Appendix A
Cost-effectiveness Analyses for Select Alternatives in ISOR

Data Collection Methods

The costs estimated for Alternatives #1 through #3 are based on the following data sources:

- NSF Listing for SAE J2975 Measurement of Copper and Other Elements in Brake Friction Materials, July 6, 2015.
- Phone conversation with Radek Markiewicz/Link Engineering regarding the unit cost per sample analyzed using SAE J 2975, February 7, 2014.
- Phone conversation with David Schenk/NSF International regarding the unit cost to register a brake friction material, February 5, 2014.
- California Environmental Protection Agency Enrolled Bill Report, Subject: Hazardous materials: motor vehicle brake friction materials, SB346/August 25, 2010, page 12.

Data Calculations

The assumptions used to calculate costs are listed below for each alternative and also listed as the first page of each spreadsheet included in this appendix.

Future value calculations used the following formula:

$$FV = PV \times (1 + r)^n$$

Where FV = Future value
PV = Present value
r = Rate of return
n = Number of periods or years from present value

Equivalent annualized cost was calculated using the following formula:

$$EAC = \frac{NPV}{A_{t,r}} \qquad A_{t,r} = \frac{1 - \frac{1}{(1+r)^n}}{r}$$

Where EAC = Equivalent annualized cost
NPV = Net present value
$A_{t,r}$ = Present value of annuity factor

The present value of annuity factor was assumed to be 1.58 percent[1] based on the present value calculations performed by the State of Washington in as part of their regulation's cost-benefit analysis.

Alternative 1: No action (current conditions)

For Alternative 1, the following assumptions used to estimate the baseline:

- 5,016 brake friction material formulations for 106 brake friction material manufacturers have been:
    - Tested using SAE standard J 2975:2011,
    - Marked in accordance with SAE standard J 866:2012
    - Certified and registered by NSF International, Inc.
- 2,023 brake friction formulations have been tested, certified, registered and marked as meeting the 2014 restrictions in Health and Safety Code section 25250.51
- 889 brake friction formulations have been tested, certified, registered and marked as meeting the 2021 restrictions in Health and Safety Code section 25250.52
- 2,104 brake friction formulations have been tested, certified, registered and marked as meeting the 2025 restrictions in Health and Safety Code section 25250.53
- Brake friction manufacturers are using the self-certification process outlined in the State of Washington regulations for testing, certifying, registering and marking the brake friction material.
- Brake friction material certified as compliant with:
    - The 2014 requirements are not required to be recertified.
    - The 2021 requirements under the State of Washington regulations (which are similar to the requirements under Health and Safety Code section 25250.52) are recertified every 3 years.
    - The 2025 requirements under the State of Washington regulations (which are similar to the requirements under Health and Safety Code section 25250.52) are recertified every 3 years.
- Brake friction material manufacturers mark the packaging of products with complaint brake friction material with a packaging logo owned by AASA (the three-leaf mark).
- Brake friction material manufacturers are currently registering their material with NSF International that meets the following criteria:
    - Has been identified by MEMA,
    - Meets the definition of a registrar under the State of Washington regulations,
    - Has a contract with AASA, an industry association, to use the AASA package logo on products that comply with the requirements of the State of Washington regulations and California statute,
    - Is an ANSI certified product certification agency,
    - Meets the electronic data submittal requirements for the State of Washington, and

[1] State of Washington Department of Ecology, Final Cost-Benefit and Least Burdensome Alternative Analysis, Chapter 173-901 WAC, Better Brakes, August 2012.

    - Has identified analytical laboratories for testing brake friction material using SAE J 2975:2013.
- Accredited laboratories used by NSF International meet the following criteria:
    - Are accredited by NELAC, ILAC or meet the ISO 17025 standard that is listed in the State of Washington regulations, and
    - Are able to perform the analyses required in SAE J 2975:2013.
- The Department will use the process outlined in Health and Safety Code section 25250.54 for requests for a time extension to the 2025 requirements in Health and Safety Code section 25250.53. The fee for this alternative is based on the assumptions provided in the Cal/EPA Enrolled Bill Report for SB 346/August 25,2010[2]:
    a. Solicit and collect advisory committee nominations
    b. Travel costs for advisory committee
    c. Extension protocol (identify fee, develop advisory committee application fee, develop MOU for ARB and SWRCB costs, develop database for tracking extension requests
    d. Receipt of extension requests, review, share with advisory committee and support for advisory committee
    e. Support for Agency Secretary in his/her final decision for each extension request received
    f. Costs associated with appointing the advisory committee will be incurred by January 1, 2019 in accordance with the statute.[3]
    g. Costs associated with the extension protocol are assumed to be a one-time cost that is incurred on January 1, 2019.
    h. Renewal of approved extensions will be good for 2 years.
    i. Assume all extensions issued prior to January 1, 2025 become effective on January 1, 2025
    j. Extensions issued prior to January 1, 2025 will expire on the following dates depending on the time period request by the manufacturer
        i. January 1, 2026 (1-yr extension)
        ii. January 1, 2027 (2-yr extension)
        iii. January 1, 2028 (3-yr extension)
    k. The fee associated with an extension request is assumed to be the same regardless of whether the duration of the extension is 1, 2, or 3 years. It is assumed the manufacturers will initially request a 3-year extension
    l. Assume the bulk of the extension requests will be received between 2023 and 2025 with 1 extension request each year received prior to 2023 and one new extension request received each year after 2025.

[2] California Environmental Protection Agency Enrolled Bill Report, Senate Bill 346/August 25, 2010, Subject: Hazardous materials: motor vehicle brake friction materials, page 12.
[3] Health and Safety Code section 25250.54(a).

m. Assume in 2023/2024 888 extension requests will be received from 60 manufacturers based on the "B" formulations data from the NSF International registration site as of 7/6/2015. Each extension request will be for one (1) vehicle platform.
n. The extension process is estimated to take approximately 1 year to complete based on the requirements in the statute.
o. The extensions approved under this process are not assumed to be recognized by the State of Washington.

Estimated Costs for Alternative #1:

Currently, the costs incurred by brake friction material manufacturers are estimated between $ 3,150 and $2,005,830 associated with testing their brake friction materials and between $320 and $310,080 for registering their materials with a third-party testing certification agency depending on the number of formulations registered[4]. Based on past conversation with representatives from the brake friction material industry, the retooling costs to incorporate the marked proof of certification on the brake friction material is estimated to be up to $250,000 and has already been incurred. Since the conditions discussed in this alternative reflects the standard practices currently used by the brake friction material manufacturers and other affected stakeholders, this alternative is also considered the baseline condition.

DTSC estimated the costs associated with recertifying brake friction material until 2032 when the extension program will sunset for all vehicles except heavy duty vehicles.[5] Recertification costs for material that meet the requirements under H& S Code section 25205.51 were estimated to be zero since these materials are not required to be recertified under the State of Washington regulations.[6] The recertification cycle and costs for brake friction material compliant with H&S Code section 25250.52 and 25250.53 were based on the expiration dates and number of registered brake friction materials as reported on the NSF International Web page as of 7/6/2015[7].

DTSC also estimated the recertification costs for brake friction material that meet the requirements of H&S Code section 25250.52 will range from $3,470 to $432,590 depending on the number of materials registered. For materials compliant with H&S Code section 25250.53, the recertification costs were estimated to range from $3,470 to $869,960. It is also assumed that brake friction material manufacturers will stop recertifying this material in 2023 since copper concentrations will need to be reduced to 0.5% by weight starting on January 1, 2025.

Under the statute, DTSC is tasked with setting up an advisory committee, and overseeing and coordinating the extensions through the review process, stakeholder comment solicitation, public review process and public hearing(s). The Cal/EPA Secretary will review recommendations from the

[4] Based on the NSF Listing for SAE J2975 Measurement of Copper and Other Elements in Brake Friction Materials, July 6, 2015.
[5] Cite H&S Code section here 25250.54(?)
[6] Cite Stat of Washington regulation section here
[7] http://info.nsf.org/Certified/autorp/listings.asp?standard=SAEJ2975

advisory panel and decide whether an extension is approved or denied. DTSC "shall assess a fee for each application for an extension sufficient to cover actual costs incurred in implementing this section."[8] The fee for one extension request from one manufacturer is estimated to be $160,449. This fee may vary depending on the number of extension requests a manufacturers submits to the Department, the number of manufacturers that request an extension, and the need to assemble a second advisory committee if the use of the brake friction material is outside the current advisory committee's expertise. Currently, the cost to DTSC is one PY to answer questions related to compliance, maintain communication with the State of Washington and stakeholders, and resolve potential issues related to the testing, marking, certification and registration of brake pads.

Alternative 2: Develop a regulation with a unique process to certify and mark brake friction materials sold in California

Alternative 2 assumes DTSC adopts regulations that:

- Develop a certification process that is similar to the current certification process but includes
    - the testing certification agency to submit testing results and data to DTSC on a quarterly basis
        - Set-up secure location for potential trade secret/confidential business information received
        - Set-up a secure location for testing results and data received from the testing certification agency
        - Set-up an encrypted FTP server for testing results and data sent by the testing certification agency
        - Establish format that data and test results to be used by the testing certification agency when sending this information to DTSC
        - Establish training for staff working with test results or data that have been declared trade secret or confidential business information
    - the testing certification agency applying for access to the DTSC packaging logo
    - DTSC registers as a scheme owner with ANSI to develop a certification scheme for brake friction materials
        - Develop a certification scheme for brake friction materials in accordance with ISO/IEC 17067, "Fundamentals of product certification and product certification schemes" which will include
            - Testing and calibration requirements
            - On-site inspection requirements
            - Certification requirements
- Uses the marking format described in J 866:2012,
- Uses the testing methodology described in SAE J 2975:2013
- Adopts a trademarked packaging logo owned by DTSC

[8] Health and Safety Code section 25250.54(j).

    - To limit access and potential abuse of the package logo
        - Set-up and sign contracts with each testing certification agency to grant them access and permission to issue the package logo.
        - Set-up an agreement that is signed by non-government organizations that request access to the package logo as part of their outreach activities.
- Analytical laboratories will be accredited using the similar accreditation requirements proposed in Alternative 3.
- The extension process would be similar to the process developed for the proposed regulation in Alternative 3.

Estimated costs for Alternative #2:

Under this alternative, the estimated costs to the brake friction material manufacturers are similar to Alternative 1 for testing and marking the brake friction material for compliance. Brake friction material manufacturers will not see an increase in costs associated with certifying and registering their brake friction material with the testing certification agency since it is assumed DTSC will perform the direct oversight (i.e., inspections) and the testing certification agency will post and maintain the registration list for the products. Brake friction material manufacturers, distributors and importers will see an increase in cost due redesigning/reformatting product packaging to include another packaging logo.

DTSC will have higher operation costs with this alternative since DTSC will be responsible for overseeing and maintaining a certification process that meets ISO 17065. Although the testing certification agency will manage and maintain the registration data, DTSC will also be responsible for performing on-site inspections, data evaluation, and data management. As part of data management, DTSC's operational cost will increase due to the handling of sensitive documentation (i.e., encrypted data with trade secret information, storage units for paper and electronic data, etc.), and possible non-disclosure agreements between DTSC and the brake friction material manufacturers.

Under ISO 17065, conformity assessment is defined as the "demonstration that specific requirements relating to a product, process, system, person or body are fulfilled."[9] Conformity assessment is intended to increase consumer confidence in the product certification by demonstrating specific requirements or standards are fulfilled. By requiring conformity assessment as part of the certification process, the potential benefit is increased confidence in the certification process and associated packaging logo by consumers. However, this benefit is offset by an increased cost due to the direct oversight required by DTSC as the scheme owner. Since the brake friction material manufacturers, testing certification agencies and qualified laboratories are located outside of California and the United States, the administrative and travel costs to DTSC will cause our operational costs to increase and there is no mechanism in the current statute to recoup these costs. The statute only allows the Department to assess a fee as part of the extension process outlined under H&S Code section 25250.54.

Recertification costs for this alternative will be higher than Alternative 1 and 3 due to the addition of conformity assessment. By adding conformity assessment, this alternative will cause the recertification

[9] ISO, Building Trust The Conformity Assessment Toolbox, 2010.

of brake friction materials to be "out-of-sync" with currently certified brake friction materials since DTSC will need to develop a certification scheme. It will also require brake friction material manufacturers to certify the same brake friction material twice; once to meet the current process used for the State of Washington, and then again using the process developed for California. This alternative will also introduce a second expiration date which will complicate the marking of brake friction material and create confusion amongst the retailers and consumers who are attempting to identify compliant brake friction material.

The extension process for this alternative will be similar to the one in Alternative 3, the proposed regulations. DTSC estimates the cost associated with processing one extension for one manufacturer to be $173,162 (see cost listed on page A-). This cost will be the basis of the fee that a manufacturer pays DTSC to process their extension request. This fee may vary for each manufacturer depending on (1) the number of extension requests submitted to the Department, and (2) the need to assemble a second advisory committee if the request describes a brake friction material use that is outside the current advisory committee's expertise.

Alternative 3: Proposed regulation (selected alternative)

DTSC has determined that no reasonable alternative has been identified and brought to the attention of DTSC that would be: (1) more effective in carrying out the purpose of the proposed regulation, (2) would be as effective and less burdensome to affected private persons than the proposed regulation, or (3) would be more cost-effective to affected private persons and equally effective in implementing the statutory policy.

For Alternative 3, the following assumptions were used:

I. Self-certification performed by the brake friction manufacturers to meet the 2014, 2021, and 2025 California requirements.
    1. The proposed regulation incorporates self-certification steps similar to the ones in the State of Washington regulations

II. Products marked by the brake friction manufacturers to meet the 2014, 2021, and 2025 California requirements.
    1. The proposed regulation requires a process similar to the one in the State of WA regulations.
    2. The proposed regulation cites SAE J 866:2012 as the standard to use to mark certified brake friction material.

III. Brake friction manufacturers register their products that are complaint with the 2014, 2021, and 2025 California requirements with a testing certification agency (registrar).
    1. The proposed regulations require an organization that wishes to be a "Testing certification agency (TCA)" to submit their certification requirements to the Department for approval. These certification requirements include:

a. a copy of the package logo that will be issued to manufacturers whose product is compliant with either the 2014, 2021 or 2025 requirements
b. Documentation that the organization is certified under ISO 17065

2. The TCA identifies the analytical laboratories qualified to perform SAE J 2975:2013 on brake friction material.
3. As part of the TCA certification requirements, the brake friction material that is compliant with:
    a. The 2021 and 2025 requirements are recertified every 3 years.
    b. The 2014 requirements are not required to be recertified.

IV. Brake friction manufacturers test their material to show compliance with the 2014, 2021, and 2025 requirements in the California statute.

1. The proposed regulation requires brake friction material be tested for compliance using SAE J 2975:2013.
2. The proposed regulation describes a process to request approval of alternative testing methods not included under SAE J 2975:2013.
3. All approved alternative test methods will be available for use by all affected parties and not limited to the applicant.
4. Brake friction material manufacturers, accredited laboratories and the testing certification agency may request the Department to approve an alternative test method.

V. Accredited laboratories are used by brake friction manufacturers to certify their products are in compliance with the California statute.

1. The proposed regulation requires analytical laboratories to be accredited by NELAC, ILAC or meets the ISO 17025 standard for test method SAE J2975:2015 and describes a process for approving other accreditation standards not listed in the regulation.
2. All approved alternative accreditation standards will be available for use by all affected parties and not limited to the applicant.
3. Brake friction material manufacturers, accredited laboratories and the testing certification agency may request the Department to approve an alternative accreditation standard.

VI. Manufacturers request the Department to grant an extension to the 2025 requirements.

1. The Department needs to establish the extension process by January 1, 2019
    a. cost associated to appoint the advisory committee [66387.9(d)(1)]
        i. Staff time to set-up/review/select Advisory Panel
    b. travel costs incurred for each advisory committee meeting held {66387.9(d)(2)];
        i. Travel costs incurred by the Advisory Panel for each advisory panel meeting held
        ii. Staff time to coordinate/manage/process the Advisory Panel travel expense claims

c. cost associated for Department staff time spent overseeing and coordinating the extensions through the review process, stakeholder comment solicitation, public review process and public hearing(s) [66387.9(d)(3)]
    i. Staff time to facilitate Advisory Panel meeting to meet Bagley Keene requirements
    ii. Staff time to set-up tracking system for extension requests received
d. cost associated with California Air Resources Board staff time to review submitted extension requests [66387.9(d)(4)]
e. cost associated with the State Water Resources Control Board staff time to review submitted extension requests [66387.9(d)(5)]
f. cost associated with a 60-day public comment period on the recommendation of the advisory committee[66387.9(d)(6)] ; and
g. Cost associated with the secretary's time to review, and approve or disapprove a submitted extension request.
    i. Cal/EPA Secretary's time to approve/deny extension requests
h. Staff time to set-up a MOU or MOA with the SWRCB and CARB to review and comment on extension requests
i. Staff time to set-up a MOU or MOA with the Cal/EPA Office for the Secretary's time to approve/deny extension requests
j. Staff time to set-up fee system and billing process

2. Fee for extension process will be based on items a, b, c, d, e, f, and g listed above.

3. The cost to the state will be due to items h, i, and j above. DTSC, the SWRCB, CARB, and CalEPA will absorb these costs by existing resources.

4. Costs associated with appointing the advisory committee will be incurred by January 1, 2019 in accordance with the statute.

5. Renewal of extensions approved in the past will be good for 2 years.

6. Assume all extensions issued prior to January 1, 2025 become effective on January 1, 2025

7. Extensions issued prior to January 1, 2022 will expire on the following dates depending on the time period request by the manufacturer
    a. January 1, 2026 (1-yr extension)
    b. January 1, 2027 (2-yr extension)
    c. January 1, 2028 (3-yr extension)

8. The fee associated with an extension request is assumed to be the same regardless on whether the duration of the extension is 1, 2, or 3 years. It is assumed the manufacturers will request an extension for 3 years.

9. The extension process is estimated to take approximately 1 year to complete based on the requirements in the statute.

10. Brake friction material manufacturers are not anticipated to apply for an extension until 2023/2024.

11. The extensions approved under this process are not assumed to be recognized by the State of Washington.

Estimated cost for Alternative #3:

The estimated costs to brake friction material manufacturers due to testing, certification, registration and marking are similar to the costs stated in Alternative 1. The proposed regulations describe a similar self-certification process, testing methodology and marked proof of certification that is currently used by the brake friction material manufacturers to show compliance with the State of Washington law and regulations. Costs associated with the packaging logo and retooling marking equipment will also be similar to Alternative 1 since the marked proof of certification in the proposed regulation is similar to the current marking convention used by the brake friction material manufacturers.

Recertification costs will also be similar to the costs cited in Alternative 1 since the same recertification cycles used by the testing certification agency are cited in the proposed regulations. Since the proposed regulations use of the same recertification cycles for each requirement, the direct cost to brake friction material manufacturers due to the testing, certification and registration are minimized. Using the current recertification cycles also reduces confusion by consumers and retailers caused by multiple expiration dates on the same product.

Costs associated with recertifying brake friction material will also be similar to the costs estimated in Alternative 1. The recertification period is estimated until 2032 which coincides to the extension program sunset date for brake friction materials used on motor vehicles except heavy duty vehicles. Recertification costs for materials that meet the requirements under H& S code section 25205.51 are estimated to be zero since these materials are not required to be recertified under the proposed regulations. The proposed regulations also include similar recertification cycle used for materials that meet H&S Code section 25250.52 and 25250.53 so that these costs were also minimized.

As part of the proposed regulations, DTSC estimated the costs associated with approving extensions to the 2025 requirements. Under section 66387.9(d) of the proposed regulation, manufacturers will pay a fee based on the costs listed in this section for each extension requested. The estimated fee for one extension request by one manufacturer is $173,162. This fee may vary depending on the number of extension requests a manufacturers submits to the Department, the number of manufacturers that request an extension, and the need to assemble a second advisory committee if the use of the brake friction material is outside the current advisory committee's expertise.