Appendix A.1

Emissions Inventory Preparation and Quality Assurance Plan for the Wallula PM_{10} Second 10-Year Maintenance Plan

FINAL

Washington State Department of Ecology
Air Quality Program

December 20, 2017

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ABBREVIATIONS

BCAA	Benton Clean Air Agency
Ecology	Washington State Department of Ecology
EI	emissions inventory
EPA	Environmental Protection Agency
IPP	inventory preparation plan
MA	maintenance area
NEI	National Emissions Inventory
NOMAD	EPA Nonpoint Methods Advisory Committee
NW-AIRQUEST	Northwest International Air Quality Environmental Science and Technology Consortium
PM_{10}	particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
PTE	potential to emit
QA	quality assurance
QC	quality control
tpy	tons per year
ug/m^3	micrograms per cubic meter
USDA	United States Department of Agriculture
VMT	vehicle miles traveled
WSDA	Washington State Department of Agriculture
WSDOT	Washington State Department of Transportation
WRAP	Western Regional Air Partnership

1 Introduction

This is the Emissions Inventory Preparation and Quality Assurance Plan (IPP) for the second 10-year maintenance plan for the 24-hour PM_{10} National Ambient Air Quality Standard (NAAQS) in Wallula, WA. The first 10-year maintenance plan was submitted to the Environmental Protection Agency (EPA) in March 2005. It included a 2002 base year inventory and an inventory projection to 2015. EPA approved the maintenance plan on August 2005 (70 FR 50212). The second 10-year maintenance plan was due in September 2015. This IPP outlines the procedures and data sources that will be used to develop the second 10-year maintenance plan inventories.

1.1 Inventory Types and Years

Four emissions inventories (EIs) will be developed: a base year inventory (2014), a mid-term projection inventory (2020), and two final projection year inventories (2025, 2030). While 2025 is the anticipated final year of the maintenance plan, the 2030 projection will be prepared in the event of a delay in plan approval. The base year is the most recent year of the National Emissions Inventory (NEI) and is an inventory of actual emissions. The projection year inventories will include all the sources inventoried for the base year. The projections will be based on future activity levels and effects of current and future controls. The base year and projected year inventories will include annual and seasonal weekday emissions.

1.2 Responsibility

The inventory process will be a cooperative effort between Washington State Department of Ecology (Ecology) and the Benton Clean Air Agency (BCAA).

- **Ecology** will inventory all sources in the maintenance area (MA) except for point sources in Benton County. Ecology will write the inventory preparation and quality assurance plan, carry out the tasks in the quality assurance plan, and write the final inventory documentation.
- **BCAA** will provide point source emissions estimates and locations and assist Ecology in identifying nonpoint emissions sources in the Benton County portion of the MA. BCAA will review the IPP and final emissions estimates documents.

1.3 Schedule

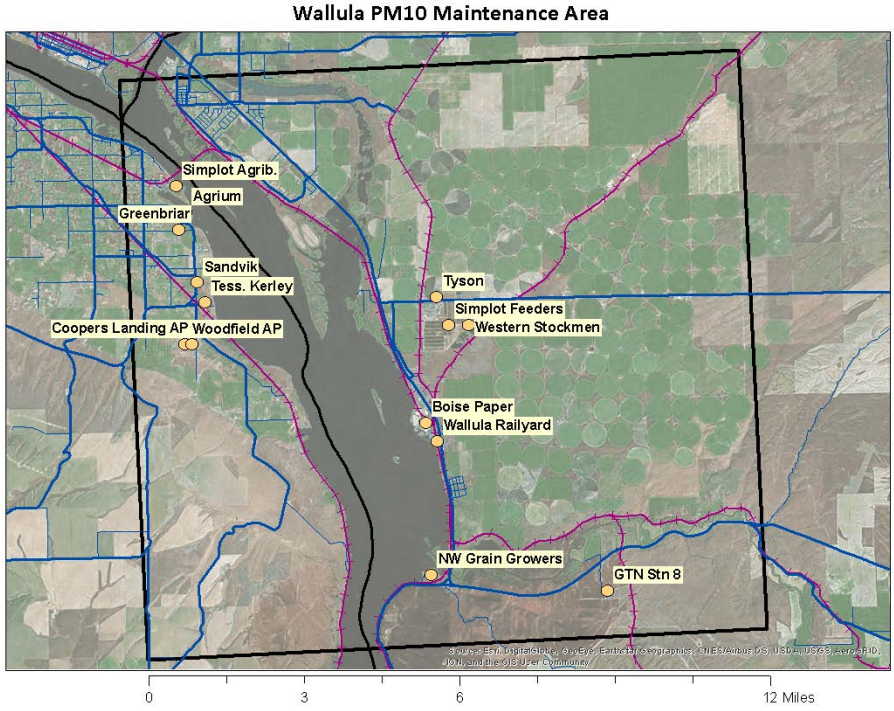
This is the schedule for submitting the draft and final IPP and Emissions Inventory to EPA.

Item	Date
Draft IPP	August or September 2017
Final IPP	December 2017
Draft Emissions Inventory	end of January 2018
Final Emissions Inventory	end of February 2018

2 Geographic Area

The MA is a square-shaped area of approximately 144 square miles encompassing portions of Walla Walla and Benton Counties, and a very small portion of Franklin County. The boundaries were defined using Universal Transverse Mercator Coordinates (zone 11). In meters, the southwest corner coordinates are (342500, 5099975) and the northeast corner coordinates are (362500, 5118600).

The MA is a rural, primarily agricultural area with grain and row crops, poplar plantations, and a large cattle feedlot. There is a pulp mill and several smaller commercial/industrial sources. There are public roads, rail lines, and marine traffic. Population is estimated at 5,700.



3 Season Determination

The PM_{10} season (June through September) from the Serious attainment plan was retained in the first 10-year maintenance plan. The season was based on concentrations measured during 1996 - 2000. For the second 10-year plan, the season will be re-evaluated using concentrations measured at the Kennewick-Metaline monitoring site from 2012 - 2016.

Table 3-1 shows the 30 highest concentrations from 2012 - 2016. The exceedances (> 150 $\mu g/m^3$) and most other high concentration events were associated with high winds. The data also show that the percentage of coarse mass was greater than 84% for all but 4 days. Extreme wildfire smoke was monitored during the four days when the coarse mass was less than 84%. This indicates that wind-blown dust sources dominated the high concentration days.

Table 3-1 Kennewick-Metaline 30 Highest PM_{10} Concentrations in ug/m^3: 2012 - 2016

PM_{10}	$NPM_{2.5}$	Max. Wind Speed (mph)	Coarse Mass	Date	Notes
619	6	38	99%	11/2/2013	
589	14.9	28.6	97%	8/14/2015	
331	2.3	32.8	99%	11/17/2015	
222	7.5	20.4	97%	10/28/2013	
215	2.4	31	99%	1/11/2014	
208	3	29.5	99%	10/30/2015	
130	12.4	NA	90%	8/12/2014	
113	3.2	21.9	97%	9/20/2015	
112	10	20.8	91%	9/9/2012	
104	3.3	26	97%	3/19/2014	
103	3	29.4	97%	1/13/2014	
98	5	NA	95%	6/12/2014	
92	5.2	24.3	94%	10/7/2013	
91	5	23	95%	10/10/2015	
89	2.1	27.6	98%	2/25/2012	
87	6.8	NA	92%	7/23/2014	
83	2.1	33.3	97%	4/7/2013	
82	45.7	8.6	44%	8/24/2015	wildfire
76	35	7.5	54%	9/21/2012	wildfire
72	3.8	24.2	95%	4/27/2013	
72	9.4	20.2	87%	7/10/2015	
71	4.9	20.2	93%	8/2/2016	
71	6.1	15.8	91%	8/27/2016	
69	5.7	11.1	92%	8/19/2016	
68	30.4	4.9	55%	9/20/2012	wildfire
68	5.6	13.6	92%	3/1/2014	
67	3.2	29.2	95%	4/10/2013	
67	35.8	6.4	47%	8/22/2015	wildfire
66	10.4	19.8	84%	9/18/2014	
66	9.5	15.3	86%	10/2/2015	

Monthly median, mean, 3rd quartile, and max concentrations are shown in Table 3-2. The statistics were calculated both with and without exceedance days (top) and also without high wind events (bottom). Using the median, mean, and 3rd quartile, higher values generally occur May - October. However, exceedances are associated with high wind events. High wind events are not considered in this inventory; they are addressed in the Natural Events Action Plan and Exceptional Events Rule requirements. Focusing on the days without high winds, higher values generally occur July - October.

Table 3-2 Kennewick-Metaline Monthly PM_{10} Concentrations in ug/m^3: 2012 - 2016

	With Exceedances				Without Exceedances			
Month	Median	Mean	3rd Quartile	Max	Median	Mean	3rd Quartile	Max
1	7	9.834	10	215	7	8.41	10	103
2	9	11.39	12	89	9	11.39	12	89
3	10	13.91	16	104	10	13.91	16	104
4	12	15.41	18	83	12	15.41	18	83
5	17	17.83	23	63	17	17.83	23	63
6	15	18.12	22	98	15	18.12	22	98
7	20.5	22.91	27	87	20.5	22.91	27	87
8	25	34.13	36	589	25	29.86	35	130
9	21.5	27.66	31.25	226	21	26.23	31	113
10	14	20.79	24	222	14	18.22	24	92
11	10	17.76	14.25	619	10	11.49	14	33
12	7	8.687	10	34	7	8.687	10	34

	When Max Hourly Wind <25 mph				When Max Hourly Wind <18 mph			
Month	Median	Mean	3rd Quartile	Max	Median	Mean	3rd Quartile	Max
1	7	7.421	10	19	7	7.59	10	19
2	9	10.23	12	64	9	9.62	12	27
3	10	12.22	15	68	10	12.35	15	68
4	12	14.49	18	72	12	13.26	17	37
5	16	17.33	23	39	15	16.94	22.5	38
6	16	18.33	23	60	16	17.01	22	41
7	20	22.09	27	72	19	20.65	26	60
8	27.5	32.72	41.25	82	27	32.19	41	82
9	22	27.07	32	113	21	25.55	32	76
10	14	19.28	24	222	14.5	17.44	23.75	66
11	10	11.41	14	33	10.5	12.03	15	33
12	7	8.789	10	34	7	8.963	10	30

Agricultural dust is a major and variable source of emissions in the maintenance area. Agricultural dust emissions will be estimated by month and compared to the monitored concentrations at Kennewick. The PM10 season will be determined based on the months with the highest concentrations and emissions. It is expected that these conditions will occur in the summer and early fall months.

4 Base Year 2014 Inventory Development

The base year inventory is an inventory of actual emissions in 2014. A list of potential PM_{10} source categories was developed for prior Wallula attainment and maintenance plan inventories. The list was compared to the 2014 Ecology inventory and the 2014 National Emissions Inventory. The lists were merged and a new list of potential source categories was developed. Because the MA is predominantly an agricultural area, many of the sources on the list are not present or have only minimal activity.

The source categories are listed in the appendix and are flagged as to whether or not they will be included in the inventory. Category selection was based on past inventories, local knowledge of the MA, and the Ecology and NEI 2014 inventories for Benton and Walla Walla counties. The sources included are shown in Table 4-1. All source categories inventoried in the first 10-year maintenance plan are included. Dust emissions from two new categories, construction activities and agricultural harvesting, will be included. While wildfire emissions can impact the MA, they will not be included since they are unpredictable and uncontrollable. Windblown dust will not be included. Windblown dust events are addressed through the Natural Events Action Plan and Exceptional Events Rule requirements.

Table 4-1 Inventory Source List

Point Sources		**Nonpoint Sources**
Point Sources ≥ 70 T PTE		Agricultural Tilling
Point Sources < 70 T PTE		Agricultural Harvesting
		Construction Dust
Mobile Sources		Paved and Unpaved Road Dust
Onroad Mobile		Agricultural Field Burning

The anticipated emissions estimation methods and data sources for each source category are described below.

4.1 Point Sources ≥ 70 (tpy) Potential to Emit

For Serious nonattainment areas, the federal Clean Air Act defines point sources as any stationary source having the potential to emit 70 tons per year of PM_{10} (≥ 70 tpy PTE). This point source cutoff value was retained for the first 10-year maintenance plan, and will be retained for the second 10-year plan.

Benton Clean Air Agency (BCAA) and Ecology point source permitting records show that Boise Cascade and Simplot Feeders are the only sources with a PTE of 70 tpy PM_{10}.

Boise Cascade is a federal Title V source and is required to report emissions annually. The 2014 annual emissions report will be used to develop the base year point source inventory.

Simplot Feeders is a cattle feedlot. It is not a federal Title V source, but it is required to report emissions annually. In 2016, Ecology conducted a literature search to update emission factors for beef cattle feedlots. Ecology recommended the PM_{10} emission factor from a study done by Bonifacio, et al. (2012).[1] In a separate effort, EPA sponsored development of a spreadsheet tool to estimate PM_{10} emissions from beef feedlots and other livestock types.[2] EPA also chose the PM_{10} emission factor from Bonifacio, et al. (2012) for the tool. The tool was developed under the 2014 NEI process, and emissions will be included in version 2 of the NEI (scheduled for release by the end of 2017). Ecology adjusted the factor downward to reflect feedlot pen emissions only, which excludes unpaved road dust emissions. Use of the new emission factor results in higher emissions than those reported by Simplot Feeders in their 2014 inventory. Ecology will use the new emission factor with Simplot Feeders' 2014 cattle activity to estimate 2014 emissions.

4.2 Point Sources < 70 tpy Potential to Emit

BCAA and Ecology permit stationary emissions sources in Benton and Franklin/Walla Walla Counties, respectively. Though they fall below the point source cutoff of 70 tons PTE, all permitted sources emitting PM_{10} will be included in the inventory. Several sources are not inventoried annually. For those, the nearest year to 2014 will be used. The facilities and their year of emissions are shown below.

Table 4-2 Point Sources < 70 T Potential to Emit

Facility	Permitting Agency	Inventoried Annually?	Year
Agrium US Inc	BCAA	yes	2014
Gas Transmission Northwest Station 8	Ecology	yes	2014
Greenbriar Rail Services	BCAA	yes	2014
NW Grain Growers	Ecology	no	2015
Sandvik Special Metals LLC	BCAA	yes	2014
Simplot Agribusiness	BCAA	yes	2014
Tessenderlo Kerley Inc	BCAA	yes	2014
Tyson	Ecology	no	2014
Western Stockmen	Ecology	no	2015

4.3 Nonpoint Sources - General Information

Nonpoint sources include a variety of sources such as road and agricultural dust. Emissions are typically estimated by multiplying an activity level by an emission factor in mass per activity.

The 2014 Ecology inventory, which was submitted to EPA for inclusion in the 2014 NEI, will be used for the base year annual inventory, except as noted in the category sections below. For some sources this will require allocating county emissions to the MA using spatial surrogates (see

Section 5). A brief description of the estimation methods and data sources used in the 2014 inventory are provided in category sections below.

4.4 Agricultural Burning

All agricultural burning in Washington requires a permit by law, but compliance is not 100%. Ecology compiled burn permit information for the 2014 inventory. Additionally, satellite-detected hot-spot data for agricultural land was obtained from EPA. The burn data for agricultural land from EPA was checked for errors (e.g. incorrect fire type, size, or crop) and then spatiotemporally cross-checked against the permit data for redundancy. Both datasets were then aggregated together. The burn permit and satellite detected locations will be mapped using GIS tools to select the burns that occurred in the MA.

Emissions were calculated for each burn in the 2014 inventory. Emissions are dependent on the number of acres (or tons) burned, pre-burn fuel loading, fuel consumption, and PM_{10} emission rates. The 2014 permits included either acres burned and a fuel loading factor, or tons of residue burned in piles. EPA default fuel loadings were used for satellite-detected burns. Combustion completeness factors (fraction of fuel actually consumed) and PM_{10} emission rates for cereal grains were taken from an Air Sciences Incorporated report. [3] Emission rates for other crop types were taken from EPA's AP42 for total particulate. For all AP42 factors, PM_{10} was estimated from total particulate using size fraction profiles from the California Air Resources Board.[4]

4.5 Agricultural Tilling

EPA provided an equation to calculate county agricultural tilling emissions in the 2014 NEI. The equation requires the number of acres tilled by crop type, the number of tilling passes by crop type, and the soil silt content. The equation will be used to estimate seasonal emissions by using WA Dept. of Agriculture (WSDA) 2014 estimates of acres planted per crop type, typical planting schedules, and local information on tilling passes. Soil silt content will be taken from National Cooperative Soil Survey data.[5]

4.6 Agricultural Harvesting

Dust from agricultural harvesting is not estimated in the National Emissions Inventory; however, the Western Regional Air Partnership (WRAP) published a handbook for calculating dust emissions which includes harvesting operations.[6] PM_{10} from harvesting operations will be calculated using the 2012 USDA survey of acres harvested by crop type and emission factors from the WRAP handbook.

4.7 Construction Dust

Dust from road construction, residential construction, and nonresidential construction was estimated by the EPA Nonpoint Methods Advisory Committee (NOMAD) for the 2014 NEI. Construction dust emissions are based on the total amount of soil disturbed, soil silt content, and soil moisture. EPA acquired silt content factors for each county, but used a single soil moisture value for the entire state. Ecology calculated soil moisture parameters for the three counties in the MA using local meteorological data from airport weather stations. Construction dust emissions estimates were then recalculated using the county-specific soil moisture. The recalculated estimates will be used for the maintenance plan.

4.8 Paved Road Dust

Emissions will be calculated by multiplying the number of vehicle miles traveled (VMT) by an emission rate in grams per mile. The number of VMT by county for 2014 is available from the Washington State Department of Transportation (WSDOT). The PM_{10} emission rate will be calculated using the paved road dust equation in AP42.[7]

4.9 Unpaved Road Dust

Emissions will be calculated by multiplying the number of vehicle miles traveled (VMT) on unpaved roads by an emission rate in grams per mile. Unpaved road VMT for 2014 will be obtained from the county engineers. The inventory will include roads meeting two conditions:

1) Length greater than or equal to 0.5 miles, and
2) Greater than 20 vehicle trips per day.

Roads of less length or trips will be considered insignificant per EPA guidance.[8]

Emission rates will be calculated using the AP42 equation for unpaved roads. The equation requires precipitation days, surface moisture content, and surface silt content. The values assigned to these variables will be taken from Ecology's 2014 inventory.

4.10 Onroad Mobile Sources

Onroad mobile source emissions are those emitted from exhaust and from brake and tire wear. The 2014 Ecology inventory estimates will be used for the base year inventory. Emissions for each of the four seasons were calculated using EPA's MOVES model. The seasonal emissions will be summed for annual emissions. Seasonal day emissions will be taken from the summer season emissions. The MOVES model may be run in a default mode, or may be tailored to individual counties using local input data. Ecology used local data to substitute for many of the defaults. The most important included vehicle miles traveled, vehicle population, and vehicle type and age distribution. The local inputs were submitted to EPA for the NEI.

5 Spatial Allocation Methods

Sources with coordinates or other location information can be allocated to the MA. For sources without specific coordinates or other location information, spatial surrogates will be used to approximate the amount of the county emissions in the MA. The surrogates will be allocated to the MA using GIS tools and scripts. Each emissions source will be assigned to an appropriate surrogate. MA emissions are estimated as:

$$E_{MA} = E_{County} * Surrogate_{MA} / Surrogate_{County}$$

Where E_{MA} = emissions in the MA, E_{County} = emissions in the county, $Surrogate_{MA}$ = surrogate activity in the MA, and $Surrogate_{County}$ = surrogate activity in the county.

The anticipated spatial allocation methods and data sources are shown in the table below. The surrogates are from EPA's 2011 modeling platform or the Northwest International Air Quality Environmental Science and Technology Consortium (NW-AIRQUEST).

Table 5-1 Spatial Surrogates

Sector and Category	Spatial Surrogate	Data Source
Agricultural Burning	Burn coordinates will be used. *Surrogate not needed*	Ecology and BCAA burn permit records. Satellite burn detects.
Agricultural Tilling	2016 WSDA Ag. Land Use	2014 WSDA Acres Planted Survey
Agricultural Harvesting	2016 WSDA Ag. Land Use	2012 USDA Acres Harvested Survey
Construction Dust - Ind/Comm/Instit	2010 50% Housing change and 50% population	US Census Bureau (EPA platform)
Construction Dust - Residential	2010 50% Housing change and 50% population	US Census Bureau (EPA platform)
Construction Dust - Roads	Vehicle miles traveled	WSDOT 2015 GIS VMT (AIRQUEST)
Paved Road Dust	Vehicle miles traveled	WSDOT 2015 GIS VMT (AIRQUEST)
Unpaved Road Dust	County engineer estimates. *Surrogate not needed.*	County engineering estimate
Onroad Mobile Sources	Vehicle miles traveled	WSDOT 2015 GIS VMT (AIRQUEST)

6 Temporal Allocation Methods

Emissions will be estimated for a weekday during June - September. The daily emissions will be calculated in one of four ways:

1) Source-specific operating schedule (point sources only).
2) Calculation using season-specific information (nonpoint and mobile only).
3) Temporal profiles.
4) Assume uniform distribution throughout the year.

The temporal profiles were developed by EPA and supplemented with information from the Northwest International Air Quality Environmental Science and Technology Consortium (NW-AIRQUEST). Monthly temporal profiles assign the fraction of annual emissions occurring each month, and day of week temporal profiles assign the monthly fractions to individual days. Wednesday will be chosen as a typical weekday. The method anticipated for each source is described below.

6.1 Point Sources

Source-specific operating schedules from their annual emissions reports will be used to calculate daily emissions from Agrium US Inc., Boise Paper, Gas Transmission Northwest Station 8, Greenbriar Rail Services, Sandvik Special Metals LLC, Simplot Agribusiness, and Tessenderlo Kerley Inc.

If available, source-specific operating schedule information will be obtained for NW Grain Growers, Simplot Feeders, Tyson, and Western Stockmen. If not, temporal profiles will be used for NW Grain Growers. Uniform operation will be assumed for Simplot Feeders, Tyson and Western Stockmen.

6.2 Nonpoint Sources

6.2.1 Agricultural Burning

One orchard burn was permitted in the MA in 2014 during the PM10 season, generating 209 lbs of PM_{10}. This burn will not be counted in the daily inventory. For the daily inventory, Ecology will assume that no burning occurs. Although it is possible to generate significant emissions from agricultural field burning during individual days, daily burn permit decisions are made to minimize impacts on the MA. This assumption was also made in the first 10-year maintenance plan inventories.

6.2.2 Agricultural Tilling and Harvesting

Temporal profiles will be used to estimate emissions. If available, monthly profiles will be constructed from usual Washington State planting and harvesting times. If not, EPA profiles from the 2011 modeling platform will be used.

6.2.3 Dust from Construction, and Paved and Unpaved Roads

The equations for calculating dust emissions include a precipitation variable. For the seasonal day inventory, Ecology will assume there is no rainfall since PM_{10} exceedances are not likely on rainy days. Adjustments for expected activity rates will be made using temporal profiles.

6.2.4 Onroad Mobile Sources

Daily emissions will be calculated using the MOVES model. Meteorological conditions (temperature, humidity) and monthly and day-of-week profiles are an integral part of MOVES. Emissions for a July weekday will be output from MOVES as the seasonal day estimate.

7 Projection Years Inventory Development

The 2014 emission inventories will be projected to 2020, 2025 and 2030 using EPA guidance. Though not irrelevant, guidance documents for projecting PM_{10} emissions are outdated. EPA recently published guidance for ozone, $PM_{2.5}$, and regional haze.[9] Ecology intends to use the goals and advice in the new guidance to project the baseline inventory:

> The primary goal in making projections is to obtain a reasonable and technically credible estimate of future-year emissions that accounts for key variables. The EPA encourages the air agencies to incorporate in their analyses the variables that have historically been shown to drive their economy and emissions, as well as the changes in growth patterns and regulations that are expected to take place between the time of their base year and projected attainment year.

Anticipated projection methods are described for each source category below.

7.1 Point Sources

In the first 10-year maintenance plan, Ecology was required to project emissions by using allowable emissions for point sources with 70 tpy PTE. For Boise Paper, using allowables resulted in emissions estimates that were more than four times higher than the highest actual emissions during the maintenance planning period and later. Under the new guidance allowables are not required, so more reasonable estimates will be made. Permit conditions, controls, orders,

and future activity levels will all be considered in making emissions projections for all point sources.

7.2 Nonpoint Sources

Nonpoint source projections are typically made using local information and/or growth surrogates using the equation:

$$Emissions_{projected\ year} = Emissions_{base\ year} \times Growth\ Indicator\ Factor_{surrogate\ activity}$$

Table 7-1 Nonpoint Source Growth Indicators

Source Category	Growth Indicator	Data Source
Agricultural Burning	Acres burned, historical	Local air agency, Ecology regional office, or agricultural extension office estimate
Agricultural Tilling	Acres harvested	Local air agency, Ecology regional office, or agricultural extension office estimate
Agricultural Harvesting	Acres planted	Local air agency, Ecology regional office, or agricultural extension office estimate
Construction - Residential	Population	WA Office of Financial Management
Construction - Non-residential	Population	WA Office of Financial Management
Construction - Roads	Vehicle miles traveled	Benton-Franklin Council of Governments, Walla Walla Council of Governments
Paved Road Dust	Vehicle miles traveled	Benton-Franklin Council of Governments, Walla Walla Council of Governments
Unpaved Road Dust	Vehicle miles traveled	Benton, Franklin, and Walla Walla Counties' Public Works Departments

7.3 Onroad Mobile Sources

MOVES will be run for each projection year. Suitable inputs will be developed. The VMT growth rate is an important input and will be obtained from the Benton-Franklin Council of Governments and Walla Walla Council of Governments. Other important inputs are vehicle population, and vehicle type and age distribution. Vehicle population will be projected using human population. Vehicle type and age distributions will be the same as in the base year.

8 Quality Assurance and Quality Control

In EPA's guidance[9], they highlight the late 1990s joint NACAA/EPA Emissions Inventory Improvement Program quality assurance document as a resource for preparing the quality assurance (QA) plan.[10] The document was used to prepare the QA plan for the first 10-year maintenance plan. A very similar plan will be used for the second 10-year maintenance plan as described in the rest of this section.

In order to provide data of sufficient quality for maintenance planning needs, the inventory process will include quality assurance and quality control (QC) procedures. The procedures address data quality objectives of accuracy, completeness, comparability, and representativeness. Goals for each objective are:

Accuracy: The inventory must calculate and document all estimates using acceptable methods. Individual source requirements and availability of data and resources will affect estimation method selection.

Completeness: Completeness will be addressed by ensuring that the inventory includes all applicable source categories and verifying that the inventory contains all the information required to estimate emissions. The appendix lists applicable source categories.

Comparability: The base year 2014 inventory will be compared to the first 10-year maintenance plan 2002 base year and 2015 projection year inventories. Discrepancies (data outliers) greater than 20% involving sources that made up greater than 5% of any of the comparison inventories will be corrected or justified.

The base year 2014 inventory will be compared to the first 10-year maintenance plan 2002 base year and 2015 projection year inventories. The projection inventories will be compared to the first 10-year maintenance plan 2015 projection year inventory. Discrepancies (data outliers) greater than 20% involving sources that made up greater than 5% of any of the three daily inventories will be corrected or justified.

The projection inventories will be compared to the 2014 base year inventory. Ecology will investigate and either correct or justify any discrepancies (data outliers) between the base year and given projection year if they are greater than the population increase percentage plus 10%, and involve sources that made up greater than 5% of the 2014 or projection year daily inventories.

Representativeness: Actual 2014 annual and PM_{10} season daily emissions for the base year inventory will be estimates. The base year and projection year inventory calculations will use local data wherever possible.

8.1 Quality Control Procedures

QC checks are an integral part of emissions calculations. Ecology will use spreadsheets and databases wherever possible to minimize errors. Ecology will make hand calculations to verify electronic calculation equations. The final inventory report will fully document calculations. During development of the inventories, Ecology will compare the inventories to the first 10-yr maintenance plan inventories to check for accuracy and comparability.

8.2 Quality Assurance Procedures

Several EI staff are involved in calculating the inventories. EI staff will perform the reality/peer review and sample calculation checks on one another's work. One or more inventory staff may do the sensitivity analysis and range checks. Ecology will use several quality assurance steps to address the data quality objectives:

- reality/peer review checks
- sample calculations
- sensitivity analysis
- range checks

The section below includes details on each step. The result of the QA procedures will consist of a completed summary of items checked, summary of overall results, and any recommended follow-up action. At the completion of the process, Ecology will evaluate the inventory according to the data quality objectives.

8.2.1 Reality Check/Peer Review Check

Definition: Independent review by a subject matter expert
Benefit: Ensure data, assumptions, and procedures are reasonable
Objective(s) Addressed: Accuracy, completeness, comparability, representativeness
Check(s): Ecology will assess reasonableness of methods, assumptions, and emissions by:

1) comparing data sources used in the final inventory to those specified in the IPP
2) relying on reviewer expertise
3) comparing emissions estimates to other inventory efforts, including the 2002 maintenance plan inventory and the 2014 Ecology comprehensive inventory.

Limitations: None

8.2.2 Sample Calculations

Definition: Verification of values by replicating calculations
Benefit: Ensure calculations are done correctly
Objective(s) Addressed: Accuracy
Check(s): Ecology will duplicate emissions calculations to check the accuracy of the calculations and resulting emissions estimate. Ecology will give priority to the categories identified as the largest PM_{10} emitters.
Limitations: Onroad mobile source calculations done within the MOVES model are difficult to replicate in their entirety; therefore, model calculations will be checked by comparing the modeled value to a value calculated using simplified assumptions.

8.2.3 Sensitivity Analysis

Definition: Systematic study of how changes in parameters affect data
Benefit: Identify the parameters that have the greatest effect on data
Objective(s) Addressed: Generally addresses all objectives
Check(s): Ecology will perform a sensitivity analyses in the form of a source category PM_{10} emissions ranking. The ranking will help determine where efforts should (or should not) be concentrated.
Limitations: None

8.2.4 Standard Range Checks

Standard range checks address the data quality objective of comparability. The inventories will be compared to the inventories prepared for the first 10-year maintenance plan as described under the comparability goal in Section 8.

8.3 Corrective Action Plan

Corrective and follow-up actions identified during the quality assurance checking process will be referred to the appropriate staff. Corrective actions and the resulting actions taken will be documented.

8.4 Quality Assurance Final Report

The final report will include discussions on inventory quality considerations for each major source category. It will summarize the results of the quality checking procedures and provide an evaluation of the inventory according to the data quality objectives. The report will include an assessment of the limitations of the inventory data.

References

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Appendix – PM_{10} Source Categories

PM_{10} emissions source categories and preliminary county emissions for 2014 in tons/year for Benton and Walla Walla Counties are shown below (see Section 4).

Sources marked with status 'X' will be included in the inventory. Sources marked with 'NA' are not present in the MA. Sources marked with an 'I' either emit at insignificant levels in the MA, or are expected to be minimal on days with elevated PM_{10} concentrations. They will not be inventoried.

Status	Category	Benton	Walla Walla	Sum
	Point Sources (≥ 70 T PTE)			
X	Title V Sources and Registered Sources	0	400	400
	Point Sources (< 70 T PTE)			
X	Title V Sources and Registered Sources	8	24	32
	Stationary Source Fuel Combustion			
I	Industrial/Commercial/Institutional Combustion	41	27	68
I	Residential non-Wood Fuel	0	0	1
I	Residential Wood Combustion	180	131	311
	Waste Disposal, Treatment and Recovery			
I	Residential outdoor burning	206	80	286
I	Non-residential burning			
	Fugitive Dust			
X	Agricultural Tilling	3,354	5,122	8,476
X	Agricultural Harvesting	423	552	974
X	Paved Road Dust	561	314	875
X	Unpaved Road Dust	387	686	1,073
X	Construction	620	213	833
	Other Nonpoint Sources			
I	Food and Kindred Products	55	21	76
I	Residential outdoor charcoal grilling	9	3	12
I	Miscellaneous	2	1	3
X	Agricultural Burning	66	826	892
I	Silvicultural Burning	56	241	297
NA	Mining and Quarrying			
	Nonroad Vehicles and Equipment			
I	Agricultural Equip	27	31	58
I	Aircraft and Airport Support Equip	3	2	5
I	Recreational Boats	6	1	7
I	Commercial Equip	2	2	4
I	Construction and Mining Equip	25	8	33
I	Industrial Equip	3	1	4
I	Lawn and Garden Equip	11	3	14
I	Logging Equip	0	0	0
I	Rail Maintenance Equip	0	0	0
I	Recreational Equip	4	6	10
I	Locomotives	32	12	45
I	Commercial Marine Vessels	0	0	0
	Onroad Mobile, Exhaust, Tire and Brake			
X	Onroad Mobile, Exhaust, Tire and Brake Wear	173	55	228