

**INVENTORY  
PREPARATION PLAN/  
QUALITY ASSURANCE  
PLAN FOR PM<sub>10</sub> AND CO  
INVENTORIES IN THE  
SPOKANE  
NONATTAINMENT  
AREAS**

FINAL

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## CHAPTER I. PURPOSE AND BACKGROUND OF THE INVENTORY

### A. CARBON MONOXIDE (CO)

Prior to the enactment of the 1990 Federal Clean Air Act Amendments on November 15, 1990, Spokane was designated nonattainment for CO. Under the amendments, Spokane was classified “moderate” and was required to submit a plan to satisfy the requirements of the 1990 Clean Air Act (CAA) amendments. Due to failure to attain the standard by December 31, 1995, Spokane was reclassified as “serious” and required to submit a new plan<sup>1</sup> to meet additional nonattainment requirements to ensure that the area would meet the CO standard.

The monitored ambient air quality in the Spokane nonattainment area for CO has improved significantly since the area was designated as a nonattainment area (NAA) after the 1977 amendments to the CAA. Ambient air monitoring shows that the Spokane area is in compliance with the CO National Ambient Air Quality Standards (NAAQS). Spokane County Air Pollution Control Authority (SCAPCA) is responsible for developing a CO Maintenance Plan to ensure the CO standards continue to be met. This plan will be provided to the Washington State Department of Ecology (Ecology) for submittal to the U.S. Environmental Protection Agency (EPA). The serious area attainment contains many of the elements that are needed for the CO Maintenance Plan. The CO Maintenance Plan requires that the area estimate emissions for a period of 10 years after the maintenance plan submittal. This project will include a CO emissions inventory for 2002 and will include projections to 2010 and 2015.

### B. PARTICULATE MATTER LESS THAN 10 MICRONS (PM<sub>10</sub>)

In November 1991, Ecology was required to submit a plan for the Spokane PM<sub>10</sub> NAA due to exceedances of the 24-hour NAAQS that had occurred since 1985 when monitoring stations were first deployed. The Spokane PM<sub>10</sub> nonattainment area was designated and classified as “moderate” due to the CAA Amendments of 1990. The Act required the submittal of a revised State Implementation Plan (SIP) to EPA that would demonstrate attainment of the NAAQS by December 31, 1994, and maintenance of the NAAQS until 1997. The plan of November 1991 failed to demonstrate attainment. EPA and Ecology subsequently agreed to further dispersion modeling to demonstrate attainment. A plan revision<sup>2</sup> was submitted to EPA in December 1994.

The monitored ambient air quality in the Spokane PM<sub>10</sub> NAA has improved since the area was designated as a nonattainment area. Ambient air monitoring shows that Spokane is in compliance with both the daily and annual PM<sub>10</sub> NAAQS. As a result, SCAPCA is developing a limited maintenance plan (LMP). This LMP option applies to certain moderate PM<sub>10</sub> nonattainment areas seeking redesignation to attainment. If the area meets specific criteria, the State may submit a maintenance plan at the time that it is requesting redesignation that is more streamlined than would ordinarily be permitted. To qualify for the LMP option, an area must meet the following applicability criteria:

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<sup>1</sup> A Plan for Attaining Carbon Monoxide National Ambient Air Quality Standards in the Spokane Serious Nonattainment Area. A Washington State Plan Revision, Publication No. 01-02-009, September 2001.

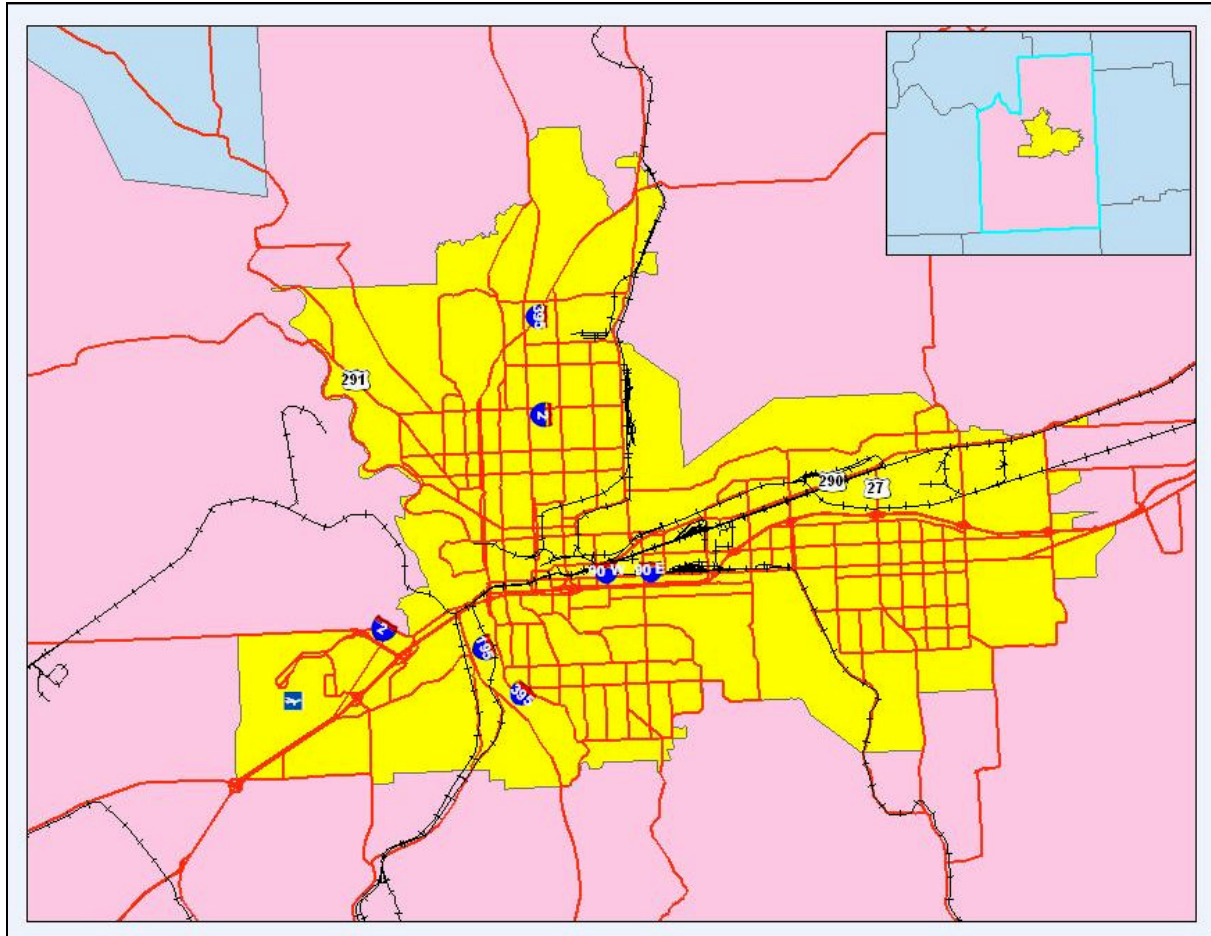
<sup>2</sup> Spokane PM-10 Attainment Plan, A Plan for Attaining and Maintaining the National Air Quality Standards for Particulate Matter (PM-10) in the Spokane PM-10 Nonattainment Area, Washington State Department of Ecology, December 1994.

1. The area should be attaining NAAQS.
2. The average PM<sub>10</sub> design value for the area, based upon the most recent 5 years of air quality data at all monitors in the area, should be at or below 40 µg/m<sup>3</sup> for the annual and 98 µg/m<sup>3</sup> for the 24-hour PM<sub>10</sub> NAAQS with no violations at any monitor in the nonattainment area.
3. The area should expect only limited growth in on-road motor vehicle PM<sub>10</sub> emissions (including fugitive dust) and should pass a motor vehicle regional emissions analysis test.

## CHAPTER II. GEOGRAPHIC AREA

The CO NAA boundaries are irregular boundaries and are shown in Figure II-1. The NAA is the Spokane urban area as defined by the Washington State Department of Transportation. It is also referred to as the 1980 Federal Aid Urban Area. The locations of major roadways, railways, and the Spokane International Airport are also shown on this figure. County-level emissions that are expected to be much different for the NAA compared to the county will be apportioned to the NAA based on population or other more representative spatial surrogates.

The PM<sub>10</sub> NAA boundary is defined by Universal Transverse Mercator (UTM) coordinates (see Figure II-2) and is smaller than Spokane County. Beginning with the far western corner, the UTM coordinates for the 8 corners of the NAA are: 458000 mE, 5288000 mN; 463000 mE, 5288000 mN; 463000 mE, 5292000 mN; 481000 mE, 5292000 mN; 481000 mE, 5288000 mN; 489000 mE, 5288000 mN; 489000 mE, 5271000 mN; and 458000 mE, 5271000 mN. Therefore, as with the CO estimates, it is likely that for some source categories, county-level emission estimates will need to be apportioned to the NAA based on spatial surrogates.



**Figure II-1. Spokane CO Nonattainment Area**

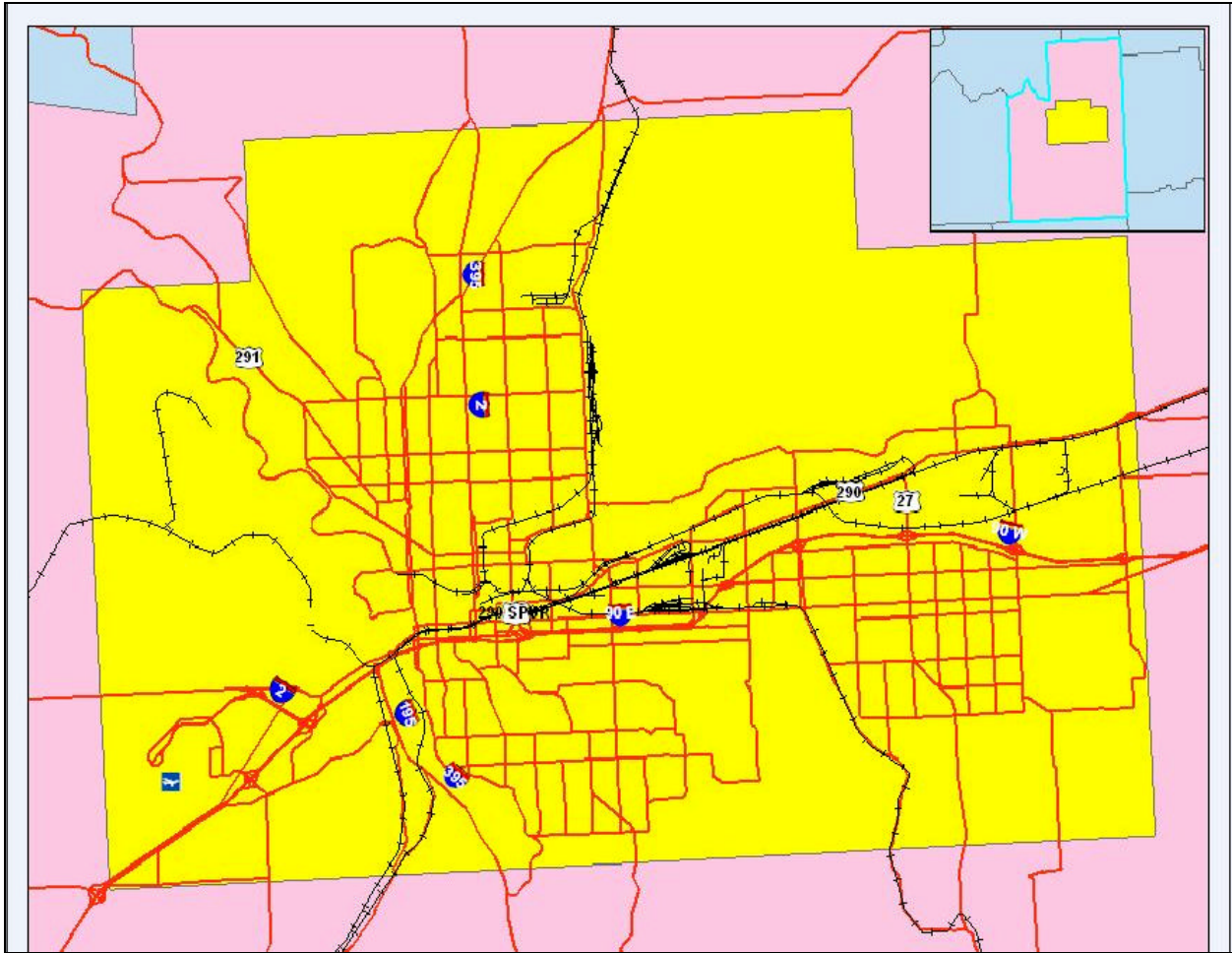


Figure II-2. Spokane PM<sub>10</sub> Nonattainment Area

## CHAPTER III. TEMPORAL RESOLUTION

For CO, there have been no exceedances of the eight hour standard since 1996 and no violations of the standard since 1995. Historically, violations of the CO standard have occurred in the winter months.

The most recent exceedances of the 24-hour PM<sub>10</sub> standard have occurred during the months of August and September in 1996, 1999, and 2001. However, these exceedances were attributed to natural occurrences. Both Washington State and EPA flagged these data points as natural events, in accordance with EPA's Natural Events Policy. As such, the data are not used to determine the attainment status of the Spokane area.<sup>3</sup> Historically, exceedances have occurred during the months from October through February.

The planning period for PM<sub>10</sub> and CO will cover the months of October through February. Annual emissions will be estimated for both pollutants. Seasonal day emissions will also be estimated for each pollutant for the period October through February. When developing seasonal day emissions, Pechan will consider weekday versus weekend day variability in emissions. Since exceedances tend to occur during the week in Spokane, seasonal day emissions will reflect activity occurring during the week.

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<sup>3</sup> E-mail correspondence with Brett Rude, Washington Department of Ecology, May 20, 2004.

## CHAPTER IV. QUALITY ASSURANCE POLICY AND OBJECTIVES

In order to provide data of sufficient quality for maintenance planning needs, quality assurance (QA) and quality control (QC) procedures are implemented as part of the inventory process. The procedures address data quality objectives of accuracy, completeness, comparability and representativeness. A brief discussion of the data quality objectives is given below.

Data quality objectives of accuracy, completeness, comparability, and representativeness are addressed to ensure an inventory of high quality. The target goals for each objective are listed below.

*Accuracy:* All estimates must be calculated and documented using acceptable methods. Individual source requirements and availability of data and resources will affect estimation method selection.

*Completeness:* Completeness is addressed by ensuring that all applicable source categories are included in the inventory, and that all information required to estimate emissions is present. Applicable source categories are listed in Appendix A.

*Comparability:* Data will be compared to the most recent base year inventories: 1990 for PM<sub>10</sub> and 1999 for CO. Any discrepancies (data outliers) greater than 20% involving sources that made up greater than 5% of either the 1990 or the 2002 inventories for PM<sub>10</sub>, or the 1999 and 2002 inventories for CO will be corrected or justified.

*Representativeness:* Actual 2002 annual and peak CO and PM<sub>10</sub> season daily emissions will be calculated for the base year inventory. Local data will be used in inventory calculations wherever possible.

## CHAPTER V. PLAN INFORMATION SOURCES

This plan draws upon inventory, quality assurance, and emissions projections guidance available from state and federal agencies and partnerships.<sup>4, 5, 6, 7, 8, 9, 10, 11</sup> The effort will also draw upon experience gained with the 1990 PM<sub>10</sub> and 1996/1999 CO base year inventory reviews and prior SIP inventory efforts in other areas and for other pollutants.

A primary source of emissions inventory data will be the 2002 Consolidated Emissions Reporting Rule (CERR) submittal recently submitted to the U.S. EPA by Ecology. Another source of information will be EPA's National Emissions Inventory (NEI). The Spokane Regional Transportation Commission (SRTC) will provide base year and projection year onroad mobile source emissions data and additional activity data to be used in estimating emissions for other source categories (paved and unpaved road dust). Finally, information from local sources, including SCAPCA, university sources, and agricultural experts will be used to develop emission estimates for select source categories (as described in Chapter VI).

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<sup>4</sup> PM-10 Emission Inventory Requirements. Final Report. U.S. Environmental Protection Agency, Research Triangle Park, NC, September 1994.

<sup>5</sup> Emission Inventory Improvement Program, Volume IV: Quality Assurance Procedures. EPA-454/R-97-0041. July 1997.

<sup>6</sup> Guidelines and Specifications for Preparing Quality Assurance Project Plans. Ecology Publication 91-16. May 1991.

<sup>7</sup> Procedures Document for National Emissions Inventory, Criteria Air Pollutants 1985-1999. United States Environmental Protection Agency. Office of Air Quality Planning and Standards. Research Triangle Park NC 27711. EPA-454/R-01-006. March 2001.

<sup>8</sup> Procedures for Preparing Emissions Projections. U.S. Environmental Protection Agency, Research Triangle Park, NC, July 1991.

<sup>9</sup> Emission Inventory Requirements for Carbon Monoxide State Implementation Plans, EPA-450/4-91-011, March 1991

<sup>10</sup> June 4-6, 1991 EPA manual Workshop for Implementation of Clean Air Act Provisions Relating to Ozone and Carbon Monoxide Emission Inventories, June 4-6, 1991 EPA.

<sup>11</sup> Guidance for the Preparation of Quality Assurance Plans for O<sub>3</sub>/CO SIP Emission Inventories. EPA-450/4-88-023. December 1988.

## **CHAPTER VI. BASE YEAR INVENTORY DEVELOPMENT AND QUALITY CONTROL PROCEDURES**

An inventory of actual emissions in the NAA will be developed for base year 2002. Annual and typical PM<sub>10</sub> and CO season day emissions estimates will be made. A list of potential PM<sub>10</sub> and CO sources was developed using the 1990 PM<sub>10</sub> base year inventory, 1996/1999 CO base year inventories, local knowledge, categories as defined in references 4 and 9, and the 2002 National Emissions Inventory (NEI) for PM<sub>10</sub> and CO source categories. The source categories are listed in Appendix A. Appendices B and C provide the NEI version 1 estimates of the 2002 base year emissions for these categories, for PM<sub>10</sub> and CO, respectively. Version 1 of the NEI (NEI V1) does not include the 2002 inventory data submitted by the State under the Consolidated Emissions Reporting Rule. These State data will be incorporated over the course of the next seven months.

Note that the emissions data for some source categories will look much different than what is included in NEI V1. Large differences are expected for at least one point source and residential wood combustion (RWC; potentially the most important area source category). Each of the source categories are addressed within section A below.

The inventory development process consists of several steps. A description of each step and the quality control procedures implemented are discussed individually in the following sub-sections:

- estimation methods and data gathering;
- emissions calculations and data checking;
- missing data;
- application of rule effectiveness and rule penetration;
- corrective action; and
- documentation.

### **A. ESTIMATION METHODS AND DATA GATHERING**

Guidance listed under “Plan Information Sources” will be utilized to select estimation methods and gather information necessary to develop the inventory. QC activities during data gathering include thorough documentation of methods and data sources, and checking for reasonableness of data obtained. Emissions will be reported in whole numbers. Annual emissions will be reported in tons, and seasonal daily emissions will be reported in pounds. General estimation methods and data sources anticipated for each source category are listed below.

#### **1. Combined Approach for PM<sub>10</sub> and CO Base Year Emissions**

This section of the IPP is an overview of Pechan’s proposed approach to preparing 2002 emission estimates for the source categories in the Spokane NAA that emit CO and/or PM<sub>10</sub>. This is followed by approaches specific to the priority PM<sub>10</sub> and CO source categories. In summary, for source categories with low or moderate contributions to CO or PM<sub>10</sub> emissions, Pechan plans to use available emission estimates, or straightforward emission estimation methods (e.g., those used for Version 1 of EPA’s 2002 NEI). Pechan will supplement these data with point and area source 2002 emission estimates being prepared by Ecology for submittal to EPA on June 1, 2004.

An example area source sector to be included in the PM<sub>10</sub> inventory from readily-available data is commercial cooking. Pechan prepared a national county-level inventory for the NEI covering the 2002 calendar year. Commercial cooking can be an important PM<sub>10</sub> contributor in urban areas.

For PM<sub>10</sub>, the top-emitting PM<sub>10</sub> categories are point sources (the two facilities owned by Kaiser), RWC, unpaved road and parking lot fugitive dust, and paved road fugitive dust. In addition, agricultural tilling and windblown dust PM<sub>10</sub> emissions were not quantified in the 1990 Base Year Emissions Inventory. For agricultural tilling, Pechan will evaluate the potential importance of this activity during the planning period through contacts with local agricultural experts. If little or no agricultural tilling occurs within the NAA during the planning period, no effort will be made to quantify these emissions. For windblown dust, emissions are dominated by sources outside of the NAA. Pechan does not intend to estimate these emissions within the NAA.

Pechan plans to focus most of its CO emission inventory and emissions projection effort on the top-emitting source categories in the area. For CO, the priority source categories are onroad mobile sources, point sources, RWC, and nonroad engines/vehicles. Given that the Spokane Regional Transportation Commission (SRTC) will provide 2002 onroad mobile source emission estimates, Pechan plans to focus most of its CO emission inventory level-of-effort on the other three source categories listed above.

**a. Point Sources**

SCAPCA and Ecology are compiling a 2002 point source emission inventory in order to satisfy EPA reporting requirements under the Consolidated Emissions Reporting Rule. It is expected that this database will be available on or about June 1<sup>st</sup>. This will be the primary resource for developing refined estimates of PM<sub>10</sub> and CO emissions for the facilities with 100 tons/year or more of allowable PM<sub>10</sub> emissions or 50 tons/year or more of allowable CO emissions. Pechan will verify that the emission factors and activity levels for the major processes at these facilities are reasonable. After this initial verification and quality control step, Pechan will develop a plan for approaching the facilities with questionable data where follow up is necessary. Any contact with individual facilities will be coordinated with SCAPCA and Ecology staff.

**b. Nonroad Vehicles/Engines**

For nonroad mobile sources, the source categories of interest in the Spokane area are aircraft, locomotives, and the source types included in EPA's NONROAD model. Aircraft emissions will be estimated using information provided by the two local airports about daily activity (landings and takeoffs) by aircraft type. Emission factors for all aircraft categories will be obtained from EPA's 2002 *Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory*<sup>12</sup> and FAA's Emissions and Dispersion Modeling System (EDMS), Version 4.11 (EDMS). As an input to EDMS,

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<sup>12</sup> U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory, Volume I: Methodology*, prepared by Eastern Research Group, Morrisville, NC for U.S. EPA, November 2002.

Pechan will work with SCAPCA and Ecology to select an appropriate mixing height for the planning period.

For locomotives, an analysis similar to that done for the 1990 base year will be performed. This will involve contacting the two local switch yards and gathering fuel consumption data for 2002. For line haul operations, Pechan will work with Ecology to gather 2002 fuel consumption data (since this was previously considered confidential). Emission factors will also be taken from the 2002 EPA document cited above.<sup>12</sup>

For the NONROAD model categories, Pechan will use the NONROAD model and Spokane County specific information provided by Ecology to estimate emissions. The Spokane County specific information will include local temperatures and fuel parameters (e.g., RVP and oxygenated fuels). The table below shows the latest NEI estimates for Spokane County (note that as stated above, aircraft and locomotive emission estimates will be made based on surveyed 2002 activity data). Pechan will consider differences in weekday versus weekend day activity for the nonroad categories. Season day emissions will be based on activity during a typical weekday during the planning period.

#### 2002 NEI NONROAD Emission Estimates for Spokane County

Source	PM <sub>10</sub> (tpy)	CO (tpy)
Agricultural Equipment	64.8	662
Aircraft	7.1	614
Commercial Equipment	22.6	7,768
Construction and Mining Equipment	81.7	1,260
Industrial Equipment	16.5	1,873
Lawn and Garden Equipment	40.0	17,073
Locomotives	40.8	164
Logging Equipment	0.97	38.4
Pleasure Craft	3.8	182
Railroad Equipment	0.77	13.8
Recreational Equipment	1.2	1,950

EPA's current NONROAD model category estimates are based on EPA's draft NONROAD model. An EPA memo posted to EPA's nonroad mobile source site states: "The draft NONROAD model is not EPA guidance and does not carry any presumptive weight when EPA reviews a SIP submission, but neither will it lead to any automatic rejection by EPA."<sup>13</sup> Because the NONROAD model represents newer information and was designed to specifically estimate emissions for each county, it will be used in this inventory. County-level emissions from NONROAD will be allocated to the NAAs using the spatial surrogates in the table below. Surrogate values will be obtained primarily from SRTC.

<sup>13</sup> "NONROAD Model Status Update." U.S. Environmental Protection Agency, Office of Mobile Sources. May 21, 1999. Posted as postli12.txt on EPA's nonroad mobile web site.

### Nonroad Mobile Source Spatial Surrogates

Equipment	Surrogate Activity Indicator for the NAAs
Agricultural Equipment	Agricultural cropland
Aircraft	No surrogate (emissions allocated to each airport)
Commercial Equipment	Population
Construction and Mining	Construction permit data
Industrial Equipment	Manufacturing and wholesale employment
Lawn/Garden Equipment	Households
Locomotives	Rail length (line haul); Facility location (switch yard)
Logging Equipment	Forested land
Pleasure Craft	Recreational waterways
Railroad Equipment	Fuel usage by rail length (provided by Ecology)
Recreational Equipment	Recreational areas

#### *c. On-Road Mobile Sources*

The on-road mobile inventory will be completed by SRTC; however, Pechan expects to coordinate with SRTC to include the SRTC results and methods into the CO maintenance plan in appropriate formats. In addition, Pechan plans to work in consultation with SRTC to incorporate the on-road mobile source emission inventory into the final 2002 PM<sub>10</sub> LMP emission inventory. Pechan staff are experienced in working with State and local transportation planning agencies to produce current and future year emission estimates using MOBILE6.2, and its predecessors. We plan to review the methods used by SRTC to produce 2002 CO and PM<sub>10</sub> emission estimates as a QA/QC check on these estimates before they are incorporated into the CO and PM<sub>10</sub> plans.

#### *d. Area Sources*

For area sources, Pechan plans to develop a combined list of CO and PM<sub>10</sub>-emitting source categories and to provide CO and PM<sub>10</sub> emission estimates for all of the source categories on this list. Appendix A provides this composite list. The primary effort involved in preparing 2002 area source emission estimates is in determining the activity levels during 2002 for each source category, so, as with the other source sectors, it will be efficient to develop a single area source emission inventory that can be used to populate the emission databases for CO and PM<sub>10</sub>. Pechan will provide the area source inventory data, methods and calculations at a similar level-of-detail to that shown in Appendix H to the Spokane PM<sub>10</sub> Attainment Plan.

Additional details on proposed methods for selected area source categories are provided below.

#### *e. Fuel Combustion*

State-level fuel combustion estimates for Washington State will be taken from the U.S. Department of Energy's State Energy Data System and allocated to Spokane County using appropriate indicators such as population. Adjustments will be made where data for Spokane County are available, or where it is known that fuel use in eastern Washington is distinctly different from the rest of the State. Residential wood combustion emission estimates will be taken from new estimates made by Ecology based on information from a recent Washington State University study.<sup>14</sup> These survey data are assumed to adequately represent wood stove/fireplace types in-place in 2002. (Future year CO emission estimates will account for the

<sup>14</sup> *Wood Burning Stove Survey for Idaho, Oregon and Washington State Data Report*, Social and Economic Sciences Research Center, Washington State University, August 2001.

expected penetration of new lower-emitting wood stoves in 2010 and 2015; note that future year PM<sub>10</sub> emission estimates are not needed.)

The allocation from the county-level to each NAA will be done using U.S. Bureau of Census data on housing units. In order to be consistent with Ecology methods used to derive the 2002 RWC estimates, Pechan will develop spatial surrogates based on housing data for both incorporated (City of Spokane, Spokane Valley, and Millwood) and non-incorporated areas.

*f. Waste Disposal, Treatment, and Recovery*

Pechan plans to use methods similar to those described in Appendix H to the Spokane PM<sub>10</sub> Attainment Plan to estimate CO and PM<sub>10</sub> emissions for On-Site Incineration. For residential open burning, Pechan will use information from the 1999 CO PEI and the 2002 emissions inventory prepared by Ecology. Local information will be updated using calendar year 2002 information.

*g. Miscellaneous Area Sources*

Source types under this heading that are common to both the CO and PM<sub>10</sub> emission inventories include forest wildfires, prescribed or managed burning, and structure fires. The recent trend for these categories has been to focus more on quantifying historical average activity or emissions and using those estimates for both current and projection years. This avoids situations where emissions from an abnormal year make a category look much less, or much more, important than it typically is. Pechan will examine wildfire and burn activity over a five-year period in order to establish a possible range of values. This would help in evaluating the risk of future nonattainment that might result from peak emissions from these categories. Pechan will check with Ecology and/or State and Federal Agencies to gather activity data on burns occurring between 1997 and 2002 in Spokane County. An average annual activity estimate as well as an estimate for 2002 will be developed for each source category.

Agricultural burning emissions will be quantified based on activity data obtained from Ecology, the Spokane County agricultural extension office, the Washington State Agricultural Statistics Service Office, or agricultural experts at Washington State University. Data on the type of crop residue burned, the amount, and the timing will be gathered as part of a crop calendar that will also provide activity data for several other source sectors (e.g., agricultural cultivation and production). Emission factors will be taken from the California Air Resources Board (CARB). If wheat stubble burning is found to occur within the NAAs, Pechan will review recent data from a study on this topic sponsored by Ecology, EPA, and the Washington Association of Wheat Growers.

Under this miscellaneous area sources sector, Pechan will also include 2002 Spokane County emission estimates for commercial cooking from EPA's National Emissions Inventory.

## **2. Approach for PM<sub>10</sub>-Specific Categories (Base Year Emissions)**

### ***a. Paved Road Dust***

In the recently revised AP-42 sections for paved and unpaved road dust, the most recent equations have changed somewhat from what was used in Appendix H of the Spokane PM<sub>10</sub> Attainment Plan. Those values were also based on silt loading data from a 1989 study. Pechan will determine if there are new silt loading data, and these new data will be used in the PM<sub>10</sub> emission calculations. Otherwise, the previous values will be used. Vehicle miles traveled (VMT) information will be provided by SRTC. Precipitation corrections will be made based on local meteorological data. Pechan will review the historical average number of precipitation days to determine whether 2002 was a relatively wet or dry year compared to the historical average. A comparison of emissions computed using the 2002 calendar year data will be made to emissions computed using the historical average number of rain days.

Emissions will be computed according to average daily traffic volume classes based on silt loading and the AP-42 equations. Spokane County emissions for 2002 were developed by Ecology based on the revised AP-42 equations and default silt loading data provided in AP-42. Pechan will apply a transport fraction developed for Spokane County by EPA to correct the emission estimates to correspond to the transportable fraction. These fractions are now commonly employed to fugitive dust emission estimates to account for material is not transported significant distances from the source due to deposition, impaction, or other removal mechanisms.

### ***b. Unpaved Road and Parking Lot Dust***

The 2002 PM<sub>10</sub> emission estimates for unpaved roads and parking lots will be prepared using methods consistent with those in Appendix H of the Spokane PM<sub>10</sub> Attainment Plan. Recent updates to the AP-42 unpaved road equation will be incorporated. The 2002 daily VMT on unpaved roads by surface type will be obtained from the SRTC. The effects of any control techniques being applied during 2002 will be incorporated in the PM<sub>10</sub> emission estimates. Precipitation correction will be performed using local meteorological data. As with the paved road dust emissions estimates described above, Pechan will compare emissions estimates based on 2002 precipitation days compared to the historical average number of rain days.

The silt loading value and traffic volume data for unpaved roads will be the same as that used by Ecology to develop the 2002 emission inventory. VMT for unpaved parking lots will be grown to 2002 using the growth in average daily volume on unpaved roads between 1990 and 2002. Pechan will apply a transport fraction developed for Spokane County by EPA to correct the emission estimates for the transportable fraction.

### ***c. Agricultural Tilling***

As mentioned above, Pechan will develop a crop calendar for Spokane County that will form the basis of activity data for both agricultural burning and tilling. PM<sub>10</sub> emissions from agricultural tilling operations were not in the previous 1990 estimates. Therefore, the estimates will be developed based on the crop calendar, which includes acreage by crop type, number of tilling passes, and timing of tilling and harvesting.

Data from the Conservation Tillage Information Center estimates of acres tilled by crop type and tilling type as an initial estimate of Spokane County agricultural tilling activity in 2002. Pechan will work with local agricultural officials to refine the activity data.  $PM_{10}$  emissions will be calculated as a function of the silt content of the surface soil, and the number of acre-passes in a time period (annual and winter period). Corrections are applied to account for crop lands subject to no till, ridge till, and mulch till, and any controls applied to reduce PM emissions (suppressants). As with the other fugitive dust emission estimates, a transport factor for Spokane County will be applied.

**d. Windblown Dust**

Under EPA's natural events policy, Spokane was not classified as a serious nonattainment area for particulate matter because much of the particulate matter impacting it was determined to be due to natural events (windblown dust from outside of the NAA). Due to the natural events policy and since there is little in the way of erodible land cover within the NAA during the planning period, Pechan does not intend to develop windblown dust emission estimates.

**3. Approach for CO-Specific Source Categories (Base Year Emissions)**

As noted above, the priority CO source categories are on-road mobile sources, point sources, residential wood combustion, and nonroad engines/vehicles. These sources have been addressed above. Pechan will review CO emissions data from the 2002 NEI for any additional source categories not addressed above.

Given its prominence in the CO Attainment Plan, the Kaiser Aluminum smelter emission estimates available from Ecology will be evaluated and all CO emission source activity and emission factors confirmed as being appropriate with 2002 activity and with the Title V permit for this facility. Ecology indicates that emissions for this plant were zero in 2002; therefore, for informational purposes, Pechan will report emissions for the most recent year in which there were emissions. Since, this plant is being sold to another company, emission estimates for CO will also be included in the projected inventories. Other point source emission estimates will be reviewed for completeness and to determine whether there are inventory outliers that require further review.

**B. EMISSIONS CALCULATIONS AND DATA CHECKING**

Calculations will be performed as appropriate for the given estimation method. QC checks are an integral part of calculations. Calculations will be done electronically wherever possible to minimize arithmetic errors. Hand calculations will be made to verify electronic calculation equations. Calculations will be fully documented in the final inventory report. Comparisons to the 1990 inventory will be made during development to catch any potential errors.

**1. Missing Data**

Missing data will be identified by the inability to complete the calculations. If data are found to be missing, a reasonable effort will be made to acquire the data. If this is unsuccessful, estimates will be made based on past years' data or default information contained in EPA documents and models. Sources of all data will be documented.

## 2. Application of Rule Effectiveness and Rule Penetration

Rule effectiveness (RE) reflects the ability of a control device or regulation to achieve all the emission reductions that could be achieved by full compliance at all times. Rule penetration (RP) is a measure of the extent to which a regulation covers emissions from a source category.

RE/RP has been the subject of ongoing discussion nationally and is the topic of a draft report by the Emissions Inventory Improvement Program (EPA/STAPPA/ALAPCO).<sup>15</sup> Briefly, the report recognizes that control efficiencies are often based on in-use conditions, and when this is the case, RE has already been taken into account. This is the situation for point sources in the NAAs. Additionally, some point source emissions are estimated through source testing, and therefore do not use control efficiencies and RE/RP to calculate emissions. For area sources, Pechan will evaluate each control measure with the assistance of SCAPCA to determine whether EPA default RE and RP estimates (80% and 100%) should be applied or some more representative values.

## 3. Corrective Action

Corrective and follow-up actions identified during the inventory development process will be noted and referred to the appropriate staff. Both the corrective actions identified and results of actions taken in response will be documented and kept on file (see Corrective Action Form, Appendix D).

Written documentation specifying inventory methodology and information sources will be provided. Emission summaries will be presented. Any paper or computer files used to assist in emissions calculations and quality checking will be provided to SCAPCA.

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<sup>15</sup> "Emissions Inventories and Proper Use of Rule Effectiveness." September 23, 1998. Memorandum from EIIP Point Sources Committee Members to EIIP Steering Committee Members. September 23, 1998.

## **CHAPTER VII. PROJECTION YEAR INVENTORY DEVELOPMENT FOR CO MAINTENANCE PLAN**

This section describes Pechan's proposed approach to estimating future year CO emissions for the Spokane nonattainment area for the purposes of meeting maintenance plan requirements. The two projection years are 2010 and 2015.

In preparing the projection year inventories, the approach should address two components: (1) estimating expected changes in emissions generating activity between the base year (2002) and the projection years; and (2) accounting for changes in emission rates by source category resulting from air pollution regulations or the replacement of equipment with new, lower-emitting technologies. For the first component, the best way for estimating activity changes is to pick an indicator for each source category that has available projections data and provides as direct as possible a link to emissions generating activity.

Possible sources of projections data, in order of preference, are: (1) Spokane County-specific activity data projections, (2) State of Washington economic/population projections at the State or sub-State level, (3) recent regional economic projections, or (4) State-level activity projections from EPA's Economic Growth Analysis System (EGAS). (Pechan developed EGAS Version 4.0, which is currently available, and is providing technical support to Version 5.0, which is currently under development.) EGAS provides growth factors for the years of interest, which are linked to standard emission inventory Source Classification Codes (SCCs). Upon completion of the base year inventory, Pechan will provide SCAPCA with a list of recommended growth factors for each source category.

Modeling of control effects will focus on the source categories whose emission rates are expected to change between 2002 and 2010 or 2015. These source categories include on-road mobile sources, nonroad mobile sources, and residential wood combustion.

### **A. ON-ROAD MOBILE SOURCES**

On-road mobile source CO emission projections to 2010 and 2015 will be made using MOBILE6.2 emission factors and projections of VMT by vehicle type, roadway functional classification, and associated speed by SRTC. Ecology has supplied SRTC with input data for 2015 and will supply similar data to SRTC for 2010. The projection year emission estimates will take into account any fuels strategies that were adopted or planned for the area, and any changes in fuel specifications that change by month/season in order to calculate winter period and annual average emissions.

### **B. NONROAD MOBILE SOURCES**

The three nonroad mobile source sectors for which CO emission projections will be needed include aircraft, locomotives, and EPA NONROAD model categories. Aircraft emission projections will use local airport landing-takeoff projections with adjustments (if needed) to aircraft emission factors to account for the effects of emission standards, or technology changes. Similar methods are planned for locomotives emission projections. For NONROAD model categories, emission projections will be based on running the current version of EPA's

NONROAD model for 2010 and 2015 with any Spokane-specific inputs used in the base year inventory development.

### C. POINT SOURCES

Point sources will include those with allowable emissions of 50 or more tons per year of CO. In addition to the actual emissions reported for each facility, allowable or potential to emit emissions for point sources will be included. These allowable emissions are important to consider in projected emission inventories, especially where they are much different than actual emissions. Actual emissions will be forecast to 2010 and 2015 using EGAS growth surrogates.

### D. AREA SOURCES

Area source projections are typically made using local information and/or growth surrogates. The effects of any control measures to be implemented between the base and projection years are then applied (e.g., using an estimate of control efficiency, rule penetration, and rule effectiveness). Projection methods are described below.

For all sources except residential wood combustion and agricultural burning (including orchard tear-out burning), emissions will be projected by multiplying the base year emission rates by the surrogate activity indicator growth factors. Details on the woodstove projection method are described in Section D. Pechan will work with SCAPCA, the Washington State University Cooperative Extension Service and other local agricultural contacts to estimate future agricultural burning activity levels. Surrogate activity indicators for each area source category are shown in the table below.

Source Category	Surrogate Growth Indicator
Industrial waste disposal, treatment, and recovery	Manufacturing
Residential open burning	Households
Fuel combustion	Population
<i>Miscellaneous Sources</i>	
Agricultural burning	Local knowledge
Commercial cooking	Population
Structure fires	Households
Wildfires/Prescribed Burns	Historical average

Future year emission projections for RWC will incorporate expected changes in activity and emission factors that account for the anticipated mix of wood stove types, and their expected CO emission rates for each projection year. The technology mixes in 2010 and 2015 are especially important because wood stoves have had to meet a set of increasingly more stringent new source performance standards. An important assumption in estimating the technology mix in future years is the expected lifetime/replacement rate for wood stoves. The faster the replacement rate, the lower the average emission rate in future years for the wood stove population. Pechan will use contacts with government agencies and industry to develop an estimate of lifetime/replacement. RWC emission estimates for the projection years will also account for any local programs to curtail wood stove/fireplace use, etc.

## CHAPTER VIII. QUALITY ASSURANCE PROCEDURES

Quality assurance activities are distinguished from QC activities in that they provide a more objective assessment of data quality. The QA checks (except the sensitivity analysis and range checks) will be performed by staff not involved in the inventory calculations. Several quality assurance checks will be employed to address the data quality objectives: reality/peer review checks, sample calculations, sensitivity analysis, and range checks. Details on each check are provided below. The product of the quality checking process will be a completed summary of items checked, summary of results, and recommended follow-up action. At the completion of the process, the inventory will be evaluated according to the data quality objectives (see Chapter IV).

### A. REALITY CHECK/PEER REVIEW CHECK

Definition: Independent review by a knowledgeable expert

Benefit: Ensure data, assumptions, and procedures are reasonable

Objective(s) Addressed: accuracy, completeness, comparability, representativeness

Check(s): Reasonableness of methods, assumptions, and emissions estimates will be assessed.

This will be accomplished by 1) comparing data sources used in the final inventory to those specified in the Inventory Preparation Plan, 2) reliance on reviewer expertise, and 3) comparison of emissions estimates to other inventory efforts, particularly the 1990 PM<sub>10</sub> base year inventory and the 1999 CO PEI.

Limitations: None

### B. SAMPLE CALCULATIONS

Definition: Verification of values by replicating calculations

Benefit: Ensure calculations are done correctly

Objective(s) Addressed: accuracy

Check(s): Emissions calculations will be duplicated to check the accuracy of the arithmetic and, therefore, the resulting emissions estimate. Priority will be given to those categories identified as the largest PM<sub>10</sub> and CO contributors.

Limitations: Estimates calculated using computer models such as MOBILE6.2 will be checked using simplified assumptions to arrive at a "ballpark" value to use as a comparison to the actual calculated value.

### C. 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): A sensitivity analysis in the form of source category PM<sub>10</sub> and CO emissions rankings will be performed. The ranking will help determine where efforts should be concentrated.

Limitations: None

## **D. STANDARD RANGE CHECKS**

Standard range checks address the data quality objective of comparability. The 2002 base year inventory will be compared to the most recent inventory (base year 1990 for PM<sub>10</sub>, base year 1999 for CO). Any discrepancies (data outliers) greater than 20% involving sources that made up greater than 5% of the 1990 PM<sub>10</sub>, 1999 CO, or 2002 inventories will be corrected (see Corrective Action Plan below) or justified.

The projection inventories will be compared to the 2002 base year inventory. Any discrepancies (data outliers) between the base year and a given projection year greater than the population increase percentage plus 10% and involving sources that made up greater than 5% of the 2002 or projection year daily inventories will be investigated and either corrected (see Corrective Action Plan below) or justified. The justification will include whether there was a change in methodology (e.g., different emission factor, allocation method, activity data) or if there is a real anticipation of emissions increasing or decreasing (e.g., decreases in the onroad sector due to fleet turnover).

## **E. CORRECTIVE ACTION PLAN**

Corrective and follow-up actions identified during the quality checking process will be noted and referred to the appropriate staff. Both the corrective actions identified and results of actions taken in response will be documented and supplied to SCAPCA (see Corrective Action Form, Appendix D).

## **F. QUALITY ASSURANCE FINAL REPORT**

The final inventory 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.

## **CHAPTER IX. RESPONSIBILITY**

The inventory process will be a cooperative effort among Pechan, SCAPCA, SRTC, and Ecology. A brief list of inventory responsibilities follows:

**SCAPCA** will inventory calendar year 2002 actual emissions and provide allowable emissions from point sources under their jurisdiction. SCAPCA will provide information about local emissions sources to Pechan. Pechan will perform a review of these data. SCAPCA will also provide information on local control programs that are expected to impact the base year or projection year inventories.

**SRTC** will provide estimates of actual 2002 and projected 2010 and 2015 emission estimates for onroad sources. SRTC will provide 2002, 2010, and 2015 VMT for both paved and unpaved roads in the NAAs to Pechan. SRTC will provide available population, housing and employment data for the base year and projection years. SRTC will provide documentation of the above data to Pechan for incorporation into emissions inventory documentation.

**Ecology** will inventory calendar year 2002 actual emissions and provide allowable emissions from point sources under their jurisdiction.

**Pechan** will inventory area and nonroad mobile sources. Pechan will review the point source inventory estimates provided by SCAPCA. Pechan will project area/nonroad mobile source emissions to 2010 and 2015. Pechan will perform the final QA review of the inventories. Finally, Pechan will prepare the inventory documentation.

**SCAPCA, SRTC and Ecology** will review all inventory products.

## **CHAPTER X. SCHEDULE**

The schedule for inventory document submittal to SCAPCA is shown below. The final inventory will be submitted according to this Inventory Preparation and Quality Assurance Plan.

### **Schedule**

- Submit IP/QA Plan to SCAPCA – June 7, 2004 (draft); June 25, 2004 (final)
- Submit Draft EI and Projections to SCAPCA – Jul 19, 2004
- Complete Final EI – Aug 9, 2004
- Submit Initial Draft CO Maintenance Plan to SCAPCA – Aug 30, 2004
- Submit Final CO Maintenance Plan to SCAPCA – Oct 31, 2004.

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## **APPENDIX A. PM<sub>10</sub> AND CO EMISSION INVENTORY SOURCE CATEGORY CORRESPONDENCE**

A list of PM<sub>10</sub> and CO emissions source categories was developed as described in Section VI. Each category is listed below.



**2002 PM<sub>10</sub> LMP Emission Inventory**

## A. AREA SOURCES

Stationary Source Fuel Combustion

Non-Residential

Residential Non-Wood

Residential Wood

Waste Disposal, Treatment and Recovery

Commercial/Industrial

Residential

Residential

Fugitive Dust

Agricultural Tillage

Agricultural Windblown Dust (not to be inventoried during this project)

Paved Roads

Unpaved Roads

**2002 CO Maintenance Plan Emissions Inventory**

## A. AREA SOURCES

Stationary Source Fuel Combustion

Electric Utility

Industrial

Commercial/Institutional

Residential Non-Wood

Residential Wood

Waste Disposal, Treatment and Recovery

On-Site Incineration

Industrial On-site

Commercial/Institutional On-Site

Residential On-site

Open Burning

Industrial

Commercial/Institutional

Residential

**2002 PM<sub>10</sub> LMP Emission Inventory**  
Construction

Other Area Sources

Wildfires

Prescribed Burning

Structure Fires

Agricultural Field Burning

Agricultural Waste Burning

Mining and Quarrying

**B. NON-ROAD MOBILE SOURCES**

Airport sources including airplanes and aviation related emissions

Locomotives

Sources included in EPA's NONROAD model

**C. ON-ROAD MOBILE SOURCES**

**D. INDUSTRIAL POINT SOURCES**

Controlled Emissions

Process Fugitives

Other

**2002 CO Maintenance Plan Emissions Inventory**

Miscellaneous Area Sources

Other Combustion

Forest Wildfires

Managed Burning

Charcoal Grilling

Structure Fires

Firefighting Training

Aircraft/Rocket/Testing

**B. NON-ROAD MOBILE SOURCES**

Airport sources including airplanes and aviation related emissions

Locomotives

Sources included in EPA's NONROAD model

**C. ON-ROAD MOBILE SOURCES**

**D. INDUSTRIAL POINT SOURCES**

External Fuel Combustion

Utility Boilers

Industrial Boilers

Commercial/Institutional Boilers

Other External Fuel Combustion

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**2002 PM<sub>10</sub> LMP Emission Inventory**

**2002 CO Maintenance Plan Emissions Inventory**

Stationary Internal Combustion

Reciprocating Engines

Gas Turbines

---

Waste Disposal

Municipal Waste

Combustion

Refuse-Derived Fuel

Mass Burn

Co-Fired

Other

---

Industrial Processes

Iron and Steel Manufacture

All Processes

---

Petroleum Refineries

Mineral Products

All Processes

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## APPENDIX B. PRELIMINARY PM<sub>10</sub> EMISSION INVENTORY SUMMARY FOR SPOKANE COUNTY (DATA SOURCE: DRAFT 2002 NEI, VERSION 1)

(Does not include data from State 2002 CERR inventory submission)

Source Sector	PM <sub>10</sub> (tons)	Comments
<b>A. AREA SOURCES</b>		
Stationary Source Fuel Combustion		
Non-Residential	83.59	
Residential Non-Wood	40.09	
Residential Wood	880.616	
<hr/>		
Waste Disposal, Treatment and Recovery		
Commercial/Industrial	323.96	314.47 tons of this is logging debris (not specified by sector)
Residential	0	
Fugitive Dust		
Agricultural Tillage	3215.293	
Agricultural Windblown Dust		The NEI does not contain estimates for windblown dust.
Paved Roads	1536.09	
Unpaved Roads	3276.69	
Construction	1453.31	
<hr/>		
Other Area Sources		
Wildfires	47.63	
Prescribed Burning	6.663	
Structure Fires	4.82	
Agricultural Field Burning	678.25	
Agricultural Waste Burning	0	
Mining and Quarrying	173.51	
<hr/>		
<b>B. NON-ROAD MOBILE SOURCES</b>		
Airport sources including airplanes and aviation related emissions	7.937	
Locomotives	40.814	
Sources included in EPA's NONROAD model	232.28	
<hr/>		
<b>C. ON-ROAD MOBILE SOURCES</b>		
243.823		
<b>D. INDUSTRIAL POINT SOURCES</b>		
Controlled Emissions	150.79	
Process Fugitives	98.034	
Other	435.08	

## APPENDIX C. PRELIMINARY CO EMISSION INVENTORY SUMMARY FOR SPOKANE COUNTY (DATA SOURCE: DRAFT 2002 NEI, VERSION 1)

(Does not include data from State 2002 CERR inventory submission)

Source Sector	CO (tons)	Comments
<b>A. AREA SOURCES</b>		
Stationary Source Fuel Combustion		
Electric Utility	0	
Industrial	155.41	
Commercial/Institutional	64.95	
Residential	6701.242	
Waste Disposal, Treatment and Recovery		
On-Site Incineration		
Industrial On-site	0	
Commercial/Institutional On-Site	30.97	
Residential On-site	0	
Open Burning		
Industrial		
Commercial/Institutional	3126.22	Logging Debris (sector not specified)
Residential		
Miscellaneous Area Sources		
Other Combustion		
Forest Wildfires	489.861	
Managed Burning	4618.094	
Charcoal Grilling	0	
Structure Fires	26.8	
Firefighting Training	0	
Aircraft/Rocket/Testing	0	
<b>B. NON-ROAD MOBILE SOURCES</b>		
Airport sources including airplanes and aviation related emissions	629.04	
Locomotives	163.99	
Sources included in EPA's NONROAD model	30818.67	
<b>C. ON-ROAD MOBILE SOURCES</b>		
	76316.382	
<b>D. INDUSTRIAL POINT SOURCES</b>		
External Fuel Combustion		
Utility Boilers	0	
Industrial Boilers	15.106	
Commercial/Institutional Boilers	27.191	
Maintenance Plan and a PM <sub>10</sub> LMP Emissions		Use or disclosure of information on this page is

Source Sector	CO (tons)	Comments
Other External Fuel Combustion	0	
Stationary Internal Combustion		
Reciprocating Engines	215.692	
Gas Turbines	0	
Waste Disposal		
Municipal Waste	0	
Combustion	0	
Refuse-Derived Fuel	0	
Mass Burn	66.304	Municipal Waste
Co-Fired	0	
Other	0	
Industrial Processes		
Iron and Steel Manufacture		
All Processes	0	
Petroleum Refineries	12.912	
Mineral Products		
All Processes	74.999	
Other Industrial	23964.534	
Petroleum Storage	7.49	

## **APPENDIX D. FORMS**

**Quality Assurance Check Form**

Checked by:

Date:

Source Category	IPP Checklist			Reasonable	Comments/Sample Calculations
	In	Date	Method		
<b>Point Sources</b>					
<b>Nonroad Mobile Categories</b>					
<b>Area Source Categories</b>					

**Quality Assurance Check Form**

Checked by:

Date:

Source Category	IPP Checklist			Reasonable	Comments/Sample Calculations
	In	Date	Method		
<b>Area Source Categories</b>					
Fugitive Dust					
Paved Roads					
Unpaved Roads					
Construction Sites					
<b>Other Sources</b>					
Residential Open Burning					
Residential Wood Combustion					
<b>Mobile Source Categories</b>					
Onroad Mobile					
Tailpipe					
Brake and Tire Wear					

### Corrective Action Form

#### Initial Information

Date: \_\_\_\_\_ Initiator: \_\_\_\_\_  
 Year of Emissions Inventory: \_\_\_\_\_  
 Action Category: Missing Data    Calculation Errors    Data input    Other \_\_\_\_\_

#### Problem Identification

Agency: \_\_\_\_\_  
 Description of Problem: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

#### Recommended Corrective Action

Description: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 Referred to (person, agency): \_\_\_\_\_  
 Implementation target date: \_\_\_\_\_

#### Problem Resolution

Action taken: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 Action taken by (person, agency): \_\_\_\_\_ Date: \_\_\_\_\_  
 Corrections made to emission inventory database, if appropriate: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 Corrections made by (person): \_\_\_\_\_ Date: \_\_\_\_\_

(Please attach any supporting information)