



Washington State Department of Ecology

Biosolids Management

Final Economic and Least Burdensome Analyses for Amendments to Chapter 173 308 WAC

*Prepared for
Ecology's Solid Waste and
Financial Assistance Program*

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SUMMARY

The purpose of the Chapter 173-308 WAC Biosolids Management Rule is to maximize the beneficial use of biosolids while protecting human health and the environment. This includes preventing diseases that may be caused by poor biosolids management practices.

Ecology is adopting amendments to WAC 173-308. The Administrative Procedures Act RCW 34.05.328(d) requires Ecology to 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.
- The rule being adopted is the least burdensome alternative for those required to comply with it.

Ecology analyzed the rule amendments and determines that some of them will increase costs and others will decrease costs. We also determine that the probable benefits will exceed the probable costs; we can adopt the amendments to the rule.

The present value¹ of the cost of the rule amendments is in the range of \$6.7 million for a 5-year period. However, the direct costs of the rule for facility owners are being reduced by \$336,000. Ecology estimated these costs based on data provided by facility managers who responded to a survey (see [Appendix 2](#) for the surveys and [Appendix 3](#) for a detailed summary of results).

In Washington State, the annual costs of diseases are around \$330 million due to lost work and school days. This does not include the cost of medical treatment. The 5-year present value of these diseases is almost \$1.6 billion. The \$1.6 billion in disease is much more than the \$6.7 million in costs for the rule. Because people rarely know where they have picked up a disease the share of this loss affected by the rule amendments is not known. However, if the share of the disease load affected is greater than 0.39% then there will be a net benefit. This percentage value is conservative in that it does not include the cost of treatment or the cost of long-term disability from disease. In other words, if the proposed rule prevents 39 in 10,000 cases of disease there will be a net gain. Ecology believes this level of disease reduction is possible. Further, the amended rule provides a level playing field so that facilities that follow safe practices do not have to compete with facilities that do not. Therefore, Ecology believes that the probable benefits outweigh the probable costs.

ADOPTED RULE AMENDMENTS

This analysis only evaluates the rule amendments that create a legal change for biosolids businesses. We provide a more detailed explanation of the amendments in [Appendix 1](#) that explains which amendments create a legal change, why we did not include some of the amendments in our analysis, and any changes to the amendments Ecology made in response to comments we received.

¹ Present value: The value of something today that does not accrue until a future date. Ecology uses average I bond rates to estimate this value.

Ecology is adopting the following amendments. The ones marked with an “*” reduce costs.

- Combining the previous classifications of Class I, Class II, and Class III septage into a single definition of “septage”.
- Requiring all facilities that land apply septage or treat septage for land application to get a permit from Ecology.
- Imposing the same site management and access restrictions requirements for sites that receive septage whether the material is pH-stabilized or not.
- *Providing owners of composting toilet systems a categorical exemption from the entire rule when the output is transferred to a facility permitted to manage it and from the permitting and reporting requirements even if they land-apply the output.
- Requiring all facilities that transport their own biosolids or contract with someone else to transport them to submit a *Spill Prevention & Response Plan* to Ecology.
- Eliminating the options for Class A-Alternative 3 and Class A-Alternative 4.
- Imposing a requirement that biosolids sold or given away in a bag or other container meet the “exceptional quality” standards.
- Requiring all applicable facilities to submit an Annual Biosolids Report.
- Requiring permittees to submit an application for coverage within 90 days of Ecology issuing a new general permit but allowing for a case-by-case extension up to 180 days.
- *Exempting research projects from the reporting and permitting requirements if they are conducted according to Ecology approved research plan.
- Requiring all facilities that land apply non-exceptional quality biosolids to issue a public notice during each permit cycle but limiting the extent of the notice to the newspaper if it was previously done at the application site.
- *Eliminating the need for public notice if proposing an “insignificant” change either when applying for coverage under a new general permit or when proposing insignificant changes while covered under a permit.
- *Reducing the number of required newspaper notices from two to one and eliminating the need for new public notice when applying for coverage under a new general permit if notice was done previously, they are in compliance, and the facility is not land-applying non-exceptional quality biosolids.
- Requiring facilities to screen through a bar screen with a maximum opening of 3/8 inch (0.95 cm) or an Ecology approved equivalent. Facilities will have 5 years to meet this new standard.
- Imposing a requirement that biosolids (including septage) land applied or sold/given away in a bag or container contain less than 1 percent by volume recognizable manufactured inerts.
- *Providing exemptions to the storage requirements for storage covered under another environmental permit and for “temporary/small-scale storage”.
- *Grandfathering facilities into the new requirements. This will allow facilities to continue their current activities, while still increasing the requirements for new activities. This is

for surface impoundments meeting the Chapter 173-304 WAC requirements. However, the Chapter 173-350 WAC surface impoundment requirements are imposed for new or upgraded surface impoundments.

- Clarifying and simplifying the requirements for biosolids from facilities outside the state (includes tribal lands). The rule allows Ecology to approve biosolids from out-of-state facilities without requiring a permit if it is sent to an Ecology-permitted facility or if it is in bags or other containers. However, if an out-of-state facility wants to manage their own operation they will have to get a permit. In all cases, fees would be assessed based upon the percent of material produced that is sent into the state.
- Requiring facilities that prepare biosolids or sewage sludge to maintain the following records:
 - The amount stored onsite.
 - The amount transferred to another facility for further treatment and the name of the other treatment facility.
 - The amount transferred for incineration and the name of the incineration facility.
- Requiring facilities that land apply non-exceptional quality biosolids to maintain the following records:
 - The location, by street address, if applicable,
 - A copy of the assessor's plat map(s) with the application area(s) clearly shown or the latitude and longitude of the approximate center of each land application site, and the section, township and range of each quarter section where biosolids are applied.
 - The number of acres in each site where biosolids were applied.
 - The date biosolids were applied to each site.
 - The nitrogen requirement for the crop or vegetation grown on each site.
 - The rate, in dry tons per acre per year, at which biosolids are applied to each site.
 - The amount, in dry tons, of biosolids applied to each site.

Costs

The direct cost change of the adopted rule amendments has a present value of about \$6.7 million over a 5-year permit span. Ecology has listed the costs in the gray rows in [Table 1: Survey Results - Total Present Value](#). The items that increase costs include:

- **The cost of spills plans for facilities that transport biosolids and septage who still do not have a spills plan.** This would include at most 30% of facilities. The one time cost for this requirement is about \$45,300.² Companies that already have a permit will not experience new costs. Ecology evaluated this cost because the adopted amendments move the requirement from the permit into the rule. We analyzed the costs of this requirement in the *Economic Impact Analysis* conducted on the biosolids general permit in December 2004.

² Based on Average cost for WWTP*number of WWTPs*percent affected+ Average cost for SMFs*number of SMFs*percent affected + Average cost for BUF*number of BUFs*percent affected)+High Cost Outlier

- **Submitting an annual biosolids report for facilities that did not have to do so in the past.** This will affect about 60% of the Wastewater Treatment Plant (WWTPs) and the Beneficial Use Facility (BUFs). Ecology expects the total annual cost of this new requirement to be \$279,000 with a present value of \$1.3 million. Existing facilities will not experience new costs because Ecology was already requiring a report from all facilities through policy and its interpretation of existing rule language. All facilities have been complying with this requirement since 1999. Ecology evaluated this cost because the adopted amendments move this requirement from policy into rule.
- **Submitting the permit application within 90 days of the adoption of a general permit.** This may affect about 30% of facilities that had more time in the past. The impact of this adopted amendment is disproportionate for those facilities that are affected. Ecology estimates this cost at \$22,000.
- **Some Septage Management Facilities (SMFs) will have to get a permit.** This will affect approximately 40% of the SMFs. We estimate the cost is \$148,000.
- **Screening Requirement.** The amended rule requires facilities to screen through a bar screen with a maximum opening of 3/8 inch (0.95 cm) or an Ecology approved equivalent. Ecology expects the cost of adding this bar screen and its annual operating costs to be \$4.2 million. This is a high estimate because facilities that have at least an equivalent alternative method approved by Ecology may have lower costs. Facilities may also get approval for long-term disposal if the new screening requirement is too costly.
- **Removal of Manufactured Inerts.** The original proposal required “a significant removal of manufactured inerts” in biosolids and the “significant removal or reduction of manufactured inerts” for biosolids that are land applied, sold, or given away in a bag or other container. However, these requirements have been specified in response to comments suggesting Ecology should be less vague and subjective. To accomplish this, Ecology added the screening requirement cited above and requires that biosolids that are land applied or sold/given away in a bag or other container contain less than 1 percent by volume recognizable manufactured inerts. All of the facilities that were surveyed are already meeting this standard, so Ecology expects zero costs from this requirement.
- **New requirements for Class A - Alternatives for four possibly affected facilities.** The original proposed amendments required facilities, who want to use the Class A-Alternative 3 or Class A-Alternative 4, to submit a pre-approval sampling plan. However, upon further consideration and in response to comments, Ecology proposed to eliminate both alternatives from the rule. We describe this in more detail in [Appendix 1](#). After this decision by Ecology, we wrote a new survey question and asked each of the four potentially affected facilities to respond. Only one facility is currently using either alternative and they estimated a one-time cost of \$26,000.
- **Management changes for unstabilized septage.** The original proposal required facilities with mixtures of septage that contain more than 25% by volume of “unstabilized” septage to be managed as biosolids from a wastewater treatment plant. However, Ecology received comments on this amendment that suggested very high costs. Therefore, under the adopted rule, facilities can pH-stabilize such mixtures and still land apply the septage, but the application rate may be stricter. Ecology believes the costs listed in Table 1 are over stated. The costs are based on three to six Septage Management Facilities (SMFs) that plan to land apply unstabilized septage. We estimated the total cost of this was about \$201,000 per year with a 5-year present value of \$941,000 and may now be closer to zero.

- **Site management requirements for five to ten SMFs that land apply septage and do not limit access for cattle or the public.** The estimated cost is \$1,800 per year with a 5-year present value of \$8,400.

Table 1: Survey Results - Total Present Value

Rule Changes by Type	Present Value
Spill Response Plan	-\$45,279
Submit Annual Biosolids Report	-\$1,308,021
Obtaining a permit (SMFs)	-\$144,972
Timing for Submitting a Permit Application	-\$21,786
Public Notice Requirements for Non-exceptional Quality Biosolids or Septage	+\$113,365
Insignificant Changes	+\$29,564
Exemptions for Certain Research	+\$179,988
Screening Requirements	-\$4,154,847
Removal of Manufactured Inerts	\$0
Deferral to Other Permits for Storage	+\$12,748
Class A Alternatives	-\$26,000
Sale or Give Away?	\$0
Management of Unstabilized Septage	-\$941,045
Site Management for pH-stabilized Septage	-\$8,399

Benefits

The primary benefits of the rule are the potential to reduce disease and reducing the current costs of complying with the rule.

Reducing Disease

The diseases this rule has the potential to reduce include:

- Salmonella
- Typhoid
- Shigellosis
- Gastro-enteritis
- Cholera
- Poliomyelitis
- Meningitis
- Pneumonia
- Hepatitis
- Encephalitis
- Respiratory Infections
- Cryptosporidiosis
- Acute Enteritis
- Giardiasis
- Chronic Diarrhea
- Toxoplasmosis
- Hookworm Disease
- Taeniasis
- Cyclospora

The impacts of these diseases range from a few days of illness to death.

In the past, these diseases had a massive impact on public health. Over time, multiple regulations and a heavy investment in sewage handling equipment have reduced their impact. The benefits of reducing these diseases have been large over time. Better toilets, the building of sewers and treatment plants, and other activities at the start of the last century were and continue to be responsible for huge public health gains and a near doubling of the average human life span. Now, it is difficult for the bacteria to make it through the gauntlet of sewers and wastewater treatment plants in American cities. Therefore, this rule is only a tiny part of the overall disease reduction that has taken place. It allows beneficial use of biosolids, which would pose a risk if facilities did not handle them properly.

Estimated costs from potential disease

Ecology estimates the potential cost of work and school day losses from diseases originating from human exposure to disease-causing organisms in biosolids for the state of Washington at \$550 million per year.

We calculated the current losses primarily from statistics at the Center for Disease Control (CDC). For most of the identified diseases, the CDC listed a range of the number of cases in the United States annually, as well as a range of the length of each infection. With this information, we were able to find the average number of days the infection is expected to last, and that became the number of days a person would typically be absent from work or school due to each particular disease. We used 2% of the annual occurrences in the US to extrapolate Washington's share of the diseases because approximately 2% of the US population lives in Washington. Multiplying the extrapolated cases for WA by the number of days a person would be absent, gives the total number of days lost due to that disease.

Ecology based the value of lost workdays on wages. The Bureau of Labor Statistics quotes the mean hourly wage as of May 2005 for the state of Washington at \$19.93. By multiplying the total number of lost days, times an 8-hour work day, times the mean wage of \$19.93, the product is the total value lost due to the particular disease. The summation of all the diseases, divided by 2 to account for half of the lost days being due to children missing school days, the results come out to nearly 2 million lost days of work at a lost cost of almost \$310 million per year. Ecology was able to estimate the total cost of toxoplasmosis born into Washington State each year at \$24 million, we describe this in detail in [Appendix 4](#). This totals \$334 million and comes to a 5-year present value of nearly \$1.6 billion.

Ecology did not estimate several of the benefits of the rule such as the reduced costs of medical treatment. The treatment costs for some of these diseases may be large.

Ecology modified the original number of sick days used to analyze the rule to be more conservative. According to the Compensation Data annual survey for 2006, the west averages 7.9 sick days per employee per year. This is the lowest region across the US. This number multiplied by the total number of people employed in Washington (2,653,320) shows that approximately 21 million days of sick leave are taken every year. The diseases considered would then account for about 10% of these lost workdays.³ The numbers selected seem accurate because cold symptoms

³ Numbers of sick days: http://www.jobbankusa.com/news/business_human_resources/sick_day_policy.html, <http://ajp.psychiatryonline.org/cgi/content/full/157/8/1274>, http://www.hse.ubc.ca/mgmt_systems/management/files/AnnualReport2004_TimeLossManagement.pdf (Canada).

and flu are reported as the most common reasons for work absenteeism.⁴ Most of the diseases people can get from biosolids have symptoms that are easily confused and misinterpreted as a cold or flu.

Reduced Compliance Costs

The adopted rule provides several features to reduce costs for individuals or facilities that do not increase health costs. We have listed the reduced costs in the white rows in Table 1, above. This direct savings has a present value of approximately \$336,000 over a 5-year permit cycle.

The adopted rule amendments reduce costs in the following ways:

- Exempting some entities from the substantive requirements of the rule.
- Providing owners of composting toilet systems a categorical exemption from the entire rule when the output is transferred to a facility permitted to manage it and from the permitting and reporting requirements even if they land-apply the output. Since these are not facilities, the savings is unknown.
- Providing exemptions from the reporting and permitting requirements for research projects that are conducted according to Ecology approved research plan. The total savings from this exemption is estimated at \$192,000 over a 5-year period.
- Exemptions to the storage requirements for storage covered under another environmental permit and for “temporary/small-scale storage”. The savings from this exemption are estimated at \$14,000 over a 5-year period.
- Clarification of the requirements for seeking approval for mixing commercial or industrial septage with domestic septage. The adopted rule allows up to 25 percent grease trap wastes (GTW) to be mixed with domestic septage without any required further approval from Ecology. By not having to receive specific approval to mix GTW with domestic septage, permittees will save time and costs.
- Reducing the number of required newspaper notices from two to one and eliminating the need for new public notice when applying for coverage under a new general permit if notice was done previously, they are in compliance, and the facility is not land-applying non-exceptional quality biosolids. The savings from this set of exemptions is estimated at \$113,000 once every 5-years.
- Eliminating the need for public notice if proposing an “insignificant” change either when applying for coverage under a new general permit or when proposing insignificant changes while covered under a permit. The savings from this exemption is estimated at \$32,000.
- Submitting permit applications and notices of intent is now available in electronic form to all parties, except the original must still be submitted in hardcopy form to the biosolids coordinator at Ecology’s regional office where the facility is located. All others may be submitted electronically. This will save the permittees time and money if a facility has the ability to use the internet.

⁴ Causes of Sick Days: Colds and Flu- (common symptoms of many of our diseases), <http://news.bbc.co.uk/2/hi/business/3866213.stm>, Migraines <http://www.sciencedaily.com/releases/2005/01/050111154753.htm>, Stress <http://news.bbc.co.uk/1/hi/business/1406449.stm>.

- Eliminating the requirement for a 2-year detention time in a tank from the pathogen reduction and vector attraction reduction subsection. The 2-year requirement caused much confusion and seemed to be very problematic. It has been removed and the regulation should now be much clearer and feasible, thereby making compliance less costly.
- Eliminating a requirement that a management plan be included if biosolids which do not meet one of the vector attraction reduction requirements in WAC 173-308-180 are stored at a site. The plans were intended to describe how protection of human health would be ensured. This is being eliminated from the land application plan requirements, thereby eliminating the time and costs to write a plan.
- Grandfathering facilities into the new requirements. This will allow facilities to continue their current activities, while still increasing the requirements for new activities. This is for surface impoundments meeting the Chapter 173-304 WAC requirements. However, the Chapter 173-350 WAC surface impoundment requirements are imposed for new or upgraded surface impoundments. This does not provide a savings by comparison with the existing rule but simply avoids imposing a high cost for the existing facilities.
- Delay compliance by allowing for an extension of the timeline for submitting permit applications to up to 180 days. This is twice the length of time otherwise allowed. This will offset some of the additional costs estimated for submitting the permit applications within 90 days after the issuance of a general permit.
- Extending the timing for meeting the requirements for significantly removing manufactured inerts to 5 years, instead of the initial 2-year date. The 2-year implementation date appeared to be too difficult to comply with, so to help facilities to be able to meet this requirement with enough time it has been extended. Facilities should now have ample time to comply.

Net Benefits

Ecology cannot calculate the net benefits of the adopted rule amendments because the number of potential diseases avoided is unknown. However, dividing the cost of the existing number of diseases into the cost of the rule gives the percentage reduction in diseases that would be required for net benefits to occur.

$$0.39\% = (\text{Direct Cost of the rule} - \text{Direct cost savings}) / \text{Cost of existing related disease} = \$6.3 \text{ million}^5 / \$1.6 \text{ billion}$$

If 0.39% or \$39 per \$10,000 of the disease load were removed by this rule amendment then the benefits would equal the cost. This ratio is conservative because the cost of treatment has not been included and the losses due to long-term damages from the permanent effects of the diseases have not been included. Thus, if this ratio is probable, then there are net benefits.

Ecology has evaluated the likelihood of this and finds that such a ratio is possible.

⁵ \$6.6 million in direct costs minus \$336,000 in direct cost reductions from the proposed rule.

LEAST BURDENSOME ALTERNATIVE

Ecology has determined that this rule is the least burdensome version of the rule, which meets the requirements of the law. Ecology has included all the changes that reduce compliance costs but do not create a significant increase in health risks. The section on [Reduced Compliance Costs](#) lists these. The 5-year present value of the savings from these changes is \$336,000.

APPENDIX 1: INFORMATION ON THE PROPOSED AND ADOPTED AMENDMENTS AND THEIR ASSESSMENT IN THE SURVEY

Septage Requirements

<p>Revised the definition of Class II septage to state that the material cannot be land applied unless it composes no more than 25% of a mixture with Class I septage or a stabilized Class III septage or it is managed as biosolids from a wastewater treatment plant.</p>	
Comments/additional information.	Class II septage is generally untreated material such as that from a portable toilet.
Requirement under current rule.	Class II can be directly land-applied if it's pH-stabilized.
Why revision is needed.	<ul style="list-style-type: none"> ▪ To protect human health and the environment from pathogens. ▪ To protect the environment from unknown sanitizers/deodorizers used in the material.
Suggested revisions that were more stringent.	Complete ban on Class II application. Ecology rejected this because it is not economically feasible.
Addressed in survey? If "no", why?	Yes.
Was the proposal significantly amended after the survey was conducted? If "yes", explain.	<p>Yes. After receiving comments, Ecology decided to consolidate the various classes of septage into a single definition of "septage".</p> <p>We also decided to eliminate the original proposal that required facilities with mixtures of septage that contain more than 25%, by volume, of unstabilized septage to manage the mixture as biosolids from a wastewater treatment plant. The amended rule allows such mixtures to be land applied as septage if they are pH-stabilized. However, Ecology also included an allowance to impose stricter application rates for such mixtures if the conditions warrant.</p>

<p>Revised the definition of Class III septage to state that it is considered Class I septage if it has been largely stabilized, but it is considered Class II septage if it has not been largely stabilized.</p>	
Comments/additional information.	Class III septage is material that is generated at a commercial facility. Such material can be managed as septage if Ecology determines the material to be "domestic in quality". The extent of treatment of such material ranges from extended to very short periods in septic tanks.
Requirement under current rule.	Class III septage is considered to be the equivalent of Class I septage in terms of management requirements.

Why revision is needed.	To protect human health and the environment from pathogens.
Suggested revisions that were more stringent.	None.
Addressed in survey? If “no”, why?	Yes.
Was the proposal significantly amended after the survey was conducted? If “yes”, explain.	Yes. After receiving comments, Ecology decided to consolidate the various classes of septage into a single definition of “septage”. We also decided to eliminate the original proposal that required facilities with mixtures of septage that contain more than 25%, by volume, of unstabilized septage to manage the mixture as biosolids from a wastewater treatment plant. The amended rule allows such mixtures to be land applied as septage if they are pH-stabilized. However, Ecology also included an allowance to impose stricter application rates for such mixtures if the conditions warrant.

Requiring all facilities who land apply septage or treat septage for land application obtain a permit from Ecology.	
Comments/additional information.	Ecology’s policy has been to only require a permit for such facilities if they manage septage from multiple pumpers.
Requirement under current rule.	A permit is required for septage land applicators only when Ecology specifies that the facility is a treatment works treating domestic sewage.
Why revision is needed.	<ul style="list-style-type: none"> ▪ To ensure those who apply septage to land comply with the rule. ▪ To protect human health and the environment from pollutants and/or pathogens.
Suggested revisions that were more stringent.	None.
Addressed in survey? If “no”, why?	Yes.
Was the proposal significantly amended after the survey was conducted? If “yes”, explain.	No.

Imposed the same site management and access restrictions requirements for sites receiving septage whether the material is pH-stabilized or not.	
Comments/additional information.	In addition to the current rule requirements, the amended rule does not allow the grazing of domestic animals for at least 30 days after applying pH-stabilized septage. It also requires site posting for 30 days or 1 year after application (depends on the degree of likelihood of public contact). This is already a requirement in the

	biosolids general permit.
Requirement under current rule.	If septage is pH-stabilized, there is no requirement for grazing restrictions or site posting.
Why revision is needed.	<ul style="list-style-type: none"> ▪ To protect human health and the environment from pathogens. ▪ Bring consistency between the rule and the biosolids general permit.
Suggested revisions that were more stringent.	None.
Addressed in survey? If “no”, why?	Yes.
Was the proposal significantly amended after the survey was conducted? If “yes”, explain.	No.

Provided a categorical exemption from the rule for composting toilet systems whose output is transferred to a facility permitted to manage it and an exemption from the permitting and reporting requirements for owners of composting toilet systems even if they land-apply the output.	
Comments/additional information.	The amended rule defines a septage management facility and requires a permit for such a facility. Composting toilet systems could be considered to meet this proposed definition.
Requirement under current rule.	Ecology and the Department of Health consider the output of composting toilets to be septage, but a permit has not been required for its management. If the material is sent to a permitted facility for management, the operation is exempt from the rule. If the material is land applied, the operation must meet the management and recordkeeping requirements.
Why revision is needed.	<ul style="list-style-type: none"> ▪ To clarify the requirements for those who currently transfer the material for management. ▪ To eliminate the need for owners of small-scale composting toilet systems to get a permit if they land-apply the output because it is not practical.
Suggested revisions that were more stringent.	Require a full permit without exemptions. Ecology rejected this because it is not feasible from a practical and regulatory standpoint. It is also overly burdensome, especially for owners of small-scale systems.
Addressed in survey? If “no”, why?	No. Ecology did not address this in the survey because we have not been requiring a permit for composting toilets. This amendment is more of a formalization of program policy than a significant change.
Was the proposal significantly amended after the survey was conducted? If “yes”, explain.	No.

Transportation Requirements

Imposed a requirement that facilities that transport or contract for the transportation of their solids submit a <i>Spill Prevention & Response Plan</i>.	
Comments/additional information.	This is already a requirement in the biosolids general permit.
Requirement under current rule.	There is no requirement for a plan.
Why revision is needed.	<ul style="list-style-type: none"> ▪ To minimize the risk of spillage of biosolids or sewage sludge during transportation. ▪ To reduce the risk of impacts to human health and the environment from pollutants and/or pathogens when a spill occurs during transportation. ▪ To provide consistency with the biosolids general permit.
Suggested revisions that were more stringent.	Impose a 24-hour notice requirement for spills in addition to the plan. Ecology rejected this because this requirement is more appropriate in the biosolids general permit
Addressed in survey? If “no”, why?	Yes.
Was the proposal significantly amended after the survey was conducted? If “yes”, explain.	No.

Class A-Alternatives 3 & 4 Requirements

Imposed a requirement that facilities proposing to use Class A-Alternatives 3 or 4 receive pre-approval from Ecology for a sampling plan prior to initiating sampling	
Comments/additional information.	Class A biosolids is considered to be effectively pathogen-free. These alternatives allow facilities to show Class A through testing rather than imposing the process requirement under all other Class A alternatives. Such material can be distributed to the public. Ecology and EPA have concerns about the testing methods and the accuracy of results. Program policy already requires this for Class A-Alternative 4.
Requirement under current rule.	Ecology does not require a sampling plan under the current rule. The only requirement is that sampling be “representative” of the material being tested.
Why revision is needed.	<ul style="list-style-type: none"> ▪ To protect human health and the environment from pathogens. ▪ To bring consistency between the rule and program policy that has been in place for Class A-Alternative 4 for nearly 2 years.
Suggested revisions that were more stringent.	Delete the alternatives from the rule entirely. Ecology originally rejected this because the alternatives provide permittees with an option, that may not be available

	otherwise, to show Class A.
Addressed in survey? If “no”, why?	Yes.
Was the proposal significantly amended after the survey was conducted? If “yes”, explain.	<p>Yes. After reviewing comments and many technical documents, and discussing the issue with a senior microbiologist from EPA, Ecology decided to eliminate the two alternatives from the rule.</p> <p>Any facilities now using either of the alternatives will need to use another Class A alternative (for example, Alternative 6, Equivalency Determination) or manage the material as Class B.</p> <p>To Ecology’s knowledge, only one facility is currently using one of the alternatives.</p>

Requirements for Biosolids Sold or Given Away In a Bag or Other Container

Imposed a requirement that biosolids sold/given away in a bag or other container must meet the criteria to be classified as exceptional quality.	
Comments/additional information.	Such material can (and usually is) distributed to the public. This is already a requirement in the biosolids general permit. The federal biosolids rule is expected to be revised in the future to require this also.
Requirement under current rule.	The current rule allows biosolids to be distributed to the public via sale/give away in a bag/other container even if they exceed the Table 3 pollutant limits as long as they do not exceed the Table 1 limits and information on how much can be applied annually is provided to the recipient.
Why revision is needed.	<ul style="list-style-type: none"> ▪ To protect human health and the environment from pollutants. ▪ To bring consistency between the rule and the biosolids general permit. ▪ To prepare for the anticipated changes to the federal program.
Suggested revisions that were more stringent.	None.
Addressed in survey? If “no”, why?	Yes.
Was the proposal significantly amended after the survey was conducted? If “yes”, explain.	No.

Reporting Requirements

Imposed a requirement that all applicable facilities submit an Annual Biosolids Report and submit all requested information.	
Comments/additional information.	Each year Ecology sends a letter and a copy of a report form to all facilities. This is considered to be a written request from Ecology for completion of an annual report.
Requirement under current rule.	Only majors and Class I facilities have to report. Others must report only upon a request from Ecology.
Why revision is needed.	<ul style="list-style-type: none"> ▪ Because the information Ecology gets in the reports is necessary to ensure facilities are complying with the rule. ▪ To implement a long-standing program policy
Suggested revisions that were more stringent.	None.
Addressed in survey? If “no”, why?	Yes.
Was the proposal significantly amended after the survey was conducted? If “yes”, explain.	No.

Permit Application Requirements

Imposed a requirement for applications for coverage under a new biosolids general permit to be submitted within 90 days following the issuance of the permit but allowed for a case-by-case extension up to 180 days	
Comments/additional information.	This is already a requirement under the biosolids general permit for some facilities (majors, Class I facilities, out-of-compliance minors, private septage management facilities, and beneficial use facilities).
Requirement under current rule.	The date of submittal depends on facility size, class, compliance status, and timelines under other permits. and compliance
Why revision is needed.	To simplify requirements and provide an allowance for facility-specific considerations.
Suggested revisions that were more stringent.	None.
Addressed in survey? If “no”, why?	Yes.
Was the proposal significantly amended after the survey was conducted? If “yes”, explain.	No.

Exempting Research Studies

Provided exemptions from the reporting and permitting requirements for research projects conducted in accordance with a department-approved research plan and occurring on 10 acres or less.	
Comments/additional information.	Ecology hopes to encourage legitimate, useful research of biosolids-related issues. Requiring a permit without exceptions has discouraged some research according to some researchers.
Requirement under current rule.	Research projects are required to get a permit and to go through the entire permit process.
Why revision is needed.	To simplify the requirements for legitimate and useful research.
Suggested revisions that were more stringent.	Require a permit without exemptions. Ecology rejected this because we do not believe requiring a permit for small-scale research enhances protection of human health and the environment.
Addressed in survey? If “no”, why?	Yes.
Was the proposal significantly amended after the survey was conducted? If “yes”, explain.	No. However, the specification of a 10-acre limit was removed.

Public Notice Requirements

Imposed a requirement for public notice each permit cycle for facilities that land apply non-exceptional quality biosolids but limited the extent of the notice.	
Comments/additional information.	The proposed amendments limited the public notice requirements for facilities by requiring that it occur in the newspaper in the county(ies) where application may occur but not at land application sites if this was done previously.
Requirement under current rule.	Ecology’s interpretation has been that notice is not required each permit cycle if the facility has previously conducted notice, is in compliance, and is not proposing any significant changes. However, EPA objected to this interpretation.
Why revision is needed.	<ul style="list-style-type: none"> ▪ To be more consistent with the federal biosolids program policy. ▪ To simplify the public notice requirements. ▪ To reduce public notice costs.
Suggested revisions that were more stringent.	Require notice at land application sites and in the newspaper. Ecology rejected this approach because: <ul style="list-style-type: none"> ▪ The rule already requires that newspaper notices include site location information. We consider this adequate to reach the interested public without providing an undue economic burden to the

	permittee. <ul style="list-style-type: none"> ▪ Posting at sites is already required during the initial public notice process. ▪ Posting at sites is often overlooked and only reaches a small portion of the public.
Addressed in survey? If “no”, why?	Yes.
Was the proposal significantly amended after the survey was conducted? If “yes”, explain.	No.

Eliminated the need for new public notice when applying for coverage under a new general permit if notice was done previously, the facility is in compliance, the facility does not land applying non-exceptional quality biosolids, and the facility is not proposing any significant changes in biosolids management practices.	
Comments/additional information.	This is related to #12, above.
Requirement under current rule.	This was the interpretation of the current rule for all such facilities, including those that land apply non-exceptional quality biosolids. However, EPA objected to this interpretation
Why revision is needed.	To eliminate unnecessary public notice costs.
Suggested revisions that were more stringent.	Require full public notice for all facilities each permit cycle. Ecology rejected this approach because it is unnecessary and overly burdensome to permittees who are not engaging in activities that pose a risk to human health or the environment. The focus of public notice should be on operations that land apply non-exceptional quality biosolids.
Addressed in survey? If “no”, why?	No. We did not specifically address this in the survey because this was the interpretation of the current rule.
Was the proposal significantly amended after the survey was conducted? If “yes”, explain.	No.

Eliminated the need to do any notice if proposing an “insignificant” change either when applying for coverage under a new general permit or when proposing insignificant changes while covered under a permit	
Comments/additional information.	Generally, an “insignificant” change is one that improves the quality of biosolids or one that would result in a reduction in management requirements.
Requirement under current rule.	Any change in management after final coverage is issued—whether significant or insignificant—requires full public notice.
Why revision is needed.	<ul style="list-style-type: none"> ▪ To simplify the public notice requirements. ▪ To encourage changes to biosolids management programs that improves the quality of the material

	or reduces the risk to human health or the environment.
Suggested revisions that were more stringent.	None.
Addressed in survey? If “no”, why?	Yes.
Was the proposal significantly amended after the survey was conducted? If “yes”, explain.	No.

Reduced the number of newspaper notices, when required, from 2 to 1.	
Comments/additional information.	Only 1 notice is required under the general permit rule (Chapter 173-226 WAC) and the SEPA rule (Chapter 197-11 WAC).
Requirement under current rule.	When newspaper notice is required, 2 notices must be run at least 1 week apart, and a public comment period begins after the 2 nd notice.
Why revision is needed.	<ul style="list-style-type: none"> ▪ To simplify the public notice requirements. ▪ To reduce public notice costs.
Suggested revisions that were more stringent.	Maintain the current requirement of 2 notices. Ecology rejected this approach because the 2 nd notice is unnecessarily burdensome and will not significantly increase public awareness.
Addressed in survey? If “no”, why?	Yes.
Was the proposal significantly amended after the survey was conducted? If “yes”, explain.	No.

Added a requirement that facilities submit a copy of an <i>Affidavit of Publication</i> at the completion of newspaper notice when newspaper notice is required.	
Comments/additional information.	It is common for Ecology to require facilities to submit of an <i>Affidavit of Publication</i> to ensure newspaper notices are run correctly.
Requirement under current rule.	The permittee must provide Ecology a copy of the notice and an explanation of all places where and when the notice was or will be published or posted.
Why revision is needed.	To simplify public notice requirements.
Suggested revisions that were more stringent.	None.
Addressed in survey? If “no”, why?	No. Ecology did not address this in the survey because the cost is minimal. The associated cost for this new requirement is for copying and mailing (or emailing) what is typically a 1-page document.
Was the proposal significantly amended after the survey was conducted? If “yes”, explain.	Yes. In response to comments received, Ecology decided to add an allowance for a facility to submit a copy of the notice that was run in place of the affidavit. This was already allowed under the existing rule.

Manufactured Inert Waste Requirements

<p>Imposed a requirement for a 95% removal of “manufactured inert wastes” for all biosolids and septage. Facilities will have 2 years to attain this standard.</p>	
Comments/additional information.	<p>State law requires Ecology to create and implement a state biosolids program that encourages the maximum beneficial use of biosolids. The existence of garbage in biosolids limits the options for beneficial use. Grinding has been allowed to reduce recognizables, however, grinding only reduces the size of garbage in biosolids, it does not remove it.</p>
Requirement under current rule.	<p>Only septage has any form of requirement regarding recognizables. This requirement mandates that screening, grinding, or another approved method be used to remove or reduce recognizables in septage.</p>
Why revision is needed.	<ul style="list-style-type: none"> ▪ To reduce the potential for humans to be exposed to sharps in unscreened biosolids. ▪ To ensure that only garbage-free material is land-applied or distributed to the public. ▪ To maximize the opportunities for beneficial use of all biosolids products. ▪ To apply a consistent approach for septage and other biosolids.
Suggested revisions that were more stringent.	None.
Addressed in survey? If “no”, why?	Yes.
Was the proposal significantly amended after the survey was conducted? If “yes”, explain.	<p>Yes. In response to comments received, Ecology decided to replace “manufactured inert wastes” with “manufactured inerts” because the latter already had a definition in Ecology’s, <i>Interim Guidelines for Compost Quality</i>.</p> <p>More importantly, Ecology decided to require the use of a bar screen with a maximum opening of 3/8 inch (0.95 cm) or an Ecology-approved equivalent to remove manufactured inerts at any point in the wastewater treatment or biosolids manufacturing process. Facilities were given 5 years to meet this standard. Ecology also imposed a requirement that biosolids that are sold or given away in a bag or other container contain less than 1 percent of recognizable manufactured inerts. These changes were made in order to respond to comments requesting a more objective and clear standard. A new survey was conducted that explored the potential costs of these new requirements.</p>

Storage Requirements

Provided exemptions to the storage requirements for storage covered under another environmental permit and for “temporary/small-scale storage”.	
Comments/additional information.	The amended rule will allow deferral to other environmental permits that address storage and to exempt all temporary/small-scale storage from any permitting requirements unless there is sufficient reason to require a permit. The current rule has no provisions for deferral.
Requirement under current rule.	Storage of solids requires a biosolids permit, and storage must be addressed when applying for a permit
Why revision is needed.	<ul style="list-style-type: none"> ▪ To simplify requirements for permittees. ▪ To reduce the workload for Ecology staff. ▪ To eliminate permitting requirements for storage that does not pose any risk to human health or the environment.
Suggested revisions that were more stringent.	<p>Do not allow exemptions for storage under a non-biosolids permit and require a separate biosolids permit for biosolids storage.</p> <p>Ecology rejected this because it adds another permitting requirement without a clear improvement of protection of human health and the environment. If another permit is adequately protective, Ecology does not want to unnecessarily impose a separate permit.</p>
Addressed in survey? If “no”, why?	Yes.
Was the proposal significantly amended after the survey was conducted? If “yes”, explain.	No.

Imposed a requirement that biosolids stored in the field meet one of the vector attraction reduction (VAR) standards or the storer must provide Ecology with a plan addressing how field storage of non-VAR biosolids will not pose an undue risk to human health.	
Comments/additional information.	Non-VAR biosolids are not considered to be adequately stabilized to reduce their attractiveness to potential vectors. Leaving such biosolids in a field where they are available to potential vectors increases the risk of the transfer of pathogens to humans by vectors.
Requirement under current rule.	Biosolids not meeting a VAR standard can be stored in the field as allowed by a permit.
Why revision is needed.	To protect human health from the potential transfer of pathogens by vectors.
Suggested revisions that were more stringent.	<p>Require that all field-stored biosolids meet VAR standards prior to storage.</p> <p>Ecology rejected this because it could impose an</p>

	extreme economic hardship on some permittees, and Ecology believes that a similar level of protection can be achieved by requiring the storer to submit a plan to describe how their storage does not pose an undue risk to human health or how any undue risk posed would be mitigated.
Addressed in survey? If “no”, why?	Yes.
Was the proposal significantly amended after the survey was conducted? If “yes”, explain.	Yes. In response to a comment received and upon further evaluation, Ecology decided to eliminate this requirement. Ecology already has numerous tools available to affect such storage.

Provided for the “grandfathering in” of surface impoundments meeting the WAC 173-304-430 requirements but imposed the WAC 173-350-330 surface impoundment requirements for new or upgraded surface impoundments.	
Comments/additional information.	The surface impoundment standards in WAC 173-350-330 were developed in part to address biosolids/sewage sludge/septage storage.
Requirement under current rule.	Storage in surface impoundments must meet the WAC 173-304-430 standards.
Why revision is needed.	To reduce the risk to the environment from the potential release of pollutants in stored biosolids, sewage sludge, and septage in surface impoundments.
Suggested revisions that were more stringent.	Impose the WAC 173-350-330 standards on all surface impoundments storing biosolids, sewage, sludge, and septage, regardless of the date of construction. Ecology rejected this approach because it imposes an undue economic burden on facilities currently complying with storing standards in WAC 173-304-430 and are not posing a risk to the environment.
Addressed in survey? If “no”, why?	No. Ecology did not address this in the survey because it is being addressed separately by contacting 4 facilities who have installed surface impoundments under the WAC 173-350-330 standards and by using numbers provided by Ecology engineers.
Was the proposal significantly amended after the survey was conducted? If “yes”, explain.	No.

Requirements for Importing and Exporting Biosolids

<p>Clarified and simplified the requirements for the importation of biosolids from facilities outside the state (includes tribal lands) by requiring an approval but not a permit if bulk material is sent to an Ecology-permitted facility or bagged material is distributed and requiring a full permit if the exporter seeks to manage their own operation within the state, In cases where bulk biosolids are exported into the state, fees would be assessed based upon the percent of material produced that is exported into the state.</p>	
Comments/additional information.	Current program policy creates an inconsistent approach for tribal facilities and other out-of-state entities. Currently a few facilities from ID export solids for further treatment into WA, and a few tribal facilities either do the same or send their solids to landfills within the state.
Requirement under current rule.	None.
Why revision is needed.	<ul style="list-style-type: none"> ▪ To correct the inconsistent approach being taken on solids from tribal lands and those from other states/nations. ▪ To simplify the requirements for those who send material to Ecology-permitted facilities. ▪ To collect a fair fee from exporters.
Suggested revisions that were more stringent.	<p>Require a full permit and payment of a full fee for any out-of-state facilities sending solids into WA.</p> <p>Ecology rejected this approach because Ecology believes if the solids are sent to an Ecology-permitted facility, protection of human health and the environment can be attained without imposing permitting requirements on out-of-state entities and the risk that enforcing such a permit might entail.</p>
Addressed in survey? If “no”, why?	No. Ecology did not address this in the survey because the change does not affect any existing permittees. Thus, there was no one on the facilities list that could be surveyed.
Was the proposal significantly amended after the survey was conducted? If “yes”, explain.	No.

Record Keeping Requirements

<p>Added a requirement that preparers of biosolids or sewage sludge maintain the following records:</p> <ul style="list-style-type: none"> ▪ The amount stored onsite. ▪ The amount transferred to another facility for further treatment and the name of the other treatment facility. ▪ The amount transferred for incineration and the name of the incineration facility. 	
Comments/additional information.	Ecology has consistently requested this information as part of the annual biosolids reports since 1998. Thus, facilities are already keeping such records.
Requirement under current rule.	There is no requirement to maintain these records.
Why revision is needed.	Such information is necessary so that Ecology can monitor biosolids and sewage sludge management practices across the state.
Suggested revisions that were more stringent.	None.
Addressed in survey? If “no”, why?	No. Ecology did not address this in the survey because facilities are already maintaining such records and providing the information with their annual biosolids reports.
Was the proposal significantly amended after the survey was conducted? If “yes”, explain.	No.

<p>Added a requirement that applicers of non-exceptional quality biosolids maintain the following records:</p> <ul style="list-style-type: none"> ▪ The location, by street address, if applicable, a copy of the assessor's plat map(s) with the application area(s) clearly shown or the latitude and longitude of the approximate center of each land application site, and the section, township and range of each quarter section on which biosolids are applied. ▪ The number of acres in each site on which biosolids were applied. ▪ The date biosolids were applied to each site. ▪ The nitrogen requirement for the crop or vegetation grown on each site. ▪ The rate, in dry tons per acre per year, at which biosolids are applied to each site. ▪ The amount, in dry tons, of biosolids applied to each site. 	
Comments/additional information.	Ecology has consistently requested this information as part of the annual biosolids reports since 1998. Thus, facilities are already keeping such records.
Requirement under current rule.	There is no requirement to maintain these records.
Why revision is needed.	The information is necessary to ensure compliance with the rule and permits.
Suggested revisions that were more stringent.	None.
Addressed in survey? If “no”, why?	No. Ecology did not address this in the survey because facilities are already maintaining these records and are providing the information with their annual biosolids reports.
Was the proposal significantly amended after the survey was conducted? If “yes”, explain.	No.

APPENDIX 2: SURVEY INSTRUMENTS

#1 - Wastewater Treatment Plant and Composter Questionnaire

Thank you for filling out this survey. It will help Ecology estimate the cost of changes to the rule.

Please put in your code _____.

When you answer the questions, please consider all your costs including things that people usually forget such as:

- reporting
- record keeping
- compliance costs
- professional services (e.g. lab costs, consultant costs, contractor costs)
- equipment
- supplies
- labor, staff time
- increased administrative costs
- lost sales or revenue

Transportation of Biosolids or Septage

Ecology is proposing to add the current biosolids general permit requirement that all facilities that transport biosolids or septage for management submit a Spill Prevention/Response Plan with the permit application. Ecology previously developed a simple template that facilities can use.

Do you transport biosolids or septage? Yes No

If YES, have you submitted a spill prevention and response plan using the plan template that Ecology developed? Yes No

If YES, how much did it cost you to complete the plan using the template? \$ _____

Class A-Alternatives 3 and 4

(This question should be asked only to: EVERETT, GRANDVIEW, PASCO, and WENATCHEE.)

Ecology is proposing to require that facilities using Class A-Alternatives 3 or 4 receive written, pre-approval of a sampling plan prior to conducting the sampling required for these alternatives. For Class A-Alternative 3, the approval would only have to occur prior to the first sampling event. For Class A-Alternative 4, the approval would have to occur prior to each sampling event.

(a) Do you use Class A-Alternatives 3 or 4? Yes No

If YES, how much did it cost you to write the sampling plan? \$ _____

(b) If you had to wait up to 60 days for approval of your sampling plan, how much would it cost you to hold the material for that time? \$ _____

(c) If you can't hold the material for up to 60 days, how much would it cost you to manage the material in another manner? \$ _____

Sale or Giveaway in a Bag or Other Container

(This question should be asked only to: ARLINGTON, BUCKLEY, CENTRAL WWTP #1 (TACOMA), CHENEY, CLARK PUBLIC UTILITIES (LaCENTER), COLUMBIA COMPOST, GRANITE FALLS, GROCO, INC., LANGLEY, LYNDEN, MILLER CREEK, OMAK, THREE RIVERS REGIONAL, and WESTPORT.)

Ecology is proposing to implement the current biosolids general permit requirement that biosolids that are sold or given away in a bag or other container (i.e. one holding less than 1 metric ton; e.g. a pick-up truck) meet the exceptional quality standards.

Do you sell or give away biosolids in quantities of less than 1 metric ton in a bag or other container? Yes No

If YES, do the biosolids always meet Table 3 limits? Yes No

If NO, how much would it cost you to handle the biosolids in another way (include forgone sales)? \$ _____

Submittal of an Annual Biosolids Report

Under the current rule only major WWTPs and septage management facilities are absolutely required to submit an annual report. However, Ecology can request a report from others and has always done so. Ecology is proposing to implement the current biosolids general permit requirement that every facility submit an annual report.

Is your facility considered to be a "minor" facility (i.e. it serves <10,000 persons AND has design flow rate of <1 million gallons/day)? Yes No

If YES, what does it cost you to submit an annual biosolids report? \$ _____

Timing for Submittal of a Permit Application

Ecology is proposing to require all facilities to submit an application for coverage under an applicable general permit within 90 days after the permit is issued. Under the current rule, there are widely varying requirements.

(a) Have you applied for coverage under the biosolids general permit? Yes No

If YES, please estimate the cost of your last application. \$ _____

(b) Were you allowed more than 90 days after the general permit was issued in order to apply for coverage? Yes No

If YES, please estimate how much more it would have cost you to submit the application within 90 days? \$ _____

Public Notice Requirements for Non-exceptional Quality Biosolids or Septage

Ecology is proposing to require that public notice be conducted by all facilities that apply non-exceptional quality (non-EQ) biosolids or septage each time they apply for coverage under a new general permit. However, the notice would only have to be posted one time in a newspaper and not at the land application sites if the sites have been posted in the past.

(a) How much did it cost you the last time you had to do full public notice for your permit (e.g. newspaper posting, site posting, SEPA)? \$ _____ N/A

(b) How much would you have saved if you only had to do a single public notice in the newspaper instead of two notices? \$ _____ N/A

(c) How much would you have saved if you did not have to post your land application sites? \$ _____ N/A

Insignificant Changes

Ecology is proposing to eliminate the need to do public notice if a facility is proposing “insignificant changes” to their biosolids program. The current rule defines “significant change” generally as changes that result in more stringent management requirements (e.g. changing from a grain crop to a root crop) or changes to certain requirements (e.g. a reduction in buffer distances or a reduction in site monitoring).

In the past 5 years, how often have you proposed changes to your biosolids management practices that would be considered to be “insignificant”? _____

Exemptions for Certain Research

Ecology is proposing to exempt certain research projects from the permitting and reporting requirements of the rule on sites that are less than 10 acres.

Have you engaged in or had your non-EQ biosolids or septage used for research on plots of land that are 10 acres or less and that were not previously covered under a permit? Yes No

If YES, what was the cost of permitting the site and reporting to Ecology for that site? \$ _____

Screening Requirements

Ecology is proposing to require screening of all biosolids (including septage) so that the final product is at least 95% free of garbage prior to end use. Grinding will be allowed only after initial screening.

Do you currently handle biosolids or septage that HAS NOT met this standard? Yes No

If YES, please estimate what it would cost you to install a screen and associated equipment and other related costs in order to achieve this standard? \$ _____

Deferral to Other Permits for Storage

Ecology is proposing to allow for the deferral to other environmental permits for certain storage of biosolids or septage (e.g. deferral to NPDES Permits, State Waste Discharge Permits, Conditional Use Permits, Solid Waste Permits).

Do you currently store biosolids or septage at your facility (note: this would include storage in tanks or similar devices and storage in lagoons, but it would not include material in treatment lagoons)? Yes No

If YES, do you have another environmental permit that addresses this storage? Yes No

If YES, please estimate what would it save you if you did not have to address this storage in your biosolids permit? \$ _____

Field-storage and Vector Attraction Reduction Requirements

Ecology is proposing to require that field-stored biosolids and septage either meet one of the vector attraction reduction (VAR) standards prior to storage or that a simple plan be submitted that addresses how the current storage minimizes risk to human health.

Do you store biosolids in the field prior to application that has not met the VAR standards? Yes No

If YES: Please estimate the cost of writing and submitting a simple plan addressing how you would minimize risk to human health (e.g. a plan might show that the site is a sufficiently lengthy distance from any neighboring properties or a plan might provide for some sort of temporary cover or a plan might state that material is only stored during winter when cold temperatures and snow cover limit pathogen activity and exposure to potential vectors).

\$ _____

LAST QUESTION

In order for us to calculate the relative impacts of the rule changes, the law requires us to calculate the costs on a per employee basis. For this reason we are asking, how many employees does your entire company, agency, or utility have? _____

#2 - Septage Management Facility Questionnaire

Thank you for filling out this survey. It will help Ecology estimate the cost of changes to the rule.

Please put in your code _____.

When you answer the questions please consider all your costs including things that people usually forget such as:

- reporting
- record keeping
- compliance costs
- professional services (e.g. lab costs, consultant costs, contractor costs)
- equipment
- supplies
- labor, staff time
- increased administrative costs
- lost sales or revenue

Management of Unstabilized Septage

Ecology is proposing to require that Class II septage and unstabilized Class III septage either be managed as biosolids or be taken to a WWTP unless it's mixed with Class I septage at a rate of 25% or less.

Do you currently land-apply Class II septage or unstabilized Class III septage (Do NOT count if mixed with Class I septage at a rate of 25% or less.)? Yes No.

If YES, please estimate the cost for either managing the material as biosolids from a WWTP (This would include the cost of sampling for metals and nitrogen and meeting at least the Class B pathogen reduction standards) **OR** the cost of taking the material to a WWTP.

\$ _____

Site Management Requirements for Septage

Ecology is proposing to implement the current general permit requirement that the same site management and access restrictions apply to all septage whether it has been pH-adjusted or not.

Do you now or have you ever applied pH-adjusted septage to:

(a) Land used for grazing cattle? Yes No

(b) Land with a high potential for public exposure? Yes No

(c) Land with a low potential for public exposure? Yes No

If you answered YES to (a), did you allow livestock to graze within 30 days? Yes No

If YES, what would it cost you to wait 30 days? \$ _____

If you answered YES to (b), did you restrict public access for 1 year? Yes No

If NO, what would it cost you to restrict public access for 1 year (e.g. site posting)?

\$ _____

If you answered YES to (c), did you restrict public access for 30 days? Yes No

If NO, what would it cost you to restrict public access for 30 days (e.g. site posting)?
\$ _____

Transportation of Biosolids or Septage

Ecology is proposing to add the current biosolids general permit requirement that all facilities that transport biosolids or septage for management submit a Spill Prevention/Response Plan with the permit application. Ecology previously developed a simple template that facilities can use.

Do you transport biosolids or septage? Yes No

If YES, have you submitted a spill prevention and response plan using the plan template that Ecology developed? Yes No

If YES, how much did it cost you to complete the plan using the template? \$ _____

Submittal of an Annual Biosolids Report

(This question should only be asked of: B & B FARMS and CHEYNE.)

Under the current rule only major WWTPs and septage management facilities are absolutely required to submit an annual report. However, Ecology can request a report from others and has always done so. Ecology is proposing to implement the current biosolids general permit requirement that every facility submit an annual report.

What does it cost you to submit an annual biosolids report for the BUF portion of your program?
\$ _____

Timing for Submittal of a Permit Application

Ecology is proposing to require all facilities to submit an application for coverage under an applicable general permit within 90 days after the permit is issued. Under the current rule, there are widely varying requirements.

(a) Have you applied for coverage under the biosolids general permit? Yes No

If YES, please estimate the cost of your last application. \$ _____

(b) Were you allowed more than 90 days after the general permit was issued in order to apply for coverage? Yes No

If YES, please estimate how much more it would have cost you to submit the application within 90 days? \$ _____

Public Notice Requirements for Non-exceptional Quality Biosolids or Septage

Ecology is proposing to require that public notice be conducted by all facilities that apply non-exceptional quality (non-EQ) biosolids or septage each time they apply for coverage under a new general permit. However, the notice would only have to be posted one time in a newspaper and not at the land application sites if the sites have been posted in the past.

(a) How much did it cost you the last time you had to do full public notice for your permit (e.g. newspaper posting, site posting, SEPA)? \$ _____ N/A

(b) How much would you have saved if you only had to do a single public notice in the newspaper instead of two notices? \$ _____ N/A

(c) How much would you have saved if you did not have to post your land application sites? \$ _____ N/A

Insignificant Changes

Ecology is proposing to eliminate the need to do public notice if a facility is proposing “insignificant changes” to their biosolids program. The current rule defines “significant change” generally as changes that result in more stringent management requirements (e.g. changing from a grain crop to a root crop) or changes to certain requirements (e.g. a reduction in buffer distances or a reduction in site monitoring).

In the past 5 years, how often have you proposed changes to your biosolids management practices that would be considered to be “insignificant”? _____

Exemptions for Certain Research

Ecology is proposing to exempt certain research projects from the permitting and reporting requirements of the rule on sites that are less than 10 acres.

Have you engaged in or had your non-EQ biosolids or septage used for research on plots of land that are 10 acres or less and that were not previously covered under a permit? Yes No

If YES, what was the cost of permitting the site and reporting to Ecology for that site? \$ _____

Screening Requirements

Ecology is proposing to require screening of all biosolids (including septage) so that the final product is at least 95% free of garbage prior to end use. Grinding will be allowed only after initial screening.

Do you currently handle biosolids or septage that HAS NOT met this standard? Yes No

If YES, please estimate what it would cost you to install a screen and associated equipment and other related costs in order to achieve this standard? \$ _____

Deferral to Other Permits for Storage

Ecology is proposing to allow for the deferral to other environmental permits for certain storage of biosolids or septage (e.g. deferral to NPDES Permits, State Waste Discharge Permits, Conditional Use Permits, Solid Waste Permits).

Do you currently store biosolids or septage at your facility (note: this would include storage in tanks or similar devices and storage in lagoons, but it would not include material in treatment lagoons)? Yes No

If YES, do you have another environmental permit that addresses this storage? Yes No

If YES, please estimate what would it save you if you did not have to address this storage in your biosolids permit? \$ _____

Field-storage and Vector Attraction Reduction Requirements

Ecology is proposing to require that field-stored biosolids and septage either meet one of the vector attraction reduction (VAR) standards prior to storage or that a simple plan be submitted that addresses how the current storage minimizes risk to human health.

Do you store biosolids in the field prior to application that has not met the VAR standards? Yes No

If YES: Please estimate the cost of writing and submitting a simple plan addressing how you would minimize risk to human health (e.g. a plan might show that the site is a sufficiently lengthy distance from any neighboring properties or a plan might provide for some sort of temporary cover or a plan might state that material is only stored during winter when cold temperatures and snow cover limit pathogen activity and exposure to potential vectors).

\$ _____

LAST QUESTION

In order for us to calculate the relative impacts of the rule changes, the law requires us to calculate the costs on a per employee basis. For this reason we are asking, how many employees does your entire company, agency, or utility have? _____

#3 - Biosolids Beneficial Use Questionnaire

Thank you for filling out this survey. It will help Ecology estimate the cost of changes to the rule.

Please put in your code _____.

When you answer the questions please consider all your costs including things that people usually forget such as:

- reporting
- record keeping
- compliance costs
- professional services (e.g. lab costs, consultant costs, contractor costs)
- equipment
- supplies
- labor, staff time
- increased administrative costs
- lost sales or revenue

Transportation of Biosolids or Septage

Ecology is proposing to add the current biosolids general permit requirement that all facilities that transport biosolids or septage for management submit a Spill Prevention/Response Plan with the permit application. Ecology previously developed a simple template that facilities can use.

Do you transport biosolids or septage? Yes No

If YES, have you submitted a spill prevention and response plan using the plan template that Ecology developed? Yes No

If YES, how much did it cost you to complete the plan using the template? \$ _____

Submittal of an Annual Biosolids Report

Under the current rule only major WWTPs and septage management facilities are absolutely required to submit an annual report. However, Ecology can request a report from others and has always done so. Ecology is proposing to implement the current biosolids general permit requirement that every facility submit an annual report.

What does it cost you to submit an annual biosolids report? \$ _____

Timing for Submittal of a Permit Application

Ecology is proposing to require all facilities to submit an application for coverage under an applicable general permit within 90 days after the permit is issued. Under the current rule, there are widely varying requirements.

(a) Have you applied for coverage under the biosolids general permit? Yes No

If YES, please estimate the cost of your last application. \$ _____

(b) Were you allowed more than 90 days after the general permit was issued in order to apply for coverage? Yes No

If YES, please estimate how much more it would have cost you to submit the application within 90 days? \$ _____

Public Notice Requirements for Non-exceptional Quality Biosolids or Septage

Ecology is proposing to require that public notice be conducted by all facilities that apply non-exceptional quality (non-EQ) biosolids or septage each time they apply for coverage under a new general permit. However, the notice would only have to be posted one time in a newspaper and not at the land application sites if the sites have been posted in the past.

(a) How much did it cost you the last time you had to do full public notice for your permit (e.g. newspaper posting, site posting, SEPA)? \$ _____ N/A

(b) How much would you have saved if you only had to do a single public notice in the newspaper instead of two notices? \$ _____ N/A

(c) How much would you have saved if you did not have to post your land application sites? \$ _____ N/A

Insignificant Changes

Ecology is proposing to eliminate the need to do public notice if a facility is proposing “insignificant changes” to their biosolids program. The current rule defines “significant change” generally as changes that result in more stringent management requirements (e.g. changing from a grain crop to a root crop) or changes to certain requirements (e.g. a reduction in buffer distances or a reduction in site monitoring).

In the past 5 years, how often have you proposed changes to your biosolids management practices that would be considered to be “insignificant”? _____

Exemptions for Certain Research

Ecology is proposing to exempt certain research projects from the permitting and reporting requirements of the rule on sites that are less than 10 acres.

Have you engaged in or had your non-EQ biosolids or septage used for research on plots of land that are 10 acres or less and that were not previously covered under a permit? Yes No

If YES, what was the cost of permitting the site and reporting to Ecology for that site? \$ _____

Screening Requirements

Ecology is proposing to require screening of all biosolids (including septage) so that the final product is at least 95% free of garbage prior to end use. Grinding will be allowed only after initial screening.

Do you currently handle biosolids or septage that HAS NOT met this standard? Yes No

If YES, please estimate what it would cost you to install a screen and associated equipment and other related costs in order to achieve this standard? \$_____

Deferral to Other Permits for Storage

Ecology is proposing to allow for the deferral to other environmental permits for certain storage of biosolids or septage (e.g. deferral to NPDES Permits, State Waste Discharge Permits, Conditional Use Permits, Solid Waste Permits).

Do you currently store biosolids or septage at your facility (note: this would include storage in tanks or similar devices and storage in lagoons, but it would not include material in treatment lagoons)? Yes No

If YES, do you have another environmental permit that addresses this storage? Yes No

If YES, please estimate what would it save you if you did not have to address this storage in your biosolids permit? \$_____

Field-storage and Vector Attraction Reduction Requirements

Ecology is proposing to require that field-stored biosolids and septage either meet one of the vector attraction reduction (VAR) standards prior to storage or that a simple plan be submitted that addresses how the current storage minimizes risk to human health.

Do you store biosolids in the field prior to application that has not met the VAR standards? Yes No

If YES: Please estimate the cost of writing and submitting a simple plan addressing how you would minimize risk to human health (e.g. a plan might show that the site is a sufficiently lengthy distance from any neighboring properties or a plan might provide for some sort of temporary cover or a plan might state that material is only stored during winter when cold temperatures and snow cover limit pathogen activity and exposure to potential vectors).
\$_____

LAST QUESTION

In order for us to calculate the relative impacts of the rule changes, the law requires us to calculate the costs on a per employee basis. For this reason we are asking, how many employees does your entire company, agency, or utility have? _____

#4 – Follow Up Survey 1

Introduction:

In response to comments from internal and advisory group reviewers, Ecology is proposing to eliminate Class A-Alternative 3 and Class A-Alternative 4 from the state biosolids rule. Facilities currently using either of these alternatives will need to request an equivalency determination under what is currently Class A-Alternative 6 or manage their biosolids as Class B. Class A equivalency determinations require an approved sampling plan which analyses a facility's pathogen reduction process to show that it adequately reduces specified pathogens or pathogen indicators. The specifics of the organisms and required reductions will depend upon the particular process being used; these may or may not be the same organisms you are now sampling for.

Question:

Do you currently use either Class A-Alternative 3 or Class A-Alternative 4? ____ YES ____ NO

If YES, please estimate the cost to you if you had to request and receive an equivalency determination under Class A-Alternative 6 or the cost to manage the biosolids as Class B.
\$ _____

#5 – Follow Up Survey 2

Thank you for filling out this survey. It will help Ecology estimate the cost of changes to the rule.

In order to remove garbage from biosolids, Ecology is proposing to require all biosolids (including septage) to be screened through a bar screen with a maximum aperture of 3/8 of an inch. Alternatively, Ecology would allow the use of an equivalent (or better) screen or method for removing garbage. The removal could occur at any point in the wastewater treatment or biosolids manufacturing process.

Does your facility currently have a bar screen with a maximum aperture of 3/8 of an inch or an equivalent (or better) means for removing garbage? (NOTE: If you only receive biosolids from other facilities, answer the question for the producers of the biosolids you receive.)

yes no

If no, how much would it cost you to install one? \$ _____

What would be your annual operating cost? \$ _____

Ecology is considering a requirement that biosolids (including septage) that are land applied or sold, given away in a bag or other container must contain less than 1 percent recognizable manufactured inerts by volume.

Does your facility currently meet this standard?

yes no

If no, what would be your initial investment cost? \$ _____

What would be your annual operating cost? \$ _____

APPENDIX 3: DATA FROM COST SURVEY RESULTS

Ecology based the results in this appendix on surveys received before December 20, 2006. The results may not include last minute updates from late surveys and may be revised if additional respondents send in their survey instruments.

Survey Data Background

The survey sample covered 7% of WWTPs (given a 59% response rate), 46% of the SMFs and all of the BUFs.

For purposes of this analysis large facilities are those with employment of over 50 people and small facilities may have up to 50 people. The 4 large facilities have an average of 2400 employees. The 34 small facilities have an average of 7 employees. 5 respondents did not report the number of employees.

Some facilities are part of government. These facilities have been included in the survey because they sometimes have data on costs that will eventually affect businesses. Once Ecology collected the data, we could not separate the governmental facilities because the responses to the survey were anonymous. This anonymity is necessary for businesses and individuals to feel comfortable giving accurate data to Ecology.

Septage

Class II and unstabilized Class III land application

The total cost of this is about \$201,000 per year with a 5-year present value of \$963,000. Only 4 respondents land apply Class II or unstabilized Class III septage at rate greater than 25% of the load. These respondents gave widely varying numbers for the costs. The estimates ranged from \$500 per load, and one respondent gave a cost of \$200,000. This latter respondent also gave other estimates well outside of the normal range of values given.

Restricting access

Respondents found this question confusing. The estimated cost is \$1,800 per year with a 5-year present value of \$8,400. One respondent who applies septage on land and then allows cows on it indicates the cost will be \$200 per month to keep the cows off. One respondent applies septage to land with a high potential for public exposure and reported it may cost between \$200,000 and \$400,000 if they have to restrict access for 1 year. They believe they may lose the land use. However they already post the area and thus would be in compliance. Others report lower costs in the range of \$20 to \$100 for a 1-year restriction. For respondents applying on land with a low potential for public exposure the expected costs ranged from \$50 to \$150 for a 30 day restriction.

Transportation

The total cost of this single point in time requirement is approximately \$45,300.⁹ Over half of the respondents report that they transport biosolids. This varies by type of respondent: 75% of SMFs transport while only 40% of BUFs transport. Nearly half of those (23% of the total) who transport used the template to write a spills plan. Those using the template reported average costs of \$975. One company reported a very high cost, \$10,000. Prior to the development of the template, in 2004, facilities reported average costs of \$650 to write the spill plan on their own. It is unlikely that the template raised the costs. The \$10,000 reported cost is 44 standard deviations higher than the average for all the other businesses. For all other businesses the average reported cost was \$281. Ecology will use the \$10,000 for that company and the lower value for extrapolation to other facilities.

For those facilities reporting costs, the average cost per employee for small facilities with fewer than 50 employees was \$72. For facilities, with over 50 employees, the cost was \$0.11 per employee.

Class A-Alternatives 3 & 4

The respondents using Class A Alternatives 3 and 4 indicated the cost of holding waste for 60 days ranged from \$0 to \$100,000. The total costs of changes due to this requirement are expected to be \$100,000. The respondent who could not hold it indicated that the cost of alternative storage/management would be \$12,500 however they indicate they don't use the Alternative 3 and 4. The costs for the only large facility affected were \$0 and are lower than the costs for the small facility of \$6,250. After the original survey, Ecology proposed eliminating the usage of Class A-Alternatives 3 & 4 and issued a follow up survey to four facilities that may be affected. Out of the four surveyed in the follow up, only one facility is currently using either alternative; they have been given what is effectively a 12-month extension. This facility estimated \$26,000, which will be a one-time additional cost to them only.

Biosolids Sold or Given Away In a Bag or Other Container

No respondents reported any costs related to biosolids that are sold or given away.

Reporting

32% of the respondents report they did submit an annual biosolids report. Respondents who were able to report on the cost of producing an annual report indicated an average cost of \$1,681. The expected total cost of newly required biosolids reports is \$279,000 with a 5-year present value of \$1.3 million. Within this group some of the respondents reported employment. The average cost per employee that small facilities provided was \$527. The average cost per employee reported by large facilities was \$0.24.

Timeline for Submitting Permit Applications

28% of the respondents report that they had more than 90 days to submit their permit application. These respondents indicated an additional cost of \$21,800 to submit the application within 90 days. This cost includes an outlier. One facility reported the added cost would be \$10,000, where all other applicants indicated it would cost between \$0 and \$500. The average without this facility is \$109. The \$10000 figure is 91 standard deviations above the mean value

⁹ Based on Average cost for WWTP*number of WWTPs*percent affected+ Average cost for SMFs*number of SMFs*percent affected + Average cost for BUF*number of BUFs*percent affected)+High Cost Outlier

without the facility. Thus the mean without the facility is used for general application. The estimated cost of this proposed amendment is \$21,800.

Only one of the respondents who indicated they had more than 90 days to submit their permit application also had over 50 employees. That facility had zero costs. The remaining small businesses had costs of \$55 per employee.

Research Exemption

Only 2 respondents had research projects spreading biosolids on plots of land less than 10 acres. The average savings reported is \$6,865.

Public Notice

The average reported savings for the change in public notice requirements for non-exceptional biosolids is \$268. For small facilities the savings is \$59 per employee and for large facility it is \$3.75.

The average number of times that respondents proposed an insignificant change to their program over the last 5 years was .56 per respondent. This would mean an average savings of \$150 per facility over the life of a permit. The average savings per employee for small facilities is \$21.74 and for large facilities is \$0.08. The present value of total savings is estimated to be \$32,000.

Reduction in Recognizables/Screening Requirements

13 respondents reported that they handle biosolids or septage that does not meet a 95% garbage free level. For these businesses, the average actual cost or expected cost of meeting the requirements \$57,000. All WWTP plants reported costs of over \$85,000. SMFs reported costs from \$500 to \$35,000. No BUFs reported costs. The expected cost of adding equipment that allows screening for garbage is \$1 million.

Small facilities reported average costs of \$9,200 per employee. Only one large facility reported costs of \$405 per employee. One company indicated they would be unable to comply, given their current lagoon system.

Storage

7 respondents reported that they store septage and have another environmental permit that they could use to defer the need for new permit deferral. For these respondents, the average expected savings is \$265. The average savings per employee for small facilities is \$28. The average savings per employee for large facilities is \$1.25.

Only 2 businesses reported that they field store biosolids and septage prior to meeting the vector attraction reduction standards. These respondents expect average costs of \$275 to write a plan to show how they will reduce the risk to human health. Both of these respondents are small facilities. The average cost per employee is \$63. The total present value of costs to write plans show reducing human health risks is expected to be \$842.

Results from Follow Up Survey 2

Ecology sent the follow up survey only to facilities that had responded to the original survey. 19 respondents replied consisting of 13 WWTPs, 4 BUFs and 2 SMFs. 6 respondents (32%) said they did not currently meet the requirement for a bar screen with a maximum aperture of 3/8 inch (0.95cm) or an approvable equivalent. On average, facilities estimated it would cost \$30,575 to install one and \$6,438 in annual operating costs. The total expected cost is \$4.2 million.

Only one respondent reported that they did not meet the requirement of less than 1 percent by volume recognizable manufactured inerts for biosolids that are land applied or sold/given away in a bag or other container. This one respondent did not estimate a cost.

APPENDIX 4: BACTERIA IN MUNICIPAL WASTEWATER AND SEWAGE SLUDGE

Samonellosis

Salmonellosis is an infection with a bacteria called *Salmonella*. Most persons infected with *Salmonella* develop diarrhea, fever, and abdominal cramps 12 to 72 hours after infection. *Salmonella* infections usually resolve in 4 to 7 days and often do not require treatment unless the patient becomes severely dehydrated or the infection spreads from the intestines. Persons with severe diarrhea may require rehydration, often with intravenous fluids. Antibiotics are not usually necessary unless the infection spreads from the intestines, then it can be treated with ampicillin, gentamicin, trimethoprim/sulfamethoxazole, or ciprofloxacin. Unfortunately, some *Salmonella* bacteria have become resistant to antibiotics, largely as a result of the use of antibiotics to promote the growth of feed animals. They are microscopic living creatures that pass from the feces of people or animals, to other people or other animals.

Every year, approximately 40,000 cases of salmonellosis are reported in the United States. Because many milder cases are not diagnosed or reported, the actual number of infections may be thirty or more times greater. Salmonellosis is more common in the summer than winter. Children are the most likely to get salmonellosis. Young children, the elderly, and the immunocompromised are the most likely to have severe infections. It is estimated that approximately 600 persons die each year with acute salmonellosis.

Typhoid

Typhoid fever is a life-threatening illness caused by the bacterium *Salmonella Typhi*. In the United States about 400 cases occur each year, and 75% of these are acquired while traveling internationally. Typhoid fever is still common in the developing world, where it affects about 21.5 million persons each year. *Salmonella Typhi* lives only in humans. Persons with typhoid fever carry the bacteria in their bloodstream and intestinal tract. In addition, a small number of persons, called carriers, recover from typhoid fever but continue to carry the bacteria. Both ill persons and carriers shed *S. Typhi* in their feces (stool).

People can get typhoid fever if they eat food or drink beverages that have been handled by a person who is shedding *S. Typhi* or if sewage contaminated with *S. Typhi* bacteria gets into the water they use for drinking or washing food. Therefore, typhoid fever is more common in areas of the world where hand washing is less frequent and water is likely to be contaminated with sewage.

Once *S. Typhi* bacteria are eaten or drunk, they multiply and spread into the bloodstream. The body reacts with fever and other signs and symptoms.

Even if the symptoms seem to go away, people may still be carrying *S. Typhi*. If so, the illness could return, or they could pass the disease to other people. In fact, if they work at a job where they handle food or care for small children, they may be barred legally from going back to work until a doctor has determined that they no longer carry any typhoid bacteria.

Shigellosis

Shigellosis is caused by *Shigella* which causes **bacillary dysentery**. Shigellosis is an infectious disease caused by a group of bacteria called *Shigella*. Most who are infected with *Shigella* develop diarrhea, fever, and stomach cramps starting a day or two after they are exposed to the bacterium. The diarrhea is often bloody. Shigellosis usually resolves in 5 to 7 days. In some persons, especially young children and the elderly, the diarrhea can be so severe that the patient needs to be hospitalized. A severe infection with high fever may also be associated with seizures in children less than 2 years old. Some persons who are infected may have no symptoms at all, but may still pass the *Shigella* bacteria to others.

There are several different kinds of *Shigella* bacteria:

- *Shigella sonnei*, also known as "Group D" *Shigella*, accounts for over two-thirds of the shigellosis in the United States.
- A second type, *Shigella flexneri*, or "group B" *Shigella*, accounts for almost all of the rest.
- Other types of *Shigella* are rare in this country, though they continue to be important causes of disease in the developing world. One type found in the developing world, *Shigella dysenteriae* type 1, causes deadly epidemics there.

About 3% of persons who are infected with one type of *Shigella*, *Shigella flexneri*, will later develop pains in their joints, irritation of the eyes, and painful urination. This is called Reiter's syndrome. It can last for months or years, and can lead to chronic arthritis which is difficult to treat. Reiter's syndrome is caused by a reaction to *Shigella* infection that happens only in people who are genetically predisposed to it.

Every year, about 18,000 cases of shigellosis are reported in the United States. Because many milder cases are not diagnosed or reported, the actual number of infections may be twenty times greater. Shigellosis is particularly common and causes recurrent problems in settings where hygiene is poor and can sometimes sweep through entire communities. Shigellosis is more common in summer than winter. Children, especially toddlers aged 2 to 4, are the most likely to get shigellosis. Many cases are related to the spread of illness in child-care settings, and many more are the result of the spread of the illness in families with small children.

Acute Gastroenteritis

Gastroenteritis means inflammation of the stomach and small and large intestines. Viral gastroenteritis is an infection caused by a variety of viruses that result in vomiting or diarrhea. It is often called the "stomach flu," although it is not caused by the influenza viruses.

The main symptoms of viral gastroenteritis are watery diarrhea and vomiting. The affected person may also have headache, fever, and abdominal cramps ("stomach ache"). In general, the symptoms begin 1 to 2 days following infection with a virus that causes gastroenteritis and may last for 1 to 10 days, depending on which virus causes the illness.

For most people, it is not a serious illness. People who get viral gastroenteritis almost always recover completely without any long-term problems. Gastroenteritis is a serious illness, however, for persons who are unable to drink enough fluids to replace what they lose through vomiting or diarrhea. Infants, young children, and persons who are unable to care for themselves, such as the

disabled or elderly, are at risk for dehydration from loss of fluids. Immune compromised persons are at risk for dehydration because they may get a more serious illness, with greater vomiting or diarrhea. They may need to be hospitalized for treatment to correct or prevent dehydration.

Cholera

Cholera is an acute, diarrheal illness caused by infection of the intestine with the bacterium *Vibrio cholerae*. The infection is often mild or without symptoms, but sometimes it can be severe. Approximately one in 20 infected persons has severe disease characterized by profuse watery diarrhea, vomiting, and leg cramps. In these persons, rapid loss of body fluids leads to dehydration and shock. Without treatment, death can occur within hours.

In the United States, cholera was prevalent in the 1800s but has been virtually eliminated by modern sewage and water treatment systems. However, as a result of improved transportation, more persons from the United States travel to parts of Africa, Asia, or Latin America where epidemic cholera is occurring. U.S. travelers to areas with epidemic cholera may be exposed to the cholera bacterium. In addition, travelers may bring contaminated seafood back to the United States; food borne outbreaks have been caused by contaminated seafood brought into this country by travelers.

Cholera can be treated by immediate replacement of the fluid and salts lost through diarrhea. Patients can be treated with oral rehydration solution, a prepackaged mixture of sugar and salts to be mixed with water and drunk in large amounts. This solution is used throughout the world to treat diarrhea. Severe cases also require intravenous fluid replacement. With prompt rehydration, fewer than 1% of cholera patients die.

Antibiotics shorten the course and diminish the severity of the illness, but they are not as important as rehydration. Persons who develop severe diarrhea and vomiting in countries where cholera occurs should seek medical attention promptly.

Poliomyelitis

Poliovirus is a member of the enterovirus subgroup, family Picornaviridae. Enteroviruses are transient inhabitants of the gastrointestinal tract, and are stable at acid pH. Picornaviruses are small, ether-insensitive viruses with a ribonucleic acid genome.

The incubation period for poliomyelitis is commonly 6–20 days with a range of 3–35 days. The response to poliovirus infection is highly variable and has been categorized on the basis of the severity of clinical presentation. Up to 95% of all polio infections are inapparent or asymptomatic. Estimates of the ratio of inapparent to paralytic illness vary from 50:1 to 1,000:1 (usually 200:1). Infected persons without symptoms shed virus in the stool and are able to transmit the virus to others.

Approximately 4%–8% of polio infections consist of a minor, nonspecific illness without clinical or laboratory evidence of central nervous system invasion. This clinical presentation is known as abortive poliomyelitis, and is characterized by complete recovery in less than a week. Three syndromes observed with this form of poliovirus infection are:

- upper respiratory tract infection (sore throat and fever),
- gastrointestinal disturbances (nausea, vomiting, abdominal pain, constipation or, rarely, diarrhea), and

- influenza-like illness.

These syndromes are indistinguishable from other viral illnesses.

Nonparalytic aseptic meningitis (symptoms of stiffness of the neck, back, and/or legs), usually following several days after an initial symptom similar to that of minor illness, occurs in 1%–2% of polio infections. Increased or abnormal sensations can also occur. Typically these symptoms will last from 2 to 10 days, followed by complete recovery.

Meningitis

Meningitis is an infection of the fluid of a person's spinal cord and the fluid that surrounds the brain. People sometimes refer to it as spinal meningitis. Meningitis is usually caused by a viral or bacterial infection.

Knowing whether meningitis is caused by a virus or bacterium is important because the severity of illness and the treatment differ. People usually recover from viral meningitis within a week or two. The time that symptoms appear varies depending on the type of virus. People can usually spread the virus to someone else about three days after they are infected until about ten days after they develop the symptoms. Viral meningitis is rarely fatal. Bacterial meningitis can result in death and must be treated right away. Bacterial meningitis can be spread to others for as long as the bacteria are present in secretions from the nose and mouth. A person is no longer infectious within 24 to 48 hours after starting antibiotic treatment.

Bacterial meningitis can be treated with a number of effective antibiotics. It is important, however, that treatment be started early in the course of the disease. Appropriate antibiotic treatment of most common types of bacterial meningitis should reduce the risk of dying from meningitis to below 15%, although the risk is higher among the elderly.

Pneumonia

Until 2000, *S. pneumoniae* infections caused 100,000-135,000 hospitalizations for pneumonia. Death occurs in 14% of hospitalized adults with invasive disease. With treatment, most types of bacterial pneumonia can be cured within one to two weeks. Viral pneumonia may last longer, and mycoplasmal pneumonia may take four to six weeks to resolve completely. The eventual outcome of an episode of pneumonia depends on how ill the person is when he or she is first diagnosed.

Hepatitis

Hepatitis A is an inflammation of the liver caused by the hepatitis A virus (HAV). There is no chronic (long-term) infection. Once you have had hepatitis A you cannot get it again. About 15% of people infected with HAV will have prolonged or relapsing symptoms over a 6-9 month period. Signs and symptoms include jaundice, fatigue, abdominal pain, loss of appetite, nausea, diarrhea, and fever. It varies in severity, running an acute course, generally starting within two to six weeks after contact with the virus, and lasting no longer than two or three months.

Encephalitis

The majority of human infections are asymptomatic or may result in a nonspecific flu-like syndrome. Onset may be insidious or sudden with fever, headache, myalgias, malaise and occasionally prostration. Infection may, however, lead to encephalitis, with a fatal outcome or permanent neurologic sequelae. Fortunately, only a small proportion of infected persons progress

to frank encephalitis. Aseptic meningitis or encephalitis. Many cases have only fever with headache but can progress to focal paralysis, intractable seizures, coma and death. Incidence varies with occurrence and intensity of epidemic transmission; usually 150-3,000 cases/year.

Costs of \$150 million - includes estimated cost of vector control and surveillance activities. For most forms of encephalitis, the acute phase of the illness (when symptoms are the most severe) usually lasts up to a week. Full recovery can take much longer, often several weeks or months.

Respiratory Infections

Respiratory syncytial virus (RSV) is the most common cause of bronchiolitis and pneumonia among infants and children under 1 year of age. Illness begins most frequently with fever, runny nose, cough, and sometimes wheezing. During their first RSV infection, between 25% and 40% of infants and young children have signs or symptoms of bronchiolitis or pneumonia, and 0.5% to 2% require hospitalization. Most children recover from illness in 8 to 15 days. The majority of children hospitalized for RSV infection are under 6 months of age. RSV also causes repeated infections throughout life, usually associated with moderate-to-severe cold-like symptoms; however, severe lower respiratory tract disease may occur at any age, especially among the elderly or among those with compromised cardiac, pulmonary, or immune systems.

Cryptosporidiosis

Cryptosporidiosis is a diarrheal disease caused by microscopic parasites of the genus *Cryptosporidium*. Once an animal or person is infected, the parasite lives in the intestine and passes in the stool. The parasite is protected by an outer shell that allows it to survive outside the body for long periods of time and makes it very resistant to chlorine-based disinfectants. Symptoms of cryptosporidiosis generally begin 2 to 10 days (average 7 days) after becoming infected with the parasite. In persons with healthy immune systems, symptoms usually last about 1 to 2 weeks. The symptoms may go in cycles in which patients may seem to get better for a few days, then feel worse again before the illness ends.

Giardiasis

A diarrheal illness caused by a one-celled, microscopic parasite, *Giardia lamblia*. Once an animal or person has been infected, the parasite lives in the intestine and is passed in the stool. Because the parasite is protected by an outer shell, it can survive outside the body and in the environment for long periods of time. During the past 2 decades, *Giardia* infection has become recognized as one of the most common causes of waterborne disease (found in both drinking and recreational water) in humans in the United States. *Giardia* are found worldwide and within every region of the United States. Symptoms of Giardiasis normally begin 1 to 2 weeks (average 7 days) after becoming infected. In otherwise healthy persons, symptoms of Giardiasis may last 2 to 6 weeks. Occasionally, symptoms last longer.

Diarrhea

Diarrhea that lasts for more than 2 weeks is considered persistent or chronic. In an otherwise healthy person, chronic diarrhea may be a nuisance problem, or, for someone who has a weak immune system, a life-threatening illness. Diarrhea caused by an infection can often be treated with antibiotics. However, the correct diagnosis must be made so the proper medication can be prescribed.

Toxoplasmosis

A single-celled parasite called *Toxoplasma gondii* causes a disease known as toxoplasmosis. While the parasite is found throughout the world, more than 60 million people in the United States may be infected with the *Toxoplasma* parasite. Of those who are infected, very few have symptoms because a healthy person's immune system usually keeps the parasite from causing illness. However, pregnant women and individuals who have compromised immune systems should be cautious; for them, a *Toxoplasma* infection could cause serious health problems especially for their infants. Most people who become infected with *Toxoplasma* are not aware of it. Some people who have toxoplasmosis may feel as if they have the "flu" with swollen lymph glands or muscle aches and pains that last for a month or more.

Toxoplasmosis is difficult to evaluate. In the United States, the frequency largely depends on the incidence of primary infection in women of childbearing age. According to the National Health and Nutrition Examination during 1989-1994, approximately 3,500 infected children should be born in the US every year; about 2% or 70, of these would be in Washington State.

Infants who are infected before birth through their mother and are born with toxoplasmosis tend to have very serious long-term effects. These effects may include problems with the heart, kidney, blood, liver or spleen, however, developmental disabilities seem to be the most prevalent and costly over a lifetime. Developmental disabilities are chronic conditions that initially form in people 18 or younger and result in impairment of physical health, mental health, cognition, speech, language, or self care.

Many infected infants will not show any signs at birth, but long-term studies show that up to 90 percent of those 70 infected cases results in developmental problems, some of which may include:

- Hearing loss,
- Vision loss,
- Mental retardation or
- Cerebral palsy.

In Washington there would be 63 (90% of 70 cases) total cases born every year.

A study done by the CDC in 2003 estimates the economic costs associated with these 4 developmental disabilities, while a 1990 study was able to estimate the percentage that each of these disabilities manifested itself from toxoplasmosis. The incidence rates listed below in the table show the percentage of cases of each disability that results from toxoplasmosis. For example, looking at vision impairment, 8% of the 63 total WA cases would yield 5.04 cases having been caused by toxoplasmosis. Vision impairment has an average lifetime cost per person of \$601,000, multiplied by the 5.04 cases results in a total cost of just over \$3 million for Washington. The same applies for hearing loss and mental retardation.

However, the study did not include cerebral palsy, but it is able to be extrapolated from current data. About 15 percent of children with cerebral palsy acquire it after birth; about 8 percent acquire it from asphyxia during birth, leaving about 77 percent of cerebral palsy cases that develop during pregnancy. Out of this 77 percent, all cases of the disorder are the result of 3 types of brain damage: damage to the white matter of the brain from maternal infections, abnormal development of the brain, or bleeding in the brain. In most cases however, the specific type of brain damage that causes cerebral palsy is unknown, we therefore assume each is equally

likely at 25.7 percent (77/3). Further, there are 3 known certain infections that can occur during birth, which we again assume are equally likely at 8.6 percent (25.7/3): rubella, cytomegalovirus and toxoplasmosis. This therefore leaves us with an extrapolated incidence rate of 8.6 percent of toxoplasmosis cases result in cerebral palsy. The table below summarizes the average lifetime costs per disability as well as the total cost per year of toxoplasmosis born into Washington State each year of \$24 million¹⁰:

Figure 1: Average lifetime cost per disability

Developmental Disability	Direct Cost	Lifetime Total Cost	Average Lifetime Cost per Person	Incidence Rate in Toxoplasmosis Cases (%)	Number of Cases per Disability (63 Total)	Total Costs
Vision Impairment	\$652M	\$2.6B	\$601,000	0.080	5.04	\$3,029,040
Hearing Loss	\$469M	\$1.9B	\$383,000	0.020	1.26	\$482,580
Mental Retardation	\$12.3B	\$51.2B	\$1,014,000	0.243	15.31	\$15,523,326
Cerebral Palsy	\$2.2B	\$11.5B	\$921,000	0.086	5.39	\$4,964,190

Anemia

This is one side effect of some of the organisms in this list. Young children are at great risk of iron deficiency because of rapid growth and increased iron requirements. Iron deficiency can occur due to lack of iron in the diets. If this continues, anemia results. Anemia is a manifestation of iron deficiency when it is relatively severe. Iron deficiency anemia significantly impairs mental and psychomotor development in infants and children. Although iron deficiency can be reversed with treatment, the reversibility of the mental and psychomotor impairment is not yet clearly understood. Thus, prevention and treatment need to be emphasized more than detection. In addition, iron deficiency increases a child's susceptibility to lead toxicity. Lead replaces iron in the absorptive pathway when iron is unavailable.

Acute Enteritis

Amebiasis is a disease caused by a one-celled parasite called *Entamoeba histolytica*. On average, about one in 10 people who are infected with *E. histolytica* becomes sick from the infection. The symptoms often are quite mild and can include loose stools, stomach pain, and stomach cramping. Amebic dysentery is a severe form of amebiasis associated with stomach pain, bloody stools, and fever. Rarely, *E. histolytica* invades the liver and forms an abscess. Even less commonly, it spreads to other parts of the body, such as the lungs or brain. Once infected, one would usually become sick 1 to 4 weeks later but sometimes more quickly or more slowly. Persons can expect to be sick for 3-10 days after beginning medication.

¹⁰ http://www.marchofdimes.com/professionals/681_1208.asp
<http://www.mayoclinic.com/health/cerebral-palsy/DS00302/DSECTION=3>
http://www.ninds.nih.gov/disorders/cerebral_palsy/detail_cerebral_palsy.htm#71533104
<http://www.ccohs.ca/oshanswers/diseases/toxoplasmosis.html>

"Estimating income losses and other preventable costs caused by toxoplasmosis in people in the United States"
 Journal of American Veterinarian Med Association
 Roberts T, Frenkel JK
 1990 Jan 15, 196(2):249-56
<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5303a4.htm>

Hookworm Disease

Hookworm is an intestinal parasite of humans that usually causes mild diarrhea or cramps. Heavy infection with hookworm can create serious health problems for newborns, children, pregnant women, and persons who are malnourished. Hookworm infections occur mostly in tropical and subtropical climates and are estimated to infect about 1 billion people -- about one-fifth of the world's population. A species, *Necator americanus*, was widespread in the southeastern United States early in this century. The Rockefeller Sanitary Commission was founded in response, and hookworm infection has been largely controlled.

The most serious results of hookworm infection are the development of anemia and protein deficiency caused by blood loss. When children are continuously infected by many worms, the loss of iron and protein can retard growth and mental development, sometimes irreversibly. Hookworm infection can also cause tiredness, difficulty breathing, enlargement of the heart, and irregular heartbeat. Sometimes hookworm infection is fatal, especially among infants. In countries where hookworm is common and reinfection is likely, light infections are often not treated. In the United States, hookworm infections are generally treated for 1-3 days with medication prescribed by your health care provider. The drugs are effective and appear to have few side effects. Another stool exam should be repeated 1 to 2 weeks after therapy. If the infection is still present, treatment will be given again. Iron supplements will be ordered if you have anemia.

Taeniasis

Taeniasis is the infection of humans with the adult tapeworm of *Taenia saginata* or *Taenia solium*. Humans are the only definitive hosts for *T. saginata* and *T. solium*. Eggs or gravid proglottids are passed with feces. The eggs can survive for days to months in the environment. In the human intestine, the cysticercus develops over 2 months into an adult tapeworm, which can survive for years. The adult tapeworms attach to the small intestine by their scolex and reside in the small intestine. Length of adult worms is usually 5 m or less for *T. saginata* (however it may reach up to 25 m) and 2 to 7 m for *T. solium*. The adults produce proglottids which mature, become gravid, detach from the tapeworm, and migrate to the anus or are passed in the stool (approximately 6 per day)

Cyclospora

Cyclospora cayetanensis is a parasite composed of one cell, too small to be seen without a microscope. The first known human cases of illness caused by *Cyclospora* infection (that is, cyclosporiasis) were reported in 1979. Cases began being reported more often in the mid-1980s. In the last several years, outbreaks of cyclosporiasis have been reported in the United States and Canada. *Cyclospora* is spread by people ingesting something, for example, water or food that was contaminated with infected stool. For example, outbreaks of cyclosporiasis have been linked to various types of fresh produce. *Cyclospora* needs time (days or weeks) after being passed in a bowel movement to become infectious. Therefore, it is unlikely that *Cyclospora* is passed directly from one person to another. It is not known whether or not animals can be infected and pass infection to people.

The time between becoming infected and becoming sick is usually about 1 week. If not treated, the illness may last from a few days to a month or longer. Symptoms may seem to go away and then return one or more times (relapse).

APPENDIX 5: TABLE OF DISEASES

Table 2: Table of Diseases

Disease	Severity	Incubation Period	Length of Infection	Occurrence	ICD-9 Code	Total Payment	Number of Clients	Notes	References
Salmonellosis	can cause death	12- 72 hours	4-7 days	40,000 cases reported/year in US- mild cases not reported, may be 30+ times greater	003.0	\$40,614	17		http://www.cdc.gov/ncidod/d/bmd/diseaseinfo/salmonellosis_g.htm
Typhoid	life threatening	10-20 days		400 cases/year	V02.1	\$468	9	may be legally barred from the work place	http://www.cdc.gov/ncidod/d/bmd/diseaseinfo/typhoidfever_g.htm
Shigellosis	not very not very- if unable to replenish fluids, then serious	1-2 days	5-7 days	18,000 reported/year in US- mild cases not reported, may be 20+ times greater	004	10	48		http://www.cdc.gov/ncidod/d/bmd/diseaseinfo/shigellosis_g.htm
Gastro-enteritis		1-2 days	1-10 days	3.5million+ infants, results in 500,000+ office visits, 55,000 hospitalizations, 30 deaths	008.0	\$2,417	3		http://www.cdc.gov/ncidod/d/vrd/revb/gastro/faq.htm
					008.61	\$14,571	7		
					009.0	\$80,547	381		
					009.1	\$74,174	553		
Cholera	mild, but can be severe (1 in 20) with out treatment- death	hours-5 days (avg 2-3 days)		virtually eliminated	001	56	72	treated with immediate fluid replacement	http://www.cdc.gov/ncidod/d/bmd/diseaseinfo/cholera_g.htm
Polio-myelitis	varies	3-35 days	less than a week	virutally eliminated since the 1970s	138	\$12,389	6		http://www.emedicine.com/MED/topic856.htm http://www.cdc.gov/nip/publications/pink/polio.pdf http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1473032
Meningitis	viral- less severe, bacterial- quite severe	3-10 days	viral- a week or 2	bacterial- 1,361 cases in 2004, viral- very common and impossible to quote accurately	viral- 047.8	\$2,525	1		http://www.cdc.gov/ncidod/d/bmd/diseaseinfo/ningococcal_g.htm
					047.9	\$26,669	6		http://www.musa.org/top_20_questions.asp
					bacterial- 320	\$4,255	1		
					320.1	\$17,567	1		
					320.81	\$104	1		
Pneumonia	14% result in death	4-6 days	1-2 weeks	100,000-135,000 hospitalizations/year, 13 cases per 100,000 in the US	481	\$33,971	10		http://www.cdc.gov/ncidod/d/bmd/diseaseinfo/streppneum_t.htm
Hepatitis	15% have prolonged or relapsing symptoms 6-9 months	2-6 weeks	1-2 weeks	about 22,700 cases/year in US	070.1	\$21,476	85		http://www.cdc.gov/ncidod/diseases/hepatitis/a/afact.pdf http://www.cfsan.fda.gov/~mow/chap31.html
Encephal-itis	may be fatal, but only very few do	7-14 days	acute phase up to a week, full recovery several weeks or months	150-3,000/year	323.8	\$9,016	1	**Costs of \$150 million - includes estimated cost of vector control and surveillance activities	http://www.cdc.gov/ncidod/d/vbid/arbor/arbofact.htm
					323.9	\$94	1		
Respiratory Infections	0.5-2% require hospitalization	1-3 days	8-15 days 1-2 weeks, symptoms go in cycles of feeling better then worse		487.1	\$56,168	34		http://www.cdc.gov/ncidod/d/vrd/revb/respiratory/rsfeat.htm
Crypto-sporidiosis	not very	2-10 days		approximately 3,000 cases reported/year	007.4	\$11,018	3		http://www.cdc.gov/ncidod/d/pd/parasites/cryptosporidiosis/factsht_cryptosporidiosis.htm
Acute Enteritis	mild	1-4 weeks	3-10 days after beginning medication	1-5% of the US population	555	\$23,578	5		http://www.emedicine.com/MED/topic484.htm http://www.cdc.gov/ncidod/d/pd/parasites/amebiasis/factsht_amebiasis.htm
Giardiasis	less severe	1-2 weeks	about 2 weeks	2% of the US population	007.1	\$55,384	31		http://www.cdc.gov/ncidod/d/pd/parasites/giardiasis/factsht_giardia.htm
Chronic Diarrhea	less severe	about 10 days	over 2 weeks, treated with antibiotics		009.3	\$35	1		http://www.cdc.gov/ncidod/d/pd/parasites/diarrhea/factsht_chronic_diarrhea.htm
Toxo-plasmosis	less severe	5-23 days	few weeks to months	60 million people in the US- only 3,500 show symptoms					http://www.cdc.gov/ncidod/d/pd/parasites/toxoplasmosis/factsht_toxoplasmosis.htm http://www.emedicine.com/PED/topic2271.htm
Hookworm Disease	less severe	varies w/ # parasites, few weeks-many months	1-3 days- another stool sample 1-2 weeks later	as high as 14.8% among school children					http://www.cdc.gov/ncidod/d/pd/parasites/hookworm/factsht_hookworm.htm http://www.emedicine.com/med/topic1028.htm
Taeniasis									
Cyclospora	less severe	1 week	if not treated may last from a few days to a month, with treatment, a couple days	an estimated 16,264 cases/year in the US					http://www.cdc.gov/ncidod/d/pd/parasites/cyclospora/factsht_cyclospora.htm http://www.emedicine.com/MED/topic3393.htm