

Improving Modeling Inventory Data: Speciation Profiles

Draft Technical Report

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1. INTRODUCTION

LADCO is developing improved chemical speciation profiles of organic carbon for select source categories (SCC). The profiles are specific to sources in the upper Midwest (i.e., States of Illinois, Indiana, Michigan, Ohio, and Wisconsin) wherever data is available to differentiate Midwest sources from National sources. This information will be used by the States in the upper Midwest as inputs for their Emission Inventory Models to assist in preparing State Implementation Plans for regional haze, fine particles, and ozone.

This study focused on four categories of emission sources: on-road motor vehicles, off-road sources (including off-road vehicles and lawn & garden equipment), area sources, and several specific point source categories. The list of specific source categories to be profiled was chosen based on the relative contribution of the SCCs to previous Midwest emission inventories, and similar lists of source categories chosen for improvement in other current model input improvement efforts.

2. ON-ROAD SOURCES

2.1 Light Duty Gasoline Vehicles

A number of sources were reviewed to identify VOC emission speciation data for gasoline vehicles. A particular goal of this effort was to develop speciation data that reflect the types of fuel used in the Midwest region. Therefore, studies were sought which focused on vehicles in the Midwest, or provided sufficient fuel composition information to allow us to adjust the measured speciation factors to better reflect Midwest fuels. Sources reviewed include a bibliography prepared by the EPA Office of Transportation and Air Quality (OTAQ), reports published under the Auto/Oil research program, speciation data previously developed by the U.S. EPA and the California Air Resources Board (CARB), journal articles, and other published sources.

No recent studies were identified of VOC speciation from vehicles in the Midwest. VOC speciation factors for motor vehicles were developed using two main sources: a study by Schauer *et al* study carried out in California, and a study by the Society of Automotive Engineers of vehicles carried out in North Carolina. The CARB study measured emissions of 66 VOC species from 11 vehicles. The federal test procedure (FTP) was used to ensure that measurements were representative of the entire driving cycle. In addition, two separate analytical procedures were used, and the results compared. The Schauer study also included a detailed chemical characterization of the fuel used.¹ The SAE study included a larger collection of vehicles –138 in all – but measurements were not as detailed as in the Schauer study. Emissions were reported for six VOC categories – alkanes, alkenes, aromatics, acetylenes, alcohols and ethers, and other unknown compounds. In addition, emissions were reported for about 20 individual species.²

In developing speciation factors, we began with the detailed measurements by Schauer *et al* of chemical species in liquid gasoline. This chemical composition was then adjusted to reflect available data on the properties of Midwest gasoline, based on county-level inputs to the MOBILE6 motor vehicle emission model. These inputs include the concentrations of methyl tert-butyl ether, methanol, ethanol, benzene, total aromatics, and total olefins in bulk gasoline. These concentrations were been estimated by the U.S. EPA³ and by LADCO in preparing the motor vehicle emissions inventories for the region.⁴ Using the EPA and LADCO fuel descriptions we developed six composite gasoline compositions to represent winter and summer gasolines sold in different sub-regions (see Table 6.1.1). Concentrations of benzene, and oxygenate additives were taken directly from the MOBILE6 inputs. Concentrations of toluene, xylene, and other aromatics (except benzene) reported by Schauer were adjusted proportionately to match the total estimated aromatic concentration for typical Midwest fuel. Likewise, concentrations of olefinic compounds were adjusted proportionately to match the total estimated olefin concentration in Midwest fuel.

MOBILE6 estimates emission factors for selected HAPs, based on the inputs discussed above for gasoline properties. Specific emission factors are produced for exhaust emissions of benzene, MTBE, 1,3-butadiene, formaldehyde, acetaldehyde, and acrolein; as well as evaporative emissions of benzene and MTBE. These emission factors were used to compute speciation factors for these compounds.

For compounds not addressed by MOBILE6, speciation factors were calculated separately for evaporative and exhaust emissions. Evaporative speciation factors were computed using Raoult's Law, assuming that evaporative emissions are roughly at equilibrium with gasoline liquid.

For exhaust emissions, we began with detailed measurements of exhaust gas emissions by Schauer *et al*. These were reviewed against measurements by the SAE, which included a larger number of vehicles but a smaller number of chemical species. The results of Schauer *et al* and the SAE were found to be consistent, taking into account the differences in gasoline composition between the two studies. Therefore, the detailed exhaust composition data from Schauer *et al* were taken as the baseline for speciation calculations. However, the speciation factors were adjusted to reflect the properties of gasoline used in the Midwest. As discussed above, six composite model gasolines were used, representing winter and summer gasolines in different sub-regions. These adjustments were based on tests of the impact of gasoline composition on the composition of emissions from nonroad engines, and on the MOBILE6 treatment of benzene and MTBE.⁵ Emissions of other aromatics and oxygenated fuel additives were assumed to be proportional to their concentrations in bulk gasoline. Olefins were divided into two groups. The first group includes ethylene and propylene, which are not present in bulk gasoline, but are produced in the combustion process. Emissions of these species are assumed to be independent of gasoline composition. The second group includes butenes and heavier olefins, which are found in bulk gasoline, and can also be produced in combustion. These compounds were assumed to be partly proportional to their concentration in bulk gasoline.

The speciation profile for PM_{2.5} emissions from on-road gasoline vehicles emissions is a composite of four studies.^{6,7,8,9} While a number of studies were evaluated for use, these were chosen because they were more recent, and because they were either dynamometer studies entailing direct emission measurement, or were tunnel studies where light-duty gasoline vehicles were separated from other traffic.

The speciated emissions from each source (summer/winter average across all vehicle ages for Cadle) were placed side-by-side and averaged to prepare a composite profile. The sulfate values were taken only from the Cadle and Kirchstetter data (the Dynamometer tests), as results from the tunnel studies were deemed unreliably high (perhaps due to contamination from other sources.)

It has been assumed that no crustal species are present in motor vehicle exhaust, and that any crustal species appearing in analytical results are likely to have resulted from road dust. Organic carbon is expressed as mass of carbon. Where necessary, OC was adjusted downward to remove any adjustments for oxides that had been applied (some sources used these adjustments, some did not.) Then the OC was scaled up across the board according to factors developed by Carnegie Mellon University and provided by LADCO. Table 6.1.2 shows the composite profile for speciated light-duty gasoline vehicle PM_{2.5} emissions, and the other profiles from which it was calculated.

2.2 Diesel Vehicles

In the course of developing the volatile organic species profile for on-road diesel engines several sources were evaluated, including recent literature¹⁰ and more dated profiles from SPECIATE.^{11,12} After comparing the profiles side by side, it was determined that the 1999 study by Schauer offered a much more detailed profile than either of the profiles from SPECIATE - probably because of improved analytical methods and because the '99 study was a dynamometer study which measured emissions directly, rather than a tunnel study. The profile for volatile organic emissions from diesel engines was calculated directly from the emission rates given in Schauer¹⁰, and is shown in Table 6.1.3, with the SPECIATE profiles for comparison.

The speciation profile for PM_{2.5} emissions from on-road diesel emissions is a composite of four studies.^{6,7,13,14} A number of studies were evaluated for use, but these were chosen because they were recent, and because they were either dynamometer studies entailing direct emission measurement, or were tunnel studies where heavy-duty vehicles could clearly be separated from other traffic.

The speciated emissions from each source (summer/winter average for Cadle, average across all engine loads & RPM for Shi) were placed side-by-side and averaged to prepare a composite profile. It has been assumed that no crustal species are present in motor vehicle exhaust, and that any crustal species appearing in analytical results are likely to have resulted from road dust. Organic carbon is expressed as mass of carbon. Where necessary, OC was adjusted downward to remove any adjustments for oxides that had been applied (some sources

used these adjustments, some did not.) Then the OC was scaled up across the board according to factors developed by Carnegie Mellon University and provided by LADCO. Table 6.1.4 shows the composite profile for speciated diesel PM_{2.5} emissions, and the other profiles from which it was calculated.

3. OFF-ROAD SOURCES

Searches of literature and existing profiles produced very little useful data regarding emissions from off-road internal combustion engine sources. One detailed study on speciated emissions from multiple four-stroke lawnmower engines was located, and was used as a basis for several profiles, with modifications detailed below. Profiles for larger engine off-road sources were developed by modifying the on-road profiles previously developed, as detailed below.

Because no useful speciated PM data for off-road sources was located, the PM profiles for on-road gasoline and diesel engines were selected as most representative of gasoline and diesel off-road emissions.

3.1 Lawn & Garden

The primary source for profiling speciated volatile organic emissions from lawn and garden equipment was a 1997 study on emissions from four-stroke lawn mower emissions by Gaebele¹⁵ covering ten mowers with two types of gasoline (1990 “baseline” gas, and California phase 2 “reformulated” gas.) An exhaust profile was developed using the Gaebele study, while evaporative emissions were based on the evaporative emission profiles developed for on-road vehicles. The PM profile for on-road gasoline engines were selected as most representative of PM emissions from these SCCs.

The profile for emission of volatile organic species from exhaust was composited from the two emission profiles contained in the Gaebele study (one for each of the two fuels used.) The two profiles were placed side by side for comparison and composited, choosing elements from each based on comparison of the composition of the fuels used by Gaebele to that of fuels currently in use in the Midwest. Olefin and non-benzene aromatic compositions were taken from the 1990 “baseline” gasoline, while benzene and oxygenate compositions from the California reformulated gas were used (replacing MTBE with ethanol.) An average of the two profiles was used for the remaining components. Finally, the exhaust profile was normalized to total 100%.

Table 6.2.1 details the profiles from Gaebele and the composite exhaust emission profile for four-stroke lawn and garden engines composited from them. Because useful data on speciated emissions from two-stroke lawn and garden emissions could not be located, the four-stroke emission profile is also used for them.

Next, a series of Midwest-specific emission profiles were developed by adding an evaporative component to the exhaust profile. The evaporative component is based on the evaporative profiles developed for on-road sources, described in Section 2.1, above. The six

evaporative profiles (summer and winter profiles for high and low aromatics, and summer and winter profiles for gas with oxygenates) were composited with the exhaust profile based on data from EPA estimating evaporative emissions as a percentage of exhaust emissions for nonroad engine modeling.¹⁶ Because of the possibility of fall and winter emissions from leaf and snow blowers in addition to summertime lawn & garden emissions, profiles for all seasons were prepared.

A weighted average of the exhaust and evaporative profiles was taken to create the composite profile. For four-stroke lawn and garden engines, exhaust emissions were assumed to be 34.6% of exhaust emissions (33% from crankcase emissions, 1.6% from diurnal evaporative emissions). For two-stroke lawn and garden engines, exhaust emissions were assumed to be 1.6% of exhaust emissions (no crankcase emissions due to the nature of combustion in two-stroke engines, 1.6% from diurnal evaporative emissions).

3.2 Snow Mobiles

Literature and internet searches failed to locate any data which would have allowed development of Midwest-specific speciated emission profiles for four-stroke snow mobile engine emissions. The exhaust profile developed for four-stroke lawn and garden engines was determined to be the most representative of the SCC. The evaporative profiles based on Midwest gasolines were combined in a weighted average with the exhaust profile. The evaporative emissions were weighted at 9.4% of the exhaust emissions, based on Mobile6 model outputs for a pre-catalyst motorcycle engine developed using model inputs supplied by LADCO. The PM profile for on-road gasoline engines was selected as most representative of PM emissions from this SCC.

3.3 Agricultural and Construction Equipment and Railroads

Literature and internet searches failed to locate any data which would have allowed development of Midwest-specific speciated emission profiles for engine emissions from diesel agricultural and construction equipment or railroads. The exhaust profiles for volatile organic species and PM developed for on-road diesel engines were determined to be the most representative of these SCCs.

3.4 Marine Vessels

3.4.1 Commercial Diesel Marine Vehicles

Literature and internet searches failed to locate any data which would have allowed development of Midwest-specific speciated emission profiles for engine emissions from commercial diesel marine vehicles. The exhaust profiles for volatile organic species and PM developed for on-road diesel engines were determined to be the most representative of this SCC.

3.4.2 Pleasure Craft

Literature and internet searches failed to locate any data which would have allowed development of Midwest-specific speciated emission profiles for two-stroke or four-stroke pleasure craft marine engine emissions. The exhaust profile developed for four-stroke lawn and garden engines was determined to be the most representative of these SCCs. The evaporative profiles based on Midwest gasolines were combined in a weighted average with the exhaust profiles. The PM profile for on-road gasoline engines was selected as most representative of PM emissions from these SCCs.

The evaporative emissions for two-stroke gasoline marine engines were weighted at 1.6% of the exhaust emissions (no crankcase emissions due to the nature of combustion in two-stroke engines, 1.6% from diurnal evaporative emissions), based on data from EPA estimating evaporative emissions as a percentage of exhaust emissions for nonroad engine modeling.¹⁶ The evaporative emissions for four-stroke gasoline marine engines were weighted at 15.4% of the exhaust emissions, based on Mobile6 model outputs for a pre-catalyst light-duty gasoline vehicle developed using model inputs supplied by LADCO, with no crankcase emissions as set out in EPA guidance.¹⁶

4. AREA SOURCES

4.1 Residential Wood Combustion

Data on the distribution of tree species in the great lakes area was available in EPA's Biogenic Emission Land use Database version 3 (BELD3). A brief telephone survey of firewood vendors in the Midwest was performed to determine the relative frequency of use for hardwood and softwood fuels.

Speciation profiles were developed for several residential wood combustion SCCs, based on recent studies which measured emissions from wood combustion in fireplaces and wood stoves.^{17,18,19,20} The studies provide speciated emission profiles from combustion of wood from several species of trees in fireplaces and woodstoves. These profiles were combined and weighted based on the estimated usage of hardwood and softwood in the Midwest and the distribution of species in the region, using data on distribution of tree species, and frequency of use of hardwood and softwood fuels.

4.1.1 Gas-Phase Organic Emissions

Most of the available studies focused on particulate emissions, with only Schauer¹⁹ including detailed analysis of gas-phase organic emissions. As a result, only one national profile was developed for organic emissions, combining the oak and pine emissions profiles from Schauer, weighted 73% for hardwood (oak) and 27% for softwood (pine). The weighting factor used is an average of the Midwest factor calculated based on the telephone survey, and a similar

factor included in the Northern Front Range study.²⁰ The profile for speciated organic emissions from residential wood combustion is included in Table 6.3.1.

4.1.2 Fireplaces, Midwest Specific PM_{2.5} Emission Profiles

Speciated PM_{2.5} emission profiles taken from Fine^{17,18} and Schauer¹⁹ were composited. Profiles for species of wood present in the Midwest were chosen from those available, including red maple, red oak, yellow poplar, paper birch, white ash, mockernut hickory, eastern white pine, and more general “pine” and “oak” profiles.

Inspection revealed that the greatest variance amongst the profiles was between hardwood and softwood species. Accordingly, the first criteria used to weight the profiles was the relative frequency of use of hardwood and softwood fuels in the Midwest, as determined by a brief telephone survey of firewood vendors in the Midwest. Next, the profiles were weighted according to the distribution of the selected tree species in the great lakes area (as per EPA’s BELD 3 Database.) Two profiles are provided, the second is more detailed, and includes speciation of metals and other inorganic particulate species.

For these profiles, crustal (FCRS) is defined according to the definition of "SOIL" taken from “A Guide to interpret data” for the IMPROVE Network, UC Davis, 1995. Crustal is defined to include the sum of soil derived elements (Al, Si, Ca, Fe, Ti) plus their normal oxides. Organic carbon is expressed as mass of carbon. Where necessary, OC was adjusted downward to remove any adjustments for oxides that had been applied (some sources used these adjustments, some did not.) Then the OC was scaled up across the board according to factors developed by Carnegie Mellon University and provided by LADCO. Profiles LAD30003m & LAD30004n, the Midwest-specific profile for speciated particulate emissions from residential wood combustion in fireplaces, are included in Table 6.3.2.

4.1.3 Fireplaces, National PM_{2.5} Emission Profile

Speciated PM_{2.5} emission profiles taken from Fine^{17,18} Schauer¹⁹, and Zielenska²⁰ were composited. Profiles for species of wood chosen included red maple, red oak, yellow poplar, paper birch, white ash, mockernut hickory, eastern white pine, Duraflame (commercially prepared firelogs), and more general “pine” and “oak” profiles, as well as composite pine and oak profiles from the Northern Front Range study.

Inspection revealed that the greatest variance amongst the profiles was between hardwood and softwood species. The profiles were divided into two groups (hardwood and softwood), for which an average profile was created. The two resulting profiles were then combined, weighted according to the relative frequency of use of hardwood and softwood fuels. The weighting factor was an average of the factor from by a brief telephone survey of firewood vendors in the Midwest, and a similar factor taken from the Northern Front Range study.

For these profiles, crustal (FCRS) is defined according to the definition of "SOIL" taken from "A Guide to interpret data" for the IMPROVE Network, UC Davis, 1995. Crustal is defined to include the sum of soil derived elements (Al, Si, Ca, Fe, Ti) plus their normal oxides. Organic carbon is expressed as mass of carbon. Where necessary, OC was adjusted downward to remove any adjustments for oxides that had been applied (some sources used these adjustments, some did not.) Then the OC was scaled up across the board according to factors developed by Carnegie Mellon University and provided by LADCO. Profile LAD30005n for speciated particulate emissions from residential wood combustion in fireplaces is included in Table 6.3.3.

4.1.4 Woodstoves, National PM_{2.5} Emission Profile

Only the Northern Front Range study (Zielenska²⁰) included an emission profile for woodstoves, so it was used. As with the other residential wood profiles, crustal(FCRS) is defined according to the definition of "SOIL" taken from "A Guide to interpret data" for the IMPROVE Network, UC Davis, 1995. Crustal is defined to include the sum of soil derived elements (Al, Si, Ca, Fe, Ti) plus their normal oxides. Organic carbon is expressed as mass of carbon and was adjusted downward to remove any adjustments for oxides that had been applied. Then the OC was scaled up according to factors developed by Carnegie Mellon University and provided by LADCO. Profile LAD30006n for speciated particulate emissions from residential wood combustion in woodstoves is included in Table 6.3.4.

4.1.5 Fireplaces & Woodstoves Composite, National PM_{2.5} Emission Profile

Profile LAD30002n for fireplaces and woodstoves is an averaged composite of profiles LAD30005n and LAD30006n. The national profile for speciated particulate emissions from residential wood combustion in woodstoves and fireplaces is included in Table 6.3.5.

4.2 Surface Coating

Speciation profiles were developed for several surface coating SCCs which account for significant amounts of organic emissions in the Midwest Regional Planning Organization emissions inventory. These categories are (in approximate order of their contribution to the inventory): auto refinishing; traffic markings; wood furniture; paper, foil, and film; can coating; electrical and electronic coatings; miscellaneous manufacturing; and industrial maintenance coatings; and "all others". Because the emissions inventory did not appear to contain any PM emissions from surface coating sources, no PM profiles were developed.

4.2.1 Architectural Coatings

The profile for emissions from architectural coatings is a composite of three profiles taken from two surveys performed for CARB. Profiles for solvent and water-based paints were taken from the 1998 architectural coatings survey²¹, a profile for thinners was taken from a 1996 study.²² These three profiles were combined to make a composite profile, weighted according to

industry sales data taken from the 2002 US Census of Manufacturers.²³ In addition, species contained in “naptha” or “mineral spirits” were replaced by a more detailed speciation profile taken from a representative MSDS.²⁴

Annual sales volumes were adjusted to remove volume attributed to solids and water, based on the composition of a typical latex interior paint. Thinners were assumed to be completely volatile. The adjusted annual sales volumes for water-based paints, solvent paints, and thinners were then used to create weighting factors used to combine the existing speciated emission profiles. Profile LAD30007n, for Architectural Coatings, is detailed in Table 6.3.6.

4.2.2 Other Surface Coating SCC's

Other important surface coating categories in the emissions inventory include: architectural coatings, auto refinishing; traffic markings; wood furniture; paper, foil, and film; can coating; electrical and electronic coatings; miscellaneous manufacturing; and industrial maintenance coatings. Earlier profiles for these categories have been based on a combination of solvent industry market data and chemical analyses of coating products. Current coating industry market data are not as detailed as the data that have been available in the past. However, the Freedonia Group reports the usage of various solvents (*e.g.*, toluene, xylene, etc.) for the entire coating formulation industry.

In the current effort, the Freedonia estimates have been used to update the earlier market-based profiles. These adjustments reflect recent changes in solvent composition due to market changes and regulatory issues. The data from the Freedonia group²⁵ included 1998 sales data for specific surface coating solvent species for the surface coating industry as a whole, while data available from the National Paint and Coatings Association (NPCA)²⁶ included projected 2000 total solvent sales for surface coating SCC's. Comparison of earlier profiles to the 1998 Freedonia speciated sales data suggested that a significant difference between 1990 coatings and 1998 coatings was substitution of aliphatic hydrocarbons and alcohols for more hazardous solvents (*i.e.*, toluene and xylenes.)

An overall species list was prepared, including all species that were present in the previously existing profiles of interest. A “1990 weighted average” for each species was then calculated, based on the average content of each species across the profiles of interest, weighted according to projected 2000 sales data for surface coating SCC's. This “1990 weighted average” was then compared to the 1998 Freedonia speciated sales data, and conversion factors were calculated for species which showed significant change (primarily increased percentages of mineral spirits and alcohols, and decreases in toluene and xylene.) These conversion factors were then applied to the appropriate species in each of the SPECIATE profiles. Species described as “naptha” or “mineral spirits” were replaced with a more detailed speciation profile taken from a representative MSDS.²⁴ Finally, the profiles were normalized to total 100%. Profiles for auto refinishing (lad30008n); wood furniture (lad30009n); miscellaneous manufacture (lad30010n); other special purpose coatings (lad30012n); metal cans (lad30011n); industrial maintenance coatings (lad30012n); electronic and other electrical coatings

(lad30013n); traffic markings (lad30014n); paper, foil, and film coatings (lad30015n); and all surface coatings (lad30010n) are detailed in Table 6.3.7.

4.3 Dry Cleaning

In the course of developing the profiles for the dry cleaning industry, several data sources were evaluated. Recent market data from the Freedonia Group²⁵ suggests that there are essentially two solvents in use by dry cleaners: perchloroethylene (a single compound), and mineral spirits (or stoddard solvent.) Existing profiles for mineral spirits used in dry cleaning from SPECIATE²⁷ and CARB²⁸ were examined, but were either insufficiently specific, or contained higher fractions of hazardous aromatics than it is believed are currently prevalent. Attempts to find current MSDS for stoddard solvent which include speciation data were also unsuccessful.

Internet research led to a toxicological profile for stoddard solvent from the U.S. Agency for Toxic Substances and Disease Registry²⁹ which contains several speciation profiles, including a profile for low aromatic white spirits which was chosen as most likely to represent solvents currently in use.

Two profiles for dry cleaning were developed. The first (LAD30020n) is a composite of the single species perchloroethylene and the low aromatics white spirits profile, weighted according to the overall dry cleaning solvent market data from Freedonia.²⁵ Profile LAD30020n should be used for commercial/industrial dry cleaners, or for an overall industry composite. The other profile (LAD30021n) is for coin-operated dry cleaners, and contains only the single species perchloroethylene, as per the current CARB profile for coin-operated dry cleaners. Profiles LAD30020n and LAD30021n for dry cleaning are detailed in Table 6.3.8. Because the LADCO inventory did not appear to contain any PM emissions from dry cleaning sources, no PM profiles were developed.

4.4 Degreasing

In order to develop the profiles for industrial degreasing (or surface cleaning), several data sources were evaluated. Recent market data on solvent sales for surface cleaning from the Freedonia Group¹⁸ indicates that there are two broad categories of degreasing: cold cleaning with liquid solvent, and vapor degreasing. Existing speciation profiles from SPECIATE²⁷ and CARB²⁸ were compared to the Freedonia data, and found to be undesirable, as they were less detailed or contained large fractions of ozone-depleting substances such as trichloroethane which have been phased out of use due to stratospheric ozone impacts.

The sales data from Freedonia were supplied in millions of pounds of each solvent per year. These values were converted into percentages by division of the volume of sales for each species by the total, giving speciated emission profiles for cold cleaning and vapor degreasing. A composite degreasing profile was then created by combining the cold cleaning and vapor degreasing profiles, weighted according to their respective fractions of the total solvent sales for

both categories. Species described as “naptha” or “mineral spirits” were replaced with a more detailed speciation profile taken from a representative MSDS.²⁴ Profile LAD30017n for degreasing is detailed in Table 6.3.8. Because the LADCO inventory did not appear to contain any PM emissions from degreasing sources, no PM profiles were developed.

4.5 Pesticide Application

Solvent sales data for pesticides from the Freedonia Group²⁵ were evaluated and found to be insufficiently detailed for the development of a speciated emission profile. Internet research provided several MSDS for pesticides, which were also deemed unsuitable due to lack of detailed speciation. Data from the U.S. Department of Agriculture³⁰ and the *Chemical Economics Handbook*³¹ suggested that the vast majority of pesticides used on corn, wheat, and soy (the primary agricultural products of the Midwest) are herbicides, while insecticides and fumigants are used sparingly.

SPECIATE²⁷ contains a fairly recent profile for speciated emissions from herbicides, based on a 1995 EPA study of commercial/consumer product solvent emissions³², which was used as the basis for profile LAD0023m. Species described as “naptha” or “mineral spirits” were replaced with a more detailed speciation profile taken from a representative MSDS.²⁴ However, for this profile, xylenes were left unadjusted, due to indications³³ that xylene is used as an active ingredient in herbicides, not just as a solvent. Profile LAD0023m for agricultural pesticide application in the Midwest is detailed in Table 6.3.9. Because the LADCO inventory did not appear to contain any PM emissions from pesticide application sources, no PM profiles were developed.

4.6 Commercial/Consumer Solvents

Speciation profiles were developed for several commercial/consumer solvent use SCCs, by adjusting available profiles to be in accordance with more current market data. Profiles developed include the following: automotive aftermarket products, adhesives and sealants, personal care products, pesticide application, and a general commercial/consumer solvent profile. Because the LADCO inventory did not appear to contain any PM emissions from commercial/consumer solvent sources, no PM profiles were developed.

4.6.1 Automotive Aftermarket

Review of automotive aftermarket solvent sales data from the Freedonia Group²⁵ revealed that the only volatile solvent associated with automotive aftermarket uses was methanol from windshield washer fluid/deicers. Other solvents included in the market data were judged to be nonvolatile, resulting from brake fluids or antifreeze. Resultantly, profile LAD30024n for automotive aftermarket emissions is 100% methanol.

4.6.2 Adhesives and Sealants

The profile for commercial/consumer solvents adhesive use is a composite of data from two sources: solvent sales data from the Freedonia Group²⁵ and a 1995 EPA study of commercial/consumer product solvent emissions.³² The SPECIATE²⁷ profile (#8523) taken from the 1995 study was more detailed, while the Freedonia solvent sales data offered a more recent snapshot of solvent usage, so the Freedonia data was used to update the solvent components of the SPECIATE profile. In addition, several solvent species described as “naptha” or “mineral spirits” were replaced with a more detailed speciation profile taken from a representative MSDS.²⁴ Finally, the profile was normalized to total 100%. Table 6.3.10 details profile LAD30025n for commercial/consumer solvents, adhesive and sealant use emissions.

4.6.3 Personal Care Products

The profile for personal care products was developed in a manner similar to that for adhesives and sealants. It is a composite of data from two sources: solvent sales data from the Freedonia Group¹⁸ and a more detailed profile from SPECIATE²⁷ (8501) based on 1995 EPA study of commercial/consumer product solvent emissions.³² The Freedonia data was used to update the solvent components of the SPECIATE profile, leaving the other components intact. Table 6.3.11 details profile LAD30026n for commercial/consumer solvents, personal care product emissions.

4.6.4 Pesticide Application

Solvent sales data for pesticides from the Freedonia Group²⁵ were evaluated and found to be insufficiently detailed for the development of a speciated emission profile for commercial consumer pesticide use, assumed to represent primarily insecticides. Internet research provided several MSDS for pesticides, which were also deemed unsuitable due to lack of detailed speciation. SPECIATE²⁷ profile 8527 is a fairly recent profile for speciated emissions from insecticides, based on a 1995 EPA study of commercial/consumer product solvent emissions³², and was used as the basis for profile LAD0027n.

Species described as “naptha” or “mineral spirits” in the SPECIATE profile were replaced with a more detailed speciation profile taken from a representative MSDS.²⁴ Freon was removed, because it is an ozone-depleting substance which has been phased out of use due to the Montreal Protocol. Also, “Undefined Propellant” was replaced with additional butane and propane. Profile LAD0027n for commercial/consumer pesticide application is detailed in Table 6.3.12.

4.6.5 General Commercial/Consumer Solvent Use

The general profile for other commercial/consumer solvent use was developed in a manner similar to that used for the profiles for adhesives and personal care products. It is a composite of data from two sources: solvent sales data from the Freedonia Group²⁵ and a more

detailed profile from SPECIATE²⁷ (8500) based on 1995 EPA study of commercial/consumer product solvent emissions.³² The Freedonia data was used to update the solvent components of the SPECIATE profile (non-specific species such as “ether solvents” were used to increase the weighting of similar species in the SPECIATE profile), while species described as “naptha” or “mineral spirits” in the SPECIATE profile were replaced with a more detailed speciation profile taken from a representative MSDS.²⁴ “Undefined Propellant” from the SPECIATE profile was replaced with additional butane and propane. Table 6.3.13 details profile LAD30029n for general commercial/consumer solvent emissions.

4.7 Gasoline Marketing Stage 2

Evaporative emissions from gasoline marketing are profiled using the evaporative emissions profiles for Midwest gasolines developed for on-road sources (see Section 2.1.)

4.8 Open Burning

Literature searches did not locate any recent data which would allow construction of Midwest-specific speciated emission profiles for open burning. Older profiles were deemed inappropriate because of shortcomings in the analytical methods, so data from more recent but non-Midwest-specific studies were used. The profile that was chosen is based on data compiled for the National Fire Emissions Technical Workshop³⁴, held in May, 2004. For open burning, a composite profile was chosen. Profiles LAD30032n and LAD30033n for household waste and land clearing debris are detailed in Table 6.4.1 (along with other profiles taken from the same data source.) OC as carbon was scaled up to adjust for oxides according to factors developed by Carnegie Mellon University and provided by LADCO. The PM profile is based on an aggregate of over twenty emission factors for elemental and organic carbon emissions from open fires. OC as carbon was scaled up to adjust for oxides according to factors developed by Carnegie Mellon University and provided by LADCO.

5. POINT SOURCES

5.1 Petroleum Refineries

Literature searches failed to locate any recent data which would have allowed development of improved or Midwest-specific speciated emission profiles for the petroleum refinery SCC's of interest. Several profiles from CARB²⁸ and SPECIATE²⁷ were reviewed and the following were selected as most representative:

Profile	Category	Source
LAD40001n	Catalytic Cracking Unit VOC	CARB #504 "External combustion boilers- distillate or residual"
	Catalytic Cracking Unit PM	SPECIATE #13505 "Residual Oil Fired Boiler: Petroleum Refinery"
LAD40002n	Process Heaters, Gas Fired VOC	CARB #3 "External combustion boiler - natural gas"
	Process Heaters, Gas Fired PM	CARB#125 "Petroleum Heaters, Gas"
LAD40003n	Process Heaters, Oil Fired VOC	CARB#29 "Petroleum Refinery Catalytic Cracker"
	Process Heaters, Oil Fired PM	SPECIATE#26205 "Petroleum Refinery Catalytic Cracker"

OC as carbon was scaled up to adjust for oxides according to factors developed by Carnegie Mellon University and provided by LADCO.

5.2 Pulp & Paper

Literature searches failed to locate any recent data which would have allowed development of improved or Midwest-specific speciated emission profiles for the pulp and paper SCC's of interest. Several profiles from CARB²⁸ and SPECIATE²⁷ were reviewed and the following profiles were selected as most representative. OC as carbon was scaled up to adjust for oxides according to factors developed by Carnegie Mellon University and provided by LADCO.

VOC: CARB profile #1413, "Pulp & Paper Industry, Average"

PM: SPECIATE profile #90015 "Pulp & Paper Industry, Average"

5.3 Primary Metals Production - Titanium

Literature searches failed to locate any recent data which would have allowed development of improved or Midwest-specific speciated emission profiles for the Primary Metals Production - Titanium SCC. Because the LADCO inventory did not appear to contain any volatile organic emissions from titanium production sources, no VOC profile was developed. Several profiles from CARB²⁸ and SPECIATE²⁷ were reviewed and the following profile was selected as most representative. OC as carbon was scaled up to adjust for oxides according to factors developed by Carnegie Mellon University and provided by LADCO.

PM: SPECIATE profile #90007 “Primary Metals Production - Average”

5.4 Fires: Prescribed Burning, Wildfires, and Agricultural Burning

Literature searches did not locate any recent data which would allow construction of Midwest-specific speciated emission profiles for open fires. Older profiles were deemed inappropriate because of shortcomings in the analytical methods, so data from more recent but non-Midwest-specific studies were used. The profiles that were chosen are all based on data compiled for the National Fire Emissions Technical Workshop³⁴, held in May, 2004.

Profile LAD40007n for prescribed burning is a composite profile. Profile LAD40008n for wildfires is a profile for woods wildfires (a grasslands wildfire profile has also been provided, as many wildfires in the Midwest are grasslands fires.) Profile LAD40009n for agricultural burning is an agricultural burning profile. The PM profile is based on an aggregate of over twenty emission factors for elemental and organic carbon emissions from open fires. OC as carbon was scaled up to adjust for oxides according to factors developed by Carnegie Mellon University and provided by LADCO.

Profiles LAD40007n for prescribed burning, LAD40008n for wildfires, and LAD40009n for agricultural burning are detailed in Table 6.4.1.

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6. Tables

Table 6.0 Profile Summary

Report Section	Description	Profile Code
On-Road Sources		
Light Duty Gasoline Vehicles		
2.1	On-road summer general catalytic exhaust	LAD1SGCEXH
	On-road summer general composite	LAD1SGENCOMP
	On-road summer general catalytic evaporative	LAD1SGENEVAP
	On-road summer general non-catalytic exhaust	LAD1SGNEXH
	On-road summer high oxygenated catalytic exhaust	LAD1SHOXCEXH
	On-road summer high oxygenated composite	LAD1SHOXCOMP
	On-road summer high oxygenated evaporative	LAD1SHOXEVAP
	On-road summer high oxygenated non-catalytic exhaust	LAD1SHOXNEXH
	On-road summer low aeromatic catalytic exhaust	LAD1SLACEXH
	On-road summer low aeromatic composite	LAD1SLACOMP
	On-road summer low aeromatic evaporative	LAD1SLAEVAP
	On-road summer low aeromatic non-catalytic exhaust	LAD1SLANEXH
	On-road winter general catalytic exhaust	LAD1WGCEXH
	On-road winter general composite	LAD1WGENCOMP
	On-road winter general evaporative	LAD1WGENEVAP
	On-road winter general non-catalytic exhaust	LAD1WGNEXH
	On-road winter high oxygenated catalytic exhaust	LAD1WHOXCEXH
	On-road winter high oxygenated composite	LAD1WHOXCOMP
	On-road winter high oxygenated evaporative	LAD1WHOXEVAP
	On-road winter high oxygenated non-catalytic exhaust	LAD1WHOXNEXH
	On-road winter low aeromatic catalytic exhaust	LAD1WLACEXH
	On-road winter low aeromatic composite	LAD1WLACOMP
	On-road winter low aeromatic evaporative	LAD1WLAEVAP
	On-road winter low aeromatic non-catalytic exhaust	LAD1WLANEXH
	On and off-road gasoline PM	LAD1PMGAS
Diesel Vehicles		
2.2	On-road diesel	LAD1DIESEL
	On and off-road diesel PM	LAD1PMDIES

Table 6.0 (continued) Profile Summary

Report Section	Description	Profile Code
Off-Road Sources		
Lawn & Garden		
3.1	Off-road summer general lawn and garden 4-stroke	LAD2SGLG4
	Off-road summer high oxygenated lawn and garden 4-stroke	LAD2SHOXLG4
	Off-road summer low aromatic lawn and garden 4-stroke	LAD2SLALG4
	Off-road winter general lawn and garden 4-stroke	LAD2WGLG4
	Off-road winter high oxygenated lawn and garden 4-stroke	LAD2WHOXLG4
	Off-road winter low aromatic lawn and garden 4-stroke	LAD2WLALG4
	Off-road summer general lawn and garden 2-stroke	LAD2SGCOMP
	Off-road summer high oxygenated lawn and garden 2-stroke	LAD2SHOXCOMP
	Off-road winter general lawn and garden 2-stroke	LAD2WGCOMP
	Off-road summer low aromatic lawn and garden 2-stroke	LAD2SLACOMP
	Off-road winter high oxygenated lawn and garden 2-stroke	LAD2WHOXCOMP
	Off-road winter low aromatic lawn and garden 2-stroke	LAD2WLACOMP
Snow Mobiles		
3.2	Off-road winter general snow mobiles	LAD2WGSNOW
	Off-road winter high oxygenated snow mobiles	LAD2WHOXSNOW
	Off-road winter low aromatic snow mobiles	LAD2WLASNOW
Agricultural & Construction Equipment, Railroads		
3.3	Off-road diesel	LAD2DIESEL
	On and off-road diesel PM	LAD1PMDIES
Marine Vessels		
3.4.1	Diesel Marine Vessels	LAD2DIESEL
	Diesel Marine Vessels PM	LAD1PMDIES
3.4.2	Off-road summer high oxygenated marine vessel 4-stroke	LAD2SHOXMAR4
	Off-road summer low aromatic marine vessel 4-stroke	LAD2SLAMAR4
	Off-road summer general marine vessel 4-stroke	LAD2SGMAR4

Table 6.0 (continued) Profile Summary

Report Section	Description	Profile Code
Area Sources		
Residential Wood Combustion		
4.1.1	Residential Wood, Organics	LAD3RESWVOC
4.1.2	Fireplaces: Insert; non-EPA certified, Midwest	LAD30003M
4.1.3	Fireplaces: Insert; non-EPA certified, National	LAD30005N
4.1.4	Woodstoves: General	LAD30006N
4.1.5	Total: Woodstoves and Fireplaces	LAD30002N
Surface Coating		
4.2.1	Architectural Coating VOC	LAD30007N
4.2.2	Auto Refinishing VOC	LAD30008N
	Wood Furniture VOC	LAD30009N
	Misc Manufacturing VOC	LAD30010N
	Other Special Purpose Coatings VOC	LAD30012N
	Metal Cans VOC	LAD30011N
	Industrial Maintenance VOC	LAD30012N
	Electronic VOC	LAD30013N
	Traffic Markings VOC	LAD30014N
	Paper VOC	LAD30015N
	All Surface Coatings VOC	LAD30010N
Dry Cleaning		
4.3	Dry Cleaning VOC: Commercial/Industrial or General	LAD30020N
	Dry Cleaning VOC: Coin-operated	LAD30021N
Degreasing		
4.4	Degreasing VOC	LAD30017N
Pesticide Application		
4.5	Agricultural Pesticides VOC: Midwest	LAD30023M
Commercial/Consumer Solvents		
4.6.1	Auto After-market VOC	LAD30024N
4.6.2	Consumer Adhesives VOC	LAD30025N
4.6.3	Consumer Personal Care Products VOC	LAD30026N
4.6.4	Consumer Pesticides VOC	LAD30027N
4.6.5	All Consumer Products VOC	LAD30029N
Gasoline Marketing - Stage 2		
4.7	See Section 2.1 for evaporative emissions from gasoline	
Open Burning		
4.8	Open Burning Household Waste VOC	LAD30032N
	Open Burning Land Clearing Debris VOC	LAD30033N
	Open Burning PM2.5	LAD40010N

Table 6.0 (continued) Profile Summary

Report Section	Description	Profile Code
Point Sources		
Petroleum Refineries		
5.1	Catalytic Cracking Unit VOC	LAD40001N
	Catalytic Cracking Unit PM2.5	LAD40001PMN
	Process Heaters, Gas VOC	LAD40002N
	Process Heaters, Gas PM2.5	LAD40002PMN
	Process Heaters, Oil VOC	LAD40003N
	Process Heaters, Oil PM2.5	LAD40003PMN
Pulp and Paper		
5.2	Pulp and Paper VOC	LAD40004N
	Pulp and Paper PM2.5	LAD40004PMN
Primary Metals Production - Titanium		
5.3	Primary Metal PM2.5	LAD40011PMN
Prescribed Burning, Agricultural Burning, and Wildfires		
5.4	Prescribed Burning VOC	LAD40007N
	Wildfires - Woods VOC	LAD40008N
	Agricultural Burning VOC	LAD40009N
	Wild Land Fire PM2.5	LAD40010N

Table 6.1.1 Composite Gasoline Compositions

Compound	Summer Low Aromatic (%)	Winter Low Aromatic (%)	Summer General (%)	Winter General (%)	Summer High Oxygenate (%)	Winter High Oxygenate (%)
Ethanol	10	10.5	0.89	0.89	3.99	3.99
MTBE	0	0		0	2.65	2.65
Aromatics	17.8	16	29	24.4	24.4	24.4
Benzene	0.79	0.79	1.2	1.1	1.1	1.1
Olefins	8	6.22	8.9	9.9	9	9.9

**Table 6.1.2 Speciated PM_{2.5} Emissions from Light-duty Gasoline Vehicles
(Profile LAD1PMGas)**

Cpd ID	Compound	CA, 92 (Watson)		CO, 96-97 (Cadle)	CA, 97 (Kirch- stetter)	CA, 99 (Schauer)		Composite
		%	Unc.	%	%	%	Unc.	
PEC	PM-fine elemental carbon	17.449	±5.61	23	31.82	10.30	±2.9	23.70
PNO3	PM-fine nitrate	11.336	±11.8	0.03		0.47	±0.45	4.54
POA	PM-fine organic aerosol	45.82	±18.81	54	48.18	43.70	±2.1	66.05
PSO4	PM-fine sulfate	4.549	±1.91	0.44	1.93	1.09	±0.3	0.88
FCRS	PM-fine crustal*							
FPRM	PM-fine "other"	2.10						2.41
	Total	81.26		77.47	81.93	55.56		100

**Table 6.1.3 Volatile Organic Emissions from On-Road Diesel Sources
(Profile LAD1Diesel)**

cas	Species	Schauer (1999) %	Speciate 1201 (1980) %	Speciate 2520 (1995) %
	1,2,3-trimethylbenzene			1.53
95636	1,2,4-trimethylbenzene	0.31		6.84
108678	1,3,5-trimethylbenzene	0.09		1.92
106990	1,3-butadiene	0.11		
	1-Butene			2.7
90120	1-methylnaphthalene	0.13		
	1-methylphenanthrene	0.01		
	1-Pentene			0.82
540841	2,2,4-trimethylpentane	0.44		1.36
75832	2,2-dimethylbutane	0.11		2.41
565753	2,3,4-trimethylpentane	0.11		0.29
79298	2,3-dimethylbutane	0.2		0.29
584941	2,3-dimethylhexane	0.06		
565593	2,3-dimethylpentane	0.25		0.83
589435	2,4-dimethylhexane	0.02		
108087	2,4-dimethylpentane	0.14		0.33
	2,5-dimethylbenzaldehyde	1.44		
592132	2,5-dimethylhexane	0.02		
	2,6,10-trimethyltridecane	0.13		
563462	2-methyl-1-butene	0.09		
	2-Methyl-1-Pentene			0.2
625274	2-methyl-2-pentene	0.07		
	2-methylanthracene	0		
592278	2-methylheptane	0.04		
591764	2-methylhexane	0.2		
91576	2-methylnaphthalene	0.21		
107835	2-methylpentane	0.33		1.81
	2-methylphenanthrene	0.01		
619998	3-ethylhexane	0.07		
563451	3-methyl-1-butene	0.06		
	3-Methylheptane			0.4
589344	3-methylhexane	0.11		2.12
96140	3-methylpentane	0.24		0.83
	3-methylphenanthrene	0.01		
	8 β ,13 α -dimethyl-14 β -[3'-methylbutyl]-podocarpene	0		
	8 β ,13 α -dimethyl-14 β -n-butylpodocarpene	0.02		
	9-methylphenanthrene	0.01		
83329	acenaphthene	0.01		
208968	acenaphthylene	0.02		
	acephenanthrylene	0		
75070	acetaldehyde	14.69	2.91	
67641	acetone	7.73		
98862	acetophenone	1.79		
107028	acrolein	1.2		
120127	anthracene	0		
	benz[a]anthracene	0		

Table 6.1.3 (cont.) Volatile Organic Emissions from On-Road Diesel Sources (Profile LAD1Diesel)

cas	Species	Schauer	Speciate	Speciate
		(1999)	1201	2520
		%	(1980)	(1995)
			%	%
100527	benzaldehyde	1.34	0.55	
71432	benzene	0.96		2.92
	benzo[ghi]fluoranthene	0		
	benzofuran	0.02		
65850	benzoic acid	0.44		
	biacetyl	0.32		
123728	butanal	0.46		
	butanone	2.64		
	C1-fluorene	0.02		
	C1-MW 202 PAH	0.01		
	C1-MW 228 PAH	0		
	C2-MW 178 PAH	0.07		
	C3-MW 178 PAH	0.03		
	C2-naphthalenes	0.19		
	C3-naphthalenes	0.08		
	C4-naphthalenes	0.03		
	chrysene and triphenylene	0		
590181	cis-2-butene	0.09		0.27
7688213	cis-2-hexene	0.04		
	CIS-2-PENTENE			0.27
123739	crotonaldehyde	4.71	1.01	
110827	cyclohexane	0.07		0.21
	cyclopenta[cd]pyrene	0		
287923	cyclopentane	0.14		0.29
142290	cyclopentene	0.07		
	decanal	0.98		
	decanoic acid	0.03		
	decylcyclohexane	0.01		
132649	dibenzofuran	0.01		
	dibenzothiazole	0.09		
	dibenzothiophene	0		
	dodecanal	0.42		
	dodecanoic acid	0.02		
	dodecylcyclohexane	0.01		
	Ethane			1.08
74851	ethene	3.01		
100414	ethylbenzene	0.17		2.61
	Ethylene			9.05
74862	ethyne (Acetylene)	1.62		2.34
	farnesane	0.15		
206440	fluoranthene	0.02		
86737	fluorene	0.01		
	fluorenone	0.01		
50000	formaldehyde	7.84	8.61	
107222	glyoxal	0.74		
	heptanal	1.12		
	heptylcyclohexane	0.01		

Table 6.1.3 (cont.) Volatile Organic Emissions from On-Road Diesel Sources (Profile LAD1Diesel)

cas	Species	Schauer	Speciate	Speciate
		(1999)	1201	2520
		%	(1980)	(1995)
			%	%
66251	hexanal	0.77	0.08	
	hexylcyclohexane	0.01		
	indanone	0.02		
	Isobutane			0.25
115117	isobutene	0.4		
78784	isopentane	0.96		1.2
	Isopropylbenzene			0.3
	m-and p-xylene	0.82		10.07
	methacrolein	1.41		
	methylbenzoic acids	0.27		
108872	methylcyclohexane	0.18		0.4
96377	methylcyclopentane	0.22		0.57
78988	methylglyoxal	0.6		
620144	m-ethyltoluene	0.07		3.8
1330207	m-ethyltoluene	0.07		
	naphthalene	0.22		
106978	n-butane	1.35		0.59
	n-decane			2.4
	n-docosane	0.02		
112403	n-dodecane	0.18		
	n-eicosane	0.07		
	n-heneicosane	0.02		
	n-heptacosane	0.01		
629787	n-heptadecane	0.22		
142825	n-heptane	0.17		0.52
	n-hexacosane	0.01		
544763	n-hexadecane	0.25		
	n-hexane			0.88
	n-nonacosane	0		
	n-nonadecane	0.14		
111842	n-nonane	0.06		1.03
	n-octacosane	0.01		
	n-octadecane	0.21		
111659	n-octane	0.09		0.28
	nonanal	1.55		
	nonanoic acid	0.08		
	nonylcyclohexane	0.01		
	norfarnesane	0.13		
	norpristane	0.2		
	n-pentacosane	0.01		
629629	n-pentadecane	0.14		
109660	n-pentane	0.65		1.39
103651	n-propylbenzene	0.04		0.97
	n-tetracosane	0.01		
629594	n-tetradecane	0.22		
	n-tricosane	0.02		
629505	n-tridecane	0.17		

Table 6.1.3 (cont.) Volatile Organic Emissions from On-Road Diesel Sources (Profile LAD1Diesel)

cas	Species	Schauer	Speciate	Speciate
		(1999)	1201	2520
		%	(1980)	(1995)
			%	%
	n-undecane			4.88
	octanal	1.09		
	octanoic acid	0.04		
	octylcyclohexane	0.01		
	o-ethyltoluene			1.83
	other			7.8
95476	o-xylene	0.29		3.42
	pentadecylcyclohexane	0		
3879289				
1	pentylcyclohexane	0.03		
622968	p-ethyltoluene	0.18		1.28
85018	phenanthrene	0.03		
	phytane	0.15		
	pristane	0.16		
123386	propanal	4.92		
	propane			2.03
115071	propene	0.27		
	propionaldehyde		1.77	
	propylene			3.66
129000	pyrene	0.03		
	styrene			1.7
	tetradecanoic acid	0		
	tetradecylcyclohexane	0.01		
108883	toluene	1.4		4.12
624646	trans-2-butene	0.18		0.22
4050457	trans-2-hexene	0.06		
646048	trans-2-pentene	0.02		0.33
	tridecanal	0.7		
	tridecanoic acid	0		
	tridecylcyclohexane	0.01		
	undecanal	0.91		
	undecanoic acid	0.07		
	undecylcyclohexane	0.01		
	xanthone	0		
	C-1 COMPOUNDS		5.8	
	C-2 COMPOUNDS		19.96	
	C-3 COMPOUNDS		5.21	
	C-4 COMPOUNDS		4.08	
	C-5 COMPOUNDS		2.36	
	C-6 COMPOUNDS		4.3	
	C-7 COMPOUNDS		2.89	
	C-8 COMPOUNDS		1.13	
	C-9 COMPOUNDS		0.75	
	C-10 COMPOUNDS		3.52	
	C-11 COMPOUNDS		3.58	
	C-12 COMPOUNDS		2.2	
	C-13 COMPOUNDS		3.43	

Table 6.1.3 (cont.) Volatile Organic Emissions from On-Road Diesel Sources (Profile LAD1Diesel)

cas	Species	Schauer (1999) %	Speciate 1201 (1980) %	Speciate 2520 (1995) %
	C-14 COMPOUNDS		4.45	
	C-15 COMPOUNDS		4.35	
	C-16 COMPOUNDS		3.49	
	C-17 COMPOUNDS		3.06	
	C-18 COMPOUNDS		2.04	
	C-19 COMPOUNDS		1.56	
	C-20 COMPOUNDS		0.91	
	C-21 COMPOUNDS		0.75	
	C-22 COMPOUNDS		0.59	
	C-23 COMPOUNDS		0.48	
	C-24 COMPOUNDS		0.48	
	C-25 COMPOUNDS		0.54	
	C-26 COMPOUNDS		0.44	
	C-27 COMPOUNDS		0.22	
	C-28 COMPOUNDS		0.32	
	C-29 COMPOUNDS		0.14	
	C-30 COMPOUNDS		0.32	
	C-31 COMPOUNDS		0.29	
	C-32 COMPOUNDS		0.27	
	C-33 COMPOUNDS		0.22	
	C-34 COMPOUNDS		0.24	
	C-35 COMPOUNDS		0.16	
	C-36 COMPOUNDS		0.2	
	C-37 COMPOUNDS		0.08	
	C-38 COMPOUNDS		0.05	
	C-39 COMPOUNDS		0.11	
	C-40 COMPOUNDS		0.02	
	C-41 COMPOUNDS		0.05	
	C-42 COMPOUNDS		0.02	
	C-43 COMPOUNDS		0.01	
	Unresolved Complex Mixture	18.91		0.36
	Total	100	100	100

**Table 6.1.4 Speciated PM_{2.5} Emissions from On-Road Diesel Sources
(Profile LAD1PMDies)**

Species	Description	1995 (Shi) %	CA, 96 (Schauer) %	Co, 96-97 (Cadle) %	CA, 97 (Kirchstetter) %	Composite %
PEC	PM-fine elemental carbon	36.39	30.8	48.9	52.00	55.02
PNO3	PM-fine nitrate	2.46	0.23	0.11		1.22
POA	PM-fine organic aerosol	31.96	19.7	32.6	20.00	40.96
PSO4	PM-fine sulfate	4.9	1	0.49	1.80	2.68
FCRS	PM-fine crustal*					
FPRM	PM-fine "other"	0.09				0.12
Total		75.8	51.73	82.1	73.8	100

**Table 6.2.1 Speciated Exhaust Emissions from Four-Stroke
Lawn & Garden Engines**

Compound	1990	CA Phase 2	Composite
	"Baseline" Gas	Gas	Gas
	% of Total Organic Gases		
ACETYLENE	12.69	12.14	13.45
METHANE	9.42	9.28	9.91
ETHYLENE	9.34	9.52	9.90
TOLUENE	6.73	6.22	7.14
BENZENE	4.78	3.6	3.82
M&P-XYLENE	4.55	4.07	4.82
ISO-PENTANE	4.51	2.77	3.86
PROPYLENE	3.87	4.91	4.10
ISO-OCTANE	1.94	3.06	2.65
N-BUTANE	1.8	0.46	1.20
1,2,4-TRIMETHYLBENZENE	1.79	1.61	1.90
ISO-BUTYLENE	1.66	3.36	1.76
ETHYLBENZENE	1.64	1.66	1.74
O-XYLENE	1.58	1.35	1.68
2-METHYLPENTANE	1.42	1.56	1.58
1-METHYL-3-ETHYLBENZENE	1.25	1.1	1.33
ETHANE	1.16	1.42	1.37
FORMALDEHYDE	1.08	1.4	1.31
3-METHYLHEXANE	0.97	0.6	0.83
2,3-DIMETHYLPENTANE	0.95	1.67	1.39
2-METHYLHEXANE	0.84	0.52	0.72
3-METHYLPENTANE	0.81	0.96	0.94
1,3-BUTADIENE	0.81	0.79	0.86
N-HEPTANE	0.64	0.37	0.54
1,3,5-TRIMETHYLBENZENE	0.63	0.57	0.67
1-METHYL-4-ETHYLBENZENE	0.58	0.51	0.61
2,4-DIMETHYLPENTANE	0.58	0.83	0.75
N-PENTANE	0.58	0.5	0.57
2,3-DIMETHYLBUTANE	0.51	0.74	0.66
1-NONENE	0.5	0.53	0.53
1,2-DIETHYLBENZENE	0.46	0.37	0.49
2,3,4-TRIMETHYLPENTANE	0.43	0.79	0.65
1-METHYL-2-ETHYLBENZENE	0.41	0.4	0.43
METHYLACETYLENE	0.39	0.5	0.47
1,3-DIETHYLBENZENE	0.37	0.29	0.39
2,4-DIMETHYLHEXANE	0.37	0.47	0.45
N-HEXANE	0.37	0.44	0.43
3-METHYLHEPTANE	0.33	0.33	0.35
METHYLCYCLOPENTANE	0.33	0.22	0.29
1-BUTENE	0.33	0.29	0.35
1,2,3-TRIMETHYLBENZENE	0.33	0.27	0.35
N-PROPYLBENZENE	0.31	0.28	0.33
2-METHYLHEPTANE	0.3	0.29	0.31
2-METHYL-2-BUTENE	0.3	0.26	0.32
NAPHTHALENE	0.29	0.24	0.28

Table 6.2.1 (cont.) Speciated Exhaust Emissions from Four-Stroke Lawn & Garden Engines			
Compound	1990 "Baseline" Gas	CA Phase 2 Gas	Composite
	% of Total Organic Gases		
2-METHYL-1-BUTENE	0.29	0.28	0.31
TRANS-2-PENTENE	0.28	0.17	0.30
1,3-DIMETHYL-2-ETHYLBENZENE	0.28	0.22	0.30
ISOPRENE	0.26	0.24	0.28
2,3-DIMETHYLHEXANE	0.26	0.31	0.30
2,2,5-TRIMETHYLHEXANE	0.25	0.36	0.32
MTBE	0.25	3.27	
ETHANOL			3.47
2,2-DIMETHYLBUTANE	0.25	0.44	0.37
ACETALDEHYDE	0.25	0.23	0.25
N-OCTANE	0.25	0.24	0.26
PROPADIENE	0.24	0.34	0.25
TRANS-2-BUTENE	0.23	0.29	0.24
TRANS-1,3-DIMETHYLCYCLOPENTANE	0.23	0.14	0.20
1-PENTENE	0.22	0.15	0.23
C10H12	0.22	0.15	0.20
1-METHYL-3-n-PROPYLBENZENE	0.21	0.18	0.22
BENZALDEHYDE	0.21	0.2	0.22
0-METHYLSTYRENE	0.21	0.18	0.22
CYCLOPENTADIENE	0.21	0.16	0.22
2,3-DIHYDROINDENE(INDAN)	0.2	0.14	0.18
2,5-DIMETHYLHEXANE	0.2	0.26	0.24
METHYLCYCLOHEXANE	0.2	0.1	0.16
1-BUTEN-3-YNE	0.19	0.17	0.20
C8H16	0.18	0.37	0.29
1,2,3,5-TETRAMETHYLBENZENE	0.18	0.14	0.19
CIS-2-BUTENE	0.18	0.22	0.19
CIS-2-PENTENE	0.17	0.1	0.18
I-HEXENE	0.06	0.18	0.06
3-METHYLOCTANE	0.16	0.12	0.15
1,3-DIMETHYL-4-ETHYLBENZENE	0.16	0.12	0.17
CIS-3-METHYL-3-HEXENE	0.15	0.09	0.16
2-METHYL-2-PENTENE	0.15	0.1	0.16
1,2-DIMETHYL-4-ETHYLBENZENE	0.14	0.12	0.15
4-METHYLHEPTANE	0.14	0.15	0.15
M-TOLUALDEHYDE	0.13	0.11	0.14
TRANS-2-HEXENE	0.13	0.08	0.14
1-METHYLCYCLOPENTENE	0.13	0.08	0.14
METHANOL	0.12	0.46	0.31
TOTAL	92.5	94.18	100.00

Table 6.3.1 Gas Phase Emissions from Residential Wood Combustion

compound	Pine	Emission Contribution	
		Oak	Composite
n-alkanes			
methane	20.223%		5.460%
ethane	2.101%		0.567%
propane	0.830%		0.224%
n-butane	0.127%		0.034%
n-pentane	0.023%		0.006%
n-heptane	0.142%		0.038%
n-octane	0.008%		0.002%
n-nonane	0.019%		0.005%
n-octadecane	0.002%		0.000%
n-nonadecane	0.002%	0.007%	0.005%
n-eicosane	0.001%	0.007%	0.006%
n-heneicosane	0.001%	0.003%	0.003%
n-docosane	0.000%	0.002%	0.002%
n-tricosane	0.000%		0.000%
n-tetracosane	0.000%		0.000%
branched alkanes			
isopentane	0.027%		0.007%
2-methylpentane	0.042%		0.011%
2-methylhexane	0.013%		0.003%
ethene	5.497%		1.484%
propene	2.106%		0.569%
1-butene	0.445%		0.120%
trans-2-butene	0.326%		0.088%
cis-2-butene	0.174%		0.047%
1-pentene	0.042%		0.011%
trans-2-pentene	0.079%		0.021%
cis-2-pentene	0.051%		0.014%
trans-2-hexene	0.042%		0.011%
branched alkenes			
i-butene	0.197%		0.053%
3-methyl-1-butene	0.034%		0.009%
2-methyl-1-butene	0.068%		0.018%
2-methyl-2-butene	0.066%		0.018%
2-methyl-2-pentene	0.034%		0.009%
alkynes			
ethyne (acetylene)	3.446%		0.930%

Table 6.3.1 (cont.) Gas Phase Emissions from Residential Wood Combustion

compound	Emission Contribution		
	Pine	Oak	Composite
diolefins			
1,3-butadiene	0.574%		0.155%
isoprene	0.201%		0.054%
cycloalkanes			
methylcyclohexane	0.042%		0.011%
aromatic hydrocarbons			
benzene	1.880%		0.508%
toluene	0.776%		0.209%
ethylbenzene	0.112%		0.030%
m-xylene +p-xylene	0.295%		0.080%
o-xylene	0.089%		0.024%
naphthalene	1.114%		0.301%
2-methylnaphthalene	0.074%	0.125%	0.111%
1-methylnaphthalene	0.052%	0.083%	0.075%
dimethylnaphthalene	0.068%	0.150%	0.128%
acenaphthylene	0.091%	0.141%	0.128%
acenaphthene	0.010%	0.015%	0.014%
fluorene	0.022%	0.050%	0.042%
phenanthrene	0.077%	0.120%	0.108%
anthracene	0.017%	0.028%	0.025%
3-methylphenanthrene	0.006%	0.013%	0.011%
2-methylphenanthrene	0.009%	0.017%	0.015%
2-methylantracene	0.005%	0.009%	0.008%
9-methylphenanthrene	0.007%	0.016%	0.014%
1-methylphenanthrene	0.011%	0.014%	0.013%
C2-178 MW PAH	0.018%	0.020%	0.020%
retene	0.007%	0.016%	0.013%
fluoranthene	0.015%	0.047%	0.038%
acephenanthrylene	0.005%	0.015%	0.012%
pyrene	0.009%	0.031%	0.025%
C1-202 MW PAH	0.004%	0.016%	0.013%
benzo[ghi]fluoranthene	0.000%	0.001%	0.001%
phenol and substituted phenols			
phenol	2.577%	3.914%	3.553%
o-cresol	0.440%	0.622%	0.573%
m-and p-cresol	1.865%	2.335%	2.208%
dimethylphenols	0.540%	0.661%	0.629%
o-benzenediol	1.531%	1.853%	1.766%
p-benzenediol	0.084%	0.184%	0.157%
m-benzenediol	0.014%	0.058%	0.046%
methylbenzenediols	0.051%	0.731%	0.547%

Table 6.3.1 (cont.) Gas Phase Emissions from Residential Wood Combustion			
compound	Pine	Emission Contribution	
		Oak	Composite
hydroxybenzaldehydes	0.059%	0.184%	0.150%
4-(2-hydroxyethyl)phenol		0.145%	0.106%
guaiacol and substituted guaiacols			
guaiacol	1.369%	2.244%	2.008%
4-methylguaiacol	1.664%	1.318%	1.411%
4-ethylguaiacol	0.996%	1.305%	1.221%
4-propylguaiacol	0.342%	0.412%	0.393%
eugenol	0.281%	0.270%	0.273%
vanillin	0.515%	0.661%	0.622%
acetovanillone	0.153%	0.303%	0.262%
guaiacyl acetone	0.435%	1.605%	1.289%
syringol and substituted syringols			
syringol		5.180%	3.781%
4-methylsyringol	0.001%	2.270%	1.658%
4-ethylsyringol	0.001%	2.401%	1.753%
4-propylsyringol		0.855%	0.624%
allylsyringol		0.017%	0.013%
4-propenylsyringol		0.017%	0.012%
syringaldehyde		0.101%	0.074%
acetosyringone		0.013%	0.010%
syringyl acetone	0.001%	0.070%	0.051%
aliphatic aldehydes			
formaldehyde	5.718%	9.903%	8.773%
acetaldehyde	8.364%	10.738%	10.097%
propanal	1.252%	1.996%	1.795%
butanal/isobutanal	0.471%	0.809%	0.718%
pentanal	0.157%	1.148%	0.881%
hexanal	2.052%	1.174%	1.411%
heptanal	2.057%	1.005%	1.289%
aliphatic ketones			
acetone	3.676%	6.028%	5.393%
butanone	1.055%	1.500%	1.380%
olefinic aldehydes			
acrolein	0.309%	0.574%	0.503%
crotonaldehyde	1.355%	2.309%	2.052%
methacrolein	0.113%	0.119%	0.117%
aromatic carbonyls			
benzaldehyde	0.241%	0.209%	0.217%
m-and p-tolualdehyde	0.059%		0.016%
acetophenone	0.019%	0.069%	0.056%

Table 6.3.1 (cont.) Gas Phase Emissions from Residential Wood Combustion

compound	Pine	Oak	Composite
	Emission Contribution		
2,5-dimethylbenzaldehyde	0.059%	0.261%	0.206%
dicarbonyls			
glyoxal	3.289%	5.728%	5.069%
methylglyoxal	4.629%	4.188%	4.307%
biacetyl	0.437%	0.952%	0.813%
2-oxobutanal	1.183%	2.531%	2.167%
PAH ketones			
indan-1-one	0.086%	0.180%	0.155%
9H-fluoren-9-one	0.033%	0.078%	0.066%
1H-phenalen-1-one	0.001%		0.000%
other compounds			
veratraldehyde	0.006%		0.002%
hydroxymethylfurfural	0.697%	1.892%	1.569%
2-furaldehyde	0.545%	2.609%	2.052%
2-methylfuraldehyde	0.049%	0.069%	0.064%
Unidentified Complex Mixture	6.528%	12.251%	10.706%
Total	100%	100%	100%

Table 6.3.2 Fireplaces, Midwest Specific PM_{2.5} Emission Profiles (Profiles LAD30003m & LAD30004n)

Cpd	Description	Wt % PM _{2.5} Mass										Wt % PM _{2.5} Mass	Composite	
		Fireplace, Red Maple	Fireplace, Northern Red Oak	Fireplace, Paper Birch	Fireplace, Yellow Poplar	Fireplace, White Ash	Fireplace, Mockernut Hickory	Fireplace, Eastern White Pine	Fireplace, Pine	Fireplace, Oak	Fireplace, Oak			
PM-fine elemental														
PEC	carbon	6.700	3.800	22.000	3.400	6.400	1.200	31.300	1.40	3.20			6.442	
PNO3	PM-fine nitrate	0.600	0.400	0.280	0.320	0.650	0.260	0.170	0.19	0.44			0.420	
PM-fine organic														
POA	aerosol	85.500	87.500	86.800	60.643	54.857	53.000	73.400	56.00	59.00			92.609	
PSO4	PM-fine sulfate	0.310	0.420	1.680	0.360	0.770	0.180	0.130	0.12	0.41			0.422	
FCRS	PM-fine crustal*	0.135	0.055	0.374	0.080	0.148	0.028	0.461	0.038	0.053			0.107	
PM-Fine "other"														
CL-	Chloride (Ionic)	0.630	0.400	0.650	0.150	0.460	0.170	0.130	0.29	0.20			0.357	
NA+	Sodium (Ionic)								0.09	1.00			0.636	
AL	ALUMINUM								0.004	0.000			0.001	
NH4	AMMONIA	0.120	0.060	0.210	0.040	0.070	0.060	0.030	0.090	0.100			0.087	
SB	ANTIMONY								0.004	0.000			0.001	
AS	ARSENIC								0.000	0.000			0.000	
BA	BARIUM								0.000	0.000			0.000	
BR	BROMINE	0.004	0.005	0.006	0.001	0.002	0.002	0.001	0.000	0.000			0.003	
CD	CADMIUM								0.004	0.007			0.005	
CA	CALCIUM	0.020	0.020	0.020	0.020	0.030	0.005	0.011	0.004	0.008			0.015	
CL	CHLORINE	0.674	0.357	0.784	0.124	0.512	0.164	0.145	0.181	0.127			0.328	
CR	CHROMIUM								0.000	0.000			0.000	
CO	COBALT								0.000	0.000			0.000	
CU	COPPER								0.000	0.000			0.000	
GA	GALLIUM								0.000	0.000			0.000	
IN	INDIUM								0.000	0.000			0.000	
FE	IRON								0.001	0.000			0.000	

Table 6.3.3 Residential Wood Combustion PM2.5 Fireplaces, National Profile (Profile LAD30005n)

Description	Red Maple	Northern Red Oak	Paper Birch	Yellow Poplar	White Ash	Mocker-nut Hickory			Eastern White Pine			Oak	Dura-flame	Soft-wood (Cpsite)	Hard-wood (Cpsite)	National Composite
						Hickory	Pine	Pine	Pine	Pine	Pine					
Weight % PM _{2.5} Mass																
PEC	6.700	3.800	22.000	3.400	6.400	1.200	31.300	1.40	3.20	64.003	33.597	8.230	13.808			
PNO3	0.600	0.400	0.280	0.320	0.650	0.260	0.170	0.19	0.44	0.022	0.104	0.200	0.320			
POA	85.500	87.500	86.800	60.643	54.857	53.000	73.400	56.00	59.00	28.713	51.437	53.624	85.244			
PSO4	0.310	0.420	1.680	0.360	0.770	0.180	0.130	0.12	0.41	0.000	0.185	0.561	0.457			
FCRS	0.135	0.055	0.374	0.080	0.148	0.028	0.461	0.038	0.053	0.608	0.192	0.043	0.171			
EPRM																

**Table 6.3.4 Residential Wood Combustion PM2.5 Woodstoves,
National Profile (Profile LAD30006n)**

	Description	Woodstove, Hardwood (Composite) Wt % PM_{2.5} Mass
PEC	PM-fine elemental carbon	11.835
PNO3	PM-fine nitrate	0.088
POA	PM-fine organic aerosol	86.971
PSO4	PM-fine sulfate	1.063
FCRS	PM-fine crustal*	0.043

**Table 6.3.5 Residential Wood Combustion PM2.5 Fireplaces & Woodstoves Composite,
National Profile (Profile LAD30002n)**

	Description	Fireplace Composite	Woodstove Composite	Fireplace & Woodstove Composite
			Weight % PM_{2.5} Mass	
PEC	PM-fine elemental carbon	13.808	11.385	12.821
PNO3	PM-fine nitrate	0.320	0.088	0.204
POA	PM-fine organic aerosol	85.244	86.971	86.108
PSO4	PM-fine sulfate	0.457	1.063	0.760
FCRS	PM-fine crustal*	0.171	0.043	0.107

Table 6.3.6 Surface Coating: Architectural Coatings (Profile LAD30007n)

CAS	CHEMICAL NAME	Water-based Paints	Solvent Paints	% TOG	
				Thinners	Com-posite
8704	DISTILLATES/ NAPHTHA/ MINERAL SPIRITS	5.436	70.631		
109660	PENTANE				30.847
107835	2-METHYL PENTANE				1.322
96140	3-METHYL PENTANE				3.305
287923	CYCLOPENTANE				1.102
75832	2,2-DIMETHYL Butane				1.102
79298	2,3-DIMETHYL Butane				1.102
78784	2-METHYLBUTANE				1.102
25265774	2,2,4-TRIMETHYL-1,3-PENTANEDIOL ISOBUTYRATE {TEXANOL}	27.996	0.038		8.979
57556	PROPYLENE GLYCOL	27.888	0.003		8.926
107211	ETHYLENE GLYCOL	15.763	0.009		5.049
9996	AGGREGATED VOCS < 1.0%	9.013	1.732		3.820
1330207	ISOMERS OF XYLENE	0.034	4.817		2.612
108883	TOLUENE	0.106	3.180	4.150	2.332
112345	2-(2-BUTOXYETHOXY)ETHANOL {BUTYL CARBITOL}	4.305	0.010		1.383
108872	METHYLCYCLOHEXANE			9.800	1.372
64175	ETHYL ALCOHOL	0.005	1.904	2.370	1.361
78933	METHYL ETHYL KETONE (MEK) (2-BUTANONE)		2.496	0.010	1.349
123864	N-BUTYL ACETATE		1.791	1.140	1.127
67561	METHYL ALCOHOL	2.828	0.095	0.370	1.008
71556	1,1,1-TRICHLOROETHANE		1.728		0.933
67641	ACETONE		0.672	3.480	0.850
142825	N-HEPTANE		0.027	5.100	0.729
1120214	N-UNDECANE			4.470	0.626
111762	BUTYL CELLOSOLVE {2-BUTOXYETHANOL} {EGBE}	0.883	0.490	0.480	0.614
124185	N-DECANE			4.340	0.608
75092	DICHLOROMETHANE {METHYLENE CHLORIDE}		1.106		0.597
67630	ISOPROPYL ALCOHOL	0.058	1.006		0.562
95636	1,2,4-TRIMETHYLBENZENE {1,3,4-TRIMETHYLBENZENE}	0.021	0.668	1.380	0.561
111659	N-OCTANE			3.860	0.540
8725	MISC. OILS - LINSEED/TUNG/SOY/ETC. (TOG PORTION)	0.235	0.824		0.520
110190	ISOBUTYL ACETATE		0.868		0.469
110430	METHYL AMYL KETONE		0.635	0.860	0.463
638040	CIS-1,3-DIMETHYLCYCLOHEXANE			2.460	0.344
71363	N-BUTYL ALCOHOL	0.086	0.531	0.020	0.317
111773	METHYL CARBITOL {2-(2-METHOXYETHOXY)ETHANOL} {DEGME}	0.962	0.007		0.312
592278	2-METHYLHEPTANE			2.180	0.305
108101	METHYL ISOBUTYL KETONE		0.550	0.030	0.301
100414	ETHYLBENZENE	0.001	0.348	0.430	0.248
9991	MISC. PROPRIETARY VOC	0.402	0.176		0.224
107982	PROPYLENE GLYCOL METHYL ETHER {1-METHOXY-2-PROPANOL}	0.090	0.338		0.211
4428	MISC. ETHYLENEAMINES		0.373		0.201
17302282	2,6-DIMETHYLNONANE			1.400	0.196
589811	3-METHYLHEPTANE			1.380	0.193
8701	MISC. GLYCOLS, GLYCOL ETHERS, AND ACETATES	0.268	0.193		0.190

Table 6.3.6 (continued) Surface Coating: Architectural Coatings (Profile LAD30007n)

CAS	CHEMICAL NAME	Water-based Paints	Solvent Paints	% TOG	
				Thinners	Com-posite
99073	1,2,4-TRIMETHYLCYCLOPENTANE			1.330	0.186
591764	2-METHYLHEXANE			1.290	0.181
63449398	CHLORINATED PARAFFIN		0.328		0.177
1678804	TRANS,TRANS-1,2,4-TRIMETHYLCYCLOHEXANE			1.210	0.169
111842	N-NONANE			1.170	0.164
2452995	1,2-DIMETHYLCYCLOPENTANE			1.150	0.161
90090	ETHYL PROPYLCYCLOHEXANES			1.100	0.154
108656	PROPYLENE GLYCOL MONOMETHYL ETHER ACETATE {2-(1-METHOXY)PROPYL ACETATE}		0.276		0.149
1678917	ETHYLCYCLOHEXANE			1.010	0.141
17301949	4-METHYLNONANE			0.940	0.132
108383	M-XYLENE	0.109	0.082	0.370	0.131
34590948	DI(PROPYLENE GLYCOL) METHYL ETHER	0.348	0.033		0.129
2207047	TRANS-1,4-DIMETHYLCYCLOHEXANE			0.850	0.119
2207036	TRANS-1,3-DIMETHYLCYCLOHEXANE			0.830	0.116
6975980	2-METHYLDECANE			0.830	0.116
25551137	TRIMETHYLBENZENES (MIXED)	0.026	0.199		0.116
26967646	METHYL PROPYLCYCLOHEXANES			0.820	0.115
111466	DIETHYLENE GLYCOL	0.357			0.114
25265718	DIPROPYLENE GLYCOL	0.291	0.036		0.113
763699	ETHYL-3-ETHOXYPROPIONATE		0.205		0.111
1072055	2,6-DIMETHYLHEPTANE			0.760	0.106
13151343	3-METHYLDECANE			0.750	0.105
2807309	ETHYLENE GLYCOL PROPYL ETHER {2-PROPOXYETHANOL}	0.218	0.063		0.104
100425	STYRENE	0.235	0.045	0.020	0.102
8723	MISC. VINYL/ACRYLIC AND OTHER COPOLYMERS (TOG PORTION)	0.304	0.004		0.100
1795273	CIS-1,CIS-3,5-TRIMETHYLCYCLOHEXANE			0.690	0.097
99074	1,2,3-TRIMETHYLCYCLOPENTANE			0.680	0.095
99075	TRANS,CIS-1,2,4-TRIMETHYLCYCLOHEXANE			0.670	0.094
4516692	1,1,3-TRIMETHYLCYCLOPENTANE			0.660	0.092
8720	MISC. ASPHALT MIXTURES (TOG PORTION)	0.279	0.004		0.091
3073663	1,1,3-TRIMETHYLCYCLOHEXANE			0.650	0.091
2847725	4-METHYLDECANE			0.640	0.090
97858	ISOBUTYL ISOBUTYRATE		0.164		0.089
99076	TRANS,TRANS-1,3,5-TRIMETHYLCYCLOHEXANE			0.630	0.088
526738	1,2,3-TRIMETHYLBENZENE			0.630	0.088
13151354	5-METHYLDECANE			0.630	0.088
589537	4-METHYLHEPTANE			0.600	0.084
108678	1,3,5-TRIMETHYLBENZENE		0.123	0.120	0.083
1678939	BUTYLCYCLOHEXANE			0.580	0.081
112403	N-DODECANE			0.570	0.080
8724	MISC. ALKYD, ACRYLIC, AND RELATED RESINS (TOG PORTION)	0.133	0.068		0.079
871830	2-METHYLNONANE			0.560	0.078

Table 6.3.6 (continued) Surface Coating: Architectural Coatings (Profile LAD30007n)

CAS	CHEMICAL NAME	Water-based Paints	Solvent Paints	% TOG	
				Thinners	Com-posite
1640897	ETHYLCYCLOPENTANE			0.560	0.078
1759586	TRANS-1,3-DIMETHYLCYCLOPENTANE			0.540	0.076
2051301	2,6-DIMETHYLOCTANE			0.540	0.076
874351	5-METHYLINDAN			0.520	0.073
1074551	1-METHYL-4N-PROPYLBENZENE			0.510	0.071
7146603	2,3-DIMETHYLOCTANE			0.490	0.069
8986	OTHER, MISC. VOC COMPOUNDS AGGREGATED IN PROFILE	0.109	0.060		0.067
124685	2-AMINO-2-METHYL-1-PROPANOL	0.198			0.063
589435	2,4-DIMETHYLHEXANE			0.450	0.063
622968	1-METHYL-4-ETHYLBENZENE			0.450	0.063
2216344	4-METHYLOCTANE			0.450	0.063
78831	ISOBUTYL ALCOHOL		0.114		0.062
2216300	2,5-DIMETHYLHEPTANE			0.440	0.062
17302328	3,7-DIMETHYLNONANE			0.440	0.062
19489102	CIS-1-ETHYL-3-METHYLCYCLOHEXANE			0.440	0.062
1678928	PROPYLCYCLOHEXANE			0.430	0.060
106423	P-XYLENE		0.016	0.350	0.058
535773	1-METHYL-3-ISOPROPYLBENZENE			0.410	0.057
767588	1-METHYLINDAN			0.410	0.057
2532583	CIS-1,3-DIMETHYLCYCLOPENTANE			0.410	0.057
124174	DIETHYLENE GLYCOL BUTYL ETHER ACETATE {2-2-(BUTOXYETHOXY)ETHYL ACETATE}	0.141	0.022		0.057
1678973	1,2,3-TRIMETHYLCYCLOHEXANE			0.400	0.056
2216333	3-METHYLOCTANE			0.400	0.056
99035	OTHER C12			0.390	0.055
611143	1-METHYL-2-ETHYLBENZENE			0.370	0.052
17302271	2,5-DIMETHYLNONANE			0.370	0.052
95476	O-XYLENE		0.010	0.320	0.050
107415	HEXYLENE GLYCOL {2-METHYL-2,4-PENTANEDIOL}	0.154			0.049
99040	1-METHYL-3-ISOPROPYLCYCLOHEXANE			0.350	0.049
934805	1,2-DIMETHYL-4-ETHYLBENZENE			0.340	0.048
8714	MISC. COPOLYMERS, SURFACTANTS, RESINS (TOG PORTION)	0.060	0.052		0.048
112243	TRIETHYLENETETRAMINE		0.086		0.046
91203	NAPHTHALENE		0.021	0.250	0.046
620144	1-METHYL-3-ETHYLBENZENE			0.330	0.046
5911046	3-METHYLNONANE			0.330	0.046
99041	1-METHYL-2-ISOPROPYLCYCLOHEXANE			0.320	0.045
584941	2,3-DIMETHYLHEXANE			0.320	0.045
619998	3-ETHYLHEXANE			0.320	0.045
3741002	PENTYLCYCLOPENTANE			0.320	0.045
3221612	2-METHYLOCTANE			0.310	0.043
99032	OTHER C9			0.300	0.042
1678984	ISOBUTYLCYCLOHEXANE			0.300	0.042
7045718	2-METHYLUDECANE {ISODODECANE}			0.300	0.042

Table 6.3.6 (continued) Surface Coating: Architectural Coatings (Profile LAD30007n)

CAS	CHEMICAL NAME	Water-based Paints	% TOG		
			Solvent Paints	Thinners	Com-posite
100516	BENZYL ALCOHOL		0.076		0.041
527537	1,2,3,5-TETRAMETHYLBENZENE			0.290	0.041
696297	ISOPROPYLCYCLOHEXANE			0.290	0.041
99079	CIS, TRANS-1,2,4-TRIMETHYLCYCLOHEXANE			0.280	0.039
98828	ISOPROPYLBENZENE (CUMENE)		0.008	0.240	0.038
590669	1,1-DIMETHYLCYCLOHEXANE			0.260	0.036
934747	1,3-DIMETHYL-5-ETHYLBENZENE			0.260	0.036
2870044	1,3-DIMETHYL-2-ETHYLBENZENE			0.260	0.036
13150817	2,6-DIMETHYLDECANE			0.260	0.036
107879	METHYL PROPYL KETONE {2-PENTANONE}		0.065		0.035
98062	DIETHYLCYCLOHEXANE			0.240	0.034
99080	TRANS-1-ETHYL-3-METHYLCYCLOHEXANE			0.230	0.032
2213232	2,4-DIMETHYLHEPTANE			0.230	0.032
95932	1,2,4,5-TETRAMETHYLBENZENE			0.220	0.031
4259001	1,1,2-TRIMETHYLCYCLOPENTANE			0.220	0.031
96297	METHYL ETHYL KETOXIME		0.055		0.030
99082	TRANS-1-ETHYL-4-METHYLCYCLOHEXANE			0.210	0.029
1758889	1,4-DIMETHYL-2-ETHYLBENZENE			0.210	0.029
4292926	PENTYLCYCLOHEXANE			0.210	0.029
2855132	ISOPHORONE DIAMINE		0.054		0.029
872504	1-METHYL-2-PYRROLIDINONE	0.091			0.029
496117	INDAN			0.200	0.028
14676290	3-ETHYL-2-METHYLHEPTANE			0.190	0.027
15869962	4,5-DIMETHYLOCTANE			0.190	0.027
99043	1,1,3,4-TETRAMETHYLCYCLOHEXANE			0.180	0.025
99044	6-ETHYL-2-METHYLOCTANE			0.180	0.025
99045	6-METHYLUDECANE			0.180	0.025
1196583	3-PHENYLPENTANE			0.180	0.025
70657704	2-METHOXY-1-PROPANOL ACETATE		0.044		0.024
99046	1,2-DIMETHYL-3-ETHYLCYCLOHEXANE			0.170	0.024
99048	1-ETHYL-3-METHYLCYCLOPENTANE			0.170	0.024
99083	1-ETHYL-2-METHYLCYCLOPENTANE			0.170	0.024
565593	2,3-DIMETHYLPENTANE			0.170	0.024
98566	PARACHLOROBENZOTRIFLUORIDE {PCBTF}		0.043		0.023
110827	CYCLOHEXANE		0.001	0.160	0.023
85687	BUTYLBENZYLPHTHALATE	0.068	0.002		0.023
99033	OTHER C10			0.160	0.022
99049	4-ETHYLDECANE			0.160	0.022
624293	CIS-1,4-DIMETHYLCYCLOHEXANE			0.160	0.022
15869804	3-ETHYLHEPTANE			0.160	0.022
112072	ETHYLENE GLYCOL BUTYL ETHER ACETATE {2-BUTOXYETHYL ACETATE}		0.040		0.021
583482	3,4-DIMETHYLHEXANE			0.150	0.021
589344	3-METHYLHEXANE			0.150	0.021

Table 6.3.6 (continued) Surface Coating: Architectural Coatings (Profile LAD30007n)

CAS	CHEMICAL NAME	Water-based Paints	Solvent Paints	Thinners	Com-posite
4218488	1-ETHYL-4-ISOPROPYLBENZENE			0.150	0.021
4551513	CIS-BICYCLO[4.3.0]NONANE			0.150	0.021
7094271	1,1,4-TRIMETHYLCYCLOHEXANE			0.150	0.021
25550145	ETHYLTOLUENES (METHYLETHYLBENZENES)		0.038		0.021
99034	OTHER C11			0.140	0.020
99050	2-METHYLDECALIN			0.140	0.020
99051	3-ETHYL-3-METHYLOCTANE			0.140	0.020
874419	1,3-DIMETHYL-4-ETHYLBENZENE			0.140	0.020
78922	SEC-BUTYL ALCOHOL	0.061			0.020
1569013	PROPYLENE GLYCOL N-PROPYL ETHER	0.045	0.008		0.019
99052	(2-METHYLBUTYL)CYCLOHEXANE			0.130	0.018
99053	1,2-DIETHYL-1-METHYLCYCLOHEXANE			0.130	0.018
99054	CIS,CIS-1,2,4-TRIMETHYLCYCLOHEXANE			0.130	0.018
1002433	3-METHYLUDECANE			0.130	0.018
4923788	TRANS-1-ETHYL-2-METHYLCYCLOHEXANE			0.130	0.018
15869940	3,6-DIMETHYLOCTANE			0.130	0.018
108327	PROPYLENE CARBONATE		0.033		0.018
2980690	4-METHYLUDECANE			0.120	0.017
3522949	2,2,5-TRIMETHYLHEXANE			0.120	0.017
15869939	3,5-DIMETHYLOCTANE			0.120	0.017
5131668	PROPYLENE GLYCOL BUTYL ETHER {1-BUTOXY-2-PROPANOL}	0.052			0.017
99055	2-ETHYL-1,3-DIMETHYLCYCLOHEXANE			0.110	0.015
99056	5-ISOPROPYLNONANE			0.110	0.015
99057	HEXYLCYCLOPENTANE			0.110	0.015
135988	(1-METHYLPROPYL)BENZENE			0.110	0.015
1632708	5-METHYLUDECANE			0.110	0.015
5881174	3-ETHYLOCTANE			0.110	0.015
15869928	3,4-DIMETHYLOCTANE			0.110	0.015
8711	MISC. ACETATES AND ESTERS (TOG PORTION)	0.036	0.007		0.015
110543	N-HEXANE	0.045	0.001		0.015
101688	METHYLENE(B)4-PHENYLISOCYANATE {METHYLENE DIPHENYL DIISOCYANATE}		0.027		0.014
1638262	1,1-DIMETHYLCYCLOPENTANE			0.100	0.014
2207014	CIS-1,2-DIMETHYLCYCLOHEXANE			0.100	0.014
111900	CARBITOL {DEGEE} {2-(2-ETHOXYETHOXY)ETHANOL}	0.037	0.003		0.013
565753	2,3,4-TRIMETHYLPENTANE			0.090	0.013
609267	2-METHYL-3-ETHYLPENTANE			0.090	0.013
824226	4-METHYLINDAN			0.090	0.013
17301234	2,6-DIMETHYLUDECANE			0.090	0.013
20348725	CIS,TRANS-1,2,3-TRIMETHYLCYCLOHEXANE			0.090	0.013
141786	ETHYL ACETATE		0.023		0.012
108054	VINYL ACETATE	0.038			0.012
80626	METHYL METHACRYLATE	0.036			0.012
628637	AMYL ACETATE		0.021		0.011

Table 6.3.6 (continued) Surface Coating: Architectural Coatings (Profile LAD30007n)

CAS	CHEMICAL NAME	Water-based Paints	Solvent Paints	Thinners	Com-posite
99059	1,1-DIMETHYL-2-PROPYLCYCLOHEXANE			0.080	0.011
99060	1-ETHYL-2,2,6-TRIMETHYLCYCLOHEXANE			0.080	0.011
108087	2,4-DIMETHYLPENTANE			0.080	0.011
1072168	2,7-DIMETHYLOCTANE			0.080	0.011
2040962	PROPYLCYCLOPENTANE			0.080	0.011
75070	ACETALDEHYDE	0.031			0.010
99061	1-ETHYL-1,2-DIMETHYLCYCLOHEXANE			0.070	0.010
6876239	TRANS-1,2-DIMETHYLCYCLOHEXANE			0.070	0.010
7094260	1,1,2-TRIMETHYLCYCLOHEXANE			0.070	0.010
16747505	1,1-METHYLETHYLCYCLOPENTANE			0.070	0.010
9999	AGGREGATE INGREDIENTS < 0.1%	0.025	0.003		0.010
108941	CYCLOHEXANONE		0.018		0.010
99062	1,1,2,3-TETRAMETHYLCYCLOHEXANE			0.060	0.008
99063	1-ETHYL-2,4-DIMETHYLCYCLOHEXANE			0.060	0.008
99064	1-METHYL-4-ISOBUTYLBENZENE			0.060	0.008
493016	CIS-DECALIN			0.060	0.008
7154805	3,3,5-TRIMETHYLHEPTANE			0.060	0.008
17302248	2,4-DIMETHYLNONANE			0.060	0.008
8710	MISC. STYRENE-CONTAINING MATERIAL (TOG PORTION)	0.011	0.009		0.008
99065	1,3-DIMETHYL-4-ISOPROPYLBENZENE			0.050	0.007
99066	4,5-DIMETHYLDECANE			0.050	0.007
99876	1-METHYL-4-ISOPROPYLBENZENE			0.050	0.007
103651	N-PROPYLBENZENE			0.050	0.007
629505	N-TRIDECANE			0.050	0.007
694724	CIS-BICYCLO[3.3.0]OCTANE			0.050	0.007
3728561	CIS-1-ETHYL-4-METHYLCYCLOHEXANE			0.050	0.007
4923777	CIS-1-ETHYL-2-METHYLCYCLOHEXANE			0.050	0.007
17085960	3-ETHYLDECANE			0.050	0.007
1897456	CHLOROTHALONIL	0.016	0.003		0.007
127184	PERCHLOROETHYLENE		0.011		0.006
624419	2-METHYL-1-BUTYL ACETATE		0.011		0.006
123422	DIACETONE ALCOHOL		0.011		0.006
91576	2-METHYLNAPHTHALENE			0.040	0.006
99037	OTHER C13			0.040	0.006
930892	CIS-1-ETHYL-2-METHYLCYCLOPENTANE			0.040	0.006
7154792	2,2,3,3-TETRAMETHYLPENTANE			0.040	0.006
121448	TRIETHYLAMINE	0.017			0.006
9994	TOTAL AGGREGATE ORGANIC INGREDIENTS < 0.1%		0.010		0.005
133073	N-(TRICHLOROMETHYLTHIO)PHthalIMIDE {FOLPET}		0.010		0.005
138863	DL-LIMONENE {DIPENTENE}		0.009		0.005
25013154	METHYL STYRENE (MIXED) {VINYL TOLUENE}		0.009		0.005
111159	2-ETHOXYETHYL ACETATE {CELLOSOLVE ACETATE}		0.009		0.005
8708	MISC. URETHANE-CONTAINING MATERIAL (TOG PORTION)	0.006	0.004		0.004

Table 6.3.6 (continued) Surface Coating: Architectural Coatings (Profile LAD30007n)

CAS	CHEMICAL NAME	Water-based Paints	Solvent Paints	% TOG	
				Thinners	Com-posite
123546	2,4-PENTANEDIONE		0.008		0.004
1163195	DECABROMODIPHENYL OXIDE		0.008		0.004
26471625	TOLUENE DIISOCYANATES (MIXED ISOMERS)		0.008		0.004
99031	OTHER C8			0.030	0.004
99067	2,7-DIMETHYLDECANE			0.030	0.004
99068	3,5-DIMETHYLNONANE			0.030	0.004
99084	1-METHYL-3-BUTYLBENZENE			0.030	0.004
592132	2,5-DIMETHYLHEXANE			0.030	0.004
1071267	2,2-DIMETHYLHEPTANE			0.030	0.004
3074713	2,3-DIMETHYLHEPTANE			0.030	0.004
9989	VOLATILE METHYL SILOXANES (VMS)	0.009	0.001		0.004
9997	AGGREGATED EXEMPT COMPOUNDS < 1.0%	0.006	0.002		0.003
117817	DI(2-ETHYLHEXYL)PHTHALATE		0.006		0.003
99038	OTHER C14			0.020	0.003
99070	1,2,3-TRIMETHYL-4-ETHYLBENZENE			0.020	0.003
99071	CIS-1-ETHYL-3-METHYLCYCLOPENTANE			0.020	0.003
99085	TRANS-1-ETHYL-3-METHYLCYCLOPENTANE			0.020	0.003
4292755	HEXYLCYCLOHEXANE			0.020	0.003
4306654	1,1,3,5-TETRAMETHYLCYCLOHEXANE			0.020	0.003
15869893	2,5-DIMETHYLOCTANE			0.020	0.003
20278857	2,3,5-TRIMETHYLHEPTANE			0.020	0.003
52896910	3-ETHYL-4-METHYLHEPTANE			0.020	0.003
101906	DIGLYCIDYL RESORCINOL ETHER {DGRE}		0.005		0.003
108112	4-METHYL-2-PENTANOL {METHYL ISOBUTYL CARBINOL}		0.005		0.003
109604	PROPYL ACETATE		0.005		0.003
9016879	METHYLENEDIPHENYLISOCYANATE POLYMERIC		0.004		0.002
584849	2,4-TOLUENE DIISOCYANATE {TDI}		0.004		0.002
80159	CUMENE HYDROPEROXIDE		0.004		0.002
84742	DIBUTYL PHTHALATE	0.007			0.002
50000	FORMALDEHYDE	0.006			0.002
61788769	CHLORAFIN		0.004		0.002
108010	N,N-DIMETHYLETHANOLAMINE	0.006			0.002
123911	1,4-DIOXANE		0.003		0.002
102716	TRIETHANOLAMINE	0.005			0.002
110496	ETHYLENE GLYCOL METHYL ETHER ACETATE {METHYL CELLOSOLVE ACETATE}		0.003		0.001
131113	DIMETHYL PHTHALATE		0.003		0.001
96377	METHYLCYCLOPENTANE			0.010	0.001
99072	METHYL PENTYLCYCLOHEXANE			0.010	0.001
99821	1-METHYL-4-ISOPROPYLCYCLOHEXANE			0.010	0.001
4032944	2,4-DIMETHYLOCTANE			0.010	0.001
94360	BENZOYL PEROXIDE		0.002		0.001
8713	MISC. HYDROCARBON RESINS (TOG PORTION)		0.002		0.001
141322	N-BUTYL ACRYLATE	0.001			0.000
78784	ISOPENTANE			0.000	0.000
99030	OTHER C7			0.000	0.000
		100	100	99	100

Table 6.3.7 Surface Coating: Other Surface Coating SCC's

cas	pollutant	1990 Wtd Avg	Fraction of 1998 Sales	Convert Factor	Auto Refinishing		Traffic Markings		Wood Furniture		Paper, Foil, Film		Can Coating		Electronic & Other		Misc Manuf.		Industrial Maint.	
					lad30008n	lad30014n	lad30009n	lad30015n	lad30011n	lad30013n	lad30010n	lad30012n	%	%	%	%	%	%	%	%
		%	%		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
108883	TOLUENE	20.45	2.78	0.136	1.636	6.364	3.780	1.707	1.326	0.000	0.000	1.093	4.385							
1330207	ISOMERS OF XYLENE UNC PEAKS TO CBM XYLENE	16.09	1.64	0.067	1.602	0.045	1.060	0.844	0.592	0.000	0.000	0.708	2.780							
64475850	MINERAL SPIRITS	10.39	33.26	3.203	0.188	0.727	0.241	0.349	0.275	4.622	0.618	0.744								
109660	PENTANE				41.260	65.629	40.729	45.639	49.269	93.149	54.079	0.000								
107835	2-METHYL PENTANE				31.914	50.763	8.299	35.296	38.104	64.309	41.828									
96140	3-METHYL PENTANE				1.368	2.176	0.356	1.513	1.633	2.756	1.793									
287923	CYCLOPENTANE				3.419	5.439	0.889	3.782	4.083	6.890	4.482									
75832	2,2-DIMETHYL Butane				1.140	1.813	0.296	1.261	1.361	2.297	1.494									
79298	2,3-DIMETHYL Butane				1.140	1.813	0.296	1.261	1.361	2.297	1.494									
78784	2-METHYLBUTANE				1.140	1.813	0.296	1.261	1.361	2.297	1.494									
123864	N-BUTYL ACETATE	7.07	2.99	1.00	4.925	0.000	5.579	3.896	6.337	0.000	3.337	24.667								
78933	METHYL ETHYL KETONE METHYL ISOBUTYL KETONE	5.79	5.25	1.00	10.758	5.630	5.854	8.429	4.469	2.465	3.567	4.452								
108101	ETHYL ALCOHOL	5.57	2.05	1.00	2.866	0.000	7.682	5.625	6.890	0.000	4.685	13.340								
64175	S-BUTYL ALCOHOL	2.72	7.67	2.820	5.963	0.000	30.455	6.700	3.712	0.000	4.798	0.000								
78922	BUTYL CELLOSOLVE	2.70		1.00	1.261	0.000	10.725	3.031	1.617	0.000	2.951	0.000								
111762	ISOPROPYL ALCOHOL	2.37	4.93	2.125	1.855	0.000	0.898	3.808	5.899	1.458	3.099	3.503								
67630	ACETONE	2.32	7.21	3.190	9.007	0.000	12.755	2.766	5.508	0.000	1.904	0.000								
67641	ETHYL ACETATE	2.26	2.72	1.00	9.498	12.452	3.742	4.152	0.000	0.000	3.173	18.957								
141786	ISOBUTYL ALCOHOL	2.20		1.00	1.317	0.000	3.043	4.324	0.382	1.240	1.414	6.204								
78831	DIACETONE ALCOHOL	2.14		1.00	3.376	0.000	0.782	0.000	3.396	3.208	4.077	3.912								
123422	N-PROPYL ACETATE	1.83	0.18	1.00	1.252	0.000	0.888	1.398	1.064	1.998	3.173	6.335								
109604	1,1,1-TRICHLORO- ETHANE	1.21		1.00	1.029	0.000	0.000	0.000	0.894	0.000	0.863	5.533								
71556	ETHANE	1.20		1.00	0.000	9.152	0.000	0.000	0.000	0.000	1.989	0.000								

Table 6.3.7 (continued) Surface Coating: Other Surface Coating SCC's

cas	pollutant	1990 Wtd Avg	Fraction of 1998 Sales	Convert Factor	Surface Coating											
					Auto Refinishing	Traffic Markings	Wood Furniture	Paper, Foil, Film	Can Coating	Electronic & Other	Misc Manuf.	Industrial Maint.				
		%	%		lad30008n	lad30014n	lad30009n	lad30015n	lad30011n	lad30013n	lad30010n	lad30012n				
107211	ETHYLENE GLYCOL	0.73	0.71	1.00	0.148	0.000	0.074	3.337	2.478	0.117	0.773	0.295				
108656	PROPYLENE GLYCOL MONOMETHYL ETHER ACETATE	0.48		1.00	0.380	0.000	0.180	0.777	1.202	0.292	0.633	0.720				
112345	OXYGENATES	0.47		1.00	0.260	0.000	0.814	0.437	0.569	0.292	0.526	0.851				
111159	BUTYL CARBITOL	0.44		1.00	0.343	0.000	0.169	0.699	1.081	0.262	0.567	0.638				
	CELLOSOLVE ACETATE	0.29		1.00	0.223	0.000	0.106	0.463	0.723	0.175	0.378	0.426				
	KETONES - GENERAL	0.27	1.37	1.00	0.185	0.000	0.137	0.210	0.154	0.292	0.469	0.949				
107982	1-METHOXY-2-PROPANOL	0.24		1.00	0.185	0.000	0.085	0.393	0.601	0.102	0.312	0.360				
34590948	MONOMETHYL ETHER	0.24		1.00	0.185	0.000	0.085	0.393	0.601	0.102	0.312	0.360				
110805	DIPROPYLENE GLYCOL	0.19		1.00	0.148	0.000	0.074	0.314	0.479	0.117	0.255	0.295				
111900	CELLOSOLVE	0.10		1.00	0.074	0.000	0.032	0.157	0.244	0.058	0.123	0.147				
111773	CARBITOL	0.10		1.00	0.074	0.000	0.032	0.157	0.244	0.058	0.123	0.147				
	METHYL CARBITOL	0.10		1.00	0.074	0.000	0.032	0.157	0.244	0.058	0.123	0.147				
Total		98.20			100	100	100	100	100	100	100	100	100	100		

Table 6.3.8 Dry Cleaning: Commercial/Industrial (LAD30020n) and Coin Operated (LAD30021n)

LAD30021n - Coin Operated Dry Cleaners			
Species	%		
Perchloroethylene	100		
LAD30020n Commercial/Industrial Dry Cleaners			
Species	Perc %	White Spirits %	Composite %
Perchloroethylene	100		77
n-nonane		9.7	2.23
n-decane		6.5	1.50
methylnonanes		4.2	0.97
2,6,-dimethyloctane		2.3	0.53
n-undecane		2.3	0.53
other alkanes		26.5	6.09
monocycloparaffins		14.0	3.22
trimethylcyclohexane		4.0	0.93
tert-butylcyclohexane		3.9	0.89
n-butylcyclopentane		4.3	0.99
n-butylcyclohexane		1.8	0.42
other cycloparaffins		20.1	4.63
other aromatics		0.3	0.06
Total		100.0	100.0

Table 6.3.9 Degreasing (LAD30017n)

CAS	Species	Cold Cleaning %	Vapor Degreasing %	Composite %
	Special Napthas	27.09		
109660	PENTANE			16.76
107835	2-METHYL PENTANE			0.72
96140	3-METHYL PENTANE			1.80
287923	CYCLOPENTANE			0.60
75832	2,2-DIMETHYL Butane			0.60
79298	2,3-DIMETHYL Butane			0.60
78784	2-METHYLBUTANE			0.60
	Pinene Solvents	19.40		15.52
	D-Limonene Solvents	14.05		11.24
	Acetone	9.36		7.49
	Ether Solvents	8.70		6.96
	Other Ethylene Oxide Solvents	4.68		3.75
	Other Propylene Oxide-Derived Solvents	4.01		3.21
	Perchloroethylene	3.68	33.33	9.61
	Ester Solvents	3.68		2.94
	Tetrahydrofuran Solvents	3.34		2.68
	Other Chlorinated Solvents	1.34		1.07
	Trichloroethylene	0.67		0.54
	Trichloroethane	0.00		0.00
	Methylene Chloride		66.67	13.33
		100.00	100.00	100.00

Table 6.3.10 Agricultural Pesticide Application (Midwest) (LAD0023m)

CAS	POLLUTANT	Speciate 8529	Composite
108907	CHLOROBENZENE	28.79	28.79
25168052	CHLOROTOLUENE	13.39	13.39
	UNDEFINED VOC	16.99	
	UNDEFINED AROMATIC	13.81	
	KEROSENE/DIESEL/FUEL OIL	2.96	
	UNDEFINED PETROLEUM DISTILLATES	0.35	
64475850	MINERAL SPIRITS	0.02	
64742956	AROMATIC 100	3.04	
	PARAFFINS/OLEFINS (C12-C16)	1.82	
76416938	TENNECO 500-100	2.72	
109660	PENTANE		32.26
107835	2-METHYL PENTANE		1.38
96140	3-METHYL PENTANE		3.46
287923	CYCLOPENTANE		1.15
75832	2,2-DIMETHYL Butane		1.15
79298	2,3-DIMETHYL Butane		1.15
78784	2-METHYLBUTANE		1.15
67630	ISOPROPYL ALCOHOL	0.28	0.28
71363	N-BUTYL ALCOHOL	0.21	0.21
64175	ETHYL ALCOHOL	0.21	0.21
64197	ACETIC ACID	0.04	0.04
1330207	ISOMERS OF XYLENE	11.78	11.78
95476	O-XYLENE	0.31	0.31
124403	DIMETHYLAMINE	2.61	2.61
78591	ISOPHORONE	0.18	0.18
	ALIPHATICS	0.15	0.15
111762	BUTYL CELLOSOLVE	0.14	0.14
108941	CYCLOHEXANONE	0.13	0.13
141797	MESITYL OXIDE	0.05	0.05
1610180	PRAMITOL	0.02	0.02
Total		100	100

Table 6.3.11 Commercial/Consumer Solvents: Adhesive and Sealant Use (Profile LAD30025n)

CAS	POLLUTANT	Speciate 8523	Freedonia	Composite
8030306	NAPHTHA	3.09	31.59	
64742956	AROMATIC 100	10.82		
	UNDEFINED VOC	8.76		
	UNDEFINED PETROLEUM DISTILLATES	4.46		
64475850	MINERAL SPIRITS	3.81		
	UNDEFINED AROMATIC	0.25		
	KEROSENE/DIESEL/FUEL OIL	0.1		
	UNDEFINED PARAFFIN	0.05		
142825	N-HEPTANE	3.82		
	ALIPHATICS	0.54		
8052413	STODDARD SOLVENT	0.35		
110543	N-HEXANE	13.12		
8032324	PETROLEUM ETHER	6.14		
108941	CYCLOHEXANONE	0.77		
115106	DIMETHYLETHER	0.46		
589344	3-METHYLHEXANE	0.16		
75285	ISOBUTANE	0.15		
110827	CYCLOHEXANE	0.14		
591764	2-METHYLHEXANE	0.13		
109660	N-PENTANE	0.11		
64742898	LACTOL SPIRITS	0.07		
111466	DIETHYLENE GLYCOL	0.02		
109660	PENTANE			24.97
107835	2-METHYL PENTANE			1.07
96140	3-METHYL PENTANE			2.68
287923	CYCLOPENTANE			0.89
75832	2,2-DIMETHYL Butane			0.89
79298	2,3-DIMETHYL Butane			0.89
78784	2-METHYLBUTANE			0.89
67561	METHYL ALCOHOL	0.11	11.67	11.93
64175	ETHYL ALCOHOL	0.9	7.24	7.40
67630	ISOPROPYL ALCOHOL	2.75		
71363	N-BUTYL ALCOHOL	0.02		
98000	FURFURYL ALCOHOL	0.02		
71238	N-PROPYL ALCOHOL	0.03		
78933	METHYL ETHYL KETONE	6.35	10.46	10.69
108883	TOLUENE	14.01	7.75	7.92
67641	ACETONE	11.77	4.43	4.53
127184	PERCHLOROETHYLENE	0.11	4.02	4.11
1330207	ISOMERS OF XYLENE	1.63	2.21	2.26

109999	TETRAHYDROFURAN	2.59		3.45
Table 6.3.11 (cont.) Commercial/Consumer Solvents: Adhesive and Sealant Use (Profile LAD30025n)				
CAS	POLLUTANT	Speciate 8523	Freedonia	Composite
97994	TETRAHYDRO-2-FURANMETHANOL	0.19		0.25
	TETRAHYDROFURAN SOLVENTS		3.62	
141786	ETHYL ACETATE	1.08		2.44
123864	N-BUTYL ACETATE	0.25	2.82	1.59
108214	ISOPROPYL ACETATE	0.02		1.36
110190	ISOBUTYL ACETATE	0.02		1.36
	ESTER ACETATE		5.23	
111762	BUTYL CELLOSOLVE	0.01		2.05
	BUTANEDIOL DERIVATIVES		2.01	
108101	METHYL ISOBUTYL KETONE	0.21	0.4	0.41
1321944	METHYLNAPHTHALENE	0.06		0.06
8006642	TURPENTINE	0.04		0.04
91203	NAPHTHALENE	0.02		0.02
5989275	D-LIMONENE	0.02		0.02
112243	TRIETHYLENE TETRAMINE	0.01		0.01
107982	1-METHOXY-2-PROPANOL	0.01		0.01
83329	ACENAPHTHENE	0.01		0.01
79016	TRICHLOROETHYLENE	0.01		0.01
1321671	NAPHTHOL	0.01		0.01
91576	2-METHYL NAPHTHALENE	0.01		0.01
67721	HEXACHLOROETHANE	0.01		0.01
106887	1,2-EPOXYBUTANE	0.01		0.01
106978	N-BUTANE	0.01		
74986	PROPANE	0.12		
	UNDEFINED PROPELLANT	0.26		
	ESTER SOLVENTS		3.42	3.50
	METHYLENE CHLORIDE		2.21	2.26
	OTHER KETONE SOLVENTS		0.4	
Total		100.00	99.48	100

Table 6.3.12 Commercial/Consumer Solvents: Personal Care Products (Profile LAD30026n)

CAS	POLLUTANT	Speciate 8501	Freedonia	Composite
64175	ETHYL ALCOHOL	60.99	89	73.64
67630	ISOPROPYL ALCOHOL	7.96	11	9.10
	UNDEFINED VOC	9.52		
75285	ISOBUTANE	9.16		9.16
74986	PROPANE	2.62		2.62
	UNDEFINED PROPELLANT	1.91		
106978	N-BUTANE	1.78		1.78
	UNDEFINED PETROLEUM DISTILLATES	1.55		
67641	ACETONE	1.40		1.40
141786	ETHYL ACETATE	0.63		0.63
64475850	MINERAL SPIRITS	0.62		
5989275	D-LIMONENE	0.29		0.29
	PARAFFINS (C16-C34)	0.29		0.29
68916392	WITCH HAZEL	0.24		0.24
123864	N-BUTYL ACETATE	0.22		0.22
115106	DIMETHYLETHER	0.20		0.20
108883	TOLUENE	0.13		
64197	ACETIC ACID	0.11		0.11
8030306	NAPHTHA	0.06		0.06
111762	BUTYL CELLOSOLVE	0.05		0.05
8007452	COAL TAR	0.05		0.05
	ALIPHATICS	0.04		
119368	METHYL SALICYLATE	0.04		0.04
8012951	MINERAL OIL	0.03		0.03
76222	CAMPHOR	0.02		0.02
63148629	SILICONE	0.02		0.02
102716	TRIETHANOLAMINE	0.02		0.02
64742956	AROMATIC 100	0.01		
100516	BENZYL ALCOHOL	0.01		0.01
141435	ETHANOLAMINE	0.01		0.01
60297	ETHYL ETHER	0.01		0.01
	UNDEFINED PARAFFIN	0.01		
		100.00	100.00	100.00

Table 6.3.13 Commercial/Consumer Insecticide Application (Profile LAD0027n)

CAS	POLLUTANT	Speciate 8527	LAD30027n
64475850	UNDEFINED PETROLEUM DISTILLATES	16.68	
	MINERAL SPIRITS	12.03	
	UNDEFINED VOC	5.03	
	UNDEFINED AROMATIC	4.72	
64742956	AROMATIC 100	4.1	
	KEROSENE/DIESEL/FUEL OIL	1.84	
	UNDEFINED PARAFFIN	0.37	
	TENNECO 500-100	0.35	
76416938	PARAFFINS (C16-C34)	0.23	
	PENTANE		35.09
107835	2-METHYL PENTANE		1.50
96140	3-METHYL PENTANE		3.76
287923	CYCLOPENTANE		1.25
75832	2,2-DIMETHYL Butane		1.25
79298	2,3-DIMETHYL Butane		1.25
78784	2-METHYLBUTANE		1.25
1330207	ISOMERS OF XYLENE	13.39	13.39
67630	ISOPROPYL ALCOHOL	7.67	7.67
64175	ETHYL ALCOHOL	0.69	0.69
91203	NAPHTHALENE	7.55	7.55
75285	ISOBUTANE	5.19	5.19
106467	P-DICHLOROBENZENE	4.22	4.22
74986	PROPANE	4.83	5.86
106978	N-BUTANE	3.66	4.69
	UNDEFINED PROPELLANT	2.05	
	ALIPHATICS	1.33	1.33
115106	DIMETHYLETHER	1.12	1.12
108941	CYCLOHEXANONE	0.93	0.93
111762	BUTYL CELLOSOLVE	0.75	0.75
333415	DIAZINON	0.3	0.30
5989275	D-LIMONENE	0.29	0.29
111273	N-HEXANOL	0.24	0.24
63252	CARBARYL (Sevin)	0.11	0.11
110123	METHYL ISOAMYL KETONE	0.1	0.10
628637	AMYL ACETATE (MIXED ISOMERS)	0.06	0.06
127184	PERCHLOROETHYLENE	0.04	0.04
111466	DIETHYLENE GLYCOL	0.03	0.03
121755	MALATHION	0.02	0.02
25551137	TRIMETHYLBENZENE	0.02	0.02
11126059	FREON	0.02	
67641	ACETONE	0.01	0.01
60515	DIMETHOATE	0.01	0.01
108101	METHYL ISOBUTYL KETONE	0.01	0.01
8002093	PINE OIL	0.01	0.01
		100	100

Table 6.3.14 General Commercial/Consumer Solvent Emissions (Profile LAD30029n)

CAS	POLLUTANT	Speciate (8500)	Freedonia	Composite
64175	ETHYL ALCOHOL	22.46	22.51	13.90
67561	METHYL ALCOHOL	5.28	39.66	24.48
67630	ISOPROPYL ALCOHOL	4.43	9.90	6.11
	UNDEFINED VOC	11.78		
64475850	MINERAL SPIRITS	5.23		
	UNDEFINED PETROLEUM DISTILLATES	3.1		
64742956	AROMATIC 100	2.68		
8052413	STODDARD SOLVENT	2.32		
	KEROSENE/DIESEL/FUEL OIL	1.56		
	UNDEFINED AROMATIC	1.31		
	ALIPHATICS	1.27		
110543	N-HEXANE	0.91		
8030306	NAPHTHA	0.57	6.70	
142825	N-HEPTANE	0.56		
76416938	TENNECO 500-100	0.2		
8012951	MINERAL OIL	0.01		
109660	N-PENTANE	0.01		
109660	PENTANE			5.18
107835	2-METHYL PENTANE			0.22
96140	3-METHYL PENTANE			0.56
287923	CYCLOPENTANE			0.19
75832	2,2-DIMETHYL Butane			0.19
79298	2,3-DIMETHYL Butane			0.19
78784	2-METHYLBUTANE			0.19
75285	ISOBUTANE	4.34		4.34
67641	ACETONE	3.87		3.87
	UNDEFINED PROPELLANT	3.47		
108883	TOLUENE	2.88	0.79	2.88
1330207	ISOMERS OF XYLENE	2.58		
74839	METHYL BROMIDE	2.4		2.40
74986	PROPANE	2.08		3.82
108907	CHLOROENZENE	1.6		1.60
8002093	PINE OIL	1.21	1.82	1.21
111762	BUTYL CELLOSOLVE	1.12		6.95
106467	P-DICHLOROBENZENE	1.06		1.06
10061015	CIS-1,3-DICHLOROPROPYLENE	0.82		0.82
25168052	CHLOROTOLUENE	0.77		0.77
106978	N-BUTANE	0.77		2.51
8032324	PETROLEUM ETHER	0.74		
10061026	TRANS-1,3-DICHLOROPROPENE	0.74		0.74
78933	METHYL ETHYL KETONE	0.67		0.67
111466	DIETHYLENE GLYCOL	0.51		3.16
91203	NAPHTHALENE	0.46		0.46
127184	PERCHLOROETHYLENE	0.45		0.45
5989275	D-LIMONENE	0.3	0.59	0.59
141786	ETHYL ACETATE	0.26		0.26
	PARAFFINS (C16-C34)	0.25		0.25
75218	ETHYLENE OXIDE	0.2		
115106	DIMETHYLETHER	0.16		0.99

Table 6.3.14 (Cont.) General Commercial/Consumer Solvent Emissions (Profile LAD30029n)

CAS	POLLUTANT	Speciate (8500)	Freedonia	Composite
60297	ETHYL ETHER	0.16		0.99
123864	N-BUTYL ACETATE	0.16		0.16
124403	DIMETHYLAMINE	0.15		0.15
109999	TETRAHYDROFURAN	0.15		0.15
108941	CYCLOHEXANONE	0.13		0.13
76062	CHLOROPICRIN	0.12		0.12
	PARAFFINS/OLEFINS (C12-C16)	0.11		0.11
	UNDEFINED PARAFFIN	0.11		
108101	METHYL ISOBUTYL KETONE	0.09		0.09
141435	ETHANOLAMINE	0.08		0.08
8001589	CREOSOTE	0.07		0.07
68916392	WITCH HAZEL	0.07		0.07
107982	1-METHOXY-2-PROPANOL	0.06		0.37
111308	GLUTARALDEHYDE	0.06		0.06
75525	NITROMETHANE	0.06		0.06
8006642	TURPENTINE	0.06		0.06
111773	METHYL CARBITOL	0.05		0.31
64197	ACETIC ACID	0.04		0.04
111900	CARBITOL	0.04		0.04
763699	ETHYL-3-ETHOXYPROPIONATE	0.04		0.25
100414	ETHYLBENZENE	0.04		0.04
50000	FORMALDEHYDE	0.04		0.04
110190	ISOBUTYL ACETATE	0.04		0.04
1321671	NAPHTHOL	0.04		0.04
8008579	OIL OF ORANGE	0.04		0.04
67663	CHLOROFORM	0.03		0.03
109864	METHYL CELLOSOLVE	0.03		0.19
100516	BENZYL ALCOHOL	0.02		0.02
74851	ETHYLENE	0.02		
108214	ISOPROPYL ACETATE	0.02		0.02
79209	METHYLACETATE	0.02		0.02
71363	N-BUTYL ALCOHOL	0.02		0.02
71238	N-PROPYL ALCOHOL	0.02		0.02
95476	O-XYLENE	0.02		0.02
30525894	PARAFORMALDEHYDE	0.02		0.02
97994	TETRAHYDRO-2-FURANMETHANOL	0.02		0.02
79016	TRICHLOROETHYLENE	0.02		0.02
121448	TRIETHYLAMINE	0.02		0.02
7785264	(1S)-(-)-ALPHA-PINENE	0.01		0.01
25265774	2,2,4-TRIMETHYL-1,3-PENTANEDIOL ISOBUTYRATE	0.01		0.06
104767	2-ETHYL HEXANOL	0.01		0.01
591764	2-METHYLHEXANE	0.01		0.01
107835	2-METHYLPENTANE	0.01		0.01
589344	3-METHYLHEXANE	0.01		0.01
108112	4-METHYL-2-PENTANOL	0.01		0.01
2492366	BUTYL	0.01		
	C10 PARAFFINS	0.01		0.01
76222	CAMPHOR	0.01		0.01
63252	CARBARYL	0.01		0.01
110805	CELLOSOLVE	0.01		0.06

Table 6.3.14 (Cont.) General Commercial/Consumer Solvent Emissions (Profile LAD30029n)

CAS	POLLUTANT	Speciate (8500)	Freedonia	Composite
8007452	COAL TAR	0.01		0.01
1338029	COPPER NAPHTHENATE	0.01		0.01
110827	CYCLOHEXANE	0.01		0.01
123422	DIACETONE ALCOHOL	0.01		0.01
333415	DIAZINON	0.01		0.01
96480	GAMMA-BUTYROLACTONE	0.01		0.01
67721	HEXACHLOROETHANE	0.01		0.01
78591	ISOPHORONE	0.01		0.01
64742898	LACTOL SPIRITS	0.01		0.01
110123	METHYL ISOAMYL KETONE	0.01		0.01
119368	METHYL SALICYLATE	0.01		0.01
111273	N-HEXANOL	0.01		0.01
95498	O-CHLOROTOLUENE	0.01		0.01
95501	O-DICHLOROBENZENE	0.01		0.01
79210	PEROXYACETIC ACID	0.01		0.01
57556	PROPYLENE GLYCOL	0.01	4.63	4.63
108656	PROPYLENE GLYCOL MONOMETHYL ETHER ACETATE	0.01		0.06
63148629	SILICONE	0.01		0.01
102716	TRIETHANOLAMINE	0.01		0.01
1300716	XYLENOL	0.01		0.01
	Ether Solvents		9.01	
	E-Series Ether Solvents		2.27	
	Other Propylene Oxide-Derived Solvents		2.12	
Total		100	100	100

Table 6.4.1 Open Fire Profiles

Profile Number			lad30032n	
	lad40008n		lad30033n	lad40009n
Compound	Forest fuels	Grasslands	Composite	Agricultural
Ethane	2.7	2.1	2.4	7
Propane	0.6	0.6	0.5	4
n-Butane	0.17	0.15	0.16	0.4
i-Butane	0.05	0.05	0.05	0.1
n-Pentane	0.15	0.04	0.11	0.17
2-Methylbutane	0.07	0.09	0.07	0.12
n-Hexane	0.12	0.31	0.16	0.3
i-Hexanes	0.2	0.4	0.23	0.6
Heptanes	0.2	0.4	0.23	0.6
Acetylene	0.7	2.3	1	2.5
Propyne	0.12	0.17	0.13	0.22
1,3-Butadiene	0.6	0.6	0.5	0.6
Isoprene	1.2	0.16	1.1	0.3
Ethylene	4	8	5	10
Propylene	2.2	2.3	2.4	7
1-Butene	0.3	0.6	0.3	0.9
Methylvinylether	1.3	1.9	1.3	
i-Butene	0.2	0.23	0.19	0.6
t-2-Butene	0.07	0.19	0.1	0.28
c-2-Butene	0.17	0.16	0.16	0.3
1-Pentene	0.12	0.17	0.13	0.06
2-Methylbutenes	0.08	0.06	0.07	0.05
Cyclopentene	0.05	0.09	0.05	0.14
4-Methyl-1-pentene	0.12	0.4	0.17	0.11
1-Hexene	0.22	0.29	0.22	0.09
Octenes	0.012	0.5	0.11	0.028
Terpenes	0.5	0.12	0.4	0.1
Benzene	1.8	1.7	1.7	1
Toluene	1.5	1.2	1.3	0.18
Xylenes	0.5	0.4	0.4	0.07
Ethylbenzene	0.12	0.1	0.11	0.21
Styrene	0.3	0.19	0.27	0.21
Methanol	7	10	8	14
Phenol	5	3	5	0.007
Ethanol	0.04	0.09	0.05	0.12
1-Propanol	0.1	0.2	0.11	0.28
Butanols	0.027	0.06	0.03	0.08
Cyclopentanol	0.1	0.25	0.13	0.12
Formaldehyde	6	6	7	10

Table 6.4.1 (Cont.) Open Fire Profiles

Profile Number	lad30032n lad30033n lad40007n lad40009n			
	lad40008n			
Compound	Forest fuels	Grasslands	Composite	Agricultural
Acetaldehyde	5	5	4	4
Glycolaldehyde	3.1	4	4	
Acrolein	0.6	0.6	0.6	1.2
Propanal	0.3	0.07	0.26	0.6
Butanals	0.5	0.4	0.5	0.14
Hexanals	0.05	0.1	0.06	0.08
Heptanals	0.01	0.023	0.012	0.007
Acetone	2.3	2.5	2.2	4
2-Butanone	1.1	2	1.3	3
1-hydroxy-2-Propanone	20	5	15	
2,3-Butanedione	2.3	4	2.6	6
Pentanones	0.22	0.12	0.19	0.05
Heptanones	0.012	0.05	0.019	0.014
Octanones	0.05	0.12	0.06	0.14
Benzaldehyde	0.09	0.23	0.11	0.06
Furan	1.3	1.2	1.3	3
2-methyl Furan	1.2	4	1.6	0.08
3-methyl Furan	0.12	0.07	0.1	0.021
2-ethyl Furan	0.015	0.008	0.012	0.007
2,4-dimethyl Furan	0.05	0.06	0.05	0.014
2,5-dimethyl Furan	0.12	0.016	0.09	0.21
Tetrahydrofuran	0.05	0.13	0.06	0.04
2,3-Dihydrofuran	0.04	0.09	0.05	0.03
Benzofuran	0.06	0.11	0.07	0.028
Acetonitrile	1.9	0.9	1.6	1.2
Propenenitrile	0.5	0.5	0.4	
Propanenitrile	0.6	0.3	0.5	
Formic acid	3	5	4	1.5
Acetic acid	14	15	16	6
Chloromethane	0.12	0.6	0.23	1.7
Furfural	1.1	1.8	1.2	2.5
Methyl formate	0.06	0.12	0.07	0.17
Methyl acetate	0.27	0.4	0.29	0.7
Hydrogen cyanide	0.4	0.22	0.31	1
Carbonyl sulfide	0.08	0.12	0.08	0.4
Methyl bromide	0.008	0.016	0.009	0.021
Methyl iodide	0.0015	0.004	0.0019	0.007
Total	100	100	100	100