federal amendments in the UIC regulation to make it current with the federal requirements. The proposed rule amendments will also bring consistency between the federal and state rules.

The Underground Injection Control (UIC) Program regulates fluids, such as stormwater, that go to ground through UIC wells. UIC wells include dry wells, catch basins, large on site septic systems, and other infiltration devices. The proposed rule amendments include:

1. Revising the UIC rule language to make Chapter 173-218 WAC consistent with new federal rule changes and to better clarify the requirements for new and existing UIC wells.
2. Allowing UIC wells to be included in a state waste discharge permit, if necessary.
3. Clarifying language in the rules.

Statutes authorizing Ecology to adopt these rule changes include RCW 43.21A.445; RCW 90.48.035; and RCW90.48.080. These statutes state:

*The department of ecology, ..., are authorized to participate fully in and are empowered to administer all programs of Part C of the federal Safe Drinking Water Act (42 U.S.C. Sec. 300h et seq.), as it exists on June 19, 1986, contemplated for state participation in administration under the act. [RCW 43.21A.445]*

*The department shall have the authority to, and shall promulgate, amend, or rescind such rules and regulations as it shall deem necessary to carry out the provisions of this chapter, including but not limited to rules and regulations relating to standards of quality for waters of the state and for substances discharged therein in order to maintain the highest possible standards of all waters of the state in accordance with the public policy as declared in RCW [90.48.010](#). [RCW 90.48.035]*

*It shall be unlawful for any person to throw, drain, run, or otherwise discharge into any of the waters of this state, or to cause, permit or suffer to be thrown, run, drained, allowed to seep or otherwise discharged into such waters any organic or inorganic matter that shall cause or tend to cause pollution of such waters according to the determination of the department, as provided for in this chapter. [RCW 90.48.080]*

As required in the RCW 34.05.328(1) (d), before adopting the proposed 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 statute requirement, this cost benefit analysis evaluates whether or not the probable benefits resulting from the proposed rule amendments are greater than the probable costs. The analysis relies upon both qualitative and quantitative methods to reach a conclusion regarding the effect of the proposed rule amendments and concludes that the probable benefits of the proposed rule amendments exceed the probable costs.

## **2. Comparison Of The Rules**

The goal of a cost benefit analysis is to analyze the difference between the situation “without the proposed rule amendments” and the expected situation “with the proposed rule amendments”. In order to accomplish this comparison, a baseline scenario, which describes the situation “without the proposed rule amendments”, must be defined. The baseline used in this analysis is the situation under the current federal and state regulations. The reason is that without the proposed rule amendments, the UIC well owners or operators must comply with both the current Federal regulations and the current state regulations.

### **2.1 Impacts on Ground Water**

Underground injection is the technology of placing fluids underground, in porous formations of rocks, through wells or other similar conveyance systems. Facilities across Washington discharge a variety of fluids into thousands of underground injection wells, and some of them make use of underground injection for waste disposal. Discharging waste fluids into UIC wells potentially affects the quality of underground water. However, the unsaturated geologic material between the bottom of the infiltration facility and the top of an unconfined aquifer, called the vadose zone, usually provides some level of treatment by removing contaminants through filtration, adsorption, and/or degradation. In some cases, the treatment provided by the vadose zone is suitable for protecting ground water quality from contamination by stormwater runoff. As such, UIC wells may be considered to provide an acceptable level of treatment for removing stormwater pollutants that exceed ground water quality standards, and as stated by Environmental Protection Agency (EPA) **“When wells are properly sited, constructed, and operated, underground injection is an effective and environmentally safe method to dispose of wastes.”**

The proposed rule amendments require that UIC wells be authorized either by rule or by a state waste discharge permit. Some UIC wells are prohibited. In order to receive rule authorization, the UIC wells must meet the non-endangerment standard, which means:

*The UIC well owners or operators must prevent the movement of fluid containing any contaminant into the ground water if the contaminant may cause a violation of chapter 173-200 WAC Water Quality Standards for the Ground Waters of the State of Washington.*

The proposed rule amendments allow some fluids to be injected into UIC wells. However, the non-endangerment standard will ensure that, even if the underground water quality can be affected, the potential degradation of the underground water quality shall be limited to the extent that no beneficial uses will be affected. As such, no underground water clean-up action is expected if complying with the proposed rule amendments, and the potential social costs associated with the potential water quality impacts should not be large.

Because rule authorization is explicitly allowed in the proposed rule, it is expected that very few UIC wells will need to apply for a state waste discharge permit. While the standards for a state waste discharge permit are not directly changed by this rule proposal, Ecology does not expect any social costs.

## **2.2 Impacts on Class I, II, III, and IV UIC Wells**

UIC wells are classified into one of the five classes (Class I, Class II, Class III, Class IV, and Class V) defined in the proposed WAC 173-218-040. These definitions are almost the same as the definitions in the federal regulations, and are slightly different from the definitions in the current state UIC rule. However, these small changes of definition will not be expected to affect the outcomes of this cost benefit analysis.

For Class I, II, III, and IV UIC wells, the comparison of the three rules (the existing UIC rule, the proposed UIC rule, and the federal regulations) is listed in table 2.1. From the table, one can conclude that the proposed rule amendments will not have any impacts on Class I, II, and III UIC wells in Washington.

Since some “Class IV wells, re-injecting treated ground water into the same formation from where it was drawn as part of a removal or remedial action,” are allowed under the proposed rule amendments, the proposed rule amendments will provide an additional choice for these remedial actions. This change probably generates a benefit to Washington because it will make the hazardous or radioactive waste clean-up actions legal, possible, and done in an efficient manner.

Table 2.1 Comparison of the rules and regulations for Class I—IV UIC wells

Wells	Existing WAC 173-218	Proposed WAC 173-218	Federal UIC Regulations	Comments	Additional Benefits or Costs
Class I	New: Prohibited Existing: Approval by Department	Prohibited	Authorized by rule under certain requirements	1. None in Washington. 2. Definition change.	None
Class II(a)	1. Notification 2. Review, evaluation, and approval by the State.	1. Notification 2. Review, evaluation, and approval by the State.	Authorized by rule under certain requirements	2. Role changes of state agencies	None
Class II (b), (c)	Not authorized	1. Notification 2. Review, evaluation, and approval by the State.	Authorized by rule under certain requirements	None in Washington	None
Class III	Not authorized	Not authorized	Authorized by rule under certain requirements	None in Washington	None
Class IV	Prohibited	Prohibited except re-injecting treated water back.	Authorized by rule under certain requirements		Benefit

## 2.3 Impacts on Class V UIC Wells

The majority of UIC wells in Washington are Class V UIC wells, which include all injection wells not included in Class I, II, III, or IV. Class V wells are usually shallow injection wells that inject fluids above the upper most ground water aquifer. Some examples are dry wells, French drains and drain fields used to manage stormwater.

The requirements of Class V UIC wells under the existing UIC rule are:

*(1) All new Class V injection wells that inject industrial, municipal, or commercial waste fluids into or above an USDW are prohibited.*

*(2) All persons operating an existing Class V injection well, that inject industrial, commercial, or municipal waste fluids into or above an USDW, must apply to the department for approval to operate .....*

*(3) All other Class V injection well owners and operators must notify the department.....*

The definition of waste fluid in the existing rule is:

*“Waste fluid” means any discarded, abandoned, unwanted, or unrecovered fluid(s), except the following are not waste fluids for the purposes of this chapter:*

*(a) Discharges into the ground or ground water of return flow, unaltered except for temperature, from a ground water heat pump used for space heating or cooling: Provided, that such discharges do not have significant potential, either individually or collectively, to affect ground water quality or beneficial uses;*

*(b) Discharges of stormwater that are not contaminated or potentially contaminated by industrial or commercial sources.*

As such, the definition of “waste fluid” is broad in the existing rule. Not only “contaminated”, but also “potentially contaminated” stormwater is treated as “waste fluids”. The Class V UIC wells built after 2/29/1984 that inject “waste fluids” into ground water are prohibited, while the wells built before that time needs to be approved by Ecology. Therefore the prohibited Class V wells in the proposed WAC 173-218-040 (5) (b) are also prohibited under the existing rule. Thus, no additional costs will be generated.

For the injection wells allowed in the proposed WAC 173-218-040 (5)(a), only some drainage wells and septic system wells are used to inject the waste or effluent. Other wells would not inject “waste fluids” into the ground water and can be approved under the existing rule. Therefore, there will be no additional costs to the well owners from the rule change.

Most of the Class V UIC wells in Washington are drainage wells that are used to manage stormwater. The existing UIC rule does not allow most of the drainage wells because they receive stormwater that, according to the existing rule language, is contaminated, or potentially contaminated, from an industrial or commercial source. These types of discharges are not allowed in the existing UIC rule. The proposed rule amendments have more detail on the specific best management practices required to reduce the likelihood of pollutants reaching groundwater. This additional language provides greater flexibility in allowing stormwater discharges into UIC wells, and therefore allows a broader coverage of UIC wells for stormwater management that can be rule authorized. Without the proposed rule amendments, all of the contaminated or potentially contaminated UIC wells should be closed, and the owners would need to develop other methods or facilities to manage and treat stormwater.

With the proposed rule amendments, most of these wells can meet the requirements for rule authorization. The well owners or operators will not need to develop alternatives to treat stormwater. This will result in saving corresponding capital investment and other resources. This saving is a benefit to the well owners or operators, and consequently benefits Washington as a whole. The same analysis is applicable to the septic system wells used to inject the waste or effluent.

For those UIC wells that need a permit under both the proposed and existing UIC rules, Ecology does not expect there will be any changes, thus no benefits or costs.

## **2.4 Decommissioning**

WAC 173-218-120 addresses the decommissioning standards and record keeping requirements for UIC wells. The decommissioning standards in the proposed rule amendments are more specific than those in the federal regulation (40 CFR 146.10 (c))<sup>1</sup>. However, the standards are almost the same, thus there may be slight additional costs that are not expected to be significant.

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<sup>1</sup> 40 CFR 146.10 (c) Requirements for Class V wells.

(1) Prior to abandoning a Class V well, the owner or operator shall close the well in a manner that prevents the movement of fluid containing any contaminant into an underground source of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 CFR part 141 or may otherwise adversely affect the health of persons.

(2) The owner or operator shall dispose of or otherwise manage any soil, gravel, sludge, liquids, or other materials removed from or adjacent to the well in accordance with all applicable Federal, State, and local regulations and requirements.

The decommissioning record keeping under the proposed rule amendments requires an update on the wells that have been decommissioned. This requirement would be a minor additional one-time cost (less than \$10) in the life time of a Class V well.

## **2.5 Retrofit**

“Retrofit” means taking actions to reduce the pollutant load from a UIC well to meet the statutory requirements of 40 CFR 144.12 and RCW 90.48.010. The UIC wells that need retrofitting under the proposed UIC rule amendments are the wells that must be closed in the current UIC rule. Under current regulations, the UIC wells that cannot meet the statutory requirements would have no choice but closure, and the well owners have to find other methods and facilities to treat their polluted water. The proposed rule amendments would allow UIC well owners to choose retrofitting instead of closure. If the well owners believe retrofitting is a big burden to them, they can still close their UIC wells without retrofitting under the proposed rule amendments. Retrofitting a well is an additional choice provided by the proposed UIC rule, and cannot be a cost to the UIC well owners.

## **2.6 Registration**

Registration is required by the federal regulation. The proposed UIC rule must reflect this requirement. The existing rule also requires the UIC well owners to notify Ecology by an approved form, or apply for a permit. The UIC wells that have been registered with Ecology are not required to register again. Therefore, registration cannot be an additional cost to the well owners or operators.

## **2.7 Well Assessment**

“Well assessment” means an evaluation of the potential risks to ground water from the use of UIC wells. A well assessment includes information such as the land use around the well which may affect the quality of the discharge, and may include the local geology, depth of the ground water in relation to the UIC well if the UIC well is located in a ground water protection area. Well assessment is explicitly required by the proposed rule amendments but is not explicitly required under the baseline. This will be a cost to the well owners.

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

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

All the benefits and costs quantified are one time benefits and costs in a well's life time. In this analysis, Ecology assumes that the operating and maintenance costs of a UIC well are the same as those costs of alternative facilities<sup>2</sup>. Thus, no additional operating and maintenance costs are expected.

### 3.1 The Benefits

The benefits of the proposed rule amendments are mainly generated from two sources – allowing remedial re-injecting Class IV UIC wells and allowing two kinds of Class V wells, namely drainage wells and septic system wells, for rule authorization. Ecology cannot quantify the benefit from allowing the remedial re-injecting Class IV wells. This is not critical because it is on the benefit side and will not affect the final conclusion that the probable benefits are greater than the costs.

There are a total of 10,057 existing drainage wells<sup>3</sup> (most of them are drywells) in Ecology's UIC well database, of which, only 40 UIC wells can be allowed under the existing UIC rule and the others are prohibited under the existing rule. Under the proposed rule amendments, it is believed that most of these drainage wells will be rule authorized because of additional language that provides greater specificity in allowing stormwater discharges into UIC wells, and therefore allows a broader coverage of UIC wells for stormwater management. Ecology estimates that 60 percent to 90 percent of these drainage wells will be rule authorized, which means that about 6,000 to 9,000 additional drainage UIC wells will be legalized.

The value used to quantify the benefit is based on the concept of "willingness to pay". The well owner must be willing to pay at least the well's cost to build it, thus the value of a UIC drainage well will be at least its cost. It is estimated that unit cost of building a dry well is about 4,000 dollars<sup>4</sup>. This number is treated as the minimum average value of a drywell<sup>5</sup>

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<sup>2</sup> The stormwater and other waste fluids must be treated. If the UIC wells are prohibited, stormwater and other waste fluids must be treated by other facilities, such as various ponds. The operating and maintenance costs will probably higher than those of UIC wells. See Table 5.3.5 of Highway Runoff Manual M31-16 (2004). Environmental and Engineering Service Center, Washington State Department of Transportation.

<sup>3</sup>This includes all well types under the EPA's Class V UIC well category.

<sup>4</sup> Cost Analysis of Stormwater Treatment and Flow Control Requirements for Eastern Washington.(2003) Washington State Department of Ecology, Publication No. 03-10-038D.

<sup>5</sup> Another method to consider is to calculate the costs of some alternatives to UIC wells, such as infiltration pond or a detention pond. We do not believe that these alternatives would give us a more accurate value, or a lower value. Because:

- a. Not all UIC wells can be fully substituted. In most cases, it is impossible to substitute a pond in the same location as a UIC well. This is due to the fact that "subsurface infiltration systems (UIC wells) should be considered only when room is inadequate to construct an infiltration basin." (Highway Runoff Manual M31-16 (2004). Environmental and Engineering Service Center, Washington State Department of Transportation.). Therefore, not only flow control facilities

and used for calculating the costs and benefits in this analysis. Based on this number the minimum total benefit will be approximately from 24 million dollars to 36 million dollars.

### 3.2 The Costs

The largest cost generated by the proposed rule amendments is the cost of well assessment, although there may be some other un-quantified minor costs. The well assessment requirements offer flexibility to the well owner. The owner may decide when, and how, to conduct the assessment within a five to seven-year period. If Ecology assumes the owner will hire a technician to do the well assessment, and assumes that, on average, it will take the technician two- to five hours<sup>6</sup> to finish the assessment and the loaded hourly wage rate is \$60, the cost of well assessment for each UIC drainage well will be \$120 to \$300, the total cost for the 10,057 drainage wells will be from 1.2 million dollars to 3 million dollars.

### 4. Conclusion and Discussion

The revision of Chapter 173-218 WAC is a necessary step to keep current with federal UIC regulations and bring consistency between the UIC rule and various state regulations. As summarized in table 4.1, the proposed rule amendments will probably bring a net benefit of at least \$21 million to the state of Washington.

Table 4.1 summary of benefits and costs In Million Dollars

	<b>Benefit</b>	<b>Cost</b>
<i>Water Quality</i>	NA	Minor to Small
<i>UIC wells</i>		
Class I	NA	NA
Class II	NA	NA
Class III	NA	NA
Class IV	>0	NA
Class V	24.0 to 36.0	NA
Registration and Record keeping	NA	Minor
Decommissioning	NA	Minor

(drywell or pond), but also water treatment facilities (such as bioinfiltration swale), if required, are needed.

b. The costs of the alternatives will probably be higher than the cost of a UIC well.

Reference:

(1) Cost Analysis of Stormwater Treatment and Flow Control Requirements for Eastern Washington. (2003) Washington State Department of Ecology, Publication No. 03-10-038D.

(2) Table 5.3.5 Relative rankings of cost elements and effective life of BMP options. Highway Runoff Manual M31-16 (2004).

<sup>6</sup> Stormwater management for eastern Washington—Model municipal stormwater program for Eastern Washington. Washington State Department of Ecology, Publication Number 03-10-076.

Well Assessment	NA	1.2 to 3.0
Retrofit	>0	NA
Total	24.0 to 36.0	1.2 to 3.0
Total Net Benefits	<b>21.0 to 34.8</b>	

The benefits and costs calculated above are based on the data currently available to Ecology. Ecology recognizes the fact that some UIC wells were not registered when the cost benefit analysis was completed. However, this will not affect the conclusion that the probable benefits are greater than the probable costs. If the total number of UIC wells is 20,000 instead of 10,000, the probable net benefits will also double to at least 42 million dollars.

The benefits of future development of drainage UIC wells are not quantified in the total benefit. Ecology believes that the net benefit of a new UIC well will be significantly lower than the 4,000 dollar estimate we used for analyzing the existing wells, because the benefit is marginal. In calculating the benefits of existing UIC wells, we didn't take the building costs into account because they have already been there. For the new UIC wells, the well owner will first invest to build the UIC wells, and then acquire the benefits. Thus, it is important to compare the building costs of alternatives. Using 4,000 dollars as the benefit for the new UIC well will significantly overestimate the benefits. On the other hand, we cannot estimate the number of new UIC wells in the future with confidence. The choice of not estimating this benefit will not affect the conclusion because it is on the benefit side.

## 5. 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.”*

In the least burdensome analysis, the pre-requirement for various alternatives is to achieve the general goals and specific objectives of the rule making. One alternative for Ecology would have been to not initiate rule making. This would have left the existing UIC well management structure in place as has been described in this document. The cost benefit analysis shows that this alternative is neither consistent with the federal regulations nor is the least burdensome.

In the rule making process, Ecology has investigated many possible alternatives which could achieve the general goals and specific objectives of the rule making. These

alternatives would be more burdensome for those required to comply, and have been abandoned in the rule making process. These alternatives include:

1. In one old version of the proposed rule, only publicly owned UIC well owners had the option of determining their own priority, approach, and retrofit schedule (well assessment). The privately owned wells well-assessment was part of the registration form. The current version allows both the private and publicly owned wells the same flexibility in determining their own approach to completing their well assessment including the priority and retrofit schedule within certain time frames.

2. There have been arguments that all UIC wells have to be registered. Considering the cost impacts, the current rule exempts single family homes that only receive residential roof runoff, or used to control basement flooding from the registration requirement.

3. In the rule making process, it is suggested that the well owner had the option of using one or the other of the two approaches: presumptive or demonstrative. The current proposed rule provides the well owner with the option of using either the presumptive, demonstrative or a combination of the two approaches. In some cases a combination of the two approaches may be used to meet the non- endangerment standard. This allows more flexibility for the UIC well owner to meet the rule requirements.

In summary, various alternatives have been studied in developing the current proposed rule language and the current one is expected to be the least burdensome to those required to comply without sacrificing the general goals and specific objectives of the rule making.