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British Columbia
Ministry of Environment
Kootenay and Okanagan Regions

An Air Emissions Inventory for Golden, British Columbia

ENVIRONMENTAL QUALITY

Preface

This report was prepared as a necessary step to proceed with further study of air quality in the Golden airshed. The purpose of this report was to identify the potential sources of air pollutants generated within the Golden Airshed as a prerequisite for a detailed Source Apportionment Study conducted by the British Columbia Ministry of Environment. The reader is cautioned that the Emissions Inventory is a theoretical estimate of contaminants released to the air, not direct measurements. By providing this information, it is hoped that local air quality can be better understood, facilitating better decision making by local industry, governments and residents regarding air quality management.

Acknowledgments

This report was prepared by Tyler Abel, Benjamin Burkholder, Lorne Nicklason, and Paul Willis of the Ministry of Environment. The authors would like to thank the following individuals and organizations for their dedication and assistance in this project:

The Golden and District Air Quality Committee
Environment Canada
Tony Wakelin, Ministry of Water, Land, and Air Protection
Earle Plain, Ministry of Water, Land, and Air Protection
Dennis Fudge, Ministry of Water, Land, and Air Protection
Mike Brygger, Louisiana Pacific Engineered Wood Products Ltd.
Greg Switenky, Town of Golden
Kevin Houle, Canadian Pacific Railway
Carol Lance, BC Assessment
Ken Schroeder, Parks Canada and Golden resident

Cover Photo
Courtesy Golden and District Chamber of Commerce
http://www.goldenchamber.bc.ca/, Dwayne Ife

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An
Air Emissions Inventory
for
Golden, British Columbia

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February 2006

Library and Archives Canada Cataloguing in Publication Data
Abel, Tyler T.
An air emissions inventory for Golden, British Columbia

Prepared by: Tyler Abel, Benjamin Burkholder and Paul Willis.
Also available on the Internet.
Includes bibliographical references: p.
ISBN 0-7726-5287-2

1. Air quality - British Columbia - Golden. 2. Particles – Environmental aspects - British Columbia – Golden. 3. Air - Pollution - British Columbia - Golden. 4. Particles – Health aspects - British Columbia – Golden. I. Burkholder, Benjamin J. II. Willis, Paul F. III. British Columbia. Ministry of Water, Land and Air Protection. Kootenay and Okanagan Regions. Environmental Quality Section. I. Title.

TD883.148.C3A23 2005 363.739’22’0971168 C2005-960035-7

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ABBREVIATIONS AND GLOSSARY

ACE	…..	Air Contaminants Emissions Project
Airshed	…..	A geographic area where local topography and meteorology hinder the dispersion of air pollutants away from the area.
Biogenic	…..	Having to do with living organisms as sources. For example, major sources of biogenic emissions in the Kootenay Region are trees.
B.C.	…..	British Columbia
CARB	…..	California Air Resources Board
CCME	…..	Canadian Council of Ministers of the Environment
CO	…..	Carbon Monoxide
Coarse fraction	…..	Particulate matter with diameter between 2.5 and 10 microns ($PM_{10-2.5}$). Also referred to as "inhalable particulate matter."
CPR	…..	Canadian Pacific Railway
EPA	…..	United States Environmental Protection Agency
Fine fraction	…..	Particulate Matter with diameter less than 2.5 microns; $PM_{2.5.}$ Also referred to as "respirable particulate matter."
GIS	…..	Geographical Information System
GDAQC	…..	Golden and District Air Quality Committee
ICBC	…..	Insurance Corporation of British Columbia
LP	…..	Louisiana Pacific Engineered Wood Products Ltd
µg/m^3	…..	Micrograms per cubic metre (concentration)

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µm	…..	Micrometres (microns) (10^6 m) (diameter)
MOBILE 6	…..	A computer model developed by EPA for estimation of emissions from vehicles.
MWLAP	…..	B.C. Ministry of Water, Land and Air Protection (formerly Ministry of Environment, Lands and Parks - MELP)
NO_x	…..	Nitrogen Oxides
PM	…..	Particulate Matter
PM_{10}	…..	Particulate Matter with aerodynamic diameter less than or equal to 10 µm
$PM_{2.5}$	…..	Particulate Matter less aerodynamic diameter less than or equal to 2.5 µm
SO_x	…..	Sulphur Oxides
TRS	…..	Total Reduced Sulphur
TSP	…..	Total Suspended Particulate matter
VOC	…..	Volatile Organic Compound
VkmT	…..	Vehicle kilometres traveled
WLAP	…..	B.C. Ministry of Water, Land and Air Protection (formerly Ministry of Environment, Lands and Parks)

1.0 Background

PM_{10} (particulate matter with diameters less than 10 microns) levels in Golden are among the highest in B.C. communities[1]. Episodes of high PM exceeding the provincial 24-hour PM_{10} objective have prompted concerned citizens and the provincial government to take action. As a first step, the completion of a detailed emissions inventory will aid in developing airshed management strategies for Golden in the future. When complete, it is expected that the assessment provided by the emissions inventory will be used to facilitate a source apportionment study aimed at identification of contributions of specific sources to poor air quality.

PM_{10} levels in Golden are among the highest in B.C. communities.

A province-wide emissions inventory was compiled in 1995 by the Air Resources Branch[2]. In preparing this inventory, provincial estimates of point, area, and mobile sources were produced. To regionalize the data contained within the inventory, prorating factors were used to scale-down and apply provincial estimates. The Golden airshed emissions inventory used the 1995 provincial inventory as a baseline. However, in many cases these scaled-down estimates were not indicative of actual emission levels within the Golden airshed. In an effort to have more accurate figures for the localized airshed, specific local data for several sources were collected. Where appropriate methods and data were available, the local data were combined with the provincial inventory, providing a more reliable, local emissions inventory.

The baseline data used from the province-wide emissions inventory was accessed using a GIS database called the Air Contaminants Emissions Project (ACE)[3]. This database allows the user to select a given airshed, and then provides scaled-down provincial estimates for that airshed. (The airshed used for this study is indicated in Figure

[1] Air Quality Report for Golden: Summary of Fine Particulate Levels 1992 to 1997, British Columbia Ministry of Environment, Lands and Parks, December 1998.

[2] 1995 British Columbia Emissions Inventory of Common Air Contaminants and Greenhouse Gases, by Tony Wakelin for the Air Resources Branch, Ministry of Environment, Lands and Parks, May 1999.

[3] Air Contaminant Emission (ACE) Model GIS User Manual and Report, by Meira Sudds for the Air Resources Branch, Ministry of Water, Land, and Air Protection.

1.) Once this database had been accessed, sources were identified for possible improvements. These emission sources were:

Point Sources:

- Louisiana Pacific Engineered Wood Products Ltd. (or "LP")

Area Sources:

- Wood-Burning Appliances
- Construction Operations
- Agricultural Operations and Prescribed Burning
- Road Dust

Mobile Sources:

- On-road Mobile Vehicles
- Railway (Canadian Pacific Railway, or "CPR")

All other emission estimates were taken directly from ACE.

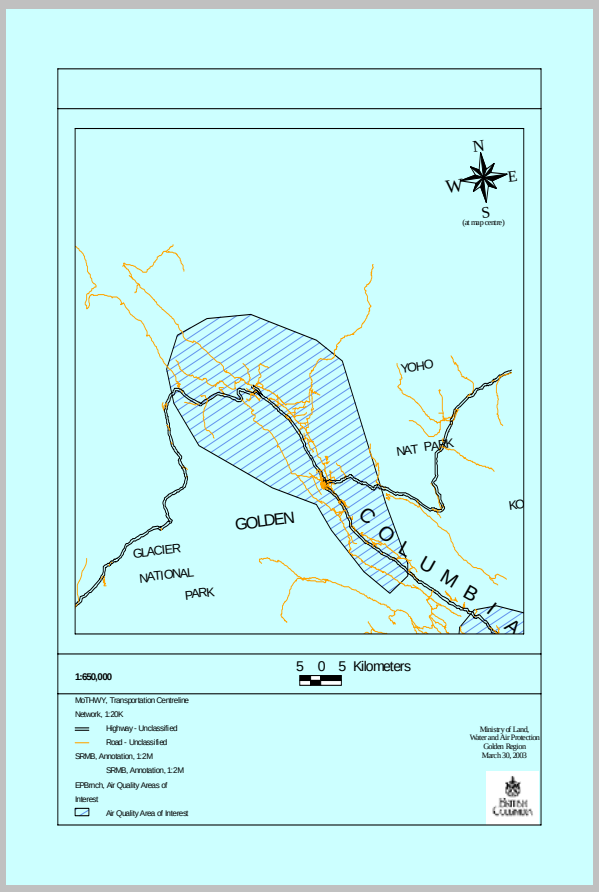

Figure 1. Golden Airshed Boundaries

1.1 Primary vs. Secondary Particulates

The total emissions reported in this inventory pertain only to primary emissions (those that are emitted directly into the atmosphere from a source). Secondary particulate matter forms in the atmosphere from a complex series of interactions between emissions of primary particles and gases.

Excluding secondary particulates is not meant to diminish the probable presence of secondary particulates, nor their potentially detrimental health effects. It is simply too difficult to quantify secondary particulates without rigorous computer-generated dispersion modelling. The results of this primary emissions inventory can be used as input for the models to theoretically identify secondary particulates formation.

1.2 Pollutants Inventoried

The list of common air contaminants inventoried for Golden are consistent with those reported in other provincial inventories. Pollutants inventoried include carbon monoxide (CO), nitrogen oxides (NO_x), sulphur oxides (SO_x), volatile organic compounds (VOC), total suspended particulate matter (TSP), particulate matter less than 10 microns in diameter (PM_{10}), and fine particulate matter less than 2.5 microns in diameter ($PM_{2.5}$).

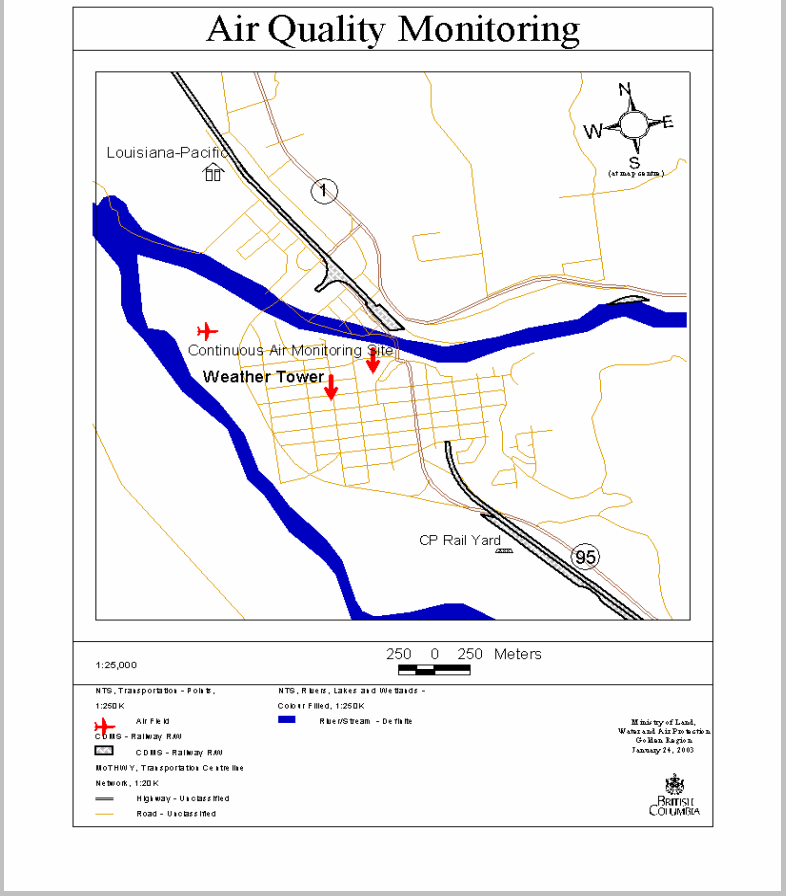

Figure 2. Air Quality Monitoring in the Town of Golden.

Total reduced sulphur (TRS) has been measured in Golden since 2002. Quantities detected have been minimal, so TRS has not been included in this inventory.

2.0 Methodology

As mentioned above, many emissions estimates were extracted from the ACE GIS database. Methods for the prorating factors used, and the development of the data contained in this database are summarized in an Air Contaminant Emissions (ACE) Project: Data Dictionary (Glen and Wakelin, 1998)[4] as well as Gibson (1998)[5] and Fam (1998)[6]. The methods that follow describe only those steps taken to improve on the estimates provided by the ACE database.

2.1 Point Sources

2.1.1 Louisiana Pacific Engineered Wood Products Ltd.

Data regarding emissions from LP were taken from its submission for the National Pollutant Release Inventory compiled by Environment Canada. This report documented air emissions from all point sources on the Golden site. The report was compiled by plant environmental staff using procedures and emission factors outlined in the NCASI Handbook of Substance-Specific Information. Fugitive dust and particulate matter estimations for mill operations are included in this inventory. However, it should be emphasized that area source emissions such as these carry significant assumptions and uncertainty.

2.2 Area Sources

2.2.1 Space Heating

In June 2003, the B. C. Ministry of Water, Land and Air Protection (presently, the Ministry of Environment) commissioned a telephone survey to study wood burning practices of British Columbia residents.

[4] Air Contaminant Emissions (ACE) Project Data Dictionary, by Allan Glen and Tony Wakelin for the Air Resources Branch, Ministry of Water, Land, and Air Protection, November 2001.

[5] British Columbia Inventory of Common Air Contaminants Emitted in 1995 from Miscellaneous Area Sources Outside of the Lower Fraser Valley, prepared by Robert Gibson for B.C. Ministry of Environment, Lands and Parks, January 1998.

[6] British Columbia Inventory of Common Air Contaminants Emitted from Mobile Sources Outside the Lower Fraser Valley, prepared by James Fam for B.C. Ministry of Environment, Lands and Parks, December 1996, Revised February 1998.

In 2003, the Ministry commissioned a telephone survey to study wood burning habits.

Using disproportionate sampling methods, a total of 2,100 wood burning appliance users were interviewed regarding their wood burning habits. The method used resulted in a margin of error for the survey of less than 10% at the 95% confidence interval. Estimates included are those provided by this recent woodstove survey of the entire province of B.C.[7]. A regional breakdown of surveys conducted in the Golden area estimated the amount of fuel burned in the region in several different types of wood-heat appliances. These estimates were combined with emission factors for the province for each type of wood-heat appliance and the total emissions for the Golden airshed were estimated.

2.2.2 Construction Operations

Emissions from construction operations were updated using local data pertaining to residential building permits and commercial project valuation. This data was combined with methods endorsed by the California Air Resources Board (CARB)[8] to produce calculations of acre-month activity for construction operations. CARB Emission factors were then used to calculate total emissions. The data supplied by the Town of Golden allowed accurate and complete estimates of emissions from this source. The estimates provided by this method were much higher than those from the 1995 provincial inventory.

2.2.3 Agricultural Operations

Methods described in the EPA document, "Fugitive Dust from Agriculture Tilling"[9], were combined with data provided by BC Assessment detailing farmland acres in the Golden airshed to provide estimates of fugitive dust emissions from agriculture. These methods served to verify the emission estimates provided for fugitive dust emissions in ACE. This lends support to the use of other previous emissions estimates based on the agriculture prorating factor used in this inventory.

[7] Woodstove Emissions in British Columbia, MWLAP, Final Draft, February 25, 2004.

[8] Building Construction Dust, Emission Inventory Methods, California Air Resources Board (http://www.arb.ca.gov/emisinv/eib.htm), Updated August, 1997.

[9] Fugitive Dust from Agriculture Tilling, Emissions Inventory Improvement Program, EIIP Document Series IX Particulate Emissions, US EPA, November, 2002. (http://www.epa.gov/ttn/chief/eiip/techreport/volume09/index.html)

One adjustment to fugitive dust emissions from agriculture was made. The size multiplier used to calculate $PM_{2.5}$ from TSP was updated based on EPA standards. In retrospect, this source would be very difficult to improve upon, without detailed information regarding activities of individual farmers.

2.2.4 Prescribed Burning / Wildfires

To produce estimates of all prescribed burns and wildfires occurring within the Golden airshed, the B.C. Ministry of Forests databases from 2000 were used, along with provincial emission factors. This estimate is static in that it does not take into account transport of pollutants from prescribed burning or wildfires (such as occurred in 2003) from outside the airshed.

2.2.5 Road Dust

Quantifying fugitive emissions from road dust continues to be an area of considerable uncertainty and non-consensus. Methods from the EPA and CARB continue to be riddled with error. It was determined that implementing such methodologies in the Golden airshed would not improve on the estimates reported in the 1995 provincial emissions inventory and those included in ACE. This is mainly because of the level of sophistication added by Environment Canada regarding snow and rainfall correction days that could not be matched in this local inventory. Even with this level of sophistication and the best available data and methods, considerable uncertainties remain in all road dust calculations.

Quantifying fugitive emissions from road dust continues to be an area of considerable uncertainty.

It has been suggested that current methods overestimate road dust emissions by 50-75%. For this reason a correction method was incorporated into the estimates as suggested by SENES[10]. This method adapts current estimates by removing the contribution of fugitive dust that is not likely to be transported to populated areas. In this inventory then, fugitive dust emissions were reduced by taking ACE totals from the immediate (populated) area around the Town of Golden. Graphs with original and corrected road dust estimates are included in this inventory. The SENES correction was also applied to appropriate fugitive dust emission sources in the Golden airshed, such as agricultural emissions and coal dust emissions.

[10] Critique of the *Air Quality Assessment of Beehive Burner Emissions Bulkley Valley, BC,* prepared by SENES Consultants Ltd., Feb. 2000.

2.2.6 Lake/Riverbed Fugitive Dust

Concern regarding fugitive dust emissions from the Columbia River and Kinbasket Lake north of the Town of Golden has been raised by the Golden and District Air Quality Committee (GDAQC). A literature search produced no methods relating directly to this emission source. Therefore, this inventory does not include any emissions from this source and further study will have to be undertaken to determine its contributions.

2.3 Mobile Sources

2.3.1 On-road Motor Vehicles

Motor vehicle emissions are estimated as the product of the number of kilometres traveled (VkmT) for each vehicle category and an emission factor (grams of contaminant per vehicle kilometre traveled). Vehicle categories include five light duty and two heavy duty classes.

VkmT was estimated using traffic statistics for the Golden airshed. VkmT for highway traffic traveling through the airshed was estimated using National Parks traffic data. Local traffic VkmT for the Town of Golden was estimated using Insurance Corporation of B.C. (ICBC) registration statistics.

The US EPA computer model MOBILE 6 was used to calculate the emission factors used in this inventory by inputting parameters such as temperature, vehicle mixes, and diesel fraction that best represented those conditions present in the Golden airshed.

Emissions from idling heavy duty diesel vehicles were also estimated, something not included in the 1995 provincial inventory. These estimates were produced using a special emission factor from MOBILE 6 and local residents' estimates of idling diesel vehicles in Golden.

Total airshed estimates produced were similar to those recorded in the 1995 provincial inventory for particulate matter, but different for other emissions. A closer examination of the division of emissions between highway and town traffic shows differences that may affect the relative impacts (or the relative estimates) of these emissions.

2.3.2 Railway (Canadian Pacific Railway)

Railway emissions were estimated using emission factors (grams of contaminant per litre fuel burned)[11] and information regarding yard and line operations obtained from Canadian Pacific Railway.

[11] Influence of Duty Cycles and Fleet Profile on Emissions from Locomotives in Canada, by Robert Dunn and Peter Eggleton for the Transportation Development Centre, Transport Canada, June 2002

Emissions from coal dust were estimated using the most recent emission factors suggested by the CCME[12] and a base quantity of coal shipped in the province of British Columbia. Coal dust emissions are also corrected and presented graphically using the SENES correction method described in Section 2.2.5.

[12] CCME (2001) *Fugitive Coal Dust Emissions in Canada*, Canadian Council of Ministers of the Environment, November, 2001.

3.0 Emissions Summary

An emissions summary is provided at the end of this report for all sources and pollutants inventoried. For easy reference, pie charts are presented along with a summary table for each pollutant inventoried. In addition, Table 1 (Appendix B) contains the complete emissions inventory.

There is a significant amount of detail included in the summary tables, but the total amount of each pollutant should be kept in perspective. The concentration of a pollutant is usually more important than the total amount. Three of the pollutants (CO, NO_x, and SO_x) are emitted in quantities low enough that they are not considered to be health or aesthetic concerns at this time. For example, during a 10-day inversion event, the calculated concentration of NO_x would approach 60 µg/m^3, which is well below the Canada maximum acceptable level of 200 µg/m^3. [13] Because most NO_x emissions are from truck and railway operations, they would be evenly dispersed through the airshed.

However, $PM_{2.5}$ is a health concern, and its emissions occur mainly in the winter. During a 10-day inversion event, the calculated concentration of $PM_{2.5}$ would approach 14 µg/m^3 for the airshed as a whole, but could reach higher levels close to the source of emissions (i.e., space heating in Golden townsite). These levels could well exceed the health reference level (15 µg/m^3) established by the NAAQOs.

Note that this theoretical 10-day inversion event assumes a mixing height of 1,000 m. Lower mixing heights are quite common during the winter season and would result in higher concentrations of all contaminants.

3.1 Carbon Monoxide (CO)

Light duty vehicles emit the most CO into the Golden airshed (Figure 3) at 46% of the total CO loading. Heavy duty vehicles and space heating contribute 22% and 10% respectively. These three sources account for almost 80% of all the CO emissions in the airshed.

3.2 Nitrogen Oxides (NO_x)

Line and yard operations from Canadian Pacific Railway locomotives in the Golden airshed account for 53% of all NO_x emissions (Figure 4). As expected mobile sources are the top

[13] The concentration during a ten day inversion event is calculated by first estimating the amount of pollutant (NOx) that is emitted during the period. From Figure 4, 1444 tonnes are emitted per year, so in ten days 10/365 x 1444 tonnes = 40 tonnes would be emitted. (For $PM_{2.5}$, it is assumed that 90% of the space heating emissions occur in winter: see Section 3.8.) The area of the Golden airshed is 630 km^2, and if a 1 km mixing height is assumed, the volume is 630 km^3.

Hence, the concentration of NOx would be 40 tonnes/630 km^3 => 63 µg/m^3.

three emitters of NO_x in the airshed, with locomotives, heavy duty vehicles (31%), and light duty vehicles (7%) accounting for the majority of the emissions.

Nitrogen oxides emissions are important precursors to ground-level ozone formation (smog)[14]. In addition, NO_x can be converted to secondary particulates such as particulate nitrate. Because these particles are good at scattering visible light, their presence can result in significant visibility degradation.

3.3 Sulphur Oxides (SO_x)

Line and yard operations from Canadian Pacific Railway locomotives account for most of the SO_x emissions in the airshed (70%). Space heating and light duty vehicles are relatively minor sources at 12% and 11%, respectively (Figure 5).

SO_x emissions are also precursors to secondary particulate formation. These emissions readily convert to secondary sulphate particles that contribute to visibility degradation, particulate matter, and acid rain.

[14] Inventory of Common Air Contaminants Emitted in the Quesnel Airshed, by Earle Plain, Ministry of Environment, Lands and Parks for the Quesnel Air Quality Roundtable, May 2001.

3.4 Volatile Organic Compounds (VOCs)

VOC emissions are primarily dominated by biogenic sources (from living organisms such as trees) at 86% (Figure 6). Other sources do not contribute significantly to VOC emissions when compared with the biogenic emissions.

VOC emissions are also important precursors to secondary particulates and therefore contribute to poor air quality and visibility impairment.

3.5 Total Suspended Particulates (TSP)

It should be re-iterated that the measures of Total Suspended Particulates, PM_{10}, and $PM_{2.5}$ do not include secondary particulates. Total particulate includes particles of all diameters, both coarse and fine. Road dust from paved and unpaved roads accounts for over 52% of the total particulate matter in the Golden airshed (Figure 7). Louisiana Pacific Engineered Wood Products Ltd. contributes 24% of TSP in the Golden Airshed: two thirds of LP's contribution is fugitive dust from yard operations.

Paved road dust is generated by the grinding action of vehicles travelling over all types of material that has been deposited on the road by wind action or directly from vehicles (i.e., mud, brake linings, tire wear). The large amount of

highway traffic and traction material in winter adds to the considerable contribution from paved road dust.

3.6 PM_{10}

Once again, road dust from paved and unpaved roads contributes a large amount (22%) of PM_{10} emissions (Figure 8). Louisiana Pacific is a significant contributor at 23%. Space heating and prescribed burning are estimated at 15% and 8% of emissions respectively; however these contributors are expected to be in higher proportion in the fine fraction ($PM_{2.5}$).

Particles with a diameter of 10 microns or smaller are less of a health concern than the finer $PM_{2.5}$ because they do not penetrate as deeply into the lungs of humans.

3.7 $PM_{2.5}$

Space heating (mostly from wood stove operation) is estimated to be the top contributor to $PM_{2.5}$ emissions in the Golden airshed at 30% (Figure 9). Prescribed burning, road dust, wildfires and LP emissions are each estimated to be between 10% and 15%.

Whereas larger particulates (PM_{10}) are dominated by road dust, fine particulates ($PM_{2.5}$) are dominated by emissions from combustion sources, as evident by the greater contributions from space heating, prescribed burning, Louisiana Pacific ($PM_{2.5}$ emissions from LP is mainly due to the powerhouse boiler, a combustion source), and wildfires. Fine particulate is of greater concern because of the serious health implications of the small diameter particles entering further into the lungs than the coarse fraction[15]. Thus, sources attributed to high $PM_{2.5}$ should be given high priority in airshed management. These particles are also of concern because of their contribution to poor visibility.

3.8 Seasonal Particulate Matter

To analyze seasonal differences in PM, particulate emissions, or portions of emissions, from all sources were allocated into two seasons, summer and winter, using the following assumptions. Agricultural emissions were assumed to be strictly summer emissions. Space heating emissions were assumed to be 90% winter and 10% summer. On-road vehicle emissions were split into seasons using outputs of MOBILE 6 and seasonal VkmT. Railway emissions were split into seasons using activity data supplied by CPR. Railway coal dust was assumed to be emitted at 30% in the winter and 70% in the summer. Wildfires were assumed to be summer only emissions. Road dust emissions

[15] Particulate matter with diameter between 2.5 and 10 microns ($PM_{10-2.5}$). Also referred to as "inhalable particulate matter."
This is contrast to the so-called "fine fraction" which is articulate matter with diameter less than 2.5 microns; $PM_{2.5}$. Also referred to as "respirable particulate matter."

were split based on 60% winter and 40% summer. All other sources were assumed to be evenly split between the two seasons. The results of these seasonal inventories can be seen in Figures 10 and 11.

In both summer and winter, road dust and Louisiana Pacific are major contributors to coarse fraction PM in the Golden airshed. In general, fugitive dust emissions from crustal materials (i.e. agriculture) are more prevalent in the summer season. On the other hand, sources such as space heating have much more influence on particulate levels in the winter months. Although the seasonal inventories are based on assumptions, they demonstrate that estimations of emissions on a tonnage/year basis are limited in their applicability when there are seasonal fluctuations. The source apportionment study slated for Golden will hopefully be able to clarify the sources of seasonal variation in particulate matter levels and types.

Emissions inventories are only estimates of the real conditions of the atmosphere.

3.9 Uncertainties in Emissions Inventories

It must be remembered that emissions inventories are most often only estimations of the actual amounts and sources of contaminants in the atmosphere. In airsheds like that of Golden there are typically four main sources of uncertainty:

- **Emission characterizations are difficult to measure.** Road dust is estimated from similar studies done elsewhere. Also, secondary atmospheric transformations can only be mathematically estimated; more often they are neglected.

- **The inventory is only as good as the data provided to the analyst**. Much of the data are from a province-wide inventory, which itself had some uncertainties. The accuracy of industrial emissions (i.e., CPR and LP) depends on their sampling and reporting methods.

- **Conflicting spatial scales of ambient conditions.** Because of budget limitations, monitors that measure ambient levels of contaminants are typically located at sites where there can best indicate the airshed conditions as a whole, over

distances of tens of kilometres. However, conditions often vary greatly at the micro-scale (i.e., a few city blocks). Thus, for example, the single monitor in an airshed may be recording only moderate levels of a contaminant while single households are experiencing poor air quality conditions because of a very localized source (e.g., the inefficient use of a neighbouring wood-burning appliance).

- **Unreported sources.** Many emission sources, or their levels of contribution, are difficult to ascertain. Examples include recreational vehicles, such as snowmobiles and ATVs (all terrain vehicles). Often these vehicles utilize two-stroke engines whose inefficient combustion processes emit more particulate matter. This inventory did not attempt to quantify such emissions.

4.0 Conclusions

Of major concern to the Golden and District Air Quality Committee is the high particulate matter levels recorded in the Town. While there are uncertainties associated with estimating emissions from road dust, it appears that road dust could be a major source of particulate matter in the Golden airshed. Prescribed burning, space heating, and Louisiana Pacific are also sources of particulate matter that should be of concern, especially because of their contributions to the fine fraction.

For other atmospheric contaminants, local industry and vehicular contributions are the major sources. The exception to this is the naturally produced contribution that plants and trees make to the ambient levels of VOC. Mobile sources dominate the emissions for CO. Emissions from the CPR switching yard and line activities contribute most of the SOx loadings and NOx emissions in the airshed.

These emissions are of concern because of their ability to combine with other particles and gases to form secondary particulates. This emissions inventory does not quantify secondary particulates, but it is plausible that they could be a key contributor to high particulate levels in Golden. Formation of secondary particulates needs to be investigated further through dispersion modelling.

Much of the PM levels in Golden are attributable to road dust, prescribed burning, space heating and LP operations.

VOC levels are mainly due to biogenic emissions.

CPR operations, vehicle traffic, and Louisiana Pacific are the major contributors to ambient SO_x.

NO_x levels are mostly due to CPR operations and other mobile sources.

Secondary particulate matter needs further analysis.

There are inherent uncertainties in emissions inventories.

Emissions inventories are estimations. Though one must recognize the inherent uncertainties with such an analysis, they are regarded as one more important tool in understanding the state of the atmosphere and providing for airshed management strategies that are science-based.

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5.0 Recommendations

- MoE incorporate the results of this inventory when determining permitted emission levels.
- MoE staff perform a wind sector analysis to complement this inventory to further elucidate possible sources of particulate matter in the airshed.
- MoE incorporate the results of this inventory into a dispersion model for this airshed. This is the logical next step in airshed management planning: to estimate how these emissions evolve spatially and temporally.
- MoE use the results of this inventory to cross-reference the results of the Golden Source Apportionment Study.
- The GDAQC use the results of this inventory to assist in the development an Airshed Management Plan.

Appendix A: Graphical Summaries of Data

SOURCE	CO (tonnes/year)	% of Total
Agricultural Burning	6.8	0.1
Back Yard Burning	9.9	0.2
Heavy-Duty Vehicles	1083.5	21.6
Light-Duty Vehicles	2281.4	45.5
Off-Road	8.2	0.2
Other Misc	59.5	1.2
Prescribed Burning	427.1	8.5
Railways Traffic	25.6	0.5
Space Heating	489.7	9.8
Wildfires	220.1	4.4
Wood Products (both point source and yard operations)	398.6	8.0
	5010.4	100.0

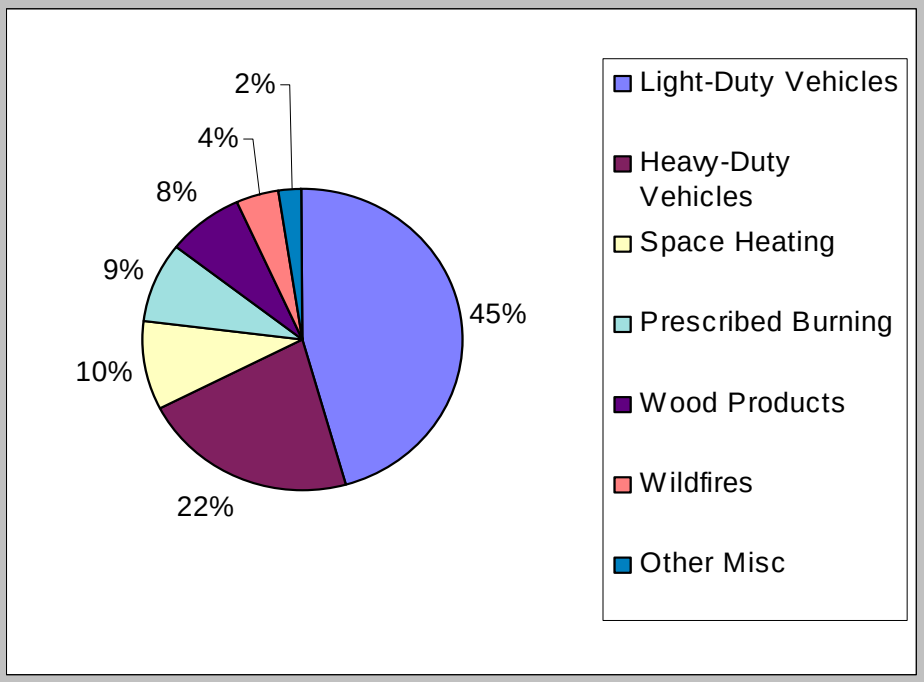


Figure 3. ***Carbon Monoxide Emissions in the Golden Airshed***

SOURCE	NOx (tonnes/year)	% of Total
Biogenics	9.4	0.6
Heavy-Duty Vehicles	448.1	31.0
Light-Duty Vehicles	107.2	7.4
Off-Road	25.8	1.8
Other Misc	5.8	0.4
Prescribed Burning	7.1	0.5
Railways Traffic	765.0	53.0
Space Heating	9.5	0.7
Wood Products (both point source and yard operations)	65.8	4.6
	1443.7	100.0

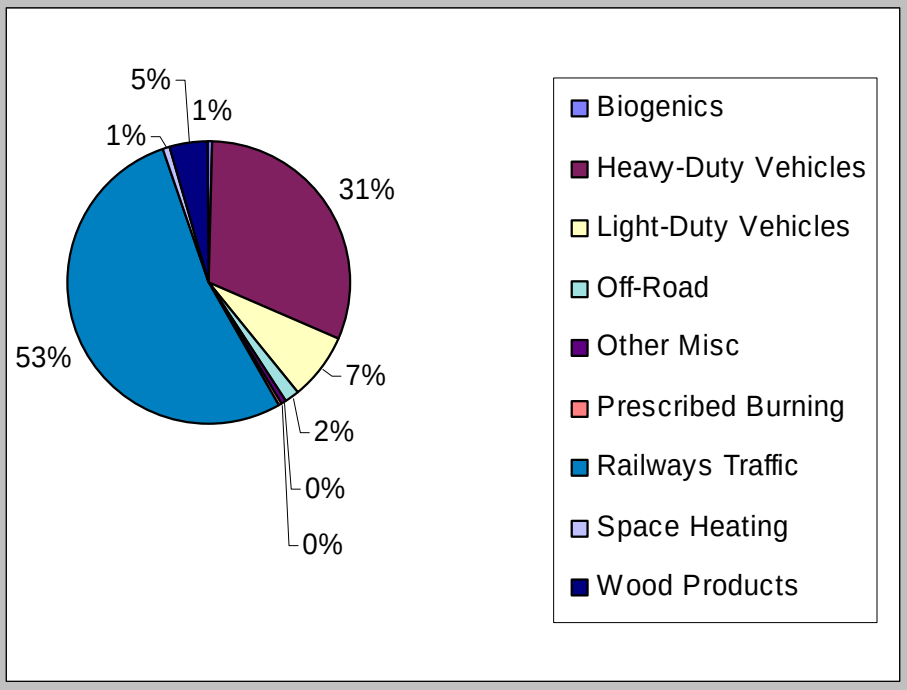


Figure 4. ***Nitrogen Oxides (NO_x) Emissions in the Golden Airshed***

SOURCE	SOx (tonnes/year)	% of Total
Heavy-Duty Vehicles	2.9	3.7
Light-Duty Vehicles	8.3	10.6
Off-Road	0.5	0.4
Prescribed Burning	0.2	0.2
Railways Traffic	54.8	70.1
Space Heating	2.0	2.6
Wood Products (both point source and yard operations)	9.5	12.2
	78.4	100.0

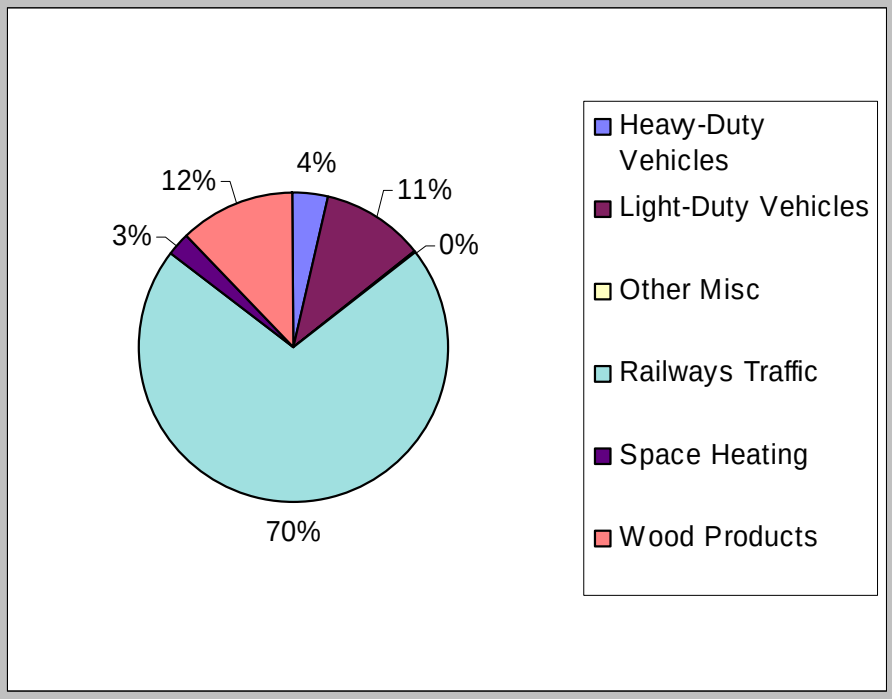


Figure 5. ***Sulphur Oxides (SO_x) Emissions in the Golden Airshed***

SOURCE	VOC (tonnes/year)	% of Total
Biogenics	3637.3	85.2
Heavy-Duty Vehicles	86.8	2.0
Light-Duty Vehicles	159.3	3.7
Other Misc	53.20	1.3
Railways Traffic	38.9	0.9
Space Heating	125.1	2.9
Wood Products (both point source and yard operations)	61.10	1.4
	4225.13	100.0

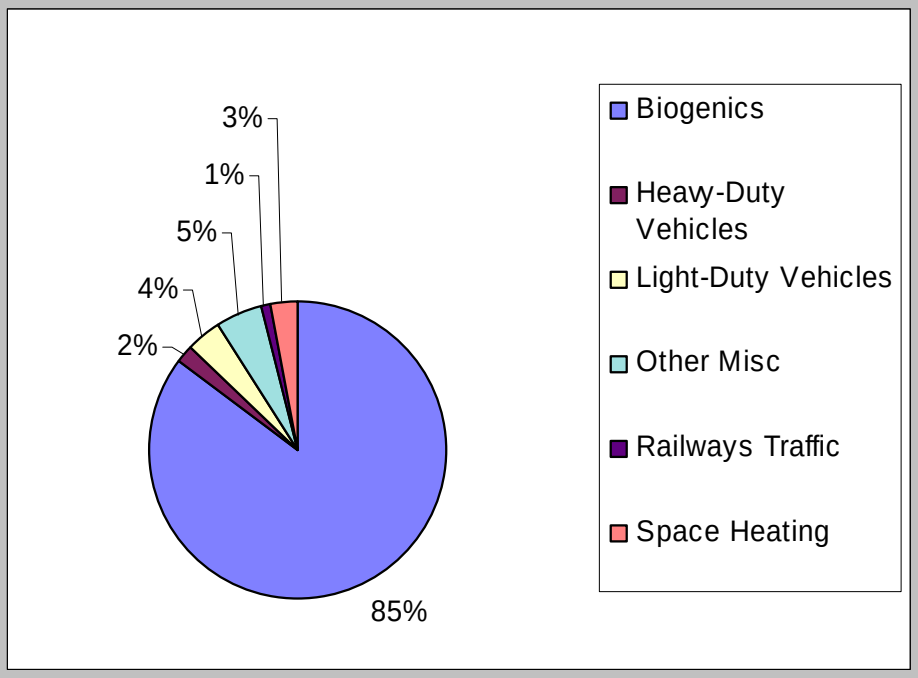


Figure 6. ***Volatile Organic Compound (VOC) Emissions in the Golden Airshed***

SOURCE	Total Particulate (tonnes/year)	% of Total
Agriculture	62.7	4.0
Gravel Pits	28.9	1.8
Other Misc	49.6	3.1
Prescribed Burning	59.9	3.8
Railways (coal dust)	59.56	3.8
Road Dust (paved)	649.5	41.2
Road Dust (unpaved)	164.7	10.5
Space Heating	89.3	5.7
Wildfires	42.3	2.7
Wood Products (point source)	107.9	6.9
Wood Products (yard operations)	260.6	16.5
	1574.85	100.0

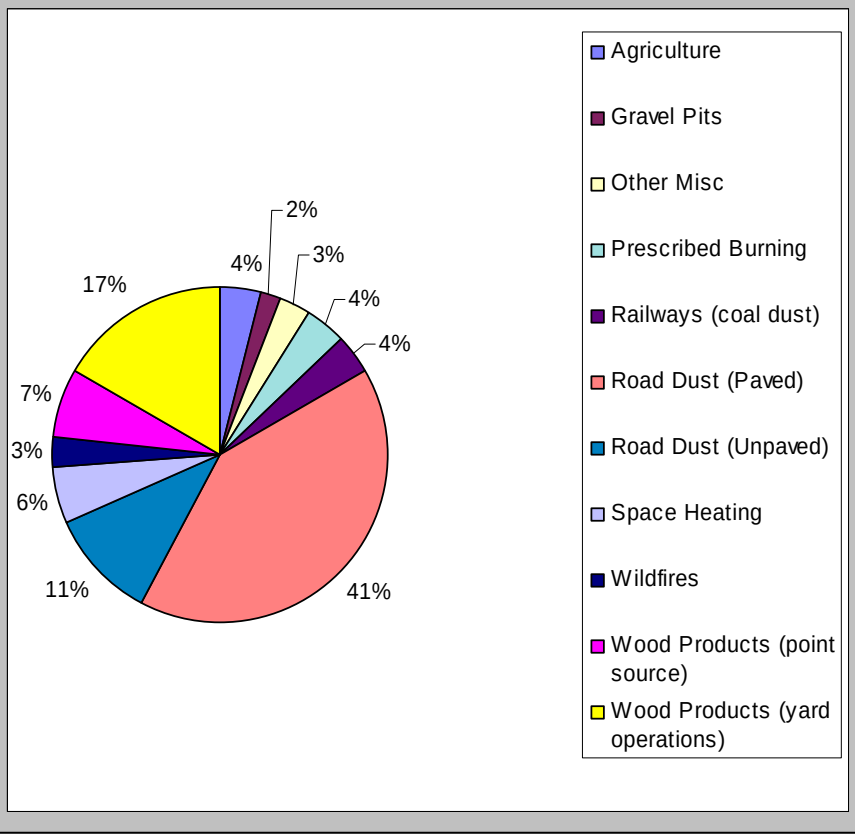


Figure 7. ***Total Suspended Particulate (TSP) Emissions in the Golden Airshed***

ENVIRONMENTAL QUALITY

SOURCE	PM_{10} (tonnes/year)	% of Total
Agriculture	23.8	4.2
Heavy-Duty Vehicles	15.2	2.7
Other Misc	19.2	3.4
Prescribed Burning	45.9	8.1
Railways (coal dust)	29.8	5.2
Railways Traffic	12.2	2.1
Road Dust (paved)	124.5	21.9
Road Dust (unpaved)	52.3	9.2
Space Heating (wood)	84.1	14.8
Wildfires	32.4	5.7
Wood Products (point source)	65.1	11.5
Wood Products (yard operations)	63.0	11.1
	567.30	100.0

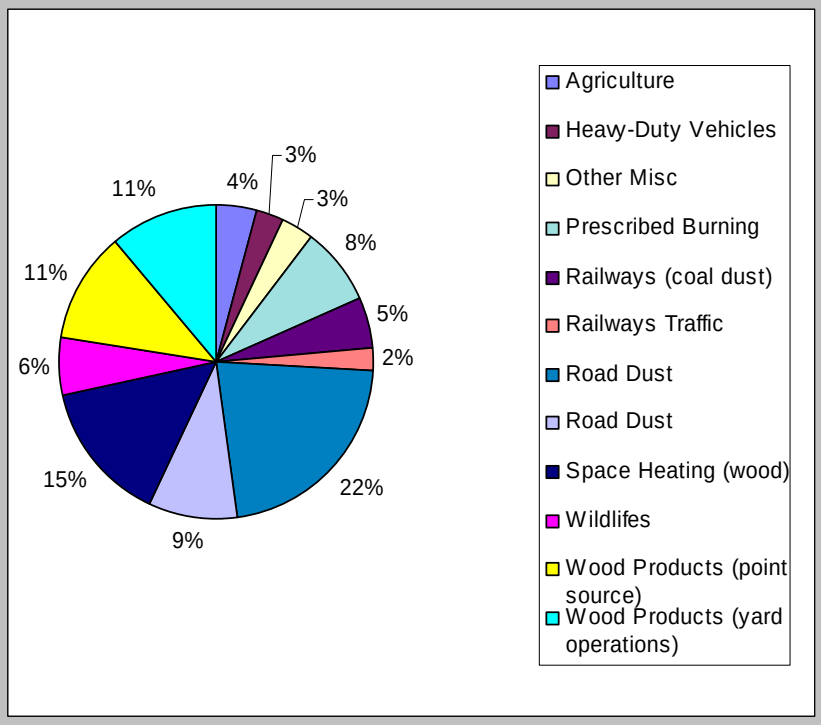


Figure 8. ***PM_{10} Emissions in the Golden Airshed***

SOURCE	PM 2.5 (tonnes/year)	% of Total
Agriculture	11.2	4.0
Heavy-Duty Vehicles	13.1	4.7
Other Misc	12.2	4.4
Prescribed Burning	40.4	14.5
Railways (coal dust)	11.9	4.3
Railways Traffic	11.2	4.0
Road Dust (paved)	29.8	10.7
Road Dust (unpaved)	7.7	2.8
Space Heating (wood)	84.1	30.1
Wildfires	29.1	10.4
Wood Products (point source)	18.0	6.4
Wood Products (yard operations)	10.3	3.7
	279.1	100.0

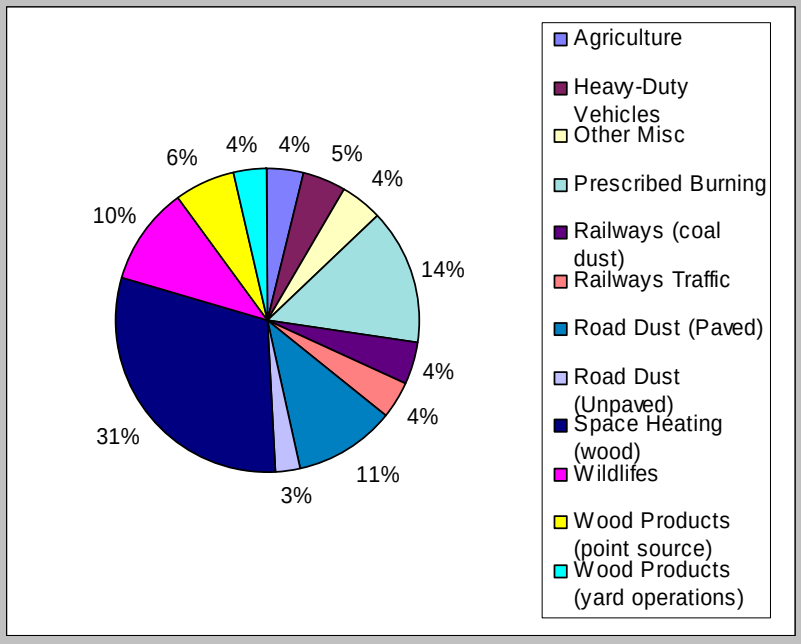
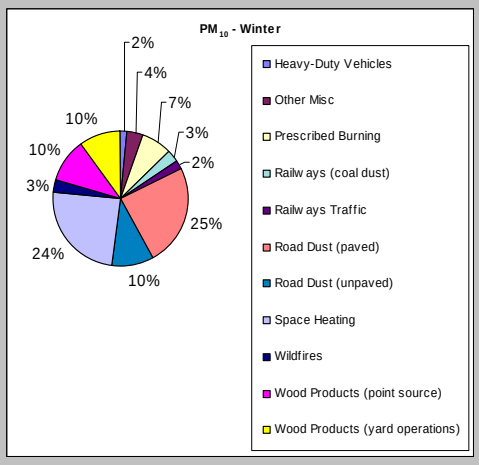


Figure 9. ***$PM_{2.5}$ Emissions in the Golden Airshed***

ENVIRONMENTAL QUALITY

Source	WinterPM10	% of Total	SummerPM10	% of Total
Agriculture	0.0	0.0	23.8	8.7
Heavy-Duty Vehicles	5.0	1.7	10.2	3.7
Other Misc	12.5	4.3	24.1	8.8
Prescribed Burning	22.9	7.8	22.9	8.4
Railways (coal dust)	8.9	3.0	20.8	7.6
Railways Traffic	6.2	2.1	6.0	2.2
Road Dust (paved)	74.7	25.4	49.8	18.2
Road Dust (unpaved)	31.4	10.7	20.9	7.6
Space Heating	75.7	25.8	8.4	3.1
Wildfires	9.7	3.3	22.7	8.3
Wood Products (point source)	32.5	11.1	32.5	11.9
Wood Products (yard operations)	31.5	10.7	31.5	11.5
	293.6		273.6	100.0



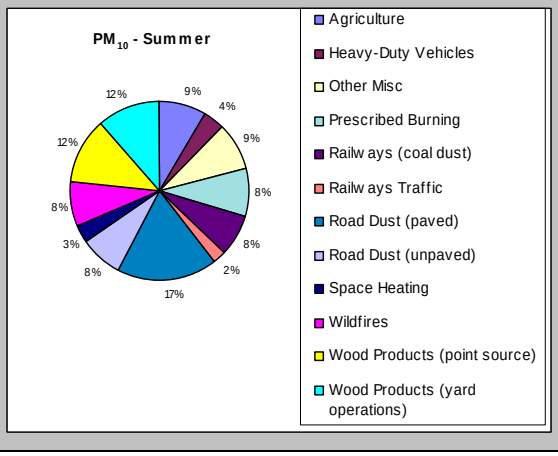
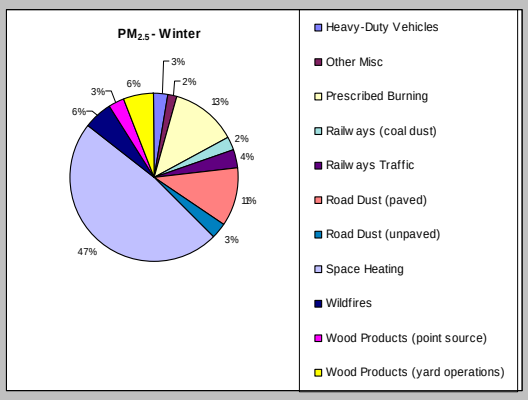


Figure 10. ***Seasonal Particulate Matter (PM_{10})***

ENVIRONMENTAL QUALITY

Source	WinterPM2.5	% of Total	Summer PM2.5	% of Total
Agriculture	0.0	0.0	11.2	9.4
Heavy-Duty Vehicles	4.3	2.7	8.8	7.3
Other Misc	4.3	2.7	12.7	10.6
Prescribed Burning	20.2	12.7	20.2	16.9
Railways (coal dust)	3.6	2.2	3.6	3.0
Railways Traffic	5.7	3.6	5.5	4.6
Road Dust (paved)	17.9	11.2	11.9	9.9
Road Dust (unpaved)	4.7	2.9	3.1	2.6
Space Heating	75.7	47.4	8.4	7.0
Wildfires	8.7	5.5	20.4	17.0
Wood Products (point source)	5.2	3.2	5.2	4.3
Wood Products (yard operations)	9.0	5.6	9.0	7.5
	159.2		119.9	100.0



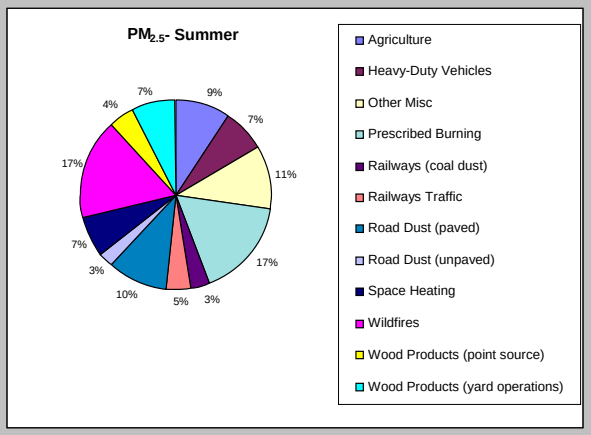


Figure 11. ***Seasonal Particulate Matter ($PM_{2.5}$)***

Appendix B: Table 1. Summary of Emissions to Golden Airshed (Tonnes/Year)

Emissions Source	Emissions Category	Emissions Process	CO	NOx	SOx	TRS	VOC	Part	PM10	PM2.5
Area	Agriculture	CATTLE	0.00	0.00	0.00	0.00	26.62	2.40	0.19	0.05
Area	Agriculture	FERTILIZER APPLIED	0.00	0.00	0.00	0.00	0.00	0.43	0.21	0.06
Area	Agriculture	FERTILIZER NITROGEN	0.00	1.36	0.00	0.00	0.00	0.00		
Area	Agriculture	FUGITIVE EMISSION AGRICULTURAL	0.00	0.00	0.00	0.00	0.00	21.65	4.55	2.17
Area	Agriculture	HORSES	0.00	0.00	0.00	0.00	0.72	0.21	0.02	0.00
Area	Agriculture	PESTICIDES	0.00	0.00	0.00	0.00	0.22	0.00	0.00	0.00
Area	Agriculture	PESTICIDES APPLIED	0.00	0.00	0.00	0.00	0.00	0.76	0.37	0.11
Area	Agriculture	PIGS	0.00	0.00	0.00	0.00	0.05	0.23	0.02	0.00
Area	Agriculture	POULTRY	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Area	Agriculture	SHEEP	0.00	0.00	0.00	0.00	0.27	0.18	0.01	0.00
Area	Agriculture	WIND EROSION	0.00	0.00	0.00	0.00	0.00	36.78	18.39	8.83
	AGRICULTURE	**TOTAL EMISSIONS**	**0.00**	**1.36**	**0.00**	**0.00**	**27.87**	**62.65**	**23.76**	**11.22**
Area	Miscellaneous Burning	AGRICULTURAL BURNING	6.77	0.05	0.00	0.00	0.87	1.16	1.15	1.05
Area	Miscellaneous Burning	BACK YARD BURNING	9.92	0.71	0.12	0.00	3.54	1.89	1.87	1.70
Area	Miscellaneous Burning	BIO-MED/CREMAT/ANIMAL INCINERATION	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.01
Area	Miscellaneous Burning	STRUCTURAL FIRES	0.62	0.01	0.00	0.00	0.05	0.04	0.04	0.04
	MISCELLANEOUS BURNING	**TOTAL EMISSIONS**	17.32	0.78	0.12	0.00	4.47	3.10	3.07	2.79
Area	**PRESCRIBED BURNING**	**TOTAL EMISSIONS**	427.11	7.12	0.21	0.00	17.88	59.92	45.85	40.41
Area	Oil and Gas	LOADING AND TANKAGE EMISSIONS AT BULK PLANTS	0.00	0.00	0.00	0.00	4.04	0.00		
Area	Oil and Gas	LOADING AND TANKAGE EMISSIONS AT BULK TERMINALS	0.00	0.00	0.00	0.00	3.47	0.00		
Area	Oil and Gas	TANKS, REFUELING & SPILLS AT AUTO SERV STATIONS	0.00	0.00	0.00	0.00	12.11	0.00		
	OIL AND GAS	**TOTAL EMISSIONS**	**0.00**	**0.00**	**0.00**	**0.00**	**19.62**	**0.00**	**0.00**	**0.00**

Emissions Source	Emissions Category	Emissions Process	CO	NOx	SOx	TRS	VOC	Part	PM10	PM2.5
Area	Other	BAKERIES	0.00	0.00	0.00	0.00	0.10	0.00		
Area	Other	BARBECUES	0.00	0.00	0.00	0.00	0.00	0.36	0.36	0.36
Area	Other	BREWERIES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Area	Other	COMMERICAL-LIGHT INDUSTRIAL GENERAL PARTICULATE	0.00	0.00	0.00	0.00	0.00	0.76	0.43	0.31
Area	Other	CUT BACK ASPHALT APPLICATION	0.00	0.00	0.00	0.00	2.95	0.00		
Area	Other	FUGITIVE EMISSION CONSTRUCTION - RESIDENTIAL	0.00	0.00	0.00	0.00	0.00	4.08	2.64	0.53
Area	Other	FUGITIVE EMISSION CONSTRUCTION - COMMERCIAL	0.00	0.00	0.00	0.00	0.00	4.23	2.74	0.55
Area	Other	FUGITIVE EMISSION CONSTRUCTION - INDUSTRIAL	0.00	0.00	0.00	0.00	0.00	0.56	0.36	0.07
Area	Other	FUGITIVE EMISSION CONSTRUCTION - INSTITUTIONAL	0.00	0.00	0.00	0.00	0.00	2.57	1.66	2.57
Area	Other	GRAVEL PITS	0.00	0.00	0.00	0.00	0.00	28.86	1.65	0.00
Area	Other	LANDFILLS MUNICIPAL	0.00	0.00	0.00	0.00	2.49	0.62	0.05	0.01
Area	Other	RESTURANTS	0.00	0.00	0.00	0.00	0.00	0.40	0.40	0.37
Area	Other	TOBACCO	0.27	0.01	0.00	0.00	0.00	0.36	0.36	0.36
Area	Other	WELDING SHOPS	0.00	0.00	0.00	0.00	0.00	0.29	0.29	0.29
	OTHER	**TOTAL EMISSIONS**	**0.27**	**0.01**	**0.00**	**0.00**	**5.55**	**43.09**	**10.94**	**5.42**
Area	Solvent Evaporation	APPLICATION OF ARCHITECTURAL COATINGS	0.00	0.00	0.00	0.00	4.59	0.00		
Area	Solvent Evaporation	APPLICATION OF COATINGS - AUTO REFINISHING	0.00	0.00	0.00	0.00	1.47	0.00		
Area	Solvent Evaporation	APPLICATION OF COATINGS - GENERAL INDUSTRIAL	0.00	0.00	0.00	0.00	2.68	0.00		
Area	Solvent Evaporation	CONSUMER PRODUCTS	0.00	0.00	0.00	0.00	11.59	0.00		
Area	Solvent Evaporation	DRY CLEANING	0.00	0.00	0.00	0.00	0.55	0.00		
Area	Solvent Evaporation	GLUES ADHESIVES SEALANTS	0.00	0.00	0.00	0.00	0.60	0.00		
Area	Solvent Evaporation	METAL DEGREASING	0.00	0.00	0.00	0.00	1.97	0.00		
Area	Solvent Evaporation	PRINTING INKS	0.00	0.00	0.00	0.00	2.41	0.00		
	SOLVENT EVAPORATION	**TOTAL EMISSIONS**	**0.00**	**0.00**	**0.00**	**0.00**	**25.86**	**0.00**	**0.00**	**0.00**

Emissions Source	Emissions Category	Emissions Process	CO	NOx	SOx	TRS	VOC	Part	PM10	PM2.5
Area	**WOOD PRODUCTS**	**Fugitive: TOTAL EMISSIONS**	**0.00**	**0.00**	**0.00**	**0.00**	**0.20**	**260.60**	**63.00**	**10.30**
Area	Space Heating	FUEL OIL COMM/IND	0.05	0.22	0.33	0.00	0.00	0.02	0.01	0.01
Area	Space Heating	LPG COMMERCIAL	0.04	0.34	0.00	0.00	0.01	0.01	0.01	0.01
Area	Space Heating	LPG RESIDENTIAL	0.02	0.19	0.00	0.00	0.01	0.01	0.01	0.00
Area	Space Heating	OIL RESIDENTIAL	0.08	0.29	0.48	0.00	0.01	0.04	0.02	0.02
Area	Space Heating (wood)	Central Furnace/Boiler (outside)								
Area	Space Heating (wood)	Fireplace Insert; Advanced Technology								
Area	Space Heating (wood)	Fireplace Insert; Catalytic								
Area	Space Heating (wood)	Fireplace Insert; Conventional								
Area	Space Heating (wood)	Fireplace; Advanced Technology								
Area	Space Heating (wood)	Fireplace; Conventional Without Glass Doors								
Area	Space Heating (wood)	Woodstove; Advanced Technology								
Area	Space Heating (wood)	Woodstove; Catalytic								
Area	Space Heating (wood)	Woodstove; Conventional								
Area	Space Heating	Pellet Stoves	0.7	0.1	0	0	0.1	0.1	0.1	0.1
Area	Space Heating (wood)	all types (except Pellet)	488.80	8.40	1.20	0.00	125.00	89.10	84.00	84.00
	SPACE HEATING	**TOTAL EMISSIONS**	**489.70**	**9.54**	**2.01**	**0.00**	**125.13**	**89.28**	**84.15**	**84.14**
AREA	**AREA**	**TOTAL EMISSIONS**	**934.40**	**18.80**	**2.34**	**0.00**	**226.59**	**518.65**	**230.75**	**154.28**
Mobile	Heavy-Duty Vehicles	HDDV, CITY, OTHER VEHICLE EMISSIONS	45.11	69.46	0.93	0.00	0.00	4.38	2.36	2.04
Mobile	Heavy-Duty Vehicles	HDDV, CITY, VEHICLE HYDROCARBONS	0.00	0.00	0.00	0.00	9.57	0.00		
Mobile	Heavy-Duty Vehicles	HDDV, HIGHWAY, OTHER VEHICLE EMISSIONS	239.83	332.91	1.66	0.00	0.00	7.77	11.13	9.77
Mobile	Heavy-Duty Vehicles	HDDV, HIGHWAY, VEHICLE HYDROCARBONS	0.00	0.00	0.00	0.00	39.60	0.00		
Mobile	Heavy-Duty Vehicles	HDDV, HIGHWAY, IDLING PM EMISSIONS						0.43	0.43	0.39

Emissions Source	Emissions Category	Emissions Process	CO	NOx	SOx	TRS	VOC	Part	PM10	PM2.5
Mobile	Heavy-Duty Vehicles	HDGV, CITY, OTHER VEHICLE EMISSIONS	533.45	32.12	0.10	0.00	0.00	0.07	0.87	0.64
Mobile	Heavy-Duty Vehicles	HDGV, CITY, VEHICLE HYDROCARBONS	0.00	0.00	0.00	0.00	26.31	0.00		
Mobile	Heavy-Duty Vehicles	HDGV, HIGHWAY, OTHER VEHICLE EMISSIONS	265.07	13.57	0.19	0.00	0.00	0.12	0.39	0.28
Mobile	Heavy-Duty Vehicles	HDGV, HIGHWAY, VEHICLE HYDROCARBONS	0.00	0.00	0.00	0.00	11.35	0.00		
	HEAVY-DUTY VEHICLES	**TOTAL EMISSIONS**	**1083.46**	**448.06**	**2.88**	**0.00**	**86.83**	**12.77**	**15.18**	**13.12**
Mobile	Light-Duty Vehicles	LDDT, CITY, OTHER VEHICLE EMISSIONS	0.63	0.51	0.05	0.00	0.00	0.16	0.07	0.06
Mobile	Light-Duty Vehicles	LDDT, CITY, VEHICLE HYDROCARBONS	0.00	0.00	0.00	0.00	0.34	0.00		
Mobile	Light-Duty Vehicles	LDDT, HIGHWAY, OTHER VEHICLE EMISSIONS	2.02	1.55	0.04	0.00	0.00	0.14	0.25	0.21
Mobile	Light-Duty Vehicles	LDDT, HIGHWAY, VEHICLE HYDROCARBONS	0.00	0.00	0.00	0.00	1.03	0.00		
Mobile	Light-Duty Vehicles	LDDV, CITY, OTHER VEHICLE EMISSIONS	0.08	0.06	0.04	0.00	0.00	0.13	0.01	0.01
Mobile	Light-Duty Vehicles	LDDV, CITY, VEHICLE HYDROCARBONS	0.00	0.00	0.00	0.00	0.04	0.00		
Mobile	Light-Duty Vehicles	LDDV, HIGHWAY, OTHER VEHICLE EMSSIONS	0.25	0.19	0.03	0.00	0.00	0.10	0.03	0.03
Mobile	Light-Duty Vehicles	LDDV, HIGHWAY, VEHICLE HYDROCARBONS	0.00	0.00	0.00	0.00	0.11	0.00		
Mobile	Light-Duty Vehicles	LDGT12, CITY, OTHER VEHICLE EMISSIONS	135.51	6.78	1.46	0.00	0.00	0.57	0.13	0.07
Mobile	Light-Duty Vehicles	LDGT12, CITY, VEHICLE HYDROCARBONS	0.00	0.00	0.00	0.00	8.74	0.00		
Mobile	Light-Duty Vehicles	LDGT12, HIGHWAY, OTHER VEHICLE EMISSIONS	435.52	19.79	1.10	0.00	0.00	0.45	0.39	0.23
Mobile	Light-Duty Vehicles	LDGT12, HIGHWAY, VEHICLE HYDROCARBONS	0.00	0.00	0.00	0.00	27.81	0.00		

Emissions Source	Emissions Category	Emissions Process	CO	NOx	SOx	TRS	VOC	Part	PM10	PM2.5
Mobile	Light-Duty Vehicles	LDGT34, CITY, OTHER VEHICLE EMISSIONS	182.59	7.78	0.08	0.00	0.00	0.04	0.15	0.09
Mobile	Light-Duty Vehicles	LDGT34, CITY, VEHICLE HYDROCARBONS	0.00	0.00	0.00	0.00	14.08	0.00		
Mobile	Light-Duty Vehicles	LDGT34, HIGHWAY, OTHER VEHICLE EMISSIONS	621.34	22.12	0.10	0.00	0.00	0.05	0.47	0.30
Mobile	Light-Duty Vehicles	LDGT34, HIGHWAY, VEHICLE HYDROCARBONS	0.00	0.00	0.00	0.00	44.72	0.00		
Mobile	Light-Duty Vehicles	LDGV, CITY, OTHER VEHICLE EMISSIONS	210.65	11.15	3.05	0.00	0.00	1.69	0.25	0.13
Mobile	Light-Duty Vehicles	LDGV, CITY, VEHICLE HYDROCARBONS	0.00	0.00	0.00	0.00	14.02	0.00		
Mobile	Light-Duty Vehicles	LDGV, HIGHWAY, OTHER VEHICLE EMISSIONS	681.79	36.64	2.30	0.00	0.00	1.30	0.73	0.40
Mobile	Light-Duty Vehicles	LDGV, HIGHWAY, VEHICLE HYDROCARBONS	0.00	0.00	0.00	0.00	46.67	0.00		
Mobile	Light-Duty Vehicles	MC, CITY, OTHER VEHICLE EMISSIONS	8.46	0.34	0.02	0.00	0.00	0.01	0.01	0.01
Mobile	Light-Duty Vehicles	MC, CITY, VEHICLE HYDROCARBONS	0.00	0.00	0.00	0.00	1.18	0.00		
Mobile	Light-Duty Vehicles	MC, HIGHWAY, OTHER VEHICLE EMISSIONS	2.59	0.30	0.01	0.00	0.00	0.01	0.01	0.00
Mobile	Light-Duty Vehicles	MC, HIGHWAY, VEHICLE HYDROCARBONS	0.00	0.00	0.00	0.00	0.57	0.00		
	LIGHT-DUTY VEHICLES	**TOTAL EMISSIONS**	**2281.45**	**107.21**	**8.27**	**0.00**	**159.30**	**4.66**	**2.51**	**1.54**
Mobile	Off-Road	LAWN EQUIPMENT	6.31	0.07	0.00	0.00	0.85	0.02	0.02	0.02
Mobile	Off-Road	OFF-ROAD DIESEL - AGRICULTURE	8.19	20.45	0.32	0.00	3.08	2.22	2.22	2.04
Mobile	Off-Road	OFF-ROAD DIESEL - CONSTRUCTION	1.39	3.61	0.09	0.00	0.31	0.32	0.32	0.29
Mobile	Off-Road	OFF-ROAD GASOLINE - AGRICULTURE	48.53	1.64	0.05	0.00	1.85	0.10	0.09	0.09
	OFF-ROAD	**TOTAL EMISSIONS**	**64.42**	**25.77**	**0.46**	**0.00**	**6.09**	**2.65**	**2.65**	**2.44**

Emissions Source	Emissions Category	Emissions Process	CO	NOx	SOx	TRS	VOC	Part	PM10	PM2.5
Mobile	Railways	DIESEL LINE TRAVEL	12.96	690.78	49.97	0.00	34.54	10.32	10.32	9.45
Mobile	Railways	DIESEL YARD TRAVEL	12.68	74.27	4.82	0.00	4.40	1.85	1.85	1.71
	RAILWAYS (TRAFFIC)	**TOTAL EMISSIONS**	**25.65**	**765.05**	**54.79**	**0.00**	**38.94**	**12.17**	**12.17**	**11.16**
Mobile	Railways (COAL DUST)	RAILWAY COAL DUST OUTSIDE LFV	0.00	0.00	0.00	0.00	0.00	59.56	29.78	11.91
	COAL DUST	**TOTAL EMISSIONS**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**13.69**	**6.85**	**2.74**
MOBILE	**MOBILE**	**TOTAL EMISSIONS**	**3454.97**	**1346.08**	**66.41**	**0.00**	**291.16**	**45.94**	**39.36**	**30.99**
Natural	Biogenics	CONIFEROUS_FOREST	0.00	7.42	0.00	0.00	2883.78	0.00	0.00	0.00
Natural	Biogenics	CROPLAND REGION 1	0.00	0.00	0.00	0.00	61.10	0.00	0.00	0.00
Natural	Biogenics	DECIDUOUS_FOREST	0.00	0.28	0.00	0.00	97.81	0.00	0.00	0.00
Natural	Biogenics	MIXED_WOOD_FOREST	0.00	1.65	0.00	0.00	594.01	0.00	0.00	0.00
Natural	Biogenics	TRANSITIONAL_FOREST	0.00	0.01	0.00	0.00	0.57	0.00	0.00	0.00
	BIOGENICS	**TOTAL EMISSIONS**	**0.00**	**9.36**	**0.00**	**0.00**	**3637.27**	**0.00**	**0.00**	**0.00**
Natural	Wildfires	WILDFIRES	220.06	4.31	0.11	0.00	9.21	42.31	32.36	29.13
	WILDFIRES	**TOTAL EMISSIONS**	**220.06**	**4.31**	**0.11**	**0.00**	**9.21**	**42.31**	**32.36**	**29.13**
NATURAL	**NATURAL**	**TOTAL EMISSIONS**	**220.06**	**13.67**	**0.11**	**0.00**	**3646.49**	**42.31**	**32.36**	**29.13**

Emissions Source	Emissions Category	Emissions Process	CO	NOx	SOx	TRS	VOC	Part	PM10	PM2.5
Point	Wood Products	LOUISIANA PACIFIC - OPERATIONS	398.60	65.80	9.50	0.00	61.10	367.90	127.6	28.80
POINT	**POINT**	**TOTAL EMISSIONS**	**398.60**	**65.80**	**9.50**	**0.00**	**61.10**	**367.90**	**127.6**	**28.80**
Totals		**WITHOUT ROAD DUST**	**4933.17**	**1442.99**	**124.68**	**0.00**	**4205.89**	**519.64**	**350.27**	**247.26**
Road Dust	Road Dust	ROAD DUST, PAVED4	0.00	0.00	0.00	0.00	0.00	649.49	124.49	29.77
Road Dust	Road Dust	ROAD DUST, UNPAVED4	0.00	0.00	0.00	0.00	0.00	164.67	52.32	7.75
ROAD DUST	**ROAD DUST**	**TOTAL EMISSIONS**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**814.16**	**176.81**	**37.52**
Totals		**WITH ROAD DUST**	**4933.17**	**1442.99**	**124.68**	**0.00**	**4205.89**	**1333.80**	**527.08**	**284.78**