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State of Washington

Final Cost-Benefit and Least Burdensome Alternative Analyses

Chapter 173-901 WAC

Better Brakes

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Final Cost-Benefit and Least Burdensome Alternative Analyses

Chapter 173-901 WAC
Better Brakes

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Table of Contents

Executive Summary

This report reviews the economic analyses performed by the Washington State Department of Ecology (Ecology) to estimate the incremental expected benefits and costs of the adopted Better Brakes rule (rule) (Chapter 173-901 WAC). The Washington Administrative Procedure Act (RCW 34.05.328) requires Ecology to evaluate significant legislative rules to "[d]etermine 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 law being implemented."

Ecology concluded that the likely benefits of the adopted rule exceed its likely costs. Ecology's analysis is based on the best available information at the time.

Assuming that manufacturers would operate independently under the baseline for reporting and certification, Ecology estimated **the total avoided compliance cost of the adopted rule to be over $14 million**. This value is in current dollars, over 20 years, and compares baseline compliance costs of over $21 million to adopted rule compliance costs of over $6 million.[1]

Assuming that manufacturers would cooperate to reduce reporting and certification costs under the baseline, Ecology estimated the **total increased compliance costs of the adopted rule to be over $5 million**. This value is in current dollars, over 20 years.

Ecology estimated the following qualitative benefits associated with the adopted rule, regardless of baseline cooperative or individual behavior.

- **Increased public and regulatory confidence** in the quality of laboratories used for certification and baseline testing.
- **Reduced manufacturer search and re-testing costs** to identify laboratories with sufficient quality to satisfy Better Brakes requirements.
- **Reduced costs of certification, reporting, and recordkeeping** (and prospectively testing) associated with using a central registrar.
- **Reduced search and compliance-determination costs for middle- and end-users** associated with universally unique identification codes for brake friction material formulations.
- **Improved and up-to-date information** for the public, regulators, and middle/end-users of brake friction material, with reduced search costs and a better basis for future regulation.

Ecology assessed alternative content to the adopted rule, and determined whether it met the general goals and specific objectives of the Better Brakes law (the authorizing statute). Of those that would meet these objectives, Ecology determined that the adopted rule content was the least burdensome.

[1] Present value calculations use an annual discount rate of 1.58 percent for future dollar exchanges, based on the risk-free historic rate of return on I-Bonds from the US Treasury.

Chapter 1: Introduction

This report reviews the economic analyses performed by the Washington State Department of Ecology (Ecology) to estimate the incremental expected benefits and costs of the adopted Better Brakes rule (rule) (Chapter 173-901 WAC). This document is generally intended for use with an associated Least Burdensome Alternative (LBA) analysis, to develop an understanding of the full impact of the adopted rule.

The Washington Administrative Procedure Act (RCW 34.05.328) requires Ecology to evaluate significant legislative rules to "[d]etermine 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 law being implemented."

Ecology's analysis is based on the best available information at the time.

1.2 Description of the adopted rule

Chapter 70.285 RCW directs Ecology to develop compliance criteria through rules to implement the Better Brakes law. The law provides a framework for reducing certain toxic substances in brakes, and calls upon the department to work with interested parties to develop compliance criteria including:

- Criteria for self-certification of compliance using third party accredited laboratories.
- Requirements relating to a "proof of certification" mark to appear on brake pads and their packages.
- Requirements for how and what data must be submitted regarding the concentration of copper and other metals in brake pads sold or offered for sale in Washington.
- A process for companies to apply for an exemption from certain requirements of RCW 70.285.
- Other issues necessary to implement RCW 70.285.

1.3 Reasons for the adopted rule amendments

1.3.1 Why brake materials

Each time a driver uses automotive brakes, a small amount of brake debris deposits on the roadway. If the brake contains copper or heavy metals, these metals can be washed into streams and rivers. With millions of drivers using their brakes each day, these small amounts significantly impact our waterways, including Puget Sound.

The copper in brake pads is of particular concern. Copper is toxic to aquatic life, and even small amounts of copper can have negative impacts. For example, small amounts of copper in water can negatively impact the ability of salmon. It impacts salmon's ability to smell, hindering their ability to avoid predators, and has other adverse effects that limit

their ability to survive. In urban areas brake pads can account for up to half of the copper entering the surrounding water bodies.

RCW 70.285 and the adopted rule also help protect the health and safety of people installing and replacing brake pads, by prohibiting the sale of asbestos-containing brakes. Many people are unaware some brake pads may still contain asbestos, and these brakes are currently sold and used legally throughout the country.

1.3.2 History

The Better Brakes rule results from a long collaborative process with brake friction material manufacturers. Brakes were first identified as a potential source of copper pollution in the San Francisco Bay in the early 1990's. Santa Clara County commissioned one of the first studies linking copper in brakes to copper pollution in water. The study estimates brakes could account for up to 50 percent of the copper released in the county. As a result of this study, the Brake Pad Partnership was formed in California.

The Brake Pad Partnership consisted of representatives of brake manufacturers, environmental groups, and water quality regulators (among other interested parties). The group met for over a decade, conducting considerable research into the composition of brake friction material and the potential impacts of brake friction material wear debris on the environment. The partnership commissioned several studies including a detailed model of copper released from brakes into the San Francisco Bay.

As part of the partnership, manufacturers agreed to phase out copper if their brakes were identified as a significant source of it, and the wear debris was causing harm to the environment. The partnership concluded the brakes were a major source of copper.

The best approach to phase copper out of brake friction materials was through legislation requiring phase-out by manufacturers. Legislation was initially introduced in California during the 2009 legislative session. However, the law did not pass. Washington State introduced a similar bill. This law passed and became Chapter 70.285 RCW, relating to brake friction material, also known as the Better Brakes law. Shortly after Washington passed legislation, California passed a similar bill.

1.4 Document organization

Ecology organized this document into the following sections:

- Baseline and adopted rule (Chapter 2): Description and comparison of the baseline requirements in state and federal laws and rules, to the adopted rule requirements.
- Likely costs of the adopted rule (Chapter 3): Analysis of the types and size of costs Ecology expects impacted entities to incur, including specific product markings and reporting behaviors.
- Likely benefits of the adopted rule (Chapter 4): Analysis of the types and size of benefits expected to result from the adopted rule. This includes avoided reporting

product markings and reporting behaviors, information for the public and future policymaking, and improved compliance at the end-user level.

- Cost-benefit comparison and conclusions (Chapter 5): Discussion of the complete implications of the Cost-Benefit Analysis. Comments on results.
- Least burdensome alternative analysis (Chapter 6): Analysis of considered alternatives to the content of the adopted rule.

Chapter 2: Baseline and Adopted Rule

2.1 Introduction

In this chapter, Ecology describes the baseline to which the adopted rule is compared. The baseline is the regulatory context in the absence of the amendments being adopted.

In this chapter, Ecology also describes the adopted rule, and identifies which elements require analysis under the Administrative Procedure Act (Chapter 34.05 RCW). Here, Ecology addresses complexities in the scope of analysis, and indicates which cost and benefit analyses are discussed in Chapters 3 and 4 of this document.

2.2 Baseline

In most rulemaking analyses, the regulatory baseline is the existing rule. If there is no existing rule, the federal or local regulation is the baseline. In the case of the Better Brakes rule, the baseline is the set of requirements explicitly dictated in the Better Brakes law (Chapter 70.285 RCW). While the law directs Ecology to develop a rule to implement the law, and enforcement of the requirements purely in law would be difficult, there are technically current legal requirements described explicitly in the law (i.e., reporting, certification, maximum percentages of brake friction material components are required in the existing law, even if they are non-specific). Ecology analyzed requirements in the Better Brakes rule that were not explicitly dictated by the Better Brakes law.

The Better Brakes law establishes:

- A January 1, 2014 ban on the sale (or offering) of brake friction material in Washington State that exceed:
    - 0.1 percent asbestiform fibers
    - 0.01 percent cadmium and its compounds
    - 0.1 percent chromium(VI) salts
    - 0.1 percent lead and its compounds
    - 0.1 percent mercury and its compounds
- A January 1, 2021 ban on sale (or offering) of brake friction material in Washington State containing more than five percent copper and its compounds.
- Exemptions for certain sales of inventory stock and original equipment on vehicles.
- Exemptions for brake friction materials for motorcycles, vehicles with internal closed oil immersed brakes, military combat vehicles, race cars, dual-sport vehicles, off-road vehicles, and collector vehicles.
- A process for establishing whether alternative brake friction material (not containing over 0.5 percent copper, meeting standards for the 2014 ban above, and meeting other standards for human and environmental health) is available, and a process for requiring alternative brake friction material if it is available.
- Criteria for exemption for certain small-volume manufacturers, specific motor vehicle models, or special classes of motor vehicles,

- Criteria for certifying brake friction material manufactured as part of an original equipment service contract, which is exempt from certain requirements of the Better Brakes Law and adopted rule.
- Manufacturer reporting at least every three years beginning by January 1, 2013, of data on antimony, copper, nickel, and zinc content.
- Ecology establishment of baseline concentrations of antimony, copper, nickel, and zinc, and progress tracking and standards for those concentrations beginning July 1 2013.
- A process for adding limits to other brake friction constituents, if reported data indicates their concentrations have increased by more than 50 percent.
- Manufacturer self-certification of compliance, using accredited labs.
- Manufacturer markings required on the brake friction material and on its packaging.
- January 1, 2021 requirement for motor vehicle manufacturers to equip new vehicles with certified brake friction materials.

The above are all requirements of Washington State law, regardless of the content of the adopted rule.

2.3 Analytic scope

The scope of this analysis is, generally, the requirements of the adopted rule that are not explicitly required by the law. This scope becomes complicated when the law has a general requirement (e.g., requiring markings of certification on brake friction materials), and the adopted rule specifies how that requirement is applied (e.g., a specific type or set of markings). To the extent possible, Ecology analyzed only the impacts of the requirements added in the adopted rule. This means that, where possible, Ecology identified the likely compliance behavior that would have happened if Ecology had not specified in the adopted rule how to comply with the law (e.g., how manufacturers would have likely marked compliant brake friction materials).

2.4 Analyzed changes

Ecology qualitatively or quantitatively analyzed the impacts of the following elements of the adopted rule. Elements explicitly dictated by the law were not analyzed.

2.4.1 Self-certification of compliance – Testing

Baseline
Manufacturers must submit formulation samples for testing by an accredited laboratory.

Change
Manufacturers must submit formulation samples for testing by an accredited laboratory (accredited by the Washington State Environmental Laboratory Accreditation Program, the International Standards Organization, or the National Environmental Laboratory Accreditation Program).

Impact
Ecology compared the likely compliance of submitting samples of brake friction materials to an accredited laboratory in general versus submitting to laboratories accredited by specific organizations.

- In the cost analysis, Ecology addressed the greater specificity of acceptable labs under the adopted rule.
- In the benefit analysis, Ecology addressed the compliance facilitation and likely reduced search costs of specifying accreditation bodies.

2.4.2 Self-certification of compliance – Registrar

Baseline
Testing, certification, and reporting are required of manufacturers. Since there is no further specification, these actions could be taken as individual manufacturers, or as groups.

Change
Certification and reporting must be done via an industry-sponsored registrar. Testing may be done by individual manufacturers, or through the industry-sponsored registrar.

Impact
Ecology compared the likely compliance behavior required to perform certification and reporting without a specific required method, to complying via an industry-sponsored registrar. Ecology also compared the likely compliance behavior required for laboratory testing without a specific required method, to optional individual or group reporting through an industry-sponsored registrar.

- In the cost analysis, these changes are not analyzed, as likely compliance is, at worst, equivalent under the baseline and adopted rule.
- In the benefits analysis, Ecology addressed the avoided costs associated with any economies of scale that would occur under centralized testing, certification, and reporting.

2.4.3 Self-certification of compliance – Identification code

Baseline
Certification is required, but a unique identification code is not explicitly required.

Change
Each certified formulation must be assigned a unique identification code. Multiple entities (such as the manufacturer, industry-sponsored registrar, etc.) could be involved in assigning the unique identification code.

Impact
Ecology compared the likely identification and recordkeeping/reporting behavior when a unique code and centralized database is not required, to compliance behavior when a unique code is required.

- In the cost analysis, Ecology addressed the difference in the cost of having an identifier.
- In the benefits analysis, Ecology addressed the value of facilitating identification of compliant parts.

2.4.4 Self-certification of compliance – Reporting and recertification

Baseline
Manufacturers must certify compliance with the law, reporting baseline concentrations of copper, zinc, nickel, and antimony, every three years. There is no requirement to recertify.

Change
Manufacturers must report specific certification information quarterly via an industry-sponsored registrar. Manufacturers must recertify formulations every three years.

Impact
Ecology compared likely certification and reporting behavior that would meet the certification requirement in the law, to compliance behavior for specific reporting requirements and quarterly timing.

- In the cost analysis, Ecology addressed the possible timing costs of reporting new certified formulations quarterly versus every three years.
- In the benefits analysis, Ecology addressed the possible cost-savings of centralized reporting.

Ecology compared recertification every three years, to no recertification behavior.

- In the cost analysis, Ecology addressed the costs of recertification.
- In the benefits analysis, Ecology addressed the value of up-to-date certification information.

2.4.5 Recordkeeping

Baseline
There is no specific recordkeeping requirement under the baseline.

Change
Laboratory testing records must be kept by the manufacturer for ten years.

Impact
Ecology compared keeping laboratory testing records for ten years, to compliance behavior that would be sufficient under the Better Brakes law to be able to demonstrate compliance with the law.

- In the cost analysis, Ecology addressed the possible additional costs of additional years of recordkeeping.
- In the benefits analysis, Ecology addressed the possible avoided costs of secure ability to demonstrate compliance.

2.4.6 Brake friction material certification markings

Baseline
Manufacturers must mark compliant brake friction materials.

Change
Manufacturers must specifically mark compliant brake friction materials with one of five environmental compliance markings (A, B, N, X, or WX) denoting compliance with asbestiform, cadmium, chromium, lead, and mercury maximum concentrations, and ranges of copper content.

Impact
Ecology compared marking brake friction materials in the manner specified by the adopted rule, to the most likely material markings that would comply with the law.

- In the cost analysis, Ecology addressed the possible difference between the required markings and the likely industry-recommended markings.
- In the benefits analysis, Ecology addressed the reduced search costs associated with the markings as required by the adopted rule, for middle- and end-users.

2.4.7 Brake friction material packaging certification markings

Baseline
Manufacturers must mark compliant brake friction material packaging.

Change
Manufacturers must specifically mark compliant brake friction materials packaging with an industry-specified, trademarked symbol or marking. The adopted rule does not specify what the symbol or marking must be.

Impact
Ecology compared marking brake friction material packaging as required in the adopted rule, to the most likely material markings that would comply with the law.

- In the cost analysis, Ecology addressed the possible difference between the required package marking and the likely package marking that would comply with just the Better Brakes law.
- In the benefits analysis, Ecology addressed the reduced search costs associated with the markings as required by the adopted rule, for middle- and end-users, and the value of streamlined, identifiable, and marketable symbols of environmental compliance.

2.4.8 Baseline reporting[2]

Baseline

[2] To clarify, "baseline reporting" terminology used in the Better Brakes law, and "baseline concentration levels" terminology used in the adopted rule are not associated with the concept of "baseline" in this analysis.

Manufacturers must report concentrations of copper, nickel, zinc, and antimony every three years.

Change

Manufacturers must report concentrations of copper, nickel, zinc, and antimony every three years, using an industry-sponsored registrar.

Impact

Ecology compared reporting behavior of copper, nickel, zinc, and antimony every three years when the method is not specified, to reporting behavior when it must be through a registrar.

- In the cost analysis, Ecology did not address this difference, because at worst, costs are equivalent if manufacturers chose to voluntarily use a centralized reporting method.
- In the benefits analysis, Ecology addressed the possible cost savings of using an industry-sponsored registrar for baseline reporting.

Chapter 3: Likely Costs of the Adopted Rule

3.1 Introduction

Ecology estimated the expected costs associated with the adopted rule, as compared to the baseline described in Chapter 2.2 of this document. The baseline is the regulatory circumstance in the absence of the adopted rule. In the case of the adopted rule, the baseline is the Better Brakes law, to the extent that compliance behavior is possible under the degree of specificity in the law.

The costs analyzed here are associated with specific requirements discussed under section 2.4 of this document, including:

- Specifying agencies that accredit laboratories acceptable for testing compliant with the adopted rule.
- Requiring a unique identification code for each accredited formulation.
- Reporting certification information quarterly instead of every three years, and recertification every three years.
- Specific markings for brake friction materials.
- Specific markings for brake friction material packaging.

3.2 Affected entities

The adopted rule (and the governing law) specify requirements primarily for manufacturers (testing, certification, reporting), but do not allow middle-men and end-users to knowingly sell or offer noncompliant brake friction material. This means Ecology analyzed most impacts as a burden borne by manufacturers, with checking for compliance marks as a burden for users downstream. Some or all costs incurred by manufacturers may be passed on to downstream users of brake friction materials, but in the scope of the Cost-Benefit Analysis, this is a transfer of costs, and overall costs across all affected entities are the same.

Ecology estimated the number of manufacturers (and the number of individual brake friction formulations) based on existing lists of manufacturers and brake friction material formulations compliant with edge code marking requirements for brake friction materials in 13 states and Puerto Rico. Ecology identified manufacturers exporting to Washington State, and determined that brake friction materials sold in Washington State were likely to be sold at least nationally, if not more broadly. Based on this correlation, Ecology assumed that manufacturers of compliant brake friction materials would likely already print friction-coefficient and manufacturing information on parts.[3]

[3] There are likely brake friction materials available online for direct shipping, that do not currently print any codes and sell to multiple locations, but Ecology must assume compliance with the law in its analysis, and such noncompliant manufacturers and distributors would be likely to be noncompliant under the adopted rule as well. They were not included in this analysis.

Ecology estimated 158 existing manufacturers, with up to 17 new manufacturers each year.[4] An average manufacturer has 9 individual formulations of brake friction material. These estimates are based on three-year-batch reporting, and likely overestimate the actual growth in reporters, but this was the best available data on existing manufacturers.[5] There are no existing manufacturers in Washington State.[6] These estimates include brake friction material formulations manufactured for original equipment service contracts, since these formulations are currently required to register for edge codes. Our estimates for the expected costs of certification and marking therefore includes costs borne by the manufacturers of brake friction materials manufactured as part of an original equipment service contract.

3.3 Expected costs

Ecology assessed the likely costs resulting from the adopted rule, as compared to the baseline of the Better Brakes law.

3.3.1 Costs of using specified accredited laboratories

Under the baseline, manufacturers are required to use an accredited laboratory for testing samples of brake friction materials. The adopted rule specifies that acceptable accredited laboratories are those accredited by the Washington State Environmental Laboratory Accreditation program, the International Standards Organization, or the National Environmental Laboratory Accreditation Program.

While this narrows the set of acceptable accredited laboratories used for compliance, Ecology does not expect a significant cost difference for testing across different accredited labs, regardless of accreditation level, for the same testing services. If, under the baseline, manufacturers could use laboratories that had not spent the money and time to become accredited, then there would likely be a cost difference, but the adopted rule explicitly specifies the use of accredited laboratories.

Ecology does not expect this difference to result in a cost.

3.3.2 Costs of unique formulation identification

Under the baseline, manufacturers must certify compliance with the law, but are not required to assign unique identifiers to each brake friction material formulation in the industry. Under the adopted rule, each certified formulation must be assigned a unique

[4] This number fell to 13 after including an earlier AMECA report of manufacturers, but Ecology chose to use the more inclusive 17.

[5] "Compliance List of Automotive Safety Devices For Three-Year Period 2005-2008, Section 10 – Friction Material Edge Codes," January 1, 2009, Automotive Manufacturers Equipment Compliance Agency, Inc.
"AMECA Compliance List of Automotive Safety Devices, Friction Material Edge Codes For Three-Year Period 2007-2010," May 2010, Automotive Manufacturers Equipment Compliance Agency, Inc.
"AMECA Compliance List of Automotive Safety Devices, Friction Material Edge Codes For Three-Year Period 2008-2011," March 2011, Automotive Manufacturers Equipment Compliance Agency, Inc.
"AMECA Compliance List of Automotive Safety Devices, Friction Material Edge Codes For Three-Year Period 2009-2012," March 2012, Automotive Manufacturers Equipment Compliance Agency, Inc.

[6] Manufacturers are in 28 countries, including the United States, but none are located in Washington State.

identification code. Multiple entities (such as the manufacturer, industry-sponsored registrar, etc.) could be involved in assigning the unique identification code. Ecology compared the compliance behavior likely under each scenario.

Under the baseline, individual manufacturers would work independently, or if a cost-savings was apparent, develop a centralized information methodology similar to a registrar or central database. If manufacturers worked independently, each would likely have some existing internal method of identifying their own brake friction materials. If manufacturers worked together to facilitate any other compliance behaviors (testing, reporting), they would likely need to create a unique identifier for each brake friction material formulation.

Comparing the adopted rule to the baseline, the adopted rule would not create any additional costs if, under the baseline, manufacturers worked together to facilitate compliance with the Better Brakes law. If, under the baseline, manufacturers worked independently, and only had internal brake friction material identifiers, some degree of coordination would be necessary to additionally determine that each identification code was unique in the industry. This means manufacturers would likely incur a cost under the adopted rule, if they did not work together under the baseline.

Ecology believes it is highly likely that, under the baseline, manufacturers would work together to facilitate compliance via some centralized method for testing, reporting, and recordkeeping. However, it is possible that some or all of the manufacturers could work independently to comply. Therefore, Ecology estimated the costs of having to additionally determine that a brake friction material formulation identification code is unique in the industry.

Ecology assumed that, to comply with this requirement, the industry would create a central database of brake friction material formulations, and individually report to it to be assigned unique identification codes. Ecology estimated the costs of such a system conservatively, using the costs of various services (per manufacturer) for the Automotive Manufacturers Equipment Compliance Agency (AMECA). Each manufacturer would pay a fee for each brake friction material formulation, as well as a set-up cost for establishing the reporter. Ecology assumed the initial set-up cost of a reporting system would be $50 thousand, comparable to Ecology's development budget for a reporting system.

For the 1,461 existing formulations, that would be up to $511 thousand in initial costs, plus up to $154 thousand for 439 new formulations each year.[7] 17 new manufacturers each year would incur up to $55 thousand in initial costs for 157 formulations, plus up to $165 thousand for 47 new formulations each year. Note that these costs are likely conservatively high, as they are based on AMECA costs, which reflects other reporting and recordkeeping behaviors as well. They overlap with other costs of a central registrar used in this analysis, so Ecology calculated their present value costs in combination with

[7] This accounts for recertifications of existing formulations, but Ecology chose to use the higher, more inclusive number as it could not identify which were recertifications.

other industry-sponsored registrar costs, presented in Chapter 5, below, to avoid double-counting.

Note, also, that Ecology used AMECA unit costs because they are readily available and reflect services similar to, or representing, what would be required under the adopted rule. Manufacturers would not, however, be required to use AMECA as the industry-sponsored registrar for the adopted rule.

Recall that if manufacturers found it beneficial and chose to work together to comply with the Better Brakes law, the likely additional cost of the adopted rule's requirement to have unique formulation identifiers would be zero.

3.3.3 Costs of quarterly reporting and recertification

Under the baseline, manufacturers are required to test and report concentrations of copper, zinc, nickel, and antimony, every three years, and to certify that they are in compliance with the law regarding asbestiform fibers, cadmium, chromium, lead, and mercury. Ecology assumed, under the baseline, that manufacturers would submit certification information on the same schedule as they were required to submit baseline concentration information on copper, zinc, nickel, and antimony. This would minimize duplicative testing, recordkeeping, and reporting, and therefore minimize associated costs under the baseline. Under the baseline, there is no recertification requirement.

The adopted rule specifies that manufacturers must submit certification information quarterly. This means for every report of baseline copper, zinc, nickel, and antimony concentrations, 12 reports of certification would be required under the adopted rule. Previously-submitted certification information would not be required to be duplicated within three-year cycles, so the overall content of the reports would be the same as if all reported every three years. In other words, the certification information submitted in each report would just be the newest certified formulations in each quarter – not those previously certified, unless it had been more than three years since their last certification. This means no *additional* certification reporting would happen under the adopted rule – smaller reports would just happen with greater *frequency*.

Ecology estimated the costs associated with submitting certification information quarterly, versus every three years. In this calculation, Ecology assumed that new formulations were certified smoothly over the course of the three years. Ecology used AMECA costs to estimate the costs of certification submission, as up to $350 per formulation. Note that these costs are likely conservatively high, as they are based on AMECA costs, which reflects other reporting and recordkeeping behaviors as well. They overlap with other costs of a central registrar used in this analysis, so Ecology calculated their present value costs in combination with other industry-sponsored registrar costs, presented in Chapter 5, below, to avoid double-counting.

Note, also, that Ecology used AMECA unit costs because they are readily available and reflect services similar to, or representing, what would be required under the adopted

rule. Manufacturers would not, however, be required to use AMECA as the industry-sponsored registrar for the adopted rule.

Recall that if manufacturers found it beneficial and chose to work together to comply with the Better Brakes law, the likely additional cost of the adopted rule's requirement to have unique formulation identifiers would be zero.

3.3.4 Costs of specific brake friction material markings

Under the baseline, manufacturers must mark certification on brake friction materials. Under the adopted rule, manufacturers must mark brake friction materials with a specific set of markings to indicate compliance. Ecology assumed (based on no available contrary information) that all manufacturers likely to incur the additional costs of certification markings already sell brake friction materials across multiple states or continents with printed edge codes on the materials. The additional cost, if any, incurred by manufacturers marking brake friction materials, then, would be the additional cost of marking them specifically as Ecology requires in the adopted rule, as compared to the next-best way of marking them that manufacturers would have used to comply with the Better Brakes law.

Ecology assumed that, to comply with the Better Brakes law's requirement to mark compliant brake friction materials, manufacturers would work within the machinery and supply standards existing to print edge codes. In fact, manufacturers proposed a set of markings during the rulemaking process that is nearly identical to the markings required under the adopted rule, but with Better Brakes certification markings in the middle of the code instead of at the end as adopted. The additional printing was otherwise likely to be identical. Ecology estimated this cost difference as zero, since under both the adopted rule and the baseline, manufacturers would mark brake friction materials with almost identical markings, and likely require the same degree of employee effort to change the programmed edge codes.

3.3.5 Costs of specific packaging markings

Under the baseline, manufacturers must mark certification on brake friction material packaging. Under the adopted rule, manufacturers must mark brake friction material packaging with an industry-determined and trademarked identification mark. This mark would indicate compliance with the rule. Under the baseline, manufacturers might choose to print individual markings on packaging – each incurring design costs, and not reaping marketing benefits associated with universally-understood markings (e.g., the USDA organic symbol, or the Energy Star label), but Ecology assumed manufacturers would develop a universal and restricted-use marking to comply with the baseline. This behavior would reduce and share design and application costs, while creating an environmental compliance mark with prospective marketing benefits.

Comparing the necessary behavior under the adopted rule to likely behavior under the baseline, Ecology estimated zero cost associated with packaging markings. When businesses see a cost-savings from an action (such as centralizing compliance behavior)

or a potential benefit from an action (marketing universal symbols), they are likely to take advantage of these opportunities, in order to maximize profits. Since Ecology expected similar or identical compliance behavior under both the adopted rule and the baseline, no additional cost was estimated for this requirement.

Chapter 4: Likely Benefits of Adopted Rule Amendments

4.1 Introduction

Ecology analyzed the benefits of the adopted rule, compared to the baseline described in section 2.2 of this document. The baseline is the regulatory circumstance in the absence of the adopted rule. In the case of the adopted rule, the baseline is the Better Brakes law, to the extent that compliance behavior is possible under the degree of specificity in the law.

The benefits analyzed here are associated with specific requirements discussed under section 2.4 of this document, including:

- Specifying agencies that accredit laboratories acceptable for testing compliant with the adopted rule, and allowing laboratory testing via a centralized registrar.
- Using a centralized registrar for certification of compliance and baseline reporting.
- Requiring a unique identification code for each accredited formulation.
- Reporting certification information quarterly instead of every three years, and recertification every three years.
- Specific markings for brake friction materials.
- Specific markings for brake friction material packaging.

4.2 Affected entities

The adopted rule (and the governing law) specify requirements primarily for manufacturers (testing, certification, reporting), but do not allow middle-men and end-users to knowingly sell or offer noncompliant brake friction material. This means Ecology analyzed most impacts as a burden borne by manufacturers, with checking for compliance marks as a burden for users downstream. Some or all costs incurred by manufacturers may be passed on to downstream users of brake friction materials, but in the scope of the Cost-Benefit Analysis, this is a transfer of costs, and overall costs across all affected entities are the same.

Ecology estimated the number of manufacturers (and the number of individual brake friction formulations) based on existing lists of manufacturers and brake friction material formulations compliant with SAE edge-code requirements for brake friction materials in 13 states and Puerto Rico. Ecology identified manufacturers exporting to Washington State, and determined that brake friction materials sold in Washington State were likely to be sold at least nationally, if not more broadly. Based on this correlation, Ecology assumed that manufacturers of compliant brake friction materials would likely already print friction-coefficient and manufacturing information on parts.[8]

[8] There are likely brake friction materials available online for direct shipping, that do not currently print any codes and sell to multiple locations, but Ecology must assume compliance with the law in its analysis, and such noncompliant manufacturers and distributors would be likely to be noncompliant under the adopted rule as well. They were not included in this analysis.

4.3 Expected benefits

Ecology assessed the likely benefits resulting from the adopted rule, as compared to the baseline of the Better brakes law.

4.3.1 Benefits of using specified accredited laboratories and allowing centralized testing

Under the baseline, manufacturers are required to use an accredited laboratory for testing samples of brake friction materials. The adopted rule specifies that acceptable accredited laboratories are those accredited by the Washington State Environmental Laboratory Accreditation program, the International Standards Organization, or the National Environmental Laboratory Accreditation Program.

Ecology determined there were likely benefits arising from this element of the adopted rule, based on increased confidence in accredited laboratories. The public and regulators would have secure and consistent information for choosing brake friction products to buy, and as input to future regulation changes.

Manufacturers would also likely experience some benefit from reduced search costs associated with determining a laboratory with sufficient quality to comply with the Better Brakes requirements, among all possible accredited laboratories. Highest-quality laboratories would also likely reduce errors and retesting costs.

4.3.2 Benefits of a centralized certification and reporting registrar

Under the baseline, manufacturers may choose to perform testing, reporting, and certification independently, or they may choose to create a central body to reduce the costs associated with these tasks. Under the adopted rule, a central industry-sponsored registrar is required for these tasks.

If, under the baseline, manufacturers functioned independently in complying with the Better Brakes law, they would benefit under the adopted rule from the cost-savings of economies of scale in testing, reporting, and certification. Since combining testing is only an option under the adopted rule, Ecology assumed manufacturers would consolidate certification and reporting behavior under the adopted rule. Ecology compared the overall costs of a central registrar to the cost of individual reporting.

Based on AMECA fees for existing certification and reporting services, the per-formulation cost is up to $350. Ecology assumed the initial set-up cost of a reporting system would be $50 thousand, comparable to Ecology's development budget for a reporting system.

For individual reporting costs, Ecology used national hourly wage estimates for compliance officers and information/record clerks, of $30.66 and $18.35, respectively.[9] Ecology assumed processing a brake friction material formulation for certification and reporting would take up to one hour.

As this benefit is part of an overall quantification of compliance costs, and to avoid double-counting, Ecology estimated overall present value impacts in Chapter 5, below.

If, under the baseline, manufacturers cooperated to comply with the law, this benefit would be zero, since the behavior and costs would be identical.

4.3.3 Benefits of unique formulation identification

Under the baseline, individual identification codes are not required for brake friction materials. Under the adopted rule, formulations would be required to have unique identification codes within the industry. Ecology determined this requirement would likely benefit middle- and end-users, by reducing search costs to determine whether the parts they are using or selling are compliant with the law.

Ecology could not confidently quantify the size of this benefit, and included it qualitatively in its assessment of the adopted rule.

4.3.4 Benefits of quarterly reporting and recertification

Under the baseline, manufacturers must certify compliance with the law, reporting baseline concentrations of copper, zinc, nickel, and antimony, every three years. There is no requirement to recertify. Under the adopted rule, quarterly certification is required, and formulations must be recertified every three years.

This means for every report of baseline copper, zinc, nickel, and antimony concentrations, 12 reports of certification would be required under the adopted rule. Previously-submitted certification information would not be required to be duplicated within three-year cycles, so the overall content of the reports would be the same as if all reported every three years. Under the adopted rule, brake friction materials must be recertified every three years.

Ecology determined that this requirement likely benefitted the public, regulators, and middle- and end-users of brake friction materials, through improved and up-to-date information. This means the public would have more security in current certification status, regulators would have more immediate and accurate information on which to base future regulatory changes, and middle- and end-users would have a more straightforward search process for determining whether they are using compliant parts. The lattermost of these would likely translate into more efficient purchasing and inventory-maintenance behavior, and ability to comply with the law.

[9] These hourly rates do not include overhead employer costs, as only an hour of time per formulation was not likely to require hiring a new permanent employee or affect the marginal cost of employment.

4.3.5 Benefits of specific brake friction material markings

Under the baseline, manufacturers must mark certification on brake friction materials. Under the adopted rule, manufacturers must mark brake friction materials with a specific set of markings to indicate compliance with the Better Brakes rule. Ecology assumed (based on no available contrary information) that all manufacturers likely to need to comply with the adopted rule sold across multiple states or continents, and already printed edge codes on brake friction materials. The benefit, if any, then of the adopted rule would be the additional benefit of marking them specifically as Ecology requires in the adopted rule, as compared to the next-best way of marking them that manufacturers would have used to comply with the Better Brakes law.

Ecology assumed that, to comply with the Better Brakes law's requirement to mark compliant brake friction materials, manufacturers would work within the machinery and supply standards existing to print edge codes. In fact, manufacturers proposed a set of markings during the rulemaking process that is nearly identical to the markings required under the adopted rule, but with Better Brakes certification markings in the middle of the code instead of at the end as adopted. The additional printing was otherwise likely to be identical. Ecology estimated this benefit as zero, since under both the adopted rule and the baseline, manufacturers would mark brake friction materials with almost identical markings.

4.3.6 Benefits of specific packaging markings

Under the baseline, manufacturers must mark certification on brake friction material packaging. Under the adopted rule, manufacturers must mark brake friction material packaging with an industry-determined and trademarked identification mark, to indicate compliance with the Better Brakes rule. Under the baseline, manufacturers might have chosen to print individual markings on packaging – each incurring design costs, and not reaping marketing benefits associated with universally-understood markings (e.g., the USDA organic symbol, or the Energy Star label), but Ecology assumed manufacturers would develop a universal and restricted-use marking to comply with the baseline. This behavior would reduce and share design and application cots, while creating an environmental compliance mark with prospective marketing benefits.

Since Ecology believes that manufacturers would take advantage of cost-savings and marketing benefits under the baseline, and create a universal, restricted-use compliance marking for packaging, it does not estimate any additional benefit to requiring such a mark under the adopted rule. In either case, wholesalers, retailers, installers, and other middle- and end-users benefit from quick identification of compliant parts, and a high degree of confidence in the meaning of the marking.

Chapter 5: Cost-Benefit Comparison and Conclusions

5.1 Introduction

As discussed in Chapter 1, the Washington Administrative Procedure Act (RCW 34.05.328) requires Ecology to evaluate significant legislative rules to "[d]etermine 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 statutes being implemented."

5.2 Quantifiable costs and benefits

Ecology estimated the total quantifiable costs associated with the changes in compliance behavior described in Chapters 3 and 4. Ecology did not calculate total costs and benefits of quantifiable individual subsections because many of the costs and benefits overlapped (required a central registrar, or changed the timing of payments while changing their size). Overall quantifiable net benefits (benefits minus costs) are calculated here under two scenarios: manufacturers behaving individually under the baseline, and manufacturers joining to use a central testing, reporting, and certification body.

In summary, the individual inputs for quantitative calculations are from costs and benefits listed in Chapters 3 and 4, as follows:

- $50 thousand per manufacturer in initial start-up costs for a registrar or individual registration system.
- 158 existing manufacturers.
- 1461 existing brake friction material formulations (averaging 9.25 formulations per manufacturer).
- 16.5 new manufacturers each year, on average.
- Maximum per-formulation costs of $350.
- Quarterly certification reporting.
- Recertification every three years.
- One hour of compliance officer and clerk time per formulation if independently complying under the baseline
- Compliance officer hourly wage of $30.66
- Information/record clerk hourly wage of $18.35

Assuming that manufacturers would operate independently under the baseline for reporting and certification, Ecology estimated **the total avoided compliance cost of the adopted rule to be over $14 million**. This value is in current dollars, over 20 years, and compares baseline compliance costs of over $21 million to adopted rule compliance costs of $6 million.[10]

[10] Present value calculations use an annual discount rate of 1.58 percent for future dollar exchanges, based on the risk-free historic rate of return on I-Bonds from the US Treasury.

Assuming that manufacturers would cooperate to reduce reporting and certification costs under the baseline, Ecology estimated the **total increased compliance costs of the adopted rule to be over $5 million**. This value is in current dollars, over 20 years.

5.3 Qualitative benefits

As described in Chapter 4, Ecology estimated the following qualitative benefits associated with the adopted rule, regardless of baseline cooperative or individual behavior.

- **Increased public and regulatory confidence** in the quality of laboratories used for certification and baseline testing.
- **Reduced manufacturer search and re-testing costs** to identify laboratories with sufficient quality to satisfy Better Brakes requirements.
- **Reduced costs of certification, reporting, and recordkeeping** (and prospectively testing) associated with using a central registrar.
- **Reduced search and compliance-determination costs for middle- and end-users** associated with universally unique identification codes for brake friction material formulations.
- **Improved and up-to-date information** for the public, regulators, and middle/end-users of brake friction material, with reduced search costs and a better basis for future regulation.

5.4 Final comments and conclusion

Based on the qualitative and quantitative assessment of the likely costs and benefits of the adopted rule, Ecology concluded that there is reasonable likelihood that estimated benefits of the adopted rule exceed its costs.

While Ecology examined the two endpoint baseline scenarios (complete independence and complete cooperation), the likely baseline behavior is somewhere in between. This is true in the case of overall costs, and of unit costs – as more manufacturers cooperate, unit costs fall – so actual net benefits would likely be in between minimum and maximum estimates for this analysis. As the cost and benefit ranges overlap when just looking at the quantifiable compliance cost impacts of the adopted rule, Ecology would conclude that it is likely that the benefits of the adopted rule exceed the likely costs. In addition to the quantifiable costs and benefits, however, there are also qualitative benefits to the public, brake manufacturers, wholesalers, installers, and retailers, and regulators. Based on the combination of quantifiable and qualitative costs and benefits, Ecology concluded that it is likely the benefits of the adopted rule exceed the costs.

Chapter 6: Least Burdensome Alternative Analysis

RCW 34.05.328(1)(d) requires Ecology to "…[d]etermine, after considering alternative versions of the rule and the analysis required under (b) and (c) of this subsection, that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives stated under (a) of this subsection."

Ecology assessed alternative content to the adopted rule, and determined whether it met the general goals and specific objectives of the Better Brakes law (the authorizing statute). Of those that would meet these objectives, Ecology determined whether the adopted rule content was the least burdensome.

6.1 Certification of compliance

RCW 70.28.080 directs manufacturers of brake friction material offered for sale in Washington State to certify compliance with the requirements of the chapter and directs Ecology to develop compliance criteria. These compliance criteria include, self-certification of compliance by brake friction material manufacturers using accredited laboratories.

6.1.1 Certification process

Ecology considered three general certification processes during rule-making:

1. A manufacturer self-certification process without the involvement of Ecology or an industry sponsored registrar.

   Under this certification process a manufacturer would self-certify that their products comply with the requirements of the law. They would independently mark their products and by doing so they would be attesting to the fact that they meet the requirements of the law. Manufacturers would be required to have a basis for marking their products and this must include laboratory testing result from an accredited laboratory.

   Ecology determined that this option would not meet the requirements of RCW 70.285.080 subsection (1) and that this would not meet the goals and objectives of the law. Ecology determined that law requires manufacturers to certify, or attest/confirm in a formal statement to Ecology, that their products comply with the requirements of the law and mark proof of certification on brake friction materials.

2. Manufacturers complete a self-certification form and submitting it directly to Ecology.

   Under this option manufacturers would test their brake friction materials using accredited laboratories and submit self-certification documentation, including

laboratory testing results to Ecology, thereby certifying that their products comply with the requirements of the law.

Ecology determined that this option meets the requirements of the law, however it was found to be more burdensome than selected option for the reasons outlined below.

3. **Selected Option**: Manufacturers complete a self-certification form and submit it to Ecology using an industry sponsored registrar.

   This option allows manufacturers to complete the certification process with the aid of an industry sponsored registrar. The general process is similar to option two, however rather than submitting information directly to Ecology information would first be sent to an industry-sponsored registrar and then transmitted on behalf of manufacturers to Ecology. Under the rule manufacturers are left with the flexibility to choose which organization will act as the industry sponsored registrar.

   This option is deemed to be the least burdensome for the following reasons. First, manufacturers are required by 13 states and Puerto Rico to register their products with a third-party registrar and certify that their products meet certain safety requirements. It is assumed that manufacturers will certify their products using this existing certification system. Allowing manufacturers to report using this system reduces the regulatory burden on manufacturers by allowing them to report through one third party organization for all of their state regulatory needs.

   Second, California's law regulating the contents of brake friction materials requires that manufacturers certify their products using a "third-party testing certification agency". It is assumed that the same entity that is the third party testing certification agency will be able to fulfill the duties of the industry sponsored registrar. Allowing manufacturers to report using a single entity for both states would reduce the burden by eliminating duplicative certification requirements in different states.

   Third, the industry sponsored registrar will fulfill vital market functions by maintaining a list of compliant parts. This is required by Californian's law and it will enable purchasers of brake friction material to quickly and easily determine if the products they are purchasing comply with the requirements of the law, reducing the regulatory burden on wholesalers, distributors, retailers, and installers of brake friction materials.

6.1.2 Certification criteria

With-in the selected certification process Ecology considered the following options for certification criteria:

1. Formula vs. product.

   One brake friction material formulation may be used on many products. For example one formula may be molded in to several different shapes for use on different

vehicles. Ecology considered requiring manufacturers to register each unique brake pad or shoe, but concluded the least burdensome option would be to require that manufacturers certify each friction formulation, which is the current practice in the industry.

2. Laboratory testing frequency.

   Ecology considered requiring manufacturers to submit brake friction materials for laboratory testing at various intervals. Ecology considered requiring testing only once when a friction material is first, certified, requiring testing on each individual batch of friction material, and everything in between, including random sampling of the production line. Ecology determined that the least burdensome requirement meeting the goals and objectives of the law is requiring manufacturers to test once every three years. This is in-line with the current industry practice for re-certification and testing of brake friction materials in accordance with safety requirements in 13 states and Puerto Rico.

   Ecology determined that testing more frequently than this would likely produce unnecessary burden, whereas, less frequent testing would not meet the goals and objectives of Chapter 70.285 RCW.

3. Testing various numbers of pads various number of times.

   During the rulemaking, Ecology considered various options regarding the number of samples a manufacturer would be required to test to demonstrate compliance. Ecology determined that the least burdensome option is requiring testing on one sample of each formula. Each sample of a given formula must then be tested in triplicate.

   Ecology's Manchester Environmental Laboratory Worked with SAE and CA Department of Toxic Substances Control (DTSC) to develop a testing protocol for evaluating brake friction materials for copper, nickel, zinc, antimony, and the other regulated constituents. Part of this process involved the development and testing of several "public domain formulas." Each formula was manufactured by several different manufacturers. When tested there was little variation between products manufactured using the same formulas regardless of which manufacturer made the product. This indicates that there is little variation between batches of brake friction material. For this reason Ecology determined that there was little reason to require testing on more than one sample of a given formula. Scientific experts from the Department of Ecology, in conjecture with SAE and CA DTSC, determined that testing in triplicate is the optimal number of tests to perform on each sample.

4. Self-certification documentation updated quarterly rather than continuously

   Ecology considered requiring manufacturers to submit self-certification documentation in a continuous process, meaning that each time a manufacturer self-

certified a product as compliant with the law they would need to submit the required documentation at that time. Ecology determined that it would be less burdensome to only require that documentation be submitted on a quarterly basis. This is in line with the current practice in the brake friction materials industry of publishing a quarterly report of brake friction materials that comply with state safety standards.

6.2 Accredited laboratories

Ecology considered allowing various third-party organizations to accredit laboratories for the purposes of Chapter RCW 70.285. Ecology determined that the least burdensome option would be the option that included as many laboratories as possible. Due to competition this should provide for the lowest possible cost of testing. However not every third party organization is qualified or equipped to accredit laboratories and it would not be in-line with the goals and objectives of Chapter 70.285 to allow manufacturers to certify compliance using laboratories accredited by these organizations.

Ecology considered each of the following organizations:

1. Automotive Manufacturers Equipment Compliance Agency, Inc (AMECA)

   AMECA currently accredits laboratories to run the mechanical test required by 13 states and Puerto Rico; however at the current time they do not accredit laboratories to conduct any chemical analysis and do not have the capacity to do so. For this reason Ecology did not approve AMECA to accredit laboratories for the purposes of this law.

2. Selected Option: The National Environmental Laboratory Accreditation Program (NELAP)

   Ecology determined that NELAP is a suitable accreditation program and Ecology currently accepts lab results from labs accredited by this organization for other programs.

3. Selected Option: The Washington State Laboratory Accreditation Program

   Ecology determined that the Washington State Laboratory Accreditation Program is a suitable accreditation program and Ecology currently accepts lab results from labs accredited by this organization for other programs.

4. Selected Option: Laboratory accreditation organizations that accredit to the ISO 17025, and are signatories to the International Laboratory Accreditation Corporation Mutual Recognition Arrangement

   Ecology determined that for the purposes of implanting this law these organizations were qualified to accredit laboratories for certification. Laboratory results from labs accredited by ILAC arrangement signatories can be used for various purposes with the U.S. Nuclear Regulatory Commission, the EPA, and for implementing parts of the Consumer Product Safety Improvement Act of 2008.

Ecology considered limiting this option to only those laboratory accreditation organizations that accredit to the ISO 17025 standard and are located with-in the United States, but concluded that there are other laboratories around the world that are also qualified and equipped to perform this testing and that it would be more burdensome to exclude these laboratories, particularly when many manufacturers are located overseas.

5. Selected Option: Other laboratories as approved by the Department

   Ecology acknowledges that there may be other bodies that are qualified and equipped to accredit laboratories for the purposes of this chapter. However, we were unable to identify these during the rule making process. These laboratories accreditation organizations may apply under the rule to accredit labs for the purposes of implementing this law, provided that they can demonstrate that they are equivalent to or better than the laboratory accreditation bodies listed above.

6.3 Markings on brake friction materials and packaging

6.3.1 General goals and specific objectives of the marking requirements in Chapter 70.285 RCW

RCW 70.28.080 directs Ecology to develop compliance criteria to meet the requirements of the law. These compliance criteria include, "marked proof of certification, including manufacture date, on brake friction material and product packaging." The term "marked proof of certification" is not defined by the law and does not appear to be a term that has been used before.

Ecology determined that general goals and specific objectives of 70.28.080 are two-fold. First the marking on the packaging and brake friction material are intended to communicate that a product has been certified to meet the requirements of the law, so that those down the supply chain can quickly and easily identify that they are selling and purchasing products that are compliant with the law. Second the markings on the brake friction material and product packaging are intended to provide proof that a given product has been certified, by linking the product to laboratory testing results.

Ecology worked with the Society of Automotive Engineers to identify marking schemes used in other states or by the federal government, to determine the constraints of current marking technology with-in the brake friction materials industry, and to determine the feasibility of various marking schemes.

6.3.2 Current state marking requirements

While Washington state does not require brake friction material manufacturers to mark their products, manufacturers are currently required to mark brake friction materials by 13 states and Puerto Rico and most brake friction material sold in the United States is

marked. These 13 states and Puerto Rico require that brakes be marked with a code containing the following information:

- The manufacturer of the brake friction material, which may be abbreviated by not less than two letters.
- A unique identifier for the formula of the brake friction material.
- The hot and cold coefficients of friction of the brake friction material.

The code must appear on the non-contacting surface of the friction material or the back plate, it must appear in the order listed above, and it must be of a certain size. These markings are commonly referred to as an EdgeCode.

In considering various marking schemes, Ecology only considered marking schemes that would work in harmony with other states' marking requirements. It should be noted that the Department of Ecology does not have the legal authority to require manufacturers to mark products with the hot and cold coefficients of friction - as this is essentially a safety marking. The Washington State Patrol would be the appropriate regulating entity for this marking.

In light of these facts, all of the various marking schemes Ecology considered placed any additional markings to the right of any markings required by other states or alternatively, if the brake products are not sold in states requiring an Edge Code, a unique identification code identifying the manufacturer of the friction material and its formula.

After the Washington state passed Chapter 70.285 RCW, California passed a similar piece of legislation phasing copper and other materials out of brake friction materials. While the two laws are similar there are several differences including differences that limit certain options for marking brake friction materials. Ecology worked closely with California's Department of Toxic Substances Control to develop marking requirements for Washington state that would meet the needs of both states and facilitate the adoption of a single marking scheme.

6.3.3 Constraints on existing marking technologies

The SAE has informed Ecology that, the brake friction materials industry primarily relies on three marking technologies to mark their products. These are an ink-jet printing technology, a laser printing technology, and metal stamping the marking into the back plate of the brake. There may be other marking technologies used by the brake friction materials industry, but Ecology was not informed of these and it is assumed that if there are other technologies they are used infrequently.

Ecology was unable to identify a marking scheme that meets the requirements of the law and could be implemented by manufacturers for zero additional cost. A manufacturer that currently use stamping technology informed Ecology that they will need to invest in new stamping equipment or transition to an ink-jet or laser printing process if they are required to add any additional markings to the brake friction material. This manufacturer informed Ecology that they were one of the last companies to still stamp their products. It

is assumed that other companies using stamping technology may be required to invest in new equipment if they are required to add any additional information to the existing code.

SAE identified two primary constraints on the marking technologies currently employed by the brake friction materials industry. The first constraint is that most of the ink-jet and laser printers can only produce alpha-numeric symbols, such as those found on a standard keyboard. The second is space. On some of the smaller pads there is limited room to mark brake friction materials. If the required code is too long some manufacturers may not be able to print a legible code onto the fiction material.

The SAE did not identify any technological constraints on the mark that must appear on the product packaging.

6.3.4 Considered brake friction material marking schemes

Ecology considered the following options for the environmental marking to appear on brake friction materials:

1. Not requiring any markings on brake friction materials or requiring only the manufacturer and formulation identifier required by other states.

   These options would not have met the minimum requirements of RCW 70.285.080. RCW 70.285.080 requires that brake friction materials be marked with proof of certification, including manufacture date on brake friction materials and packaging. Meaning that brake friction material must be marked with the date it was manufactured and some proof that it had been certified. The current marking scheme used by industry does not contain the date of manufacture.

2. Marking the complete date on the edge-code.

   Ecology considered requiring manufacturers to mark the complete date of manufacture on brake fiction material. However, as all of the effective dates in the law are January 1st, there was no regulatory reason to include more than the last two digits of the year of manufacturer. One could determine if a pad was compliant using only the year of manufacture on the product. Faced with concerns over limited space, Ecology determined that there was no need to require the entire date be marked on the brake friction material.

3. Requiring only the last two digits of the year of manufacture to be added to the existing edge code scheme without any additional information.

   Ecology determined that it would be possible to identify if a brake friction material was compliant using only a code indicating the manufacturer, formulation, and last two digits of the year of manufacture and that a marking scheme using only these pieces of information could meet the requirements of the law. In so much as a person could take the information marked on the product and look up the edge code on the publicly accessible database or list, required by the rule, to determine if a product complied with the requirements of the law.

The cost of adding additional information that would identify the level of environmental compliance and enable a person to determine if a product complied with the requirements of the law without looking it up on the internet is expected to be incremental for ink-jet and laser printing technologies. Whereas the burden on other people to determine if the product they are selling is compliant with the law would be substantial.

In addition, this marking scheme would likely not meet the requirements of a similar California law regulating the copper content of brake pads. Whereas Washington state's law is based on the manufacture date of the brake friction material, California's law is based on the model year of the vehicle for which the material is intended. Meaning that to determine if a brake friction material may be placed on a vehicle one must know the copper content of the brake friction material. For example, in California a brake pad manufactured in 2026 may contain >5% copper by weight provided it is installed on a vehicle manufactured prior to 2021.

If this option were selected California would likely need to create a separate marking system. This could require that manufacturers mark products in two separate ways. The brake friction material manufacturers currently manufacture products for sale in the NAFTA region and have said that it is not economical to produce products for a specific state. Having two marking systems would place a significantly burden on the brake friction materials industry.

4. Marking brake friction materials with a non-alpha numeric symbol such as the certification mark and the last two digits of the year of manufacture.

   Ecology considered requiring manufacturers to mark brake friction materials with a non-alpha numeric symbol to indicate compliant products. According to the SAE, many manufacturers marking systems can only produce alpha numeric markings. Requiring non-alpha numeric symbols would require many manufacturers to purchase additional marking equipment and would be more burdensome than the selected option.

5. Marking brake friction materials with two letters indicating the level of environmental compliance and the last two digits of the year of manufacture.

   Ecology considered requiring manufacturers to mark brake friction materials with two letters indicating the level of compliance of the product. This option meets the requirements of the law and could convey all the required information. However when this option is compared to the selected option of using only one letter for each of the levels of environmental compliance, this option is found to be slightly more burdensome. This is due primarily to size constrains on some brake friction materials. The department determined that a scheme using one letter could convey the same information as the two letter scheme and was as easy to understand if not easier as it avoided the possibility of confusion resulting from miss-identifying the hot and cold coefficients of fiction as the environmental compliance markings, or vice versa.

6. **Selected Option**: Marking brake friction materials with a letter or letters indicating the level of environmental compliance and the last two digits of the year of manufacture.

   Ecology considered the following options regarding the placement and order of the environmental marking to appear on brake friction materials:

7. Requiring all edge codes to be placed on the back of the pad/shoe so they would not wear.

   Ecology considered requiring that brake friction materials be marked on the back of the pad or shoe where the edge codes could not wear off. Brake friction materials are currently marked on the side or on the back of the product. It is possible that the marking on the side of the brake friction material may wear off as the product is used on a vehicle. Ecology determined that it would impose significant costs on manufacturers to reconfigure or purchase new equipment to mark brake friction materials and that the law could be implemented using the current practices within the industry.

8. Placing the environmental compliance markings to the left of the optional batch code used by some manufacturers.

   Some manufacturers mark brake friction materials with optional batch code information. This information indicates when a brake friction material was made and may be used to aid manufacturers in fulfilling federal requirements. Ecology considered placing the marking to the right of the code indicating the manufacturer of the brake friction material, its formulation, and possibly the hot and cold coefficients of friction, but before the optional batch code information. This option would meet the requirements of the law, however there was concern that people could possibly be confused about where to look for the environmental code that this would make the code confusing. This could increase the costs of compliance for those further down the supply chain. Ecology did not identify any additional manufacturing costs associated with the order of the environmental markings as they appear with-in the edge code as long as they fall to the right of the information required by other states.

9. Ecology considered requiring that the environmental marking be ordered with the date to the left of the letter indicating the level of environmental compliance and to the right of the optional batch code information.

   This option would meet the requirements of the law, however there was concern that people could possibly be confused, as the batch code is often a long string of numbers. This could lead to confusion about when the product was manufactured. This may increase the costs of compliance for those further down the supply chain. Ecology did not identify any additional manufacturing costs associated with the order of the environmental markings as they appear with-in the edge code as long as they fall to the right of the information required by other states.

10. **Selected Option**: Placing the environmental markings to the right of the optional batch code information, with the year of manufacturer following the letter or letters indicating the level of environmental compliance.

6.4 Marking packaging

Ecology considered the following options for the required packaging mark:

1. Marking the Date on The Product Packaging

   Ecology considered requiring brake friction material manufacturers to mark brake friction material packaging with the year the product was manufactured. Ecology determined that this would be impractical because it could lead to confusion about when a product was manufactured. For example, Ecology heard that there are instances where product is re-boxed after it is manufactured. These products may be manufactured in one year and then put in a box that is marked incorrectly. Also manufacturers may order packaging and store it, meaning that a product may be manufactured in one year and placed in a package manufactured the previous year. Ecology determined that it would be clearer and less burdensome to those down the supply chain to only require the date of manufacture on the brake friction material.

2. A Specific Ecology Identified Mark

   Ecology concluded that a specific mark identified by Ecology would be an inappropriate type of mark, because it is not economical for manufacturers of brake fiction material to manufacture products for a single state. California's similar brake friction material law does not have a requirement that packaging be marked, however a Washington specific mark appearing on product packaging could lead to possible confusion in CA due to difference between the two laws and what can be sold in each state and when. Ecology was also concerned that in the future another state could adopt differing environmental standards for brake friction material and that having a Washington only marking requirement could become burdensome in the future.

3. **Selected option**: A certification mark that has been registered with the United States Patent and Trademark Office

   Ecology conducted a review of the types of legally recognized marks currently used in commerce within the United States, including trademarks, service marks, collective marks, and certification marks. After reviewing each of the types of marks Ecology concluded that the only type of mark that meets the goals and objectives of the law is a certification mark.

6.5 Exemption process

Chapter 70.285 RCW grants manufacturers of motor vehicles and brake friction materials the right to apply to Ecology for an exemption from the requirements of the law. The law explains that exemptions may only be issued for small volume motor vehicle manufacturers, specific motor vehicles models, or special classes of vehicles. These exemptions may only be

granted when complying with the requirements of the law is not feasible, does not allow compliance with safety standards, or causes significant financial hardship.

Prior to establishing the exemption process contained in the rule, Ecology reviewed exemption processes in other laws and regulations concerning chemicals in products and evaluated the process outlined in Californian's brake fiction material law. After evaluating these alterative processes Ecology determined the minimum information that would be required to determine if an exemption could be granted.

Ecology then explored the option of harmonizing our exemption process with the extension process outlined in California's brake friction material law. However California's process is significantly different and grants an extension rather than an exemption. Ecology determined that it would not be practicable to harmonize with California in this regard.
Ecology also considered not specifying timelines in the rule for each of the steps in the certification process. Ecology considered instead stating that manufacturers and Ecology shall fulfill their respective obligations within a reasonable period of time. Manufacturers objected to this proposal and said that they would prefer that there be specific timelines in the rule to ensure a predictable and timely process.

After evaluating these various alternatives, Ecology determined the selected exemption application process is the least burdensome option that meets the goals and objectives of RCW 70.285.

6.6 Reporting requirements

RCW 70.285.070 requires that brake friction material manufacturers report data adequate to enable the department to determine the concentrations of copper, nickel, antimony, and zinc in brake friction materials sold or offered for sale in Washington State. Manufacturers must report this information by January 1, 2013, and at least every three years thereafter. The law directs ecology to use this information to calculate a baseline, track progress on copper reductions, and monitor the levels of the other elements in brake friction materials. Ecology considered the following options for implementing this reporting requirement:

1. **Selected option**: Ongoing reporting requirements are fulfilled by data reported as part of certification

   Prior to determining what data would be required for reporting, Ecology determined the certification process. When Ecology compared data required for certification with the data required for reporting, Ecology concluded that the testing data used for certification was similar to the data required for ongoing reporting requirements under RCW 70.285.070. Data for nickel, zinc, and antimony can be collected using the same analytic test method. As such Ecology determined that testing data provided as part of the certification process is adequate to enable the department to determine concentrations of copper, nickel, zinc, and antimony in brake friction materials sold or offered for sale in Washington State. Due to time constraints it was not feasible to test all brake friction materials for the initial baseline report. As such all brake friction material manufacturers can provide a baseline report using producer knowledge of the brake friction material formulation as opposed to testing results.

2. Requiring manufacturers to report data specific to Washington state

   Ecology considered requiring manufacturers to report data specific to Washington State. Manufacturers informed us that they could not provide Washington state specific data. Once they manufacturer a product they sell it to a distributor who may sell the product into various states. Manufacturers informed us that it would be nearly impossible for them to track which formulas and in what amounts are sold into Washington State. Ecology concluded that it could meet the goals and objectives with national baseline data.

3. Reporting Using an Industry Trade Association

   Ecology considered allowing industry to report the average concentration of copper, nickel, antimony, and zinc in brake friction material in Washington State. Ecology determined that this would not meet the goals and objectives of the law. RCW 70.285.070 directs the Department to calculate the baseline using information provided by manufacturers. Ecology determined that to meet this objective Ecology would have to perform the final calculations and determine the baseline. This option did not meet this objective.

4. Reporting by New Vehicle Model

   Ecology considered allowing manufacturers to report the concentrations of these elements in friction materials for the 40 most popular models of cars manufactured in 2011. Ecology determined that this option would not meet the goals and objectives of the law. The law directs manufacturers of brake friction material sold offered for sale in Washington State to report data and this reporting option would only require manufacturers of brake friction material used on new cars to report. Many manufacturers of brake friction material sold or offered for sale in Washington State only sell parts in the aftermarket and these manufacturers would not be required to report under this option.

5. Reporting a Company Volume Weighted Average

   Ecology considered requiring each company to report the baseline concentrations for each of the elements in all friction materials produced by the company as a volume weighted average. For example if a manufacturer made 9 pounds of material X, containing 10 percent copper by weight, and one pound of material Y, containing one percent copper by weight that the company's volume weighted average would be 9.1 percent copper by weight. Ecology concluded that this option would meet the goals and objectives of the law; however manufacturers informed Ecology that this information would be difficult to calculate due to various limitations on how manufacturers store information about what is produced. Manufacturers proposed an alternative which was selected.

6. **Selected option**: Concentrations of each of the elements in each formulation manufactured by a manufacturer

   Under the selected option manufacturers provide the design intent for each formula they manufacturer. Meaning that each manufacturer will provide the department with the percent by weight of each of the elements in each of the materials they manufacture. This option meets the goals and objectives of the law and was proposed by manufacturers. Ecology assumes that this manufacturer proposal is the least burdensome option for manufacturers to meet the requirements of the law.

6.7 Original equipment service contract exemption

RCW 70.285.030 (5) and (6) exempt brake friction materials manufactured as part of an original equipment service contract from certain requirements of the law. “Original equipment service contract” is not defined by the law. However the law does provide a definition of “original Equipment service”:

"Original equipment service" means brake friction material provided as service parts originally designed for and using the same brake friction material formulation sold with a new motor vehicle.

Ecology considered two options for defining which brake products are exempted under this law:

1. Identical Service Parts

   Ecology considered defining this exemption to include only those service parts that are identical to those that originally came with the new motor vehicle. This definition would meet the goals and objectives of the law. However, the Alliance of Automobile Manufacturers informed Ecology that this definition would extremely difficult to implement given that there may be small design changes made to a brake part after a car is initially sold. These changes may be made to fix issues identified after a vehicle has been released, such as brake noise or judder. These changes are expected to be minor de minimums changes. If this option were selected it would cause a significant burden on vehicle manufacturers as they would have to redesign an entire brake to correct a minor issue that could be corrected for by making a small de minimums change to the brake design.

2. Selected Option: Identical Brake Friction Material Formulation

   Under this definition brake friction materials that have the same brake friction material formulation that came with the vehicle would be exempted from certain requirements of the law. This definition provides some flexibility to manufacturers of motor vehicles to make small design changes to a service part, while still meeting the goals and objectives of the law.