ATTACHMENT A

PLANNING
COMMISSION
RECOMMENDATION,
10/7/2020

THURSTON COUNTY
WASHINGTON
SINCE 1852

COUNTY COMMISSIONERS

John Hutchings
District One
Gary Edwards
District Two
Tye Menser
District Three

**COMMUNITY PLANNING &
ECONOMIC DEVELOPMENT DEPARTMENT**

Creating Solutions for Our Future

Joshua Cummings, Director

October 7, 2020

Thurston County Board of Commissioners
2000 Lakeridge Drive SW
Olympia, WA 98502

SUBJECT: Planning Commission Recommendation on Docket Item CP-11, Recycled Asphalt Policy Review

Dear Commissioners,

The Thurston County Planning Commission has completed their review of Docket Item CP-11 on the 2020-2021 Official Comprehensive Plan Docket, Recycled Asphalt Policy Review. This is a citizen-initiated request to amend Policy E.5 of the Nisqually Subarea Plan, which currently prohibits asphalt recycling within the subarea. The proposed amendment allows for recycling of asphalt pavement as an accessory use with-in the mined-out portion of gravel pits in the Nisqually Subarea.

The Planning Commission was initially briefed by staff on the proposed amendments on July 15, 2020. Two additional work sessions were held on August 5 and September 2, 2020, including holding a panel of guest speakers from David Troutt of the Nisqually River Council and Karen Deal and Bill Dempsey of Lakeside Industries, Inc. at the September 2 meeting.

A public hearing was scheduled for October 7, 2020 to hear public testimony on three proposed options of proposed language for Policy E.5; some options also include proposed amendments to 20.54 TCC, the Special Use Permit Chapter. Prior the public hearing, a legal notice was published on September 16, 2020 in *The Olympian* and September 17, 2020 in the *Nisqually Valley News*. A webmailer was also sent to interested parties prior to the public hearing. A public hearing was held on October 7, 2020. 11 people testified at the public hearing, and 21 written comments were submitted. A post-hearing work session was held immediately following the public hearing. The Planning Commission did not recommend any changes to the proposed text in the options being considered. In considering public comment and materials presented, the Planning Commission produces the following recommendation:

The following is a recommendation from the Planning Commission on the Comprehensive Plan Amendment 2020/2021 Docket Item #11, Recycled Asphalt Policy Review.

The Planning Commission recommends approval of Comprehensive Plan Docket Item CP-11, Recycled Asphalt Policy Review, which amends Policy E.5 in the Nisqually Subarea as denoted in Option 3.

On October 7, 2020, the Planning Commission voted unanimously (9-0) in favor of the attached recommendation.

In formulating its recommendation, the Planning Commission has considered the requirements in the Growth Management Act under RCW 36.70A and WAC 365-196, Thurston County's County Wide Planning Policies as amended, other applicable state laws, public testimony, and local circumstances. The Planning Commission recommends approval of the Docket Item #11, Recycled Asphalt Policy Review with the following findings.

Findings:

1. The proposed amendments are consistent with the Growth Management Act 36.70A RCW.
2. The proposed amendments are consistent with the Thurston County County-Wide Planning Policies.
3. The Thurston County Planning Commission held a duly noticed public hearing on October 7, 2020 as required by Thurston County Code Chapter 2.05 Growth Management Public Participation.

Thank you for the opportunity to review proposed amendments. If you have any questions, please feel free to contact me.

Sincerely,

_____

Scott Nelson, Chair

Attachments:

- Draft Amendments to Policy E.5 of the Nisqually Subarea
- Draft Amendments to TCC 20.54, 'Special Use Permit'

CC: Thurston County Planning Commission Members
Ramiro Chavez, County Manager
Joshua Cummings, Director
Travis Burns, Deputy Prosecuting Attorney

ATTACHMENT B

PROPOSED
AMENDMENTS TO
POLICY E.5

Summary of Options for Policy E.5 (p. 21, Nisqually Subarea Plan)

Comprehensive Plan Amendments: 2020-2021 Docket Item 11
NSAP Asphalt Recycling Policy Review Project (Policy E.5)

Current Text (Policy E.5, p.21):

Allow accessory activities to be considered inside the mined out portion of the gravel pit through the site plan review process. Examples of allowable accessory uses would include concrete pipe and/or septic tank construction and the recycling of used concrete. The reprocessing of imported mineral materials shall not be the primary accessory use and the reprocessing of asphalt shall not be allowed due to water quality concerns. These activities shall be discontinued once reclamation of the pit is completed in accordance with the WDNR standards.

Proposed Options:

Option 1:

Make no changes to the current policy E.5 of the Nisqually Subarea Plan. Continue to prohibit reprocessing of asphalt.

No change from current text.

Option 2:

Adopt the applicant's proposed amendment to Policy E.5 of the Nisqually Subarea Plan, thus removing the prohibition on asphalt recycling as an accessory use within the Nisqually Subarea.

"Allow accessory activities to be considered inside the mined out portion of the gravel pit through the site plan review process. Examples of allowable accessory uses would include concrete pipe and/or septic tank construction and the recycling of used concrete and asphalt pavement. The reprocessing of imported mineral materials shall not be the primary accessory use. ~~and the reprocessing of asphalt shall not be allowed due to water quality concerns.~~ These activities shall be discontinued once reclamation of the pit is completed in accordance with the WDNR standards."

Option 3 (PLANNING COMMISSION RECOMMENDATION, OCTOBER 7, 2020):

Adopt the applicant's proposed amendment to Policy E.5 of the Nisqually Subarea Plan, with additional amendments. This option would remove the prohibition on asphalt recycling as an accessory use within the Nisqually Subarea, but add the requirement that Best Management Practices be employed (specifically for covering stockpiles). This option would also require text changes in the Thurston County Code.

"Allow accessory activities to be considered inside the mined out portion of the gravel pit through the site plan review process. Examples of allowable accessory uses would include concrete pipe and/or septic tank construction and the recycling of used concrete and asphalt pavement. Operators shall employ best management practices for covered storage of recycled asphalt to ensure minimal environmental harm and impact due to leachate. Best management practices will be determined through the site-level permit review process, but may include tarping, storage sheds, or other methods. The reprocessing of imported mineral materials shall not be the primary accessory use. ~~and the reprocessing of asphalt shall not be allowed due to water quality concerns.~~ These activities shall be discontinued once reclamation of the pit is completed in accordance with the WDNR standards."

ATTACHMENT C

PROPOSED
AMENDMENTS TO
TCC 20.54, PAIRS
WITH OPTION 3

Thurston County Community Planning and Economic Development Department

Community Planning Division

THURSTON COUNTY PLANNING COMMISSION RECOMMENDATION DRAFT

Titles: 20.54

October 7, 2020

SPECIAL USE.

Chapter: 20.54 (attachment-A) (Amended)

Deleted Text:	~~Strikethrough~~	Proposed Changes:	Underlined
Staff Comments:	*Italics*	Unaffected Omitted Text	…

The below code changes are being reviewed in conjunction with the Recycled Asphalt Policy review, which is item number 11 on the 2020/2021 Official Comprehensive Plan Docket.

The proposed code changes below would complement Option 3.

On October 7, 2020, the Planning Commission produced a recommendation for the proposed amendment as denoted in Option 3. There were no additional changes proposed by the Planning Commission to the language as denoted in Option 3.

Thurston County Zoning Ordinance, Special Use Permit (Title 20)

Chapters:

Chapter 20.54 – SPECIAL USE

Sections:

…

20.54.070 – Use – Specific Standards.

…

3.1 Asphalt Production. Asphalt plants (hot mix or batch plants) are subject to the following provisions:

…

l. For operations that process and store Recycled Asphalt Pavement (RAP) within the Nisqually Subarea, operators shall employ best management practices to mitigate leachate by providing covered storage of processed/recycled asphalt stockpiles. Specific practices will be determined through the site-level permit review process, but may include tarping, storage sheds, or other methods.

…

ATTACHMENT D

LAKESIDE
INDUSTRIES
APPLICATION
FOR
COMPREHENSIVE
PLAN
AMENDMENT

THURSTON COUNTY
WASHINGTON
SINCE 1852

Thurston County Permit Assistance Center
2000 Lakeridge Dr. SW, Olympia, WA 98502
(360) 786-5490 | (360) 754-2939 (Fax)
TDD Line (360) 754-2933
Email: permit@co.thurston.wa.us
www.co.thurston.wa.us/permitting
Creating Solutions for Our Future

MASTER APPLICATION

oject Specific Supplemental Application

	DATE STAMP
ST BE NLY	THURSTON COUNTY RECEIVED NOV 15 2016 RESOURCE STEWARDSHIP
	Intake By:

2016105567

16 114069 VC
Site Address: **11123 DURGIN RD SE OLYMPIA WA 98513**
Parcel #: **21817140200**

Property Tax Parcel Number(s): 21817140200

Subdivision Name (if applicable): NA

Property Address: 11125 Durgin Road Southeast **City:** Olympia **Zip Code:** 98513

Directions to the Property:
I-5 southbound, take Exit 116 toward Mounts Road/Old Nisqually. Turn left onto Nisqually Road. Nisqually road becomes Old Pacific Highway SE. Turn left onto Durgin Road SE. Site on right.

Property Access: ☑ Existing ☐ Proposed

Access Type: ☐ Private Driveway ☐ Shared Driveway ☐ Private Road ☑ Public Road
Property Access Issues (locked gate, code required, dogs or other animals): ☐ No ☑ Yes **If yes, Describe:**
This is an active mine site. Please contact site office (360) 491-5460 to notify of planned site visit.

(property owner is responsible for securing animals prior to site visit)

Water Supply: ☑ Existing ☐ Proposed

Water Supply Type: ☐ Single Family ☐ Two Single Family Residential ☑ Group A ☐ Group B
☐ Group B Exempt Name of Community Water System:
City of Lacey

Waste Water Sewage Disposal: ☑ Existing ☐ Proposed ☑ Individual Septic System ☐ Sewer
☐ Community Septic System Name of Public System:

DESCRIPTION OF PROJECT PROPOSAL (attach additional sheet if needed)

Please see attached description.

BILLING OF INVOICES

The base application fee charged at the time of application covers base hours listed on the fee schedule. When the base hours by a Department are used, a monthly billing invoice will be generated for additional hours at the hourly rate listed on the fee schedule. Should review of the project exceed the base hours allotted, billing invoices shall be mailed to:

☐ **Owner** ☑ **Applicant** ☑ **Point of Contact**

Additional property owner sheets can be obtained online at www.co.thurston.wa.us/permitting

EMAIL: An email address is required if you would like communication to be provided by email.

Property Owner: Nielson Pacific LTD
Mailing Address: P.O. Box 39009
City: Lakewood State: WA Zip Code: 98496
Phone #: (253) 474-0725 Fax #:
Cell #: 253-691-1431 E-mail: HolRoydce@Comcast.Net
Signature:* Charles L Estes **Date:** 11-14-16

Applicant (if different than owner): Lakeside Industries, Inc.
Mailing Address: P.O. Box 7016
City: Issaquah State: WA Zip Code: 98027
Phone #: (425) 313-2600 Fax #: (425) 313-2631
Cell #: E-mail:
Signature:* Karen Deal **Date:** 11-14-2016

Point of Contact: Karen Deal
Mailing Address: P.O. Box 7016
City: Issaquah State: Zip Code: 98027
Phone #: (425) 313-2660 Fax #: (425) 313-2631
Cell #: (425) 864-5081 E-mail: karen.deal@lakesideindustries.com
Signature:* Karen Deal **Date:** 11-14-2016

***Application is hereby made for a permit or permits to authorize the activities described herein. I certify that I am familiar with the information contained in the application and that to the best of my knowledge and belief, such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities. I hereby grant to the agencies to which this application is made or forwarded, the right to enter the above-described location to inspect the proposed, in-progress or completed work. I agree to start work only after all necessary permits/approvals have been received.**

THURSTON COUNTY
WASHINGTON
SINCE 1852

Thurston County Planning
2000 Lakeridge Dr. S.W. Olympia, WA 98502
(360)786-5490 / (360)754-2939 (Fax)
TDD Line (360) 754-2933
Email: GMA_Mail@co.thurston.wa.us
http://www.co.thurston.wa.us/planning/

Supplemental Application
COMPREHENSIVE PLAN AMENDMENT

STAFF USE ONLY	DATE STAMP
16 114069 VC Permit Type: Comprehensive Plan Amendment Sub Type: Legislative County Work Type: Text Amendment Site: **11123 DURGIN RD SE OLYMPIA WA 98513** Assessor Property ID: 21817140200 Applicant: Karen Deal Owner: NIELSEN PACIFIC LTD	THURSTON COUNTY RECEIVED NOV 15 2016 RESOURCE STEWARDSHIP **Intake by:** SN

This application cannot be submitted alone. In addition to this form, a complete package includes:

Applicant Use	SUBMITTAL CHECKLIST	Staff Use Only
☒	Master application	☐
☒	Applicable processing fees. *Refer to current fee schedules. Depending on the adopted fee structure, additional fees may occur if base hours/fees at intake are exhausted.*	☐
☒	Supplemental requirment checklist *(attached)*	☐
☒	SEPA Checklist	☐
☐	Rezone Application with required materials *(if applicable)*	☐

1. What type of amendment are you requesting: _____ Map __X__ Policy
2. Are you the property owner or under contract to purchase the property? ☐ Yes ☒ No

Site Specific Amendments to Land Use Designations

Complete the following section for amendments to land use designations. Attach additional sheets as needed. The County reserves the right to request additional studies or information necessary to process the application. An amendment that affects an Urban Growth Boundary will require additional studies.

A. Identify the land uses surrounding the property affected, and describe how the proposed change would affect those surrounding land uses.

Proposal Proponent, Lakeside Industries, is seeking a text amendment to the Thurston County Comprehensive Plan - Nisqually Sub-Area Plan (NSAP). There are multiple land use designations within the Affected Geographic Area (AGA). Specifically, Lakeside is seeking an amendment to Policy E.5 of the NSAP. Policy E.5 currently precludes the reprocessing of asphalt (reclaimed asphalt pavement (RAP)) due to water quality concerns. Since approval of Policy E.5 over a decade ago, there has been significant effort put forth by governmental, educational, and private research entities to evaluate potential impacts associated with the processing and recycling of RAP. This research has resulted in a body of technical information and scientific evidence supporting the claim that RAP is inert and poses no threat to water quality. Lakeside wishes to begin recycling RAP by incorporating it into its permitted hot-mix asphalt production process located within the AGA. Amending Policy E.5 will have no discernible impact on adjacent properties and will not affect water quality within the AGA.

Description of Project Proposal

Lakeside Industries is seeking a text amendment to the Thurston County Comprehensive Plan - Nisqually Sub-Area Plan (NSAP). Specifically, Lakeside is seeking an amendment to Policy E.5 of the NSAP. Policy E.5 currently precludes processing of reclaimed asphalt pavement (RAP) due to water quality concerns. Policy E.5 is obsolete based on current proven scientific research and current progressive and sustainable public policy. Many agencies and jurisdictions are beginning to mandate recycle of RAP. Not allowing recycle of RAP is in direct contradiction to Thurston County Resolution No. 13755 which encourages the County to "demonstrate leadership by incorporating environmentally sustainable practices into its operations that preserve natural resources, conserve energy, eliminate waste and emissions, and lessen overall environmental impact"(Attachment 4). As such, Lakeside wishes to begin recycling RAP by incorporating it into its permitted hot-mix asphalt production process located within the Affected Geographic Area. To allow recycling, Policy E.5 must first be revised and updated to meet current policy standards.

B. Explain why the existing land use designation is not appropriate.

The underlying land use designation of the Lakeside Durgin Road site is Designated Mineral Resource Land (see CP Map M-43). The designation is appropriate. Lakeside is seeking a minor text amendment that will allow recycling of RAP within the NSAP at the Durgin Road site, which lies within Designated Mineral Resource Lands. The asphalt production facility is currently in operation at the site and Lakeside simply wishes to use reclaimed asphalt pavement by recycling it into fresh asphalt mix - an activity that is encouraged by local, state, and federal agencies and is part of normal operation at asphalt plants including those located elsewhere in Thurston County.

C. How have conditions changed so that the proposed designation is more appropriate than the existing designation.

See attached sheet for complete response.

D. Explain why additional land of the designation proposed is needed in Thurston County, and why it is needed at the location proposed.

NA

E. If the property is in the rural area (outside of an urban growth area), demonstrate, with appropriate data, how the property meets the designation criteria and policies and Chapter 2 – Land Use of the Comprehensive Plan.

Lakeside is not seeking land use re-designation, only a minor text amendment to Policy E.5 of the NSAP.

Text Amendments

Most, but not necessarily all, text amendments are legislative changes; they can be processed only with the consent of the Thurston County Board of Commissioners. However, if a text amendment with limited applicability is proposed, identify the chapter and page number of the text to be changed, and provide the exact wording changes proposed (attach separate sheets, if needed).

Name of Plan: Thurston County - Nisqually Sub Area Plan - Policy E.5 (see Attachment 1)

Chapter: NA Page: 20-22 Section/Other Policy E.5

All Amendments

Note: Responses to the following section are required. Attach additional sheets as needed.

1. Explain why the change is needed. What issue or problem is resolved by the proposed change?

See attached sheet for complete response.

2. How would the proposed change serve the interests of not only the applicant, but the public as a whole?

See attached sheet for complete response.

3. Explain how the proposed amendment fulfills the goals of the Washington State Growth Management Act (RCW 36.70A.020). A list of the goals is attached.

See attached sheet for complete response.

4. Explain how the proposed amendment is consistent with the policies of the Thurston County Comprehensive Plan, including any policies of an applicable joint plan or Subarea plan. (Be sure to review the Transportation Chapters.)

See attached sheet for complete response.

Applicant Signature(s)

I (We), the undersigned, do hereby affirm and certify, under penalty of perjury, that the above statements are in all respects true and correct on my (our) information as to those matters.

Printed Name	Signed	Date
Karen Deal	Karen Deal	11-14-2016

Form No. SA036a

Planning Goals
Washington State Growth Management Act
RCW 36.70A.020

1. **Urban Growth**. Encourage development in urban areas where adequate public facilities and services exist or can be provided in an efficient manner.

2. **Reduce Sprawl.** Reduce the inappropriate conversion of undeveloped land into sprawling, low-density development.

3. **Transportation.** Encourage efficient multimodal transportation systems that are based on regional priorities and coordinated with county and city comprehensive plans.

4. **Housing.** Encourage the availability of affordable housing to all economic segments of the population of this state, promote a variety of residential densities and housing types, and encourage preservation of existing housing stock.

5. **Economic development.** Encourage economic development throughout the state that is consistent with adopted comprehensive plans, promote economic opportunity for all citizens of this state, especially for unemployed and for disadvantaged persons, and encourage growth in areas experiencing insufficient economic growth, all within the capacities of the state's natural resources, public services, and public facilities.

6. **Property rights.** Private property shall not be taken for public use without just compensation having been made. The property rights of landowners shall be protected from arbitrary and discriminatory actions.

7. **Permits**. Applications for both state and local government permits should be processed in a timely and fair manner to ensure predictability.

8. **Natural resource industries**. Maintain and enhance natural resource-based industries, including productive timber, agricultural, and fisheries industries. Encourage the conservation of productive forest lands and productive agricultural lands, and discourage incompatible uses.

9. **Open space and recreation.** Encourage the retention of open space and development of recreational opportunities, conserve fish and wildlife habitat, increase access to natural resource lands and water, and develop parks.

10. **Environment.** Protect the environment and enhance the state's high quality of life, including air and water quality, and the availability of water.

11. **Citizen participation and coordination.** Encourage the involvement of citizens in the planning process and ensure coordination between communities and jurisdictions to reconcile conflicts.

12. **Public facilities and services.** Ensure that those public facilities and services necessary to support development shall be adequate to serve the development at the time the development is available for occupancy and use without decreasing current service levels below locally-established minimum standards.

13. **Historic preservation.** Identify and encourage the preservation of lands, sites, and structures that have historical or archaeological significance.

SUPPLEMENTAL REQUIREMENT CHECKLIST

This application shall contain and/or address the following in a clear, accurate and intelligible form. Submit this checklist with your application. Check the box for each item addressed. Provide an explanation for any unchecked item.

Applicant Use	USE BLACK or BLUE INK ONLY	Staff Use Only
☐	1. One 8.5" x 11" or 11" x 17" map, drawn to scale, using a standard interval of engineer scale, which shall include the following:	☐
☐	a. All information drawn to scale (standard engineer scale).	☐
☐	b. A north arrow, map scale, date and directions to the site.	☐
☐	c. Property line boundaries and dimensions for all property lines.	☐
☐	d. The location of all existing structures, including, but not limited to, mobile homes, houses, sheds, garages, barns, fences, culverts, bridges, and storage tanks.	☐
☐	e. All means, existing and proposed vehicular and pedestrian ingress and egress to and from the site, such as driveways, streets and fire access roads, including existing road names and existing county and state right-of-way.	☐
☐	f. The location of all existing easements.	☐
☐	g. The location of all existing public and on-site utility structures and lines, such as on-site septic tanks, drainfield and reserve areas, water lines, wells and springs.	☐
☐	h. Vicinity map, at a scale of not less than three (3) inches to the mile, indicating the boundary lines and names of adjacent developments, streets and boundary lines of adjacent parcels, and the relationship of the proposed development to major roads and highways.	☐
☐	i. Location of critical areas or buffers affecting the site, both on-site and on adjacent properties, including but not limited to shorelines, wetlands, streams, flood zones, high groundwater, steep slopes and special habitats.	☐
☐	2. Special reports (may include wetland delineation, geotechnical report, mitigation plan, or other).	☐

Site Specific Amendments to Land Use Designations

C. How have conditions changed so that the proposed designation is more appropriate than the existing designation?

When Policy E.5 was established, there was a misconception that RAP processing or storage might pose a threat to water quality. Much research has been done since Policy E.5 was put into place and it is clear that the storage, processing, and recycling of RAP is a safe and environmentally responsible activity. There are no other jurisdictions that we operate in where recycling RAP is prohibited. In fact, local jurisdictions are moving toward, or in some cases have already passed, ordinances mandating recycle of RAP (see City of Seattle Ordinance #123553, Attachment 4). Thurston County Resolution No. 13755 encourages the County to "demonstrate leadership by incorporating environmentally sustainable practices into its operations that preserve natural resources, conserve energy, eliminate waste and emissions, and lessen overall environmental impact"(Attachment 4). Current recycling technology comprises introduction of sized RAP into new asphalt mix when it is produced. This technology reduces the use of petroleum, reduces demand on limited aggregate resources, and conserves landfill space. The Department of Ecology along with numerous other state and local agencies recognize the value of recycling RAP and have provided Lakeside with letters of support for this Text Amendment (Attachment 5).

All Amendments

Note: Responses to the following section are required. Attach additional sheets as needed.

1. Explain why the change is needed. What issue or problem is resolved by the proposed change?

The NSAP was adopted in November, 1992 and was updated in 1997. Policy E.5 (see Attachment 1 current and proposed text) was inserted at a time when it was wrongly believed that reprocessing of asphalt might affect water quality.

When Lakeside first applied for a Special Use Permit (SUP) for the Durgin Road site, a SEPA Environmental Threshold Determination was issued – in this case, a Mitigated Determination of Non-Significance (MDNS). Storage, processing, and recycling of RAP use was evaluated under that MDNS. No adverse effects were identified.

Both the Thurston County Health Department and the Department of Ecology recognize that RAP does not pose a threat to groundwater quality, as currently (and erroneously) stated in Policy E.5. RAP is hot-mix asphalt that has been previously placed as road surface, removed, and crushed. By using RAP instead of fresh aggregate and asphalt cement (a petroleum product comprising the heaviest fraction of a barrel of crude oil) Lakeside effectively conserves those two natural resources at a 1:1 ratio.

Lakeside generates approximately 20 tons of excess hot-mix asphalt per day during normal startup and shutdown operations. Since Policy E.5 restricts recycling, Lakeside must pay for the excess asphalt to be trucked off-site to a location within Thurston County outside the Affected Geographic Area and pay a

tipping fee for disposal of this recyclable product. All other asphalt plants located within Thurston County simply recycle the excess hot-mix asphalt on-site.

Asphalt pavement is 100% recyclable, results in 0% waste, and natural resource and environmental agencies across the nation encourage the use of recycled products wherever possible. Recycling is especially critical during times of high oil prices and recession economic conditions.

Acceptance of this proposal is necessary to rectify a problem in Policy E.5 of the NSAP. This policy runs counter to current environmental science, thinking regarding recycling, and sustainable policies.

2. How would the proposed change serve the interests of not only the applicant, but the public as a whole?

The proposed text amendment would allow Lakeside to use an existing material, RAP, in the production of new hot-mix asphalt thereby reducing the total amount of natural resources required. Petroleum and aggregates that would otherwise be needed to produce new asphalt, would be directly replaced with RAP on a 1:1 basis. For every 10 tons of RAP used, 9.5 tons of aggregate and 0.5 tons of asphalt cement are conserved. Recycling in this manner is the responsible thing to do. We at Lakeside believe that we have an obligation to pursue the use of recycled materials, RAP, wherever possible.

Recycling RAP serves both the interest of Lakeside and the public. Lakeside brings demolished pavement to a Lakeside facility, grinds it up and reuses it in the asphalt production process. By recycling, Lakeside sees a reduction in expenditure of company resources for every ton of RAP that is recycled and passes the savings on to the public through reduced bid cost for public transportation paving projects. Secondly, RAP is used by all other operating asphalt plants in the vicinity of Thurston County. Allowing the use of RAP at our Durgin Road plant will allow Lakeside to be more competitive in a marketplace where recycling asphalt is already the norm. Using RAP will serve to reduce overall cost and will allow Lakeside to create more jobs.

Asphalt pavement is 100% recyclable and produces 0% waste. The interests of the public are further served in the following ways:

1. Recycling RAP reduces the amount of new asphalt cement (AC) used (a petroleum product) because as noted above, the AC that is already in the RAP is incorporated directly into the new mix. There is a commensurate reduction in the total amount of AC consumed. That reduction translates into an overall reduction in the need to drill, refine, and transport new petroleum.
2. Previously mined aggregates are reused. This reduces the total amount of aggregate consumption and preserves resources for future generations.
3. Any RAP that is reused is effectively removed from the waste stream. It should be understood that these are very large amounts of reclaimed asphalt typically measured in the hundreds of thousands of tons. This is RAP that would otherwise go into a landfill. Unlike most other recyclables, very little additional energy is required to recycle RAP. It is simply ground up and introduced into the already heated mix. No chemicals or additives are used.

4. Using RAP does not create any adverse (new or different) environmental impacts. In fact, the only impacts that are created are beneficial as outlined herein. As noted elsewhere in this document, Lakeside's new Durgin Road plant underwent extensive environmental review during the SUP and SEPA processes. Use of RAP was fully evaluated in that review because it was always assumed that it would be stored and processed.
5. Use of RAP will result in a boon to the taxpayer because it will allow Lakeside to be more competitive with other local hot-mix asphalt manufacturers. Lower material costs can then be passed along in the form of lower bids and lower final costs on projects, thus saving taxpayer dollars. Furthermore, saving tax dollars allows more projects to be constructed which generates more jobs in Thurston County.
6. Recycled asphalt pavement is stored in stockpiles prior to use. Although there are no specific treatment requirements for storm water contacting RAP alone due to the inert nature or RAP, Lakeside provides additional storm water collection and treatment controls to ensure protection of the environment.
7. In accordance with the MDNS, there will be no impact on traffic.
8. Recycled asphalt pavement is used successfully all over the world and Lakeside uses it at all other Lakeside Divisions without any negative impacts – only positive ones.
9. The Department of Ecology supports the use of recycled asphalt pavement (see Attachment 5) and revising Policy E.5 of the NSAP is entirely defensible. In fact, failure to recognize the efficiencies and net positive effects of RAP use is indefensible.

3.Explain how the proposed amendment fulfills the goals of the Washington State Growth Management Act (RCW 36.70A.020). A list of the goals is attached.

This proposal is for a minor text amendment, but it is responsive to the goals of the GMA in very pronounced ways. In particular, this amendment is responsive to *Goal 10 – Environment*, because using recycled asphalt pavement is an environmentally responsible and defensible alternative to placing the RAP in a landfill. It is also responsive to Goal 10 for all of the reasons detailed in our response to No. 2 above. This proposal is also responsive to *Goal 8 – Natural Resource Industries* because it will help to maintain a healthy (and necessary) mineral extraction industry by conserving resources as detailed above. This leads to *Goal 3 – Transportation*, and *Goal 5 - Economic Development*, respectively. Roads cannot be constructed or maintained without a significant source of aggregate and hot-mix asphalt. Economic growth, including growth in housing, retail, and commercial sectors cannot occur without adequate roads and infrastructure. Roads and infrastructure cannot be built without aggregate and asphalt production. These two products are naturally associated and are typically produced together at the same location. The Thurston County Zoning Code (TCZC) specifically permits both aggregate mining and asphalt production at the same site. Interestingly, the TCZC also specifically allows reprocessing (recycling) of asphalt pavement at these same sites. Only the NSAP currently restricts the use of recycled asphalt pavement. Finally, the use of recycled asphalt pavement saves the taxpayers of Thurston County increasingly scarce funds that would otherwise be spent on new aggregate and petroleum. This is directly responsive to *Goal 5 – Economic Development* of the GMA because it

preserves scarce funds for all other economic activity e.g. consumer spending, property development, and consumer credit.

4. Explain how the proposed amendment is consistent with the policies of the Thurston County Comprehensive Plan, including any policies of an applicable joint plan or Subarea plan. (Be sure to review the Transportation Chapters.)

The proposed text amendment is consistent with the policies of the Thurston County Comprehensive Plan (TCCP) for many of the same reasons that it is consistent with the GMA. The proposal seeks to change a policy that was put in place as part of the TCCP – Nisqually Sub-Area Plan at a time when less emphasis was placed on recycling and when it was falsely assumed that using recycled asphalt pavement might have an impact on water quality. With this text amendment, the TCCP will be updated to allow for recycling RAP which is an activity that is actively encouraged by the DOE and that has already been vetted under SEPA.

Specifically, this proposal is consistent with and responsive to *Chapter 3 – Natural Resource Lands*, because it will help to maintain mineral extraction as a vital part of Thurston County's nature resource-based economy. This proposal is responsive to Chapters 4, 5 and 8, Housing, Transportation and Economic Development, respectively, because aggregate and asphalt pavement are essential construction materials and by recycling asphalt we can reduce construction costs. In that sense, this proposal is directly and critically responsive to *Chapter 8 – Economic Development*. This proposal is particularly germane to Chapter *9 – Natural Environment* because it seeks to revise a policy that is absolutely contrary to the GMA's goals with respect to conservation of natural resources and use of recycled materials wherever possible. It would be irresponsible to continue a practice that leads to overconsumption of natural resources such as petroleum and aggregates when there is a recycling alternative. Policy E.5 is contrary to all current thinking regarding environmental protection and natural resource conservation; therefore, the text amendment should be approved.

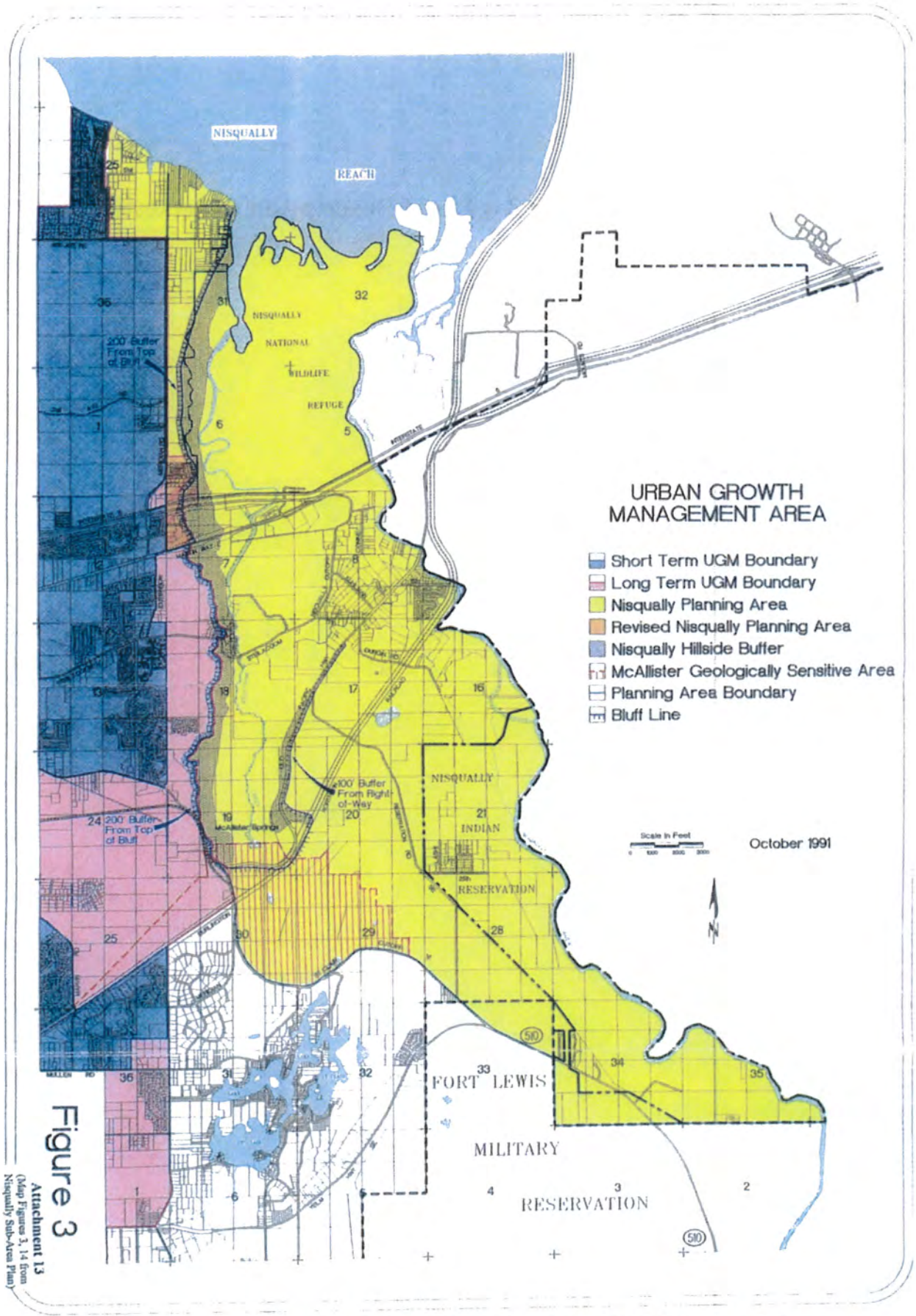


Figure 3

Attachment 13
(Map Figures 3, 14 from Nisqually Sub-Area Plan)

NISQUALLY PLANNING AREA

Attachment 3 – Legal Description of Lakeside Site

Thurston County Assessor

Parcel Number: 21817140200 **Date: 11/14/2016**

Situs Address:	11125 DURGIN RD SE	**Sect/Town/Range:**	17 18 1E
Owner:	NIELSEN PACIFIC LTD	**Size:**	24.98 Acres
Address:	7216 LAKEWOOD DR W TACOMA, WA 98467	**TCA Number:**	239
		Neighborhood:	7101
Taxpayer:	NIELSEN PACIFIC LTD	**Property Type:**	IND
Address:	7216 LAKEWOOD DR W TACOMA, WA 98467	**Taxable:**	YES
		Active Exemptions:	None
		Fire District:	FIRE DISTRICT #03
Abbreviated Legal:	Section 17 Township 18 Range 1E Quarter SW NE NW SE BLA980097 TRB Document 3151588	**School District:**	NORTH THURSTON S.D. #3
Associations:	99002086069 LAKESIDE INDUSTRIES	**Water Source:**	PUBLIC
		Sewer Type:	SEPTIC

Market Values

Tax Year Assessment Year	2017 2016	2016 2015	2015 2014	2014 2013	2013 2012	2012 2011	2011 2010	2010 2009	2009 2008	2008 2007
Market Value Land	$396,700	$299,650	$424,550	$424,550	$491,300	$491,300	$544,150	$419,200	$397,900	$351,250
Market Value Buildings	$1,083,700	$705,100	$868,300	$867,200	$772,900	$750,200	$840,200	$1,032,500	$441,700	
Market Value Total	**$1,480,400**	**$1,004,750**	**$1,292,850**	**$1,291,750**	**$1,264,200**	**$1,241,500**	**$1,384,350**	**$1,451,700**	**$839,600**	**$351,250**

Commercial Structures

Building	Year Built	Floor	Square Feet	No. Floors	Total Sq. Ft.	Quality	Condition
2496	2007				0	FAIR	AVERAGE
					0		
COM-GRGE-SVC	2008				0	AVERAGE	AVERAGE
					0		
STORAGE-WHSE	2008				0	FAIR	AVERAGE
					0		
STORAGE-WHSE	2008	1	1220	1	1220	FAIR	AVERAGE
		1	2496	1	2496		
		1	6561	1	6561		
					10277		

Detached Structures

Structure	Year Built	Square Feet	Quality	Condition
PVNG-CONCRTE	2007	1090	FAIR	AVERAGE
PVNG-ASPHALT	2007	89000	FAIR	AVERAGE

Land Characteristics

Land Flag	8040	**Land Influence(s)**	ST-STEEP-TOPO NS-NO SITE IMPRV PE-PR EXPOSURE FA-FAIR ACCESS LT-LIGHT TRAFFIC
Lot Square Footage	Not Listed		
Lot Acreage	24.98		
Effective Frontage	Not Listed		
Effective Depth	Not Listed		
Water Source	Public		
Sewer Source	Septic		

Office of the Assessor
Steven J. Drew, Assessor
2000 Lakeridge Drive SW - Olympia, WA 98502
Customer Service (360)867-2200 -- Fax (360)867-2201 -- TDD (360)754-2933

Attachment 4 – City of Seattle Ordinance # 123553
Thurston County Resolution #13755

RESOLUTION NO. 13755

A RESOLUTION approving the Environmental Sustainability Policy to replace the Recycle Product Procurement Policy.

WHEREAS, the growth of Thurston County's economy and the quality of life, health, and safety of its citizens are dependent on the careful stewardship of natural resources and protection of the environment; and

WHEREAS, the daily activities and routine operations of the County have a significant impact on the quality of Thurston County's environment and use of its natural resources; and

WHEREAS, the County is a highly visible model for Thurston County's citizens, businesses, industries, and local governments; and

WHEREAS, the County can demonstrate leadership by incorporating environmentally sustainable practices into its operations that preserve natural resources, conserve energy, eliminate waste and emissions, and lessen overall environmental impact; and

WHEREAS, waste source reduction, reuse, and recycling constitute key components of environmental sustainability; and

WHEREAS, the County is a large consumer of goods and services, which, in the course of their manufacture, use, and disposition impact the quality of the environment; and

WHEREAS the procurement of environmentally sound goods and services by the County can serve to protect health and safety, reduce energy consumption, conserve natural resources, prevent pollution, and promote markets for recyclable materials.

NOW, THEREFORE, THE BOARD OF COUNTY COMMISSIONERS OF THURSTON COUNTY, STATE OF WASHINGTON DOES RESOLVE AS FOLLOWS:

Section 1. PURPOSE. This Resolution strongly recommends that all County Departments and Offices maximize their efforts to develop and implement environmentally sustainable policies and practices. Specifically, agencies will strive to:

a. consider and minimize the environmental impacts associated with construction, facility management, and employee transportation;

b. reduce and recycle material recoverable from solid waste originating at their facilities and from new construction and renovation of existing facilities;

c. procure goods and services that reduce the impact on human health and the environment, including products made wholly, or in part, from the least toxic ingredients and highest (post-consumer content) recycled materials; and,

d. encourage and promote conservation of energy through reducing wasteful, inefficient or uneconomical uses of energy resources and to procure the most energy efficient products available for county buildings.

Section 2. RESPONSIBILITIES OF COUNTY AGENCIES.

a. County Departments and Offices, all part of or under the Board of Thurston County Commissioners, (herein known as agencies), will be responsible for implementing programs to make their operations environmentally sustainable, including, but not limited to, programs to reduce and recycle solid wastes and procure environmentally preferable goods and services. Such programs will be consistent with and as comprehensive as described in this Resolution.

b. Each agency will designate an Environmental Sustainability Coordinator to direct sustainability activities including coordinating and overseeing its waste reduction, recycling, and environmental procurement programs, and serving as a liaison with the Department of Water and Waste Management, Solid Waste Team (Solid Waste) and Public Health and Social Services, Environmental Health Division (Environmental Health) who oversee the program.

c. Solid Waste and Environmental Health will provide technical assistance, education, and training to agencies on these matters. The Solid Waste Division will serve as a central point of information and coordination for all agency environmental sustainability efforts.

d. As provided in this Resolution, the agencies will aggressively explore opportunities for procuring goods and services that have a lesser or reduced effect on human health and the environment.

Section 3. ENVIRONMENTALLY SUSTAINABLE OPERATIONS AND PRACTICES.
Agency environmental sustainability efforts will focus primarily on the operations of County-owned facilities and leased spaces. Agencies will assess the impacts of facility daily operations, management, and capital improvement projects as they pertain to health and safety, environmental quality, land use, and resource conservation.

a. Capital improvements: Agencies will seek opportunities to reduce environmental impacts associated with capital improvements throughout project planning, site and building design, and construction. Agencies will implement project initiatives or modifications that result in energy efficiency, water conservation, pollution prevention, solid waste reduction, and preservation of land and native plants during the construction and operation of agency facilities. This will be accomplished by requiring that all new public buildings of more than 5,000 square feet, as well as major renovation projects, meet the US Green Building Council's Leadership in Environmental Design (LEED) Silver standards, as is now required for all Washington State buildings, pursuant to Senate Bill 5509 signed into law on April 8, 2005.

b. Facilities management: Agencies will seek to integrate into the daily operations and management of County-owned and leased facilities, practices that enhance health and safety, reduce consumption of energy and fuels, conserve water, minimize emissions, and reduce solid and hazardous wastes. Agencies will give consideration to these practices, to the extent feasible and practicable, as criteria for entering into lease agreements or contracts for maintenance and landscaping services. Agencies will utilize the US Green Building Council's Leadership in Environmental Design (LEED) Existing Building Operations Rating System as a guideline for measuring operations, improvements, and maintenance on a consistent scale.

c. County Vehicle Maintenance: County fleet maintenance will include available product alternatives that meet required automotive specifications, which may include, but are not limited to: aqueous parts cleaning and brake washing, recycled antifreeze, re-refined motor oil, alternative fuels, lead-free wheel weights, and retread tires.

Section 4. SOURCE REDUCTION AND RECYCLING OF SOLID WASTES.

a. Source reduction: To encourage reduction of waste at its source, Agencies will review their operations to determine where solid waste can be reduced at its source. Specific measures agencies will employ to reduce waste at the source include, but are not limited to, those identified in this Section.

(1) Reduction of office paper waste

(a) Printing and photocopying: agencies will avoid unnecessary printing or photocopying of printed materials, and will require two-sided copying on all documents, when feasible, and practicable. To the extent feasible, all new and re-manufactured photocopy machines and laser printers purchased will have duplexing capabilities.

(b) Use of electronic communication: agencies will, to the extent feasible, use electronic media such as voice mail, e-mail, servers, and the Internet to circulate or distribute routine announcements, memoranda, documents, reports, forms, manuals, and publications.

(2) Product necessity, durability, packaging, and recyclability: agencies will discourage the use of disposable products where reusable products are available and economically viable for use. Furthermore, agencies will assess their waste generation with regard to purchasing decisions and make every attempt to purchase items only when needed and in amounts that are not excessive. When purchases are necessary, agencies will, to the extent feasible and practicable, acquire items that are more durable, have minimal packaging, or are readily recyclable or re-useable when discarded.

b. Collection programs for recyclable materials.

(1) Agencies, with assistance from Solid Waste, will ensure that employees have access to containers for recycling (at a minimum) aluminum cans, high-grade office paper, and corrugated cardboard.

(2) agencies' facilities that routinely host the general public, will implement programs for the collection of recyclable materials discarded by the public at all such locations (e.g., aluminum, glass, and plastic beverage containers). Agencies will work closely with the appropriate local government agencies and Solid Waste when developing and implementing these recycling programs.

(3) Agencies that operate or contract for the operation of food service establishments for the public, employees, and/or inmates (snack bars, cafeterias, dining halls, etc) are encouraged to implement programs to recover and recycle leftover food and to eliminate the use of disposable dishes and utensils when practicable and feasible. When disposable food service items must be used, alternatives to expandable polystyrene (commonly known by the trade name Styrofoam) will be used.

c. Education of agency employees: It will be the duty of each agency to educate and encourage employee participation in agency waste reduction and recycling programs. Solid Waste and Environmental Health will assist agencies in developing and implementing educational programs.

Section 5. PURCHASE AND USE OF ENVIRONMENTALLY PREFERABLE PRODUCTS. As a component of their environmental sustainability efforts and to help develop markets for recyclable materials, agencies will procure and use environmentally preferable goods and services, including products made wholly or in part from least toxic ingredients or recycled materials, whenever feasible and practicable. Environmentally preferable products have a lesser or reduced effect on human health and the environment in their manufacture, use, and disposal when compared with other products that serve the same purpose. Agencies will give consideration to environmentally preferable products that are more energy efficient, least toxic, less polluting, and which generate less waste overall. For all purchases, the Thurston County purchasing and contracting policies, located in the Thurston County Administrative Manual, must be followed.

a. Purchases of environmentally preferable and recycled-content products

(1) With assistance provided by Solid Waste and Environmental Health, agencies will identify environmentally preferable goods and services and products made from recycled materials highest in post-consumer content that meet appropriate standards for use by County agencies. When environmentally preferable and recycled-content products are offered that are comparable in quality, availability, and price to products not having environmental attributes, the environmentally preferable products will be purchased.

(2) All agencies will require all businesses to provide, in writing, the minimum percentage, if not the exact percentage, of postconsumer and secondary materials in the applicable products, goods, or supplies offered or sold. With this information and their own research, Solid Waste and Environmental Health will prepare an electronic listing of environmentally preferable and recycled-content products sources and make it available to all County staff via the Intranet.

(3) With assistance provided by Solid Waste and Environmental Health, agencies will utilize product specifications that encourage vendors to offer environmentally preferable and recycled-content products. Specifications will be written to ensure that they do not contain restrictive language or other barriers to purchasing environmentally preferable or recycled-content products, unless such specifications are necessary to protect public health, safety, or welfare.

(4) All electronic office equipment, including but not limited to computers, monitors, printers, scanners, photocopy machines, facsimile machines, and other such equipment purchased by County agencies will be Energy Star® compliant.

(5) Agencies will give priority consideration to the purchase of fleet vehicles that use less-polluting fuels and that have the highest available miles-per-gallon rating.

b. Purchases of recycled paper

(1) Agencies are directed to purchase and use a minimum of 30% recycled content, bleach-free paper for all letterhead stationery, reports, memoranda, and other documents, used by County staff or printed by County or outside vendors when feasible and practicable. All new and re-manufactured photocopy machines and laser printers purchased will have the ability to use xerographic paper having at least 50% recycled content, 30% of which should be post-consumer content.

(2) Agencies will attempt to meet the goal that 100% of the total dollar value of expenditures for paper and paper products be toward purchases of paper and paper products with recycled content when recycled content is available. In addition, County agencies will attempt, to the extent feasible and practicable, to purchase recycled paper and paper products with the highest percentage of post consumer content.

c. Guidelines and criteria: Solid Waste and Environmental Health will develop criteria for determining the environmental preferability of goods and services and

establish minimum content standards for recycled-content products purchased by agencies utilizing state and federal guidelines.

Section 6. REPORTING.

a. Agency annual reports on solid waste reduction and procurement of recycled products: By the first of March annually, each agency will report to Solid Waste for the previous fiscal year the following information, at a minimum: activities or programs implemented to reduce the amount of solid waste generated by the agency; recycling programs and types of materials collected by the agency; and the dollar amounts and types of recycled/less toxic products purchased. Solid Waste will provide a blank reporting form to the agencies in order to assist them.

b. Annual progress report to the Board of County Commissioners: Solid Waste will compile the agency data and provide to the Board of County Commissioners an annual progress report on County agency efforts to reduce waste at the source, collect recyclable materials, and procure recycled products, which will be delivered to the Board in April of the following fiscal year.

c. Tracking recycled products procurement: Central Services Support Services will review the County's sales report procedures and determine any changes needed to facilitate tracking of environmentally preferable and recycled products purchased by County agencies.

Section 7. EFFECT OF OTHER RESOLUTIONS.

The Recycle Product Procurement Policy #38.i of June 5, 1995 is hereby rescinded.

ADOPTED: February 12, 2007

ATTEST:

Clerk of the Board

BOARD OF COUNTY COMMISSIONERS
Thurston County, Washington

DIANE OBERQUELL, Chairman

ROBERT N. MACLEOD, Commissioner

CATHY WOLFE, Commissioner

APPROVED AS TO FORM
EDWARD G. HOLM
PROSECUTING ATTORNEY

By: _____
Jeff Fancher
Deputy Prosecuting Attorney

O:\USERS\TC032a\DATA\Admin Team\BOCC Documents\Agenda Items\Agenda 07\07-02 Reso - Adopt Sustainability Policy.doc

Ordinance No. 123553

Council Bill No. 117111

AN ORDINANCE relating to the solid waste system of Seattle Public Utilities; prohibiting certain recyclable concrete, bricks, and asphalt paving from disposal in construction and demolition garbage containers and railhead intermodal containers, as well as at the City's transfer stations; establishing enforcement provisions; adding Section 21.36.089 to the Seattle Municipal Code; and amending Section 21.36.922.

Related Legislation File: _____

Date Introduced and Referred: 2 22 11	To: (committee): Seattle Public Utilities + Neighborhoods
Date Re-referred:	To: (committee):
Date Re-referred:	To: (committee):
Date of Final Action: 3/7/11	Date Presented to Mayor: 3/8/11
Date Signed by Mayor: 3.10.11	Date Returned to City Clerk: 3.10.11
Published by Title Only: X Published in Full Text:	Date Vetoed by Mayor:
Date Veto Published:	Date Passed Over Veto:
Date Veto Sustained:	Date Returned Without Signature:

The City of Seattle – Legislative Department

Council Bill/Ordinance sponsored by: [signature]

Committee Action:

Date	Recommendation	Vote
2/25/11	Yes: MOB, RC, BH	3-0

This file is complete and ready for presentation to Full Council. _____

Full Council Action:

Date	Decision	Vote
3/7/11	PASSED	8-0 (excused: Burgess)

LAW DEPARTMENT

Gabriella Uhlar-Heffner
SPU Disposal Ban on Concrete, Bricks, and Asphalt Paving ORD
February 6 , 2011
Version #4a

ORDINANCE 123553

AN ORDINANCE relating to the solid waste system of Seattle Public Utilities; prohibiting certain recyclable concrete, bricks, and asphalt paving from disposal in construction and demolition garbage containers and railhead intermodal containers, as well as at the City's transfer stations; establishing enforcement provisions; adding Section 21.36.089 to the Seattle Municipal Code; and amending Section 21.36.922.

WHEREAS, City Council Resolution 30990 established new recycling goals for the City and provided direction on waste reduction and recycling programs, including those for construction and demolition wastes; and

WHEREAS, City recycling surveys have found aggregate materials, such as concrete, bricks, and asphalt paving, constitute a significant amount of construction and demolition waste material; and

WHEREAS, City recycling surveys have also found well-established, local end-markets are capable of providing for the reuse and recycling of such concrete, bricks, and asphalt paving; and

WHEREAS, since 1993 the City has required concrete, cement concrete and asphalt recycling in City public works projects; NOW, THEREFORE,

BE IT ORDAINED BY THE CITY OF SEATTLE AS FOLLOWS:

Section 1. A new Section 21.36.089 of the Seattle Municipal Code is added as follows:

21.36.089 Concrete, bricks, and asphalt paving -- recycling required

A. Recycling Required. As of January 1, 2012, all construction and demolition sites shall separate out readily recyclable concrete, bricks, and asphalt paving for reuse on or off site and/or recycling, and such quantities of concrete, bricks, and asphalt paving shall not be deposited in construction and demolition site garbage containers for disposal at a public or private transfer station, railhead intermodal containers, or in the garbage disposal areas at the City's Recycling and Disposal Stations after that date.

B. Enforcement.

1. As of January 1, 2012, the Director of Seattle Public Utilities shall begin a program of educational outreach regarding these new recycling requirements.

2. As of January 1, 2013, civil infractions shall apply to any violation of this section pursuant to Section 21.36.922.

C. Exceptions. The recycling requirement will not apply where concrete, bricks, and asphalt paving are painted, have hazardous constituents, are difficult to separate from other materials (such as wood), are present only in very small quantities, or are generated during disaster emergency situations where disaster debris needs to be removed quickly and recycling options are not available.

Section 2. Section 21.36.922 of the Seattle Municipal Code is amended as follows:

21.36.922 Civil Infractions ((:))

A. The violation of or failure to comply with any section of this chapter identified in this section is designated as a civil infraction and shall be processed as contemplated by RCW Chapter 7.80.

B. The violation of or failure to comply with any of the following sections is a Class 1 civil infraction under RCW 7.80.120:

((~~SMC~~)) Section 21.36.415 (Discarding potentially dangerous litter), except that the maximum monetary penalty and default amount is ((~~Five Hundred Dollars ($500.00)~~))$500, not including statutory assessments

((~~SMC~~)) Section 21.36.420 (Unlawful dumping of solid waste)

((~~SMC~~)) Section 21.36.084 (Prohibition on use of expanded polystyrene food service products)

((~~SMC~~)) Section 21.36.086 (Compostable or recyclable food service ware required)

Section 21.36.089 (Concrete, bricks, and asphalt paving -- recycling required)

C. The violation of or failure to comply with any of the following sections shall be a civil infraction and subject as a Class 3 civil infraction under RCW 7.80.120 to a maximum monetary penalty and default amount of ((~~Fifty Dollars ($50.00)~~))$50, not including statutory assessments:

((~~SMC~~)) Section 21.36.044 (Containers required -- Nonresidential)

((~~SMC~~)) Section 21.36.082 (Commercial recycling required)

((~~SMC~~)) Section 21.36.410 (Littering)

((~~SMC~~)) Section 21.36.425 (Accumulation of solid waste)

((~~SMC~~)) Section 21.36.430 (Unlawful use of City litter receptacles)

((~~SMC~~)) Section 21.36.440 (Unlawful use of solid waste container on private property)

* * *

Section 3. This ordinance shall take effect and be in force 30 days after its approval by the Mayor, but if not approved and returned by the Mayor within ten days after presentation, it shall take effect as provided by Seattle Municipal Code Section 1.04.020.

Passed by the City Council the 7th day of March, 2011, and signed by me in open session in authentication of its passage this 7th day of March, 2011.

President _____ of the City Council

Approved by me this 10th day of March, 2011.

Michael McGinn, Mayor

Filed by me this 10th day of March, 2011.

City Clerk

(Seal)

Gabriella Uhlar-Heffner
SPU Disposal Ban on Concrete, Bricks and Asphalt Paving FISC
February 6, 2011
Version #4

Form revised: August 9, 2010

FISCAL NOTE FOR NON-CAPITAL PROJECTS

Department:	Contact Person/Phone:	CBO Analyst/Phone:
Seattle Public Utilities	Gabriella Uhlar-Heffner/6-9772	Karen Grove/4-5805

Legislation Title: AN ORDINANCE relating to the solid waste system of Seattle Public Utilities; prohibiting certain recyclable concrete, bricks, and asphalt paving from disposal in construction and demolition garbage containers and railhead intermodal containers, as well as at the City's transfer stations; establishing enforcement provisions; adding Section 21.36.089 to the Seattle Municipal Code; and amending Section 21.36.922.

Summary of the Legislation: The proposed ordinance would ban the disposal of readily recyclable asphalt paving, bricks and concrete in construction and demolition (C&D) job site disposal containers, in railhead intermodal containers, and in the garbage disposal areas of the City's transfer stations beginning January 1, 2012.

Background: Council Resolution 30990 established new recycling goals for the City and provided direction on waste reduction and recycling programs, including programs for construction and demolition waste. Concrete and asphalt paving can comprise a significant percentage of the construction and demolition material generated in the city. City recycling surveys conducted from 2007 through 2009 found asphalt paving, bricks and concrete are recycled at a rate of about 90%. This legislation supplements a similar recycling requirement for concrete, cement concrete and asphalt generated in the process of City street, bridge, drainage or other public works projects performed by or under contract with the City.

SPU will inform construction and demolition contractors, building permit applicants and transfer station customers of these new requirements starting in the third quarter of 2011 and throughout 2012. Beginning on January 1, 2013, it will be a civil infraction to dispose of such materials.

Under the proposed legislation, exceptions to this recycling requirement would include concrete, bricks and asphalt paving materials which are painted, have hazardous constituents, or are combined with other materials where separation is difficult. The legislation also excludes concrete, bricks and asphalt paving present in only small quantities and when these materials are a component of disaster debris which needs to be removed quickly and where recycling options are not available.

Please check one of the following:

____ **This legislation does not have any financial implications.**
(Stop here and delete the remainder of this document prior to saving and printing.)

__X__ **This legislation has financial implications.** (Please complete all relevant sections that follow.)

Approval of this legislation would require SPU to perform outreach to customers and assign

commercial solid waste field inspectors to undertake periodic monitoring of construction site job containers and at the City transfer stations to ensure that significant quantities of recyclable concrete, bricks and asphalt paving are not being disposed. These new efforts can be incorporated into SPU's existing workload. SPU is not requesting new position authority or appropriation authority to perform this work.

What is the financial cost of not implementing the legislation:
No direct financial cost to the City.

Does this legislation affect any departments besides the originating department?
No, SMC 21.36.088 regarding "Concrete and Asphalt Recycling" already directs the recycling of concrete, cement concrete or asphalt generated in the process of City street, bridge, drainage or other public works whether those projects are performed by or under contract with the City.

What are the possible alternatives to the legislation that could achieve the same or similar objectives? Information is currently provided to interested construction and demolition contractors regarding recycling options for different materials through the King County/Seattle Construction Recycling Directory, the Resource Venture website and technical assistance hotline and the King County Green Tools website. These efforts could be strengthened.

Is the legislation subject to public hearing requirements: No.

Other Issues (*including long-term implications of the legislation*): None.

List attachments to the fiscal note below: None.

City of Seattle
Office of the Mayor

February 15, 2011

Honorable Richard Conlin
President
Seattle City Council
City Hall, 2nd Floor

Dear Council President Conlin:

I am transmitting the attached proposed Council Bill which would prohibit disposal of recyclable construction and demolition waste in construction and demolition site disposal containers, railhead intermodal containers, and the garbage disposal areas at Seattle's transfer stations.

Council Resolution 30990 established new recycling goals for the City and provided direction on waste reduction and recycling programs including those for construction and demolition waste. Concrete and asphalt paving can represent a significant amount of construction and demolition material generation. Seattle Public Utilities' recycling surveys have found asphalt paving, bricks and concrete have a high reuse and recycling rate of at least 90% with well established local end markets. This proposed disposal ban would supplement an existing requirement for the recycling of concrete and asphalt paving generated in the process of City street, bridge, drainage and other public works, whether those projects are performed by the City or under contract with the City. SPU will inform construction and demolition contractors, Department of Planning and Development permit applicants and City transfer station customers of these new requirements starting in the third quarter of this year. Beginning in 2013, it will be considered a civil infraction to dispose of such materials. The recycling requirement would not apply to asphalt, bricks and concrete materials that are painted, have hazardous components, or are combined with other materials. Also excluded from the recycling requirement are concrete, bricks and asphalt paving materials present in only small quantities.

This legislation is one more in a long series of steps Seattle is taking to reduce the volume of material generated in the city that ends up in a landfill. If you have any questions, please contact Hans VanDusen at 684-4657.

Sincerely,

Michael McGinn
Mayor of Seattle

cc: Honorable Members of the Seattle City Council

Michael McGinn, Mayor
Office of the Mayor
600 Fourth Avenue, 7th Floor
PO Box 94749
Seattle, WA 98124-4749

Tel (206) 684-4000
Fax (206) 684-5360
TDD (206) 615-0476
mike.mcginn@seattle.gov

STATE OF WASHINGTON – KING COUNTY

--ss.

268350 No. 123553-554

CITY OF SEATTLE,CLERKS OFFICE

Affidavit of Publication

The undersigned, on oath states that he is an authorized representative of The Daily Journal of Commerce, a daily newspaper, which newspaper is a legal newspaper of general circulation and it is now and has been for more than six months prior to the date of publication hereinafter referred to, published in the English language continuously as a daily newspaper in Seattle, King County, Washington, and it is now and during all of said time was printed in an office maintained at the aforesaid place of publication of this newspaper. The Daily Journal of Commerce was on the 12th day of June, 1941, approved as a legal newspaper by the Superior Court of King County.

The notice in the exact form annexed, was published in regular issues of The Daily Journal of Commerce, which was regularly distributed to its subscribers during the below stated period. The annexed notice, a

CT:TITLE ONLY ORDINANCE

was published on

03/15/11

The amount of the fee charged for the foregoing publication is the sum of $ 40.95, which amount has been paid in full.

Subscribed and sworn to before me on

03/15/11

Notary public for the State of Washington, residing in Seattle

Affidavit of Publication

Attachment 5 – Letters of Support

State of Washington, King County

City of Seattle

TITLE-ONLY PUBLICATION

The full text of the following resolutions, passed by the City Council on March 7, 2011, and published here by title only, will be mailed upon request, or can be accessed at http://clerk.seattle.gov. For further information, contact the Seattle City Clerk at 684-8344.

ORDINANCE NO. 123553

AN ORDINANCE relating to the solid waste system of Seattle Public Utilities; prohibiting certain recyclable concrete, bricks, and asphalt paving from disposal in construction and demolition garbage containers and railhead intermodal containers, as well as at the City's transfer stations; establishing enforcement provisions; adding Section 21.36.089 to the Seattle Municipal Code; and amending Section 21.36.922.

ORDINANCE NO. 123554

AN ORDINANCE appropriating money to pay certain audited claims and ordering the payment thereof.

Date of publication in the Seattle Daily Journal of Commerce, March 15, 2011.

3/15(268350)

THURSTON COUNTY
WASHINGTON
SINCE 1852

COUNTY COMISSIONERS
George L. Barner, Jr.
District One
Diane Oberquell
District Two
Linda Medcalf
District Three

PUBLIC HEALTH AND
SOCIAL SERVICES DEPARTMENT

Patrick M. Libbey, Director
Diana T. Yu, MD, MSPH
Health Officer

December 15, 1992

Michael Kain
Thurston County Planning Department

Re: Policy statement - Asphalt/concrete recycling

Dear Mike,

This is a reply to your recent request for a position response from the health department with regard to site specific use for recycling of waste concrete and asphalt. After review and consultation with DOE and the initial examination of the Jone's Quarry S.U.P. for the on-site recycling of concrete and asphalt, our department has taken the approach that a waste asphalt recycling operation presents none to very minimal environmental health concerns.

Formerly, our department's greatest concern was the possibility of leaching PAH's from the asphalt materials to ground or surface waters. Present research and information suggests that this is not a serious problem as PAH's are basically insoluble in water and adsorb well to organic soils. If future information about asphalt indicates otherwise, then our department will reassess our current approach.

However, as a condition of issuance of a solid waste permit for such a facility, other parameters would need to be addressed:

1) the hydrogeological characteristics of the site would need to be assessed, ie., waste material would not be stored in a wetlands or flood plain area, nor should the material have direct contact with surface or groundwater or placed on excessive slopes.

2) all waste materials received at the site is to be quantified (by weight or volume) and the source of the material must be known. For instance, if the waste asphalt or concrete came from a known industrial site or petroleum spill, this material would not be suitable for recycling. The operator would be obligated to turn away the material or test the material prior to acceptance.

3) Surface water run-off at the site would need to be addressed.

The recycling of waste materials is also in concert with stated county and Washington State goals to divert waste items from landfilling to a more beneficial use. Asphalt and concrete recycling definitely support these goals and the county should be supportive if site specific proposals can meet the appropriate solid waste permitting criteria.

I hope this will help in future determinations about this issue. If you have further inquiries, please contact me at 786-5461.

Sincerely,

John Libby
Solid Waste Program

cc: Gregg Grunenfelder
Jane Hedges

City of Olympia | Capital of Washington State
P.O. Box 1967, Olympia, WA 98507-1967

October 11, 2012

Mr. Dean Smith
Lakeside Industries
4825 88th Avenue SW
Olympia, WA 98512

Dear Mr. Smith:

SUBJECT: Letter of Support - Use of Recycled Materials in Hot Mix Asphalt

The City of Olympia supports the efforts of asphalt manufacturers to utilize and actively offer recycled asphalt materials, as long as the remanufacturing process meets all applicable Federal, State, and local regulations. By expanding the ability of asphalt manufacturers to utilize reclaimed asphalt and asphalt shingles, we increase the opportunity to divert waste from the landfill, moving us all toward a Zero Waste vision.

By way of background, in June 2006, the Olympia City Council adopted a Zero Waste Resolution. This resolution established a vision for the City, anticipating a future in which "waste" is viewed as an inefficient use of resources. Using reclaimed materials reduces the need for virgin resources and can greatly reduce construction costs.

Increasing the quantity of recyclable materials diverted from the landfill is one of three main goals found in Olympia's *Toward Zero Waste: Olympia's Waste ReSources Plan*. This vision supports the use of recycled materials such as recycled asphalt pavement (RAP) and Reclaimed Asphalt Shingles (RAS) wherever it meets State and Federal specifications, or as approved on locally funded projects.

The use of Recycled Asphalt Pavement (RAP) and Reclaimed Asphalt Shingles (RAS) is also in line with the State's waste reduction goals. The Washington State Department of Ecology (DOE) outlined five key initiatives in the *Beyond Waste Plan*. Recycling is a key foundation of all five initiatives and is vital to moving the State towards a goal of zero waste. One of these initiatives is Green Building. Specifically, element GB4 is to "expand capacity and markets for reusing and recycling construction and demolition materials." Among the list of areas to expand is to "Continue to build markets for salvaged and recycled building materials."

Washington State Department of Transportation (WSDOT) current hot mix asphalt (HMA) paving specifications allow contractors to use up to 20 percent RAP in new paving. In August of this year, a special provision was added that allows paving contractors to use reclaimed asphalt shingles (RAS) in select state hot mix asphalt (HMS) paving projects. Based on the above WSDOT actions, we believe the use of RAP and RAS will only increase in the coming years.

Olympia will continue to promote the use of reclaimed materials for construction projects and encourage other entities to remove barriers to the use of RAP and RAS in their paving projects.

If you have any questions, please contact me at 360.753.8422, or via email at feide@ci.olympia.wa.us.

Sincerely,

RICHARD T. HOEY, P.E.
Public Works Director
Public Works Department

ec: Fran Eide, P.E., City Engineer
Dan Daniels, Waste ReSources Director

FE/adst
\\Calvin\pw technical services\Administraton\Fran\ReclaimedAsphalt10-2012

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
P.O. Box 47600 • Olympia, Washington 98504-7600
(360) 407-6000 • TDD Only (Hearing Impaired) (360) 407-6006

January 30, 2006

Mr. James Hatch, P.G.
Director – Regulatory Affairs
Lakeside Industries
P.O. Box 7016
Issaquah, Washington 98027

Dear Mr. Hatch:

You have asked for our opinion on the use of recycled asphalt product (RAP) in making new asphalt. While Ecology would like to see less of the world paved, we still understand the need for paving work. Given that your company provides that material, we are very supportive of using RAP in your process.

Using RAP should decrease the need for newly mined aggregate, and reduce the amount of pitch needed. Both reductions are good for the environment.

Local government has primary authority for solid waste and planning. While we don't envision that local governments would not endorse the use of recycled materials, we leave local decisions in local hands.

Please call me at (360) 407-6103 if you have further questions.

Sincerely,

Cullen D. Stephenson, Program Manager
Solid Waste & Financial Assistance

NATIONAL ASPHALT PAVEMENT ASSOCIATION

October 2, 2012

Mr. Scott Clark, Director
Thurston County Planning Department
2000 Lakeridge Drive SW
Olympia, WA 98502

Reference: *Notice of Availability for Public Comment*
Preliminary Docket of Comprehensive Plan Amendments for 2013
Proposed Tier One Amendments

Dear Mr. Davis:

This letter is in response to the above referenced public notice. The notice is of interest to me and the National Asphalt Pavement Association (NAPA) Membership as I was invited to testify as an expert witness before the Asphalt Advisory Task Force on October 23, 2007. Specifically, we would strongly encourage the Thurston County Planning Commission and the Thurston County Board of Commissioners to include in the *Official Docket* for consideration later this year, the *Tier One* proposed amendment to allow recycled asphalt pavement (RAP) by Lakeside Industries in the Nisqually planning area.

NAPA is the national association exclusively representing the Asphalt Pavement Producers and Paving Contractors in the U.S. with more than 1100 member companies. As a national association, we are known for providing credible technical and regulatory assistance to member companies, regulatory authorities, and others in matters relating to asphalt paving operations.

According to the U.S. EPA, the paving industry recycles or reuses about 70 million tons of asphalt pavement per year, making our industry among, if not the largest recycler in the nation. RAP is one of the most environmentally sustainable materials in the U.S. It is used in varying degrees in asphalt pavements in virtually every state in the nation. Because of its many sustainability attributes, the Federal Highway Administration has currently established an Expert Task Group (ETG) to assist with removing barriers to increasing the use of recycled asphalt in road construction nationally. In addition, RAP is up front and center as the U.S. House Science and Technology Subcommittee on Technology and Innovation deliberates the inclusion of sustainable technologies in future transportation reauthorization proposals.

ASPHALT.
AMERICA RIDES ON US.

5100 FORBES BLVD.
LANHAM, MD 20706

Toll Free 888.468.6499
Phone 301.731.4748
Fax 301.731.4621

AsphaltPavement.org
NAPA@AsphaltPavement.org

From an overall environmental sustainability perspective, recycled asphalt pavement is the right thing to do. The national track record and the science say that RAP does not present a leachate or an emissions problem. RAP conserves scarce natural resources in the form of virgin raw materials. RAP conserves scarce county and municipal landfill space. In addition, RAP reduces overall carbon footprint, a subject of much interest to the State of Washington and the Nation in the quest to address climate change. Simply stated, allowing recycled asphalt pavement is the right thing to do for the environment and for Thurston County.

We thank you for your consideration of this request and invite a continuation of a constructive dialogue with interested stakeholders.

Sincerely,

Gary Fore

R. Gary Fore
Retired Vice President–Environment, Health and Safety

Three Key Words

Reduce, Reuse, Recycle: three key words in the world of sustainability. You reduce by building to last and by not using as much material in the first place. You reuse by taking a material and returning it back to the same use. Recycling takes one material manufactured for a specific use and remanufactures that material for a different use.

Reduce

Reducing involves working to eliminate the need to replace what you have built. Building higher quality, longer lasting facilities reduces the need to regularly replace those facilities. Better roads and better bridges last longer, reduce the need for maintenance and repair, and reduce the consumption of resources.

WSDOT designs highways to be functional and durable. The basic infrastructure for any highway, the embankment and the roadbed, do not need replacement once built. The basic alignment and the roadbed beneath the pavement remain in place indefinitely.

Pavement Design

Asphalt pavement designs preserve the pavement structure by driving the distress to the surface. The surface course is easily replaced, leaving the pavement's base course and subbase course untouched. Today's asphalt pavement structures will not need to be rehabilitated for very long periods of time, exceeding 30 years or more. Asphalt pavement wearing surfaces last an average of 16 years on the west side of the mountains and over 12 years east of the Cascades.

WSDOT's concrete pavements have proven to be extremely durable. While making up only 9% of the state highway system, concrete pavements carry 32% of the truck miles and 35% of the total vehicle miles traveled. Today over 60% of our concrete pavements are 30 years old or older. Designed for a 20 year design life, these pavements now exceed their original design life by 50%. New concrete pavement designs use dowel bars to transfer loads between panels and are built thicker to handle greater traffic loads and to allow grinding of studded tire damage. These new designs should last 50 years or more.

Typical Pavement Structure. Only the top of surface course would be removed and replaced as it is worn by traffic; the rest of the pavement structure remains in place.

Making Old Pavement New Again

Dowel Bar Retrofit (DBR) extends the pavement life of old concrete pavements. Adding dowel bars and grinding old concrete pavement smooth adds years to the life of these pavements. Extending pavement life reduces consumption, improving sustainability, while also saving money. WSDOT is a nationwide leader in the design and implementation of dowel bar retrofits.

A contractor installs dowel bars into a slot on a Dowel Bar Retrofit project. The dowels strengthen the joint between concrete panels, transfering heavy truck loads from panel to panel.

Completed Dowel Bar Retrofit (DBR) Project. Finished DBR project shows typical markings where dowels were placed in the old concrete pavement, strengthening the pavement and extending its life.

Pavement Management

WSDOT's Pavement Management System (WSPMS) increases pavement life while providing pavements at the lowest life cycle cost. The lowest life cycle cost occurs when you replace the surface course just before it fails and causes damage to the pavement beneath. Replace the surface course too soon and pavement life is wasted. Replace the surface course too late and costly pavement repair becomes necessary. Each year we measure all WSDOT pavements for smoothness, structural condition and rutting to find that specific point of lowest life cycle cost. Knowing when to replace the surface course preserves the pavement, decreases resource use and increases sustainability.

Alternative Hydraulic Cements

Portland cement is a wonderful material: it creates the concrete that meets many needs in construction. Production of portland cement, though, produces significant quantities of greenhouse gases, both from the fuels used in the manufacturing and the CO2 driven off the minerals used to make portland cement. Alternative hydraulic cements allow WSDOT to reduce the amount of portland cement used while still producing a high quality, durable concrete. Many of the alternative cements were once categorized as hazardous wastes and were disposed of in landfills. Today, materials such as flyash, microsilica and ground, granulated blast furnace slag find uses in a wide variety of WSDOT concretes, reducing the need for greater quantities of portland cement.

LED Traffic Signal Heads

WSDOT aggressively updated signal heads from incandescent lamps to light emitting diode (LED) lamps, dramatically reducing energy consumption. LEDs are more durable and last much longer than incandescent lamps, saving even more money and reducing consumption, improving sustainability.

Warm Mix Asphalt: New Technology

Heating the aggregate and the asphalt binder to make asphalt pavement is expensive and consumes considerable fuel (diesel of lower grades of bunker fuel). Warm Mix Asphalt (WMA) uses special modifiers that lower the mixing temperature for asphalt. Decreases of 50° F or more are possible. We placed our first test section on I-90 in 2008 and more will follow.

Milling operation, removing worn asphalt wearing surface and hauling it back to the asphalt plant to be reused. Typically only the top two inches of the wearing surface are removed, leaving the rest of the pavement intact.

Reclaimed Asphalt Pavement (RAP) pile at an asphalt paving company yard.

A cold-in-place (CIP) recycling train.

Reuse

Reuse involves taking a material and returning it in place as the same material. Reuse differs from recycling by not altering the nature of the material. You reuse an aluminum pop can when it is turned into another pop can; you recycle aluminum foil when it is used to make new car parts.

Reclaimed Asphalt Pavement

Far and away, the greatest reused material in the USA is asphalt pavement. Nationwide, Reclaimed Asphalt Pavement (RAP) amounts to over 72 million tons, with another 18 million tons of asphalt pavement being recycled into other pavement materials.[1] As a comparison, in 1990, only about 20 million tons of paper and paperboard were recycled and only 2.6 million tons of glass.[2] In fact, in 1990 the total of all commonly reused materials (paper, glass, metals, plastics, rubber, textiles, wood and others) was only a little over 29 million tons, or less than half of the total RAP tonnage.[3]

WSDOT was an early leader in reusing asphalt pavements, beginning in the oil crisis years in the late 1970s. Our original trials used up to 90% RAP, but continued research showed that a more modest rate of 20% would yield good results without increasing the complexity of manufacturing the pavement. Today at this 20% rate, the Washington Asphalt Pavement Association reports that WSDOT is using all of the RAP it is producing through pavement rehabilitation.

RAP starts as old pavement, is milled from the road, crushed and sent through an asphalt plant and mixed with new aggregate and asphalt binder, to return to the road as new asphalt pavement. When that new pavement reaches the end of its useful life it will again be reclaimed.

Hot-In-Place (HIP) Recycling

Hot-In-Place (HIP) recycling (really reuse rather than recycling) is another technology being investigated by WSDOT. HIP performs the same function as RAP, but it is done in the field, while the pavement is still on the road. Large mobile heating plants heat the old roadway, milling machines grind the surface and mix it with additional asphalt and then it is compacted back onto the existing pavement. HIP has the potential to reduce trucking costs and environmental impacts by reusing the asphalt pavement right in the field.

Recycle

The final option for increasing sustainability is recycling: taking a material in one form and converting it to a material in another form.

Cold-In-Place Recycling

Cold-In-Place recycling reconditions low volume roadways, turning worn out pavement into sound new base. The pavement is milled in place, treated with a binding agent and compacted. This new, strong base is overlaid with either new asphalt pavement or a chip seal (sprayed liquid asphalt with rock chips embedded into it). The process is inexpensive and has been very successful.

Asphalt Shingle Recycling

Asphalt shingles present a possible opportunity for recycling, using the asphalt binder in the shingle to make new asphalt pavement. WSDOT's State Materials Lab is working closely with King County as they build a test project using recycled shingles. We will help with testing and analysis of the pavement and will help track its performance over time.

Plants and Compost

WSDOT salvages plants before the start of construction and uses them to restore other areas. Trees and logs are saved and converted to habitat features within streams, wetlands and other natural areas. We convert what was once waste plant material into mulch, placing it back on site to reduce runoff and encourage plant growth. WSDOT is a national leader in using compost created from yard waste and other sources to control erosion and sediment on our projects.

Other

Other recycled materials used on WSDOT projects include benches and picnic tables manufactured from recycled pop bottles, converting brush onsite into compost for use within the project and crushing old concrete into new aggregate for base or subbase courses.

[1] *A Study of the Use of Recycled Paving Material: Report to Congress*, June 1993, Federal Highway Administration and United States Environmental Protection Agency, Washington D.C. FHWA-RD-93-147 and EPA/600/R-93/095.

[2] *Municipal Solid Waste in the United States: 2007 Facts and Figures. US EPA EPA530-R-08-010 November 2008*

[3] *Ibid*

Reduce, Reuse and Recycle within the State Materials Lab building

The WSDOT State Materials Lab has taken action close to home to reduce, reuse and recycle. We now recycle nearly every type of material we encounter: testing waste (aggregates, concrete, asphalt and steel), paper, cardboard, plastics and plastic sheeting, wooden pallets and even kitchen waste (wet or soiled paper towels, food waste, coffee grounds – all are taken for compost). The local waste hauler has certified the State Materials Lab as a Certified Green Program.

Additionally, WSDOT's State Materials Lab reviewed chemicals stored in the Chemistry Lab, evaluating the real need for having them on hand. By reducing those chemicals on hand (eliminating over 600 chemicals) we reduced consumption, the risk of storing potentially hazardous chemicals and the associated costs. Now, if we need a specialty chemical for a specific test, small quantities are ordered and after completion of the expected testing the remainder is recycled, greatly reducing hazardous chemical storage onsite.

WSDOT's State Materials Lab, located in Tumwater.

Future Activities

Limestone In Portland Cement

Since 2008, WSDOT has allowed up to 5% limestone in portland cement, reducing greenhouse gas emissions while not affecting quality. Current studies underway are reviewing the opportunity of using even greater levels of limestone in hydraulic cements.

Solar Powered Traffic Systems

Solar power holds promise for a variety of traffic systems, especially in remote locations. We are examining solar powered systems for both new installations and for retrofitting old locations. In the right location solar power can reduce greenhouse gas emissions, reduce consumption and decrease costs.

More Warm Mix Asphalt

Asphalt pavement makes up 63% of our state highways. Making asphalt pavement requires heating up the rock and asphalt binder (the "glue") to drive off moisture and make it pliable when it is placed. New technologies can reduce the mixing temperatures by 50° F or more, in a process called "warm mix asphalt or WMA (as opposed to the current "hot mix asphalt). Less heat means less fuel and lower emissions, conserving fossil fuels while reducing greenhouse gasses. WSDOT performed trial installations in 2008 and 2009 and in 2010 WSDOT opened up the use of WMA on all projects calling for asphalt pavement.

For more information contact:

Tom Baker
State Materials Engineer
360-709-5401

Jeff Uhlmeyer, PE
State Pavement Engineer
360-709-5485

Kurt Williams, PE
Construction Materials Engineer
360-709-5410

11-03-0506

Washington State Department of Transportation

From the
WSDOT State Materials Lab
March 2011

Sustainability: Highway Materials

Sustainability means many things to many people: businesses and our economy, spending time and money wisely, preserving our natural environment, investing in people and communities. Recently these principals have taken on new relevance and urgency. Highway materials, used to build embankments, pavements, bridges and other items, offer opportunities to innovate while improving the environment. Changes to hydraulic cements allow the substitution of limestone for cement, decreasing greenhouse gas production while preserving quality. In 2009, we eliminated coal tar emulsion treatments from the parking areas in our rest stops. The new emulsions used to protect the parking areas do not contribute to polycyclic aromatic hydrocarbon (PAH) pollution, unlike the coal tars. These innovations, and other opportunities, continue to address and improve our sustainability.

At WSDOT, a sustainable transportation system is a system that preserves the environment, is durable and takes into account how we build and the materials we use. We manage and operate this system using policies and strategies that meet society's present needs without compromising the ability of future generations to meet their own needs.

Secretary of Transportation
Paula Hammond, P.E.

Washington State Department of Transportation
Paula J. Hammond, P.E.
Secretary of Transportation

Transportation Building
310 Maple Park Avenue S.E.
P.O. Box 47300
Olympia, WA 98504-7300

360-705-7000
TTY: 1-800-833-6388
www.wsdot.wa.gov

October 16, 2012

Mr. Scott Clark, Director
Thurston County Planning Department
2000 Lakeridge Drive SW
Olympia, WA 98502

Re: Proposed Tier 1 amendment request to Thurston County Comprehensive Plan for 2013

Dear Mr. Clark:

This letter supports Lakeside Industry's request for a Comprehensive Plan amendment to allow the use of Reclaimed Asphalt Pavement (RAP) at its facility in Thurston County.

The Washington State Department of Transportation (WSDOT) strongly supports the use of RAP throughout the state. Asphalt pavement is the most recycled material in the country today, far exceeding other materials. The asphalt industry remains the country's number one recycler – based on data from the Federal Highway Administration, more than 62 million tons of asphalt pavement were recycled nationally into new asphalt pavement in 2010. Use of RAP is safe, efficient, cost effective, and reduces the environmental impact of our State's highways and roadways. Under contract with Federal Highway Administration, the National Asphalt Pavement Association performed a survey on the use of RAP. This survey found that in 2010, 99.9% of RAP produced was recycled into new asphalt pavement or aggregate or cold mix asphalt or other engineered materials.

As mentioned above, the use of RAP is a key part of WSDOT's efforts to improve the sustainability of Washington's highways. The approach conserves limited resources and landfill space. I have enclosed a recent folio on sustainability of highway materials that highlights the use of RAP.

I encourage you to amend the county's Comprehensive Plan to allow use of RAP. My agency relies on RAP to increase the sustainability of highway materials. Please let me know if you have any questions.

Sincerely,

Paula J. Hammond, P.E.
Secretary of Transportation

PJH:jaa
Enclosure

OLYMPIC REGION CLEAN AIR AGENCY
ORCAA

2940-B Limited Lane NW
Olympia, WA 98502

1-800-422-5623 • (360) 539-7610
Fax: (360) 491-6308

July 26, 2013

Thurston County Board of Commissioners
2000 Lakeridge Dr. SW
Olympia WA. 98502

RE: Lakeside Industry's Durgin Road Facility

Dear Commissioners:

I was asked by Lakeside Industries to clarify Olympic Region Clean Air Agency's (ORCAA's) authority and position regarding air emissions from the use of recycled asphalt pavement (RAP) in the production of the asphalt paving product at Lakeside's asphalt plant located on Durgin Road in the Nisqually valley.

From a "life-cycle" perspective, use of RAP avoids aggregate mining and the associated emissions and other environmental impacts caused by mining. From a plant-wide emissions perspective, use of RAP in asphalt production can result in slightly more air pollution if the plant is not adequately controlled. Lakeside's Nisqually plant employs emissions control technology such as a baghouse to control emissions from the drum dryer, a "Blue Smoke Eliminator" to control emissions during truck loading and pollution prevention measures such as minimizing asphalt product temperatures, thus alleviating this concern. In addition, ORCAA's review and approval will be required prior to RAP being introduced into Lakeside Nisqually's production cycle.

Lakeside Industry's Durgin Road plant has the appropriate air pollution control technology to effectively and safely utilize RAP. ORCAA's approval will verify that the use of this material will comply with all applicable air regulations and standards and sets enforceable conditions that assure compliance now and in the future. I would be happy to meet with you to provide any additional information or address any questions about the use of RAP at this asphalt plant.

Sincerely

Francea L. McNair
Executive Director

THURSTON COUNTY
WASHINGTON
SINCE 1852

PUBLIC HEALTH AND
SOCIAL SERVICES DEPARTMENT

Scott Schimelfenig-

January 22, 2010

The Hazardous Waste staff was recently asked to help the Public Works Department determine if the recycled asphalt material (RAP) currently stored at the Waste and Recovery Center (WARC) is contributing to pollution. To determine this, I consulted a local laboratory to ensure that any sample collected was analyzed for the chemical contaminants that are most likely to be associated with RAP. The analytes that were selected were; metals (MTCA 5 – arsenic, cadmium, chromium, mercury and lead), total petroleum hydrocarbons (diesel extended range which includes longer petroleum hydrocarbon chains like oils), and polycyclic aromatic hydrocarbons (including the carcinogenic hydrocarbons).

On January 6th, I walked around the area where the RAP is stored (in the rain) and determined that the rain water that comes off the RAP material, and reaches the ground surface, combines with runoff from the upland landfill. To ensure that the sample collected constitutes only runoff from the RAP and no other source, I decided the most appropriate sample would be collected from rainwater dripping off the RAP pile (before it hits the ground).

On January 8 and 9, I collected two sets of samples in glass containers and poured them into appropriate sample bottles and hand delivered one set to an analytical lab and the other sample set was provided to Lakeside Industry personnel.

The attached laboratory data is the results of the analysis. The sample analysis shows that the RAP was not contributing arsenic, cadmium, chromium, mercury or lead into the stormwater runoff. Total petroleum hydrocarbons (oils and diesel0 were not detected in the runoff sample and neither were there any detectable polycyclic aromatic hydrocarbons (PAH's).

Although only one sample was collected from the RAP pile, there does not appear to be variability in the material stored, so collecting multiple samples from various points is unlikely to create a different result. At this time it does not appear that the RAP material is contributing pollution via stormwater runoff. If you have any questions or would like further clarification, please contact me.

Patrick Soderberg
Hazardous Waste Specialist
Thurston County Health Department

Attachment: Libby Labs analytical data

LAKESIDE INDUSTRIES

October 4, 2012

Thurston County Commissioners
2000 Lakeridge Dr. S.W.
Olympia, WA 98502

Dear Commissioners:

Lakeside Industries is seeking a minor text amendment to the Thurston County Comprehensive Plan (TCCP) – Nisqually Sub-Area Plan. Specifically, Lakeside is seeking to amend Policy E.5 of the Nisqually Sub-Area Plan. Policy E.5 is contrary to all current thinking regarding environmental protection and natural resource conservation. The proposed minor text amendment is responsive to the goals of the Growth Management Act and should require minimal staff effort to review and approve given the body of technical information and legislative efforts already completed in support of comparable proposals regarding Recycled Asphalt Pavement (RAP). Therefore, the proposed minor text amendment should be approved as a Tier One amendment on the Official Docket for 2011-2012.

Policy E.5 currently precludes the reprocessing of asphalt due to water quality concerns. This policy was put in place at a time when less emphasis was placed on recycling and when it was falsely assumed that using recycled asphalt pavement might have an impact on water quality. Since approval of Policy E.5 over a decade ago, significant effort has been put forth by governmental, educational, and private research entities to evaluate potential impacts associated with the processing and recycling of asphalt. This research has resulted in a body of technical information and scientific evidence supporting the claim that asphalt is inert and poses no threat to water quality.

With this proposal, the TCCP will be updated to allow for processing RAP – an activity that is actively encouraged by the Department of Ecology and that has already been vetted under the State Environmental Policy Act. Amending Policy E.5 will have no discernible impact on adjacent properties and will not affect water quality within the Affected Geographic Area.

Prompt approval of the amendment would allow Lakeside to process RAP by incorporating it into its permitted hot-mix asphalt production process located within the Affected Geographic Area – an activity already authorized throughout Thurston County outside the Affected Geographic Area. Recycling of asphalt into fresh asphalt mix is an activity that is encouraged by local, sate, and federal agencies and is part of normal operation at asphalt plants. In fact, local jurisdictions are moving toward, or in some cases have already passed, ordinances mandating recycle of asphalt. The City of Seattle passed and Ordinance (#123553) on March 7, 2011 requiring the recycling of asphalt pavement.

P.O. Box 3004, Lacey, WA 98503 • (360) 491-5460 • (360) 459-3858/FAX

Approval of the amendment is necessary to ensure the sustainability of Lakeside Industries' operation and the support of other local companies who rely on the availability of our product. We respectfully request the proposed minor text amendment be approved as a Tier One amendment on the Official Docket for 2011-2012 to facilitate timely review and approval.

Very truly yours,

Dean Smith
Division Manager

cc: Scott Clark, Planning Director, Thurston County Planning Department

Signing in support and agreement of the comments presented in this letter:

Signature	Name	Address
	Catherine L Berlin	11484 Hobby St SE, Yelm
	Craig O. Larson	PO Box 40 Onalaska
	TAO NETZEL	3704 67th Court SW Olympia, WA
	Dan Wagner	9510 Horizon Ln SE Port Orchard, WA
	SARAH E. SCARDINO	PO Box 811 TENINO, WA 98589
	DALE K. GILDERSLEEVE	PO Box 23 Curtis, WA 98538
	DAVID McCLELLAN	67 Aldergrove DR Monte -
	Leigh J Chase	2415 Aberdeen Ave, Hoquiam, WA
	Neil McLeod	12631 123rd Ave SE Rainier WA
	Sherry Gallington	658 Wilkie Ln. Montesano, WA
	KEOLAOKALANI DANIELS	10315 16th Ave E. Tacoma, Wa 98445
	Robert Valentine	623 E Monroe Ave Montesano WA 9856
	HERBERT K MILLESON	3042 MERIDIAN Rd SE
	Michael A Gentile	6517 Olympic Hy

Signature	Name	Address
7573	Kenneth Koidahl	450 penzance Ct Shelton WA 98514
Doug Stephens	Douglas Stephens	2849 Cliff Ln NE Oly, Wa. 98506
Mark A Bolam	Mark A. Bolam	5 Eaton Ln Montesano, WA 98563
	MARK A GAYMAN	5111 JESSICA CT SE LACEY WA 98513
	Julio Garcia	12725 Morris Rose Yelm Wa 98597
Dawn Rae Sprague	Dawn Sprague	14749 high valley Inse tenino wa 98589
		14109 Littlerock Rd Rochester
	Johnny Escobedo	16483 Greenbrier St SE Yelm wa 98597
Debbie Clements	Debbie clements	5605 Raywood WA 98
Tami		
Stephanie Butler	STEPHANIE BUTLER	71 Garden ln 9838
David S Hagen	DAVID Hagen	6625 188TH AVE SW 98577
JOHN E. ARREOLA JR	JOHN E. ARREOLA JR	1513 72ND ST. SE AUBURN, WA 98092
Ron R. Denman	Ron R. Denman	118 URQUHART Rd. 985 Chehalis
	Tim Craig	5616 Mount Saint Hele
Gordon L. Avery	Gordon Avery	262 Hall Rd Silver Lake 98645
K.R. Hatton	Kristen Hatton	18425 elaine ct. Rochester 985
Mike O'Neil	Mike O'Neil	340 nct Olympia Dr. SW ISSN

Mr Scott Clark, Director
Thurston County Planning Deptartment
2000 Lakeridge Drive SW
Olympia, Washington 98502

RE: Comprehensive Plan Text Amendment
To Nisqually sub area- Lakeside Industries
Use of Recycled Asphalt Pavement at Durgin Road Plant

Dear Mr. Clark,

I am writing this letter as an employee of Lakeside Industries and as a tax paying citizen of Thurston County. The purpose of this letter is to highlight the benefits of using Recycled Asphalt Pavement or RAP, at our Durgin Road Plant.

Using RAP with new asphalt can lower the cost of our product, allowing Lakeside to be more competitive with our bids, and provide on-going work for those of us who depend on Lakeside Industries for employment. It's a comforting thought in these tough economic times.

RAP is also the most recycled material in the world. In Thurston County, I believe that we have prided ourselves in recycling and reducing waste; in other words being "green" long before it was in fashion. This is what we have taught our children and this is how we live. Using RAP is a perfect example of recycling and reusing a product. Where will all of the RAP go if we don't reuse it? Into our precious landfills that are already overloaded. Does that make sense when we have a viable way to reuse it?

Using RAP can also make us less dependent on foreign oil as we save more energy by using a product so readily available.

If we can decrease our carbon footprint, produce an excellent product at a lower price, and recycle asphalt that will otherwise be dumped into our limited landfills, why wouldn't we?

Sincerely,

Kathy Miller

Kathy Miller
Traffic Control Supervisor
Lakeside Industries

October 1st, 2012

Mr Scott Clark, Director
Thurston County Planning Deptartment
2000 Lakeridge Drive SW
Olympia, Washington 98502

Dear Scott,

This letter is in regard to the request of site-specific use for recycling of waste asphalt by Lakeside Industries. Also, the letter is intended to discuss plans to address concerns about the storage and use of Recycled Asphalt Pavement (RAP.) Currently Lakeside Industries is unable to use RAP because of the Nisqually Valley Subarea Plan (NVSP.) As a young college student of twenty years of age, I am constantly exposed to classes, seminars, bulletins, emails, and news about everyone doing their own part in the community to help out with the environment. In recent years many strides have been made to make the world a safer, and "greener" place to inhabit. Lakeside Industries in several aspects is one of the more excellent asphalt paving industries in the Northwest. Whether it be smoothly paved jobs that make drivers happy, great employees with an outstanding safety record, or an environment/community first approach to all their concerns, Lakeside Industries seems to do it "right" when it comes to asphalt and a happy community around them. Now, Lakeside would like to improve their own selves as to make the world a better place by recycling asphalt and doing their own part to keep the world a great place to inhabit.

The little concerns of Lakeside Industries using RAP are very minimal if not non-existent when compared to the Pros of using RAP. The pros of allowing Lakeside to use RAP are reduction of petroleum products used, and the reduction in the necessity to mine new aggregate.

It is also useful for me to state that all other asphalt plants use some sort of RAP in their processes producing asphalt. Lakeside Industries would like to help the environment by using Recycled Asphalt Pavement. Lakeside also seems to be willing to do whatever it takes to make the community surrounding their plants happy by ensuring the community has no concerns on the processes that take place at their facilities. Using RAP is the right thing to do and a waste asphalt recycling operation presents none to extremely minimal environmental health concerns. As a student included in a generation that is expected to keep the world a safe place to inhabit in the decades to come, please give this request to allow Lakeside Industries to use Recycled Asphalt Pavement your fullest consideration because it will help us all in the long run. I appreciate very much your support and recommendation for approval and hope that you see to it as I do that this is the right thing to do.

Sincerely,

Nick Smith

Nick Smith
Georgia Tech University
1-360-915-2856
Mrnsmith2@gmail.com

CAIRNCROSS&HEMPELMANN
524 2nd Ave. Suite 500
Seattle, WA 98104
www.cairncross.com

ATTORNEYS AT LAW
office 206 587 0700
fax 206 587 2308

CH&

October 1, 2014

Commissioner Karen Valenzuela
Commissioner Cathy Wolfe
Commissioner Sandra Romero
Thurston County Board of Commissioners
2000 Lakeridge Drive SW, 1-209
Olympia, Washington 98502-1045

Re: Comprehensive Plan Amendment Docket

Dear Commissioners:

We are writing in support of the Lakeside Industries request for a Tier 1 position on the County Docket to review proposed amendments to the Comprehensive Plan. As the Lakeside request demonstrates, an amendment to the Nisqually Subarea Plan should eliminate the prohibition on the use of recycled asphalt or RAP at the Lakeside Plant in the Holroyd Mine.

This letter addresses one issue - the regional significance of the Lakeside Plant and its use of RAP. In its August 7, 2014 Briefing Memorandum to the Board on the Comprehensive Plan Docket, Staff (on page 2) listed three criteria to prioritize the then draft preliminary docket. The first criteria was "Regulatory compliance, moratorium, and interim regulations deadlines". The second criteria was "Regional Significance". The third criteria was "Human resources availability through full-time employees, interjurisdictional support, or grant funded project employees and consultants". The Staff Briefing Memorandum classified three items as having regional significance. The Staff Briefing Memorandum did not classify any of the four Citizen Initiated proposals.

We submit that the Lakeside proposal, one of the four citizen initiated proposals, has great regional significance. The Lakeside Plant is located in Thurston County but it serves a broad region and its product is used in many jurisdictions by a broad range of federal, state and local governments and a broad range of private businesses and individuals.

The Thurston County Code does not define the term regional significance. Thus, it is appropriate to look to dictionary definitions of the term and also to look at how Staff has interpreted the term in other cases. The Random House Kernerman Webster's College Dictionary (2010) defines regional as "pertaining to a region of considerable extent, not merely local." The Merriam Webster Dictionary

jhempelmann@cairncross.com
direct: (206) 254-4400

defines regional as "of, relating to, characteristic of, or serving a region" and uses the example of "a regional high school". Staff applies these common sense definitions in its work. For example, one of the proposed Comprehensive Plan Docket items the Staff classified in the Briefing Memorandum as having regional significance is the Grand Mound Rezone. Staff also classified the Prairie Habitat Conservation Plan as having regional significance.

The Lakeside Plant serves a large region of Western Washington. The area the Plant serves includes Thurston County, Pierce County, Kitsap County, Grays Harbor County, Lewis County and, in a few instances, Clallam and Pacific Counties. Included with this letter is a list of projects served by the Lakeside Plant in the last two years. Also included is a list of customers from throughout the region who used material from the Plant for their projects in the region. It demonstrates the very large region and very broad type of projects served by the Plant. Obviously, this broad area is not "local" and the region is much larger than an area served by a regional high school. Clearly, the region is much larger than the area of the Grand Mound Rezone or the areas that will be addressed by the Prairie Habitat Conservation Plan, Docket items the Staff have classified as having regional significance. One of the many purposes and values of using RAP in the production of asphalt is that it reduces the cost of the end product. Thus, the cost of the use of asphalt in the many government and private projects served by the Lakeside Plant in this broad region would be reduced. Use of RAP will save precious public tax dollars in numerous counties and cities in Western Washington, as well as on federal projects. You will have received a letter in support of the Lakeside request from Ms. Karen Deal, the Environmental Manager for Lakeside Industries. She provides you with very important information about how the use of RAP at the Lakeside Plant will reduce greenhouse gas emissions or GHG emissions. Air quality is without question a regional issue and thus use of RAP by Lakeside to reduce GHG emissions is an issue of regional significance.

Given this analysis, we submit the Lakeside request should be classified as having regional significance. It is our opinion that failing to classify the Lakeside request as regional would be unreasonable.

Sincerely yours,

John W. Hempelmann

JWH:msd
Enclosure
cc: Cliff Moore
Cynthia Wilson

LAKESIDE INDUSTRIES, INC.

October 1, 2014

Cynthia Wilson
Long Range Planning Manager
Thurston County Resource Stewardship Department
2000 Lakeridge Dr, SW
Olympia, WA 98502

Re: Notice of Availability for Public Comment, Preliminary Docket of Comprehensive Plan Amendments for 2014-15, Proposed Tier One Amendments

Dear Cynthia:

Lakeside Industries respectfully requests the Thurston County Board of County Commissioners include the application for a Text Amendment to Policy E.5 of the Nisqually Sub-Area Plan as a Tier I proposal on the Official 2014-2015 Docket of Comprehensive Plan Amendments. The application proposal, which includes an environmental review to evaluate the impacts of recycling Reclaimed Asphalt Pavement (RAP) within the Nisqually Sub-Area, meets the criteria for Tier I, being of regional significance. The proposal is regionally significant due to the potential social, economic, and environmental benefits that would be incurred by the County if the proposal is approved for review.

The environmental benefits are well documented nationally and internationally. The benefits include reduced reliance on virgin raw materials including oil and aggregate, reduced landfill demand, reduced energy demand, and reduced emissions including Greenhouse Gas Emissions (GHG).

The Thurston Climate Action Team (TCAT), a local non-profit dedicated to creating a healthy and sustainable future for Thurston County, prepared a scientifically supported Greenhouse Gas (GHG) Inventory Report for Calendar Year 2010, dated December 26, 2013 (http://www.oly-wa.us/ThurstonClimateAction/PDF/ThurstonCountyGreenhouseGasInventoryReport2013August.pdf).

The report documents that Thurston County's greenhouse gas emissions amounted to 2,761,800 metric tons of carbon dioxide equivalent or 10.95 metric tons per person. The majority of these greenhouse gas emissions, a total of 1,443,200 metric tons or 10.68 metric tons per person, are emitted from Unincorporated Thurston County.

Members of the TCAT's Energy Advisory Committee provided guidance on the approach to this effort. Members of the committee included local City Council Members including Cathy Wolfe, Commissioner, Thurston County.

Sustainable Thurston, a three year sustainability planning program being completed by Thurston Regional Planning Council, recommends 25% reduction from 1990 levels by 2020, which is

consistent with Washington State's legally established GHG reduction goals, codified in RCW 70.235.020.

Given an opportunity to recycle Reclaimed Asphalt Pavement (RAP), Lakeside would be able to document a 50% potential reduction in net overall GHG emissions due to its ability to recycle RAP on-site. The 50% reduction or "credit" is a result of avoided emission from the mining, processing and transportation of crushed stone and asphalt binder (http://www.asphaltpavement.org/ghgc/GHGC%20v4%20instructions.pdf). This GHG offset/credit does not account for the saved landfill space and the energy associated with landfilling, nor does it account for additional emissions (or their offset) that would be associated with transporting RAP from the local roads to locations or jurisdictions outside Thurston County that embrace RAP recycling. By processing RAP at the Nisqually plant, additional GHG savings (above the documented 50%) can also be realized.

Thurston County received $849,200 in federal grant money for projects that reduce energy use, curb greenhouse gas emissions, and improve energy efficiency. The grant was awarded in late 2009 by funds administered by the United States Department of Energy. With this grant, Thurston County committed to a number of goals including working with the building community to create greener building codes and creating and editing regional plans to make the community more sustainable (http://www.co.thurston.wa.us/planning/climate/climate_home.htm).

Beginning in 2005, Lakeside has annually applied for a Comprehensive Plan Amendment for the County to consider a minor text amendment to the Nisqually Sub-Area Plan. The applications request an environmental review of language in the plan that prohibits RAP recycling. Every application to date has been deemed low priority and "lack of staffing" has prevented consideration of our proposal.

If the County is truly interested in achieving GHG emissions reduction goals and encouraging the efforts of local businesses to reduce GHG emission impacts, they would place Lakeside's application as a Tier I proposal on the Official 2014-2015 Docket of Comprehensive Plan Amendments.

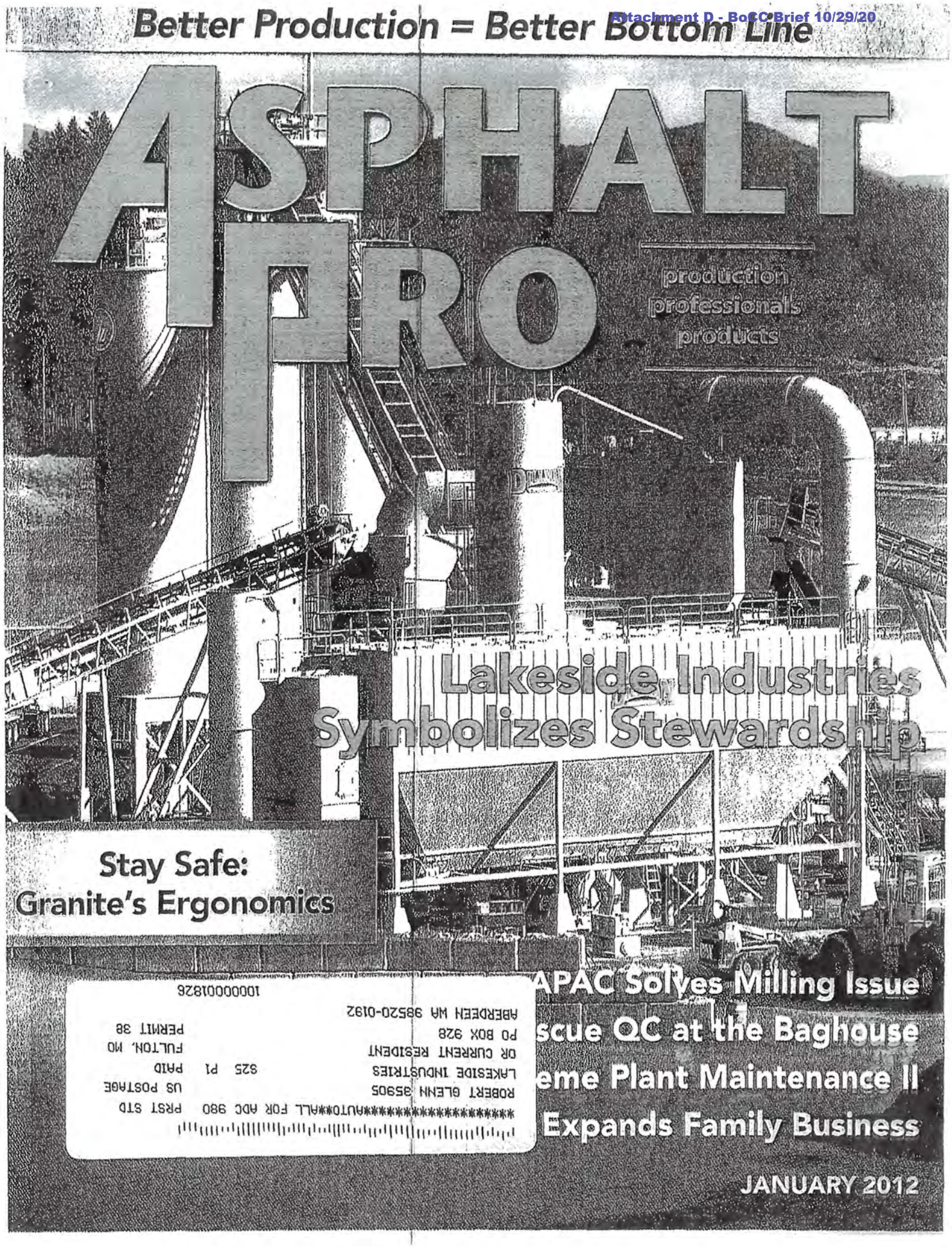
Sincerely,

Karen Deal
Lakeside Industries, Inc.

Better Production = Better Bottom Line

ASPHALT PRO

production professionals products



Lakeside Industries Symbolizes Stewardship

Stay Safe: Granite's Ergonomics

APAC Solves Milling Issue

scue QC at the Baghouse

eme Plant Maintenance II

Expands Family Business

JANUARY 2012

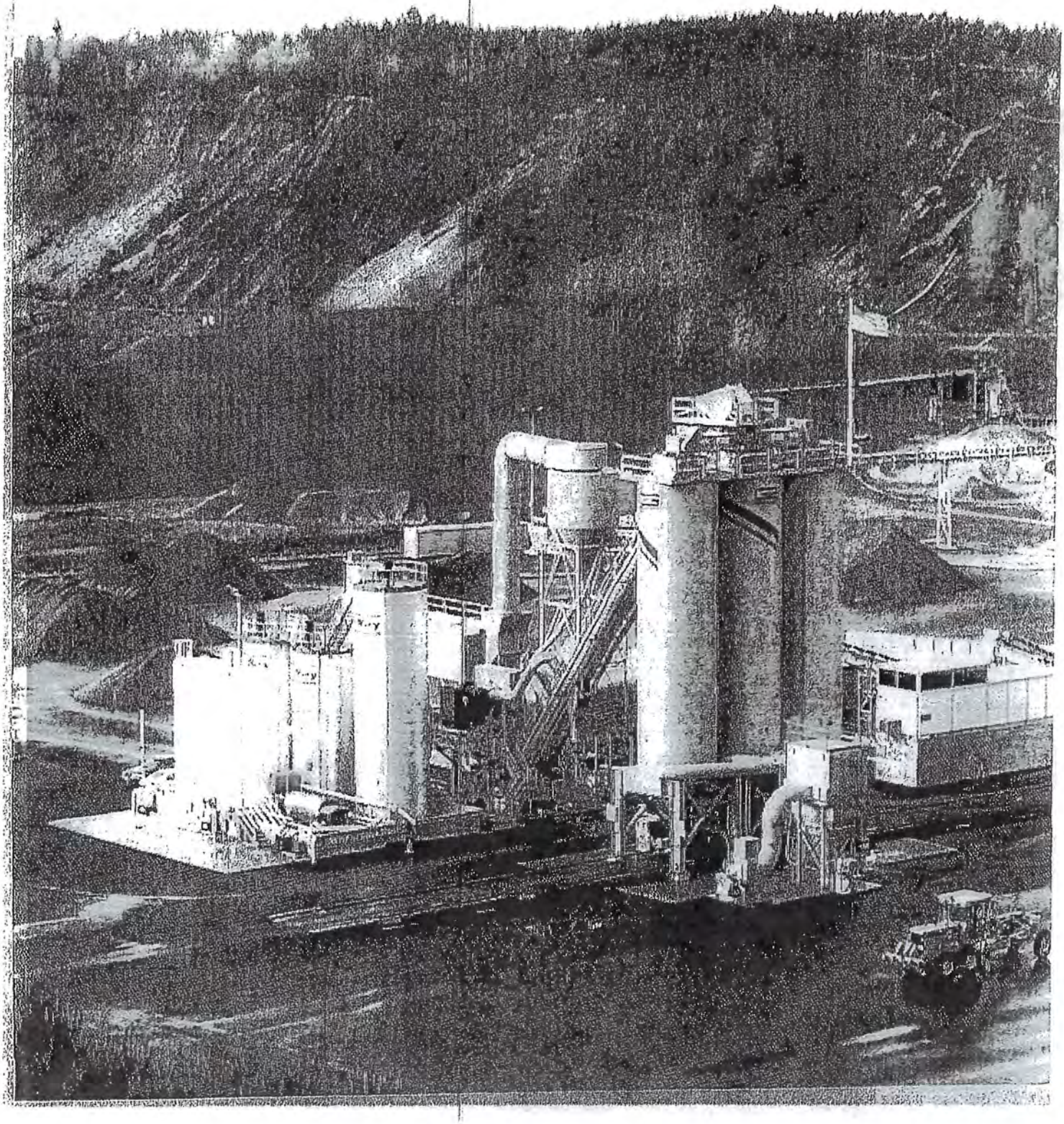
10000001826

**********AUTO**ALL FOR ADC 980 PRST STD
ROBERT GLENN 35905
LAKESIDE INDUSTRIES
OR CURRENT RESIDENT
PO BOX 928
ABERDEEN WA 98520-0192

S25 P1 PAID
US POSTAGE
FULTON, MO
PERMIT 38

Ecological Plant Prowess Garners Attention

Stewardship, company pride continue long after accepting awards for Lakeside divisions



One of the ways Dean Smith keeps dust down at the Lacey division plant is by forming stockpiles close to the cold feeds. He also uses a clever system of conveyors. Notice the conveyors at the far right, upper corner of the image bringing aggregate from larger piles farther away. This lessens truck traffic as well as loader traffic, compaction and segregation.

BY SANDY LENDER

As the company name implies, Lakeside Industries, Inc., headquartered in Issaquah, Wash., has an environmental edge to it that a national entity would make an example of. In fact, the National Asphalt Pavement Association (NAPA) has already done that. In 2009 and 2010 NAPA honored two Lakeside plants with its New Plant Ecological Awards. As a whole, the company strives to perform at this level of excellence while maintaining a family atmosphere and a commitment to the asphalt industry.

Start by looking at the company's track record. Lakeside Industries is one of the few remaining family owned construction companies of its size—and it's focused solely on asphalt paving. Its 12 regional divisions spanning Western Washington, Northwest Oregon and Central Idaho offer a range of local products and services from state DOT work to commercial projects for private citizens.

Within each division, the people bring local knowledge and focus to customers while using the expertise and resources of the larger company. That business plan reflects the company's mission: "To provide quality asphalt products while serving the community as industry leaders."

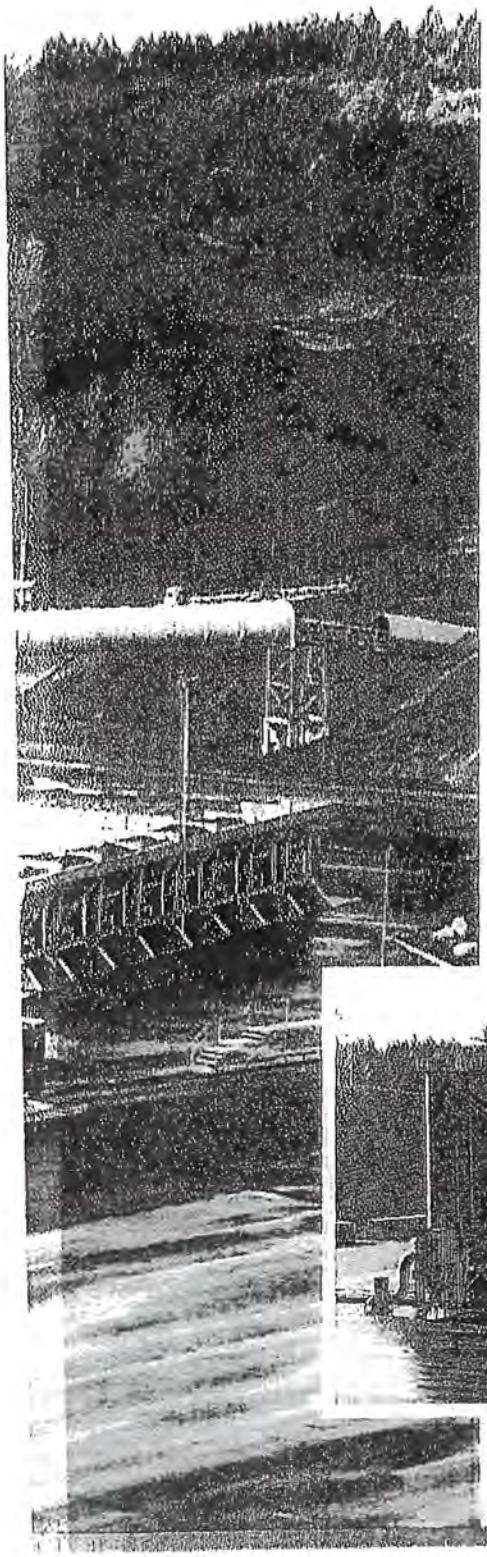
The company has consistently won awards from agencies and organizations such as the Asphalt Pavement Association of Oregon (APAO), the American Public Works Association—Washington State Chapter (APWA-WA), American Society of Civil Engineers (ASCE), NAPA, Washington Asphalt Paving Association (WAPA), Washington State Association of County Engineers (WSACE) and Washington State Department of Transportation (WSDOT).

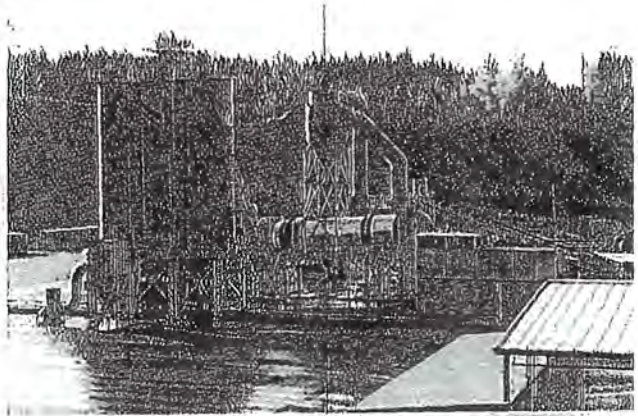
Management's attention to quality doesn't end with workmanship. It extends to the health and welfare of employees and environment. For example, Lakeside Industries divisions have won multiple certificates of achievement in safety from the Mine Safety and Health Administration and multiple certificates of honor from the Joseph A. Holmes Safety Association. In 2007, the Lakeside Industries online safety training program was a finalist for the NAPA Asphalt Operations Safety Innovations Award.

In 2009, the Lacey Division Durgin Road Plant was a New Plant Finalist in the NAPA Ecological Awards. In 2010, the Monroe Plant took first place in the NAPA Ecological Awards. The company has more than 50 NAPA Diamond Achievement Commendations for Excellence in Hot Mix Asphalt Plant/Site Operations since 1999 when its Aberdeen plant achieved the first. The Aberdeen division has garnered its own NAPA ecological award for an existing asphalt plant in 1988 and again in 1998.

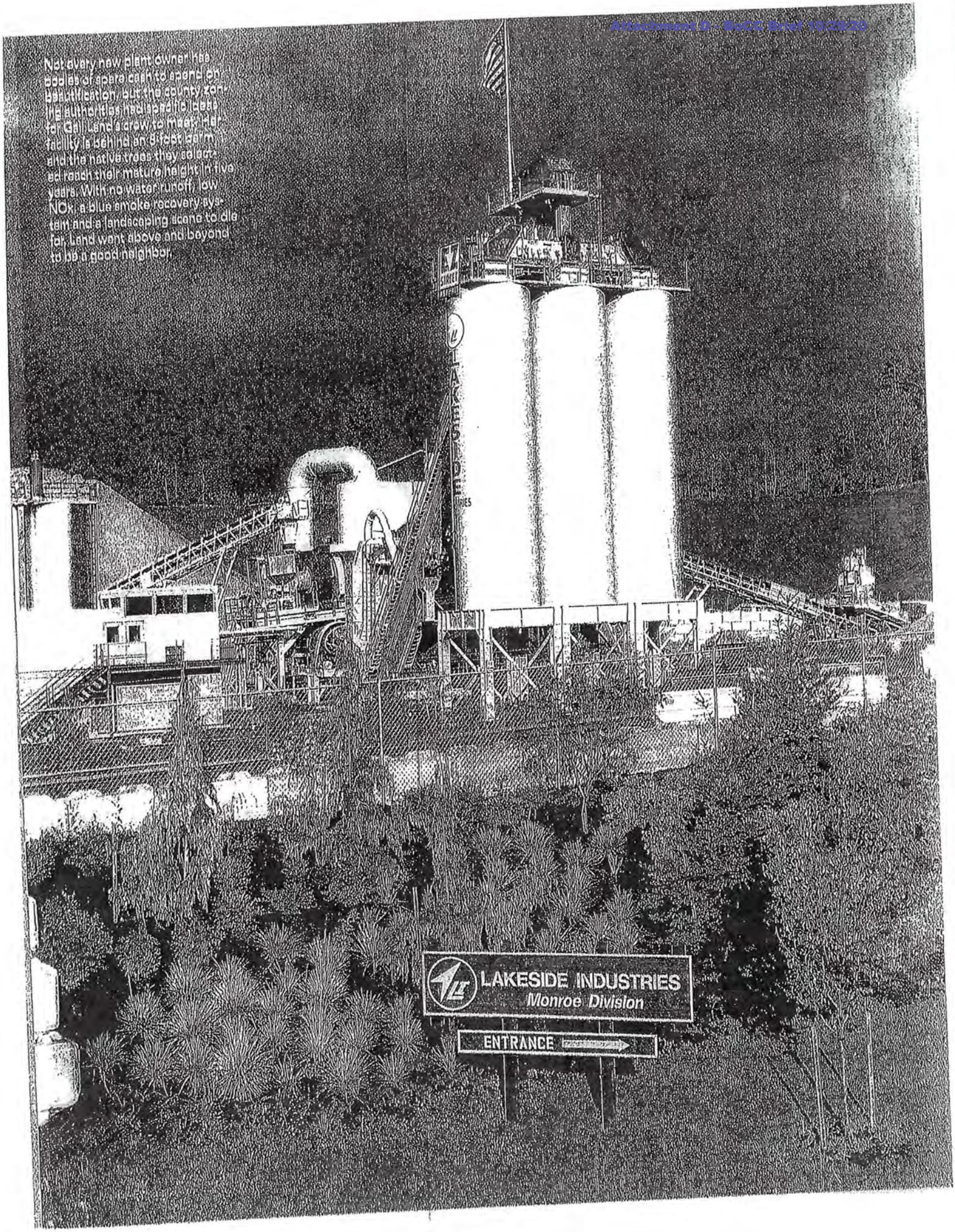
When *AsphaltPro* contacted Aberdeen Division Manager Bob Glenn about the successes Lakeside has enjoyed, his immediate reaction was to shine the spotlight on the environmental advances two specific division managers have put in place. Dean Smith is the Lacey division manager; Gail Land is the Monroe division manager. Both spoke proudly of the plants and people they work with, and an impressive picture of Lakeside Industries began to emerge. These folks haven't been building nice plants the past few decades merely to win awards. They put together environmentally friendly operations because it's the right thing to do.

Mike Peringer of Process Heating, Co., Seattle, summed that up. "It is very gratifying to see asphalt companies taking such a significant interest in community," Peringer said. "Lakeside has a reputation for just that and that attitude is to be commended. I teach 'Leaders Who Give Back' at the University of Washington Public Affairs School and often refer to companies like Lakeside. Others should take note and realize that such community is like an asset in determining company value."





Notice that the Durgin Road plant site is completely paved, which also helps keep dust down.


Not every new plant owner has oodles of spare cash to spend on beautification, but the county zoning authorities had specific ideas for Gail Land's crew to meet. Her facility is behind an 8-foot berm and the native trees they selected reach their mature height in five years. With no water runoff, low NOx, a blue smoke recovery system and a landscaping scene to die for, Land went above and beyond to be a good neighbor.
LAKESIDE INDUSTRIES
Monroe Division
ENTRANCE

LACEY DIVISION

Working toward bettering a community was on Smith's mind when he spoke about the Durgin Road plant in Olympia, Wash. "It took us eight years to permit the Durgin Road plant, so we're doing everything in our power to be great stewards of our neighborhood," he said.

His facility is a picture-perfect illustration of how to set your new plant up for environmental excellence, even when the neighborhood has limits to recycling. Believe it or not, the Thurston County zoning regulations currently prohibit reclaimed asphalt pavement (RAP) or recycled asphalt shingle (RAS) use. Because Smith wants to be a part of the movement keeping waste out of landfills, he's working on changing that prohibition.

"We are working with Thurston County and the neighbors to change the zoning to allow us to recycle both asphalt and shingles," Smith said.

Even with those limitations, Smith's plant was a finalist in the NAPA ecological awards. Currently, asphalt plant owners don't get official "credit" for lobbying their local officials to allow recycling. "The nomination forms do not include a question about this, but some companies write this in," NAPA's Margaret Cervarich said. "In that case, it is considered by the judges."

The awards that Cervarich described take a significant effort. "To receive the ecological award, the company must first earn the Diamond Achievement Commendation for Excellence in Asphalt Plant/Site Operations. This sets a high standard. Those who earn the Diamond Achievement may then apply for the ecological award.

"A team of industry experts evaluates the nominations on a number of objective criteria. Plant operations, compliance, community relations and environmental excellence are considered. More subjectively, aesthetics are also taken into account. Thus, to be named as a winner or finalist in the ecological award competition means that the plant is the crème de la crème of the industry."

Thurston County officials already know of the Lacey division's commitment to the environment. The division has a Thurston Green Business certification for the recycling its employees perform in the office. They've elected to recycle items such as office paper, ink cartridges, soda cans and the like, and Thurston officials have recognized them for it. Of course, Thurston officials and neighbors recognized their positive plant aspects, as well.

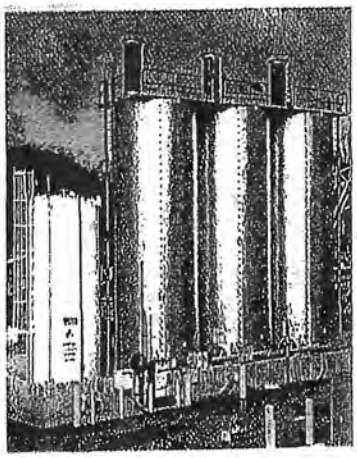
"It's a state-of-the-art 300 ton-per-hour Gencor Ultraplant," Smith said. "It's got all the bells and whistles—a great burner that's a burner of choice and efficient. The plant can make foamed asphalt warm mix."

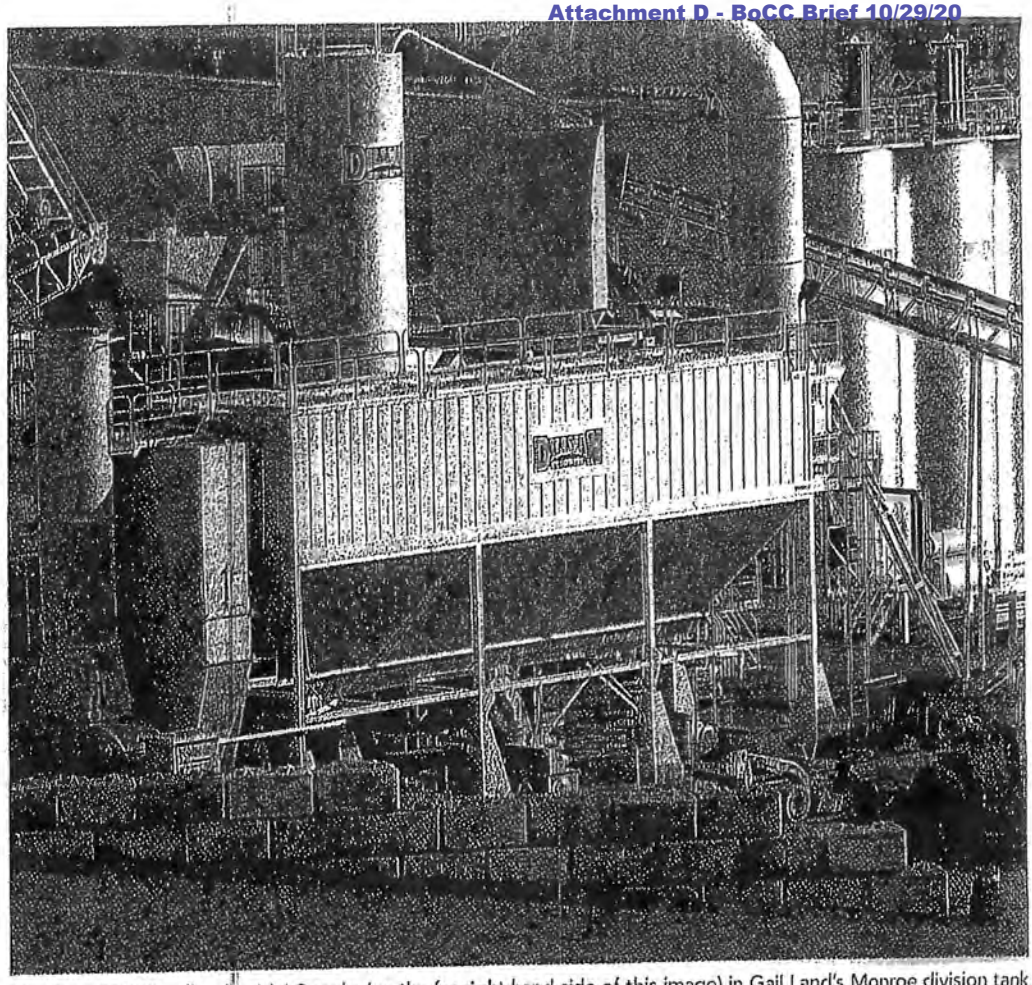
Smith uses a variety of good practices to mitigate dust. First, the crew paved the entire site. Something that works for fuel savings and noise mitigation, as well as keeping dust and material confusion to a minimum, is the use of conveyors.

"We have minimized loader and truck traffic by having the stockpile close to the plant and the rock delivered by belt to the stockpile area from the crusher," Smith said.

Finally, they use a Dustex blue smoke baghouse, and baghouse dust is returned and metered back into the finished product.

The Portland and Issaquah plants produce EZ Street cold mix that other divisions, such as the Lacey division managed by Dean Smith, sell.





The three 30,000-gallon liquid AC tanks (on the far right-hand side of this image) in Gail Land's Monroe division tank farm feature scrubbers on top to assist in meeting air quality standards. The baghouse also features a metered return system to take dust back to the drum.

A natural gas hot oil system keeps 75,000 gallons of liquid AC hot at the tank farm and the silos can store up to 900 tons.

Who keeps all this going? "Herb Milleson is my plant operator," Smith reported. "Herb has worked for us for 30 plus years and has run plant for us since 2001. Herb does a great job for us."

MONROE DIVISION

Likewise, the Monroe division's manager, Gail Land, praised her plant operator. "Gary Swanson is amazing. He was instrumental in picking out and setting up and calibrating our plant."

Land has worked for Lakeside for 16 years and knew the kind of work it would take to get an asphalt plant permitted. She knew it took working with the community to alleviate the neighbors' worries and to build something she's proud of.

"A lot of forward thinking went into this when we moved," Land said. "We purchased an existing gravel pit, cleaned it out and went from there to building the asphalt site. The county has rigorous water regulations, so we worked to accommodate that. None of the water that falls on my site can leave my site, so none of it does. The entire site is paved on a 3 percent slope. All water channels into a main water cleaning system."

As far as water is concerned, Land pointed out that the site stays mud-free. "We have a truck-washing station as well. Here in the Northwest we have mud everywhere, but not on my site. There's no mud at this plant."

One of the ways to keep away mud is to keep away dust, and Land uses a baghouse for dust mitigation as her colleague Smith does. As mentioned above, her entire site is paved, which keeps dust from tires and fallen, crushed rocks to a minimum. She shared that her paving crew had just paved the road into the quarry with RAS, a product the Monroe division has recently embraced.

"We have purchased a shingle grinder, so we're talking with the scrap producers around here to set up and grind at their sites," Land said. For now, the grinder, which consists of two pieces of grinder equipment and a trackhoe, travels to different divisions as needed. The RAS pile is kept inside, covered and contained.

As if mirroring the Lacey division, Land's Dillman DuoDrum plant has run both RAS and RAP, but Land is just looking into warm-mix asphalt now. The plant is capable of 400 TPH and Land said they've gotten production close to that limit. "In today's market we don't get to push it as much."

Her facility includes three 30,000-gallon liquid AC tanks and a 15,000-gallon diesel tank in the tank farm and three

"We have purchased a shingle grinder, so we're talking with the scrap producers around here to set up and grind at their sites."

300-ton silos for storage. A blue smoke recovery system and scrubbers atop the AC tanks help keep air quality up to standard.

"I couldn't be prouder of this place," Land said. "It's a neat, tidy-looking site."

GOOD BUSINESS

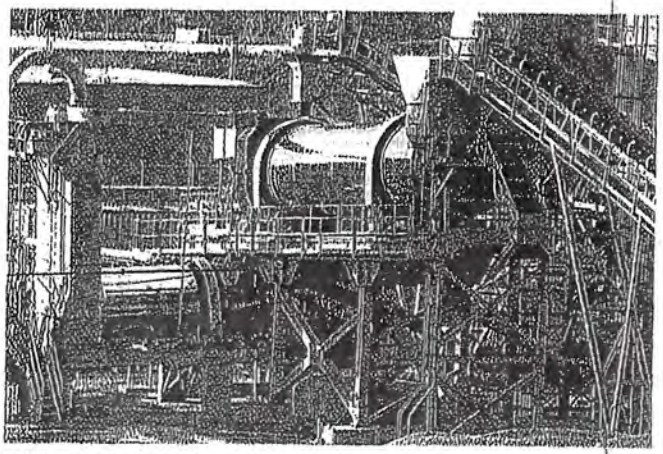
Land and Smith have much to be proud of with award-winning operations to their credit. They also have much to live up to. Lakeside Industries doesn't rest on its laurels.

The company began a business relationship with EZ Street Co., Miami, a few years back, allowing two of its facilities to produce environmentally friendly mix for pothole and repair work.

"Lakeside began producing EZ Street in 2000 in Issaquah under a licensing agreement with the EZ Street Company," Rick Rawlings said. "We began to produce it in Portland in 2002. We began packaging it in 35- and 50-pound bags in 2002 as well. Our sales demand is fairly uniform now year-round."

Lakeside remains committed to its local communities as well. For example, if you followed the company's facebook page during December, you'd have seen employees were making and collecting donations for Issaquah children who needed warm clothing. They were also hosting a food drive and receiving accolades for sports equipment they'd donated and installed for schools.

While it's commendable and "good business" to go the extra mile ecologically speaking to get an asphalt plant permitted, it's uplifting to see a large company keeping its environmental and community commitments. With priorities that include quality workmanship, quality asphalt products and serving the community, the regional divisions of Lakeside Industries have a multi-generational history to be proud of.



Gail Land's Monroe division plant is a Dillman DuoDrum.

LAKESIDE INDUSTRIES, INC.

October 1, 2014

Cynthia Wilson
Long Range Planning Manager
Thurston County Resource Stewardship Department
2000 Lakeridge Dr, SW
Olympia, WA 98502

Re: Notice of Availability for Public Comment, Preliminary Docket of Comprehensive Plan Amendments for 2014-15, Proposed Tier One Amendments

Dear Cynthia:

Lakeside Industries respectfully requests the Thurston County Board of County Commissioners include the application for a Text Amendment to Policy E.5 of the Nisqually Sub-Area Plan as a Tier I proposal on the Official 2014-2015 Docket of Comprehensive Plan Amendments. The application proposal, which includes an environmental review to evaluate the impacts of recycling Reclaimed Asphalt Pavement (RAP) within the Nisqually Sub-Area, meets the criteria for Tier I, being of regional significance. The proposal is regionally significant due to the potential social, economic, and environmental benefits that would be incurred by the County if the proposal is approved for review.

The environmental benefits are well documented nationally and internationally. The benefits include reduced reliance on virgin raw materials including oil and aggregate, reduced landfill demand, reduced energy demand, and reduced emissions including Greenhouse Gas Emissions (GHG).

The Thurston Climate Action Team (TCAT), a local non-profit dedicated to creating a healthy and sustainable future for Thurston County, prepared a scientifically supported Greenhouse Gas (GHG) Inventory Report for Calendar Year 2010, dated December 26, 2013 (http://www.oly-wa.us/ThurstonClimateAction/PDF/ThurstonCountyGreenhouseGasInventoryReport2013August.pdf).

The report documents that Thurston County's greenhouse gas emissions amounted to 2,761,800 metric tons of carbon dioxide equivalent or 10.95 metric tons per person. The majority of these greenhouse gas emissions, a total of 1,443,200 metric tons or 10.68 metric tons per person, are emitted from Unincorporated Thurston County.

Members of the TCAT's Energy Advisory Committee provided guidance on the approach to this effort. Members of the committee included local City Council Members including Cathy Wolfe, Commissioner, Thurston County.

Sustainable Thurston, a three year sustainability planning program being completed by Thurston Regional Planning Council, recommends 25% reduction from 1990 levels by 2020, which is

Supporting Documentation

For

Comprehensive Plan Amendment Application

Proposed Text Amendment to Nisqually Sub-Area Plan

Includes:

Attachment 1 – Current and Proposed Policy Language

Attachment 2 – Vicinity Map – Site Plan

Attachment 3 – Legal Description of Lakeside Site

Attachment 4 – City of Seattle Ordinance # 123553; Thurston County Resolution #13755

Attachment 5 – Letters of Support

Attachment 1 – Current and Proposed Policy Language

Thurston County Comprehensive Plan Amendment
Proposed Text Amendment to the Nisqually Sub-Area Plan

Proponent: Lakeside Industries

Goal E.5

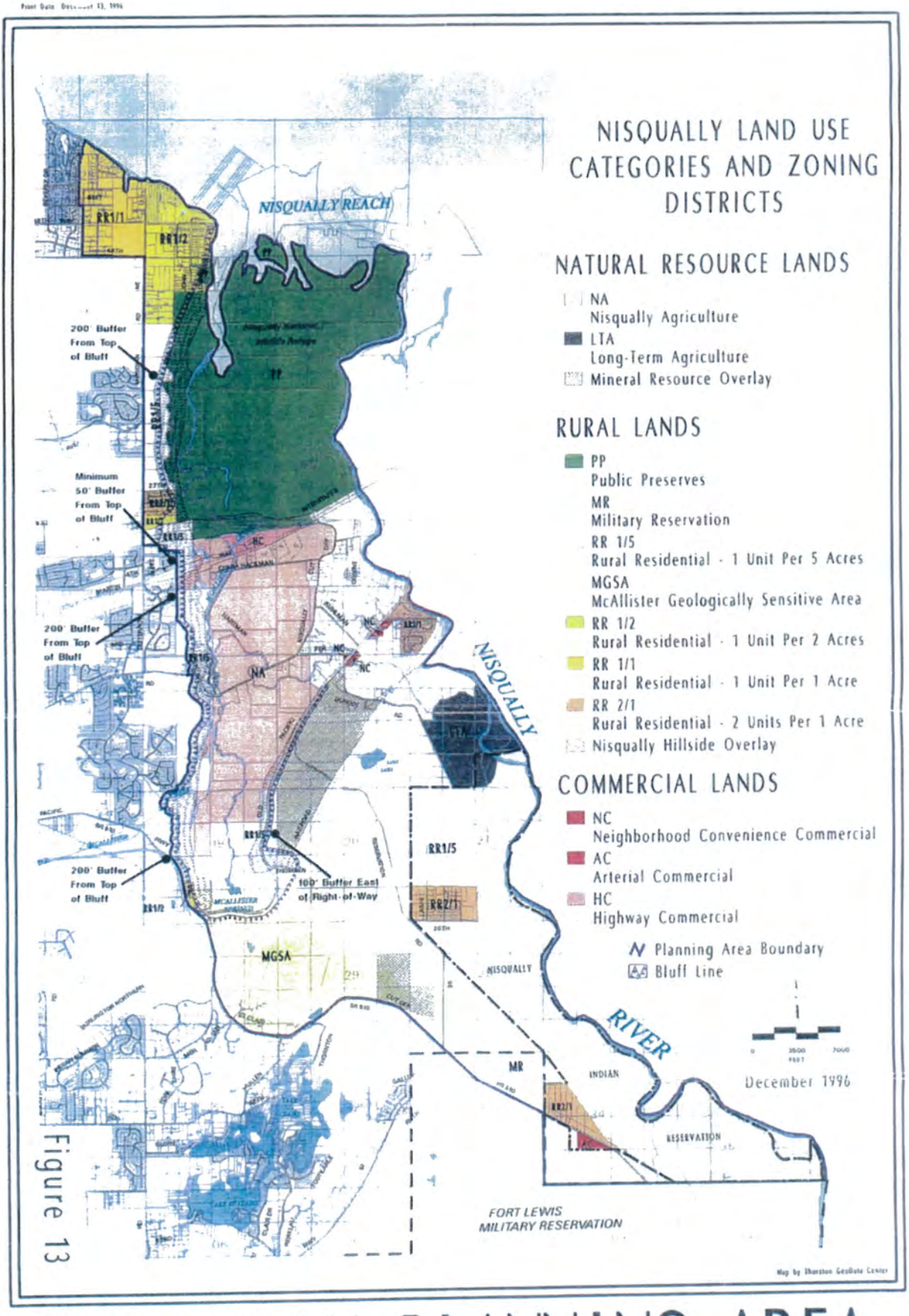
Current Text:

Allow accessory activities to be considered inside the mined out portion of the gravel pit through the site plan review process. Examples of allowable accessory uses would include concrete pipe and/or septic tank construction and the recycling of used concrete. The reprocessing of imported mineral materials shall not be the primary accessory use and the reprocessing of asphalt shall not be allowed due to water quality concerns. These activities shall be discontinued once reclamation of the pit is completed in accordance with DNR standards.

Proposed Text Amendment:

Allow accessory activities to be considered inside the mined out portion of the gravel pit through the site plan review process. Examples of allowable accessory uses would include concrete pipe and/or septic tank construction and the recycling of concrete and asphalt. The reprocessing of imported mineral materials shall not the primary accessory use. These activities shall be discontinued once reclamation of the pit is completed in accordance with DNR standards.

Attachment 2 – Vicinity Map – Site Plan



NISQUALLY PLANNING AREA

#2016105567

THURSTON COUNTY
SINCE 1852

Thurston County Resource Stewardship
2000 Lakeridge Dr. S.W. Olympia, WA 98502
(360)786-5490 / (360)754-2939 (Fax)
TDD Line (360) 754-2933
Email: permit@co.thurston.wa.us
www.co.thurston.wa.us/permitting

Supplemental Application

ENVIRONMENTAL CHECKLIST (SEPA)

STAFF USE ONLY	DATE STAMP
LABEL 2016105567 17-107649 XA Area: Site: 11123 DURGIN RD SE OLYMPIA 21817140200 Sub Type: Hearing Examiner STAFF USE ONLY	THURSTON COUNTY RECEIVED JUN 19 2017 RESOURCE STEWARDSHIP Intake by: KKA

This application form cannot be submitted alone. In addition to this form, a complete application package includes:

Applicant Use	SUBMITTAL CHECKLIST	Staff Use Only
☒	Master application.	☐
☒	Applicable processing fees. *Refer to current fee schedules. Depending on the adopted fee structure, additional fees may occur if base hours/fees at intake are exhausted.*	☐
☐	Site plan – One copy of a site plan, drawn to scale on 8 ½ x 11 or 11 X 17 paper, which depicts all items outlined in the attached site plan submittal requirements.	☐
☐	Environmental reports (wetland report, mitigation plan, geotechnical report, etc.) as required.	☐
☒	Signature and date.	☐

Instructions for Applicants

This Environmental Checklist asks you to describe some basic information about your proposal. Governmental agencies use this checklist to determine whether the environmental impacts of your proposal are significant, requiring preparation of an Environmental Impact Statement (EIS). Answer the questions briefly, with the most precise information known, or give the best description you can. **DO NOT WRITE IN THE AREA THAT IS SPECIFIED FOR AGENCY USE ONLY AND USE ONLY THE ENVIRONMETNAL CHECKLIST APPLICATION PROVIDED BY THURSTON COUNTY.**

You must answer each question accurately and carefully, to the best of your knowledge. In most cases, you should be able to answer the questions from your own observations or project plans without the need to hire experts. If you really do not know the answer, or if a question does not apply to your proposal, write "do not know" or "does not apply." Complete answers to the questions now may avoid unnecessary delays later.

Some questions ask about governmental regulations, such as zoning, shoreline, and landmark designations. Answer these questions if you can. If you have problems, the governmental agencies can assist you.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be a significant adverse impact.

Use of Checklist for Non-Project Proposals:

Non-project proposals are those which are not tied to a specific site, such as adoption of plans, policies or ordinances. Complete the Environmental Checklist for non-project proposals even though questions may be answered "does not apply." In addition, complete the Supplemental Sheet for Non-project Actions (Part D).

For non-project actions, the references in the application to the words "project," "applicant," and "property" should read as "proposal," "proposer," and "affected geographic area," respectively.

Supplemental and Site Plan Submittal Requirements

This application shall contain and/or address the following in a clear, accurate and intelligible form. Submit this checklist with your application. Check the box for each item addressed. Provide an explanation for any unchecked item.

Applicant Use	Supplemental and Site Plan Submittal Requirements	Staff Use Only
☐	1. The project site must be identified in the field by posting an identification sign visible from the access road and by flagging the property corners and the center of the driveway/road access location. The purpose of the sign is for project identification rather than public notification. The sign and flagging are provided by Thurston County and can be obtained at the Permit Assistance Center.	☐
☐	2. One copy of a site plan, drawn to scale (standard engineer scale) on 8 ½" x 11" or 11" X 17" paper, which depicts the following:	☐
☐	a. All information drawn to scale (standard engineer scale).	☐
☐	b. A north arrow, map scale, date and site address.	☐
☐	c. Property boundary lines and dimensions for all affected parcel(s).	☐
☐	d. The location of all existing structures, including, but not limited to, mobile homes, houses, sheds, garages, barns, fences, culverts, bridges, and storage tanks.	☐
☐	e. All means, existing and proposed vehicular and pedestrian ingress and egress to and from the site, such as driveways, streets and fire access roads, including existing road names and existing county and state right-of-way.	☐
☐	f. The location of all existing and proposed easements	☐
☐	g. The location of all existing proposed public and on-site utility structures and lines, such as on-site septic tanks, drainfields and reserve areas, water lines, wells and springs.	☐
☐	h. The location of all critical areas including, but not limited to, shorelines, wetlands, streams, flood zones, lakes, high groundwater, and steep slopes.	☐
☐	i. Vicinity sketch, at a scale of not less than three (3) inches to the mile, indicating the boundary lines and names of adjacent developments, streets and boundary lines of adjacent parcels, and the relationship of the proposed development to major roads and highways.	☐
☐	j. Include acreage and square footage within each parcel.	☐
☐	k. Description of proposed grading, including a written estimate of both cut and fill quantities in cubic yards and a map showing the location of cut and fill areas.	☐

Applicant Use	Supplemental and Site Plan Submittal Requirements	Staff Use Only
☐	l. Description of proposed grading, including a written estimate of both cut and fill quantities in cubic yards and a map showing the location of cut and fill areas.	☐
☐	m. Topographic information showing two-foot contours for the entire subject parcel or parcels and a minimum of fifty feet into adjacent parcels, based on available county information. The topographic information may be generalized to the smallest, even-numbered, contour interval that is legible in areas of steep slopes where two-foot contour lines would otherwise be illegible to read.	☐
☐	3. Environmental reports (wetland report, mitigation plan, geotechnical report, etc.) as required.	☐

#20161055671

Attachment D - BoCC Brief 10/29/20

THURSTON COUNTY
SINCE 1852

THURSTON COUNTY RESOURCE STEWARDSHIP
ENVIRONMENTAL CHECKLIST

THURSTON COUNTY
RECEIVED
JUN 22 2017
RESOURCE STEWARDSHIP

"USE BLACK INK ONLY"

1. Applicant: Lakeside Industries, Inc.
   Address: P.O. Box 7016
   Issaquah, WA 98027
   Phone: (425) 313-2600
   Cell: (425) 864-5081
   E-Mail Address: karen.deal@lakesideindustries.com

*** * * * OFFICIAL USE ONLY * * * ***
Folder Sequence # _____
Project # : _____
Related Cases: _____
Date Received: _____ By: _____
*** * * * OFFICIAL USE ONLY * * * ***

2. Point of Contact: Karen Deal
   Address: P.O. Box 7016
   Issaquah, WA 98027
   Phone: (425) 313-2660
   Cell: (425) 864-5081
   E-Mail Address: karen.deal@lakesideindustries.com

3. Owner: NA
   Address: NA
   NA
   Phone: NA
   Cell:
   E-Mail Address: NA

4. Property Address or location:
   NA - Nisqually Sub-Area; Reference Thurston County Comprehensive Plan Map M-15

5. Quarter/Quarter Section/Township/Range: NA - Ref Comp Plan Map M-15

6. Tax Parcel #: Nisqually Sub-Area - Ref Comp Plan Map M-15

7. Total Acres: 8,980 - Ref Comp Plan Map M-15

8. Permit Type: Comprehensive Plan Text Amendment

9. Zoning: Multiple Zones - Ref Comp Plan Map M-15

10. Shoreline Environment: McAllister Creek, Nisqually River, Nisqually Reach - Ref Comp Plan Map M-15

11. Water Body: See response to 10 above.

12. Brief Description of the Proposal and Project Name:
    Proposal Proponent, Lakeside Industries, is seeking a text amendment to the Thurston County Comprehensive Plan - Nisqually Sub-Area Plan (NSAP). Specifically, Lakeside is seeking an amendment to Policy E.5 of the NSAP. Proposal Name: NSAP Policy E.5 Amendment.

13. Did you attend a presubmission conference for this project? ☒ Yes ☐ No

    If yes, when? _____

14. Estimated Project Completion Date: NA

15. List of all Permits, Licenses or Government Approvals Required for the Proposal (federal, state and local--including rezones):

    NA

16. Do you have any plans for future additions, expansion or further activity related to or connected with this proposal? If yes, explain:

    No. There are no plans for additional text amendments related to this proposal.

17. Do you know of any plans by others which may affect the property covered by your proposal? If yes, explain:

    No

18. Proposed timing or schedule (including phasing, if applicable):

    NA

19. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

    There is a body of technical information and evidence available to support the deminimus environmental impacts associated with the recycling of RAP. Some of these sources of information are appended to the application for "Comprehensive Plan Amendment" and some will be incorproated directly into the application.

THURSTON COUNTY
WASHINGTON
SINCE 1852

THURSTON COUNTY
RESOURCE STEWARDSHIP
ENVIRONMENTAL ELEMENTS

To be Completed by Applicant

Evaluation for Agency Use Only

1. **Earth**

a. General description of the site (check one):

- ☐ Flat
- ☐ Rolling
- ☐ Hilly
- ☐ Steep Slopes
- ☐ Mountainous
- ☒ Other: Variable terrain within Affected Geographic Area

b. What is the steepest slope on the site (approximate percent slope)?

NA

c. What general types of soils are found on the site (for example, clay, sand gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.

NA

d. Are there surface indicators or history of unstable soils in the immediate vicinity? If so, describe.

NA

e. Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.

NA

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

NA

To be Completed by Applicant

Evaluation for Agency Use Only

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

NA

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

NA

2. **Air**

a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.

Recycling of RAP does not increase emissions to the air. In fact, recycling RAP reduces net air emissions. See application for details.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

No

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

NA

3. **Water**

a. Surface

(1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

The Affected Geographic Area is bound to the east by the Nisqually River and to the west by McAllister Creek.

Thurston County
Resource Stewardship
Environmental Elements

To be Completed by Applicant

Evaluation for Agency Use Only

(2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

No

(3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

NA

(4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

No

(5) Does the proposal lie within a 100-year flood plain? If so, note location on the site plan.

No

(6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

No

b. Ground

(1) Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximately quantities if known.

No

To be Completed by Applicant

Evaluation for Agency Use Only

(2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: domestic sewage; industrial, containing the following chemicals; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

NA

c. Water Run-off (including stormwater)

(1) Describe the source of runoff (including stormwater) and method of collection and disposal, if any (include quantities, in known). Where will this water flow? Will this water flow into other waters? If so, describe.

Stormwater runoff is collected, contained, and treated on-site. There will be no change as the result of the use of RAP.

(2) Could waste materials enter ground or surface waters? If so, generally describe

No

(3) Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:

NA

4. **Plants**

a. Check the types of vegetation found on the site:

- ☒ **Deciduous tree:** ☐ alder ☐ maple ☐ aspen ☐ other _____
- ☒ **Evergreen tree:** ☐ fir ☐ cedar ☐ pine ☐ other _____
- ☒ **Shrubs**
- ☒ **Grass**
- ☐ **Pasture**
- ☐ **Crop or grain**
- ☒ **Wet soil plants:** ☐ cattail ☐ buttercup ☐ bulrush ☐ skunk cabbage other _____
- ☒ **Water plants:** ☐ water lily ☐ eelgrass ☐ milfoil ☐ other

Other types of vegetation _____

Thurston County
Resource Stewardship
Environmental Elements

To be Completed by Applicant

Evaluation for Agency Use Only

b. What kind and amount of vegetation will be removed or altered?

NA

c. List threatened or endangered species known to be on or near the site.

NA

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

NA

5. **Animals**

a. Check any birds and animals which have been observed on or near the site or are known to be on or near the site:

☒ **Birds:** ☐ hawk, ☐ heron, ☐ eagle, ☐ songbirds,
☐ other: _____

☒ **Mammals** ☐ deer, ☐ bear, ☐ elk, ☐ beaver,
☐ other: _____

☒ **Fish:** ☐ **bass,** ☐ **salmon,** ☐ **trout,** ☐ **herring,** ☐ **shellfish,**
☐ other: _____

b. List any threatened or endangered species known to be on or near the site.

NA

c. Is the site part of a migration route? If so, explain.

NA

d. Proposed measures to preserve or enhance wildlife, if any:

NA

To be Completed by Applicant

Evaluation for Agency Use Only

6. **Energy and Natural Resources**

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

No additional energy is required to recycle RAP. In fact, there is a net reduction in energy needs when recycling RAP.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

No

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any

Recycling of RAP conserves energy by reducing the consumption of fossil fuels and asphalt cement.

7. **Environmental Health**

a. Are there are any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

No

(1) Describe special emergency services that might be required.

None

(2) Proposed measures to reduce or control environmental health hazards, if any:

NA

To be Completed by Applicant

Evaluation for Agency Use Only

b. Noise

(1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

NA

(2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

No new or additional noise impacts will occur.

(3) Proposed measures to reduce or control noise impacts, if any:

NA

8. **Land and Shoreline Use**

a. What is the current use of the site and adjacent properties?

The Affected Geographic Area has multiple uses.

b. Has the site been used for agriculture? If so, describe.

No

c. Describe any structures on the site.

Hot-mix asphalt plant and appurtenances.

d. Will any structures be demolished? If so, what?

No

e. What is the current zoning classification of the site?

The Affected Geographic Area has multiple zoning classifications.

To be Completed by Applicant

Evaluation for Agency Use Only

f. What is the current comprehensive plan designation of the site?

The Affected Geographic Area has multiple comprehensive plan designations.

g. If applicable, what is the current Shoreline Master Program designation of the site?

NA

h. Has any part of the site been classified an "environmentally sensitive" area? If so, specify.

No

i. Approximately how many people would reside or work in the completed project?

NA

j. Approximately how many people would the completed project displace?

None

k. Proposed measures to avoid or reduce displacement impacts, if any?

NA

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

NA

9. **Housing**

a. Approximately how many units would be provided, if any? Indicate whether high-, middle-, or low-income housing.

NA

Thurston County
Resource Stewardship
Environmental Elements

To be Completed by Applicant

Evaluation for Agency Use Only

b. Approximately how many units, if any, would be eliminated? Indicate whether high-, middle, or low-income housing.

None

c. Proposed measures to reduce or control housing impacts, if any:

NA

10. **Aesthetics**

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

NA

b. What views in the immediate vicinity would be altered or obstructed?

None

c. Proposed measures to reduce or control aesthetic impacts, if any:

NA

11. **Light and Glare**

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

No type of light or glare is produced by the proposal.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

NA

To be Completed by Applicant

Evaluation for Agency Use Only

c. What existing off-site sources of light or glare may affect your proposal?

No off-site source of light or glare affect the proposal.

d. Proposed measures to reduce or control light and glare impacts, if any:

NA

12. **Recreation**

a. What designated and informal recreational opportunities are in the immediate vicinity?

None

b. Would the proposed project displace any existing recreational uses? If so, describe.

No

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:

NA

13. **Historic and Cultural Preservation**

a. Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.

No

b. Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.

NA

Thurston County
Resource Stewardship
Environmental Elements

To be Completed by Applicant

Evaluation for Agency Use Only

c. Proposed measures to reduce or control impacts, if any

NA

14. **Transportation**

a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.

NA

b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?

No

c. How many parking spaces would the completed project have? How many would the project eliminate?

None

d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).

No

e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

No

f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.

NA

To be Completed by Applicant

Evaluation for Agency Use Only

g. Proposed measures to reduce or control transportation impacts, if any:

NA

15. **Public Services**

a. Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.

No

b. Proposed measures to reduce or control direct impacts on public services, if any.

NA

16. **Utilities**

a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other.

NA

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

None

17. **Signature**

a. The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Print Name Karen Deal

Date Submitted June 22, 2017

Signature: Karen Deal

THURSTON COUNTY
SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS
(Do not use this sheet for project actions)

Non-project proposals are those which are not tied to a specific site, such as adoption of plans, policies, or ordinances.

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment. When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

To be Completed by Applicant

Evaluation for Agency Use Only

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

   There will be no new or modified impacts to the air, water or local environment.

   Proposed measures to avoid or reduce such increases are:

   There is no increase in emissions or water discharges or production of noise.

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

   Storage and recycling of RAP at approved and permitted hot-mix asphalt facilities will not affect plants, animals, fish, or marine life.

   Proposed measures to protect or conserve plants, animals, fish, or marine life are:

   No measure beyond those already required by Special Use Permits (specifically Lakeside's SUPT990457) are proposed.

3. How would the proposal be likely to deplete energy or natural resources?

   No energy or natural resources will be depleted. The proposal results in a conservation of energy and natural resources.

   Proposed measures to protect or conserve energy and natural resources are:

   Recycling RAP protects and conserves energy and natural resources and diverts a recyclable product from the landfill thus conserving landfill space. Recycling RAP decreases construction time and associated indirect energy and natural resource consumption.

Thurston County
Resource Stewardship
Supplemental Sheet for Nonproject Action

To be Completed by Applicant

Evaluation for Agency Use Only

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, flood plains, or prime farmlands?

   NA. This proposal will have no additional or changed impacts.

   Proposed measures to protect such resources or to avoid or reduce impacts are:

   NA

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

   NA. This proposal will not affect land or shoreline use.

   Proposed measures to avoid or reduce shoreline and land use impacts are

   NA

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

   NA. This proposal will not increase demands.

   Proposed measures to reduce or respond to such demand(s) are:

   NA

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment

   No conflicts. Recycling of RAP is permitted by Thurston County subject to the requirements of TCC 17.20 and 20.54.

ATTACHMENT E

HERRERA
ENVIRONMENTAL
CONSULTANTS
REPORT ON RAP
LEACHATE

LITERATURE REVIEW

CONTAMINANT LEACHING FROM RECYCLED ASPHALT PAVEMENT

Prepared for
Thurston County
Community Planning & Economic Development

Prepared by
Herrera Environmental Consultants, Inc.

HERRERA

Note:
Some pages in this document have been purposely skipped or blank pages inserted so this document will copy correctly when duplexed.

LITERATURE REVIEW

CONTAMINANT LEACHING FROM RECYCLED ASPHALT PAVEMENT

Prepared for
Community Planning and Economic Development
2000 Lakeridge Drive Southwest
Olympia, Washington 98502

Prepared by
Herrera Environmental Consultants, Inc.
1220 Fourth Avenue Northeast
Olympia, Washington 98506
Telephone: 360-754-1344

May 14, 2019

CONTENTS

APPENDICES

TABLES

EXECUTIVE SUMMARY

Recycled asphalt pavement (RAP) is typically asphalt that has been removed from roadways or parking lots during repair and replacement of the roadway surface. It is then reused extensively in the creation of new roadway surfaces. Concerns over possible leaching of pollutants from RAP stem from the original composition of the asphalt as well as from the pollutants added during its use, for example, when the RAP has been taken from roadways where it has been exposed to vehicle traffic and the metals and petroleum products that are associated with that use.

Between the time when RAP is removed and when it is reused, it must be stockpiled. When stockpiled, precipitation falling onto the stockpile can result in contaminants leaching from the RAP. These contaminants can then be transported to nearby surface waters or infiltrated to groundwater. The purpose of this study was to review available research on leaching of pollutants from RAP. The study was purposely constrained to a review of research on direct measurements of leachate from RAP; no research that evaluated application of Best Management Practices (BMPs) to reduce contaminant loading or that assessed fate and transport of contaminants once the leachate reaches the environment were considered in this literature review.

After an assessment of over 100 articles initially identified, eight highly rated studies were selected for this literature review. They were selected because they were directly applicable to the objectives of this study, and the research was of high quality in terms of the number of tests, quality assurance, and in the detail provided for this review.

Key conclusions of the literature review are:

- As a source of contaminants, RAP is highly variable. Factors contributing to variability in leachate from RAP appear to include how the asphalt was originally manufactured (e.g., the sources of crude oil and aggregate or whether coal tar or bitumen was used), how the RAP was used, the duration and degree to which it has weathered and been exposed to traffic or other pollution generating sources, and how long it is stored.

- Laboratory testing indicated that there were typically some contaminants leached from RAP at concentrations that exceeded state groundwater quality standards. There were five polycyclic aromatic hydrocarbons (PAHs) that were measured above state groundwater quality standards with some frequency (i.e., in 50 percent or more of the studies where detection limits were adequate). Some metals were also leached, primarily in tests run under low pH environments.

- Testing indicated that there is a distinct, initial flush of contaminants from RAP that can result in concentrations exceeding Washington State groundwater quality standards, but that these peak concentrations decrease quickly to below detection limits as more water is flushed through the RAP.

INTRODUCTION

Recycled asphalt pavement (RAP) is typically asphalt that has been removed from roadways or parking lots during repair and replacement of the roadway surface. It is then re-used extensively in the creation of new roadway surfaces. Concerns over possible leaching of pollutants from RAP stem from the original composition of the asphalt as well as the pollutants added by vehicle traffic. Asphalt can be composed of bitumen, coal tar, mineral aggregate, and fillers such as adhesives and polymers. Bitumen and coal tar are derived from crude oil and contain metals and polycyclic aromatic hydrocarbons (PAHs). The composition of the crude oil is also highly variable in terms of these pollutants, which is why some of the studies summarized in this report have compared different sources of RAP. Mineral aggregate can be a natural source of heavy metals in RAP, and vehicle traffic contributes metals and PAHs from wear and tear of vehicle parts and from gasoline and lubricants.

Between the time when RAP is removed and when it is reused, it must be stockpiled. When stockpiled, precipitation falling onto the stockpile can result in contaminants leaching from the RAP. These contaminants can then be transported to nearby surface waters or infiltrated to groundwater. The latter is especially a concern in areas where the groundwater is more vulnerable to contamination due to fast-draining soils and where it is used as a drinking water supply, such as in the Nisqually area of Thurston County. Because of concerns about RAP leaching contaminants while it is stockpiled, the Nisqually Sub-Area plan of the Thurston County Comprehensive Plan specifically prohibits the use of mined-out gravel pits for the reprocessing of asphalt due to water quality concerns.

The purpose of this study by Herrera Environmental Consultants, Inc. (Herrera) was to review available research on leaching of pollutants from RAP. The study scope was specifically constrained to summarizing research on direct leaching of pollutants. For example, it does not account for use of best management practices (BMPs) such as covering the material to reduce the amount of precipitation that comes into contact with the RAP, thereby limiting leachate formation. It also does not address fate and transport as leached materials move over or through ground and water. Such practices and processes could be evaluated in a subsequent phase of study, if warranted.

Most of the laboratory studies reviewed can be grouped into two different methods of simulating pollutant leaching: batch-leaching tests (referred to herein as batch tests) and water column leaching tests (referred to herein as column tests).

Batch tests are those in which prepared samples of RAP are placed in containers with water, which is sometimes acidified, and allowed to soak for a fairly short period, usually on the order of hours or days. The samples are typically agitated during the soaking period to maximize surface area contact. The samples are filtered, and the filtrate is tested for pollutants. The objective of a batch test is to evaluate the short-term leaching potential of water-soluble contaminants. Batch tests are small-scale tests used to provide quick estimates of maximum

potential leaching behavior; the low water volume, high contact time, and agitation do not simulate the conditions likely to exist in the field, where water continually flows through the material. There are many variations in how batch tests are performed, such as how the samples are prepared, size of the test containers, the ratio of liquids to solids (L:S ratio), the duration of the test, and the character and pH of the water used as the extractant. The extractant in the studies reviewed varied from neutralized deionized water, to slightly acidified water, to more strongly acidified solutions. The more acidic the solution, the more aggressive the leaching of most contaminants. In the United States (US), there are two standard protocols that are typically followed for performing these tests: the Toxicity Characteristic Leaching Procedure (TCLP) and the Synthetic Precipitation Leaching Procedure (SPLP). The TCLP test was designed to simulate conditions that might be experienced by materials exposed for many years to the acidic environment of a landfill. The SPLP is used to better simulate conditions in a more natural environment but under acid rainfall conditions. Even the studies done in Europe often use these protocols from the US Environmental Protection Agency (US EPA).

Column tests involve placing compacted samples into a column and delivering water to the column at a specified flow rate for a specific period of time, typically a number of weeks. For column tests, water samples are collected from the columns at multiple times during the test to allow assessment of changes in contaminant leaching over time. In addition to the type, quantity, and source of RAP used, the rate that the water is delivered to the column, the total amount of water sent through the column (which affects the L:S ratio), and the sampling intervals are important variables in column tests. As with the batch tests, the pH of the water used for the test is also critical. There are no standard protocols for conducting column tests.

As described below, the literature review began with identification of 101 information sources to consider. Through initial sorting and reviewing, eight studies were identified that were of high quality in terms of how the research was performed and for which the research was most applicable to the objective of this report. This report includes a brief synopsis of the findings of each of the eight studies.

METHODS

During the first phase of this project, a list of preliminarily identified studies was created. At project onset, Thurston County provided a list of 88 information sources that were identified by project stakeholders over the years and submitted to Thurston County. As a first step in development of this literature review, a reference library search was completed to identify additional information sources; this resulted in the addition of 13 references to the database, for a total of 101 information sources. Then, studies dated before 1995 were eliminated to remove sources with outdated analytical techniques. The remaining sources were sorted with the objective of including only those that serve as primary data sources; studies that did not contain data or that summarized data collected by others were excluded. As a result, 33 of the 101 information sources were retained for further evaluation.

During the second phase of the project, a closer examination of the study methods and objectives used in each of the 33 studies was completed; and each of the studies was rated as low, medium, or high in terms of its appropriateness for inclusion in this report. There were initially 5 studies rated as high, and they were the only studies included in an early (October 2018) draft of this literature review. The studies rated as low were not considered further. In most cases, those rated as low did not appear to specifically address RAP, although some were given low ratings because they did not provide data or because the author(s) had completed a more recent study that superseded the preceding one. In general, the studies rated as moderate were either: 1) older and had higher detection limits than those currently in use, 2) done by undergraduate students and did not have rigorous review, or 3) did not specifically address the objective of this study. However, the results and conclusions of the moderate-rated studies were reviewed to evaluate whether they used a testing approach or contained unusual findings that should be considered. None of the studies rated as moderate had findings notably different than the highly rated studies.

One concern identified during review of the early (October 2018) draft of the document was that too many of the highly rated studies were done outside the U.S. where coal tar has been used in the processing of asphalt for many years beyond when it stopped being used in the U.S. Because coal tar has many times more PAHs than the bitumen used in the U.S., it could be expected that the character of the RAP and leachate would be different. A second search of the literature and review of reference sections of the other reports was done in an effort to identify additional U.S.-based research. As a result, two additional highly rated studies were identified and included in this evaluation. A third study, which had been included in the list of 33 studies but removed from consideration due to its age, was also added to the list of literature to be reviewed because it was done in the U.S. and was considered one of the preeminent studies of RAP. This resulted in a total of 35 studies. Appendix A contains a list of the 35 studies that were considered in this second phase and provides the rating rationale for each.

In the end, eight studies were highly rated because they were directly applicable to the objectives of this study and the research was of high quality in terms of the number of tests, quality assurance, and detail provided for the analysis. Each of these studies is described individually below.

Tables 1 and 2 (following the *Summary and Conclusions* section of this report) provide a comparison of key data provided in the eight studies. The intent of these tables was not to list all of the data but to focus on those data of most interest and frequently reported. For the Total Metals category, all 13 US EPA priority pollutant metals have been included plus a few others that were commonly measured in the different studies. No elements were left out if they were commonly detected or if they were detected in any study at a problem concentration. The data for Polycyclic Aromatic Hydrocarbons (PAHs) is limited to the US EPA's list of 16 priority pollutant PAHs. With the exception of one study that assessed 29 PAHs, the remaining seven studies evaluated the list of 16 or a subset of these.

Tables 1 and 2 provide a comparison of study results to Washington State Groundwater Quality Standards (Washington Administrative Code [WAC] Chapter 173-200-040). These standards are

the most applicable because Thurston County refers to them for groundwater monitoring under its mineral extraction and asphalt production code (Thurston County Code 17.20.210) and because the literature reviewed relies on direct measurements in discharge. State drinking water standards would have been applied if the measurements had been made in the groundwater. Table 3 provides a comparison of the state groundwater quality standards to the Washington State Drinking Water Standards for Group A Public Water Supplies (WAC 246-290-310). These are standards that would apply under the Sanitary Code for Thurston County-Article III and are applicable to assessments of domestic water supply. The drinking water standards are provided for comparison purposes only.

SUMMARY OF SELECTED LITERATURE

In the research reports summarized below, the authors used a variety of standards for comparison, including European Community (EU) drinking water standards, Danish groundwater standards, US EPA standards, and state-specific standards, because the studies were done in different countries and states. In the summary of each report, provided below, the authors' conclusions related to the standards they used are included. For the purposes of this review, the groundwater quality standards in Washington State are the standards that of are of most interest and that would be applied in Nisqually. Therefore, in the *Comparisons of Study Results to Standards* section of this report the data from all of the studies is compared to Washington State groundwater quality standards. In that section, the authors' conclusions related to the standards they applied are summarized again so that all of those conclusions related to standards exceedances are in one place.

Hydraulic and Environmental Behavior of Recycled Asphalt Pavement in Highway Shoulder Applications (Aydilek et al. 2017)

This was an extensive study done by researchers at the University of Maryland for the Maryland Department of Transportation. The objective of the testing was to evaluate RAP from seven different sources in Maryland to reflect differences in original source materials (e.g., crude oil and aggregate) and roadway use characteristics. The study included three different phases: hydraulic behavior, environmental behavior, and pH relationships with leaching. The information gained from the testing was used to develop models to predict fate and transport of contaminants in surface water and through the ground.

For the purposes of this review, the second phase of the testing that examined environmental behavior was most applicable. For those studies, the seven RAP samples, as well as three or four control samples consisting of either aggregate base, stone, or topsoils, were tested. The tests included batch and column tests.

Batch Tests

Batch tests, which used deionized water with a low amount of salt as the extractant (likely close to neutral pH), were done in triplicate. A total of 15 elements were analyzed, including most of the heavy metals. Aluminum (Al), arsenic (As), barium (Ba), copper (Cu), iron (Fe), sodium (Na), and zinc (Zn) were measured at detectable concentrations in one or more of the seven RAP samples; the rest of the elements tested were below the detection limits for all samples. Of those elements detected, Al, Ba, and Cu were detected at levels that exceeded either a US EPA or Maryland State standard. Copper was detected in four of the seven samples, with two results slightly exceeding the US EPA Water Quality Limits (US EPA WQLs), and all results exceeded Maryland's Aquatic Toxicity Limits (ATLs) for fresh water. Aluminum was detected in five of the seven RAP samples; all five results were well below the US EPA WQLs but well above Maryland's ATLs. Barium was detected in three of the seven samples, with all three results above Maryland's ATLs; there is no US EPA WQL for barium. The authors do not specifically discuss the arsenic results; however, all three of the RAP samples where arsenic was measured at detectable concentrations exceeded Maryland's ATL. The detection limit for the remaining four samples exceeded the Maryland's ATL standard; therefore, it is unknown how they compare to them. Similarly, lead (Pb), Chromium (Cr), Cobalt (Co), Nickel (Ni) and Vanadium (V) were below detection in all samples, but again the detection limit was higher than Maryland's ATL for these elements; however, they were all below US EPA WQLs.

Column Tests

The same seven RAP samples used in the batch tests, were tested in flow-through column tests. The column tests involved pumping a constant flow of water (pH 6.0 to 6.5) through the columns and collecting samples at regular intervals that represented different pore volume exchanges. Approximately 15 to 20 samples were collected from each column, representing pore volume exchanges from approximately 1 to 250. In the column tests, peak concentrations exceeded Maryland's ATL standards for:

- Aluminum (Al) (in three of the seven RAP samples)
- Boron (B) (in all seven samples)
- Barium (Ba) (in all seven samples)
- Cobalt (Co) (in one of seven samples)
- Copper (Cu) (in four of seven samples)
- Manganese (Mn) (in six of seven samples)
- Nickel (Ni) (in four of seven samples)
- Zinc (Zn) (in one of the seven)

The peak concentrations for Zn and Cu exceeded the US EPA WQLs (each in one of the seven RAP samples) but decreased to below the US EPA WQLs very quickly. All As, Pb, Cr, and V concentrations were below the detection limit, but the limit was higher than the ATL; thus, it is unknown how the concentrations compare to Maryland's ATL standard. However, the detection limits are well below the US EPA WQL; thus, those standards were met. Almost all of the analytes tested exhibited a strong first-flush characteristic; that is, peak concentrations occurred early in the testing and then concentrations dropped precipitously. With the exception of one RAP sample, which had very high (relative to the other RAP samples) aluminum (Al) concentration to begin with, Al did not exhibit a first-flush characteristic. Instead, Al concentrations began to increase late in the experiment and coincident with a pH increase. This result fits with what is understood about the solubility of Al within the neutral range of pH.

As stated by the study authors, if any kind of a weighted average were to be applied to the results, the concentrations for all constituents would be well below the most stringent standards. The authors concluded that RAP from sources in Maryland does not release excessive amounts of toxic elements, as determined through either the batch or column tests.

Leaching of Heavy Metals and Polycyclic Aromatic Hydrocarbons from Reclaimed Asphalt Pavement (Legret et al. 2005)

This study was completed by researchers in France and funded by the French Public Works Ministry. The objective was to evaluate potential environmental concerns associated with leaching of contaminants from RAP. In this study, RAP samples were collected during a repaving project on a heavily used highway. Batch and column tests were done on composite samples collected from a stockpile of the RAP. Testing was also performed on core samples taken from the roadway. All leachate samples were analyzed for heavy metals, total hydrocarbons, and PAHs. The study authors compared results to European Community (EC) drinking water standards, Dutch target (intervention) levels for groundwater, and US EPA standards. The research included batch tests and column tests, as well as column tests completed with core samples.

Batch Tests

Batch tests were performed on four composite samples collected from a stockpile of RAP. A series of three extractions, done in a succession of 16-hour periods, were run on three RAP samples. Deionized water was used as the extractant. Of the eight metals analyzed, only Zn and mercury (Hg) were measured at levels above detection limits. Zinc was detected during only the first of the three extractions in the 16-hour series test, but the concentration was below US EPA standards. Mercury was detected during all three extractions but always at or near the detection limit. Metals detected were all well below the maximum contaminant level (MCL). Total hydrocarbons were detected slightly above the Dutch intervention level for groundwater during the initial extraction but below the detection limit for the remaining extractions. Of the 16 PAHs

analyzed, all were near or below the detection limit except phenanthrene, which was measured at or just above the detection limit but well below the Dutch intervention level.

The last composite sample was tested over one, 24-hour extraction period in parallel with a sample of new asphalt (as opposed to RAP). Heavy metals were below detection in both the RAP and the new asphalt. Total hydrocarbons were higher in the RAP sample. Of the six PAHs tested, only benzo(a)pyrene and fluoranthene were measured above detection limits in the RAP leachate; neither were above Dutch groundwater intervention levels. None of the six PAHs were detected in the new asphalt sample.

The researchers also ran a two-stage batch test that included a first stage at neutral pH (7) and a second stage at low pH (4). No data tables were provided for this test, but the researchers noted that Zn, Ni, chromium (Cr), and cadmium (Cd) were released at the lower pH, while Cu and lead (Pb) were not. All the elements tested were below the EC limits for drinking water.

Column Tests

Column tests were performed on two of the composite RAP samples. One unique aspect of these column tests was that the bottom of each sample was submerged at all times to simulate saturated conditions that might occur in some roadway configurations. The column tests were conducted by adding 1.5 liters of water to the columns every day for 75 days. Samples were collected five times during that period (on Days 2, 10, 25, 50, and 75) to represent increasing volumes of water passing through the columns and corresponding to an L:S ratio ranging from 0.5 to 30.

Similar to other studies, there was a definite first-flush effect for some analytes. Only five heavy metals were tested: Cu, Pb, Zn, molybdenum (Mo), and Hg. Copper and Zn were detectable in the initial test samples (Day 2) but at low concentrations, and Zn was detected again at even lower concentrations on Day 10. Lead and Mo were below detection for all samples. Mercury was not detected until Days 50 and 75 and was detected at concentrations just above the detection limit. The total hydrocarbon concentration was above the EC drinking water standards but well below the Dutch groundwater intervention level until Day 10; it was not detected after that. Of the 16 PAHs tested, 10 were below detection in all samples. The remaining six PAHs showed classic, first-flush characteristics, with detectable concentrations during the Day 2 test and in a few cases during the Day 10 test, but concentrations were generally below detection after Day 10. Only benzo(a)pyrene slightly exceeded the EC drinking water standard during the first two tests (Day 2 and Day 10). All PAHs were below detection by Day 20.

Core Samples

This study also included collection of four core samples: two from a pavement with 10 percent RAP and two from a pavement with 20 percent RAP. The four core samples were placed in columns and, after saturating them under pressure, 4 liters of deionized water was passed through them and analyzed. Six heavy metals were tested. However, since the authors noted

that the metal analyses may have been confounded by some of the equipment that was used, no summary of those results is provided herein. As with the column tests, the concentration of total hydrocarbons was significantly high as compared to the Dutch target value for groundwater. Among the six PAHs analyzed, one (fluoranthene) was at a detectable level, and its concentration was just above the detection limit.

The authors concluded that pollutant leaching is rather weak for most of the studied parameters. Concentrations in the solutions derived from batch tests generally remained below EC limits for drinking water. Column experiments showed higher concentrations in the initial leaching stages that rapidly decreased to values below detection limits. The authors recommended that the laboratory experiments be followed by field experiments to evaluate real-world hydrologic conditions and scaling.

Environmental Impacts of Reclaimed Asphalt Pavement (RAP) (Mehta et al. 2017)

This study was funded by the New Jersey Department of Transportation and performed by researchers from the State University of New York and Columbia University. The objective of the study was to investigate levels of 32 elements and PAHs in leachate from RAP (using batch and column tests), as well as to evaluate how weathering might affect leachate characteristics. The study also included toxicity testing. Three RAP sources from different areas in New Jersey were used in the study, as well as a ”fresh” hot mix asphalt sample (which had not been used in roadways) as a control.

Batch Tests

Batch extraction experiments, using acidified water (pH 4.93) as the extraction fluid, were performed on all samples (from all three RAP sources and the fresh asphalt, each in four different weathered forms) and were analyzed for 32 major and trace elements, including most of the heavy metals. The purpose of using a low pH extractant was to simulate a very aggressive leaching environment, such as would occur in a landfill. The study authors summarized that, overall, no elements except Pb exceeded US EPA drinking water MCLs. Lead was close to or higher than the MCL for a number of the weathered samples, but all of them came from the same RAP source (i.e., “NORTHRAP”). The elevated Pb was attributed to historical use of lead in gas and white road paint. The control sample had significantly lower concentrations of most elements, indicating that the source of the contaminants was related to road exposure. Weathering of the control samples did not affect these findings, indicating that aging and oxidation of the RAP did not lead to contamination.

The PAH testing included evaluating the acidified water-soluble fraction as well as the total organic extractable fraction of 29 PAH compounds. The total organic extractable fraction used a strong solvent (dichloromethane) as the extractant. The acidified water-soluble fraction represents the portion that would be released into solution under more aggressive leaching

conditions (e.g., in landfills) than would be expected with natural rainwater (i.e., rainwater with a pH of approximately 5.6), while the total organic extractable PAH represents the maximal amount of organic compounds that could be leached from the RAP under extreme conditions.

Acidified water extracted little, if any, PAHs from the samples. The water leaching process, on average, mobilized less than 1 percent of the total PAHs. Again, the one RAP source (NORTHRAP) and its weathering products showed the highest concentrations for most PAHs, while samples from the fresh asphalt and the other RAP sources often had concentrations below detection. The authors noted that benzo(a)anthracene was the only PAH detected at levels of concern. (This was based on 1995 US EPA human health advisory levels.)

For the 8 PAHs for which specific data was provided, the total extractable PAH concentrations were magnitudes higher than what was extracted with acidified water, as would be expected. The fresh asphalt source and its weathering products had the lowest concentrations for most PAHs. The NORTHRAP source and its weathering products had the highest PAH concentrations.

Column Tests

Water column experiments were performed to investigate both leaching and the attenuation effect of soil on contaminants leached. The columns had two stages—the first column contained the RAP samples and the second contained a local sandy loam soil—to test leaching as well as attenuation in the soil. The column experiments were done as a time series with samples collected eight times over a 4-day period. Synthetic rain water (pH close to 5) was used as the extractant. The RAP samples selected for testing included the sample with the consistently highest concentrations of contaminants from previous testing (NORTHRAP) in weathered and unweathered form, and the fresh asphalt, which had consistently low concentrations of contaminants in weathered and unweathered form. As with the batch experiments, samples from the column experiments were analyzed for 32 major and trace elements. No major or trace elements were found to exceed US EPA's primary drinking water MCL. The authors summarized that, compared to the strong dissolution capacity of the more acidic water used in the batch testing, the synthetic rain water used in the column experiments was less capable of eluting elements. Most of the major and trace elements exhibited higher release from the soil than from the asphalt, but in both stages (RAP and soil stage) the contaminants were leached out quickly. The elements that were released from the asphalt column were attenuated in the soil column.

Overall, PAHs in the column experiments were detected at concentrations less than the 1995 US EPA guidelines cited by the authors. Some of the PAHs appeared to be generated by the soil stage of the columns. The weathered RAPs generally generated more PAHs, but the concentrations were still below the US EPA guidelines and decreased to below detection after attenuation through the soil.

Toxicity Testing

This study also included extensive testing of toxicity using multiple test types and assay organisms. Overall, the results did not identify significant toxicity associated with the solutions emanating from fresh or weathered RAP. However, there were problems associated with the testing, including that the extracting fluid itself exhibited toxicity and that fungal growth in the soil may have affected some of the tests. The authors caution that minor toxicity could have been obscured by these problems.

The authors included the following conclusions:

- Leaching of some PAHs and Pb may occur under acidic environments such as landfills, but typical New Jersey rainfall is expected to elute negligible contaminants.
- Column testing indicated that weathered RAP can leach PAHs; however, the contaminants were attenuated in the soil and reached baseline levels.
- New Jersey soils can be a source of contamination for both metals and PAHs; thus, soil testing may be important in some usages.

Based on these findings, the authors made recommendations on use of RAP. They recommended that it could be used as an unbound material in all environments except those which are highly acidic (pH < = 4), such as mines or landfills. (Note: the assumption is that the authors are referring to coal- and metal-type mines and not gravel-type mines since the former can result in acidic drainage waters.) The authors listed acceptable, beneficial uses of unbound RAP in addition to use in hot mix asphalt applications as including surface materials for parking lots, farm roads, or pathways; for quarry reclamation; as non-vegetative cover underneath guiderails; and mixed with other materials for subbase or base materials.

Leaching of PAHs from Hot Mix Asphalt Pavements (Birgisdottir et al. 2007)

This study was performed by researchers at the University of Denmark. The underlying question for the research was whether the source of elevated PAHs measured in soils near paved roads originated from the asphalt. The researchers used laboratory results to inform model parameters (e.g., diffusion coefficients for PAHs) and then to evaluate scenarios of PAHs moving to the adjacent roadway soils. The research included testing of two core samples collected from different paved surfaces: a gas station in operation since 1980 and a roadway constructed in 2001. Because the cores were collected in 2002, the samples represent more than 20 years of potential contaminant accumulation for the gas station but only about 1 year of the same for the roadway. The two core samples were subdivided to include a ”wear course” (the upper portion of the pavement core) and a ”base course,” resulting in a total of four samples. Two types of tests were run. The first used a column-based set up, but the methods and objectives

were more similar to the batch tests done by other researchers; the second was a tank leaching test, and those methods were more similar to column testing done by others.

Batch Type Test

The batch type tests (called availability tests in the paper) were done using columns, but the leachate was recirculated through the system for a 7-day period. Deionized water was used for the elutriate; the pH was not reported but presumably it would be near neutral. The total content of PAHs was found to be higher in the wear course than in the base course for both samples. This supports the findings of other studies indicating that the source of contaminants was from pavement use (e.g., contaminants from vehicles or vehicle emissions) rather than from the original asphalt material. The portion of the total PAHs that was calculated to be available through leaching was 3 percent to 11 percent. In terms of availability of individual PAHs in the wear course, they ranged from 0.5 to 75 percent available; naphthalene and phenanthrene had the highest availability at 33 to 75 percent and 4 to 36 percent, respectively.

Column Tests

The column tests in this study were done in large tanks over a 64-day leaching period. Samples were collected eight times over that period, and the water was replaced each time samples were collected. The extractant was deionized water stabilized with sodium-azide with a close to neutral pH. The sample from the wear course of the gas station exhibited the highest concentrations for all PAHs detected. Generally, in all four samples the highest concentrations were measured for naphthalene and phenanthrene. However, in the wear course sample from the gas station, 8 of the 16 PAHs were measured at detectable concentrations at some point over the 64-day leaching period.

The cumulative leaching measured during the 64-day test was used to develop diffusion coefficients for naphthalene and phenanthrene; those diffusion coefficients were applied to hypothetical scenarios for leaching from a roadway. The authors concluded that leaching of PAHs from asphalt would only slightly influence the concentration of PAHs in soil near roads.

The authors concluded that, for three of the four samples (all except the gas station wear course), the total content of PAHs in the samples were below the Danish soil quality criteria; the wear course from the gas station sample exceeded the criteria. Based on this study and the modeling, the authors also concluded that only a minor portion of the PAHs present in the asphalt is available to be leached during 25 years of leaching and it is very unlikely that leaching of PAHs from the asphalt causes roadside soils to exceed Danish soil criteria. However, the authors also noted that their conclusions were reliant upon the determination of PAH availability and that further studies should be conducted due to uncertainty in that parameter.

Leaching of Organic Contaminants from Storage of Reclaimed Asphalt Pavement (Norin and Strömvall 2004)

This study was done by researchers at Chalmers University of Technology in Sweden. The purpose of this study was to evaluate the leaching mechanism of organic contaminants including how the leaching may be impacted during temporary storage or stockpiling of the material. Of the sources reviewed, this may be the most directly applicable to this report because its purpose was to characterize runoff from outdoor stockpiles of RAP. However, it must also be noted that in Sweden coal tar was used as an additive in asphalt until 1975; and coal tar contains 10^3 to 10^5 times more PAH than the bitumen used today (Norin and Strömvall 2004). Coal tar has not been similarly used in the U.S. since World War II (Lakeside Industries. Letter to Thurston County Community Planning and Economic Development. November 6, 2018).

In addition to the testing of exposed stockpiles, column tests were carried out in laboratory settings. (Batch tests were completed during an earlier phase of the study [Larson 1998]; some of that data was provided in the report and therefore is included in Table 1; but generally, this data was not summarized in this 2004 report and therefore is not summarized in this review.)

Stockpile Testing

Two stockpiles of RAP were designed and set up specifically to allow collection of leachate samples from different places in each stockpile, such as from the center of the stockpile, where the L:S ratio was lowest, and from near the outer edges of the stockpile, where the L:S ratio was much higher. One stockpile comprised ”scarified” RAP, which was asphalt collected from the top 3 centimeters (cm) of a highly used highway (called the wear course in other studies) and milled into fine gravel (average diameter of approximately 2 millimeters). The second stockpile comprised ”dug” RAP, which consisted of coarse pieces (diameter of 20 to 50 cm) collected to a depth of 10 cm from the same highway; it includes material from both the wear and base courses. The stockpiles were uncovered and, therefore, exposed to precipitation. Precipitation in the west coast of Sweden, where the study occurred, has an approximate pH of 4.5 and a chloride content of 4 to 20 milligrams per liter. The authors describe it as representing ”a relatively aggressive leaching environment.”

Rainfall leachate samples from the two stockpiles were collected monthly for a year and were analyzed for total organic carbon (TOC), which was used as a surrogate measure for all organic contaminants; PAHs; and semi-volatile organics.

Thirty semi-volatile organic compounds (which includes PAHs) were identified in the stockpile samples. The number of semi-volatile compounds identified, and their concentrations were highest in leachate collected from the inner portions of both stockpiles. Leachate from the inner part of the piles had the longest vertical transport time and drained through the thickest part of the stockpiles, providing a lower L:S ratio and more contact between the percolating water and the RAP. Leachate from the stockpile of scarified RAP exhibited higher concentrations of semi-volatile organics than leachate from the stockpile of dug RAP. The authors attributed the

differences between scarified and dug RAP to the scarified RAP's greater exposure to pollutants contributed from the roadway (because the scarified RAP was sourced from wear course only; the dug RAP came from the wear and base courses) and the higher contact area of the more-finely-ground scarified material.

Six of the 30 compounds identified occurred with the most frequency; they were naphthalene, butylated hydroxytoluene (BHT), dibutylphthalate (DBP), N-butyl-benezenesulfonamide, dibenzylhydrozylamine, and di(2-ethylhexyl)phthalate (DEHP). The concentration of total PAHs in leachate from both stockpiles (scarified and dug RAPs) exceeded the threshold set by Sweden for groundwater in polluted soils at gas stations.

Column Test

A column test was done using the same scarified asphalt source to compare "unstored" (i.e., removed from the roadway and immediately tested) RAP to "stored" RAP, which had been stockpiled for 2 years. Acidified water (pH 4) was continuously pumped through the columns. Samples were collected early in the test, representing an L:S ratio of 0.05, and at the end of the test, representing an L:S ratio of 1.0.

The highest concentrations and amounts of TOC were measured in the unstored sample at the highest L:S ratio. The amount of TOC released by the stored samples decreased by more than 50 percent, although TOC concentrations remained high. The concentration of total PAHs followed the same leaching trend as TOC. However, as the authors noted, total PAHs accounted for only 0.005 percent of the TOC, indicating that nearly all the organic compounds leached were from unidentified organic compounds of unknown origin. Where PAHs were detected, the unstored RAP sample had higher concentrations, compared to the stored RAP sample. Comparison of the total PAHs leached in the column tests with the total available for leaching (based on a batch test previously performed by Larsson [1998] with an L:S ratio of 100), indicated that less than <0.4 percent of the total available PAH amount leached during the column tests. Naphthalene was by far the dominant PAH released, representing 85 percent of the total PAH released. Naphthalene and other lower-weight, more volatile PAHs decreased considerably over the 2 years of storage, while PAHs with higher molecular weights increased.

For semi-volatile organics, the trend was opposite that of TOC and PAHs; the stored sample had higher concentrations than the unstored sample, but the concentration difference was not great.

Comparison of Stockpile and Column Test Results

Norin and Strömvall (2004) compared results of the stockpile and column tests. The number and concentration of semi-volatile organic compounds was much lower in leachate samples collected in the column test than were measured in the stockpiles. The total cumulative loading of semi-volatile organics leached from the columns was approximately only 25 percent of what was calculated from the inner section of the scarified RAP stockpile. Further, the leaching in the columns continued for a few days while in the stockpiles it continued for a year. Due to these

differences, the authors cautioned that it is crucial to do further studies and measurements of field leachates because column test results for PAHs and other semi-volatile organics are typically under or near detection limits (as demonstrated by many of the other studies reviewed herein).

The authors attributed the differences in test results to the disparities between the L:S ratios, especially the low ratios for leachate collected from the center (i.e., the deepest part) of the stockpile, and to the cumulative effect of contaminants leaching over a longer period of time in the stockpile test versus the column test. Consequently, the study authors considered the leachate test results from the column tests to be less reliable than those from the stockpile tests.

The authors concluded that their findings "clearly show that the release of organic pollutants from asphalt storage could cause environmental problems." The cumulative amounts of organic contaminants (as total PAHs) were high in leachates from both fresh and stored RAP in the stockpile study and exceeded the Swedish recommended values for groundwater in polluted soils at gas stations. The dominant contaminants identified were naphthalene, BHT, and DBP. The authors note that these contaminants occur in urban groundwater, and their high emission rates and persistent structures make them potentially hazardous.

Recycled Materials as Substitutes for Virgin Aggregates in Road Construction: II. Inorganic Contaminant Leaching (Kang et al. 2011)

This study was done by researchers at the University of Minnesota in cooperation with the Minnesota Pollution Control Agency and Minnesota Department of Transportation. It is one part of a larger study to evaluate the suitability of fly ash, RAP, recycled cement material, and foundry sand mixed with virgin aggregates as base and subbase materials in roadways. Part I of the study was focused on hydraulic and mechanical characteristics of the materials and mixtures; Part II evaluated contaminant leaching. The study included both batch and column style testing; however, most of the testing was on mixtures of materials and therefore not strictly representative of RAP. A few of the batch tests included evaluation of 100 percent RAP and those results are summarized in Table 1. Some findings from the column studies are described as they related to evidence of leaching patterns, but no column testing data is included in Table 2 because there were no column studies with 100 percent RAP.

Batch Tests

Batch tests were completed with 100 percent RAP using Mili-q® (ultra-pure) water as the elutriate at an L:S ratio of 20. The pH of Mili-q water is reported as 6.998. The researchers were more focused on fly ash than the other components, and therefore they did not formulate many conclusions related to RAP. However, relevant results for metals for 100 percent RAP are summarized in Table 1. Arsenic was detected at a concentration at the MCL, but no other measured metals had high concentrations. Except for sodium, which was only moderately

elevated, the 100 percent RAP sample had lower concentrations of all inorganic elements detected than 100 percent fly ash and 100 percent aggregate materials.

Column Test

Column tests were performed on six mixtures of three different materials (i.e., fly ash, RAP, and aggregate). No column tests were performed on 100 percent RAP, but the mixtures contained 25 percent to 75 percent RAP. Initial leaching of some contaminants did occur; those mixtures with the highest portion of fly ash (i.e., 15 percent) exhibited the most significant initial leaching. This was attributed in part to the higher water residence time (contact time) of those columns that contained high fly ash. The authors' conclusions were primarily focused on use of fly ash and were not relevant to this review. No column test results are included in Table 2 because there were no column tests on 100 percent RAP.

Environmental Characteristics of Traditional Construction and Maintenance Materials: Final Report (Morse et al. 2001)

This Texas Tech University study was done for the Texas Department of Transportation. The purpose of the study was to determine the concentration of contaminants that would be released into the environment from traditional construction and maintenance materials. RAP was one of eight materials tested. The testing was limited to batch type tests that used the SPLP method to evaluate the mobility of contaminants.

Batch Tests

RAP samples from three different districts in Texas were tested. The experiments used deionized water (pH 5) as the extractant and were mixed by rotating for an 18-hour period at an L:S ratio of 20. Samples were analyzed for 19 major and trace elements, including most of the heavy metals. Organic compounds were also tested in this study, but not on RAP samples. In this study analyte concentrations were compared to the Texas Risk Reduction Standard 2 (RRS2) to evaluate whether the leachate concentrations exceed the values specified by TxDOT. RAP samples exceeded RRS2 regulatory concentrations for at least one of the three samples for antimony, barium, and lead. The average concentration exceeded RRS2 concentrations for barium and lead. Table 1 provides a comparison of their results with groundwater standards applicable in Washington, which were exceeded in one or more samples for antimony, lead, and manganese.

Leaching of Pollutants from Reclaimed Asphalt Pavement (Brantley and Townsend 1999)

This University of Florida study was done for the Florida Center for Solid and Hazardous Waste and the Florida Department of Transportation. The purpose of the study was to address some of

the environmental concerns related to possible leaching of pollutants from RAP. Testing was performed on six RAP samples collected from six different asphalt plants in Florida. Both batch tests and column tests were performed. The testing focused on volatile organic compounds (VOCs), PAHs, and heavy metals. Although this is a dated study, it is considered one of the preeminent RAP leaching studies and therefore was included in this review. The results are summarized here, but it should be noted that the detection limits achieved during this study were very high. In nearly all cases, the detection limits were higher than the state groundwater quality standards, which means the data are not useful for determining whether the contaminant is present at a level that exceeds the standards.

Batch Tests

Three batch type tests were performed on all six samples: TCLP, SPLP, and a test following the same procedures but using unacidified deionized water. None of the 53 VOCs or 16 PAHs tested were found above detection limits, and no heavy metals were detected above Florida's drinking water standards that were in place at that time.

Column Tests

Column tests were performed to simulate two different environmental scenarios: saturated and unsaturated. In the saturated condition, the samples were completely submerged in a SPLP solution for the entire 6-week experiment; the column was drained and refilled every 14 days, and the elutriate was tested. This resulted in a total of three sampled "events" over the course of the experiment. For the unsaturated condition, a liter was drained from the columns every 2 days and tested, and a new liter of SPLP solution was added to the columns. This resulted in a total of 21 sampled events over the 6-week period. Column tests based on general water quality parameters (total dissolved solids was the example used in the report) indicated the "typical leaching curve" of higher concentrations of chemicals during the first 10 to 20 days of the experiment. All of the PAHs were below detection limits. All heavy metals were below detection limits except for lead. Lead exceeded drinking water standards in one of the samples under unsaturated conditions and in three of the samples under saturated conditions. Based on other sample characteristics measured, the samples with the higher measured lead were indicated to be samples of older RAP material; thus, the authors suggest that the older samples likely contained more lead as a result of longer exposure to traffic and emissions.

The authors concluded that few if any priority pollutant chemicals leached from the RAP samples collected and that under most regulatory policies RAP would pose minimal risk from a leaching standpoint. In terms of the lead results, they concluded that under most reuse circumstances where some degree of dilution and attenuation would occur, even if lead was encountered at levels of the highest concentrations measured in the study, the concentrations in the environment would be below acceptable regulatory levels of drinking water. An exception they noted was under saturated conditions with minimal dilution.

COMPARISON OF STUDIES TO EXPECTED CONDITIONS IN NISQUALLY

With the exception of the Norin and Strömvall (2004) study, all of the studies are based on controlled laboratory conditions. For at least three of the eight studies, batch test results followed protocols designed to test leaching under what were considered acidic environments (i.e., pH levels at about 5 and below). However, the pH of precipitation in the Puget Sound region can be very low; in one study mean rainwater pH in the Puget Sound region was reported as 4.5 (Harrison et al. 1977), and the United States Geological Survey (<https://pubs.usgs.gov/gip/acidrain/2.html>) indicates a pH for most of Washington State as 5.3. Therefore, the acidic test conditions used in the batch tests are not too low to represent expected conditions in Nisqually. For the other four studies, testing conditions were close to a neutral pH and therefore represent a less acidic (less leaching) environment than would occur in Nisqually. The one recent study (therefore with improved detection limits), performed at lower pH conditions (Metha 2017) did appear to exhibit higher leaching of metals. In the column tests there were only a few studies that used lower pH elutriates, and there was very little data for metals (the contaminants that would be most impacted by pH) so it is difficult to draw any relationships from those tests.

The Norin and Strömvall (2004) study was the only research conducted in an outdoor setting in the west coast of Sweden where the precipitation has a pH of 4.5 and was considered by the authors to be a "relatively aggressive leaching environment." As noted above, this is similar to the mean pH of precipitation in the Puget Sound region, so from a pH perspective the study results are applicable to this region. The larger concern with the Swedish study is related to the quality and type of asphalt used in Europe versus the U.S. In Europe the asphalt manufacturing process (e.g., the presence of coal tar in European pavement), the make and model of vehicles, and other factors (e.g., use of studded tires and winter de-icing solutions) could influence the type of contaminants found in the RAP (Lakeside Industries. Letter to Thurston County Community Planning and Economic Development. November 6, 2018). As noted by the study authors, in Sweden tar was used as an additive in asphalt until 1975; and tar contains 10^3 to 10^5 times more PAH than bitumen, which is what has been used in the U.S. since World War II. The PAH results from the Norin and Strömvall (2004) study were the highest concentrations measured, especially for naphthalene and phenanthrene, likely an indication of the quality of the original asphalt. Thus, the basic findings of the Norin and Strömvall (2004) study, that is that RAP from roadway wear course exhibits more leaching than base course RAP and that leaching is highest at the beginning of storage, are likely applicable to the Nisqually area; but the concentrations of contaminants measured may not be representative.

The most consistent trend in all of the studies was that most of the contaminant leaching occurred during the early stages of flushing, whether in batch or column tests or at neutral and low pH. In the Puget Sound region, summer and early fall are typically dry; and storm events that do occur are small, likely too small to completely soak a large stockpile of RAP. Therefore, leaching from stockpiles stored in Nisqually would likely occur during the first large storm

events of the season when the stockpiles are first exposed to heavy rainfall. This is the period when the greatest potential for leaching of contaminants would likely exist.

COMPARISON OF STUDY RESULTS TO STANDARDS

Tables 1 and 2 provide a summary of the most relevant data from each of the selected studies and a comparison to current Washington State Groundwater Quality Standards. Batch test results are presented in Table 1, and column test results are presented in Table 2. All data in these tables reflect testing on 100 percent RAP. Ranges are shown where there was a range of RAP materials tested. For example, seven different RAP sources were tested in one study (Aydilek et al. 2017), and, therefore, Tables 1 and 2 include the range for all the test data from that study. **Bolded** results in the tables indicate where that standard was exceeded. Results are *Italicized* in cases where the detection limit was higher than the state groundwater quality standard. This means that the concentration of the contaminant could have exceeded the standard, or it could have been zero, and makes the results meaningless for evaluating against the standard.

As indicated by Table 1, in four of the eight studies there was at least one metal detected at a level that exceeded the standard. In the one study performed in a low pH (acidic) environment and where detection limits were low enough to compare to the standards (Mehta et al. 2017), four metals were detected at peak concentrations that exceeded a standard. In tests performed under more neutral pH conditions only two metals exceeded a standard. PAHs were only tested at appropriate detection limits (i.e., above groundwater standards) in four of the batch type studies. Thirteen, of the sixteen PAHs were measured at detectable concentrations in at least one of the four studies with appropriate detection limits. At least one PAH above groundwater standards was measured in each of the four studies. Acenaphthene, fluoranthene, naphthalene, benzo(a)pyrene, and pyrene exceeded groundwater standards in at least two (50 percent) of the studies where detection limits were adequate.

Table 2 summarizes the study results from column tests. Metals data are largely lacking for comparison between studies, due to high detection limits and the fact that only a few of the studies evaluated metals in column tests. There was only one metal (manganese) that was measured at a concentration that exceeded the Washington State groundwater standard. For PAHs, all 16 analytes exceeded the standard in at least one of the four studies where they were tested at appropriate detection limits. There were eight PAHs that were measured above the standard in at least two (50 percent) of the studies. These were acenaphthene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-c,d)pyrene, naphthalene, phenanthrene, and pyrene.

Table 3 provides a comparison of the state groundwater quality standards to the state drinking water quality standards. As shown, for all metals and PAH's reviewed in this study, the groundwater quality standards (those included in Tables 1 and 2) are the most stringent. However, there are three metals for which there are drinking water standards but no groundwater quality standards; beryllium, nickel, and thallium. With the exception of one case

where thallium slightly exceeded the state drinking water standard, all other measurements of these metals were below the standard.

The following standards comparisons have been excerpted from each of the report summaries above and relate to the standards used by the various authors rather than Washington State standards:

1. Aydilek et al. (2017) reported that Cu, Al, B, Ba, Co, Mn, Ni, and Zn exceeded Maryland's ATLs in either batch or column tests. Of those, Cu and Zn also exceeded US EPA WQLs. Most of the exceedances occurred during initial flushing, after which concentrations of all the elements quickly fell below detection.

2. In column tests by Legret et al. (2005), total hydrocarbon concentrations were measured above the EC target level for groundwater, and benzo(a)pyrene) slightly exceeded the EC drinking water standard. In both cases, the highest measured concentrations occurred during initial flushing and concentrations were below detection in later tests.

3. Lead was close to or higher than US EPA drinking water standards for a number of the weathered NORTHRAP samples in batch tests done by Mehta et al. 2017. In the same study, benzo(a)anthrazene was detected at levels of concern based on 1995 US EPA human health advisory levels. In the experiments conducted with a strong solvent, many of the PAHs exceeded US EPA 2016 Clean Water Act criteria.

4. In Birgsdotter et al. (2007) the total content of PAHs in the wear course sample from a gas station exceeded Danish soil quality criteria.

5. In Norin and Strömvall (2004), the concentration of total PAHs in leachate from stockpiles of scarified, wear-course RAP and dug, wear- and base-course RAP, both collected from a highly used highway, exceeded the threshold set by Sweden for groundwater in polluted soils at gas stations. The dominant contaminants identified were naphthalene, BHT, and DBP.

6. In Morse et al. (2003), RAP samples exceeded Texas regulatory standards for at least one of the three samples for antimony, barium, and lead. The average concentration exceeded Texas standards for barium and lead.

7. In Kang et al. (2011), there was little testing on 100 percent RAP, and only metals were assessed. Arsenic was measured at the MCL, but no other measured metals had high concentrations as per the standards they were using.

8. In Brently and Townsend (1999), lead exceeded Florida's drinking water standards in a number of the samples during column testing.

SUMMARY AND CONCLUSIONS

There was a wide range in testing materials and protocols used in these studies, and they represent a wide range in conditions. For example, in Europe the asphalt manufacturing process (e.g., the presence of coal tar in European pavement), the make and model of vehicles, and other factors (e.g., use of studded tires and winter de-icing solutions) could influence the type of contaminants found in the RAP (Lakeside Industries. Letter to Thurston County Community Planning and Economic Development. November 6, 2018).The issue of the manufacturing process is emphasized in one of the studies from Sweden where it was noted that in Sweden tar was used as an additive in asphalt until 1975 and that tar contains 10^3 to 10^5 times more PAH than bitumen (Norin and Strömvall 2004). In comparison, coal tar has not been used in the U.S. since World War II (Lakeside Industries. Letter to Thurston County Community Planning and Economic Development. November 6, 2018). As a result of this and other sources of variability, only broad summaries can be drawn from the research. The following points summarize basic findings from the literature reviewed.

- As a source of contaminants, RAP is highly variable. Factors contributing to variability in leachate from RAP appear to include the asphalt manufacturing process, the RAP source, the duration and degree to which it has weathered and been exposed to pollution generating sources, and how long it is stored.

- Both batch and column tests indicated that there were typically some contaminants leached from RAP at concentrations that exceeded Washington State groundwater quality standards. Typically, these exceedances occurred during initial flushing of the RAP.

    - Acenaphthene, fluoranthene, naphthalene, and pyrene were measured above groundwater standards with the most frequency (in 50 percent or more of the studies where detection limits were adequate) in both batch and column tests.

    - Metals data from batch testing indicated that increased release should be expected under acidic (low pH) conditions.

- Although this literature review specifically did not include an assessment of potential environmental impact from fate and transport of these contaminants, a number of the researchers suggested that the impact to the environment would be negligible if dilution and assimilation were considered.

- While some portion of the contaminants is likely generated from components of the asphalt itself, exposure to roadways (and traffic) was identified as a major contributor of contaminants that were available for leaching in three of the studies (Mehta et al. 2017; Birgisdottir et al. 2007; and Norin and Strömvall 2004).

- Batch and column laboratory tests, while informative, are not necessarily representative of what can be expected under field conditions. In the one study that evaluated leachate

collected from outdoor stockpiles (Norin and Strömvall 2004) the results indicated that the total cumulative loading of semi-volatile organics leached during laboratory-based column studies was approximately only 25 percent of what was calculated from leachate collected from the inner section (where the most leaching occurred) of the RAP stockpile. The authors attributed this to differences between the L:S ratios, and to the cumulative effect of contaminants leaching over a longer period of time in the stockpile versus the column test. The authors emphasized the need for field testing as a follow up to laboratory studies.

Table 1. Summary of Batch Test Results from the Eight Research Studies Reviewed.

Constituent	Washington Groundwater Quality Standards[a]	Aydilek et al. 2017[b]	Legret et al. 2005[c]	Mehta et al. 2017[d]	Birgisdottir et al. 2007[e]	Norin and Strömvall 2004[f]	Morse et al. 2001[g]	Brantley and Townsend 1999[h]	Kang et al. 2011[i]
pH	–	7	7.2 to 7.8	4.93	~7	Not reported	5	4.9 to 5.2	7
Liquid:Solids Ratio	–	20:1	10:1 to 30:1	–	100	100	20:1	20:1	20:1
Total Metals (ug/L)									
Aluminum	–	<5 – 272	–	~30 – 800	–	–	<2,000 – <2,000	–	37
Arsenic	0.05	*<50* – **39.5**	–	**~0.4 – 0.6**	–	–	*<25 – <25*	–	**10**
Antimony	–	–	–	–			5.2 – 6.3	–	–
Barium	1,000	<5 – 29.3	–	~0.08 – 300	–	–	*<2,000 – <2,000*	<500 – <500	70
Beryllium	–	–	–	~0.08 – 0.5	–	–	<1 – <1	–	BDL
Cadmium	10	<2 – <5	<0.01 – <0.01	~0.04 – 0.8	–	–	1.2 – 1.8	<5 – <5	BDL
Chromium	50	<5 – <25	<1 – <1	~0.4 – 1.5	–	–	<5 – 6.0	*<100 – <100*	BDL
Copper	1,000	<5 – 28.4	<5 – <5	~0.5 – 750	–	–	<100 – <100	<500 – <500	BDL
Iron	300	<5 – 10.2	–	~1.4 – **1,100**	–	–		–	**410**
Lead	50	<5 – <25	<5 – <5	~0.08 – 20	–	–	20.4	<10 – <10	BDL
Manganese	50	<5 – <5	–	~0.08 – **1,000**	–	–	*<100* – **113**	–	30
Mercury	2	–	0.1 – 0.2	–	–	–	*<2 – <2*	–	–
Molybdenum	–	–	<5 – <5	~0.05 – 0.8	–	–	<10 – <10	–	BDL
Nickel	–	<5– <5	<2 – <2	~0.08 – 20	–	–	<50 – <50	<100 – <100	BDL
Selenium	10	–	–	~4 – **12**	–	–	*<25 – <25*	–	–
Silver	50	<5 – <5	–	~0.01 – 0.03	–	–	*<100 – <100*	–	–
Thallium	–	–	–	~0.03 – 0.2					–
Zinc	5,000	<5 – 8.90	<10 – 115	~6 – 500	–	–	290 – 977	<500 – <500	BDL

Bold values represent detected results that exceed Washington groundwater quality standards.

Italics represent when the detection limit is as high or higher than one of the groundwater quality criteria.

– = Not reported or not available.

µg/L = Micrograms per liter.

BDL = Below detection limit (used when detection limit was not reported).

< = Indicates the analyte was below detection; the adjacent number is the reported detection limit.

~ = Indicates approximate value

[a] Washington Groundwater Quality Standards (WAC 173-200-040).

[b] The numbers shown provide the range from all seven RAP samples tested.

[c] Three extractions at increasing liquid to solid (L:S) ratios were done in these experiments. These data show the range measured in those extractions.

[d] Data reflect range of three unweathered RAP samples from supply sources in New Jersey. Raw data for metals were not provided but were grossly interpolated from graphics. These are shown as approximate (~) values.

[e] These results show the range in concentrations from the wear course of RAP removed from a gas station that had been in use for 20 years as well as the wear course from a highway that had only been in use a few years.

[f] Results reported are from batch tests performed during previous research (Larsson 1998) that were performed on finely ground material.

[g] The results shown represent the range of concentrations measured from three or four samples over two experiments as reported in Appendix B of the report.

[h] The results represent TCLP, SPLP, and deionized water batch tests for six RAP samples. Results were taken from Townsend and Brantley (1998) since only select data was reported in the referenced literature report (i.e., Brantley and Townsend 1999).

[i] Results are from testing of one RAP sample.

Table 1 (continued). Summary of Batch Test Results from the Eight Research Studies Reviewed.

Constituent	Washington Groundwater Quality Standards[a]	Aydilek et al. 2017[b]	Legret et al. 2005[c]	Mehta et al. 2017[d]	Birgisdottir et al. 2007[e]	Norin and Strömvall 2004[f]	Morse et al. 2001[g]	Brantley and Townsend 1999[h]	Kang et al. 2011[i]
Polycyclic Aromatic Hydrocarbons (PAHs) (in µg/L)									
Acenaphthene	0.01	–	*<0.05* – *<0.05*	BDL – **0.20**	BDL – **0.05**	**0.057**	–	*<5* – *<5*	–
Acenaphthylene	0.01	–	*<0.05* – *<0.05*	–	BDL– BDL	**0.338**	–	*<5* – *<5*	–
Anthracene	0.01	–	**0.030 – 0.030**	–	BDL – BDL	*<0.018*	–	*<5* – *<5*	–
Benzo(a)anthracene	0.01	–	*<0.025* – *<0.025*	BDL – BDL	**0.06 – 0.08**	–	–	*<5* – *<5*	–
Benzo(a)pyrene	0.008	–	*<0.010* – **0.020**	–	BDL – **0.02**	*<0.071*	–	*<0.025* – *<0.025*	–
Benzo(b)fluoranthene	0.01	–	*<0.025* – *<0.025*	–	–	*<0.053*	–	*<1* – *<1*	–
Benzo(k)fluoranthene	0.01	–	*<0.025* – *<0.025*	–	BDL – **0.04**	*<0.036*	–	*<2.5* – <2.5	–
Benzo(g,h,i)perylene	0.01	–	*<0.025* – **0.030**	–	BDL – 0.01	*<0.036*	–	*<5* – *<5*	–
Chrysene	0.01	–	*<0.025* – *<0.025*	BDL – BDL	BDL– BDL	**0.249**[j]	–	*<5* – *<5*	–
Dibenzo(a,h)anthracene	0.01	–	*<0.025* – *<0.025*	–	BDL– BDL	*<0.036*	–	*<2.5* – <2.5	–
Fluoranthene	0.01	–	**0.050 – 0.060**	0.0039 – 0.0087	**0.07 – 0.20**	*<0.036*	–	*<5* – *<5*	–
Fluorene	0.01	–	**0.030 – 0.040**	BDL – BDL	BDL – 0.01	**0.057**	–	*<1* – *<1*	–
Indeno(1,2,3-cd)pyrene	0.01	–	*<0.025* – *<0.025*	–	BDL – BDL	*<0.053*	–	*<1* – *<1*	–
Naphthalene	0.01	–	*<0.100* – *<0.100*	–	**0.08 – 0.50**	**3.92**	–	*<1* – *<1*	–
Phenanthrene	0.01	–	0.250 – 0.300	–	**0.10 – 0.50**	0.012	–	*<2.5* – <2.5	–
Pyrene	0.01	–	*<0.025* – *<0.025*	BDL – **0.019**	**0.07 – 0.09**	**0.062**	–	*<.5* – *<.5*	–

Bold values represent detected results that exceed Washington groundwater quality standards.

Italics represent when the detection limit is as high or higher than the groundwater quality standard.

– = Not reported or not available.

µg/L = Micrograms per liter.

BDL = Below detection limit (used when detection limit was not reported).

< = Indicates the analyte was below detection; the adjacent number is the reported detection limit.

~ = Indicates approximate value interpreted from figures

[a] Washington Groundwater Quality Standards (WAC 173-200-040).

[b] The numbers shown provide the range from all seven RAP samples tested.

[c] Three extractions at increasing liquid to solid (L:S) ratios were done in these experiments. These data show the range measured in those extractions.

[d] Data reflect range of three unweathered RAP samples from supply sources in New Jersey. Raw data for metals were not provided but were grossly interpolated from graphics. These are shown as approximate (~) values.

[e] These results show the range in concentrations from the wear course of RAP removed from a gas station that had been in use for 20 years as well as the wear course from a highway that had only been in use a few years.

[f] Results reported are from batch tests performed during previous research (Larsson 1998) that were performed on finely ground material.

[g] The results shown represent the range of concentrations measured from three or four samples over two experiments as reported in Appendix B of the report.

[h] The results represent TCLP. SPLP, and deionized water batch tests for six RAP samples. Results were taken from Townsend and Brantley (1998) since only select data was reported in the referenced literature report (i.e., Brantley and Townsend 1999).

[i] Results are from testing of one RAP sample.

[j] Chrysene concentration represents both chrysene and benzo(a) anthracene as reported in the study.

Table 2. Summary of Column Test Results from the Eight Research Studies Reviewed.

Constituent	Washington Groundwater Quality Standards[a]	Aydilek et al. 2017[b]	Legret et al. 2005[c]	Mehta et al. 2017[d]	Birgisdottir et al. 2007[e]	Norin and Strömvall 2004[f] Scarified Recycled Asphalt Pavement		Morse et al. 2001	Brantley and Townsend 1999	Kang et al. 2011
						Not Stored	Stored			
pH	–	6.0 – 6.5	~7 (deionized water)	~5 (artificial rain water)	8	4.5	4	4	~7	
Liquid:Solids Ratio		25:1	30:1		100	0.05	0.07			
Total Metals (ug/L)										
Aluminum	–	<5 – 320	–	–	–	–	–	–	–	–
Arsenic	0.05	*<25* – <25	–	*<10*	–	–	–	–	–	–
Antimony	–	–	–	–	–	–	–	–	–	–
Barium	1,000	14.2 – 172	–	*<2,000*	–	–	–	–	<500	–
Beryllium	–	–	–	–	–	–	–	–	–	–
Cadmium	10	<2 – <5	–	<5	–	–	–	–	<5	–
Chromium	50	<5 – <25	–	*<100*	–	–	–	–	*<100*	–
Copper	1,000	<5 – 16.1	13	<1,300	–	–	–	–	<500	–
Iron	300	<25 – 224	–	–	–	–	–	–	–	–
Lead	50	*<25*– <25	<5	<15	–	–	–	–	<10 – 38	–
Manganese	50	<5 – **426**	–	–	–	–	–	–	–	–
Mercury	2	–	<0.1	–	–	–	–	–	–	–
Molybdenum	–	–	<5	–	–	–	–	–	–	–
Nickel	–	<5 – 108	–	–	–	–	–	–	<100	–
Selenium	10	–	–	–	–	–	–	–	–	–
Silver	50	–	–	–	–	–	–	–	–	–
Zinc	–	23 – 213	71	–	–	–	–	–	<500	–

Bold values represent detected results that exceed Washington groundwater quality standards.

Italics represent when the detection limit is as high or higher than the groundwater quality standard.

– = Not reported or not available.

µg/L = micrograms per liter.

BDL = Below detection limit (used when detection limit was not reported).

< = Indicates the analyte was below detection; the adjacent number is the reported detection limit.

[a] Washington Groundwater Quality Standards (WAC 173-200-040).

[b] This is the range in peak concentrations across seven recycled asphalt pavement (RAP) samples.

[c] This study was done over a 75-day period at increasing L:S ratios. These results are from Day 2 (the first testing day), and therefore reflect the highest concentrations measured for all parameters except mercury and total hydrocarbons which peaked later in the testing.

[d] Raw data for metals were not provided but were reported as less than maximum contaminant level (<MCL). The MCLs (or in the case of copper and lead, US EPA-designated Action Levels) are shown in the table.

[e] Range shown represents results of testing the wear course of RAP from a gas station that had been in use for 20 years and a highway that had been in service for approximately a year. They reflect the range in concentrations measured over the 64-day test period.

[f] Results for a laboratory column test where compounds were leached from two RAP samples: scarified asphalt that was not stored and scarified asphalt that was stored for 2 years. Both samples came from the same highway road surface at 3 cm of depth that had been in use for 11 years.

Table 2 (continued). Summary of Column Test Results from the Eight Research Studies Reviewed.

Constituent	Washington Groundwater Quality Standards[a]	Aydilek et al. 2017[b]	Legret et al. 2005[c]	Mehta et al. 2017[d]	Birgisdottir et al. 2007[e]	Norin and Strömvall 2004[f] Scarified Recycled Asphalt Pavement		Morse et al. 2001	Brantley and Townsend 1999	Kang et al. 2011
						Not Stored	Stored			
Polycyclic Aromatic Hydrocarbons (PAHs) (in µg/L)										
Acenaphthene	0.01	–	*<0.05*	BDL – **0.09**	*<0.015* – **0.070**	**3.0**	**0.7**	–	*<5*	–
Acenaphthylene	0.01	–	*<0.05*	–	*<0.015* – <0.003	**0.5**	**0.4**	–	*<5*	–
Anthracene	0.01	–	*<0.025*	–	–	**0.5**	**0.1**	–	*<5*	–
Benzo(a)anthracene	0.01	–	*<0.025*	BDL	**0.015 – 0.180**	<0.01	<0.01	–	*<5*	–
Benzo(a)pyrene	0.008	–	**0.020**	–	*<0.024 – <0.050*	*<0.01*	*<0.01*	–	*<0.25*	–
Benzo(b)fluoranthene	0.01	–	**0.025**	–	–	<0.01	<0.01	–	*<1*	–
Benzo(k)fluoranthene	0.01	–	*<0.025*	–	**0.150 – 0.830**	<0.01	<0.01	–	*<2.5*	–
Benzo(g,h,i)perylene	0.01	–	**0.080**	–	*<0.024 – <0.050*	<0.01	<0.01	–	*<5*	–
Chrysene	0.01	–	**0.045**	BDL	–	<0.01	<0.01	–	*<5*	–
Dibenzo(a,h)anthracene	0.01	–	**0.055**	–	<0.024 – *0.043*	**0.04**	**0.20**	–	*<2.5*	–
Fluoranthene	0.01	–	*<0.025*	BDL	**0.015 – 0.078**	**0.1**	**0.1**	–	*<5*	–
Fluorene	0.01	–	*<0.025*	BDL – **0.03**	*<0.015 – <0.030*	**2.1**	**0.5**	–	*<1*	–
Indeno(1,2,3-cd)pyrene	0.01	–	**0.050**	–	**0.024 – 0.200**	**0.02**	**0.04**	–	*<1*	–
Naphthalene	0.01	–	*<0.100*	–	**0.310 – 0.320**	**28**	**9.2**	–	*<1*	–
Phenanthrene	0.01	–	*<0.025*	–	**0.026 – 0.120**	**1.8**	**0.7**	–	*<2.5*	–
Pyrene	0.01	–	*<0.025*	BD L – **0.19**	*<0.015* – **0.054**	**0.1**	**0.1**	–	*<0.5*	–

Bold values represent detected results that exceed Washington groundwater quality standards.

Italics represent when the detection limit is as high or higher than the groundwater quality standard.

– = Not reported or not available.

µg/L = micrograms per liter.

BDL = Below detection limit (used when detection limit was not reported).

< = Indicates the analyte was below detection; the adjacent number is the reported detection limit.

[a] Washington State Groundwater Quality Standards (WAC 173-200-040).

[b] This is the range in peak concentrations across seven recycled asphalt pavement (RAP) samples.

[c] This study was done over a 75-day period at increasing L:S ratios. These results are from Day 2 (the first testing day), and therefore reflect the highest concentrations measured for all parameters except mercury and total hydrocarbons which peaked later in the testing.

[d] Raw data for metals were not provided but were reported as less than US EPA's maximum contaminant level (<MCL). The MCLs (or in the case of copper and lead, US EPA-designated Action Levels) are shown in the table.

[e] Range shown represents results of testing the wear course of RAP from a gas station that had been in use for 20 years and a highway that had been in service for approximately a year. They reflect the range in concentrations measured over the 64-day test period.

[f] Results for a laboratory column test where compounds were leached from two RAP samples: scarified asphalt that was not stored and scarified asphalt that was stored for 2 years. Both samples came from the same highway road surface at 3 cm of depth that had been in use for 11 years.

Table 3. Water Quality Standards Comparison.		
Constituent	**Washington Groundwater Quality Standards[a]**	**Drinking Water Standards[b]**
Total Metals (in micrograms per liter [µg/L])		
Aluminum	–	–
Arsenic	0.05	10
Antimony	–	6
Barium	1,000	2,000
Beryllium	–	4
Cadmium	10	5
Chromium	50	100
Copper	1,000	1,300[c]
Iron	300	–
Lead	50	15[c]
Manganese	50	–
Mercury	2	2
Molybdenum	–	–
Nickel	–	100
Selenium	10	50
Silver	50	–
Thallium	–	2
Zinc	5,000	–
Polycyclic Aromatic Hydrocarbons (PAHs) (in micrograms per liter [µg/L])		
Acenaphthene	0.01	–
Acenaphthylene	0.01	–
Anthracene	0.01	–
Benzo(a)anthracene	0.01	–
Benzo(a)pyrene	0.008	0.20[d]
Benzo(b)fluoranthene	0.01	–
Benzo(k)fluoranthene	0.01	–
Benzo(g,h,i)perylene	0.01	–
Chrysene	0.01	–
Dibenzo(a,h)anthracene	0.01	–
Fluoranthene	0.01	–
Fluorene	0.01	–
Indeno(1,2,3-cd)pyrene	0.01	–
Naphthalene	0.01	–
Phenanthrene	0.01	–
Pyrene	0.01	–

– = Not reported or not available

[a] Washington State Groundwater Quality Standards (WAC 173-200-040)

[b] Washington State Drinking Water Standards for Group A Public Water Supplies (WAC 246-290-310)

[c] Although the state board of health has not established maximum contaminant levels for copper and lead, there is sufficient public health significance connected with copper and lead levels to require inclusion in inorganic chemical and physical source monitoring. For copper and lead, the US EPA has established distribution-system-related levels at which a system is required to consider corrosion control. These Action Levels are 0.015 mg/L for lead and 1.3 mg/L for copper (WAC 246-290-310).

[d] US EPA Drinking Water Standard

REFERENCES

Aydilek, A.H., Z. Mijic, and O. Seybou-Insa. 2017. Hydraulic and Environmental Behavior of Recycled Asphalt Pavement in Highway Shoulder Applications. Final Report. University of Maryland, College Park. October.

Birgisdottir, H., J. Gamst, and T.H. Christensen. 2007. Leaching of PAHs from Hot Mix Asphalt Pavements. Environmental Engineering Science. Volume 24, Number 10.

Brantley, A.S., and T.G. Townsend. 1999. Leaching of Pollutants from Reclaimed Asphalt Pavement. Environmental Engineering Science Volume 16, Number 2. 105–116.

Harrison, H., R.J. Charlson, G.D. Christian, N.R. Horike, E.J. Knudson, T.V. Larson, H. Riley, R. Vanderwort, and R. Weiss. 1977. Acid Rain in Puget Sound. In: Proceedings US Energy Research and Development Administration ERDA Symposium Series 41, pp. 602–610.

Kang, D.H., S.C. Gupta, A.Z. Ranaivoson, R. Roberson, and J. Siekmeier. 2011. Recycled Materials as Substitutes for Virgin Aggregates in Road Construction: II. Inorganic Contaminant Leaching. Soil Society of America Journal 75:1276–1284.

Lakeside Industries. 2018. Letter to Thurston County Community Planning and Economic Development. November 6.

Larsson, L. 1998. Temporary Storing of Asphalt: Leaching of Dug Asphalt – part 1; Report 468. Swedish Geotechnical Institute, Linkoping, Sweden.

Legret, M., L. Odie, D. Demare, and A. Jullien. 2005. Leaching of heavy metals and polycyclic aromatic hydrocarbons from reclaimed asphalt pavement. Water Research 39:3675–4685.

Mehta, Y.M., A. Ayman, B. Yan, A.E. McElroy, and Y. Huiming. 2017. Environmental Impacts of Reclaimed Asphalt Pavement (RAP). FHWA-NJ-2017-008.

Morse, A., A.M. Jackson, and R. Davio. 2001. Environmental Characterization of Traditional Construction and Maintenance Materials. In T.T. Eighmy, ed., Proceedings of an International Conference on Beneficial Use of Recycled Materials in Transportation Applications, Arlington, Virginia. November 13–15, 2001. University of New Hampshire, Durham.

Norin, M., and A-M. Strömvall. 2004. Leaching of Organic Contaminants from Storage of Reclaimed Asphalt Pavement. Environmental Technology, Volume 25, pp. 323–340.

Townsend, T., and Brantley, A. 1998. Leaching Characteristics of Asphalt Road Waste, Final Project Report. Gainesville, Florida. Florida Center for Solid and Hazardous Waste Management, University of Florida.

APPENDIX A

Literature Considered for Phase 2 of the Literature Review for Contaminant Leaching from Recycled Asphalt Pavement

Appendix A: LIterature Considered for Phase 2 of the Literature Review for Contaminant Leaching from Recycled Asphalt Pavement

Author	Title	Date	Overall Rating	Rating Rationale
Aydilek, Ahmet H.; Mijic, Zorana; Seybou-Insa, Ousmane	Hydraulic and Environmental Behaviour of Recycled Asphalt Pavement in Highway Shoulder Applications	2017	High	Direct testing of leaching 7 different RAP. High quality study.
Birgisdottir, H.; Gamst, J; Christensen, T. H.	Leaching of PAHs From Hot Mix Asphalt Pavements	2007	High	Direct testing of different RAP sources. High quality study.
Brantley, A.S.; Townsend, T.G.	Leaching of Pollutants from Reclaimed Asphalt Pavement	1999	High	Laboratory batch and column tests of 6 different RAP samples. Detection limits were high, limiting the value of this study.
Kang, Dong Hee; Gupta, Satish C; Ranaivoson, Andry Z; Roberson, Ruth; Siekmeier, John A.	Recycled Materials as Substitutes for Virgin Aggregates in Road Construction: II. Inorganic Contaminant Leaching	2011	High	Focus of testing is fly ash and mixtures but one test sample is 100% RAP.
Legret, M.; Odie, L.; Demare, D.; Jullien, A.	Leaching of heavy metals and polycyclic aromatic hydrocarbons from reclaimed asphalt pavement	2005	High	Direct testing of RAP. High quality study.
Mehta, Yusuf; Ayman, Ali; Beizhan, Yan; McElroy, Anne E.; Huiming, Yin	Environmental Impacts of Reclaimed Asphalt Pavement	2017	High	High quality study. Assessed various RAP sources including "fresh" RAP and evaluated affects of weathering.
Morse, A., A.M. Jackson, and R. Davio	Environmental Characterization of Traditional Construction and Maintenance Materials	2001	High	Direct testing of RAP from 3 different districts in Tx was tested following std SPLP protocol.
Norin, Malin; Strömvall, A-M.	Leaching of Organic Contaminants from Storage of Reclaimed Asphalt Pavement	2004	High	Direct testing of RAP. High quality study
Arulrajah, A.; Piratheepan, J.; Disfani, M. M.	Reclaimed Asphalt Pavement and Recycled Concrete Aggregate Blends in Pavement Subbases: Laboratory and Field Evaluation	2014	Low	Testing is related to its physical properties and therefore RAP use as a subbase material.
Azah, Edmund; Kim, Hwidong; Townsend, Timothy	Assessment of Direct Exposure and Leaching Risk from PAHs in Roadway and Stormwater System Residuals	2017	Low	Not about RAP. Samples were from stormwater maintenance operations.
Beyers, C; Clifton, M.	Land use planning and the impacts of odour emissions from waste recycling in asphalt production	2017	Low	Testing was based on manufacturing of product not impacts of recycled product. Comparison of odor emissions from hot mix and RAP facilities.
Brandt, H.C.A; de Groot, P.C.	Aqueous Leaching of Polycyclic Aromatic Hydrocarbons From Bitumen and Asphalt	2001	Low	Not about RAP but about petroleum bitumens that make up asphalt and one asphalt product.
Cai, Hongmei; Wei, Jianming; Zhang, Yuzhen; Changtai, Jin	The Research on the Potential Leachability of Asphalt	2011	Low	Testing is of 5 types of asphalt binders not RAP.

Appendix A: LIterature Considered for Phase 2 of the Literature Review for Contaminant Leaching from Recycled Asphalt Pavement

Author	Title	Date	Overall Rating	Rating Rationale
Harrington, Joseph T.; Wagter, James M; R., Kevin	Toxicity of Milled Asphalt Pavement to Aquatic Organisms and its Effect on Stream Substrates in Deep Creek, San Bernardino County	1996	Low	Could not acquire this report. The age of the study would have limited its usefulness due to poor detection limits and likely false negatives.
Jullien, A., Monéron, P., Quaranta, G. and Gaillard, D.	Air emissions from pavement layers composed of varying rates of reclaimed asphalt	2006	Low	Testing of air emissions during newly laid (hot mix) asphalt pavement with different ratios of RAP. Results are related to air emissions during roadway building and for hot asphalt. Not related to RAP storage.
Kang, Dong Hee; Gupta, Satish C; Ranaivoson, Andry Z; Roberson, Ruth; Siekmeier, John A.	Leaching Characteristics of Fly Ash, Recycled Asphalt, and Aggregate Mixtures	2010	Low	Testing was of fly ash and RAP mixes. Therefore any results woud be biased by fly ash component.
Kayhanian, M., Vichare, A., Green, P.G. and Harvey, J.	Leachability of dissolved chromium in asphalt and concrete surfacing materials	2009	Low	Leaching test on different pavement types but doesn't appear to be RAP in any of the mixes.
Kayhanian, Masoud; Vichare, Akshay; Green, Peter G.; Alaimo, Chris; Hwang, Hyun-Min; Signore, James M.; Troxler, Mark; Jones, David; Harvey, John	Water Quality Evaluation of Leachate Produced from Pavement Specimens Under Controlled Laboratory Conditions	2011	Low	Testing is of different new roadway materials, many w an asphalt component but not directly pertaining to RAP.
Kriech, A.J.; Kurek, J.T.; Osborn L.V, et al.	Determination of Polycyclic Aromatic Compounds in Asphalt and in Corresponding Leachate Water	2002	Low	Research on "virgin" asphalts from 6 sources. Not about recylced asphalt. No contaminants from its use in the roadway would have been tested.
Licbinsky, R.; Huzlik, J.; Provalilova, I.; Jandova, V.; Licbinska, M.	Groundwater Contamination Caused by Road Construction Materials	2012	Low	Testing is done on boreholes in existing roadway. RAP may or may not be part of the roadway structure. Either way, the results would not reflect RAP alone.
Lopez, S; Sanchez, F; Kosson, D S	Evaluation of the impact of environmental conditions on constituent leaching from granular materials during intermittent infiltration	2001	Low	Did not test asphalt or RAP
Mitchel, M.R.; Link, R.E.; Hongmei, Cai; Xiaosheng, Huang; Peng, Wang; Yuzhen, Zhang	Factors Influencing the Leaching of Asphalt Components	2009	Low	Testing is of asphalt binders not RAP. Precursor to 2011 report.

Appendix A: LIterature Considered for Phase 2 of the Literature Review for Contaminant Leaching from Recycled Asphalt Pavement

Author	Title	Date	Overall Rating	Rating Rationale
Nelson, P.O., Eldin, N.N., Huber, W.C., Lundy, J.R., Williamson, K.J., Quigley, M.M., Azizian, M.F., Thayumanavan, P., and Frey, K.M.	Environmental impact of construction and repair materials on surface and ground waters. *Final report* , *4* , pp.25-9.	2000	Low	This report was superceded by NCHRP 448 listed above.
Nielsen, E. et al	Processing and RA management at the mixing plant. Final report. Deliverable 4.6 of Re-Road – End of life strategies of asphalt pavements	2012	Low	Not about environmental impacts but about maximizing use of RAP in pavements.
Ogunro, Vincent O.; Inyang, Hillary I.	Relating Batch and Column Diffusion Coefficients for Leachable Contaminants in Particulate Waste Materials	2003	Low	Leaching test was asphalt mixed with municipal waste. Results would be biased by municipal waste component.
The Recycled Materials Resource Center – Dr. David Kosson of Vanderbilt University	Project 11 – Leaching from Granular Materials Used in Highway Construction During Intermittent Wetting	2006	Low	Test objective was looking at impact of freeze/thaw cycles on leaching on recyled concrete
Townsend, Timothy G.	Leaching Characteristics of Asphalt Road Waste	1998	Low	Graduate study. Laboratory batch and column tests of 6 different RAP samples. See Brantly and Townsend for reviewed paper
Unknown	Asphalt Test Show Little Leachate	1998	Low	News summary. No data. Superceded by Brantly and Townsend study.
Ventura, A. Jullien, A., and P. Moneron.	Polycyclic aromatic hydrocarbons emitted from a hot-mix drum, asphalt plant: study of the influence from use of recycled bitumen	2007	Low	Testing was based on air emissions from manufacturing of product not impacts of recycled product or leaching from RAP.
Norrman, Jenny; Rosén, Lars; Norin, Malin	Decision Analysis for Storage for Reclaimed Asphalt	2005	Moderate	This is about storage and fate/transport. Refers to Norin paper as source of original leachate tests.
Sadecki, Roger W., et al.	An Investigation of Water Quality In Runoff From Stockpiles of Salvaged Concrete And Bituminous Paving	1996	Moderate	Comparison of leaching from stockpiles of concrete and RAP in field application. Just a few heavy metals were sampled and PAHs; however the tests were done in mid-1990s and no information on detection limits was provided. Age of study and likely high detection limits, limit its value.

Appendix A: LIterature Considered for Phase 2 of the Literature Review for Contaminant Leaching from Recycled Asphalt Pavement

Author	Title	Date	Overall Rating	Rating Rationale
Student Investigators: Nemeth, Andrew F.; Ward, Devon A.; Woodington, Walter G. Advisor: Mathisen, Paul P.	The Effect of Asphalt Pavement on Stormwater Contamination	2010	Moderate	Methods appear to be good and it is specifically about RAP. However, it is undergraduate student work. Doesn't appear to have had much review. Does not meet test of having met peer review standards.
Student Investigators: Shedivy, Ryan F.; Meier, Amara Advisors: Edil, Tuncer B.; Tinjum, James M.; Benson Craig H.	Leaching Characteristics of Recycled Asphalt Pavement Used as Unbound Road Base	2012	Moderate	Methods appear to be good and it is specifically about RAP. However, it appears to be undergraduate student work. Doesn't appear to have had much review. Does not meet test of having met peer review standards.
NCHRP	Environmental Impact of Construction and Repair Materials on Surface and Ground Waters: Summary of Methodology, Laboratory Results, and Model Development	2001	Moderate	Extensive study but RAP was only tested in initial toxicity phase. Because there was no toxic effect it was eliminated from further testing.
Thayumanavan, P., Nelson, P., Azizian, M., Williamson, K., and Lundy, J.	Environmental impact of construction and repair materials on surface water and groundwater: Detailed evaluation of waste-amended highway materials	2001	Moderate	Looked at leaching from a wide range of recycled materials and impacts in aquatic environment. RAP was tested RAP during the first phase of aquatic toxicity testing, since No Toxic Effect was observed, it was not included in follow up testing.

APPENDIX B

Copies of Selected Literature

The contents of this appendix will be provided separately.

ATTACHMENT F

PUBLIC
COMMENT
RECEIVED

Due to the size of the file, the public comments were not included directly as an attachment to this file. **All public comments are available online at:**

https://www.thurstoncountywa.gov/planning/planningdocuments/CP-11_Matrix%20Summary.pdf