Appendix C - Michigan Mobile Source Emissions

Mobile Source Emissions

The State of Michigan reported its 1999 point and area source emissions as a part of the Great Lakes Region air toxic emissions inventory, released in December 2002. For details on point or area source emissions, please refer to the earlier report. Mobile source emissions were not reported at that time as the data was not available. Now that data is available, the mobile source emissions addendum is being released. This report details the mobile source emissions. The data tables presented will contain point, area and mobile source emissions individually and also combined to allow the reader a view of the total air toxic emissions picture. Michigan's on-road and off-road mobile source emissions data were obtained from the EPA Draft Version 3 of the 1999 NEI.

On-Road Mobile Emissions

On-road mobile source air toxic emissions were obtained from the EPA Draft Version 3 of the 1999 NEI. The on-road mobile emissions were estimated by EPA. The latest draft version of the EPA mobile source model MOBILE 6.2 was used by EPA to develop the emission factors used for the emissions estimates. The final estimated toxic emissions were then submitted to the Rapids QA/QC committee in the EPA NIF 2.0 format for quality assurance.

These emissions were calculated using seasonal emission factors generated by using EPA's MOBILE6.2 model and 1999 VMT calculated at the county/roadway type/vehicle type level. The VMT totals by county and roadway type needed to be allocated among the 28 MOBILE6 vehicle types. OTAQ provided EPA a national allocation of HPMS to MOBILE56 vehicle categories. This was done based on the distribution of the 1999 rural and urban VMT among the six HPMS vehicle types found in Table VM-1 ("Annual Vehicle Distance Traveled in Miles and Related Data - 1999 - by Highway Category and Vehicle Type") of FHWA's *Highway Statistics 1999* and a mapping of these HPMS vehicle categories to the 28 MOBILE6 vehicle types, provided by OTAQ.

Within the MOBILE6.2 model, six HAPs (benzene, formaldehyde, acetaldehyde, 1,3 butadiene, acrolein, and methyl tertiary butyl ether [MTBE]) can be calculated directly by including detailed fuel parameters within the MOBILE6.2 scenario descriptions. These fuel parameters are: sulfur content, olefins content, aromatics content, benzene content, E200 value, E300 value, oxygenate content by type, and oxygenate sales fraction by type. Since these fuel parameters are area-specific, EPA developed county-level inputs for each of these parameters for summer and winter gasoline. MOBILE6.2 also has a command (ADDITIONAL HAPS) which allows the user to enter emission factors or air toxic ratios for additional air toxic pollutants. Emission factors for an additional 29 HAPs were calculated by EPA with MOBILE6.2 through the use of external data files specifying emission factors for these pollutants in one of three ways: as fractions of VOC, fractions of PM , or by supplying the basic emission factors (primarily used for metals and metal compounds).

Off-Road Mobile Emissions

The off-road mobile source air toxic emissions were obtained from the EPA Draft Version 3 of the 1999 NEI. The final estimated toxic emissions were submitted to the Rapids QA/QC committee in the EPA NIF 2.0 format for quality assurance.

The aircraft source category includes all aircraft types used for public, private, and military purposes. This includes four types of aircraft:

Commercial, Air Taxis, General Aviation, and Military

Commercial aircraft include those used for transporting passengers, freight, or both. Commercial aircraft tend to be larger aircraft powered with jet engines. Air taxis carry passengers, freight, or both, but usually are smaller aircraft and operate on a more limited basis than the commercial carriers. The national air taxi fleet includes both jet and propeller-driven aircraft. General aviation includes most other aircraft used for recreational flying and personal transportation. Aircraft that support business travel, usually on an unscheduled basis, are included in the category of general aviation. Most of the general aviation fleet is made up of propeller-driven aircraft, though smaller business jets can also be found in this category. Military aircraft cover a wide range of aircraft types such as training aircraft, fighter jets, helicopters, and jet- and propeller-driven cargo planes of varying sizes. It should also be noted that this inventory includes emission estimates for aircraft support vehicles and engines typically found at airports such as aircraft refueling vehicles, baggage handling vehicles and equipment, aircraft towing vehicles, passenger buses, larger portable generators, and other airport vehicles as derived from the NONROAD model.

EPA has developed guidance for inventorying aircraft emissions associated with an aircraft's landing and takeoff (LTO) cycle. The cycle begins when the aircraft approaches the airport on its descent from cruising altitude, lands, taxis to the gate, and idles during passenger deplaning. It continues as the aircraft idles during passenger boarding, taxis back out onto the runway for subsequent takeoff, and ascent (climb-out) to cruising altitude. Thus, the five specific operating modes in an LTO are:

Approach, Taxi/idle-in, Taxi/idle-out, Takeoff and Climb-out.

During each mode of operation, an aircraft engine operates at a fairly standard power setting for a given aircraft category. Emissions for one complete cycle are calculated using emission factors for each operating mode for each specific aircraft engine combined with the typical period of time the aircraft is in the operating mode. HAP emission estimates were developed by EPA for all aircraft types except military aircraft. Because of the diversity of military aircraft operations, representative HAP emission factors could not be identified or developed. The FAA's airport activity statistics for certified air carriers only documents activity of American flagged carriers. EPA/OTAQ provided aircraft-specific data for foreign flagged air carriers. EDMS (generates estimates for hydrocarbons (HC), NO_x, CO, and SO_x. The HC estimates were converted to VOC .

In this effort, all of the default time-in-mode (TIM) values incorporated in the EDMS (FAA's *Emissions and Dispersion Modeling System Ver. 4.0)* were used. EDMS did not have a default TIM value for the period that an aircraft is taxiing and idling. In this effort, a TIM value of 26 minutes was used for taxing and idling; this value was obtained from EPA State Implementation Plan (SIP) guidance on estimating aircraft emissions. Not all of the aircraft included in the FAA activity report could be matched to the aircraft in the EDMS. For those aircraft that could not be matched directly, their LTOs were applied to an average LTO-based emission factor developed from the aircraft that could be matched directly. HAP emission estimates for all aircraft were estimated by applying speciation profiles to national level VOC or PM_{10} emissions estimates. Lead emission estimates were handled differently. Lead emissions are primarily associated with leaded aviation fuel used in piston driven aircraft associated with general aviation. The lead estimates developed in this inventory were derived by combining DOE annual aviation gasoline usage data with the lead content of aircraft fuel (assumed to be 2.0 g/gal.), and applying a 75% retention value to reflect the lead that is retained in the engine or exhaust system.

National aircraft emission estimates were allocated to individual counties by EPA using airport activity data derived from the FAA Terminal Area Forecast System (TAF) database of over 2,000 airports in the United States (DOT, 2001c). A GIS database obtained from the Bureau of Transportation Statistics (BTS) (DOT, 2001d) contained airport level data with latitude and longitude coordinates. These two data sources were matched to identify the county in which each airport is located. Using airport-specific LTO data, the percentage of national activity was then calculated by EPA for each airport for each aircraft type (i.e., commercial, air taxis, general aviation, and military), as noted in the following equation.

> *Airport X Percentage of National LTO by aircraft type = LTO at airport X by aircraft type National LTO by aircraft type*

National aircraft emissions for each aircraft type were allocated by EPA to specific airports by using the LTO percentages (see equations below):

> *Airport X Emissions = Airport X Percentage by Aircraft Type* Pollutant by Aircraft Type*

Where there were multiple airports in a given county, EPA simply summed these emissions to provide a county level emissions estimate.

Other categories estimated.

The commercial marine vessel (CMV) source category includes all boats and ships used either directly or indirectly in the conduct of commerce or military activity. These vessels range from 20-foot charter boats to large tankers and military vessels which can exceed 1,000 feet in length (EPA, 1989). In spite of the broad range of vessels represented by this category, a number of common characteristics allow for the use of simple emission estimation methods. The majority of vessels in this category are powered either by diesel engines or steam turbines. The predominant fuel used is oil, both distillate (diesel) and residual grades. It can be assumed that CMVs powered by diesel engines predominantly use distillate fuel oil or higher grade residual oils, and those powered by steam turbines use residual fuel oil. The CMV source category does not include recreational marine vessels, which are vessels less than 100 feet in length, most being less than 30 feet, and powered by either inboard or outboard engines. Emissions from recreational marine vessels are included in the other non-road source category.

The CMV emission estimates in this inventory were developed by EPA for the Draft Version 3 1999 National Emissions Inventory (NEI) using a “top-down” approach. This means that the estimates were developed at the national level and allocated to individual counties using appropriate surrogates. The fuel usage data were derived from documents that support recent marine diesel rules. HAP speciation profiles were applied to the VOC and PM emission estimates. Unfortunately, there are very few data available to characterize HAP emissions from CMVs, therefore “alternative” speciation profiles were used in this inventory effort. For diesel-powered vessels, the speciation profiles were for heavy-duty diesel vehicles (HDDV) and were obtained from information in *Evaluation of Factors That Affect Diesel Exhaust Toxicity* (Truex and Norbeck, 1998). For steam-driven vessels, speciation profiles for stationary industrial and commercial boilers were considered to be appropriate surrogates. The boiler speciation data were obtained from the EPA’s Industrial Combustion Coordinated Rulemaking (ICCR) program (Porter, 1998; EPA, 1996). For PAH emissions for diesel marine engines, speciation profiles were developed by OTAQ to individually estimate emissions for the 16-PAH compounds. For distillate oil-fueled CMVs, PAH/$PM_{2.5}$ speciation profiles were obtained from Colorado’s Northern Front Range Air Quality Study (NFRAQS) report, and are based on test data for heavy duty diesel vehicles. For steamships, speciated PAH data are not currently available, therefore aggregate 7-PAH and 16-PAH emission factors were used. National HAP emissions were disaggregated into port and underway emission estimates, based on assumptions used in the EPA’s SIP guidance that 75% of distillate fuel and 25% of residual fuel is consumed within the port, the remaining fuel is consumed while underway. To allocate emissions to individual counties, National port emissions were assigned to the 150 largest U.S. ports based on activity data obtained from the *Waterborne Commerce of the United States, Part 5-Waterways and Harbors National Summaries* (U.S. Army Corps of Engineers, 2001). This reference included data for Puerto Rico and the Virgin Islands. The percentage of total traffic for each port was calculated by dividing the port-level traffic by the total traffic. This approach will slightly over estimate port emissions for the 150 ports included in this inventory as emissions are not allocated to the smaller ports not included in this list. Underway emissions were allocated to the 1999 county-level by applying county-specific waterway activity factors expressed as thousand ton miles to the national estimate. Using GIS software, county borders were overlaid with the U.S. waterway network to determine the waterway length in each county. Each county was then assigned a weighting factor by summing the product of the waterway length (miles) in the county and the waterway-cargo traffic (tons) for each segment of the waterway, and then dividing this sum by the national total. It is recognized that there are some inconsistencies with the BTS, GIS data for other inventory years, therefore the 1999 weight factors are used in all inventory years. To allocate emissions to ports with underway emissions, two methods were employed. Where shorelines intersected with counties, emissions were assigned based upon shoreline length. Where this was not possible, a weighted average of tonnage miles was divided equally among the counties that had a shipping lane within close proximity of a county. Underway emissions were then added to in-port emissions to get county level CMV emission estimates.

The locomotive emission estimates in this inventory were developed by EPA for the Draft Version 3 1999 National Emissions Inventory (NEI). The locomotive source category includes railroad locomotives powered by diesel-electric engines. A diesel-electric locomotive uses 2-stroke or 4-stroke diesel engines and alternator or generator to produce the electricity required to power its traction motors. The locomotive source category does not include locomotives powered by electricity or steam. Emissions associated with the operation of electric locomotives would be included in the point source utility emission estimate. It is believed that the number of wood or coal driven steam locomotives is currently very small; therefore, these types of locomotives are not included in this inventory. The locomotive source category is further divided up into five categories: line haul class I, class I yard, line haul class II/III, passenger, and commuter. The national rail estimates were divided up between the subcategories based on ratios calculated from fuel data obtained from the American Association of Railroads for each subcategory.

HAP emissions were estimated in two ways. First, HAP emission factors were combined with the amount of distillate fuel oil used by locomotives. The HAP emission factors were obtained from *Diesel Fuel Effects on Locomotive Exhaust Emissions* (Fritz, 2000) and from *Baseline Emission Inventory of HAP Emissions from MACT Sources - Interim final Report*, 1998 (Porter, 1998). Where emission factors are not available, HAP emissions were estimated by applying speciation profiles to the VOC or PM estimates. The speciation profiles were derived from *Evaluation of Factors that Affect Diesel Exhaust Toxicity* Steve,(Truex and Norbeck, 1998), and data provided by OTAQ (Scarbro, 2001 and 2002).

The locomotive HAP emissions were allocated to the county level by using 1999 county-specific railroad traffic data (ton miles) obtained from the Department of Transportation (BTS, 2000). Using GIS software, county borders were overlaid with the US railroad network in order to determine the rail activity in each county for the specific SCCs. Each county was then assigned a weighted emissions factor by summing the product of the rail activity and the track-specific loading factor for each track, and then dividing this sum by the national total. GIS activity data for each county were available for each of the railroad category used in this inventory except yard locomotives. Inventories of yard locomotive activities have not been developed recently, therefore emissions for this category were spatially allocated to urban counties which had Class I railroad activity.

The other nonroad source emission estimates in the inventory were obtained from the Draft Version 3 1999 NEI inventory. The other nonroad mobile source category includes vehicles and equipment that normally are not operated on public roads nor provide transportation and are not considered aircraft, commercial marine vessels or locomotives. Note, the individual source categories included in this group parallel the source categories included in the NONROAD model. This includes categories such as lawn and garden equipment, agricultural equipment, logging equipment, construction equipment, airport service vehicles, locomotive maintenance vehicles, and recreational equipment (including recreational marine equipment). The other nonroad vehicles and equipment include both diesel-powered and gasoline powered engines. Gasoline-powered engines can further be characterized into two engine categories, specifically 2- and 4-stroke engines.

Source emissions were estimated by EPA using a mixture of “top down” and “bottom up” approach. The emission estimates for metal HAPs, excluding lead, were estimated by EPA by applying emission factors to vehicle activity or fuel consumption data. For these metal HAP estimates, it was necessary to combine the 2- and 4-stroke engine-type categories into one category, called gasoline engines. Thus, metal HAP emissions for all gasoline engines, regardless of type, were based on the same metal emission factor. A national estimate of other nonroad lead emissions was obtained by EPA by multiplying the average lead content of mobile fuel with the amount of fuel used nationally and the fraction of the fuel used by other nonroad sources. Note, the lead content of fuel is very small and represents trace compounds in the extracted crude oil. The emission estimates for organic HAPs were developed by EPA by applying HAP/VOC speciation profiles to county-level VOC estimates. A number of different fuels are used in onroad vehicles. EPA assumed that these same fuels were used in other nonroad applications. Currently, the onroad fuel parameters data are being updated by EPA to more accurately reflect different fuels used in each county. At the time this inventory was being developed by EPA, the updated fuel parameter data were not available such that this study does not include the newer data - future revision of the 1999 NEI nonroad inventory will include the updated fuel parameters data.

RESULTS

The toxic emissions for Michigan are listed in the table following R*eferences.* The values are expressed in total pounds per year of pollutant by inventory type. As indicated in the text, point source emissions were calculated at the process level, but have been aggregated to and are only reported at the state level. An electronic database of toxic emissions, NEI format, for the state of Michigan, is available at the process level upon request. For additional information, contact the Michigan Department of Environmental Quality, Air Quality Division, Emissions Reporting and Assessment Unit, Constitution Hall, Third Floor, P.O. Box 30260, Lansing, Michigan, 48909, (517)-373-7023.

Michigan was only able to estimate mobile source emissions for 35 on-road and 37 off-road pollutants of the 213 toxic air pollutants of concern. This was due to lack of data needed to characterize the other pollutant emissions. *References* and a toxic emissions summary table follow.

REFERENCES

Air Toxics Emissions Inventory *Protocol* for the Great Lakes Commission, June 1994.

Act 348 of 1965, As Amended and Administrative Rules for Air Pollution Control for the Michigan Department of Natural Resources.

Section 182(a)(3) (B) of the Clean Air Act.

Environmental Protection Agency (EPA). Documentation for the 1999 Base Year Nonpoint Source National Emission Inventory for Hazardous Air Pollutants. September, 2001

Environmental Protection Agency (EPA). EPA Non-road Emissions Model, June, 2000

Environmental Protection Agency (EPA). EPA FAA Aircraft Engine Emission Database (FAAED).

INFORMATION

For more information about Michigan's emissions inventory, please contact:

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Table C-1: Michigan - Statewide Emissions (lb/yr)

Pollutant	Point Sources	Area Sources	On Road Sources	Non Road Sources	Total
1,1,1-TRICHLOROETHANE	3018.087055	5799978.225	0	0	5802996.312
1,1,2,2-TETRACHLOROETHANE	1267.735829	0	0	0	1267.735829
1,1,2-TRICHLOROETHANE	5.97823198	0	0	0	5.97823198
1,1-DICHLOROETHANE	1536.203173	0	0	0	1536.203173
1,2,3,4,6,7,8-HEPTACHLORODIBENZODIOXIN	0.00001187	0	0	0	0.00001187
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	0.00000274	0	0	0	0.00000274
1,2,3,4,7,8-HEXACHLORODIBENZODIOXIN	0.00002609	0	0	0	0.00002609
1,2,3,7,8- PENTACHLORODIBENZODIOXIN	0.00001316	0	0	0	0.00001316
1,2,3,7,8,9-HEXACHLORODIBENZODIOXIN	0.00000056	0	0	0	0.00000056
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	0.00004488	0	0	0	0.00004488
1,2-DIBROMOETHANE	59.16545769	0	0	0	59.16545769
1,2-DICHLOROETHANE	1322.162634	1981.903	0	0	3304.065634
1,3-BUTADIENE	689.0890528	0	1882742.29	782591.2907	2666022.67
1,3-DICHLOROPROPENE	18.14182924	1578204	0	0	1578222.142
1,4-DICHLOROBENZENE	26.35851327	768388.0269	0	0	768414.3854
1,4-DIOXANE	0.0438	98.6383	0	0	98.6821
2,2,4-TRIMETHYLPENTANE	295.8240166	246605.47	13836352.49	13553574.12	27636827.9
2,3,7,8-TETRACHLORODIBENZODIOXIN	0.00035533	0	0	0	0.00035533
2,3,7,8-TETRACHLORODIBENZOFURAN	0.02975828	0	0	0	0.02975828
2,4-DINITROPHENOL	4.28312467	0	0	0	4.28312467
2,4-DINITROTOLUENE	6.70834719	0	0	0	6.70834719
2-CHLOROACETOPHENONE	80.61853163	0	0	0	80.61853163
2-NITROPROPANE	0	19.2344	0	0	19.2344
3,3-DICHLOROBENZIDENE	1	0	0	0	1
4-NITROPHENOL	5.07387085	0	0	0	5.07387085
ACENAPHTHENE	47.59091955	5347.89	2409.85	1499.701124	9305.032044
ACENAPHTHYLENE	137.3768767	113382.33	12785.88	4150.385986	130455.9729
ACETALDEHYDE	75302.53577	0	2193461.72	1253649.767	3522414.023
ACETAMIDE	0	1.1934	0	0	1.1934
ACETONITRILE	2321.314994	0	0	0	2321.314994
ACETOPHENONE	359.3757531	84.1379	0	0	443.5136531
ACROLEIN	11166.12649	66411.26	305531.11	177112.627	560221.1235
ACRYLIC ACID	0	0.0357	0	0	0.0357
ACRYLONITRILE	3188.314894	0	0	0	3188.314894
ALLYL CHLORIDE	0	0	0	0	0
ANILINE	5.01000022	0	0	0	5.01000022
ANTHRACENE	30.57901594	7487.18	2892.09	1156.23287	11566.08189
ANTIMONY	138.6036866	0	0	0	138.6036866
ARSENIC	6028.121417	0.7383	0	31.26287667	6060.122594
ASBESTOS	0	0	0	0	0
ATRAZINE	0	239138.31	0	0	239138.31
BENZ(A)ANTHRACENE	180796.6855	10696.16	676.82	421.6649628	192591.3305
BENZENE	161535.6432	1627423.305	15215055.73	6244134.461	23248149.14
BENZO(A)PYRENE	2527.737904	2138.92	428.79	306.5463715	5401.994275
BENZO(B)FLUORANTHENE	1.54653545	3208.57	474.56	220.6627998	3905.339335

Pollutant	Point Sources	Area Sources	On Road Sources	Non Road Sources	Total
BENZO(G,H,I)PERYLENE	747.3373063	2138.92	852.45	1035.682845	4774.390151
BENZO(K)FLUORANTHENE	3.18511559	1069.26	474.56	202.7698318	1749.774947
BENZYL CHLORIDE	16776.91457	0	0	0	16776.91457
BERYLLIUM	349.8970452	0.034	0	0.6470321	350.5780773
BIPHENYL	78.4520947	0	0	0	78.4520947
BROMOFORM	934.3769585	0	0	0	934.3769585
BROMOMETHANE	1842.8486	2189758.012	0	0	2191600.861
CADMIUM	9397.020139	16.1193	0	9.05845229	9422.197891
CARBON DISULFIDE	3380.744368	0	0	0	3380.744368
CARBON TETRACHLORIDE	83.01363493	1433.3008	0	0	1516.314435
CARBONYL SULFIDE	200	0	0	0	200
CHLORINE	47893.25131	694300.0628	0	0	742193.3141
CHLOROBENZENE	761.8279731	706395.2068	0	0	707157.0348
CHLOROETHANE	1103.430669	84962.60278	0	0	86066.03345
CHLOROFORM	1629.413407	17893.2684	0	0	19522.68181
CHLOROPRENE	0	0	0	0	0
CHROMIUM	72847.51629	1.4672	0	0	72848.98349
CHROMIUM (VI)	670.3951891	0	388.84	35.16970171	1094.404891
CHRYSENE	70.11375663	6417.52	376.39	259.382321	7123.406078
COBALT	403.0531678	0	0	0	403.0531678
COKE OVEN EMISSIONS	4679.99984	0	0	0	4679.99984
COPPER	4125.628048	0	0	0	4125.628048
CUMENE	2880.519878	3023.71	0	0	5904.229878
CYANIDE	29161.32274	0	0	0	29161.32274
DIBENZO(A,H)ANTHRACENE	5.79946934	0	0.07	7.53675526	13.4062246
DIBENZOFURAN	0	72.992	0	0	72.992
DIBUTYL PHTHALATE	2020.03793	0	0	0	2020.03793
DICHLORODIBENZODIOXINS, ALL ISOMERS	0	0	0	0	0
DIETHANOLAMINE	40	0	0	0	40
DIETHYLHEXYL PHTHALATE	2080.381808	0	0	0	2080.381808
DIMETHYL PHTHALATE	0	0	0	0	0
DIMETHYL SULFATE	1150.002411	0	0	0	1150.002411
DIMETHYLFORMAMIDE, N,N-	99	96867.15105	0	0	96966.15105
ETHYLBENZENE	14314.85815	883578.4653	5876579.86	4287978.627	11062451.81
ETHYLENE GLYCOL	650.6599942	250822.0156	0	0	251472.6756
ETHYLENE OXIDE	1595.14994	148942.9998	0	0	150538.1497
FLUORANTHENE	270.9517316	10696.16	3014.83	2793.130012	16775.07174
FLUORENE	12132.93988	12835.42	5026.86	3855.6369	33850.85678
FORMALDEHYDE	2980721.429	517289.5781	5843964.94	3187724.647	12529700.59
GLYCOL ETHERS (MISC.)	123685.0771	369816.597	0	0	493501.6741
HEPTACHLORODIBENZODIOXIN, ALL ISOMERS	0.01841072	0	0	0	0.01841072
HEPTACHLORODIBENZOFURAN, ALL ISOMERS	0.13502959	0	0	0	0.13502959
HEXACHLORODIBENZODIOXINS, ALL ISOMERS	0.00424933	0	0	0	0.00424933
HEXACHLORODIBENZOFURANS, ALL ISOMERS	0.00947578	0	0	0	0.00947578
HEXACHLOROETHANE	660.00002	0	0	0	660.00002
HYDROCHLORIC ACID	32273513.65	231194.1481	0	0	32504707.8
HYDROFLUOROCARBONS	4999.99998	0	0	0	4999.99998

Pollutant	Point Sources	Area Sources	On Road Sources	Non Road Sources	Total
HYDROGEN FLUORIDE	3914899.529	127.0249	0	0	3915026.554
INDENO(1,2,3-C,D)PYRENE	6.06999257	0	238.45	311.0180811	555.5380737
ISOPHORONE	14253.7678	9340.9954	0	0	23594.7632
LEAD	85702.45448	17.3187	0	39003.21571	124722.9889
MANGANESE	173477.2889	109.1592	0	72.80901001	173659.2571
MERCURY	4986.371354	78.6589143	0	46.55152011	5111.581789
METHANE	5190077.099	0	0	0	5190077.099
METHANOL	428059.4771	6288812.344	0	0	6716871.821
METHOXYCHLOR	319.99998	0	0	0	319.99998
METHYL CHLORIDE	22363.05899	70802.16677	0	0	93165.22576
METHYL ETHYL KETONE	64969.31067	2493516.731	0	0	2558486.042
METHYL HYDRAZINE	1957.878626	0	0	0	1957.878626
METHYL IODIDE	13.31091053	0	0	0	13.31091053
METHYL ISOBUTYL KETONE	9712.469709	2314596.144	0	0	2324308.613
METHYL METHACRYLATE	743.267677	0	0	0	743.267677
METHYL TERT BUTYL ETHER	4069.543424	212.0711	234985.86	0	239267.4745
METHYLENE CHLORIDE	255762.9677	1537048.97	0	0	1792811.937
METHYLENE(B)4-PHENYLISOCYANATE	1789.20826	0	0	0	1789.20826
M-XYLENE	3629.251353	27507.41	0	0	31136.66135
NAPHTHALENE	15239.28708	611836.8418	322698.33	69402.78302	1019177.242
N-HEXANE	480902.2919	5285243.38	4804463.35	2846576.514	13417185.54
NICKEL	18204.52266	10.8938	0	1956.735471	20172.15193
NITROUS OXIDE	2048762.554	0	0	0	2048762.554
O-CRESOL	2.49999993	0	0	0	2.49999993
OCTACHLORDIBENZOFURANS, ALL ISOMERS	0.04272609	0	0	0	0.04272609
OCTACHLORODIBENZODIOXINS, ALL ISOMERS	0.04159267	0	0	0	0.04159267
O-TOLUIDINE	1.37	0	0	0	1.37
O-XYLENE	441.7482993	169561.1786	0	0	170002.9269
PENTACHLORDIBENZOFURANS, ALL ISOMERS	0.0550275	0	0	0	0.0550275
PENTACHLORODIBENZODIOXINS, ALL ISOMERS	0.00123781	0	0	0	0.00123781
PHENANTHRENE	444.0191589	41715.83	8278.79	6248.031925	56686.67108
PHENOL	130493.3537	0	0	0	130493.3537
PHOSGENE	0	0	0	0	0
PHOSPHORUS (YELLOW OR WHITE)	18194.9732	0	0	0	18194.9732
POLYCHLORINATED BIPHENYLS (PCBS)	0	0	0	0	0
POLYCHLORINATED DIBENZODIOXINS, TOTAL	0.07272749	0	0	0	0.07272749
POLYCHLORINATED DIBENZOFURANS, TOTAL	0.24898203	0	0	0	0.24898203
PROPIONALDEHYDE	9114.461729	0	327641.38	301858.8697	638614.7114
PROPYLENE DICHLORIDE	79.11382963	0	0	0	79.11382963
PROPYLENE OXIDE	92.99998	0	0	0	92.99998
P-XYLENE	266.8741226	27507.41	0	0	27774.28412
PYRENE	83.28389087	12835.42	4193.74	3286.417338	20398.86123
QUINONE	136.5643998	0	0	0	136.5643998
SELENIUM	3074.704526	0	0	15.85229172	3090.556818
STODDARD	10900.00002	0	0	0	10900.00002
STYRENE	836084.0266	12336.4907	1215201.15	319550.1483	2383171.816

Pollutant	Point Sources	Area Sources	On Road Sources	Non Road Sources	Total
TETRACHLORODIBENZODIOXINS, ALL ISOMERS	0.0485029	0	0	0	0.0485029
TETRACHLOROETHYLENE	170512.7802	4667183.269	0	0	4837696.049
TETRCHLORODIBENZOFURANS, ALL ISOMERS	0.26634324	0	0	0	0.26634324
TOLUENE	3945789.278	8340921.108	40093765.91	32783202.24	85163678.53
TOLUENE-2,4-DIISOCYANATE	240.86	0	0	0	240.86
TRICHLOROETHYLENE	273671.0536	2135384.316	0	0	2409055.37
TRIETHYLAMINE	20159.81963	8275.7071	0	0	28435.52673
TRIFLURALIN	0	51755.5	0	0	51755.5
VINYL ACETATE	10560.18328	0.4468	0	0	10560.63008
VINYL CHLORIDE	3299.194693	25328.5449	0	0	28627.73959
VINYLIDENE CHLORIDE	62.56960002	1638.9058	0	0	1701.4754
XYLENES (MIXED ISOMERS)	977138.0791	5080514.703	22551106.38	17792076.45	46400835.61
	55220629	55914339.48	114746063.5	83666358.64	309547390.6