Attachment A

2005 Wisconsin Criteria Emissions Inventory Documentation

1. Organization of the Inventories

The emissions inventory (EI) was partitioned as follows:

Point Sources: Point sources are industrial, commercial or institutional stationary facilities which are normally located in permanent sites, and which emit air pollutants in great enough quantities to warrant individual quantification. To better enable detailed control evaluations, the point source EIs included all reporting sources regardless of the magnitude of reported emissions. Portable point sources such as asphalt plants and rock crushers were reported under nonpoint sources to be consistent with other states.

Nonpoint Sources: Nonpoint sources are stationary sources that are too small and/or too numerous to be tracked individually in the point source inventory. The nonpoint source inventory quantifies emissions collectively. Nonpoint sources include commercial/institutional, industrial and residential sources such as gasoline stations, dry cleaners, consumer and commercial products, industrial solvent use, auto refinishing and wood combustion.

Nonroad Mobile Sources: Nonroad mobile sources are motorized mobile equipment and other small and large engines that are primarily used off public roadways. Examples of nonroad mobile sources include commercial marine, construction, lawn and garden, locomotive and agricultural equipment.

Onroad Mobile Sources: Onroad mobile sources are motorized mobile equipment that are primarily used on public roadways. Examples of onroad mobile sources include cars, trucks, buses and road motorcycles.

2. Overview of Emissions Calculation Methodologies

2.1. Point Sources

This emissions inventory was created using reported point source emissions, USEPA's Clean Air Markets database and approved USEPA techniques for emissions calculation. Whenever feasible, federal, state and local controls were factored into the emissions calculations.

Emissions were estimated by collecting process-level information from each facility that qualifies for inclusion into a state's point source database. In Wisconsin, this information was normally collected via an internet or a computer diskette submittal, and subsequently loaded into the point source database. Process level emissions at emission generating devices such as boilers, generators, cold cleaners and tanks were typically calculated using throughput information multiplied by an emission factor. Emission factor sources included mass balance, stack testing, continuous emissions monitors, engineering judgment and USEPA's Factor Information Retrieval (FIRE) database. Missing data elements such as Source Classification Codes (SCC), North American Industrial Classification System (NAICS) codes and seasonal throughput percentages were added. Process level confidential data were removed while retaining any associated emissions. PM10 and PM2.5 emissions were augmented using known FIRE emission factors and USEPA's PM Calculator.

2.2 Nonpoint Sources

Nonpoint source emission estimates were typically calculated using population, gasoline consumption, employment, crop acreages and other activity surrogates. The results of a USEPA

Solvent Mass Balance study were used to estimate emissions for some categories. For the appropriate categories (e.g. industrial fuel combustion), point source emissions were subtracted from total category specific emissions to calculate nonpoint category specific emissions and avoid double counting. Emission factors were derived from local data, local or national surveys, U.S. USEPA's Factor Information Retrieval (FIRE) database and USEPA procedural guidance for the development of emission inventories.

2.2.1 Fuel Combustion

Fuel combustion was divided into three different categories: industrial, commercial/institutional and residential. These categories were further partitioned by fuel type.

2.2.1.1 Industrial Fuel Combustion

Industrial fuel combustion emissions were reported under six SCCs corresponding to different fuels: distillate oil (2102004000), residual oil (2102005000), natural gas (2102006000), liquified petroleum gas (2102007000), wood (2102008000) and kerosene (2102011000). An insignificant quantity of coal was consumed by nonpoint sources. Consequently, no emissions from coal were reported. Emissions were calculated using the following approach.

a. At the state level, subtracted industrial point source fuel consumption from total industrial fuel consumption to determine nonpoint source fuel consumption. For distillate oil only, apportioned the nonpoint fuel consumption between boilers and engines based on point source distillate oil use.
b. At the county level, subtracted point source industrial employment from total industrial employment to determine nonpoint employment.
c. Apportioned the fuel consumption to the county level using nonpoint employment.
d. For the different types of fuel, calculated the emissions using the county level fuel consumption, emission factors and any appropriate ash or sulfur contents.

2.2.1.2 Commercial/Institutional Fuel Combustion

Commercial/institutional fuel combustion emissions were reported under six SCCs corresponding to different fuels: distillate oil (2103004000), residual oil (2103005000), natural gas (2103006000), liquified petroleum gas (2103007000), wood (2103008000) and kerosene (2103011000). An insignificant quantity of coal was consumed by nonpoint sources. Consequently, no emissions from coal were reported. Emissions were calculated using the following approach.

a. At the state level, subtracted commercial/institutional point source fuel consumption from total industrial fuel consumption to determine nonpoint source fuel consumption. For distillate oil only, apportioned the nonpoint fuel consumption between boilers and engines based on point source distillate oil use.
b. At the county level, subtracted point source commercial/institutional employment from total commercial/institutional employment to determine nonpoint source employment.
c. Apportioned the fuel consumption to the county level using nonpoint employment.
d. For the different types of fuel, calculated the emissions using the county level fuel consumption, emission factors and any appropriate ash or sulfur contents.

2.2.1.3 Residential Fuel Combustion

Residential fuel combustion emissions were reported under ten SCCs corresponding to different fuels. Wood combustion was further partitioned by type of combustion device. These were the fuel and device (if wood) combinations and their corresponding SCCs: anthracite coal (2104001000), bituminous/subbituminous coal (2104002000), distillate oil

(2104004000), natural gas (2104006000), liquified petroleum gas (2104007000), wood–fireplaces-general (2104008001), wood–woodstoves-general (2104008010), wood–catalytic woodstoves-general (2104008030), wood–non-catalytic woodstoves-EPA certified (2104008050) woodstoves-non-catalytic not certified (used to report indoor wood furnaces as well) (2104008051), woodstoves – pellet (2104008053), outdoor hydronic heaters (outdoor wood boilers) (2104008070), firelogs (2104009000) and kerosene (2104011000). Fire pits were reported under wood–fireplaces-general (2104008001).

Non-wood combustion emissions were calculated using the following approach.

a. Allocated fuel consumption, depending on the availability, to the county level using occupied housing units.
b. If the fuel consumption data was for years other than 2005, adjusted the county level fuel consumption to 2005 using heating degree days.
c. For the different types of fuel, calculated the emissions using county level fuel consumption, emission factors and any appropriate ash or sulfur contents.

Wood combustion emissions were calculated using the following approach. All parameters were estimated at the county level.

a. Calculated number of wood burning devices based on the average fraction of households using a specific type of residential wood burning unit.
b. Calculated the total number of wood burning devices in Wisconsin using on 2005 household data from the Department of Administration.
c. Calculated urban/rural distribution of devices based on USEPA methodology.
d. Calculated the average # of cords burned by device type.
e. Calculated county-level throughput by device type.
f. Converted total residential cords of wood burned to tons using an average Wisconsin wood density.
g. For the different types of wood burning, calculated the emissions from the county level wood consumptions using appropriate emission factors.

2.2.2 Industrial Processes

Industrial processes vary extensively. Emission sources range from pharmaceutical manufacturers to commercial cooking operations to asphalt plants.

2.2.2.1 Chemical Manufacturing

One subcategory of chemical manufacturing was included in the EI: pharmaceutical manufacturing. The emissions from this category were reported under the following SCC: 2301030000.

Emissions were estimated using the results from the 2002 USEPA Solvent Mass Balance (SMB) study that applied a material balance approach incorporating total solvent production or sales; point source emissions; emission controls; and waste management and recycling practices. The total 2002 emissions (i.e. nonpoint and point) were grown to 2005 before the point source emissions were removed to estimate nonpoint emissions.

2.2.2.2 Commercial Cooking

Commercial cooking emissions were reported under five SCCs corresponding to conveyorized charbroiling (2302002100), under-fired charbroiling (2302002200), deep fat frying (2302003000), flat griddle frying (2302003100) and clamshell griddle frying (2302003200). Emissions were calculated using the following approach:

a. Estimated the number of restaurants for each county based on NAICS 722///.
b. Calculated the average number of cooking equipment devices.
c. Calculated the mass of food (meat) cooked based on cooking equipment type.
d. Calculated the county level emissions using mass of prepared food and emission factors.

2.2.2.3 Bakery Products

Bakery emissions were reported under one SCC (2302050000). Emissions were calculated using the following approach.

a. Calculated statewide emissions using a per capita consumption rate, an emission factor and population.
b. Calculated county level bakeries nonpoint source employment by subtracting county level bakeries point source employment from county level bakeries total employment.
c. Allocated statewide emissions to the county level based on bakeries nonpoint source employment.

2.2.2.4 Asphalt Plants

Portable asphalt plant emissions were reported under one SCC (2306010000). Portable asphalt plant emissions were based on the point source EI. These emissions were excluded from the reported point source EI to avoid double counting. Any emissions from fuel combustion were excluded since they were covered under fuel combustion for industrial nonpoint sources.

2.2.2.5 Rock Crushers

Portable rock crusher emissions from were reported under one SCC (2325000000). Portable rock crusher emissions were based on the point source EI. These emissions were excluded from the reported point source EI to avoid double counting. Any emissions from fuel combustion were excluded since they were covered under fuel combustion for industrial nonpoint sources

2.2.3 Solvent Utilization

Solvents are used in many different applications. Emission sources included surface coating, solvent cleaning, dry cleaning, graphic arts, asphalt paving, pesticide application and miscellaneous commercial/consumer solvents. The evaporation of solvents generated the emissions.

Some solvent utilization categories' emissions were estimated using the results from the 2002 USEPA Solvent Mass Balance (SMB) study that applied a material balance approach incorporating total solvent production or sales; point source emissions; emission controls; and waste management and recycling practices. The total 2002 emissions (i.e. nonpoint and point) were grown to 2005 before the point source emissions were removed to estimate nonpoint emissions.

2.2.3.1 Surface Coating

2.2.2.1.1 Autobody Refinishing, Electrical and Electronics, Factory Finished Wood, Furniture, Large Appliance, Machinery and Equipment, Marine, Metal Cans, Miscellaneous Finished Metals and Railroad Coating

The emissions estimates for these coatings categories were calculated using employment based emission factors. The emissions were reported under seven

SCCs corresponding to different types of coating: autobody refinishing (2401005000), electrical and electronics (2401065000), factory finished wood (2401015000), furniture (wood (2401020000) and metal (2401025000)), large appliance (2401060000), machinery and equipment (2401055000), marine (2401080000), metal cans (2401040000). Railroad (2401085000) emissions were incorporated under miscellaneous manufacturing (2401090000). For the remaining 2005 categories, emissions were estimated using the results from the 2002 USEPA SMB study.

Any benefits due to NR422.095 of the Wisconsin Administrative Code in Kenosha, Kewaunee, Manitowoc, Milwaukee, Ozaukee, Racine, Sheboygan, Washington and Waukesha counties regulating auto refinishing were included in the calculations.

2.2.2.1.2 Architectural, Industrial Maintenance, Miscellaneous Manufacturing and Special Purpose Coating

The emissions from these categories were reported under the following SCCs corresponding to different types of coating: architectural (2401001000), industrial maintenance (2401100000), miscellaneous manufacturing (2401090000) and special purpose (2401200000) coating. Emissions were estimated using the results from the 2002 USEPA SMB study.

Any benefits of the Federal Architectural, Industrial and Maintenance coatings (AIMS) rule were included in the calculations.

2.2.2.1.3 Traffic Marking Coating

The emissions from this category were reported under the following SCC: 2401008000. Emissions were calculated using the following approach.

a. Apportioned the traffic marking paint to the county level using miles of lines.
b. Determined VOC content of paint using Material Data Safety Sheets (MSDS). The calculated VOC content was lower than the mandated VOC content in NR422.17 of the Wisconsin Administrative Code in Kenosha, Kewaunee, Manitowoc, Milwaukee, Ozaukee, Racine, Sheboygan, Washington and Waukesha counties regulating application of traffic marking materials. Consequently, no additional benefits results from NR422.17.
c. Calculated the emissions using county level paint consumption and a MSDS based emission factor.

2.2.2.1.4 Motor Vehicle and Paper Coating

The emissions from these categories were reported under the following SCCs: 2401070000 (motor vehicle) and 2401030000 (paper). Emissions were estimated using the results from the 2002 USEPA SMB study.

2.2.3.2 Solvent Cleaning

Solvent cleaning was reported under one SCC: all industries – cold cleaning (2415300000). Emissions were estimated using the results from the 2002 USEPA SMB study.

Any benefits due to NR423.03 of the Wisconsin Administrative Code in Kenosha, Kewaunee, Manitowoc, Milwaukee, Ozaukee, Racine, Sheboygan, Washington and Waukesha counties regulating solvent metal cleaning were included in the calculations.

2.2.3.3 Dry Cleaning

Emissions calculated based on dry cleaning solvent supplied and an average VOC content for dry cleaning solvent were less than the point source dry cleaning emissions. Consequently, nonpoint dry cleaning emissions were assumed to be insignificant and/or entirely captured in the point source EI.

2.2.3.4 Graphic Arts

Emissions were estimated using the results from the 2002 USEPA SMB study.

2.2.3.5 Rubber/Plastics Solvents

The emissions from this category were reported under the following SCC: 2430000000. Emissions were estimated using the results from the 2002 USEPA SMB study.

2.2.3.6 Miscellaneous Industrial

Emissions from this category were reported under the nine following SCCs: ethanol (2440000165), glycol ethers – all types (2440000235), isopropanol (2440000250), methanol (2440000260), methyl ethyl ketone (2440000275), methyl isobutyl ketone (2440000285), propylene glycol (2440000350), special napthas (2440000370) and solvents-NEC (2440000999). Emissions were estimated using the results from the 2002 USEPA SMB study.

2.2.3.7 Commercial and Consumer Solvents

Emissions from commercial and consumer solvents were reported under five SCCs corresponding to different applications: personal care products (2460100000), household products (2460200000), automotive aftermarket (2460400000), adhesives and sealants (2460600000) and pesticide application (2465800000). Emissions from coatings and related products (2460500000) were reported under the paint and coating nonpoint source categories. Emissions from miscellaneous products (2460900000) were not significant contributors to VOC emissions relative to the other source categories. All emissions were estimated using the results from the 2002 USEPA SMB study with the exception of adhesives and sealants that were calculated using county population and a population based emission factor.

Any benefits of the Federal National Volatile Organic Compound Emission Standards for Consumer Products were included in the calculations.

2.2.3.8 Asphalt Paving

Emissions from asphalt paving were reported under two SCCs corresponding to two types of asphalt: cutback asphalt (2461021000) and emulsified asphalt (2461022000). Emissions were calculated using the following approach.

a. Gathered results of 2001 Wisconsin asphalt paving survey of contractors and county highway departments.
b. Used 1999 county level cutback asphalt consumption for winter, spring and fall for 2002. Cutback asphalt use between 1999 and 2005 was flatlined due to the impact of NR422.16 of the Wisconsin Administrative Code regulating the use of cutback asphalt.

c. Grew 1999 county level emulsified asphalt consumption for spring, summer and fall using lane miles. Assumed that no emulsified asphalt use was used in the winter due to temperature constraints.
d. For the different types of asphalt, calculated the emissions using county level asphalt consumption and emission factors.

2.2.3.9 Agricultural Pesticide Application

Agricultural pesticide application emissions were reported under one SCC (2461850000). Non-agricultural applications of pesticides were addressed under commercial and consumer solvents use. Emissions were calculated using the following approach.

a. Assembled harvested acres of various types of crops: corn, forage, green peas, oats, potatoes, snap beans, soybeans, sweet corn and wheat. Crops with less than 40,000 acres harvested weren't included. Their emissions were considered insignificant.
b. For each crop and pesticide combination, calculated the fraction of the crop to which a given pesticide was applied and the quantity of active ingredient per mass of pesticide applied.
c. For the different types of crops, calculated the emissions using harvested acres, fraction of the crop to which a given pesticide was applied, quantity of active ingredient per mass of pesticide applied, a base emission factor and a base evaporation rate.
d. Used an evaporation rate of 10%. The default evaporation rate of 90% was updated to 10%. Academic experts at UW-Madison were asked to review pesticides used in Wisconsin and to estimate the actual evaporation rate of individual pesticides. A vast majority of the agricultural pesticides had evaporation rates of 5% or less. None of the pesticides had evaporation rates exceeding 10%. (This, of course, led to a substantial decrease in pesticide VOC emissions.)
e. Summed emissions for all pesticides to the county level.

2.2.4 Petroleum Distribution Losses

The distribution of gasoline results in emissions from a wide variety of sources including tank trucks, motor vehicles, aircraft, gasoline pumps, underground storage tanks and portable fuel containers (PFCs).

2.2.4.1 Gasoline Service Stations

Petroleum distribution emissions from gasoline service stations were reported under three SCCs corresponding to Stage 1 (2501060050), Stage 2 (2501060100) and underground tank breathing and emptying (2501060201). Stage 1 emissions are basically station loading losses. Stage 2 emissions are basically vehicle refueling losses. Emissions were calculated using the following approach.

a. Allocated statewide gasoline usage to the county level using latest available county level gasoline service station sales.
b. For Stage 1; calculated the emissions using county level gasoline usage, an uncontrolled emission factor, control efficiencies, rule effectivenesses and rule penetrations. Used monthly emission factors.
c. For Stage 2; calculated the emissions using county level gasoline usage, appropriate seasonal emission factors and appropriate seasonal usage fractions. The seasonal emission factors were generated using USEPA's MOBILE6.2 model. MOBILE6.2 is primarily used for calculating onroad mobile emissions.

d. For underground tank breathing and emptying; calculated the emissions using county level gasoline usage, an uncontrolled emission factor, control efficiencies, rule effectivenesses and rule penetrations.

Any benefits due to NR420.04 of the Wisconsin Administrative Code in Brown, Calumet, Dane, Dodge, Door, Fond du Lac, Jefferson, Kenosha, Kewaunee, Manitowoc, Milwaukee, Outagamie, Ozaukee, Racine, Rock, Sheboygan, Walworth, Washington, Waukesha and Winnebago counties regulating Stage 1 emissions were included in the calculations. Any benefits due to NR420.045 of the Wisconsin Administrative Code for Kenosha, Kewaunee, Manitowoc, Milwaukee, Ozaukee, Racine, Sheboygan, Washington and Waukesha counties regulating Stage 2 emissions were included in the calculations. Any benefits due to NR420.035 of the Wisconsin Administrative Code for Kenosha, Kewaunee, Manitowoc, Milwaukee, Ozaukee, Racine, Sheboygan, Washington and Waukesha counties regulating underground tank breathing and emptying emissions were included in the calculations.

2.2.4.2 Airports

Petroleum distribution emissions from aviation gasoline at airports were reported under two SCCs corresponding to Stage 1 (2501080050) and Stage 2 (2501080100). However, emissions from storage tank breathing losses and fugitive emissions from valves and pumps were included in the Stage 1 emissions. Emissions were calculated using the following approach.

a. Allocated statewide aviation gasoline usage to the county level using the number landing take-off operations (LTOs) of aircraft using aviation gas.
b. Calculated the emissions using county level aviation gasoline usage and emission factors.

2.2.4.3 Tank Trucks

Petroleum distribution emissions from tank trucks were reported under one SCC (2505030120). Emissions were calculated using the following approach.

a. Allocated statewide gasoline usage to the county level using 2002 county level gasoline service station sales.
b. Calculated the emissions using county level gasoline usage, emission factors for loaded and unloaded trucks and a gasoline transportation adjustment factor. The gasoline transportation adjustment factor was used to adjust for gasoline transported once (from bulk terminals outside the area to gasoline service stations) or twice (distribution to gasoline bulk plants, then subsequent distribution to gasoline service stations).

2.2.4.4 Portable Fuel Containers (PFCs)

Petroleum distribution emissions from portable fuel containers (PFCs) were reported under two SCCs corresponding to residential portable gasoline containers (2501011010) and commercial/industrial portable gasoline containers (2501012010). Emissions from residential portable gasoline containers were calculated using the following approach.

a. Calculated the number of PFCs per county using average PFCs per household and number of households per county.
b. Calculated the permeation emissions from metal and plastic PFCs using PFCs per county, weighted average PFC capacity, fraction of PFCs stored with gasoline, weighted fraction of PFC capacity used, fraction of PFCs that were stored closed and emission factors.

c. Calculated the diurnal emissions from metal and plastic PFCs using PFCs per county, weighted average PFC capacity, fraction of PFCs stored with gasoline, weighted fraction of PFC capacity used, fraction of PFCs that were stored closed, fraction of PFCs that were stored open and emission factors.
d. Calculated the transport/refill emissions from metal and plastic PFCs using PFCs per county, fraction of PFCs stored with gasoline, fraction of PFCs that were stored closed, fraction of PFCs that were stored open, average number of daily refills and emission factors.
e. Summed all permeation, diurnal and transport/refill emissions to the county level.

Emissions from commercial/industrial PFCs were calculated using the following approach.

a. Calculated the number of PFCs per county using average number of PFCs per business and number of businesses with PFCs per county. Businesses using PFCs were selected using NAICS codes.
b. Used NAICS codes to distinguish between PFCs at lawn and garden equipment businesses and non-lawn and garden equipment businesses.
c. Calculated the permeation emissions from metal and plastic PFCs using PFCs per county, weighted average PFC capacity, fraction of PFCs stored with gasoline, weighted fraction of PFC capacity used, fraction of PFCs that are stored closed and emission factors.
d. Calculated the diurnal emissions from metal and plastic PFCs using PFCs per county, weighted average PFC capacity, fraction of PFCs stored with gasoline, weighted fraction of PFC capacity used, fraction of PFCs that were stored closed, fraction of PFCs that were stored open and emission factors.
e. Calculated the transport/refill emissions from metal and plastic PFCs using PFCs per county, fraction of PFCs stored with gasoline, fraction of PFCs that were stored closed, fraction of PFCs that were stored open, average number of daily refills for lawn and garden equipment businesses or non-lawn and garden equipment businesses and emission factors.
f. Summed all permeation, diurnal and transport/refill emissions to the county level.

Emissions were reduced in Dane county to incorporate the benefits of a 2004-2005 PFC exchange program

2.2.5 Waste Disposal, Treatment and Recovery

The waste disposal, treatment and recovery results in emissions from a wide variety of sources including on-site incineration, open burning, wastewater treatment, industrial wastewater treatment facilities (IWTFs), publicly owned treatment works (POTWs) and hazardous waste treatment, storage and disposal facilities (TSDFs).

2.2.5.1 Commercial/Institutional On-site Incineration

Emissions from commercial/institutional on-site incineration were negligible. The Wisconsin expert on on-site incineration indicated that nonpoint on-site incineration has essentially been eliminated due to the application of rules in Chapter NR 445 of the Wisconsin Administrative Code.

2.2.5.2 Open Burning

Open burning was reported under four SCCs corresponding to different combustibles: residential municipal solid waste (MSW) (2610030000), leaf yard waste (2610000100), brush yard waste (2610000400) and land clearing debris (2610000500). Emissions from residential municipal solid waste burning were calculated using the following approach.

a. Assumed that rural population and MSW burned in burn barrels were proportional.
b. Calculated county level residential MSW generated using average Wisconsin per capita waste generation factor and rural population.
c. Calculated the emissions using county level residential MSW generated, average fraction of MSW burned, correction factors to adjust for local burning restrictions based on the rural population fraction and emission factors.

Emissions from leaf yard waste and brush yard waste burning were calculated using the following approach.

a. Calculated statewide yard trimmings burned by growing 2000 yard trimmings burned using rural population.
b. Allocated the yard trimmings burned to the county level using rural population.
c. Calculated the county level emissions using quantity of yard waste; average yard waste composition fractions from leaves, brush and grass; correction factor based on fraction of forested acres, average fraction of yard waste burned and emission factors. Assumed that grass clippings aren't typically burned.

Emissions from land clearing debris burning were partitioned by the type of construction: residential, non-residential/commercial and road. Emissions from residential construction land clearing debris burning were calculated using the following approach.

a. Calculated the county level acres disturbed for residential construction using permits issued for single family residences, two-family residences and apartment buildings; and an average acres cleared per type of structure.
b. Calculated the county level emissions using acres disturbed, fractions of land coverage that are hardwood, softwood or grass; fuel loading factors for hardwood, softwood and grass; average fractions of debris burned; and emission factors. Assumed 10% of land clearing debris was burned in Kenosha, Kewaunee, Manitowoc, Milwaukee, Ozaukee, Racine, Sheboygan, Walworth, Washington and Waukesha counties and 50% of land clearing debris was burned in the remaining counties.

Emissions from non-residential/commercial construction land clearing debris burning were calculated using the following approach.

a. Calculated the acres disturbed for non-residential/commercial construction using amount spent on non-residential/commercial construction in the U.S. and dollars-to-acres disturbed conversion factor.
b. Allocated the acres disturbed to the county level using population.
c. Calculated the county level emissions using acres disturbed, fractions of land coverage that are hardwood, softwood or grass; fuel loading factors for hardwood, softwood and grass; average fractions of debris burned; and emission factors. Assumed 10% of land clearing debris was burned in Kenosha, Kewaunee, Manitowoc, Milwaukee, Ozaukee, Racine, Sheboygan, Walworth, Washington and Waukesha counties and 50% of land clearing debris was burned in the remaining counties.

Emissions from road construction land clearing debris burning were calculated using the following approach.

a. Calculated the acres disturbed for road construction using state capital outlay and maintenance expenditures on roads, average cost per mile for road reconstruction and average acres disturbed per mile. This estimate was

performed for six road types: interstate urban, interstate rural, other arterial urban, other arterial rural, collectors urban and collectors rural.

b. Allocated the acres disturbed for road construction to the county level using acres disturbed for residential construction.
c. Calculated the county level emissions using acres disturbed, fractions of land coverage that are hardwood, softwood or grass; fuel loading factors for hardwood, softwood and grass; average fractions of debris burned; and emission factors. Assumed 10% of land clearing debris was burned in Kenosha, Kewaunee, Manitowoc, Milwaukee, Ozaukee, Racine, Sheboygan, Walworth, Washington and Waukesha counties and 50% of land clearing debris was burned in the remaining counties.

2.2.5.3 Municipal Solid Waste Landfills (MSWLs)

Emissions from municipal solid waste landfills (MSWLs) were reported under nonpoint and point sources. Nonpoint MSWLs emissions were reported under one SCC (2620030000). Emissions were calculated using the following approach.

a. Calculated average annual acceptance rate for individual landfills.
b. Calculate emissions based on USEPA Landfill Air Emissions Estimation Model
c. Aggregated emissions at the county level.

2.2.5.4 Industrial Wastewater Treatment Facilities (IWTFs)

Industrial Wastewater Treatment Facilities (IWTFs) emissions were reported under one SCC (2630010000). Emissions were calculated using the following approach.

a. Calculated the average daily wastewater discharged from industrial sources (i.e. Standard Industrial Classification (SIC) code = 29XX to 39XX) excluding food production facilities. Food production facilities don't have significant quantities of VOC in their wastewater. Non-contact cooling water and cooling water flows were excluded.
b. Summed the daily wastewater discharged to the county level.
c. Calculated annual wastewater discharged by multiplying daily wastewater discharged by 365.
d. Calculated the county level emissions using wastewater discharged and appropriate Surface Impoundment Modeling System (SIMS) grouping emission factors. If an exact match wasn't found between a SIC code and SIMS grouping, the closest match available was used.

2.2.5.5 Publicly Owned Treatment Works (POTWs)

Publicly Owned Treatment Works (POTWs) emissions were reported under one SCC (2630020000). Emissions were calculated using the following approach.

a. Calculated the wastewater effluent discharged from each POTW.
b. Summed the wastewater effluent to the county level.
c. At the county level, subtracted the point source wastewater effluent from the total wastewater effluent to calculate the nonpoint wastewater effluent.
d. Calculated the county level emissions using nonpoint wastewater effluent and emission factors.

2.2.5.6 Hazardous Waste Treatment, Storage and Disposal Facilities (TSDFs)

Hazardous Waste Treatment, Storage and Disposal facilities (TSDFs) emissions were reported under one SCC (2640000000). Emissions were calculated using the following approach.

a. Calculated the capacities of individual TSDFs.
b. Summed the capacities of individual TSDFs to the county level.
c. Calculated the county level emissions using capacities, average spill/loss fraction, average photochemically reactive volatile organic weight fraction, average volatilization fraction and average VOC density. The spill/loss fractions and volatilization fractions differed for storage facilities and treatment facilities.

2.2.6 Structure Fires

Structure fire emissions were reported under the following SCC: 2810030000. Emissions were calculated using the following approach.

a. Obtained the number of county level reported structure fires.
b. Calculated an average fuel loading factor of 1.15 tons of fuel per fire.
c. Calculated the county level emissions using number of structure fires, fuel loading factor and emission factors.

2.2.7 Agricultural Ammonia

For the 2002 EI, version 3.6 of the Carnegie Mellon University (CMU) Ammonia Model (**http://www.cmu.edu/ammonia/**) was used to calculate monthly county-level agricultural ammonia emissions for animals and fertilizers. Updated seasonal profiles based on scientific research were applied to agricultural animal emissions to more accurately apportion the emissions throughout the year. For the 2005 EI, the 2002 EI was grown. The following agricultural ammonia emission sources were quantified.

Table 7: Agricultural Ammonia Sources

SCC	Description
2805022100	dairy_deep_pit_confinement
2805022200	dairy_deep_pit_storage
2805022300	dairy_deep_pit_landapp
2805023100	dairy_drylot_confinement
2805023200	dairy_drylot_storage
2805023300	dairy_drylot_landapp
2805019100	dairy_flush_confinement
2805019200	dairy_flush_storage
2805019300	dairy_flush_landapp
2805021100	dairy_scrape_confinement
2805021200	dairy_scrape_storage
2805021300	dairy_scrape_landapp
2805018000	dairy_composite
2805001100	beef_drylot_confinement
2805001200	beef_drylot_storage
2805001300	beef_drylot_landapp
2805003100	beef_pasture_confinement
2805002000	beef_composite
2805047100	swine_deep_pit_confinement

2805047300	swine_deep_pit_landapp
2805039100	swine_lagoon_confinement
2805039200	swine_lagoon_storage
2805039300	swine_lagoon_landapp
2805053100	swine_outdoor_confinement
2805025000	swine_composite
2805009100	poultry_broilers_confinement
2805009200	poultry_broilers_storage
2805009300	poultry_broilers_landapp
2805007100	poultry_layers_dry_confinement
2805007300	poultry_layers_dry_landapp
2805008100	poultry_layers_wet_confinement
2805008200	poultry_layers_wet_storage
2805008300	poultry_layers_wet_landapp
2805010100	poultry_turkeys_confinement
2805010200	poultry_turkeys_storage
2805010300	poultry_turkeys_landapp
2805030000	poultry_composite
2805035000	horses
2805040000	sheep
28050450000	goats
2805030008	geese
2805030007	ducks
2801700099	mix
2801700001	anhydrous_ammonia
2801700002	aqueous_ammonia
2801700005	ammonium_nitrate
2801700006	ammonium_sulfate
2801700007	ammonium_thiosulfate
2801700011	calcium_ammonium_nitrate
2801700003	nitrogen_solutions
2801700004	urea
2801700013	diammonium_phosphate
2801700014	monoammonium_phosphate
2801700015	liquid_ammonium_polyphosphate
2801700012	potassium_nitrate
2801700099	miscellaneous

Summer day emissions were calculated by dividing the county-level sum of June, July and August by 92 days.

2.3 Nonroad Mobile Sources

For calculation, nonroad mobile source emission estimates were partitioned into aircraft, commercial marine, locomotives and all remaining categories. The remaining categories included construction equipment, lawn and garden equipment, agricultural equipment, recreation marine equipment, airport ground support equipment and more.

2.3.1 Aircraft

There are four general types of aircraft: air carrier, air taxi, general aviation and military. Air carrier (AC) aircraft are operated for hire or compensation and have a seating capacity of more than 60 seats or a maximum payload capacity of more than 18,000 pounds. Air taxi (AT) aircraft

are operated for hire or compensation and have a seating capacity of 60 seats or less or a maximum payload capacity of 18,000 pounds or less. General aviation (GA) aircraft are all remaining civil aircraft. Emissions from aircraft were reported under one SCC (2275000000). Emissions are calculated using the following approach.

a. Assembled landing and take-off operations (LTO) data. This data was available by specific aircraft type for AC aircraft only. Some LTO data was grown from years other than 2005.
b. Selected representative aircraft for AT aircraft, GA aircraft and military aircraft. For military aircraft, representative aircraft were chosen for both fighter and cargo aircraft.
c. Summed the LTO data to the county level.
d. Entered LTO data into the Federal Aviation Administration's Emissions and Dispersion Modeling System (EDMS) using the best matches for aircraft type and engine type. For 2005, EDMS ver. 4.5 released on 15 June 2006.
e. Ran EDMS for each county to calculate emissions.

2.3.2 Commercial Marine and Locomotives

Lake Michigan Air Directors Consortium (LADCO) funded studies by ENVIRON International Corporation that estimated emissions for commercial marine and locomotives for Illinois, Indiana, Michigan, Ohio and Wisconsin. For detailed description of methodologies used to estimate emissions, see the Environ reports.

2.3.3 Other Nonroad Mobile

The National Mobile Inventory Model (NMIM) developed by USEPA was used to estimate emissions for all other nonroad mobile categories. NMIM consolidates nonroad mobile emissions and onroad emissions modeling into a single modeling system. Only the nonroad emissions modeling portion of NMIM was used in the development of this EI. NMIM uses the USEPA's NONROAD model to calculate nonroad mobile emissions. The basic NONROAD algorithm for calculating emissions uses base year equipment populations, average load factors, available engine powers, activity hours and emission factors. Before NMIM was run, modifications and additions were made to the NMIM input data.

a. Revised activity data for construction equipment using updates provided by E.H. Pechan & Associates, Inc.. Activity data describes typical usage for different types of nonroad mobile equipment.
b. Revised allocation data for recreational marine equipment using updates provided by ENVIRON International Corporation. Allocation data is used to spatially allocate emissions.
c. Added emission factors for diesel tampers/rammers provided by E.H. Pechan & Associates, Inc.. Diesel tampers/rammers are a type of construction equipment.
d. Revised population data for construction and recreational marine equipment using updates provided by E.H. Pechan & Associates, Inc. and ENVIRON International Corporation respectively.
e. Revised growth rates using updates provided by E.H. Pechan & Associates, Inc.. If equipment populations aren't provided for the modeled year (e.g. 2005), growth rates and scrappage rates are used to adjust the available equipment populations to the modeled year.
f. Revised gasoline parameters using updates provided by the states and E.H. Pechan & Associates, Inc.. Gasoline parameters include Reid Vapor Pressure (RVP), oxygenate content and sulfur content

2.4 Onroad Mobile Sources

Onroad mobile source emissions are reported for each of Wisconsin's 72 counties for two categories: gasoline-powered vehicles and diesel-powered vehicles. The emissions were calculated by the Lake Michigan Air Directors Consortium (LADCO) for the day July 12, 2002, using the EMS-2003 model. EMS-2003 incorporates the USEPA's MOBILE6.2 emission factor model and transportation data such as vehicle-miles of travel (VMT) and average speeds. The MOBILE6.2 input files were provided to LADCO by the Wisconsin Department of Natural Resources. The transportation data were provided to LADCO by the Wisconsin Department of Transportation and the Southeastern Wisconsin Regional Planning Commission.

A motor vehicles inspection and maintenance program was modeled for seven Wisconsin counties (Kenosha, Milwaukee, Ozaukee, Racine, Sheboygan, Washington and Waukesha).

Reformulated gasoline (RFG) was modeled for six counties (Kenosha, Milwaukee, Ozaukee, Racine, Washington and Waukesha). The Reid vapor pressure (RVP) of the RFG was assumed to be 6.92 psi and the RFG was assumed to include ethanol at a volume of 10.1%. Gasoline sulfur was assumed to be 122 ppm. These fuel parameters were derived from USEPA fuel survey data.

For the 66 counties of Wisconsin without RFG, the RVP was assumed to be 8.7 psi for the gasoline without ethanol (91.1% market share) and 9.7 psi for the gasoline with 10% ethanol (8.9% market share). The assumed RVP for gasoline without ethanol is 0.3 psi below the national limit of 9 psi. An RVP of 1 psi higher is assumed for the ethanol-blended gasoline since federal and state laws allow a 1 psi RVP waiver for ethanol blends. The ethanol market share (8.9%) was derived from gasoline sales reported by the Wisconsin Department of Administration. Gasoline sulfur was assumed to be 279 ppm (MOBILE6.2 default) for the 66 non-RFG counties.

Local vehicle age distributions and vehicle class distributions were used instead of the MOBILE6.2 default distributions. Also, for the seven counties in the SEWRPC region (Kenosha, Milwaukee, Ozaukee, Racine, Walworth, Washington and Waukesha), a local distribution of VMT by hour was used instead of the MOBILE6.2 default distribution.