Impact Analysis
Proposed Amendments to Article 8 of Regulation I
(Revise Sections 8.09, 8.10, 8.11 and Adopt Section 8.13)

State Environmental Policy Act (SEPA)

An Environmental Checklist and a Determination of Nonsignificance, required under SEPA for non-project administrative changes, were prepared on November 30, 2007. The proposed rule-making CR-102 form will be filed with the Washington State Code Reviser on January 22, 2008.

A. Affected Regulations

Amend Regulation I, Sections 8.09, 8.10, and 8.11.

Adopt Regulation I, Section 8.13.

B. Rationale for the Proposed Regulation Revisions

I. Introduction

In accordance with RCW 70.94.743, Agency Regulation I, Sections 8.09, 8.10, and 8.11 prohibit residential burning and land-clearing burning in the Urban Growth Areas (UGAs) and former carbon monoxide non-attainment areas of King, Pierce, and Snohomish Counties and have so stated since 1994. In addition, since 2000, Regulation I, Section 8.12 has prohibited residential burning and land-clearing burning in the Kitsap County UGA and in other areas in Kitsap County with reasonable alternatives to burning.

In addition to the bans on residential burning and land-clearing burning based on UGA and non-attainment area boundaries, RCW 70.94.745(6) requires the Agency to prohibit residential burning and land-clearing burning in areas outside the UGAs and non-attainment areas when the Agency has determined that an alternate technology or method of disposing of the organic refuse is available, reasonably economical, and less harmful to the environment than burning. To implement the requirements of RCW 70.94.745(6), the Department of Ecology adopted WAC 173-425-040(5), which established the process for making this determination.

WAC 173-425-040(5) provides that a reasonable alternative exists for any area where the criteria (in a. and b.) below are met for the specified type of burning:

1. **Available and reasonably economical.** Is the area served by:

   a. A county- or municipally-sponsored service for recycling (e.g., composting) of the organic refuse (e.g., natural vegetation); or

   b. Any other method for disposing of the organic refuse (such as a public or private chipping or chipping rental service, an energy recovery or incineration facility, or a solid waste drop box, transfer station, or landfill) that is located within a reasonable distance and will accept the type and volume of organic refuse at a cost that is less than or equivalent to the median of all county tipping fees in the state for disposal of municipal solid waste?

2. **Less harmful to the environment.** Is any available and reasonably economical alternative method of disposing of the organic refuse less harmful to the environment than outdoor burning according to the following hierarchy:

Less Harmful	Waste Reduction Recycling Energy Recovery or Incineration Landfill Disposal
More Harmful	Outdoor Burning

The proposed amendments reflect the Agency's analysis under WAC 173-425-040.

II. Land-Clearing Burning Analysis

The following section analyzes WAC 173-425-040(5) as it applies to land-clearing burning in King, Pierce, Snohomish, and Kitsap counties. Land-clearing burning is the outdoor burning of trees, stumps, shrubbery, or other natural vegetation from projects that clear land for development, use it for a different purpose, or leave it unused.

1. Available and Reasonably Economical (WAC 173-425-040(5)(a))

a. ***WAC 173-425-040(5)(a)(i)*** – The first issue is whether the area is served by a county- or municipally-sponsored recycling service for land-clearing debris. If so, under the regulation, a reasonable alternative is available and reasonably economical and WAC 173-425-040(5)(a) is met.

We believe the criterion described in WAC 173-425-040(5)(a)(i) was intended to mean a county- or municipally-sponsored curbside collection system for organic debris. We do not believe this criterion was intended to include county-sponsored drop boxes or transfer stations because these alternatives are explicitly described in WAC 173-425-040(5)(a)(ii) as other alternative disposal methods.

We evaluated existing disposal methods for land-clearing debris throughout our four counties and found no county- or municipally-sponsored curbside recycling services for land-clearing debris in any of the four counties. Therefore, the criterion in WAC 173-425-040(5)(a)(i) is **not** met for land-clearing debris.

b. ***WAC 173-425-040(5)(a)(ii)*** – Since the criterion in WAC 173-425-040(5)(a)(i) is not met, the second prong of WAC 173-425-040(5)(a) must be examined. The second prong, WAC 173-425-040(5)(a)(ii), contains three separate questions:

- Is the alternative located within a reasonable distance?
- Will the alternative accept the type and volume of organic refuse?
- Is the cost of disposal, less than or equivalent to the median of all county tipping fees in the state for disposal of municipal solid waste?

All three of the above questions must be answered in the affirmative for the second prong to be met. To answer each question, we evaluated disposal methods for land-clearing debris in our region as described below.

- ***Is the alternative located within a reasonable distance?***

WAC 173-425 does not define "reasonable distance" for disposal of land-clearing debris nor has Ecology provided guidance on the meaning of this phrase.

The Agency developed an interpretation of "reasonable distance" for land-clearing debris through a previous stakeholder process. The suggestions from stakeholders ranged from 10 to 30 miles, and approximately 30 to 60 minutes travel time as a potential substitute for "reasonable distance". For purposes of this analysis, the Agency considers "reasonable distance" for land-clearing debris to mean alternatives located within 30 miles or approximately 60 minutes of travel time each way.

- ***Will the alternative accept the type and volume of organic refuse?***

To answer this question, we interviewed representatives from all four county solid waste programs and health districts and compiled a list of existing land-clearing debris disposal sites and transfer stations. We then made telephone calls to local facilities that provide recycling services for land-clearing debris to determine potential capacity to accept additional debris. The facilities listed in Table 1 accept land-clearing debris, and are responsive to this question.

As shown in Table 1, our research identified facilities in and around the four-county region that offer an alternative to the open burning of land-clearing debris by recycling it into compost or mulch, preparing it for combustion in a boiler, or land filling it. Based on this information, we then applied our "reasonable distance" interpretation and determined that all areas outside the current no-burn zones are served by facilities located within a reasonable distance.

It should also be noted that in addition, we identified additional area businesses that offer mobile chipping/grinding/hauling services. These businesses provide on-site chipping/ grinding of land-clearing debris and either haul the ground material away, or leave the material on-site for use in erosion control, road-bed construction, etc. These providers offer another alternative to outdoor burning of land-clearing debris, in addition to stationary facilities.

- ***Is the cost of disposal, less than or equivalent to the median of all county tipping fees in the state for disposal of municipal solid waste?***

To answer this question, the median of all county tipping fees in the state for disposal of municipal solid waste must be determined. Ecology publishes a list of tipping fees at municipal solid waste (MSW) landfills in Washington. However, the Agency does not recommend relying on this list because it does not include all county tipping fees in the state. Thus, the Agency surveyed county tipping fees throughout the state to determine the county tipping fees for MSW. We obtained data from 34 of the 39 counties, and the results of the Agency survey are shown in Table 2.

Based on this survey, the Agency calculated the statewide median tipping fee for MSW at $73.32 per ton. Thus, alternatives that charge a disposal fee of $73.32 per ton or less would meet the criterion for costing less than or equivalent to the statewide median county tipping fee. Of the facilities listed in Table 1, the majority (45 facilities) charge less than the statewide median county tipping fee. As seen by the rates stated in Table 1, the 7 facilities that charge more are: Cedar Falls Drop Box (King County), Enumclaw Transfer (King County), Fruhling Sand and Topsoils (King County), Zellerhoff Construction (King County), Airport Road R&T (Snohomish County), North County R&T Station (Snohomish County), and Southwest R&T (Snohomish County).

2. Less Harmful to the Environment (WAC 173-425-040(5)(b))

If alternatives are found to be available and reasonably economical under WAC 173-425-040(5)(a), the next issue is whether the alternatives are less harmful to the environment. With respect to the criterion in WAC 173-425-040(5)(b), all the alternatives to outdoor burning listed in Table 1 recycle the waste, prepare it as fuel for wood waste boilers, or land

fill the waste. According to WAC 173-425-040(5)(b), all these alternatives are less harmful to the environment than outdoor burning. Therefore, this criterion is met with respect to land-clearing burning.

3. Conclusions and Recommendations Regarding Land-Clearing Burning

Based on the evaluation described above, Agency staff believes that under WAC 173-425-040(5), reasonable alternatives to land-clearing burning exist in all four counties. However, in Kitsap County there are no commercial-size facilities that are capable of receiving land-clearing debris and are regulated by the Kitsap County Health District. There is one facility on the Suquamish Reservation that accepts land-clearing debris, but it is not subject to the Kitsap County regulations. The other commercial facilities that handle Kitsap County's debris are in Mason County.

Therefore, we recommend prohibiting burning of land-clearing debris in King, Pierce, and Snohomish counties as soon as practical, which we have determined is June 30, 2008. We also recommend the Agency work with Kitsap County to develop a commercial-size, land-clearing recycling facility in the County subject to the County regulations and then expand the no-burn area.

The recommended phase out date for King, Pierce, and Snohomish Counties is June 30, 2008 and is set forth in the proposed new section, Regulation I, Section 8.13.

III. Residential Burning Analysis

The following section analyzes WAC 173-425-040(5) as it applies to residential burning in King, Pierce, Snohomish, and Kitsap Counties. Residential burning is the outdoor burning of leaves, clippings, prunings, and other yard and gardening refuse originating on lands immediately adjacent and in close proximity to a human dwelling.

1. Available and Reasonably Economical (WAC 173-425-040(5)(a))

a. ***WAC 173-425-040(5)(a)(i)*** – The first issue is whether the area is served by a county- or municipally-sponsored recycling service for residential yard waste. If so, under the regulation, a reasonable alternative is available and reasonably economical and WAC 173-425-040(5)(a) is met.

We believe the criterion described in WAC 173-425-040(5)(a)(i) was intended to mean a county- or municipally-sponsored curbside collection system for organic debris. We do not believe this criterion was intended to include county-sponsored drop boxes or transfer stations because these alternatives are explicitly described in WAC 173-425-040(5)(a)(ii) as other alternative disposal methods.

Using that assumption, we evaluated existing disposal methods for residential yard waste throughout our four counties and found the following county- or municipally-sponsored curbside recycling services:

- King County: Curbside yard waste collection is currently available throughout King County and there is capacity to accept additional yard waste at the currently permitted compost facilities. Therefore, the criterion contained in WAC 173-425-040(5)(a)(i) **is** met for all areas in King County.
- Kitsap County: Curbside service is currently offered only in all no-burn areas. The Kitsap County Solid Waste Division has informed us that curbside service will only be expanded when the no-burn areas are expanded. Therefore, the criterion contained in WAC 173-425-040(5)(a)(i) **is not** met for all of Kitsap County.

- Pierce County: Curbside service is offered in all areas where residential yard debris burning is now permanently banned. In addition, curbside service is offered in some areas outside the urban growth areas on a voluntary basis. Pierce County officials have concerns about providing additional curbside service, because their yard-debris composting system is beyond capacity. Therefore, the criterion contained in WAC 173-425-040(5)(a)(i) **is not** met for all of Pierce County.
- Snohomish County: Curbside yard waste service is offered to all residents in Snohomish County and there is capacity to accept additional yard waste at the currently permitted compost facilities. Therefore, the criterion contained in WAC 173-425-040(5)(a)(i) **is** met for all areas in Snohomish County.

In summary, the Agency has evaluated the alternatives to residential burning and determined that available and reasonably economical alternatives, as defined by WAC 173-425-040(5)(a)(i), exist in King and Snohomish Counties.

b. ***WAC 173-425-040(5)(a)(ii)*** – Since the criterion in WAC 173-425-040(5)(a)(i) is not met in Kitsap or Pierce Counties, the second prong of WAC 173-425-040(5)(a) must be examined for those counties. The second prong, WAC 173-425-040(5)(a)(ii), contains three separate questions:

- Is the alternative located within a reasonable distance?
- Will the alternative accept the type and volume of organic refuse?
- Is the cost of disposal, less than or equivalent to the median of all county tipping fees in the state for disposal of municipal solid waste?

Because the first prong was met for King and Snohomish counties, the analysis of the second prong does not include either of those counties. For Kitsap and Pierce counties, all three of the above questions must be answered in the affirmative for the second prong to be met. To answer each question, we evaluated disposal methods for residential yard waste in both counties as described below.

- ***Is the alternative located within a reasonable distance?***

WAC 173-425 does not define "reasonable distance" for disposal of residential yard waste nor has Ecology provided guidance on the meaning of this phrase.

The Agency developed an interpretation of "reasonable distance" for residential yard waste through a previous stakeholder process. The suggestions from stakeholders ranged from 10 to 30 miles, and approximately 30 to 60 minutes travel time as a potential substitute for "reasonable distance". For purposes of this analysis, the Agency considers "reasonable distance" for residential yard waste to mean alternatives located within 15 miles or approximately 30 minutes of travel time each way.

- ***Will the alternative accept the type and volume of organic refuse?***

To answer this question, we interviewed representatives from all four county solid waste programs and health districts and compiled a list of existing residential yard waste disposal sites and transfer stations. We then made telephone calls to local facilities that provide recycling services for residential yard waste to determine potential capacity to accept additional debris. The facilities listed in Table 3 accept residential yard waste, and are responsive to this question.

As shown in Table 3, our research identified facilities in and near Kitsap and Pierce counties that recycle residential yard waste into compost or mulch and thus offer an

alternative to the open burning of that waste. (Table 3 includes information on facilities in all four counties; however, the analysis in this section only focuses on Kitsap and Pierce Counties.) Based on this information, we then applied our "reasonable distance" interpretation and determined that all areas outside the current no-burn zones in Kitsap and Pierce counties are served by facilities located within a reasonable distance.

It should also be noted that in addition, we found over 100 businesses in the telephone directory that offer mobile chipping/grinding/hauling services in Kitsap and Pierce Counties. These businesses provide on-site chipping/grinding of residential yard waste and either haul the ground material away, or leave the material on-site for use. These providers offer another alternative to outdoor burning of residential yard waste, in addition to stationary facilities.

- ***Is the cost of disposal, less than or equivalent to the median of all county tipping fees in the state for disposal of municipal solid waste?***

To answer this question, the median of all county tipping fees in the state for disposal of municipal solid waste must be determined. Ecology publishes a list of tipping fees at municipal solid waste (MSW) landfills in Washington. However, the Agency does not recommend relying on this list because it does not include all county tipping fees in the state. Thus, the Agency surveyed county tipping fees throughout the state to determine the county tipping fees for MSW. We obtained data from 34 of the 39 counties, and the results of the Agency survey are shown in Table 2.

Based on this survey, the Agency calculated the statewide median tipping fee for MSW at $73.32 per ton. Thus, alternatives that charge a disposal fee of $73.32 per ton or less would meet the criterion for costing less than or equivalent to the statewide median county tipping fee. All of the facilities in Kitsap and Pierce County that are listed in Table 3 charge less than $73.32 per ton for disposal of residential yard waste.

2. Less Harmful to the Environment (WAC 173-425-040(5)(b))

If alternatives are found to be available and reasonably economical under WAC 173-425-040(5)(a), the next issue is whether the alternatives are less harmful to the environment. With respect to the criterion in WAC 173-425-040(5)(b), all the alternatives to outdoor burning listed in Table 3 recycle the waste by composting it. According to WAC 173-425-040(5)(b), this alternative is less harmful to the environment than outdoor burning. Therefore, this criterion is met with respect to residential yard waste.

3. Conclusions and Recommendations Regarding Residential Burning

Based on the evaluation described above, Agency staff believes that under WAC 173-425-040(5), reasonable alternatives to residential burning exist in all four counties. However, in Kitsap County there are no commercial-size facilities that are capable of receiving residential yard waste. The facilities that handle Kitsap County's yard waste are in Mason County.

Therefore, we recommend prohibiting residential burning in King, Pierce, and Snohomish counties as soon as practical, which we have determined is June 30, 2010. This date is different than that proposed for land-clearing burning because of the need for extensive public outreach with residents of the affected area to effectively implement the proposal. We also recommend the Agency work with Kitsap County to develop a facility in the county to recycle residential yard waste and then expand the no-burn area.

This recommendation is set forth in the proposed new section, Regulation I, Section 8.13.

C. Probable Emission Reductions

I. Land-Clearing Burning Emissions

1. Key Assumptions

a. Land-clearing burning will be the debris disposal method when a land-clearing permit has been issued by the appropriate county land use authority and burning is permitted.

Local fire departments and county fire marshals issue burn permits for land-clearing for a specified duration. Permit holders may burn as necessary, subject to restrictions including burn bans that the fire departments and the Agency may impose. With the exception of Hat Island Fire Department and Anderson Island Fire Department, the fire departments do not track the acreage, number of piles, and frequency of burning. It is difficult to determine how many times a permit holder burned land-clearing debris or if the land-clearing burn permit holder burned at all. Furthermore, no information is available for developers who truck a portion of the debris to landfills and compost facilities, and use some debris for on-site erosion control. For these reasons, the estimates presented here assume that developers burn all the debris cleared in the areas where burning is allowed.

b. The acreages included in land-clearing permits issued by county land use authorities are the basis for estimating the amount of material burned.

In each county the number of land-clearing burn permits the fire departments issued in the areas where the Puget Sound Clean Air Agency regulations allow burning exceeds the number of land-clearing permits the county land use authorities issued in those areas. It appears that multiple fire department permits were issued for the same locations due to renewals, etc. For this reason, the Agency has selected the land-clearing permits as its basis for determining the number of acres cleared and burned.

c. A local estimate of 95 tons/acre reflects the amount of land-clearing debris generated in our four county area.

Local developers hire companies including Rainier Wood Recyclers to chip debris from land-clearing projects. Bob Sargent, the owner of the company, provided an estimated fuel loading on one cleared acre. Based upon their extensive experience, Mr. Sargent estimates one cleared acre generates about 95 tons of debris.[1] The highest Rainier Wood Recyclers have ever encountered is 180 tons per acre, near Snoqualmie, WA. According to Mr. Sargent, this is unusual. The Snoqualmie clearing had very dense and mature second growth forest over very dense, unrotted, old growth stump field with large numbers of partially rotted old growth logs. On the low side, they have seen 30 tons per acre on forested acreage (after the merchantable timber has been removed). Mr. Sargent added that from his chipping business experience, more land-clearing burning occurs in Kitsap County, leading to less chipping business in Kitsap County.

Table 16.4-6 of the Emission Inventory Improvement Project, Volume III, recommends 70 tons per acre for unspecified forest residue for the Pacific Northwest. 95 tons per acre is considered more representative of the Puget Sound area because it is based upon an estimate from a knowledgeable, experienced, local recycling company.

[1] E-mail from Bob Sargent, rwrdsl@nwlink.com, owner of Rainier Wood Recyclers, to Amy Fowler, PSCAA, February 26, 2004.

2. Estimating Equation

Emissions = tons of debris burned × pounds per ton burned

3. Activity Levels

The generic equation used to estimate tons of land-clearing debris burned is:

Tons burned = (acres cleared in burn areas) × (95 tons per acre cleared)

4. Emission Factors

The EPA emission factors for this category are shown below.

Pollutant	Lbs/Ton	Reference
Carbon Monoxide (CO)	185.4	EIIP, Vol III, Table 16.4-2 (Ward, 1989, Pile)
Nitrogen Oxides (NOx)	2.6	Fireplaces, AP-42, Table 1.9-1
Fine Particulate Matter ($PM_{2.5}$)	23.4	EIIP, Vol III, Table 16.4-2 (Ward, 1989, Pile)
Sulfur Oxides (Sox)	0.4	Fireplaces, AP-42, Table 1.9-1
Volatile Organic Compounds (VOC)	15.2	EIIP, Vol III, Table 16.4-2 (Ward, 1989, Pile)
Carbon Dioxide (CO_2)	3,143	EIIP, Vol III, Table 16.4-2 (Ward, 1989, Pile)
Methane (CH_4)	21.72	EIIP, Vol III, Table 16.4-2 (Ward, 1989, Pile)
Nitrous Oxide(N_2O)	0.46	Forest Wildfires, AP-42, Table 13.1-5

5. Land-Clearing Permits – estimating acreage and tonnage

The table below shows the various authorities that issue land-clearing permits in the four-county jurisdiction.

County	Issuing Authority in County
King	Department of Development & Environmental Services (DDES)
Kitsap	Kitsap County Community Development (KCCD)
Pierce	Pierce County Planning and Land Services (PALS)
Snohomish	Snohomish County Planning & Development Services (PDS)

Kitsap County issues two types of land-clearing permits: commercial development and single-family development. Pierce County issues residential site development permits, grading permits, clearing permits, forest practice permits, and commercial development permits. King and Snohomish Counties issue permits for vegetative removal, land-clearing, and site development.

2005 Land-Clearing Permits Issued in Burn Zones

Description of No-Burn Area Permits	# of Permits	Total Acreage	Avg. Acres/ Permit
King County land-clearing permits	197	205	1.04
Kitsap County commercial development permits	42	227	5.42
Kitsap County single-family development permits	451	1,025	2.27
All Kitsap County development permits	493	1,252	2.54 (weighted)
Pierce County commercial development permits	23	not available	5.42 (Kitsap assumed)
Pierce County residential development permits	241	not available	2.27 (Kitsap assumed)
All Pierce County development permits	264	not available	2.54 (weighted)
Snohomish County site development permits	57	684	12.0

For King, Kitsap, and Snohomish counties, land-clearing permits state the number of acres cleared. The average acreage for Snohomish County land-clearing permits is substantially higher than the other counties. Snohomish County issued only 57 permits in the burn areas averaging 12 acres each, King County issued 197 permits averaging 1 acre each, Kitsap County issued 493 permits averaging 2.5 acres each, and Pierce issued 264 permits. Snohomish County probably classifies its permits differently from the other counties, leading to substantially fewer permits issued but an average Snohomish County permit having a much larger acreage than the other county land-clearing permits.

Pierce County land-clearing permits do not state the acreage cleared. For this analysis, the Agency assumed Kitsap County average acres per permit for Pierce County because Pierce County fire departments located close to South Kitsap County issued 248 burn permits out of the 263 land-clearing burn permits issued in Pierce County.

Land-Clearing Permits and Tons of Debris Burned in the Burn Areas (without PC FD #23) in 2005

County	# of Permits	Avg Acres/ Permit	Acreage Burned	Tons Burned at 95 tons per acre
King	197	1.04	205	19,464
Kitsap	493	2.54	1,252	118,961
Pierce	264	2.54	672	63,800
Snohomish	57	12.00	684	64,980

Based on conversation with a local wood recycler (Mr. Bob Sargent, the owner of Rainier Wood Recyclers), there is likely less wood chipping business in Kitsap County (than in the other three counties). This may explain why the estimate for burning in Kitsap County is considerably more than the other three counties.

One fire department, Pierce County Fire Department #23 (PC FD #23), provided burn permit data in cubic yards (instead of acres). The table below presents the tons debris burned in the permits issued by PC FD #23.

Tons of Debris Pile Burned with Permit Issued by PC FD #23 in 2005

Description of Parameter	Source of Data
218, 717 cubic yards burned	Ashford FD (PC FD #23)
5,905,359 cubic feet burned	conversion factor
20% packing ratio (or porosity of pile)	Mark Gray, WA DNR, msrk.gray@dnr.wa.gov
28.1 lb/ft^3 density of wood (normally burned in piles)	Mark Gray, WA DNR, msrk.gray@dnr.wa.gov
16,594 tons burned (piles permitted by PCFD #23)	(cubic feet)(packing ratio)(density)/2000

Adding in the tonnage for PC FD #23 yields the total estimate for the 4-county region provided in the table below.

Total Tons of Land-Clearing Debris Burned with Permits in 2005

County	Tons of Land-Clearing Debris Burned
King	19,464
Kitsap	118,691
Pierce	80,408
Snohomish	64,980

6. Summary of Land-Clearing Burning Emissions

Using the emission factors shown in Section 4 and the estimated tonnage, yields the total estimated emissions shown in the table below for the area. This inventory includes the carbon dioxide emissions from land-clearing, as the land cleared and developed does re-grow the vegetative matter (and then absorb carbon dioxide)[2].

The last column in the table below, CO_2 Equivalents, includes the greenhouse gases carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_20).[3]

2005 Tons of Pollutant Emitted from Land-Clearing Debris Burning

	CO	NOx	$PM_{2.5}$	SOx	VOC	CO_2 Eqv.
King	1,804	39	228	6	148	36,418
Kitsap	11,028	238	1,392	37	904	222,583
Pierce	7,454	161	941	25	611	150,449
Snohomish	6,024	130	760	20	494	121,581
Region	26,309	568	3,321	89	2,157	531,031

II. Residential Burning Emissions

1. Key Assumptions

a. **Rural households dispose of yard waste not collected at the curb by burning, self-hauling to transfer stations or drop boxes, composting, or dumping**.

Waste management companies provide curbside pick-up in some rural areas in all four counties. The counties also provide drop box services and transfer stations where households can self-haul their yard waste. Some households compost in their backyards; others pile up yard waste to rot in their backyards and leave grass clippings on the lawns. A few others dump the waste in ravines and remote areas. The remainder, who do not have curbside pick-up, self-hauls, composts, dumps, or burns their yard waste with or without permits.

b. **The Agency assumes households that do not subscribe to curbside services generate waste at the same rate as subscribers**.

The Agency does not have data about the households that do not subscribe to curbside pick-up and assumes subscriber and non-subscriber households have similar waste generation characteristics.

c. **Only households in single-family units, mobile homes, duplexes, triplexes, and four-plexes are eligible for curbside pick-up**.

Households in apartment complexes and condominiums do not burn yard waste because property managers or commercial landscapers take care of the yards and properly dispose of the yard waste. Waste management companies and county waste management departments classify housing units containing less than five units as eligible for curbside

[2]Page 3-63, Section 3.12, Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2004; revised 1996 IPCC Guidelines for National Greenhouse Inventories: Reference Manual, pages 1.3 and 1.10.

[3]EPA. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005. EPA 430-R-07-002. April 2007. Table ES-1 (page ES-3) provides the weighting: $1*C0_2 + 21*CH_4 + 310*N_20$.

pick-up. Many rural single-family homes, motor homes, trailer homes, and 2- to 4-unit homes subscribe to curbside pick-up. The maximum possible number of subscribers is the number of households not exceeding 4 units.

d. The survey conducted by the Bellwether Group is applicable to the rural areas.

The survey conducted by the Bellwether group in December 2006 asked rural households about their waste disposal methods.[4] The Agency assumes the responses relevant to yard-waste disposal are applicable to the households that burn.

The estimates are based on information provided by county waste departments and the responses to a yard-waste disposal question in the Bellwether survey. The survey covered 22 small towns and unincorporated areas. The purpose of the survey was to provide benchmarks for the Agency in advance of a public education campaign about household waste disposal practices, alternatives to burning household wastes, and awareness of burning restrictions and general air quality issues.

The Bellwether survey covered rural areas and small cities. The surveyed areas are:

King:	Kitsap:	Pierce:	Snohomish:
E. Kent	Kingston	Carbonado	Granite Falls
Maple Valley	Poulsbo	Roy	Lake Stevens
Enumclaw		Eatonville	Gold Bar
Covington		Orting	Sultan
E. Woodinville		Buckley	Stanwood
Black Diamond		Wilkeson	Darrington
Skykomish		South Prairie	

The survey asked several questions about waste disposal. One question asked: "When you have yard debris, how do you dispose of it?" The table below presents relevant extracts of the results for yard-debris disposal from the Bellwether survey, (Banner 1, Table 12-1).

Characteristics of Rural Households Yard Waste Disposal

	King	Kitsap	Pierce	Snohomish
Number of respondents	213	73	105	182
Percent that burn openly, a	16.4%	12.3%	16.2%	19.8%
Percent that burn in barrels, b	0.9%	1.4%	2.9%	2.2%
Percent that burn, (a + b)	17.3%	13.7%	19.1%	22.0%

2. Demographic Data

Single-family homes, duplexes, triplexes, fourplexes, and mobile homes are eligible to subscribe to curbside pick-up. According to the data provided by the county waste management departments, housing with more than four units do not subscribe to curbside pick-up, since yard maintenance service is part of their rent or condominium fees.

[4]Four-County Outdoor Burning Behavioral and Attitudinal Phone Survey, developed and completed for the Puget Sound Clean Air Agency by The Bellwether Group, 506 2nd Ave, #3000, Seattle, WA 98104, (206) 583-0333, www.thebellwethergroup.net.

Housing Units and Households Eligible for Curbside Pick-up in Unincorporated Areas

Description	King	Kitsap	Pierce	Snohomish
1-unit	109,396	49,390	96,150	90,537
2-unit	1,094	1,235	1,762	1,877
3- or 4-unit	2,188	1,351	2,491	2,537
Mobile homes	7,523	9,524	21,503	13,922
All eligible units	120,201	61,500	121,906	108,909
Eligible households	115,153	57,380	114,713	103,681

3. Activity Levels

Each county compiles its waste management data differently, so each county's estimates are presented separately. The methodology divides each county into sub-areas compatible with the format the county uses to collect waste management data. The generic equation used to estimate amount burned in a sub-county area is as follows:

Tons burned = (number of household that potentially burned) × (tons burned/household)
Tons emitted = [(tons burned) × (pounds/ton burned)] ÷ 2000

Yard Waste Burning Characteristics in Rural Puget Sound Households, 2005

Description	Source	King	Kitsap	Pierce	Snohomish
Households eligible for curbside pick-up	(a)	115,153	57,380	114,713	103,681
% of households that burn yard waste	(b)	17.3%	13.7%	19.1%	22.0%
# of households that burn yard waste	(c)	19,921	7,861	21,910	22,810
Lbs generated per subscribing household	(d)	1,560	1,560	875	1,242
Lbs burned per non-subscribing household	(e)	1,560	1,560	875	1,242
Tons burned	(f)	15,539	6,132	9,756	14,168

(a) Data from previous table
(b) Data from Bellwether Survey
(c) = (a) x (b)
(d) Data from County Waste Management
(e) Data from County Waste Management
(f) = (e) x (c)

This is an overestimate because the estimates assume burners burn all their yard wastes. The Bellwether survey asked about composting, self-haul, and dumping, but did not ask about households that use other disposal methods and then burn.

4. Residential Burning Emission Factors

EPA Emission Factors for Residential Burning (lbs/ton)

Description	CO	NOx	$PM_{2.5}$	SOx	VOC	CH_4	N_2O	CO_2 Eqv
lbs/ton	112	4	38	0.625	28	12	0.46	395

5. Residential Burning Emissions

Applying the emission factors to the tons burned leads to the following emission calculations:

Tons of Emissions from Residential Burning

Tons	CO	NOx	$PM_{2.5}$	SOx	VOC	CO_2 Eqv
King	870	31	295	5	218	3,066
Kitsap	343	12	117	2	86	1,210
Pierce	546	20	185	3	137	1,925
Snohomish	793	28	269	4	198	2,795
Region	2,553	91	866	14	638	8,996

D. Differences Between Proposed Regulation and State/Federal Law

There are no known conflicts between the proposed revisions and the state or federal air pollution control statutes.

E. Coordination with Federal, State, and Other Local Agencies

The Agency will coordinate with county solid waste agencies, fire protection agencies, and health districts to conduct public outreach before the proposal becomes effective.

F. Regulation Implementation Plan

	Date
CR-102 Form Filed with State Code Reviser	January 22, 2008
PSCAA Board Hearing	February 28, 2008
CR-103 Form to State Code Reviser	March 3, 2008
Revised Regulation Effective Date	June 30, 2008

Table 1: Land-Clearing Waste Disposal Sites and Transfer Stations

County	Cost	Unit	Cost <Median Tipping Fee for MSW?
King County			
All Wood Recycling	$ 12.00	y^3	Yes
Cedar Falls Drop Box	$ 75.00	ton	No
Cedar Grove Composting	$ 42.00	ton	Yes
Enumclaw Transfer	$ 75.00	ton	No
Fruhling Sand and Topsoils	$ 100.00	ton	No
Lloyd Enterprises	$ 35.00	ton	Yes
Pacific Topsoils – Bellevue	$ 13.50	y^3	Yes
Pacific Topsoils – Kenmore	$ 13.50	y^3	Yes
Pacific Topsoils – Issaquah	$ 13.50	y^3	Yes
Pacific Topsoils – Northgate	$ 13.50	y^3	Yes
Pacific Topsoils – Tukwila	$ 13.50	y^3	Yes
Pacific Topsoils – Maple Valley	$ 13.50	y^3	Yes
Pacific Topsoils – Redmond	$ 13.50	y^3	Yes
Rainier Wood – Auburn	$ 5.50	y^3	Yes
Rainier Wood –Covington	$ 5.50	y^3	Yes
Rainier Wood – Fall City	$ 5.50	y^3	Yes
Squak Mountain Materials	$ 7.00	y^3	Yes
Sunset Materials, Inc – Issaquah	$ 12.00	y^3	Yes
Sunset Materials, Inc – Maple Valley	$ 12.00	y^3	Yes
Zellerhoff Construction	$ 100.00	ton	No
Pierce County			
A & J Development Recycling	$ 35.00	ton	Yes
LRI – Hidden Valley	$ 35.00	ton	Yes
Holroyd Concrete Recycling	$ 45.00	ton	Yes
LRI – Purdy	$ 35.00	ton	Yes
LRI – Sales Road	$ 42.50	ton	Yes
Purdy Topsoils	$ 35.00	ton	Yes
Randles Sand and Gravel	$ 35.00	ton	Yes
Recovery 1	$ 30.00	ton	Yes
Silver Springs Organics (Tenino)	$ 38.00	ton	Yes
Kitsap County			
A & L Topsoil – Poulsbo	$ 10.00	y^3	Yes
Allen Shearer Trucking & Landscape	$ 12.50	ton	Yes
EMU Topsoil – Hansville	$ 12.00	y^3	Yes
Morrison Sand & Gravel	$ 20.00	ton	Yes
North Mason Fibers (Mason County)	end dump $ 50 dump truck $ 25	load	Yes
Peninsula Topsoils (Mason County)	end dump $ 100 dump truck $ 40	load	Yes
The Soil Factory	$ 15.00	y^3	Yes
Tucker's Topsoil	$ 12.00	y^3	Yes

Table 1 (con't): Land-Clearing Waste Disposal Sites and Transfer Stations

County	Cost	Unit	Cost <Median Tipping Fee for MSW?
Snohomish County			
Airport Road R&T	$ 89.00	ton	No
Bobby Wolford Trucking & Demolition	$ 15.00	y^3	Yes
Cedar Grove Composting – Everett	$ 42.00	ton	Yes
Dubuque Road Drop Box	$ 13.71	y^3	Yes
Everett Fuel & Lumber Distributors, Inc	$ 15.00	y^3	Yes
F A Koenig & Sons	$ 5.00	y^3	Yes
Gold Bar Drop Box	$ 13.71	y^3	Yes
Granite Falls Drop Box	$ 13.71	y^3	Yes
Lenz Enterprises	$ 9.00	y^3	Yes
North County R&T Station	$ 89.00	ton	No
Oso Drop Box	$ 13.71	y^3	Yes
Pacific Topsoils – Maltby	$ 13.25	y^3	Yes
Pacific Topsoils – Everett	$ 13.25	y^3	Yes
Riverside Topsoils	$ 12.50	y^3	Yes
Southwest R&T	$ 89.00	ton	No
Mobile Chippers Only			
Topsoils, Inc, Snohomish			
Dick's Chipping Service, Bothell			
Goodnight Construction, Monroe			

For the purpose of this analysis, $3y^3$ is equivalent to one ton of organic waste.

Table 2: 2006 County Tipping Fees for MSW

County	Facility Name	$ per Ton
Adams	Ritzville Transfer Station	$ 65.00
Asotin	Asotin County MSW Landfill	$ 35.00
Benton	BDI	$ 55.00
Chelan	Wenatchee Transfer Station	$ 15.88
Clallam	Regional Transfer Station	$ 97.00
Clark	Central Transfer Center	$ 80.00
Columbia	County Transfer Station	$ 94.00
Cowlitz	Cowlitz – B	$ 37.30
Douglas	Greater Wenatchee Landfill	$ 45.60
Ferry	County Transfer Stations	$ 122.00
Franklin	Richland	$ 61.33
Garfield	County Transfer Stations	$ 24.75
Grant	Ephrata Landfill	$ 26.85
Grays Harbor	Central Transfer Station	$ 35.00
Island	Coupeville Transfer Station	$ 130.00
Jefferson	County Transfer Station	$ 114.00
King	Cedar Hills Landfill	$ 82.50
Kitsap	Olympic View Landfill	$ 62.02
Kittitas	Transfer Station	$ 72.64
Klickitat	Roosevelt Regional Landfill – MS	$ 22.00
Lewis	County Transfer Stations	$ 84.95
Okanogan	County Transfer Stations	$ 74.00
Pierce	304th Street Landfill (LRI)	$ 93.40
San Juan	Waste Management	$ 260.00
Skagit	County Recycling	$ 83.00
Skamania	Transfer Station	$ 150.00
Snohomish	County Transfer Stations	$ 89.00
Spokane	Regional Solid Waste Facilities	$ 98.00
Stevens	Regional Transfer Stations	$ 68.00
Thurston	County Waste Center	$ 72.46
Wahkiakum	K&M Drop Box	$ 140.00
Walla Walla	County Landfill	$ 47.46
Whitman	County Landfill	$ 95.00
Yakima	Landfill	$ 24.05
	Median	$ 73.32

Table 3: Residential Yard-Waste Disposal Sites and Transfer Stations

County	Cost	Unit	Cost <Median Tipping Fee for MSW?
Pierce County			
Anderson Island Transfer Station	no charge		Yes
Key Center Transfer Station	no charge		Yes
LRI – Hidden Valley	$ 35.00	ton	Yes
LRI – Purdy	$ 35.00	ton	Yes
LRI – Sales Road	$ 35.00	ton	Yes
Prairie Ridge Transfer Station	no charge		Yes
Purdy Topsoils	$ 35.00	ton	Yes
Purdy Transfer Station	no charge		Yes
Randles Sand and Gravel	$ 35.00	ton	Yes
Silver Springs Organics (Tenino)	$ 38.00	ton	Yes
Tacoma Landfill	no charge		Yes
Kitsap County			
A & L Topsoil – Poulsbo	$ 10.00	y^3	Yes
Allen Shearer Trucking & Landscape	$ 12.50	ton	Yes
EMU Topsoil – Hansville	$ 12.00	y^3	Yes
Hansville Recycling & Garbage Facility	$ 51.73	ton	Yes
Morrison Sand & Gravel	$ 20.00	ton	Yes
North Mason Fibers (Mason County)	end dump $ 50 dump truck $ 25	load	Yes
Olalla Recycling and Garbage Facility	$ 51.73	ton	Yes
Olympic View Transfer Station	$ 51.73	ton	Yes
Peninsula Topsoils (Mason County)	end dump $ 100 dump truck $ 40	load	Yes
Silverdale Recycling & Garbage Facility	$ 51.73	ton	Yes
The Soil Factory	$ 15.00	y^3	Yes
Tucker's Topsoil	$ 12.00	y^3	Yes

Table 3 (con't): Residential Yard-Waste Disposal Sites and Transfer Stations

County	Cost	Unit	Cost <Median Tipping Fee for MSW?
Snohomish County			
Airport Road R&T	$ 89.00	ton	No
Bailey's Compost	$ 12.00	y^3	Yes
Bobby Wolford Trucking & Demolition	$ 15.00	ton	Yes
Cedar Grove Composting – Everett	$ 42.00	ton	Yes
Dubuque Road Drop Box	$ 13.71	y^3	Yes
Everett Fuel & Lumber Distributors, Inc	$ 15.00	y^3	Yes
F A Koenig & Sons	$ 9.00	y^3	Yes
Gold Bar Drop Box	$ 13.71	y^3	Yes
Granite Falls Drop Box	$ 13.71	y^3	Yes
Lenz Enterprises	$ 9.00	y^3	Yes
Lord Hill Farms	$ 7.00	y^3	Yes
North County R&T Station	$ 89.00	ton	No
Oso Drop Box	$ 13.71	y^3	Yes
Pacific Topsoils – Maltby	$ 13.25	y^3	Yes
Pacific Topsoils – Everett	$ 13.25	y^3	Yes
Riverside Topsoils	$ 12.50	y^3	Yes
Southwest R&T	$ 89.00	ton	No
King County			
All Wood Recycling	$ 12.00	y^3	Yes
Cedar Falls Drop Box	$ 75.00	ton	No
Cedar Grove Composting	$ 42.00	ton	Yes
Enumclaw Transfer	$ 75.00	ton	No
Fruhling Sand and Topsoils	$ 100.00	ton	No
Lloyd Enterprises	$ 35.00	ton	Yes
Pacific Topsoils – Bellevue	$ 13.50	y^3	Yes
Pacific Topsoils – Kenmore	$ 13.50	y^3	Yes
Pacific Topsoils – Issaquah	$ 13.50	y^3	Yes
Pacific Topsoils – Northgate	$ 13.50	y^3	Yes
Pacific Topsoils – Tukwila	$ 13.50	y^3	Yes
Pacific Topsoils – Maple Valley	$ 13.50	y^3	Yes
Pacific Topsoils – Redmond	$ 13.50	y^3	Yes
Rainier Wood – Auburn	$ 5.50	y^3	Yes
Rainier Wood – Covington	$ 5.50	y^3	Yes
Rainier Wood – Fall City	$ 5.50	y^3	Yes
Seattle – North Transfer Station	$ 55.00	ton	Yes
Seattle – South Transfer Station	$ 55.00	ton	Yes
Sunset Materials, Inc – Issaquah	$ 12.00	y^3	Yes
Sunset Materials, Inc – Maple Valley	$ 12.00	y^3	Yes

For the purpose of this analysis, $3y^3$ is equivalent to one ton of organic waste.