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Diesel PM Model-To-Measurement Comparison

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Assessment and Standards Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency

Prepared for EPA by
ICF Consulting
EPA Contract No. 68-C-01-164
Work Assignment No. 0-5

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Final Report

DIESEL PM MODEL-TO-MEASUREMENT COMPARISON

EPA Contract 68-C-01-164
Work Assignment No. 0-5

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Diesel PM Model-To-Measurement Comparison
EPA Contract 68-C-01-164, Work Assignment No. 0-5

CHAPTER 1. INTRODUCTION AND SUMMARY

The purpose of this project was to compare estimated diesel particulate matter (diesel PM or DPM) concentrations based on elemental carbon (EC) and black carbon (BC) data with modeled ambient concentrations of DPM from the 1996 National-Scale Air Toxics Assessment (NSATA).

The NSATA used DPM inventory estimates from EPA's final rule promulgating 2007 heavy duty engine standards. Using the ASPEN dispersion model, NSATA developed estimates of 1996 annual average concentrations of DPM at census tracts nationwide. The goal of this project was to evaluate the reasonableness of DPM estimates from dispersion models for this case by comparing the NSATA DPM concentration estimates with estimates based on measured EC and BC concentrations.

EC measurements can be obtained from PM2.5 monitoring sites that sample PM2.5 using quartz fiber media. The EC is measured using thermo-optical analysis of the carbonaceous material. Many studies have used thermal optimal transmission (TOT), the NIOSH method developed at Sunset laboratories. Some studies have used thermal optical reflectance (TOR), a method developed by Desert Research Institute. In addition, some sites measure ambient BC with an Aethalometer. EPA's Office of Air Quality Planning and Standards is reviewing the measurement of EC through the Speciation Trends Network, and an Agency statement on the issue is forthcoming. For now, however, existing values developed using the TOT method are being used.

All these carbon concentration measurements can be used to estimate ambient DPM by using conversion factors based on 1) source apportionment studies, 2) source-receptor model studies, and 3) studies which examine the fraction of EC in DPM.

Our analysis was carried out as a series of steps that are detailed in this report:

1. A nationwide database was compiled containing elemental carbon (EC), organic carbon (OC), and black carbon (BC) concentration measurements from $PM_{2.5}$ monitoring sites from January 1994 to December 2001. The database includes daily, annual, seasonal, weekday/weekend, and overall average concentrations and other summary statistics for each monitoring site.

2. Using results from several source apportionment studies, multiplicative conversion factors to estimate diesel particulate matter (DPM) from EC, OC, and BC concentrations were compiled. Average conversion factors were compiled together with lower and upper bound values.

3. Based on the results of steps 1 and 2, average, minimum, and maximum estimates of the overall average DPM at each monitoring site were computed.

4. The monitored values of the DPM (derived in step 3) were statistically compared with modeled values from the NSATA at the nearest census tract centroid and at the census tract centroid with the maximum modeled value within 30 km. The goal of the comparison was to determine if the modeled DPM concentrations in the NSATA agree reasonably well with estimates from monitored data.

Data Base

As described in Chapter 2, ICF developed a database of EC and BC measurements from PM2.5 monitoring sites, consisting of EC and BC data collected in the time period from January 1, 1994 to December 31, 2001. The database has been provided to EPA in a .DBF format, although ICF's statistical analyses were performed in SAS using a SAS database. The data sources with currently available data included 76 EPA PM speciation sampling sites, the Northern Front Range Air Quality Study (NFRAQS), the Phoenix EPA PM Supersite, Interagency Monitoring of Protected Visual Environments (IMPROVE), Clean Air Status and Trends Network (CASTNET), the California Multiple Air Toxics Exposure Study in the South Coast Air Basin (MATESii), and the 1995 Integrated Monitoring Study (IMS95). Data were also obtained from one of EPA's EMPACT grant recipients, Airbeat.

The EC and BC values "below the detection limit" were replaced by one half of the minimum detection limit (MDL). Missing data were not used or substituted for, to avoid biasing the estimated standard deviations.

The database includes the following information, where available:

1. For each site measuring carbon on quartz fiber, the method by which EC and OC fractions (EC/OC) are determined
2. Latitude and longitude coordinates of the monitor
3. Whether the monitor is in an urban or rural tract, based on NSATA assignments
4. The minimum detection limit of the monitor and analytic method
5. Monitor start and end dates
6. Summary statistics of daily average EC, OC, or BC measurements for all data at the site and also stratified by 1) year, 2) calendar quarter, 3) year and quarter, 4) weekday and weekend. The following summary statistics were obtained: mean, median, standard deviation, geometric mean, geometric standard deviation, minimum, 10th, … 90th percentile, maximum.
7. The same set of summary statistics were obtained for ECOCX, an EC concentration value developed from the EPA PM TOT speciation data to estimate the corresponding TOR value, and for the various monitored DPM estimates computed by applying correction factors (described below) to the EC values.
8. At each PM2.5 monitoring site, the fractions of PM2.5 which are elemental carbon, organic carbon, sulfates, and nitrates.

Conversion Factors

As described in Chapter 3, ICF developed multiplicative "conversion factors" (CFs) for estimating ambient DPM based on the ambient EC, BC or OC measurements. For each site and carbon type (EC, OC, or BC), a low-end, most likely ("average"), and high-end CF was assigned, as discussed below. For EC sites, the estimated ambient DPM-high equals ambient EC multiplied by the high-end CF for EC, the estimated ambient DPM-low equals ambient EC multiplied by the low-end CF for EC, and the estimated ambient DPM-avg equals ambient EC multiplied by the most likely CF for EC. BC and OC conversion factors were tabulated but not applied to the concentration data. Separate sets of conversion factors were applied to EC data collected by the TOR or TOT method.

The CFs were developed using existing source apportionment studies. Source apportionment studies for the West US included the Northern Front Range Air Quality Study (Denver, Colorado), the Los Angeles Study (various analyses based on data collected in 1982 at 4 urban Southern California sites), and the San Joaquin Valley Study. For the East US, information from the recent source apportionment study for sites in the South-East US was used. We contacted several experts and reviewed available literature to obtain information from these studies. In particular, James Schauer from University of Wisconsin-Madison provided very helpful information. The conversion factors were developed by dividing the reported DPM concentration by the reported total EC or OC concentration.

Since there are several source apportionment studies, each giving different estimates of the diesel contribution at different receptors, and since there are several diesel exhaust source profiles in the literature, several possible CF values could be applied for each site. For the TOR conversion factors, we developed rural CFs for rural sites and urban CFs at urban sites. We could not obtain TOR data to match by region or season, since the available data were all collected in the winter and in the West US. For the TOT conversion factors we developed separate factors by quarter for the East US and another set of factors for the West US. We could not obtain TOT data to match by the urban or rural classification. The minimum, average, and maximum of the possible CFs will give the low-end, most likely, and high-end CF's for that site.

Model to Monitor Comparisons

In Chapter 4, we will describe the DPM model-to-monitor comparisons. Using the CFs to convert the monitored EC values to estimated DPM concentrations, we compared differences between the monitored and modeled DPM values. For the modeled values, the NSATA predictions for 1996 using ASPEN (and CALPUFF, for the background) were used. We compared the monitored value to the NSATA prediction at the nearest ASPEN receptor site (census tract centroid). We also compared the monitored value to the maximum NSATA prediction within 30 km. For the monitored value we separately analyzed the site means of DPM-high, DPM-low, and DPM-avg, as described above. The site means were computed by averaging all the daily averages (from January 1, 1994 to December 31, 2001). There were insufficient data to restrict the monitored data to the modeling year 1996.

Separately for each model-to-monitor comparison, and for all locations, urban locations, and rural locations, we compared the modeled and monitored results using:

- Scatterplots of modeled against monitored values that include fitted regression lines
- Tables summarizing the regression fits, average difference, and average percentage difference for the modeled values against the monitored values
- Tables summarizing the proportions of modeled values that were within 10%, 25%, 50%, and 100% of the monitored values

Using the NSATA estimates of the percentage contributions of onroad and nonroad sources at each matched receptor site, we also evaluated whether the regions dominated by either onroad or nonroad sources have better model-to-monitor comparisons. The same statistical comparisons were applied to the subsets of sites dominated by non-road (at least 75 % of modeled DPM is non-road) or on-road (at least 50 % of modeled DPM is on-road) emissions.

The inventory estimates from the NONROAD model have been revised since the NSATA assessment was conducted using the draft 2000 NONROAD model (also used to develop inventories for EPA's 2007 heavy duty standards). The EPA provided a single nationwide multiplicative adjustment factor of 0.69 for the nonroad ambient DPM based on the ratio of NONROAD year 1996 predictions from the 2002 and 2000 draft versions of the NONROAD model . To determine if this 70 % adjustment lead to improved model-to-monitor comparisons, we applied the same statistical comparisons after adjusting the NSATA predictions using the nonroad adjustment factor (the onroad ambient DPM is unchanged).

Findings

The model-to-monitor comparisons for non-EPA TOR data (i.e. excluding the ECOCX estimates of TOR from the EPA TOT data) were based on 15 monitoring sites. The model-to-monitor comparisons for TOT data were based on 95 monitoring sites. The model-to-monitor comparisons for TOR data including the EPA ECOCX values were based on 88 monitoring sites.

The regression model analyses were generally less useful because the R squared values were in most cases less than 0.3 and the regressions tended to be over-influenced by the more extreme values. Based on the regression results, the best model performance was for the DPM-minimum monitored value for TOT data but for the DPM-average value for TOR data. Results were very similar for the modeled values based on the 2000 and 2002 NONROAD model and were a little better for the rural sites compared to the urban sites. For the Non-road-dominated subset of TOT sites, the regression model fitted better than the all sites regression, but the monitored values were significantly overpredicted. For the Non-road-dominated subset of TOR sites including the EPA ECOCX sites, the regression model fitted a bit worse than the all sites regression. There was not enough data to evaluate the On-road-dominated subset. The comparisons between the maximum modeled value within 30 km and the monitored values all showed that the monitored value was significantly over-predicted.

A summary table of the differences between the nearest modeled values and the monitored values is given on the next page. Based on the mean percentage difference and based on the

fraction of modeled values within 100 % of the monitored value, the best model performance was consistently for the DPM-maximum value at the nearest census tract centroid using the estimates consistent with the 2002 NONROAD model. For the non-EPA TOR, for TOT, and for the combination of TOR data from TOR sites and from EPA TOT converted to TOR (i.e., TOR and ECOCX), the mean percentage differences were 26 %, 27 %, and –12 % and the fractions of modeled values within 100 % of the monitored value were 73 %, 80 %, and 92 %, respectively. These results compare favorably with the results of the model to monitor comparisons for other pollutants in the NSATA assessment. For instance, ASPEN typically agrees with monitoring data within 30% half the time and within a factor of 2 most of the time. The best agreement is for benzene where the results are within a factor of two for 89 percent of the cases and within 30% 59 percent of the time. The median ratio of the benzene model to monitor comparisons was 0.92. Agreement for other HAPs varies, with median ratios of model to monitor values varying between 0.65 for formaldehyde to 0.17 for lead.

We can conclude that the modeled diesel PM concentrations in NSATA agree reasonably well with monitor values, and the agreement is better than for other pollutants evaluated, except for benzene.

Summary of differences between the nearest modeled concentration and the monitored values.

Modeled Variable[1]	Monitored Variable[2]	N	Mean Modeled Value	Mean Monitored Value	Mean Difference	Mean % Difference	Fraction of Modeled Values Within			
							10%	25%	50%	100%
concnear	ECTOR	15	1.56	0.94	0.63	100	0.07	0.13	0.53	0.53
concnear2	ECTOR	15	1.20	0.94	0.26	56	0.07	0.13	0.47	0.60
concnear	ECTORH	15	1.56	1.16	0.40	62	0.00	0.07	0.40	0.60
concnear2	ECTORH	15	1.20	1.16	0.04	26	0.00	0.07	0.33	0.73
concnear	ECTORL	15	1.56	0.64	0.92	190	0.13	0.40	0.47	0.53
concnear2	ECTORL	15	1.20	0.64	0.55	126	0.07	0.33	0.47	0.53
concnear	ECTOT	95	2.61	1.73	0.88	80	0.12	0.21	0.45	0.68
concnear2	ECTOT	95	2.05	1.73	0.32	42	0.11	0.37	0.53	0.77
concnear	ECTOTH	95	2.61	2.10	0.52	61	0.11	0.22	0.46	0.74
concnear2	ECTOTH	95	2.05	2.10	-0.05	27	0.11	0.35	0.53	0.80
concnear	ECTOTL	95	2.61	1.52	1.09	101	0.09	0.17	0.43	0.63
concnear2	ECTOTL	95	2.05	1.52	0.52	58	0.09	0.32	0.52	0.72
concnear	TOR	88	2.31	1.70	0.61	47	0.10	0.30	0.59	0.78
concnear2	TOR	88	1.81	1.70	0.11	15	0.17	0.30	0.59	0.85
concnear	TORH	88	2.31	2.23	0.08	13	0.11	0.26	0.60	0.84
concnear2	TORH	88	1.81	2.23	-0.42	-12	0.08	0.22	0.52	0.92
concnear	TORL	88	2.31	1.19	1.12	110	0.10	0.26	0.41	0.65
concnear2	TORL	88	1.81	1.19	0.62	65	0.14	0.31	0.52	0.74

Notes:

1. Modeled variable:

concnear — Nearest modeled DPM concentration consistent with the draft 2000 NONROAD Model

concnear2 — Nearest modeled DPM concentration consistent with the draft 2002 NONROAD Model

2. Monitored variable:

ECTOR — EC value multiplied by TOR average correction factor (missing for EC measured using TOT).

ECTORH — EC value multiplied by TOR maximum correction factor (missing for EC measured using TOT).

ECTORL — EC value multiplied by TOR minimum correction factor (missing for EC measured using TOT).

ECTOT — EC value multiplied by TOT average correction factor (missing for EC measured using TOR).

ECTOTH — EC value multiplied by TOT maximum correction factor (missing for EC measured using TOR).

ECTOTL — EC value multiplied by TOR minimum correction factor (missing for EC measured using TOR).

TOR — ECOCX value multiplied by TOT average correction factor for EPA data, ECTOR for TOR data.

TORH — ECOCX value multiplied by TOT maximum correction factor for EPA data, ECTOR for TOR data.

TORL — ECOCX value multiplied by TOR minimum correction factor for EPA data, ECTOR for TOR data.

CHAPTER 2. DIESEL PARTICULATE MATTER EC/OC/BC DATABASE

EPA has been provided with three DbaseIII (DBF) files, comprising the EC/OC/BC (elemental/organic/black carbon) concentration database. The files were developed by compiling and processing data from the following studies ("source"):

- AIRBEAT
- CASTNET
- EPA (PM Speciation data)
- IMPROVE (six selected sites)[1]
- IMS95
- MATESII
- NERL (Phoenix Supersite)
- NFRAQS

All concentrations are reported as $\mu g/m^3$.

The dailyavg.final.dbf file contains daily average concentrations by source, site_id, and date. The variables are listed in Table 2-1. Note that each daily average is possibly averaged across multiple time periods during the day (e.g. some black carbon data was reported every five minutes) and/or multiple measuring instruments at the same location (e.g. EPA daily average data with multiple POCs on the same date). For MDLs, we either used values reported with the database or used default values obtained from the literature. Raw values below the MDL were replaced by one half of the MDL prior to computing the daily averages (this did not happen very often for the EC/OC/BC concentration data). For black carbon, MDLs were not reported in the databases and could not be obtained from the data suppliers. According to the "Aethalometer Book" (Hansen, 2000), written by the company that makes the aethalometer instrument that measures BC, the black carbon MDL depends upon the filter size, air flow rate, and averaging period. The filter size and air flow rate were not always available. Furthermore, since we are only interested in daily averages, the MDLs of the five-minute or hourly values do not represent the precision of the daily averages. For these reasons, we did not use MDLs for the black carbon data, effectively assuming an MDL of zero. The method variable lists all methods used for that day ("Aethalometer" applies to all black carbon data, other methods apply to EC and OC).

EPA's Office of Air Quality Planning and Standards is reviewing the measurement of EC through the Speciation Trends Network, and an Agency statement on the issue is forthcoming. For now, however, existing values developed using the TOT method are being used.

Minimum detection limits (MDLs) were obtained from the data suppliers if possible. For the EPA PM speciation data, specific MDL's for each of the various NIOSH methods were supplied; each daily measurement had an associated measurement method. The EPA MDLs were mostly equal to or close to 0.146 $\mu g/m^3$ for EC and OC. For Airbeat, the data supplier reported EC MDLs that were either 0.059 or 0.134 $\mu g/m^3$ depending on the method used. For IMPROVE and

[1] The data from the two Yellowstone Park sites YELL1 and YELL2 were treated as all coming from the YELL1 site. The Yellowstone Park monitoring site was moved a short distance in 1996.

NFRAQS, the data source contact was unable to give specific MDL values for the TOR method, because the TOR measurements of EC and OC are both sums of three components, each of which has its own MDL. However, we were able to find a report by Chow and Watson (1998) that tabulated MDLs of 0.12 $\mu g/m^3$ for EC and OC by TOR. We used these values for the IMPROVE and NFRAQS EC and OC data. For CASTNET, MATESII, and NERL, we were unable to obtain specific MDL values for the NIOSH measurements, but Gary Lear (EPA) suggested a typical MDL value of 0.1 $\mu g/m^3$ for EC and OC, which was used for these three studies. For MATESII, the EC MDL was erroneously entered as 0.01 in the database; this has no affect on the daily averages or other results since all the MATESII EC measurements were 0.47 $\mu g/m^3$ or greater.

Since some site-days had more than one measured EC or OC concentration, a daily average can be treated as being below the MDL if any of the measurements for that day and carbon species were below the MDL. Using this definition, across the entire dataset, 9.9 % of the 13,993 EC daily averages were below the MDL and 3.3 % of the 13,804 OC daily averages were below the MDL.

In addition to the carbon species EC, OC, and BC, the daily average file also includes daily average concentrations for the various estimated DPM concentrations defined as follows:

ECOCX	The EPA EC and OC data were collected using the NIOSH (Sunset Laboratory) method of thermal optical transmission (TOT). EPA also computed a value ECOCX intended to approximate the equivalent EC concentration based on thermal optical reflectance (TOR, as developed and applied by Desert Research Institute). This value is missing for non-EPA data.
ECTOR	EC value multiplied by TOR average correction factor (missing for EC measured using TOT).
ECTORH	EC value multiplied by TOR maximum correction factor (missing for EC measured using TOT).
ECTORL	EC value multiplied by TOR minimum correction factor (missing for EC measured using TOT).
ECTOT	EC value multiplied by TOT average correction factor (missing for EC measured using TOR).
ECTOTH	EC value multiplied by TOT maximum correction factor (missing for EC measured using TOR).
ECTOTL	EC value multiplied by TOR minimum correction factor (missing for EC measured using TOR).

EPATOR ECOCX value multiplied by TOR average correction factor (missing for non-EPA data).

EPATORH ECOCX value multiplied by TOR maximum correction factor (missing for non-EPA data).

EPATORL ECOCX value multiplied by TOR minimum correction factor (missing for non-EPA data).

In the concentration summary file, EC, OC, BC, and the above DPM estimates are all referred to as “SPECIES”.

The TOR and TOT (NIOSH) minimum, maximum, and average conversion factors are reported in Table 3-2 of Chapter 3 “Diesel Particulate Matter Conversion Factors.” The converted values estimate the diesel particulate matter (DPM) concentration. The applicable conversion factors depend upon the measurement method (TOR or TOT), whether the location is in the East or West US, whether the site is urban or rural, and the calendar quarter. For this calculation, sites with (signed) longitude less than –92° were treated as being in the West US. The Mississippi river roughly lies along the –92° longitude line. Sites were defined as urban or rural based on the NSATA assignment for the nearest census tract centroid; this assignment is given by the variable urbannear in the site summary file.

The sitesummary.final.dbf file contains summary information about the individual sites (identified by the source and site_id variables). The variables are listed in Table 2-2. Information includes: the city or county; state; latitude and longitude; first and last measurement dates for EC, BC, or OC (within the time frame starting January 1, 1994); method; ratios of EC, OC, sulfate and nitrate to PM2.5; location, distance, location type (urban or rural) and modeled concentration for the nearest modeled diesel PM2.5 concentration from NATA; location and modeled concentration for the maximum modeled diesel PM2.5 concentration from NATA within 30 km, if any; and the dominant source. Note that the maximum modeled value within 30 km is missing if there are no census tract centroids within 30 km. The method variable lists all methods used for that site (“Aethalometer” applies to all black carbon data, other methods apply to EC and OC).

The first set of analyses used the 1996 NSATA model predictions consistent with the year 2000 draft of the NONROAD model. The second set of analyses used 1996 NSATA model predictions consistent with the year 2002 draft of the NONROAD model: The earlier model’s ambient and background non-road components were both multiplied by 0.69 for every census tract. (since the 1996 national modeled NONROAD DPM was reduced by 31 % for the 2002 draft model). The values of the nearest modeled concentration and of the location and modeled value for the maximum modeled concentration within 30 km are each given separately for each version of the NONROAD model. The dominant source is defined for the 2000 NONROAD model only. If the total on-road modeled DPM is 50 % or greater of the total modeled DPM, the dominant source is “On-road.” If the total on-road modeled DPM is less than 25 % of the total modeled DPM, the dominant source is “Non-road.” Otherwise there is no dominant source.

The concsummary.final.dbf file contains summary statistics for the daily average concentration data by source and site, species (BC, EC, OC, ECOCX, ECTOR, ECTORL, ECTORH, ECTOT, ECTOTH, ECTOTL, EPATOR, EPATORL, EPATORH), year, calendar quarter, and weekday/weekend. The variables are listed in Table 2-3. Possible values of year are 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, and "All" (all years combined). Possible values of quarter are 1, 2, 3, 4, and "All" (all quarters, i.e., the entire year or years). Possible values of dayofweek are "Weekday" (Monday to Friday), "Weekend" (Saturday or Sunday), and "All." For example, overall averages for a site are obtained by considering year = quarter = dayofweek = "All." Summary statistics are available by year (including "All") and/or by quarter (including "All"). For the weekend/weekday split, separate weekend and weekday summary statistics are reported by year (including "All") or by quarter (including "All") but not for specific year and quarter combinations.

Table 2-1. Daily Average File (dailyavg.dbf)	
Variable	**Description**
Date	Date
Source	Data source (study)
Site_id	Site identifier
Citycounty	City or County
State	State
EC	Elemental carbon daily average
OC	Organic carbon daily average
BC	Black carbon daily average
ECOCX	Estimated EC by TOR (EPA data)
ECTOR	Average estimated DPM (TOR data)
ECTORH	Maximum estimated DPM (TOR data)
ECTORL	Minimum estimated DPM (TOR data)
ECTOT	Average estimated DPM (TOT data)
ECTOTH	Maximum estimated DPM (TOT data)
ECTOTL	Minimum estimated DPM (TOT data)
EPATOR	Average estimated DPM (EPA ECOCX data)
EPATORH	Maximum estimated DPM (EPA ECOCX data)
EPATORL	Minimum estimated DPM (EPA ECOCX data)
MinECMDL	Minimum EC MDL for date
MaxECMDL	Maximum EC MDL for date
MinOCMDL	Minimum OC MDL for date
MaxOCMDL	Maximum OC MDL for date
Sulfate	Sulfate daily average
Nitrate	Nitrate daily average
PM25	$PM_{2.5}$ daily average
Latitude	Latitude (degrees and fractions of a degree)
Longitude	Longitude (degrees and fractions of a degree)
Method	List of all measurement methods used on date, separated by semicolons.

Table 2-2. Site Summary File (sitesummary.dbf)	
Variable	**Description**
Source	Data source (study)
Site_id	Site identifier
Citycounty	City or County
State	State
Latitude	Latitude (degrees and fractions of a degree)
Longitude	Longitude (degrees and fractions of a degree)
MinECDate	First date with non-missing EC
MaxECDate	Last date with non-missing EC
MinBCDate	First date with non-missing BC
MaxBCDate	Last date with non-missing BEC
MinOCDate	First date with non-missing OC
MaxOCDate	Last date with non-missing OC
MinECMDL	Minimum EC MDL for site
MaxECMDL	Maximum EC MDL for site
MinOCMDL	Minimum OC MDL for site
MaxOCMDL	Maximum OC MDL for site
EC_PM25	Mean EC divided by mean $PM_{2.5}$ (for days when both were reported)
OC_PM25	Mean OC divided by mean $PM_{2.5}$ (for days when both were reported)
Sulf_PM25	Mean sulfate divided by mean $PM_{2.5}$ (for days when both were reported)
Nitr_PM25	Mean nitrate divided by mean $PM_{2.5}$ (for days when both were reported)
Method	List of all measurement methods used at site, separated by semicolons
Fipsmax	FIPS code for census tract centroid with maximum modeled DPM within 30 km (2000 NONROAD model)
Tractmax	Tract ID code for census tract centroid with maximum modeled DPM within 30 km (2000 NONROAD model)
Dist	Distance (km) to nearest census tract centroid

Table 2-2. Site Summary File (sitesummary.dbf)	
Variable	**Description**
Maxconc	Maximum modeled DPM within 30 km (2000 NONROAD model)
Concnear	Modeled DPM at nearest census tract centroid (2000 NONROAD model)
Fipsnear	FIPS code at nearest census tract centroid
Tractnear	Tract ID code at nearest census tract centroid
Urbannear	NSATA location type (U = urban, R = rural) at nearest census tract centroid
Fipsmax2	FIPS code for census tract centroid with maximum modeled DPM within 30 km (2002 NONROAD model)
Tractmax2	Tract ID code for census tract centroid with maximum modeled DPM within 30 km (2002 NONROAD model)
Maxconc2	Maximum modeled DPM within 30 km(2002 NONROAD model)
Concnear2	Modeled DPM at nearest census tract centroid (2002 NONROAD model)
Dominant	Dominant source: “Non-road,” “On-Road,” or “ ” (blank). Consistent with the 2000 NONROAD model.

Table 2-3. Concentration Summary File (concsummary.dbf)	
Variable	**Description**
Source	Data source (study)
Site_id	Site identifier
Year	Calendar year or “All”
Quarter	Calendar quarter or “All”
DayofWeek	“Weekday,” “Weekend,” or “All”
Species	EC, OC, BC, ECOCX, ECTOR, ECTORL, ECTORH, ECTOT, ECTOTH, ECTOTL, EPATOR, EPATORL, or EPATORH
N	Number of days
Mean	Arithmetic mean
Median	Median
Geommean	Geometric mean
Stddev	Standard deviation
Minimum	Minimum
Maximum	Maximum
Perc10	10th percentile
Perc20	20th percentile
Perc30	30th percentile
Perc40	40th percentile
Perc50	50th percentile
Perc60	60th percentile
Perc70	70th percentile
Perc80	80th percentile
Perc90	90th percentile

CHAPTER 3. DIESEL PARTICULATE MATTER CONVERSION FACTORS

This part of the effort was primarily carried out by the consulting firm dKC. We compiled "conversion factors" (CFs) for estimating ambient diesel particulate matter (DPM) based on elemental carbon (EC), organic carbon and $PM_{2.5}$ measurements. We attempted to collect information on CFs for black carbon (BC), but found none in the literature. See below for a discussion of the recommended treatment of the black carbon data. The CFs were collected from existing source apportionment and source-receptor model studies.

We received assistance from the following researchers to identify data sources: James Schauer (University of Wisconsin), Philip Hopke (Clarkston University), Alan Gertler (Desert Research Institute), and Steve Cadle (GM Research). Overall, we identified and compiled data on CFs from the following sources:

1. Zheng, Cass, Schauer et al (2002).
   Apportionments of PM2.5 (mass) and organic carbon in PM2.5 for 8 SE US sites: 4 urban, 3 rural and 1 suburban. Season: All 4 individually. Dr. Schauer also provided an elemental carbon breakdown by season (but not by site).

2. Ramadan, Song, and Hopke (2000).
   Apportionments of PM (mass) in Phoenix, AZ. Season: Annual Average.

3. Schauer et al (1996).
   Apportionments of primary fine organic aerosol and fine particulate mass concentrations for 4 urban sites in Southern California. Season: Annual Average.

4. Schauer and Cass (2000).
   Apportionments of primary fine organic aerosol and fine particulate mass concentrations for 3 sites in the Central Valley of California: 2 urban and 1 rural. Season: Winter

5. Watson, Fujita, Chow, Zielinska et al (1998).
   NFRAQS. This was the most comprehensive and current analysis of sources of ambient PM. Two techniques were used to apportion ambient PM: Conventional CMB and Extended Species CMB. Extended Species CMB breaks down gasoline vehicle emissions into 3 categories: cold start, hot transient, and high PM emitter (e.g. a vehicle with visible smoke). PM was apportioned into total carbon, organic carbon, elemental carbon and PM2.5. A total of 9 sites were evaluated: 3 urban, 4 rural, one suburban, and one to characterize regional transport. Two sites were used for the Extended Species CMB analysis: one rural and one urban. For the Extended Species CMB analysis, a temporal apportionment was done. Season: Winter

6. Air Improvement Resources (1997).
   Summary and analysis of available data on contribution of gasoline powered vehicles to ambient levels of fine particulate matter. Most of the data was covered

in Reference #3. Included projections of sources of fine carbonaceous PM. for 4 Southern California sites. Season: Annual Average.

7. Cass (1997).
   Summary and analysis of available data on contribution of motor vehicles to ambient levels of fine particulate matter. Most of the data was covered in Reference #3. Included projections of sources of elemental carbon for 3 Southern California sites. Season: Annual Average.

The numbering of these source apportionment study references is arbitrary but is retained here for consistency with the attached Excel spreadsheet.

Dr. Schauer noted that several important source apportionment studies are currently underway, and results should start being available in the next 6 months.

We compiled data on conversion factors (CFs) into an Excel spreadsheet provided to EPA. The spreadsheet contains a page for CFs from each reference. The following information was compiled for each data point:

- Year data were collected
- Site evaluated
- State data were collected
- Type of site: urban, rural, suburban (in some cases more specific types were used, e.g. rural down valley).
- Season data were collected
- Ambient Measurement Technique: Thermal optical transmission (TOT, also referred to as the NIOSH method, as developed by Sunset laboratories) or thermal optical reflectance (TOR, as developed and applied by Desert Research Institute, which was also used for the IMPROVE database and the Northern Front Range study).
- PM measurement parameter (organic carbon, elemental carbon, $PM_{2.5}$)
- Concentration apportioned to diesel powered engines
- Concentration apportioned to gasoline engine exhaust. *(One of the data sources, Northern Front Range Air Quality Study, had a breakdown of gasoline powered vehicle emissions into LDHV Cold Start, LDGV hot stabilized (warmed-up vehicle emissions, and LDGV high PM emitter)*
- Total concentration

- % of PM from diesel, for each measurement parameter This value was calculated for each site (in some cases, by season) as the ratio of the CMB estimated diesel fine particulate matter to the site average total fine particulate matter concentration. Both values were either reported in the source apportionment study report or were obtained directly from the researcher.

- Multiplicative conversion factor to convert total organic carbon (OC) or total elemental carbon (EC) concentration to diesel $PM_{2.5}$ concentration. Conversion factors (CFs) were calculated by dividing the diesel $PM_{2.5}$ concentration reported by the study by the total organic carbon or elemental carbon concentration reported by the study.

- Z factor: % of diesel $PM_{2.5}$ that is OC or EC. This was calculated by dividing the reported % of OC or EC that is from diesels by the CF calculated above. The % of diesel $PM_{2.5}$ that is OC or EC varied significantly for data based on the two measurement techniques: TOR or NIOSH.

The Z factor equals the OC or EC diesel $PM_{2.5}$ concentration divided by the total diesel $PM_{2.5}$ concentration. This factor can be compared with the measured OC or EC fraction in the associated diesel $PM_{2.5}$ source profile. For most of the studies, the diesel source profiles were not easily obtained. For reference 5 (NFRAQS), the calculated Z factor for EC is compared with the source profile Z factor in the attached spreadsheet. The calculated and source profile Z factors were quite close except for the Chatfield and Highlands sites. For consistency with the treatment of other studies, for all the NFRAQS sites (including Chatfield and Highlands) we used the multiplicative conversion factor defined above and did not correct for any differences between the calculated and source profile Z factors.

The originally proposed approach for this project was to compute the conversion factors as the percentages of diesel in $PM_{2.5}$ OC or EC (from CMB) divided by the source profile percentage of OC or EC in diesel $PM_{2.5}$ (i.e., divided by the source profile Z factor). This alternative approach gives almost the same results, as can be shown in the reference 5 worksheets, which demonstrate that the two methods give almost the same conversion factors for the NFRAQS sites, except for the Chatfield and Highlands sites. The method used here does not require the CMB study to provide a source apportionment of OC or EC (just the source apportionment for $PM_{2.5}$) and does not need the diesel source profile.

The spreadsheet also contains sheets that compile available data on the following:

- Organic Carbon (OC) conversion factors (conversion factors to convert total OC to diesel $PM_{2.5}$ concentration).

- Elemental Carbon (EC) conversion factors (conversion factors to convert total EC to diesel $PM_{2.5}$ concentration).

- Fraction of fine particulate mass attributed to diesels.

Table 3-1 presents the minimum, maximum, and average diesel fraction of $PM_{2.5}$ as a function of:

- Urban or rural
- Season
- East or West US

The reported minimum, maximum, and average values in Table 3-1 are the minima, maxima, and arithmetic means of the "% of PM from diesel" values across all sites (and seasons, where applicable) in the given site subset.

Table 3-2 presents the minimum, maximum, and average EC conversion factors as a function of:

- Measurement technique
- East or West US
- Season
- Urban or rural

The reported minimum, maximum, and average values in Table 3-2 are the minima, maxima, and arithmetic means of the EC conversion factors across all sites (and seasons, where applicable) in the given site subset. For the NIOSH (same as TOT) data collected in the East, the minimum, maximum, and average conversion factors are all equal. This is because these values were based only on the Zheng, Cass, Schauer, et al (2002) study. For this project, Dr, Schauer provided EC summary data from this study averaged over sites, by season. Hence only one value is available for NIOSH data for each season in the Eastern US.

Table 3-3 presents the minimum, maximum, and average OC conversion factors as a function of:

- Urban or rural
- Season
- East or West US

The reported minimum, maximum, and average values in Table 3-3 are the minima, maxima, and arithmetic means of the OC conversion factors across all sites (and seasons, where applicable) in the given site subset.

Black Carbon

Black carbon is measured on an "aethalometer," a measuring instrument developed by Magee Scientific. The following summary is taken from the "Aethalometer Book," by Hansen (2000).

> "The Aethalometer is an instrument that provides a real-time readout of the concentration of 'Black' or 'Elemental' carbon aerosol particles. (BC or EC). These particles ("soot") are emitted from all types of combustion, most notably from diesel exhaust. 'BC' is defined by blackness, an optical measurement. The Aethalometer uses an optical

measurement, and gives a continuous readout. The 'EC' definition is more common. It is based on a thermal-chemical measurement, an analysis of material collected on a filter sample for several hours and then sent to a laboratory. Research at Harvard showed that the Aethalometer BC measurement is directly related and equivalent to the filter-based EC measurement. In fact, an option in the software allows it to read out in EC units."

More details are given in the full document (Hansen, 2000) and in various references, including Allen et al (1999), Chow et al (1993), Hansen and Mc Murry (1990), and Liousse et al (1991).

On this basis, and because none of the source apportionment studies that we found used black carbon measurements, we recommend using the same conversion factors to convert BC and EC concentrations to diesel $PM_{2.5}$.

Recommendations

The final columns in Tables 3-2 and 3-3 give our recommendations for which minimum, maximum, and average EC and OC conversion factors should be applied to the database. For BC, the available data are more limited and we did not find any source apportionment studies based on BC measurements. OC is not as useful a surrogate for diesel PM as EC because diesel PM source profiles tend to contain much more EC than OC, on average, and because the diesel fraction in EC is typically estimated to be much higher than the diesel fraction in OC. For example, the NFRAQS study (Watson, Fujita, Chow, Zielinska, et al, 1998), determined that EC contains about 60 % diesel and OC contains about 8 % diesel. Therefore, EPA determined that only EC data be used for the model to monitor comparisons.

For EC, as shown in Table 3-2, available CF data based on the NIOSH (TOT) method in the East mainly allows a breakdown by season. There is not enough seasonal data to stratify by location type. The seasonal stratification in the East is based only on reference 1, which had data for January, April, July, August, and October only. Thus for the data in the East, the seasonal stratification is equivalent to a quarterly stratification: Winter = Quarter 1, Spring = Quarter 2, Summer = Quarter 3, Fall = Quarter 4. For the East US, we recommend using the EC conversion factors for each daily mean according to the calendar quarter (equivalently, the season). For the West US, the available data were collected at urban sites in Los Angeles and the season was not reported. Thus we suggest applying the same factors for all EC data collected in the West, regardless of location type. For observations based on the TOR method, we suggest that conversion factors be based on location type (urban or rural), regardless of season. This is due to an absence of TOR data from non-Winter observations. For BC, the approximate equivalence between EC and BC suggests using the same conversion factors as for EC.

For OC, separate conversion factors for TOR and TOT data were not computed, although they would be preferred due to the wide differences in the two measurement methods. For OC, as shown in Table 3-3, the data in the East is stratified by Urban or Rural location and by season, but the data in the West is only available for the winter season. The seasonal stratification in the East is based only on reference 1, which had data for January, April, July, August, and October only. Thus for the data in the East, the seasonal stratification is equivalent to a quarterly stratification: Winter = Quarter 1, Spring = Quarter 2, Summer = Quarter 3, Fall = Quarter 4. For

the East US, we recommend using the OC conversion factors for each daily mean according to the calendar quarter (equivalently, the season), and whether the site is urban or rural. For the West US at rural sites, only winter data are available for OC conversion factors, but at rural sites in the winter, the CF distributions for East and West are quite similar (the factors in the West are a little lower). On this basis, assuming the same applies to all seasons, we recommend applying the OC CF's for the seasonal/quarterly totals to the daily averages at West US rural sites in the first three quarters. For West US rural sites in the winter, i.e., Quarter 1, we recommend using the corresponding OC CF distribution. For urban sites, the winter CF distributions are very different between the East and West sites—the averages differ by a factor of about two—so this approach is not recommended. Instead, for West US urban sites, we recommend using the "Urban All" OC CF distribution since the uncertainty range is conservatively wide, the mean is close to the mean for West US urban sites, and the minimum is the same as the minimum for West US urban sites in the winter.

Table 3-1
Summary of Percent of Fine PM Apportioned to Diesels

Location type	Season	East or West	% Contribution From Diesels		
			Minimum*	Maximum*	Average*
Rural	Fall	East	8.9%	10.9%	9.8%
	Spring	East	11.4%	15.2%	12.9%
	Summer	East	7.5%	10.9%	8.7%
	Winter	East	10.0%	13.5%	12.1%
		West	2.7%	11.4%	5.9%
	Winter Total		2.7%	13.5%	7.8%
Rural Total			2.7%	15.2%	9.1%
Urban	All	West	12.7%	35.7%	21.2%
	Fall	East	7.5%	32.0%	20.7%
	Spring	East	10.1%	29.9%	19.8%
	Summer	East	9.6%	25.5%	14.8%
	Winter	East	17.0%	24.1%	21.2%
		West	5.3%	12.7%	9.4%
	Winter Total		5.3%	24.1%	13.3%
Urban Total			5.3%	35.7%	16.6%
Grand Total			2.7%	35.7%	13.9%

Notes:
* Minimum, maximum, or average value across all sites of the % contribution from diesel, which is defined as the ratio of the CMB estimate of diesel $PM_{2.5}$ divided by the total $PM_{2.5}$

Table 3-2
Summary of Calculated Elemental Carbon (EC) Conversion Factors
(Conversion factors to convert total EC to diesel $PM_{2.5}$ concentration)

Ambient Measurement Technique:TOR or NIOSH	East or West	Season	Location Type General	MIN*	MAX*	AVERAGE*	Recommended Conversion Factors	
							EAST	WEST
NIOSH	East	Fall (Q4)	Mixed	2.3	2.3	2.3	X	
	East	Spring (Q2)	Mixed	2.4	2.4	2.4	X	
	East	Summer (Q3)	Mixed	2.1	2.1	2.1	X	
	East	Winter (Q1)	Mixed	2.2	2.2	2.2	X	
	West	Unknown	Urban	1.2	2.4	1.6		X
NIOSH Total				1.2	2.4	2.0		
TOR	Winter		Rural	0.6	1.0	0.8	X	X
			Urban	0.5	1.0	0.7	X	X
	Winter Total			0.5	1.0	0.8		
TOR Total				0.5	1.0	0.8		
Grand Total				0.5	2.4	1.3		

Notes:
* Minimum, maximum, or average value across all sites of the estimated conversion factors.

Table 3
Summary of Calculated OC Conversion Factors
(Conversion factors to convert total OC to diesel $PM_{2.5}$ concentration)

Location Type General	Season	East or West	Calculated OC Conversion Factor			Recommended Conversion Factors	
			Minimum*	Maximum*	Maximum*	East	West
Rural	Fall	East	0.5	0.5	0.5	X	
	Fall Total		0.5	0.5	0.5		X
	Spring	East	0.5	1.3	0.8	X	
	Spring Total		0.5	1.3	0.8		X
	Summer	East	0.5	1.9	1.4	X	
	Summer Total		0.5	1.9	1.4		X
	Winter	East	0.4	0.5	0.5	X	
		West	0.2	0.5	0.4		X
	Winter Total		0.2	0.5	0.4		
Rural All			0.2	1.9	0.6		
Urban	All	West	0.6	1.3	0.9		
	All Total		0.6	1.3	0.9		
	Fall	East	0.9	1.3	1.0	X	
	Fall Total		0.9	1.3	1.0		
	Spring	East	0.9	2.0	1.3	X	
	Spring Total		0.9	2.0	1.3		
	Summer	East	1.0	1.9	1.5	X	
	Summer Total		1.0	1.9	1.5		
	Winter	East	0.4	0.8	0.6	X	
		West	0.2	0.5	0.4		
	Winter Total		0.2	0.8	0.5		
Urban All			0.2	2.0	0.9		X
All			0.2	2.0	0.8		

Notes:
* Minimum, maximum, or average value across all sites of the estimated conversion factors.

CHAPTER 4. MODEL-TO-MONITOR COMPARISONS

Using the CFs to convert the monitored EC values to estimated DPM concentrations, we compared differences between the monitored and modeled DPM values. For the modeled values, the NSATA predictions for 1996 using ASPEN (and CALPUFF, for the background) were used. We compared the monitored value to the NSATA prediction at the nearest ASPEN receptor site (census tract centroid). These comparisons were made for the original NSATA model predictions consistent with the draft 2000 NONROAD model ("concnear") and for the revised NSATA model predictions consistent with the draft 2002 NONROAD model ("concnear2") with non-road model predictions reduced to 69 % of their original value. We also compared the monitored value to the maximum NSATA prediction within 30 km. These comparisons were also made for the original NSATA model predictions consistent with the draft 2000 NONROAD model ("maxconc") and for the revised NSATA model predictions consistent with the draft 2002 NONROAD model ("maxconc2")

For the monitored value we separately analyzed the site means of DPM-high, DPM-low, and DPM-avg, as described above. The site means were computed by averaging all the daily averages (from January 1, 1994 onward), since there were insufficient data to restrict the monitored data to the modeling year 1996. The first set of comparisons used EC data collected by the TOR method only (average, minimum, and maximum DPM values ECTOR, ECTORL, and ECTORH respectively). The second set of comparisons used EC data collected by the TOT (NIOSH) method only (average, minimum, and maximum DPM values ECTOT, ECTOTL, and ECTOTH respectively). The third set of comparisons combined the EC data collected using the TOR method with the EPA ECOCX value (based on estimated TOR values). This set of average, minimum, and maximum DPM values are denoted by TOR, TORL, and TORH, respectively.

Each of these model-to-monitor comparisons were applied to the subsets of all locations, urban locations, and rural locations. Additionally, but only for the predictions consistent with the draft 2000 NONROAD model, we considered the subsets of sites with modeled DPM dominated by Non-road (at least 75 % non-road) or by On-road (at least 50 % on-road).

We compared the modeled and monitored results using:

- Scatterplots of modeled against monitored values that include fitted regression lines
- Tables summarizing the regression fits, average difference, and average percentage difference for the modeled values against the monitored values
- Tables summarizing the proportions of modeled values that were within 10%, 25%, 50%, and 100% of the monitored values

Table 4-1 summarizes each of the regressions. The modeled values are regressed against the average, maximum, and minimum "DPM monitored" values for each given data subset. The "DPM monitored" value is the EC value multiplied by the applicable conversion factor to convert it to the estimated DPM. Scatterplots are shown for a few representative cases. In each scatterplot, the fitted regression lines of the modeled values against the DPM monitored values. Each plot shows the modeled values plotted against the average, maximum, and minimum DPM monitored values for a given data subset. The three regression lines are shown together with the

Y=X line. The Y=X line has zero intercept and slope 1 and represents the ideal case where modeled and monitored values agree precisely. For easier comparison, the regressions have been numbered in Table 4-1, and those numbers are included in the Figure footnotes.

In some cases, all three regression lines intersect and have the same intercept (but different slopes). This occurs in cases where the same set of three conversion factor values apply at each monitored value in the data subset. In some cases there are some data points where all three DPM monitored values are identical, or almost identical. This is attributable to the fact that for NIOSH data in the East, the minimum, maximum, and average estimated CFs were identical for each season, and the seasonal values were almost identical, as shown in Table 3-2.

Table 4-1 presents the regression lines in tabular format. For each case is presented: the intercept, its standard error, the slope, its standard error, and the R squared goodness-of-fit statistic. Ideally the intercept should be close to zero and the slope should be close to 1. R squared values close to 1 indicate a good fit of the simple linear model and values close to zero indicate a poor fit.

Tables 4-2 to 4-4, respectively, show the monitored DPM values and nearest modeled value (consistent with the draft 2000 NONROAD model) for the TOR sites, for the TOT sites, and for the combination of the TOR sites and the EPA sites with the ECOCX data. These data were used for the "concnear" regressions (except that the TOR outlier value mentioned below was excluded from the regressions).

Table 4-5 presents the mean modeled and monitored values, the mean difference, the mean percentage difference, and the fractions of modeled values within 10 %, 25 %, 50 %, or 100 % of the monitored values. Ideally the mean differences and mean percentage differences should be close to zero and the fractions of modeled values within a small percentage of the modeled values should be close to one.

Review of preliminary scatterplots showed clearly that for the TOR data, there was one site with an extremely high modeled value that was greater than 12 ug/m3 compared to monitored DPM values close to 1 ug/m3. Other TOR modeled to monitor ratios were much lower. This obvious outlier value from the IMPROVE Washington DC site (WASH1) was removed from all these analyses although it was retained in the database.

Results

<u>TOR Regressions excluding EPA data</u>

The TOR comparisons excluding the EPA ECOCX data are based on only 15 monitoring sites and therefore are relatively less representative. As shown in Figure 4-1 (regressions 1, 19, and 37), for all sites combined, the regression line of the nearest modeled concentration against the DPM average is closest to the Y=X line but, as shown in Table 1, regression 1, the R squared value is 0.22, indicating a poor regression fit. The model tends to overpredict as shown by the fact that more of the values are above the Y=X line. The same analysis for rural sites only (regressions 2. 20, and 38) shows a better fit for the regression but a greater tendency to

overpredict, with slopes close to 2. There are too few urban TOR locations to properly evaluate this subset. There are also too few Non-road dominated locations (and zero on-road dominated locations) to compare the modeled and monitored data. Comparing Figure 4-2 to Figure 4-1, the regression model using the revised NONROAD model appears to fit slightly worse but the numerical differences are relatively small for most locations. The comparisons between the maximum modeled value within 30 km and the monitored values show that the monitored value is significantly over-predicted (e.g., see Figure 4-3).

TOT Regressions

The TOT comparisons are primarily based on the EPA PM speciation data producing a total of 95 monitored values for each of the DPM-minimum, DPM-maximum, and DPM-average. Figure 4 uses all these data. The best results are for the DPM-minimum case, with a R squared value of 0.17, an intercept of 1.52 and a slope of 0.72. Figure 4-4 shows that there are some monitored values that are significantly over-predicted and some monitored values that are significantly under-predicted. The results for the urban and rural subsets are similar although the model performance appears to be a little better for the rural sites. For the Non-road dominated sites, the regression model fits better than the all sites regression, but the monitored values are significantly overpredicted (the slope is 1.82 for the DPM-average, regression 58). There are not enough data points to properly evaluate the subset of On-road dominated sites. Comparing Figure 4-4 to Figure 4-5, the regression model using the revised NONROAD model appears to fit slightly better but the numerical differences are relatively small for most locations; the DPM-minimum predictions give the best model performance. Similarly to TOR, the comparisons between the maximum modeled value within 30 km and the monitored values show that the monitored value is significantly over-predicted.

TOR Regressions including EPA data

The TOR comparisons including the EPA ECOCX data are based on 88 monitoring sites. Of the three monitored DPM values, the best model performance is obtained for the DPM-average value, regression 127, with a slope of 0.91 and an intercept of 0.77 although the R squared value is only 0.12. (Figure 4-6). The regression results for the rural and urban subsets are very similar, but the regression fit is a little better for the rural subset. For the 18 Non-road dominated sites, the model performance is a bit worse than the performance for all sites. There are insufficiently many sites to evaluate the subset of on-road dominated sites. The numerical differences between the 2000 and 2002 models are relatively small for most locations and the model performance is very similar. (Using the revised model the R squared values are slightly higher, the intercept is closer to zero, but the slope is further from 1). The comparisons between the maximum modeled value within 30 km and the monitored values show that the monitored value is significantly over-predicted.

Differences and percentage differences

The following table extracted from Table 4-5 summarizes the differences and percentage differences between the nearest modeled value and the monitored values. The ECTOR outlier value for the IMPROVE Washington DC site is excluded from these calculations.

Summary of differences between the nearest modeled concentration and the monitored values.

Modeled Variable[1]	Monitored Variable[2]	N	Mean Modeled Value	Mean Monitored Value	Mean Difference	Mean % Difference	Fraction of Modeled Values Within			
							10%	25%	50%	100%
concnear	ECTOR	15	1.56	0.94	0.63	100	0.07	0.13	0.53	0.53
concnear2	ECTOR	15	1.20	0.94	0.26	56	0.07	0.13	0.47	0.60
concnear	ECTORH	15	1.56	1.16	0.40	62	0.00	0.07	0.40	0.60
concnear2	ECTORH	15	1.20	1.16	0.04	26	0.00	0.07	0.33	0.73
concnear	ECTORL	15	1.56	0.64	0.92	190	0.13	0.40	0.47	0.53
concnear2	ECTORL	15	1.20	0.64	0.55	126	0.07	0.33	0.47	0.53
concnear	ECTOT	95	2.61	1.73	0.88	80	0.12	0.21	0.45	0.68
concnear2	ECTOT	95	2.05	1.73	0.32	42	0.11	0.37	0.53	0.77
concnear	ECTOTH	95	2.61	2.10	0.52	61	0.11	0.22	0.46	0.74
concnear2	ECTOTH	95	2.05	2.10	-0.05	27	0.11	0.35	0.53	0.80
concnear	ECTOTL	95	2.61	1.52	1.09	101	0.09	0.17	0.43	0.63
concnear2	ECTOTL	95	2.05	1.52	0.52	58	0.09	0.32	0.52	0.72
concnear	TOR	88	2.31	1.70	0.61	47	0.10	0.30	0.59	0.78
concnear2	TOR	88	1.81	1.70	0.11	15	0.17	0.30	0.59	0.85
concnear	TORH	88	2.31	2.23	0.08	13	0.11	0.26	0.60	0.84
concnear2	TORH	88	1.81	2.23	-0.42	-12	0.08	0.22	0.52	0.92
concnear	TORL	88	2.31	1.19	1.12	110	0.10	0.26	0.41	0.65
concnear2	TORL	88	1.81	1.19	0.62	65	0.14	0.31	0.52	0.74

Notes:

3. Modeled variable:

concnear — Nearest modeled DPM concentration consistent with the draft 2000 NONROAD Model

concnear2 — Nearest modeled DPM concentration consistent with the draft 2002 NONROAD Model

4. Monitored variable:

ECTOR — EC value multiplied by TOR average correction factor (missing for EC measured using TOT).

ECTORH — EC value multiplied by TOR maximum correction factor (missing for EC measured using TOT).

ECTORL — EC value multiplied by TOR minimum correction factor (missing for EC measured using TOT).

ECTOT — EC value multiplied by TOT average correction factor (missing for EC measured using TOR).

ECTOTH — EC value multiplied by TOT maximum correction factor (missing for EC measured using TOR).

ECTOTL — EC value multiplied by TOR minimum correction factor (missing for EC measured using TOR).

TOR — ECOCX value multiplied by TOT average correction factor for EPA data, ECTOR for TOR data.

TORH — ECOCX value multiplied by TOT maximum correction factor for EPA data, ECTOR for TOR data..

TORL — ECOCX value multiplied by TOR minimum correction factor for EPA data, ECTOR for TOR data.

Tables 4-2 to 4-4 show the monitored and modeled (nearest tract, DPM modeled values consistent with the draft 2000 NONROAD model) DPM values. In most cases the modeled values are within at most a factor of 2 of the monitored values.

Table 4-5 summarizes the differences and percentage differences between all the sets of modeled and monitored values. The ECTOR outlier value for the IMPROVE Washington DC site is excluded from these calculations.

For the TOR comparisons excluding the EPA ECOCX data, the best model performance based on the mean percentage difference and based on the fraction of modeled values within 100 % of the monitored value is for the DPM-maximum value consistent with the 2002 NONROAD model. For all 15 sites the mean percentage difference is 26 % and the fraction of modeled values within 100 % of the monitored value is 73 %. This fraction would have been 69 % including the outlier. For the 10 rural sites the mean percentage difference is 20 % and the fraction of modeled values within 100 % of the monitored value is 70 %. For the 5 urban sites the mean percentage difference is 39 % and the fraction of modeled values within 100 % of the monitored value is 80 %. Interestingly, this finding is different to the regression analyses which found the model performance to be slightly worse with the modeled value consistent with the revised NONROAD model and better using the DPM-average monitored values.

For the TOT comparisons, the best model performance based on the mean percentage difference and based on the fraction of modeled values within 100 % of the monitored value is also for the DPM-maximum value consistent with the 2002 NONROAD model. (The results for the subset of On-road dominated sites are even better, but are based on only 6 monitors) For all 95 sites the mean percentage difference is 27 % and the fraction of modeled values within 100 % of the monitored value is 80 %. For the 30 rural sites the mean percentage difference is 16 % and the fraction of modeled values within 100 % of the monitored value is 80 %. For the 65 urban sites the mean percentage difference is 32 % and the fraction of modeled values within 100 % of the monitored value is 80 %.

For the TOR comparisons including the EPA ECOCX data, the best model performance based on the mean percentage difference and based on the fraction of modeled values within 100 % of the monitored value is also for the DPM-maximum value using the 2002 NONROAD model. For all 88 sites the mean percentage difference is -12 % and the fraction of modeled values within 100 % of the monitored value is 92 %. For the 30 rural sites the mean percentage difference is 6 % and the fraction of modeled values within 100 % of the monitored value is 87 %. For the 58 urban sites the mean percentage difference is -14 % and the fraction of modeled values within 100 % of the monitored value is 95 %.

Discussion

The model performance evaluation based on the regression models leads to different conclusions than the model performance evaluation based on the differences. One primary reason is that the regression analyses are more influenced by the extreme values. For most purposes the analysis of the differences is more useful, especially since all of the regression models fitted relatively poorly (except for those with only 2 data points). The best model performance based on the mean

percentage difference and based on the fraction of modeled values within 100 % of the monitored value is for the DPM-maximum value consistent with the 2002 NONROAD model. The corresponding fractions of modeled values within 100 % of the monitored value are 73 % for all TOR sites excluding the EPA ECOCX data, 80 % for all TOT sites, and 92 % for all TOR sites including the EPA ECOCX data. As discussed in Chapter 1, this performance compares favorably with the model to monitor results for the other pollutants assessed in the NSATA, except for benzene.

Table 4-1. Regression models for modeled against monitored DPM concentrations.

Number	Modeled Variable[1]	Monitored Variable[2]	Subset[3]	Location	N	Intercept	Intercept Standard Error	Slope	Slope Standard Error	R Squared
1	concnear	ECTOR	All	All	15	0.80	0.49	0.81	0.42	0.22
2	concnear	ECTOR	All	Rural	10	0.04	0.61	1.57	0.59	0.47
3	concnear	ECTOR	All	Urban	5	1.78	0.74	0.07	0.55	0.01
4	concnear	ECTOR	Non-road	All	4	1.99	2.22	0.39	1.20	0.05
5	concnear	ECTOR	Non-road	Rural	2	-2.37	.	3.20	.	1.00
6	concnear	ECTOR	Non-road	Urban	2	3.71	.	-0.64	.	1.00
7	concnear2	ECTOR	All	All	15	0.67	0.36	0.56	0.31	0.20
8	concnear2	ECTOR	All	Rural	10	0.14	0.45	1.07	0.43	0.44
9	concnear2	ECTOR	All	Urban	5	1.39	0.56	0.04	0.41	0.00
10	maxconc	ECTOR	All	All	14	3.40	1.33	1.41	1.12	0.12
11	maxconc	ECTOR	All	Rural	9	2.24	1.95	2.16	1.79	0.17
12	maxconc	ECTOR	All	Urban	5	4.91	2.16	0.75	1.60	0.07
13	maxconc	ECTOR	Non-road	All	4	4.45	2.07	1.32	1.12	0.41
14	maxconc	ECTOR	Non-road	Rural	2	7.60	.	0.00	.	.
15	maxconc	ECTOR	Non-road	Urban	2	2.23	.	1.98	.	1.00
16	maxconc2	ECTOR	All	All	14	2.49	0.94	0.98	0.79	0.11
17	maxconc2	ECTOR	All	Rural	9	1.66	1.38	1.50	1.26	0.17
18	maxconc2	ECTOR	All	Urban	5	3.57	1.49	0.51	1.10	0.07
19	concnear	ECTORH	All	All	15	0.89	0.48	0.58	0.33	0.19
20	concnear	ECTORH	All	Rural	10	0.04	0.61	1.37	0.51	0.47
21	concnear	ECTORH	All	Urban	5	1.78	0.74	0.05	0.39	0.01
22	concnear	ECTORH	Non-road	All	4	2.28	2.12	0.17	0.89	0.02
23	concnear	ECTORH	Non-road	Rural	2	-2.37	.	2.80	.	1.00
24	concnear	ECTORH	Non-road	Urban	2	3.71	.	-0.46	.	1.00
25	concnear2	ECTORH	All	All	15	0.73	0.35	0.40	0.24	0.18
26	concnear2	ECTORH	All	Rural	10	0.14	0.45	0.94	0.38	0.44
27	concnear2	ECTORH	All	Urban	5	1.39	0.56	0.03	0.30	0.00
28	maxconc	ECTORH	All	All	14	3.45	1.27	1.10	0.84	0.12
29	maxconc	ECTORH	All	Rural	9	2.24	1.95	1.89	1.56	0.17
30	maxconc	ECTORH	All	Urban	5	4.91	2.16	0.54	1.15	0.07
31	maxconc	ECTORH	Non-road	All	4	4.90	2.12	0.82	0.89	0.30
32	maxconc	ECTORH	Non-road	Rural	2	7.60	.	0.00	.	.
33	maxconc	ECTORH	Non-road	Urban	2	2.23	.	1.42	.	1.00

Table 4-1. Regression models for modeled against monitored DPM concentrations.

Number	Modeled Variable[1]	Monitored Variable[2]	Subset[3]	Location	N	Intercept	Intercept Standard Error	Slope	Slope Standard Error	R Squared
34	maxconc2	ECTORH	All	All	14	2.52	0.89	0.77	0.59	0.12
35	maxconc2	ECTORH	All	Rural	9	1.66	1.38	1.31	1.10	0.17
36	maxconc2	ECTORH	All	Urban	5	3.57	1.49	0.37	0.79	0.07
37	concnear	ECTORL	All	All	15	0.82	0.49	1.15	0.61	0.21
38	concnear	ECTORL	All	Rural	10	0.04	0.61	2.33	0.87	0.47
39	concnear	ECTORL	All	Urban	5	1.78	0.74	0.10	0.77	0.01
40	concnear	ECTORL	Non-road	All	4	2.07	2.20	0.49	1.71	0.04
41	concnear	ECTORL	Non-road	Rural	2	-2.37	.	4.75	.	1.00
42	concnear	ECTORL	Non-road	Urban	2	3.71	.	-0.90	.	1.00
43	concnear2	ECTORL	All	All	15	0.69	0.35	0.79	0.45	0.19
44	concnear2	ECTORL	All	Rural	10	0.14	0.45	1.59	0.64	0.44
45	concnear2	ECTORL	All	Urban	5	1.39	0.56	0.06	0.58	0.00
46	maxconc	ECTORL	All	All	14	3.40	1.32	2.05	1.60	0.12
47	maxconc	ECTORL	All	Rural	9	2.24	1.95	3.20	2.65	0.17
48	maxconc	ECTORL	All	Urban	5	4.91	2.16	1.05	2.25	0.07
49	maxconc	ECTORL	Non-road	All	4	4.57	2.09	1.80	1.63	0.38
50	maxconc	ECTORL	Non-road	Rural	2	7.60	.	0.00	.	.
51	maxconc	ECTORL	Non-road	Urban	2	2.23	.	2.79	.	1.00
52	maxconc2	ECTORL	All	All	14	2.49	0.93	1.42	1.12	0.12
53	maxconc2	ECTORL	All	Rural	9	1.66	1.38	2.23	1.87	0.17
54	maxconc2	ECTORL	All	Urban	5	3.57	1.49	0.72	1.56	0.07
55	concnear	ECTOT	All	All	95	1.74	0.32	0.51	0.14	0.12
56	concnear	ECTOT	All	Rural	30	1.26	0.43	0.54	0.23	0.16
57	concnear	ECTOT	All	Urban	65	2.05	0.43	0.45	0.18	0.09
58	concnear	ECTOT	Non-road	All	19	1.60	1.31	1.82	0.59	0.36
59	concnear	ECTOT	Non-road	Rural	7	0.69	2.18	2.16	1.38	0.33
60	concnear	ECTOT	Non-road	Urban	12	2.31	1.98	1.61	0.79	0.29
61	concnear	ECTOT	On-road	All	6	1.48	0.45	0.21	0.18	0.25
62	concnear	ECTOT	On-road	Rural	2	1.43	.	0.47	.	1.00
63	concnear	ECTOT	On-road	Urban	4	1.24	0.74	0.25	0.26	0.32
64	concnear2	ECTOT	All	All	95	1.37	0.23	0.39	0.10	0.13
65	concnear2	ECTOT	All	Rural	30	0.96	0.31	0.43	0.17	0.19
66	concnear2	ECTOT	All	Urban	65	1.63	0.31	0.34	0.13	0.10

Table 4-1. Regression models for modeled against monitored DPM concentrations.

Number	Modeled Variable[1]	Monitored Variable[2]	Subset[3]	Location	N	Intercept	Intercept Standard Error	Slope	Slope Standard Error	R Squared
67	maxconc	ECTOT	All	All	95	4.67	4.84	7.91	2.15	0.13
68	maxconc	ECTOT	All	Rural	30	-0.35	2.22	5.49	1.22	0.42
69	maxconc	ECTOT	All	Urban	65	8.85	7.13	7.73	2.95	0.10
70	maxconc	ECTOT	Non-road	All	19	-4.24	26.43	27.11	11.98	0.23
71	maxconc	ECTOT	Non-road	Rural	7	-4.39	7.71	9.05	4.87	0.41
72	maxconc	ECTOT	Non-road	Urban	12	27.73	40.39	19.83	16.17	0.13
73	maxconc	ECTOT	On-road	All	6	3.39	1.46	0.74	0.59	0.2783
74	maxconc	ECTOT	On-road	Rural	2	2.11	.	2.06	.	1.0000
75	maxconc	ECTOT	On-road	Urban	4	3.17	2.51	0.75	0.88	0.2660
76	maxconc2	ECTOT	All	All	95	3.45	3.37	5.52	1.50	0.1271
77	maxconc2	ECTOT	All	Rural	30	-0.09	1.54	3.88	0.84	0.4317
78	maxconc2	ECTOT	All	Urban	65	6.37	4.96	5.38	2.05	0.0981
79	concnear	ECTOTH	All	All	95	2.01	0.30	0.29	0.10	0.0792
80	concnear	ECTOTH	All	Rural	30	1.48	0.40	0.30	0.16	0.1058
81	concnear	ECTOTH	All	Urban	65	2.32	0.40	0.26	0.13	0.0598
82	concnear	ECTOTH	Non-road	All	19	2.07	1.36	1.35	0.53	0.2792
83	concnear	ECTOTH	Non-road	Rural	7	2.64	2.85	0.65	1.42	0.0398
84	concnear	ECTOTH	Non-road	Urban	12	2.65	1.81	1.30	0.63	0.2986
85	concnear	ECTOTH	On-road	All	6	1.56	0.44	0.12	0.12	0.2004
86	concnear	ECTOTH	On-road	Rural	2	1.59	.	0.26	.	1.0000
87	concnear	ECTOTH	On-road	Urban	4	1.36	0.74	0.15	0.18	0.2537
88	concnear2	ECTOTH	All	All	95	1.57	0.22	0.23	0.07	0.0903
89	concnear2	ECTOTH	All	Rural	30	1.14	0.29	0.24	0.12	0.1300
90	concnear2	ECTOTH	All	Urban	65	1.83	0.29	0.20	0.09	0.0666
91	maxconc	ECTOTH	All	All	95	9.11	4.55	4.41	1.56	0.0793
92	maxconc	ECTOTH	All	Rural	30	1.06	2.11	3.54	0.84	0.3864
93	maxconc	ECTOTH	All	Urban	65	14.11	6.62	4.15	2.14	0.0564
99	maxconc	ECTOTH	Non-road	All	19	19.34	28.55	12.94	11.05	0.0746
95	maxconc	ECTOTH	Non-road	Rural	7	1.75	10.41	3.80	5.19	0.0970
96	maxconc	ECTOTH	Non-road	Urban	12	53.90	39.14	7.31	13.65	0.0279
97	maxconc	ECTOTH	On-road	All	6	3.66	1.41	0.44	0.40	0.2261
98	maxconc	ECTOTH	On-road	Rural	2	2.80	.	1.14	.	1.0000
99	maxconc	ECTOTH	On-road	Urban	4	3.53	2.48	0.43	0.61	0.2002

Table 4-1. Regression models for modeled against monitored DPM concentrations.

Number	Modeled Variable[1]	Monitored Variable[2]	Subset[3]	Location	N	Intercept	Intercept Standard Error	Slope	Slope Standard Error	R Squared
100	maxconc2	ECTOTH	All	All	95	6.54	3.17	3.08	1.09	0.0796
101	maxconc2	ECTOTH	All	Rural	30	0.90	1.46	2.50	0.58	0.3952
102	maxconc2	ECTOTH	All	Urban	65	10.03	4.61	2.89	1.49	0.0563
103	concnear	ECTOTL	All	All	95	1.52	0.33	0.72	0.17	0.1573
104	concnear	ECTOTL	All	Rural	30	1.01	0.44	0.85	0.30	0.2227
105	concnear	ECTOTL	All	Urban	65	1.85	0.45	0.62	0.22	0.1171
106	concnear	ECTOTL	Non-road	All	19	1.92	1.23	1.83	0.61	0.3485
107	concnear	ECTOTL	Non-road	Rural	7	0.59	1.50	2.65	1.09	0.5400
108	concnear	ECTOTL	Non-road	Urban	12	2.74	2.03	1.52	0.87	0.2333
109	concnear	ECTOTL	On-road	All	6	1.39	0.47	0.33	0.25	0.3061
110	concnear	ECTOTL	On-road	Rural	2	1.14	.	0.86	.	1.0000
111	concnear	ECTOTL	On-road	Urban	4	1.11	0.74	0.40	0.34	0.4095
112	concnear2	ECTOTL	All	All	95	1.21	0.24	0.55	0.13	0.1719
113	concnear2	ECTOTL	All	Rural	30	0.77	0.32	0.67	0.21	0.2580
114	concnear2	ECTOTL	All	Urban	65	1.48	0.33	0.47	0.16	0.1250
115	maxconc	ECTOTL	All	All	95	1.02	4.99	11.38	2.61	0.1696
116	maxconc	ECTOTL	All	Rural	30	-1.52	2.37	7.43	1.60	0.4350
117	maxconc	ECTOTL	All	Urban	65	4.54	7.38	11.25	3.55	0.1373
118	maxconc	ECTOTL	Non-road	All	19	-10.13	23.05	33.26	11.34	0.3360
119	maxconc	ECTOTL	Non-road	Rural	7	-3.85	5.39	10.36	3.92	0.5827
120	maxconc	ECTOTL	Non-road	Urban	12	14.93	37.64	27.43	16.14	0.2242
121	maxconc	ECTOTL	On-road	All	6	3.06	1.49	1.15	0.80	0.3415
122	maxconc	ECTOTL	On-road	Rural	2	0.83	.	3.76	.	1.0000
123	maxconc	ECTOTL	On-road	Urban	4	2.73	2.51	1.20	1.16	0.3499
124	maxconc2	ECTOTL	All	All	95	0.91	3.47	7.94	1.82	0.1701
125	maxconc2	ECTOTL	All	Rural	30	-0.93	1.64	5.25	1.11	0.4462
126	maxconc2	ECTOTL	All	Urban	65	3.37	5.14	7.83	2.47	0.1372
127	concnear	TOR	All	All	88	0.77	0.48	0.91	0.27	0.1177
128	concnear	TOR	All	Rural	30	0.34	0.66	1.06	0.37	0.2286
129	concnear	TOR	All	Urban	58	1.26	0.73	0.68	0.40	0.0483
130	concnear	TOR	Non-road	All	18	2.04	1.65	1.06	0.83	0.0920
131	concnear	TOR	Non-road	Rural	9	0.60	2.48	1.57	1.24	0.1861
132	concnear	TOR	Non-road	Urban	9	2.93	2.39	0.82	1.22	0.0606

Table 4-1. Regression models for modeled against monitored DPM concentrations.

Number	Modeled Variable[1]	Monitored Variable[2]	Subset[3]	Location	N	Intercept	Intercept Standard Error	Slope	Slope Standard Error	R Squared
133	concnear	TOR	On-road	All	5	1.82	1.67	-0.03	0.84	0.0006
134	concnear	TOR	On-road	Rural	2	1.20	.	0.40	.	1.0000
135	concnear	TOR	On-road	Urban	3	8.23	1.20	-3.52	0.63	0.9688
136	concnear2	TOR	All	All	88	0.63	0.36	0.69	0.20	0.1228
137	concnear2	TOR	All	Rural	30	0.29	0.47	0.80	0.26	0.2455
138	concnear2	TOR	All	Urban	58	1.02	0.55	0.52	0.30	0.0497
139	maxconc	TOR	All	All	87	-3.38	9.21	10.46	5.06	0.0478
140	maxconc	TOR	All	Rural	29	0.28	2.85	3.58	1.57	0.1616
141	maxconc	TOR	All	Urban	58	-9.75	15.68	16.33	8.62	0.0603
142	maxconc	TOR	Non-road	All	18	-0.95	38.73	20.74	19.53	0.0659
143	maxconc	TOR	Non-road	Rural	9	0.93	8.62	4.03	4.30	0.1118
144	maxconc	TOR	Non-road	Urban	9	-0.16	58.79	36.94	29.99	0.1781
145	maxconc	TOR	On-road	All	5	4.40	5.46	-0.02	2.74	0.0000
146	maxconc	TOR	On-road	Rural	2	1.10	.	1.75	.	1.0000
147	maxconc	TOR	On-road	Urban	3	26.79	3.66	-11.99	1.93	0.9748
148	maxconc2	TOR	All	All	87	-2.27	6.41	7.35	3.53	0.0486
149	maxconc2	TOR	All	Rural	29	0.20	1.99	2.60	1.09	0.1729
150	maxconc2	TOR	All	Urban	58	-6.62	10.92	11.39	6.00	0.0604
151	concnear	TORH	All	All	88	0.79	0.48	0.68	0.20	0.1183
152	concnear	TORH	All	Rural	30	0.34	0.66	0.92	0.32	0.2286
153	concnear	TORH	All	Urban	58	1.26	0.73	0.49	0.29	0.0483
154	concnear	TORH	Non-road	All	18	1.94	1.57	0.88	0.62	0.1103
155	concnear	TORH	Non-road	Rural	9	0.60	2.48	1.37	1.08	0.1861
156	concnear	TORH	Non-road	Urban	9	2.93	2.39	0.59	0.88	0.0606
157	concnear	TORH	On-road	All	5	2.54	1.71	-0.31	0.67	0.0667
158	concnear	TORH	On-road	Rural	2	1.20	.	0.35	.	1.0000
159	concnear	TORH	On-road	Urban	3	8.23	1.20	-2.53	0.45	0.9688
160	concnear2	TORH	All	All	88	0.63	0.36	0.53	0.15	0.1272
161	concnear2	TORH	All	Rural	30	0.29	0.47	0.70	0.23	0.2455
162	concnear2	TORH	All	Urban	58	1.02	0.55	0.37	0.22	0.0497
163	maxconc	TORH	All	All	87	-7.19	8.94	9.67	3.74	0.0728
164	maxconc	TORH	All	Rural	29	0.28	2.85	3.13	1.37	0.1616
165	maxconc	TORH	All	Urban	58	-9.75	15.68	11.73	6.19	0.0603

Table 4-1. Regression models for modeled against monitored DPM concentrations.

Number	Modeled Variable[1]	Monitored Variable[2]	Subset[3]	Location	N	Intercept	Intercept Standard Error	Slope	Slope Standard Error	R Squared
166	maxconc	TORH	Non-road	All	18	-20.88	35.28	24.86	14.00	0.1648
167	maxconc	TORH	Non-road	Rural	9	0.93	8.62	3.52	3.75	0.1118
168	maxconc	TORH	Non-road	Urban	9	-0.16	58.79	26.55	21.56	0.1781
169	maxconc	TORH	On-road	All	5	5.68	5.73	-0.52	2.24	0.0179
170	maxconc	TORH	On-road	Rural	2	1.10	.	1.53	.	1.0000
171	maxconc	TORH	On-road	Urban	3	26.79	3.66	-8.62	1.39	0.9748
172	maxconc2	TORH	All	All	87	-4.91	6.23	6.78	2.61	0.0737
173	maxconc2	TORH	All	Rural	29	0.20	1.99	2.27	0.96	0.1729
174	maxconc2	TORH	All	Urban	58	-6.62	10.92	8.18	4.31	0.0604
175	concnear	TORL	All	All	88	0.75	0.48	1.31	0.38	0.1194
176	concnear	TORL	All	Rural	30	0.34	0.66	1.57	0.54	0.2286
177	concnear	TORL	All	Urban	58	1.26	0.73	0.95	0.56	0.0483
178	concnear	TORL	Non-road	All	18	1.98	1.64	1.57	1.19	0.0982
179	concnear	TORL	Non-road	Rural	9	0.60	2.48	2.32	1.83	0.1861
180	concnear	TORL	Non-road	Urban	9	2.93	2.39	1.15	1.72	0.0606
181	concnear	TORL	On-road	All	5	2.01	1.73	-0.19	1.25	0.0073
182	concnear	TORL	On-road	Rural	2	1.20	.	0.59	.	1.0000
183	concnear	TORL	On-road	Urban	3	8.23	1.20	-4.96	0.89	0.9688
184	concnear2	TORL	All	All	88	0.62	0.36	1.01	0.29	0.1256
185	concnear2	TORL	All	Rural	30	0.29	0.47	1.18	0.39	0.2455
186	concnear2	TORL	All	Urban	58	1.02	0.55	0.73	0.43	0.0497
187	maxconc	TORL	All	All	87	-4.70	9.19	16.08	7.24	0.0549
188	maxconc	TORL	All	Rural	29	0.28	2.85	5.30	2.32	0.1616
189	maxconc	TORL	All	Urban	58	-9.75	15.68	22.99	12.13	0.0603
190	maxconc	TORL	Non-road	All	18	-7.20	38.11	34.83	27.75	0.0896
191	maxconc	TORL	Non-road	Rural	9	0.93	8.62	5.98	6.37	0.1118
192	maxconc	TORL	Non-road	Urban	9	-0.16	58.79	52.01	42.24	0.1781
193	maxconc	TORL	On-road	All	5	4.73	5.66	-0.27	4.09	0.0014
194	maxconc	TORL	On-road	Rural	2	1.10	.	2.59	.	1.0000
195	maxconc	TORL	On-road	Urban	3	26.79	3.66	-16.88	2.72	0.9748
196	maxconc2	TORL	All	All	87	-3.19	6.40	11.29	5.04	0.0557
197	maxconc2	TORL	All	Rural	29	0.20	1.99	3.86	1.62	0.1729
198	maxconc2	TORL	All	Urban	58	-6.62	10.92	16.04	8.45	0.0604

Notes for Table 4-1:

1. Modeled variable:

concnear	Nearest modeled DPM concentration consistent with the draft 2000 NONROAD Model
concnear2	Nearest modeled DPM concentration consistent with the draft 2002 NONROAD Model
maxconc	Nearby (within 30 km) maximum modeled DPM concentration consistent with the draft 2000 NONROAD Model
maxconc2	Nearby (within 30 km) maximum modeled DPM concentration consistent with the draft 2002 NONROAD Model

2. Monitored variable:

ECTOR	EC value multiplied by TOR average correction factor (missing for EC measured using TOT).
ECTORH	EC value multiplied by TOR maximum correction factor (missing for EC measured using TOT).
ECTORL	EC value multiplied by TOR minimum correction factor (missing for EC measured using TOT).
ECTOT	EC value multiplied by TOT average correction factor (missing for EC measured using TOR).
ECTOTH	EC value multiplied by TOT maximum correction factor (missing for EC measured using TOR).
ECTOTL	EC value multiplied by TOR minimum correction factor (missing for EC measured using TOR).
TOR	ECOCX value multiplied by TOT average correction factor for EPA data, ECTOR for TOR data.
TORH	ECOCX value multiplied by TOT maximum correction factor for EPA data, ECTOR for TOR data..
TORL	ECOCX value multiplied by TOR minimum correction factor for EPA data, ECTOR for TOR data.

3. Subset:

All	All sites
Non-road	Sites dominated by Non-road source (at least 75 % of modeled DPM consistent with the draft 2000 NONROAD Model)
On-road	Sites dominated by On-road source (at least 50 % of modeled DPM consistent with the draft 2000 NONROAD Model)

Table 4-2. Nearest modeled concentration and ECTOR, ECTORL, and ECTORH monitored values for each site.

City / County[1]	State[1]	Nearest Modeled Concentration[2]	Urban or Rural	Subset[3]	ECTOR[4]	ECTORL[4]	ECTORH[4]
Oceanville	NJ	2.032	R		0.435755	0.294003	0.498756
Seattle	WA	3.2264	U	Non-road	0.75129	0.533525	1.045273
Shenandoah National Park	VA	0.9612	R		0.308284	0.207999	0.352855
Lake Tahoe	NV	0.6111	R		0.942438	0.635862	1.078694
Washington DC	DC	12.263	R	Non-road	1.01273	0.683288	1.159149
Yellowstone National Park	WY	0.0548	R		0.106637	0.071948	0.122055
Denver	CO	0.7626	R	Non-road	0.978226	0.660008	1.119656
Denver	CO	1.9723	U	Non-road	2.711257	1.925386	3.772184
Denver	CO	1.5939	U		0.452586	0.321402	0.629685
Denver	CO	0.7304	R		1.330274	0.897534	1.522603
Denver	CO	0.7953	U		0.820571	0.582724	1.141664
Denver	CO	2.5918	R		0.815005	0.549883	0.932837
Denver	CO	1.6963	U		0.593728	0.421633	0.826056
Denver	CO	1.3913	R		1.065238	0.718715	1.219248
Denver	CO	0.4174	R		0.560907	0.378443	0.642002
Denver	CO	4.5809	R	Non-road	2.16979	1.463955	2.483495

Notes for Table 4-2:

1. City / county and State may appear multiple times if there are several different monitoring sites at that general location.
2. Modeled variable = "concnear" Nearest modeled DPM concentration consistent with the draft 2000 NONROAD Model
3. Subset:

Non-road Sites dominated by Non-road source (at least 75 % of modeled DPM consistent with the draft 2000 NONROAD Model)

On-road Sites dominated by On-road source (at least 50 % of modeled DPM consistent with the draft 2000 NONROAD Model)

4. Monitored variable:

ECTOR EC value multiplied by TOR average correction factor (missing for EC measured using TOT).
ECTORH EC value multiplied by TOR maximum correction factor (missing for EC measured using TOT).
ECTORL EC value multiplied by TOR minimum correction factor (missing for EC measured using TOT).

5. Outlier value not used for statistical comparisons

Table 4-3. Nearest modeled concentration and TOT, TOTL, and TOTH monitored values for each site.							
City / County[1]	**State[1]**	**Nearest Modeled Concentration[2]**	**Urban or Rural**	**Subset[3]**	**TOT[4]**	**TOTL[4]**	**TOTH[4]**
Chicopee	MA	1.7019	U		0.683716	0.683716	0.683716
Harrison	MA	4.0016	U	Non-road	1.889732	1.889732	1.889732
Adams	PA	1.501	R		0.838376	0.838376	0.838376
Champaign	IL	1.205	R		0.736247	0.736247	0.736247
Trigg	KY	0.8134	R		0.674421	0.674421	0.674421
Tompkins	NY	0.7298	R		0.510466	0.510466	0.510466
Washington	IN	0.8839	R		0.709542	0.709542	0.709542
Mercer	PA	0.9414	R		0.980116	0.980116	0.980116
Noble	OH	0.9718	R		1.208977	1.208977	1.208977
Winn Parish	LA	0.3588	R		0.444273	0.329798	0.645967
Jefferson	Alabama	1.9958	U		3.014976	3.014976	3.014976
Maricopa	Arizona	1.5009	U		1.35271	1.004159	1.966824
Fresno	California	0.6956	U	On-road	1.486594	1.103546	2.16149
Kern	California	0.7167	U		1.720329	1.277054	2.501338
Riverside	California	2.3167	R		2.196692	1.630673	3.193963
Sacramento	California	1.2622	U		1.189164	0.882754	1.72903
San Diego	California	1.6952	U	On-road	1.342048	0.996244	1.951321
Santa Clara	California	2.5023	U		1.71742	1.274895	2.497108
Ventura	California	2.2541	R	On-road	1.7441	1.2947	2.5359
Adams	Colorado	1.743	R	Non-road	1.92981	1.432558	2.80592
Kent	Delaware	2.3066	U		0.958036	0.958036	0.958036
New Castle	Delaware	3.903	U		1.980288	1.980288	1.980288
District of Columbia	District of Columbia	3.3894	U		1.654408	1.654408	1.654408
Dade	Florida	2.4764	U		4.237155	4.237155	4.237155
Hillsborough	Florida	1.441	U		1.048591	1.048591	1.048591
DeKalb	Georgia	3.3168	R		2.377515	2.377515	2.377515
Cook	Illinois	10.2885	U	Non-road	2.232918	2.232918	2.232918
Cook	Illinois	2.2496	U		1.827492	1.827492	1.827492

Table 4-3. Nearest modeled concentration and TOT, TOTL, and TOTH monitored values for each site.							
City / County[1]	**State[1]**	**Nearest Modeled Concentration[2]**	**Urban or Rural**	**Subset[3]**	**TOT[4]**	**TOTL[4]**	**TOTH[4]**
Cook	Illinois	2.3421	U		1.438204	1.438204	1.438204
Marion	Indiana	2.3757	U		1.364853	1.364853	1.364853
Linn	Iowa	1.0643	R		0.71563	0.71563	0.71563
Polk	Iowa	1.0352	R		0.588565	0.43691	0.855767
Scott	Iowa	1.4764	U		0.764604	0.764604	0.764604
Wyandotte	Kansas	1.7453	U		1.10273	0.818591	1.603357
East Baton Rouge Parish	Louisiana	6.7431	R	Non-road	1.420214	1.420214	1.420214
Baltimore	Maryland	2.9017	U		1.548465	1.548465	1.548465
Baltimore	Maryland	3.7513	U		1.104987	1.104987	1.104987
Hampden	Massachusetts	1.7019	U		0.586525	0.586525	0.586525
Suffolk	Massachusetts	4.6792	U		1.347231	1.347231	1.347231
Oakland	Michigan	1.9572	U		1.67521	1.67521	1.67521
Wayne	Michigan	2.0105	U		1.552197	1.552197	1.552197
Wayne	Michigan	2.0734	U		1.248826	1.248826	1.248826
Hennepin	Minnesota	2.2469	U		0.493075	0.366025	0.716925
Hennepin	Minnesota	2.3247	U		0.856137	0.635537	1.244813
Harrison	Mississippi	0.9887	U		0.943544	0.943544	0.943544
Jefferson	Missouri	1.2994	R		1.218458	1.218458	1.218458
St. Louis	Missouri	2.1799	U		1.582243	1.582243	1.582243
Missoula	Montana	0.5105	U		0.734287	0.545084	1.067644
Douglas	Nebraska	1.358	U		0.673697	0.500106	0.979547
Washoe	Nevada	3.9817	R	Non-road	1.604714	1.191229	2.333234
Camden	New Jersey	4.1874	U		1.40286	1.40286	1.40286
Middlesex	New Jersey	3.3877	U		1.404459	1.404459	1.404459
Morris	New Jersey	2.8348	R		0.828597	0.828597	0.828597
Union	New Jersey	5.2935	U	Non-road	4.198329	4.198329	4.198329
Bronx	New York	8.0006	U	Non-road	1.77503	1.77503	1.77503
Bronx	New York	7.1404	U	Non-road	2.606724	2.606724	2.606724
Bronx	New York	8.5915	U	Non-	2.394239	2.394239	2.394239

Table 4-3. Nearest modeled concentration and TOT, TOTL, and TOTH monitored values for each site.							
City / County[1]	**State[1]**	**Nearest Modeled Concentration[2]**	**Urban or Rural**	**Subset[3]**	**TOT[4]**	**TOTL[4]**	**TOTH[4]**
				road			
Essex	New York	0.2218	R		0.383065	0.383065	0.383065
Monroe	New York	1.7872	R	On-road	0.751336	0.751336	0.751336
Queens	New York	6.6119	U	Non-road	1.624842	1.624842	1.624842
Steuben	New York	0.5936	R		0.444674	0.444674	0.444674
Mecklenburg	North Carolina	2.2706	U		1.352154	1.352154	1.352154
Burleigh	North Dakota	0.5387	U	Non-road	0.344482	0.25572	0.500872
Cass	North Dakota	0.6603	R	Non-road	0.591956	0.439428	0.860697
Cuyahoga	Ohio	6.9579	R	Non-road	2.434012	2.434012	2.434012
Tulsa	Oklahoma	1.4889	U		0.767198	0.569515	1.115497
Multnomah	Oregon	2.085	U		1.14655	0.85112	1.66707
Adams	Pennsylvania	1.501	R		0.571485	0.571485	0.571485
Allegheny	Pennsylvania	2.7774	U		1.832849	1.832849	1.832849
Allegheny	Pennsylvania	1.9699	U		1.365899	1.365899	1.365899
Philadelphia	Pennsylvania	4.9986	U		1.769076	1.769076	1.769076
Washington	Pennsylvania	1.1656	R		0.856576	0.856576	0.856576
Westmoreland	Pennsylvania	1.6285	U		1.588581	1.588581	1.588581
Charleston	South Carolina	0.893	U		0.853549	0.853549	0.853549
Shelby	Tennessee	3.0845	U	Non-road	2.99937	2.99937	2.99937
Dallas	Texas	3.3398	R	Non-road	0.843332	0.626032	1.226195
El Paso	Texas	0.8152	U		0.850771	0.631554	1.23701
Harris	Texas	2.3903	U		0.482679	0.358308	0.701809
Salt Lake	Utah	1.5764	U		1.292407	0.959394	1.879144
Utah	Utah	0.606	R		0.886836	0.658326	1.289449
Chittenden	Vermont	1.855	U		0.799992	0.799992	0.799992
Richmond	Virginia	1.5432	U		1.145547	1.145547	1.145547
King	Washington	3.6513	R	Non-road	1.493096	1.108372	2.170944

Table 4-3. Nearest modeled concentration and TOT, TOTL, and TOTH monitored values for each site.							
City / County[1]	**State[1]**	**Nearest Modeled Concentration[2]**	**Urban or Rural**	**Subset[3]**	**TOT[4]**	**TOTL[4]**	**TOTH[4]**
King	Washington	3.2264	U	Non-road	1.008721	0.748805	1.466668
Milwaukee	Wisconsin	2.3524	U	On-road	1.306485	1.306485	1.306485
	Puerto Rico	1.1811	U		5.036414	5.036414	5.036414
Anaheim	CA	3.5344	U		3.753411	2.786274	5.457413
Burbank	CA	2.6058	U	On-road	5.178159	3.843909	7.528979
Fontana	CA	2.0988	R		5.047655	3.747032	7.339229
Huntington Park	CA	4.6059	U		7.390285	5.48604	10.74538
Central LA	CA	3.0531	R		5.754731	4.271917	8.367309
Long Beach	CA	11.744	U	Non-road	4.134551	3.069207	6.011587
Pico Rivera	CA	2.4915	U		7.097502	5.268698	10.31968
Rubidoux	CA	2.5544	U		5.597411	4.155133	8.138567
Phoenix	AZ	2.5682	U	Non-road	1.779664	1.3211	2.58761

Notes for Table 4-3

1. City / county and State may appear multiple times if there are several different monitoring sites at that general location.
2. Modeled variable = "concnear" Nearest modeled DPM concentration consistent with the draft 2000 NONROAD Model
3. Subset:

Non-road Sites dominated by Non-road source (at least 75 % of modeled DPM consistent with the draft 2000 NONROAD Model)

On-road Sites dominated by On-road source (at least 50 % of modeled DPM consistent with the draft 2000 NONROAD Model)

4. Monitored variable:

ECTOT EC value multiplied by TOT average correction factor (missing for EC measured using TOR).

ECTOTH EC value multiplied by TOT maximum correction factor (missing for EC measured using TOR).

ECTOTL EC value multiplied by TOR minimum correction factor (missing for EC measured using TOR).

5. Outlier value not used for statistical comparisons

Table 4-4. Nearest modeled concentration and TOR, TORL, and TORH monitored values for each site.

City / County[1]	State[1]	Nearest Modeled Concentration[2]	Urban or Rural	Subset[3]	TOR[4]	TORL[4]	TORH[4]
Jefferson	Alabama	1.9958	U		2.87283	2.040126	3.996981
Maricopa	Arizona	1.5009	U		1.656433	1.176308	2.304603
Fresno	California	0.6956	U	On-road	2.112493	1.500176	2.93912
Kern	California	0.7167	U		2.241741	1.591961	3.118944
Riverside	California	2.3167	R		3.220693	2.172998	3.686336
Sacramento	California	1.2622	U		1.805432	1.282118	2.511905
San Diego	California	1.6952	U	On-road	1.903438	1.351717	2.648261
Santa Clara	California	2.5023	U		1.849625	1.313502	2.573392
Ventura	California	2.2541	R	On-road	2.626535	1.77212	3.006275
Adams	Colorado	1.743	R	Non-road	2.508408	1.69242	2.871069
Kent	Delaware	2.3066	U		1.823765	1.295138	2.537412
New Castle	Delaware	3.903	U		2.255988	1.602079	3.138766
District of Columbia	District of Columbia	3.3894	U		1.981439	1.407109	2.756785
Dade	Florida	2.4764	U		2.273114	1.614241	3.162594
Hillsborough	Florida	1.441	U		1.564298	1.110878	2.176414
DeKalb	Georgia	3.3168	R		2.812688	1.897717	3.219341
Cook	Illinois	2.2496	U		1.834895	1.303041	2.552898
Cook	Illinois	2.3421	U		1.264669	0.898098	1.75954
Marion	Indiana	2.3757	U		1.8532	1.316041	2.578366
Linn	Iowa	1.0643	R		1.331275	0.89821	1.523748
Polk	Iowa	1.0352	R		1.576618	1.063742	1.804563
Scott	Iowa	1.4764	U		1.253591	0.890231	1.744127
Wyandotte	Kansas	1.7453	U		2.237625	1.589038	3.113217
East Baton Rouge Parish	Louisiana	6.7431	R	Non-road	1.658044	1.11868	1.897761
Baltimore	Maryland	2.9017	U		1.886666	1.339806	2.624927
Baltimore	Maryland	3.7513	U		1.90302	1.35142	2.64768
Hampden	Massachusetts	1.7019	U		0.898909	0.638356	1.250656
Suffolk	Massachusetts	4.6792	U		1.873434	1.33041	2.606518
Oakland	Michigan	1.9572	U		1.807817	1.283812	2.515224
Wayne	Michigan	2.0105	U		1.792132	1.272673	2.493401
Wayne	Michigan	2.0734	U		2.017959	1.433043	2.807595
Hennepin	Minnesota	2.3247	U		1.603413	1.138655	2.230835

Table 4-4. Nearest modeled concentration and TOR, TORL, and TORH monitored values for each site.							
City / County[1]	**State[1]**	**Nearest Modeled Concentration[2]**	**Urban or Rural**	**Subset[3]**	**TOR[4]**	**TORL[4]**	**TORH[4]**
Harrison	Mississippi	0.9887	U		1.573738	1.117582	2.189548
Jefferson	Missouri	1.2994	R		2.274006	1.534269	2.602778
St. Louis	Missouri	2.1799	U		1.868836	1.327144	2.600119
Missoula	Montana	0.5105	U		1.682974	1.195156	2.341529
Douglas	Nebraska	1.358	U		1.43152	1.016587	1.99168
Washoe	Nevada	3.9817	R	Non-road	2.809452	1.895534	3.215638
Camden	New Jersey	4.1874	U		1.917837	1.361942	2.668295
Middlesex	New Jersey	3.3877	U		1.733885	1.23131	2.412362
Morris	New Jersey	2.8348	R		1.798739	1.213607	2.058798
Union	New Jersey	5.2935	U	Non-road	2.866781	2.03583	3.988565
Bronx	New York	7.1404	U	Non-road	2.212477	1.571179	3.078228
Bronx	New York	8.5915	U	Non-road	1.832909	1.301631	2.550134
Essex	New York	0.2218	R		1.102289	0.743713	1.261656
Monroe	New York	1.7872	R	On-road	1.459265	0.984564	1.670243
Queens	New York	6.6119	U	Non-road	1.582166	1.123567	2.201275
Steuben	New York	0.5936	R		1.223072	0.825205	1.399902
Mecklenburg	North Carolina	2.2706	U		1.98954	1.412862	2.768056
Burleigh	North Dakota	0.5387	U	Non-road	0.96715	0.686817	1.3456
Cass	North Dakota	0.6603	R	Non-road	1.512952	1.020787	1.731692
Cuyahoga	Ohio	6.9579	R	Non-road	2.637039	1.779207	3.018298
Tulsa	Oklahoma	1.4889	U		1.858217	1.319603	2.585345
Multnomah	Oregon	2.085	U		1.8004	1.278545	2.504904
Adams	Pennsylvania	1.501	R		1.987328	1.340848	2.274653
Allegheny	Pennsylvania	2.7774	U		2.111918	1.499768	2.93832
Allegheny	Pennsylvania	1.9699	U		1.946273	1.382136	2.707858
Philadelphia	Pennsylvania	4.9986	U		1.839106	1.306032	2.558756
Washington	Pennsylvania	1.1656	R		2.085923	1.40737	2.387502
Westmoreland	Pennsylvania	1.6285	U		1.963036	1.39404	2.73118
Charleston	South Carolina	0.893	U		1.614335	1.146412	2.246032
Shelby	Tennessee	3.0845	U	Non-road	2.415763	1.715542	3.361061
Dallas	Texas	3.3398	R	Non-road	1.44195	0.972882	1.650425
El Paso	Texas	0.8152	U		1.037519	0.736789	1.443505
Harris	Texas	2.3903	U		0.88649	0.629536	1.233377

Table 4-4. Nearest modeled concentration and TOR, TORL, and TORH monitored values for each site.							
City / County[1]	**State[1]**	**Nearest Modeled Concentration[2]**	**Urban or Rural**	**Subset[3]**	**TOR[4]**	**TORL[4]**	**TORH[4]**
Salt Lake	Utah	1.5764	U		1.679742	1.19286	2.337033
Utah	Utah	0.606	R		1.790894	1.208314	2.049819
Chittenden	Vermont	1.855	U		1.397072	0.992123	1.943752
Richmond	Virginia	1.5432	U		2.093134	1.486429	2.912187
King	Washington	3.6513	R	Non-road	1.518021	1.024207	1.737494
King	Washington	3.2264	U	Non-road	0.958905	0.680962	1.334129
Milwaukee	Wisconsin	2.3524	U	On-road	1.646925	1.169555	2.291374
	Puerto Rico	1.1811	U		2.454399	1.742979	3.414816
Oceanville	NJ	2.032	R		0.435755	0.294003	0.498756
Seattle	WA	3.2264	U	Non-road	0.75129	0.533525	1.045273
Shenandoah National Park	VA	0.9612	R		0.308284	0.207999	0.352855
Lake Tahoe	NV	0.6111	R		0.942438	0.635862	1.078694
Washington DC	DC	*12.263*[5]	R	Non-road	1.01273	0.683288	1.159149
Yellowstone National Park	WY	0.0548	R		0.106637	0.071948	0.122055
Denver	CO	0.7626	R	Non-road	0.978226	0.660008	1.119656
Denver	CO	1.9723	U	Non-road	2.711257	1.925386	3.772184
Denver	CO	1.5939	U		0.452586	0.321402	0.629685
Denver	CO	0.7304	R		1.330274	0.897534	1.522603
Denver	CO	0.7953	U		0.820571	0.582724	1.141664
Denver	CO	2.5918	R		0.815005	0.549883	0.932837
Denver	CO	1.6963	U		0.593728	0.421633	0.826056
Denver	CO	1.3913	R		1.065238	0.718715	1.219248
Denver	CO	0.4174	R		0.560907	0.378443	0.642002
Denver	CO	4.5809	R	Non-road	2.16979	1.463955	2.483495

Notes for Table 4-4:

1. City / county and State may appear multiple times if there are several different monitoring sites at that general location.
2. Modeled variable = "concnear" Nearest modeled DPM concentration consistent with the draft 2000 NONROAD Model
3. Subset:

Non-road Sites dominated by Non-road source (at least 75 % of modeled DPM consistent with the draft 2000 NONROAD Model)

On-road Sites dominated by On-road source (at least 50 % of modeled DPM consistent with the draft 2000 NONROAD Model)

4. Monitored variable:

TOR	ECOCX value multiplied by TOT average correction factor for EPA data, ECTOR for TOR data.
TORH	ECOCX value multiplied by TOT maximum correction factor for EPA data, ECTOR for TOR data..
TORL	ECOCX value multiplied by TOR minimum correction factor for EPA data, ECTOR for TOR data.

5. Outlier value not used for statistical comparisons

Table 4-5. Summary of differences and percentage differences between modeled against monitored DPM concentrations.

Modeled Variable[1]	Monitored Variable[2]	Subset[3]	Location	N	Mean Modeled Value	Mean Monitored Value	Mean Difference	Mean % Difference	Fraction of Modeled Values Within			
									10%	25%	50%	100%
concnear	ECTOR	All	All	15	1.56	0.94	0.63	100	0.07	0.13	0.53	0.53
concnear	ECTOR	All	Rural	10	1.41	0.87	0.54	76	0.00	0.10	0.60	0.60
concnear	ECTOR	All	Urban	5	1.86	1.07	0.79	147	0.20	0.20	0.40	0.40
concnear	ECTOR	Non-road	All	4	2.64	1.65	0.98	98	0.00	0.25	0.50	0.50
concnear	ECTOR	Non-road	Rural	2	2.67	1.57	1.10	45	0.00	0.50	0.50	0.50
concnear	ECTOR	Non-road	Urban	2	2.60	1.73	0.87	151	0.00	0.00	0.50	0.50
concnear2	ECTOR	All	All	15	1.20	0.94	0.26	56	0.07	0.13	0.47	0.60
concnear2	ECTOR	All	Rural	10	1.07	0.87	0.20	38	0.10	0.10	0.50	0.70
concnear2	ECTOR	All	Urban	5	1.44	1.07	0.37	93	0.00	0.20	0.40	0.40
maxconc	ECTOR	All	All	14	4.80	1.00	3.81	516	0.07	0.07	0.07	0.21
maxconc	ECTOR	All	Rural	9	4.30	0.96	3.35	416	0.11	0.11	0.11	0.33
maxconc	ECTOR	All	Urban	5	5.71	1.07	4.64	696	0.00	0.00	0.00	0.00
maxconc	ECTOR	Non-road	All	4	6.63	1.65	4.98	376	0.00	0.00	0.00	0.00
maxconc	ECTOR	Non-road	Rural	2	7.60	1.57	6.03	464	0.00	0.00	0.00	0.00
maxconc	ECTOR	Non-road	Urban	2	5.66	1.73	3.93	288	0.00	0.00	0.00	0.00
maxconc2	ECTOR	All	All	14	3.46	1.00	2.47	346	0.00	0.07	0.21	0.36
maxconc2	ECTOR	All	Rural	9	3.10	0.96	2.15	275	0.00	0.11	0.33	0.33
maxconc2	ECTOR	All	Urban	5	4.11	1.07	3.05	473	0.00	0.00	0.00	0.40
concnear	ECTORH	All	All	15	1.56	1.16	0.40	62	0.00	0.07	0.40	0.60
concnear	ECTORH	All	Rural	10	1.41	1.00	0.42	54	0.00	0.10	0.40	0.70
concnear	ECTORH	All	Urban	5	1.86	1.48	0.37	78	0.00	0.00	0.40	0.40
concnear	ECTORH	Non-road	All	4	2.64	2.11	0.53	53	0.00	0.00	0.50	0.75
concnear	ECTORH	Non-road	Rural	2	2.67	1.80	0.87	26	0.00	0.00	0.50	1.00
concnear	ECTORH	Non-road	Urban	2	2.60	2.41	0.19	80	0.00	0.00	0.50	0.50
concnear2	ECTORH	All	All	15	1.20	1.16	0.04	26	0.00	0.07	0.33	0.73
concnear2	ECTORH	All	Rural	10	1.07	1.00	0.08	20	0.00	0.10	0.40	0.70
concnear2	ECTORH	All	Urban	5	1.44	1.48	-0.04	39	0.00	0.00	0.20	0.80
maxconc	ECTORH	All	All	14	4.80	1.23	3.57	394	0.00	0.07	0.14	0.29
maxconc	ECTORH	All	Rural	9	4.30	1.09	3.21	351	0.00	0.11	0.22	0.33
maxconc	ECTORH	All	Urban	5	5.71	1.48	4.22	472	0.00	0.00	0.00	0.20
maxconc	ECTORH	Non-road	All	4	6.63	2.11	4.53	286	0.00	0.00	0.00	0.00

Table 4-5. Summary of differences and percentage differences between modeled against monitored DPM concentrations.

Modeled Variable[1]	Monitored Variable[2]	Subset[3]	Location	N	Mean Modeled Value	Mean Monitored Value	Mean Difference	Mean % Difference	Fraction of Modeled Values Within			
									10%	25%	50%	100%
maxconc	ECTORH	Non-road	Rural	2	7.60	1.80	5.80	392	0.00	0.00	0.00	0.00
maxconc	ECTORH	Non-road	Urban	2	5.66	2.41	3.25	179	0.00	0.00	0.00	0.00
maxconc2	ECTORH	All	All	14	3.46	1.23	2.23	258	0.07	0.14	0.36	0.36
maxconc2	ECTORH	All	Rural	9	3.10	1.09	2.01	228	0.11	0.22	0.33	0.33
maxconc2	ECTORH	All	Urban	5	4.11	1.48	2.63	312	0.00	0.00	0.40	0.40
concnear	ECTORL	All	All	15	1.56	0.64	0.92	190	0.13	0.40	0.47	0.53
concnear	ECTORL	All	Rural	10	1.41	0.59	0.83	161	0.10	0.50	0.50	0.60
concnear	ECTORL	All	Urban	5	1.86	0.76	1.10	248	0.20	0.20	0.40	0.40
concnear	ECTORL	Non-road	All	4	2.64	1.15	1.49	184	0.25	0.50	0.50	0.50
concnear	ECTORL	Non-road	Rural	2	2.67	1.06	1.61	114	0.00	0.50	0.50	0.50
concnear	ECTORL	Non-road	Urban	2	2.60	1.23	1.37	254	0.50	0.50	0.50	0.50
concnear2	ECTORL	All	All	15	1.20	0.64	0.55	126	0.07	0.33	0.47	0.53
concnear2	ECTORL	All	Rural	10	1.07	0.59	0.49	104	0.00	0.30	0.50	0.60
concnear2	ECTORL	All	Urban	5	1.44	0.76	0.68	171	0.20	0.40	0.40	0.40
maxconc	ECTORL	All	All	14	4.80	0.69	4.12	792	0.00	0.00	0.07	0.07
maxconc	ECTORL	All	Rural	9	4.30	0.65	3.66	665	0.00	0.00	0.11	0.11
maxconc	ECTORL	All	Urban	5	5.71	0.76	4.95	1021	0.00	0.00	0.00	0.00
maxconc	ECTORL	Non-road	All	4	6.63	1.15	5.48	591	0.00	0.00	0.00	0.00
maxconc	ECTORL	Non-road	Rural	2	7.60	1.06	6.54	735	0.00	0.00	0.00	0.00
maxconc	ECTORL	Non-road	Urban	2	5.66	1.23	4.43	446	0.00	0.00	0.00	0.00
maxconc2	ECTORL	All	All	14	3.46	0.69	2.78	545	0.07	0.07	0.07	0.14
maxconc2	ECTORL	All	Rural	9	3.10	0.65	2.46	456	0.11	0.11	0.11	0.22
maxconc2	ECTORL	All	Urban	5	4.11	0.76	3.35	707	0.00	0.00	0.00	0.00
concnear	ECTOT	All	All	95	2.61	1.73	0.88	80	0.12	0.21	0.45	0.68
concnear	ECTOT	All	Rural	30	1.99	1.36	0.63	66	0.13	0.30	0.60	0.73
concnear	ECTOT	All	Urban	65	2.90	1.90	1.00	86	0.11	0.17	0.38	0.66
concnear	ECTOT	Non-road	All	19	5.17	1.96	3.20	171	0.11	0.16	0.26	0.32
concnear	ECTOT	Non-road	Rural	7	3.87	1.47	2.39	164	0.14	0.29	0.29	0.29
concnear	ECTOT	Non-road	Urban	12	5.92	2.25	3.68	175	0.08	0.08	0.25	0.33
concnear	ECTOT	On-road	All	6	1.90	1.97	-0.07	28	0.00	0.00	0.50	0.83
concnear	ECTOT	On-road	Rural	2	2.02	1.25	0.77	84	0.00	0.00	0.50	0.50
concnear	ECTOT	On-road	Urban	4	1.84	2.33	-0.49	1	0.00	0.00	0.50	1.00

Table 4-5. Summary of differences and percentage differences between modeled against monitored DPM concentrations.

Modeled Variable[1]	Monitored Variable[2]	Subset[3]	Location	N	Mean Modeled Value	Mean Monitored Value	Mean Difference	Mean % Difference	Fraction of Modeled Values Within			
									10%	25%	50%	100%
concnear2	ECTOT	All	All	95	2.05	1.73	0.32	42	0.11	0.37	0.53	0.77
concnear2	ECTOT	All	Rural	30	1.55	1.36	0.19	30	0.10	0.40	0.63	0.80
concnear2	ECTOT	All	Urban	65	2.28	1.90	0.37	47	0.11	0.35	0.48	0.75
maxconc	ECTOT	All	All	95	18.36	1.73	16.63	918	0.02	0.04	0.08	0.12
maxconc	ECTOT	All	Rural	30	7.11	1.36	5.76	423	0.03	0.03	0.10	0.13
maxconc	ECTOT	All	Urban	65	23.55	1.90	21.65	1146	0.02	0.05	0.08	0.11
maxconc	ECTOT	Non-road	All	19	48.98	1.96	47.02	2142	0.00	0.00	0.00	0.05
maxconc	ECTOT	Non-road	Rural	7	8.95	1.47	7.48	489	0.00	0.00	0.00	0.14
maxconc	ECTOT	Non-road	Urban	12	72.34	2.25	70.09	3106	0.00	0.00	0.00	0.00
maxconc	ECTOT	On-road	All	6	4.84	1.97	2.87	214	0.00	0.17	0.33	0.33
maxconc	ECTOT	On-road	Rural	2	4.68	1.25	3.43	307	0.00	0.00	0.00	0.00
maxconc	ECTOT	On-road	Urban	4	4.92	2.33	2.59	168	0.00	0.25	0.50	0.50
maxconc2	ECTOT	All	All	95	12.99	1.73	11.26	626	0.02	0.09	0.12	0.21
maxconc2	ECTOT	All	Rural	30	5.17	1.36	3.81	284	0.00	0.13	0.13	0.30
maxconc2	ECTOT	All	Urban	65	16.60	1.90	14.70	783	0.03	0.08	0.11	0.17
concnear	ECTOTH	All	All	95	2.61	2.10	0.52	61	0.11	0.22	0.46	0.74
concnear	ECTOTH	All	Rural	30	1.99	1.71	0.28	48	0.07	0.27	0.57	0.80
concnear	ECTOTH	All	Urban	65	2.90	2.28	0.63	67	0.12	0.20	0.42	0.71
concnear	ECTOTH	Non-road	All	19	5.17	2.29	2.88	138	0.16	0.21	0.32	0.47
concnear	ECTOTH	Non-road	Rural	7	3.87	1.89	1.98	116	0.00	0.14	0.29	0.57
concnear	ECTOTH	Non-road	Urban	12	5.92	2.52	3.40	151	0.25	0.25	0.33	0.42
concnear	ECTOTH	On-road	All	6	1.90	2.71	-0.81	10	0.00	0.33	0.33	0.83
concnear	ECTOTH	On-road	Rural	2	2.02	1.64	0.38	63	0.00	0.50	0.50	0.50
concnear	ECTOTH	On-road	Urban	4	1.84	3.24	-1.40	-17	0.00	0.25	0.25	1.00
concnear2	ECTOTH	All	All	95	2.05	2.10	-0.05	27	0.11	0.35	0.53	0.80
concnear2	ECTOTH	All	Rural	30	1.55	1.71	-0.16	16	0.10	0.40	0.60	0.80
concnear2	ECTOTH	All	Urban	65	2.28	2.28	0.00	32	0.11	0.32	0.49	0.80
maxconc	ECTOTH	All	All	95	18.36	2.10	16.26	832	0.03	0.05	0.12	0.19
maxconc	ECTOTH	All	Rural	30	7.11	1.71	5.41	369	0.00	0.03	0.17	0.27
maxconc	ECTOTH	All	Urban	65	23.55	2.28	21.27	1046	0.05	0.06	0.09	0.15
maxconc	ECTOTH	Non-road	All	19	48.98	2.29	46.69	2051	0.00	0.05	0.05	0.16
maxconc	ECTOTH	Non-road	Rural	7	8.95	1.89	7.06	376	0.00	0.14	0.14	0.43

Table 4-5. Summary of differences and percentage differences between modeled against monitored DPM concentrations.

Modeled Variable[1]	Monitored Variable[2]	Subset[3]	Location	N	Mean Modeled Value	Mean Monitored Value	Mean Difference	Mean % Difference	Fraction of Modeled Values Within			
									10%	25%	50%	100%
maxconc	ECTOTH	Non-road	Urban	12	72.34	2.52	69.81	3027	0.00	0.00	0.00	0.00
maxconc	ECTOTH	On-road	All	6	4.84	2.71	2.13	169	0.17	0.17	0.33	0.33
maxconc	ECTOTH	On-road	Rural	2	4.68	1.64	3.03	256	0.00	0.00	0.00	0.00
maxconc	ECTOTH	On-road	Urban	4	4.92	3.24	1.68	125	0.25	0.25	0.50	0.50
maxconc2	ECTOTH	All	All	95	12.99	2.10	10.90	564	0.02	0.08	0.18	0.27
maxconc2	ECTOTH	All	Rural	30	5.17	1.71	3.46	245	0.03	0.17	0.27	0.37
maxconc2	ECTOTH	All	Urban	65	16.60	2.28	14.33	712	0.02	0.05	0.14	0.23
concnear	ECTOTL	All	All	95	2.61	1.52	1.09	101	0.09	0.17	0.43	0.63
concnear	ECTOTL	All	Rural	30	1.99	1.16	0.83	86	0.13	0.27	0.57	0.70
concnear	ECTOTL	All	Urban	65	2.90	1.69	1.21	108	0.08	0.12	0.37	0.60
concnear	ECTOTL	Non-road	All	19	5.17	1.78	3.39	207	0.05	0.11	0.16	0.26
concnear	ECTOTL	Non-road	Rural	7	3.87	1.24	2.63	219	0.00	0.14	0.14	0.29
concnear	ECTOTL	Non-road	Urban	12	5.92	2.09	3.83	201	0.08	0.08	0.17	0.25
concnear	ECTOTL	On-road	All	6	1.90	1.55	0.35	49	0.00	0.00	0.33	0.83
concnear	ECTOTL	On-road	Rural	2	2.02	1.02	1.00	106	0.00	0.00	0.00	0.50
concnear	ECTOTL	On-road	Urban	4	1.84	1.81	0.02	20	0.00	0.00	0.50	1.00
concnear2	ECTOTL	All	All	95	2.05	1.52	0.52	58	0.09	0.32	0.52	0.72
concnear2	ECTOTL	All	Rural	30	1.55	1.16	0.39	46	0.10	0.43	0.63	0.73
concnear2	ECTOTL	All	Urban	65	2.28	1.69	0.59	64	0.09	0.26	0.46	0.71
maxconc	ECTOTL	All	All	95	18.36	1.52	16.84	1014	0.02	0.02	0.05	0.11
maxconc	ECTOTL	All	Rural	30	7.11	1.16	5.95	484	0.00	0.00	0.10	0.10
maxconc	ECTOTL	All	Urban	65	23.55	1.69	21.86	1258	0.03	0.03	0.03	0.11
maxconc	ECTOTL	Non-road	All	19	48.98	1.78	47.21	2244	0.00	0.00	0.00	0.00
maxconc	ECTOTL	Non-road	Rural	7	8.95	1.24	7.71	615	0.00	0.00	0.00	0.00
maxconc	ECTOTL	Non-road	Urban	12	72.34	2.09	70.25	3194	0.00	0.00	0.00	0.00
maxconc	ECTOTL	On-road	All	6	4.84	1.55	3.29	265	0.17	0.17	0.17	0.33
maxconc	ECTOTL	On-road	Rural	2	4.68	1.02	3.65	363	0.00	0.00	0.00	0.00
maxconc	ECTOTL	On-road	Urban	4	4.92	1.81	3.10	216	0.25	0.25	0.25	0.50
maxconc2	ECTOTL	All	All	95	12.99	1.52	11.47	694	0.00	0.07	0.11	0.16
maxconc2	ECTOTL	All	Rural	30	5.17	1.16	4.01	329	0.00	0.10	0.10	0.17
maxconc2	ECTOTL	All	Urban	65	16.60	1.69	14.91	863	0.00	0.06	0.11	0.15
concnear	TOR	All	All	88	2.31	1.70	0.61	47	0.10	0.30	0.59	0.78

Table 4-5. Summary of differences and percentage differences between modeled against monitored DPM concentrations.

Modeled Variable[1]	Monitored Variable[2]	Subset[3]	Location	N	Mean Modeled Value	Mean Monitored Value	Mean Difference	Mean % Difference	Fraction of Modeled Values Within			
									10%	25%	50%	100%
concnear	TOR	All	Rural	30	2.04	1.60	0.44	38	0.00	0.20	0.57	0.73
concnear	TOR	All	Urban	58	2.44	1.75	0.70	51	0.16	0.34	0.60	0.81
concnear	TOR	Non-road	All	18	4.01	1.86	2.14	128	0.00	0.06	0.33	0.44
concnear	TOR	Non-road	Rural	9	3.60	1.91	1.69	87	0.00	0.11	0.33	0.44
concnear	TOR	Non-road	Urban	9	4.41	1.81	2.60	168	0.00	0.00	0.33	0.44
concnear	TOR	On-road	All	5	1.76	1.95	-0.19	-5	0.00	0.60	0.80	1.00
concnear	TOR	On-road	Rural	2	2.02	2.04	-0.02	4	0.00	1.00	1.00	1.00
concnear	TOR	On-road	Urban	3	1.58	1.89	-0.31	-12	0.00	0.33	0.67	1.00
concnear2	TOR	All	All	88	1.81	1.70	0.11	15	0.17	0.30	0.59	0.85
concnear2	TOR	All	Rural	30	1.57	1.60	-0.03	7	0.13	0.17	0.50	0.87
concnear2	TOR	All	Urban	58	1.93	1.75	0.19	19	0.19	0.36	0.64	0.84
maxconc	TOR	All	All	87	14.57	1.72	12.85	721	0.05	0.07	0.17	0.25
maxconc	TOR	All	Rural	29	6.20	1.65	4.55	296	0.07	0.10	0.24	0.38
maxconc	TOR	All	Urban	58	18.75	1.75	17.01	933	0.03	0.05	0.14	0.19
maxconc	TOR	Non-road	All	18	37.69	1.86	35.83	1802	0.00	0.00	0.11	0.11
maxconc	TOR	Non-road	Rural	9	8.65	1.91	6.74	365	0.00	0.00	0.22	0.22
maxconc	TOR	Non-road	Urban	9	66.73	1.81	64.92	3239	0.00	0.00	0.00	0.00
maxconc	TOR	On-road	All	5	4.36	1.95	2.41	134	0.00	0.00	0.20	0.20
maxconc	TOR	On-road	Rural	2	4.68	2.04	2.63	134	0.00	0.00	0.00	0.00
maxconc	TOR	On-road	Urban	3	4.16	1.89	2.27	135	0.00	0.00	0.33	0.33
maxconc2	TOR	All	All	87	10.34	1.72	8.63	484	0.06	0.16	0.23	0.40
maxconc2	TOR	All	Rural	29	4.51	1.65	2.85	189	0.07	0.28	0.38	0.55
maxconc2	TOR	All	Urban	58	13.26	1.75	11.51	632	0.05	0.10	0.16	0.33
concnear	TORH	All	All	88	2.31	2.23	0.08	13	0.11	0.26	0.60	0.84
concnear	TORH	All	Rural	30	2.04	1.83	0.21	21	0.07	0.13	0.47	0.77
concnear	TORH	All	Urban	58	2.44	2.43	0.01	8	0.14	0.33	0.67	0.88
concnear	TORH	Non-road	All	18	4.01	2.36	1.65	78	0.06	0.11	0.33	0.50
concnear	TORH	Non-road	Rural	9	3.60	2.19	1.41	64	0.00	0.11	0.33	0.56
concnear	TORH	Non-road	Urban	9	4.41	2.52	1.89	93	0.11	0.11	0.33	0.44
concnear	TORH	On-road	All	5	1.76	2.51	-0.75	-26	0.40	0.40	0.80	1.00
concnear	TORH	On-road	Rural	2	2.02	2.34	-0.32	-9	0.50	0.50	1.00	1.00
concnear	TORH	On-road	Urban	3	1.58	2.63	-1.05	-37	0.33	0.33	0.67	1.00

Table 4-5. Summary of differences and percentage differences between modeled against monitored DPM concentrations.

Modeled Variable[1]	Monitored Variable[2]	Subset[3]	Location	N	Mean Modeled Value	Mean Monitored Value	Mean Difference	Mean % Difference	Fraction of Modeled Values Within			
									10%	25%	50%	100%
concnear2	TORH	All	All	88	1.81	2.23	-0.42	-12	0.08	0.22	0.52	0.92
concnear2	TORH	All	Rural	30	1.57	1.83	-0.27	-6	0.07	0.17	0.40	0.87
concnear2	TORH	All	Urban	58	1.93	2.43	-0.50	-14	0.09	0.24	0.59	0.95
maxconc	TORH	All	All	87	14.57	2.25	12.32	510	0.06	0.14	0.22	0.36
maxconc	TORH	All	Rural	29	6.20	1.89	4.31	246	0.07	0.17	0.34	0.45
maxconc	TORH	All	Urban	58	18.75	2.43	16.32	643	0.05	0.12	0.16	0.31
maxconc	TORH	Non-road	All	18	37.69	2.36	35.33	1303	0.00	0.06	0.11	0.17
maxconc	TORH	Non-road	Rural	9	8.65	2.19	6.46	306	0.00	0.11	0.22	0.22
maxconc	TORH	Non-road	Urban	9	66.73	2.52	64.21	2300	0.00	0.00	0.00	0.11
maxconc	TORH	On-road	All	5	4.36	2.51	1.85	83	0.00	0.00	0.00	0.60
maxconc	TORH	On-road	Rural	2	4.68	2.34	2.34	104	0.00	0.00	0.00	0.50
maxconc	TORH	On-road	Urban	3	4.16	2.63	1.53	69	0.00	0.00	0.00	0.67
maxconc2	TORH	All	All	87	10.34	2.25	8.09	335	0.08	0.18	0.32	0.51
maxconc2	TORH	All	Rural	29	4.51	1.89	2.61	152	0.17	0.28	0.41	0.62
maxconc2	TORH	All	Urban	58	13.26	2.43	10.83	426	0.03	0.14	0.28	0.45
concnear	TORL	All	All	88	2.31	1.19	1.12	110	0.10	0.26	0.41	0.65
concnear	TORL	All	Rural	30	2.04	1.08	0.96	105	0.13	0.40	0.53	0.67
concnear	TORL	All	Urban	58	2.44	1.24	1.20	112	0.09	0.19	0.34	0.64
concnear	TORL	Non-road	All	18	4.01	1.29	2.72	228	0.11	0.22	0.28	0.33
concnear	TORL	Non-road	Rural	9	3.60	1.29	2.31	178	0.11	0.22	0.33	0.33
concnear	TORL	Non-road	Urban	9	4.41	1.29	3.12	278	0.11	0.22	0.22	0.33
concnear	TORL	On-road	All	5	1.76	1.36	0.40	36	0.00	0.00	0.40	0.80
concnear	TORL	On-road	Rural	2	2.02	1.38	0.64	54	0.00	0.00	0.50	1.00
concnear	TORL	On-road	Urban	3	1.58	1.34	0.24	24	0.00	0.00	0.33	0.67
concnear2	TORL	All	All	88	1.81	1.19	0.62	65	0.14	0.31	0.52	0.74
concnear2	TORL	All	Rural	30	1.57	1.08	0.49	59	0.10	0.30	0.50	0.73
concnear2	TORL	All	Urban	58	1.93	1.24	0.69	68	0.16	0.31	0.53	0.74
maxconc	TORL	All	All	87	14.57	1.20	13.37	1066	0.01	0.03	0.07	0.13
maxconc	TORL	All	Rural	29	6.20	1.12	5.08	487	0.03	0.03	0.07	0.14
maxconc	TORL	All	Urban	58	18.75	1.24	17.51	1355	0.00	0.03	0.07	0.12
maxconc	TORL	Non-road	All	18	37.69	1.29	36.40	2596	0.06	0.06	0.06	0.06
maxconc	TORL	Non-road	Rural	9	8.65	1.29	7.36	589	0.11	0.11	0.11	0.11

Table 4-5. Summary of differences and percentage differences between modeled against monitored DPM concentrations.

Modeled Variable[1]	Monitored Variable[2]	Subset[3]	Location	N	Mean Modeled Value	Mean Monitored Value	Mean Difference	Mean % Difference	Fraction of Modeled Values Within			
									10%	25%	50%	100%
maxconc	TORL	Non-road	Urban	9	66.73	1.29	65.44	4602	0.00	0.00	0.00	0.00
maxconc	TORL	On-road	All	5	4.36	1.36	3.01	237	0.00	0.20	0.20	0.20
maxconc	TORL	On-road	Rural	2	4.68	1.38	3.30	246	0.00	0.00	0.00	0.00
maxconc	TORL	On-road	Urban	3	4.16	1.34	2.81	231	0.00	0.33	0.33	0.33
maxconc2	TORL	All	All	87	10.34	1.20	9.14	730	0.02	0.03	0.11	0.24
maxconc2	TORL	All	Rural	29	4.51	1.12	3.39	328	0.03	0.03	0.14	0.34
maxconc2	TORL	All	Urban	58	13.26	1.24	12.02	931	0.02	0.03	0.10	0.19

Notes on next page.

Notes for Table 4-5:

5. Modeled variable:

concnear	Nearest modeled DPM concentration consistent with the draft 2000 NONROAD Model
concnear2	Nearest modeled DPM concentration consistent with the draft 2002 NONROAD Model
maxconc	Nearby (within 30 km) maximum modeled DPM concentration consistent with the draft 2000 NONROAD Model
maxconc2	Nearby (within 30 km) maximum modeled DPM concentration consistent with the draft 2002 NONROAD Model

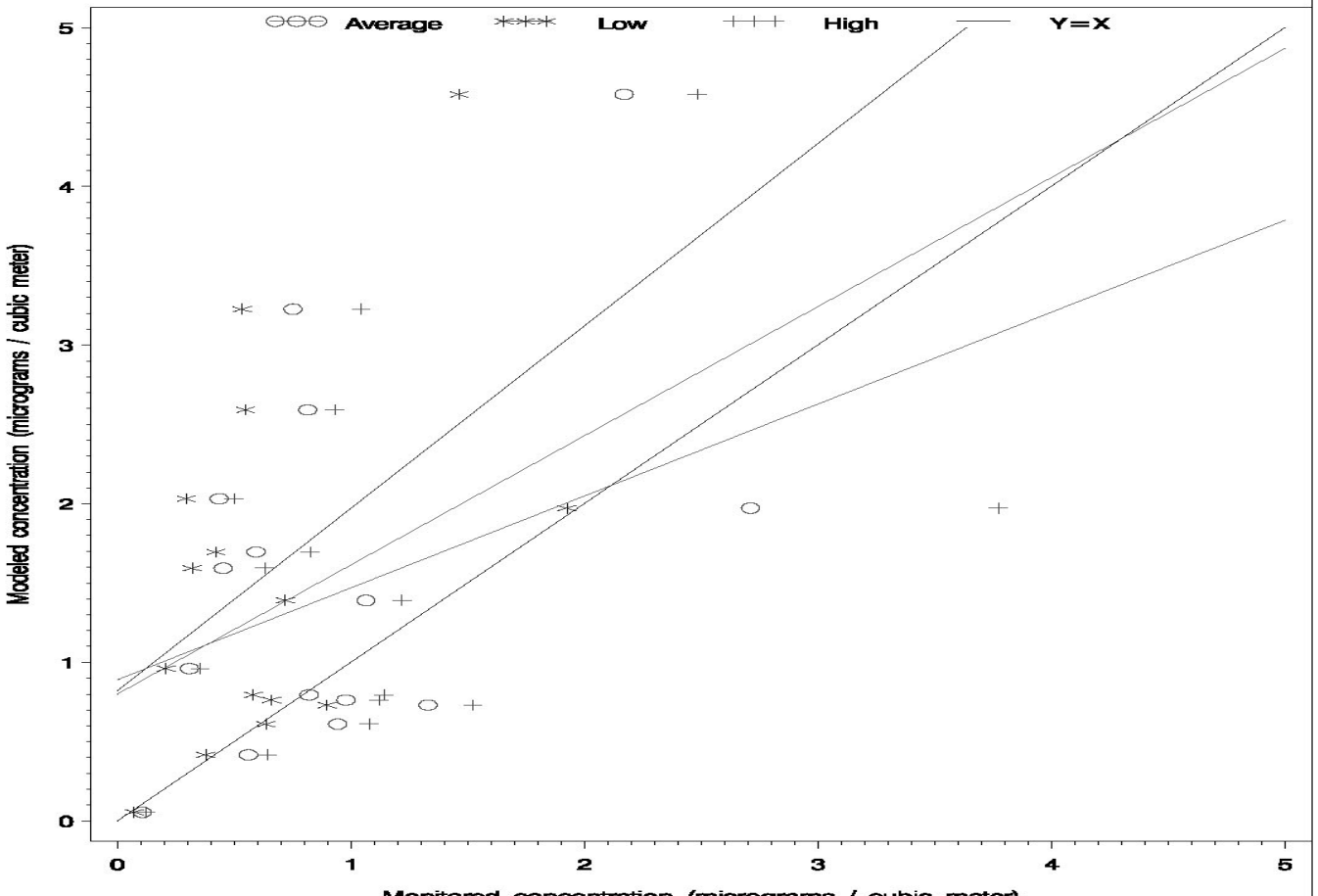
6. Monitored variable:

ECTOR	EC value multiplied by TOR average correction factor (missing for EC measured using TOT).
ECTORH	EC value multiplied by TOR maximum correction factor (missing for EC measured using TOT).
ECTORL	EC value multiplied by TOR minimum correction factor (missing for EC measured using TOT).
ECTOT	EC value multiplied by TOT average correction factor (missing for EC measured using TOR).
ECTOTH	EC value multiplied by TOT maximum correction factor (missing for EC measured using TOR).
ECTOTL	EC value multiplied by TOR minimum correction factor (missing for EC measured using TOR).
TOR	ECOCX value multiplied by TOT average correction factor for EPA data, ECTOR for TOR data.
TORH	ECOCX value multiplied by TOT maximum correction factor for EPA data, ECTOR for TOR data..
TORL	ECOCX value multiplied by TOR minimum correction factor for EPA data, ECTOR for TOR data.

7. Subset:

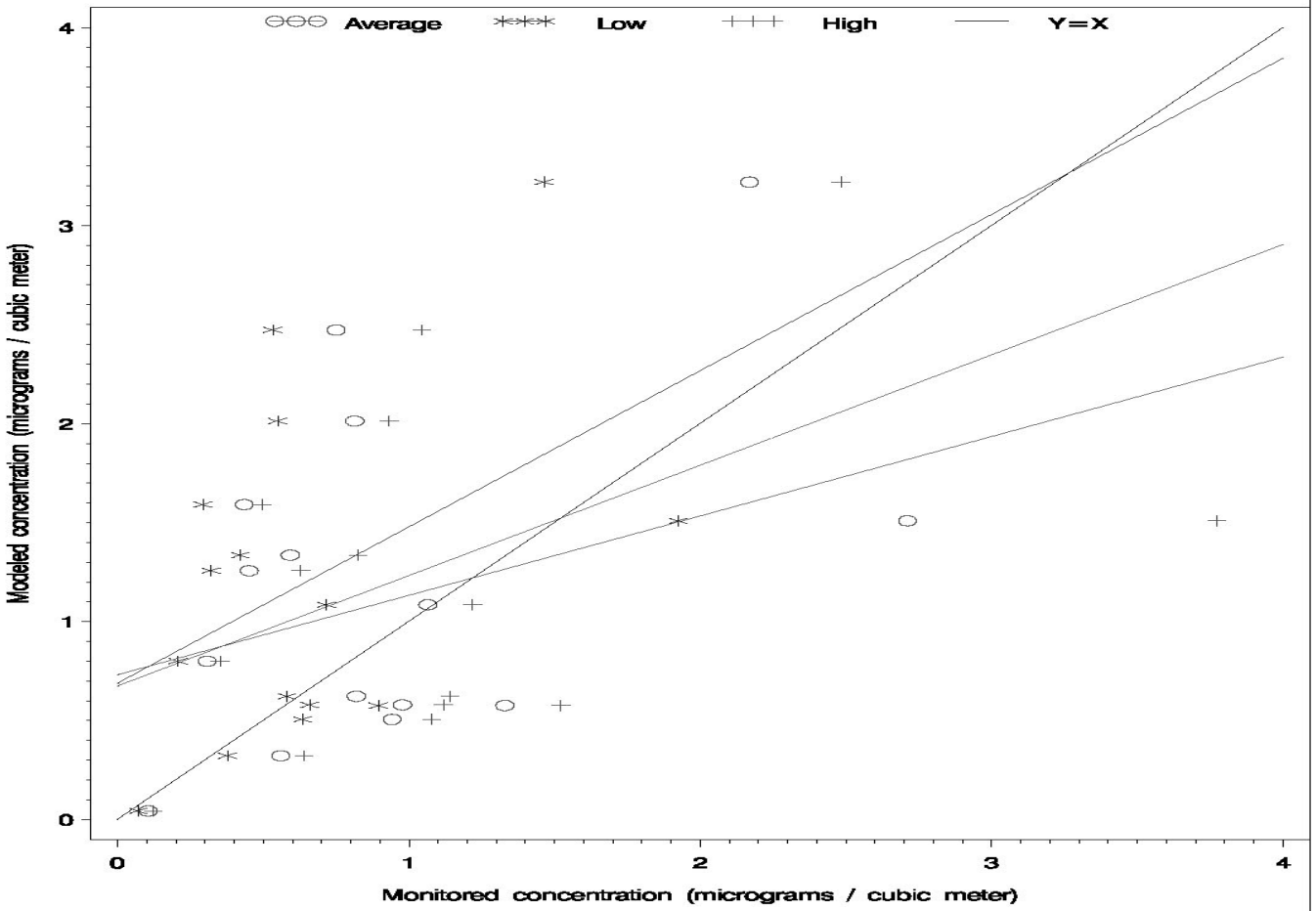
All	All sites
Non-road	Sites dominated by Non-road source (at least 75 % of modeled DPM consistent with the draft 2000 NONROAD Model
On-road	Sites dominated by On-road source (at least 50 % of modeled DPM consistent with the draft 2000 NONROAD Model

Figure 4—1
Scatter plot of nearest modeled DPM concentration against corrected monitored EC concentration based on TOR. EPA data excluded. All sites. Draft NONROAD 2000 Model.



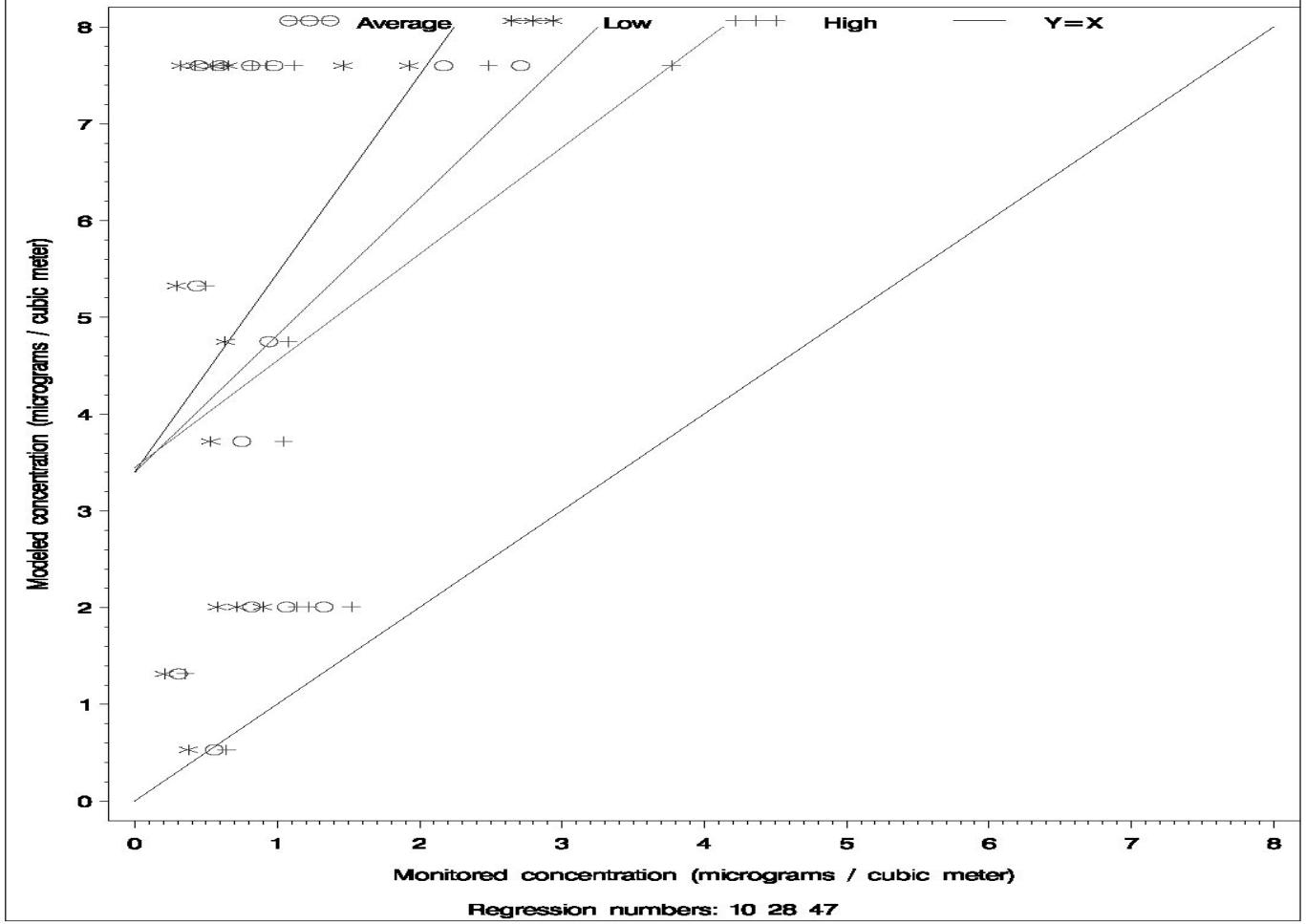
Regression numbers: 1 19 37

Figure 4−2
Scatter plot of nearest modeled DPM concentration against corrected monitored EC concentration based on TOR. EPA data excluded. All sites. Draft NONROAD 2002 Model.



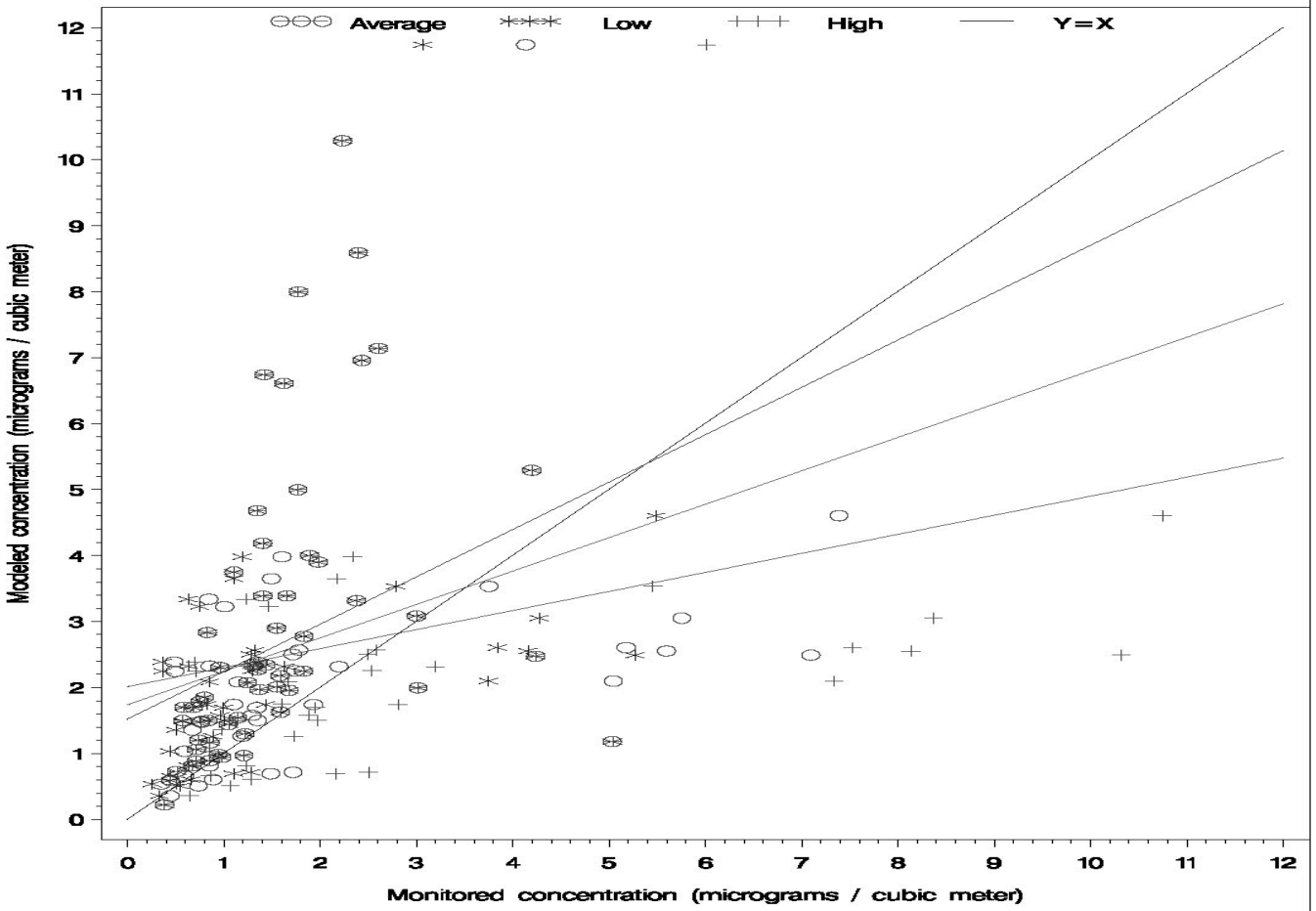
Regression numbers: 7 25 44

Figure 4–3
Scatter plot of nearby maximum modeled DPM concentration against corrected monitored EC concentration based on TOR. EPA data excluded. All sites. Draft NONROAD 2000 Model.



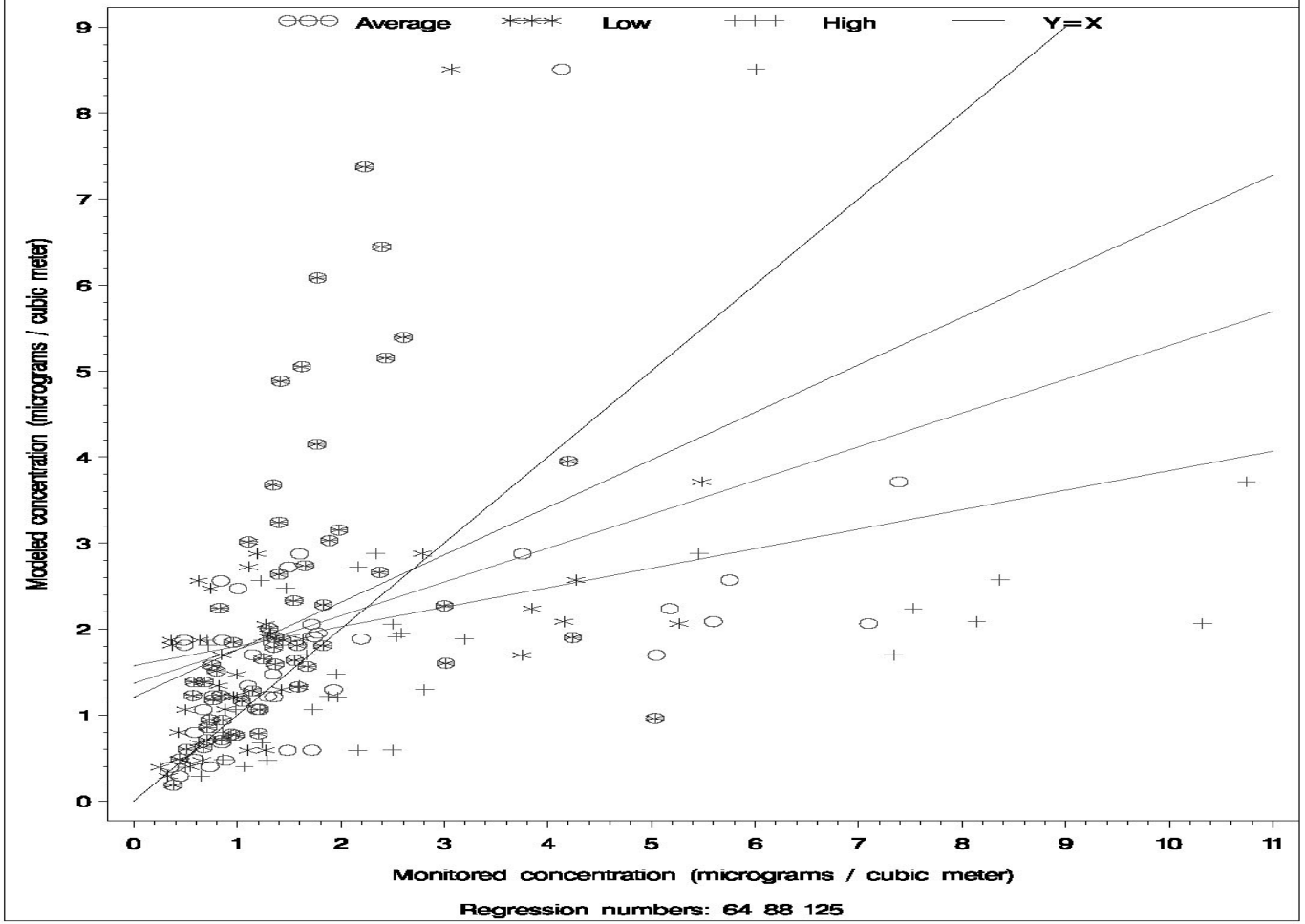
Regression numbers: 10 28 47

Figure 4 – 4
Scatter plot of nearest modeled DPM concentration against corrected monitored EC concentration based on TOT. All sites. Draft NONROAD 2000 Model.



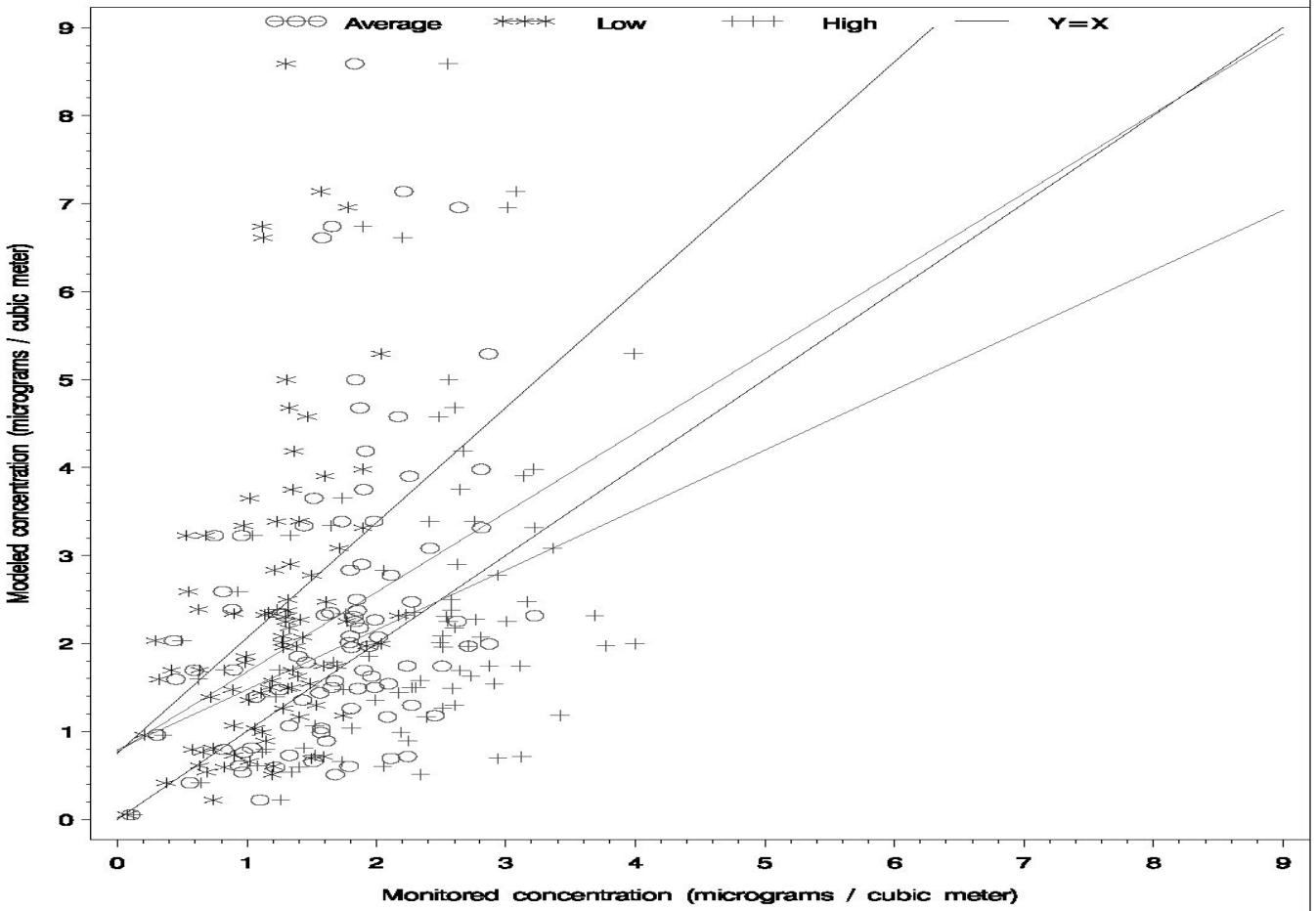
Regression numbers: 55 79 103

Figure 4–5
Scatter plot of nearest modeled DPM concentration against corrected monitored EC concentration based on TOT. All sites. Draft NONROAD 2002 Model.



Regression numbers: 64 88 125

Figure 4–6
Scatter plot of nearest modeled DPM concentration against corrected monitored EC concentration based on TOR. EPA data included. All sites. Draft NONROAD 2000 Model.



Regression numbers: 127 151 175

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