

**EmiLink: A Quantitative Mobile Source Air Toxics (MSATs) Analysis
Tool for the Dallas Fort Worth Region: *Loop 12 Roadway Alternative,*
*A Case Study, DFW, Texas***

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ABSTRACT

As part of the National Environmental Policy Act (NEPA) documentation, the Federal Highway Administration (FHWA) requires a project level quantitative Mobile Source Air Toxics (MSAT) analysis to identify the air quality effect of major transportation projects. Since the MSAT analysis procedure is consistent for all new or improved roadway projects undergoing an environmental review, the North Central Texas Council of Governments (NCTCOG) has automated the process by developing a module called EmiLink that is used on the back end of the regional travel demand model. Currently, using results from this tool, volume changes between a build and a no-build network are estimated for all roadway links for all analysis years. EmiLink has been successfully applied to numerous projects undergoing the NEPA process in the Dallas-Fort Worth (DFW) area, and has not only reduced the time required to complete a MSAT analysis, but also provides procedural and data assumption consistency. A sensitivity analysis was performed for the Loop-12 NEPA project in the DFW region which focused on pros and cons of the FHWA's current recommended procedure and other methods or parameters that can be utilized to identify transportation impacts in a project level MSAT analysis.

INTRODUCTION

Hazardous air pollutants are pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive or birth defects, or adverse environmental effects.¹ The United States Environmental Protection Agency (U.S. EPA) identified a group of 188 hazardous air pollutants as air toxics, and extracted 21 air toxics as MSAT, which are set forth in an EPA final rule.² Of these 21 MSAT, six pollutants are labeled as priority; these priority pollutants are benzene, formaldehyde, acetaldehyde, 1-3 butadiene, diesel particulate matter/diesel exhaust organic gases, and acrolein. Benzene, formaldehyde, acetaldehyde, 1-3 butadiene, and diesel exhaust are carcinogenic to humans by inhalation.³ Diesel exhaust also represents chronic respiratory effects.³ Acrolein is a potential carcinogenic for either the oral or inhalation route of exposure.³ Mobile sources are considered to be a significant contributor of air toxics.¹ Thus, the human health impact analysis of MSAT due to transportation projects is necessary. However, the U.S. EPA indicated that the project-specific health impact of MSAT emissions has not been fully investigated partly due to the lack of an appropriate technical tool.³ The FHWA provided an interim guidance for project level MSAT analysis and developed a tiered approach for analyzing MSAT in NEPA documents:

- No analysis for projects with no potential meaningful MSAT effects;
- Qualitative analysis for projects with low potential MSAT effects; or
- Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects.⁴

As per FHWA interim guidance, a quantitative MSAT analysis should be conducted for every new or improvement project that has an annual average daily traffic (AADT) volume greater than or equal to 140,000. A quantitative MSAT analysis involves estimating emission factors, identifying roadway links that have changed +/- 5 percent in volume between a build and a no-build transportation network scenario, and calculating emissions for the roadway links identified in the process for a base, intermediate, and horizon years. Since the MSAT analysis methodology is consistent for all new or

improved roadway projects, NCTCOG has automated the process using EmiLink, a tool that estimates emissions for every roadway network link for every hour of the day in the DFW region. This paper is broken down into two sections; the first section consists of a case study for the North West Highway (Loop 12) roadway, this analysis focuses on the methodology and outputs of the EmiLink tool, and the second section focuses on the current MSAT quantitative process and other alternatives to identify affected links in a 2015 build and corresponding no-build transportation network.

EMILINK MODULE

In 2007, the DFW metropolitan planning area had many projects that required a quantitative MSAT analysis. NCTCOG was responsible for providing travel data for build and no-build alternatives to consultants working on the MSAT portion of the NEPA document. Initially for all MSAT analyses, consultants were calculating emissions which were not consistent for all projects in the DFW region. To make the performance of these analyses more efficient, NCTCOG developed the EmiLink application which is displayed in **Figure 1**. EmiLink is a tool that calculates the emissions for all roadway links in the DFW region. Using the link-emissions output, comparisons are easily made between build and no-build scenarios for MSAT documentation.

Figure 1. EmiLink Application User Interface

The screenshot shows the 'AQ Report EmiLink (c:)' application window. It is divided into several sections:

- Reports:** A list of report options with checkboxes:
 - AQ Trip Length Distribution Report
 - AQ Report #1: Link, Speed, VMT (Reports for each Day and TOD)
 - All Days
 - Midweek only
 - AQ Report #3: Auto Truck VMT
 - AQ Report #5: VMT Distribution (Reports for each county)
 - AQ Report #6: Avg Loaded Speed Distribution (Reports for each county)
 - AQ Report #8: Center-Line Miles, Lane Miles (Reports for AM/PM/OP)
 - EmiLink: Link-Emissions Report
 - Generate TCI/ImpSum Reports
- ESTIMATED RUN TIME:** A box displaying '00:00:00'.
- Folders:** A series of dropdown menus for folder paths:
 - Drive Name: c:
 - Roadway Network Folder (RDWY):
 - Zone Structure Folder (GEO): GEO Folder
 - Zonal Activity Folder (ACT): ACT Folder
 - Airport Folder (APT): APT Folder
 - Transit Network Folder (TRNT): TRNT Folder
 - External Folder (EXT): EXT Folder
 - Output Folder Suffix:
 - Output Name Extra Description:
 - Output Month Name: Aug
 - Output Year Name: 07
- Required Variables:** Input fields for:
 - Name:
 - HPMS Factor: 1.017
 - Non-Recurring Congestion Factor: 0.961
 - Half Hour Factors:
 - Day Of Week Factors:
 - Perimeter Counties Representation: 'Other' County, Separate Counties
- MSAT:** File selection fields:
 - Rdw Correspondence File:
 - Pollutant-Emission Type File:
 - VMT Mix File:
 - Mobile 6 Emission Factor Files:

Buttons for 'Cancel' and 'Run' are located at the bottom of the window.

EmiLink provides three main advantages for the creation of the link emissions files. It provides a stream-lined process to go from the MOBILE6 Emission Factor files to the emissions output. It provides consistency in results by always incorporating Highway Performance Monitoring System (HPMS) and Automatic Traffic Recorder (ATR) factors into the calculation of volume and vehicle miles of travel (VMT). It also provides a graphical user interface developed in Microsoft Visual Basic for specifying the inputs; this is a more user-friendly interface than the text-based Job Control Format (JCF) required by current Texas Mobile Source Emissions Software. Because of these

advantages, EmiLink has successfully made the creation of the link-emissions files simpler and consistent.

In order to understand how to use EmiLink, the following sections present the input files, methodology, and output files of EmiLink.

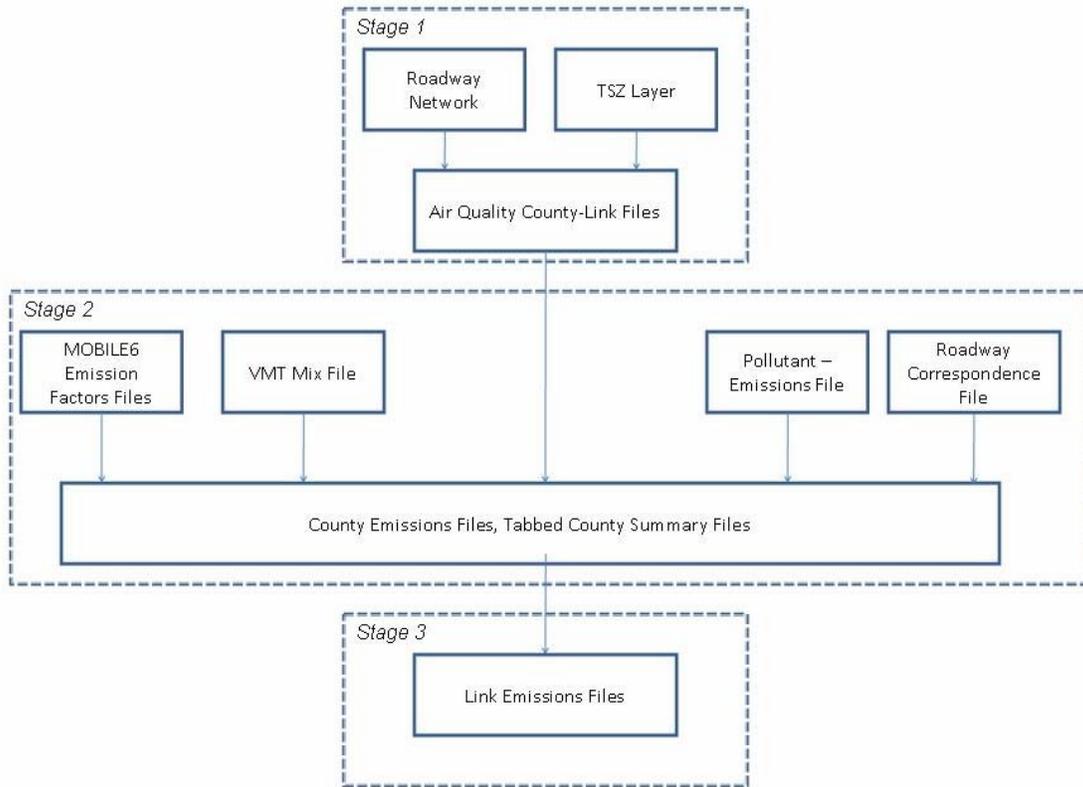
EmiLink Inputs

Inputs for EmiLink include emission factors calculated using the U.S. EPA MOBILE6, a roadway correspondence file, a roadway network file, vehicle speed and VMT calculated by the Dallas Fort Worth Regional Travel Model (DFWRTM), and other supplementary files such as VMT mix.

EmiLink Methodology

EmiLink runs in three stages. In the first stage, it processes output of the DFWRTM model run to generate a file that lists each direction of a roadway link, for each of the 26 time-of-day periods with the functional class, county, speed, length, VMT, and volume. In the second stage, EmiLink calculates emissions for each pollutant for both directions of each link and generates tabulated files for each county. In the third stage, EmiLink aggregates output from stage two into daily and annual Link Emissions files. The general flow of inputs and outputs is shown in **Figure 2**. This section will discuss the calculations performed in each stage.

Figure 2. Three Stages in EmiLink



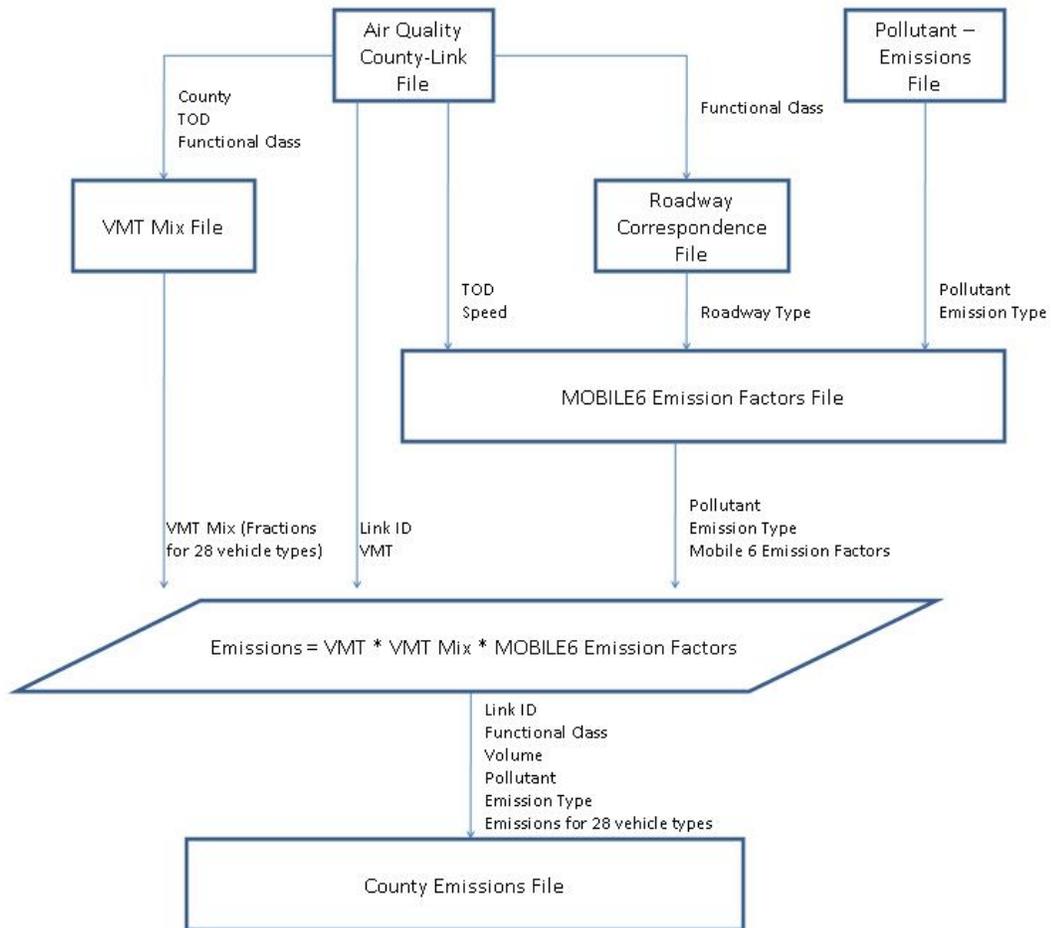
Stage One

In stage one, the program generates a record of each direction of a link for each time of day in the air quality county-link files; one file is created for each of the nine counties in the modeling area. Each record contains the link ID, endpoints of the link, the time of day, the county where the link is located, the functional class of the link, speed, VMT, and corresponding Traffic Survey Zone (TSZ). There are 26 time-of-day (TOD) periods: 22 of the TOD periods are hours, and the remaining four periods are half-hour periods representing parts of the hours that transition between peak and off-peak periods. To accurately represent the VMT and speed during these transitional hours, each of these hours are represented as two half-hour time of day periods.

Stage Two

In stage two, the program calculates emissions for each record of each county-link file produced in stage one for each pollutant-emission type pair. The process uses the air quality county-link files, the VMT mix file, the roadway correspondence file, the pollutant-emission type file, and MOBILE6 emission factor files. The process of converting these files into county emission files for each county is outlined in **Figure 3**. The main output files of this stage are nine county files containing pollutant emissions for 28 vehicle types for each direction of a link for each time of day. In addition, an emission summary file is created for each county.

Figure 3. Using Stage 2 Inputs to create County Emissions Files



Stage Three

In stage three, EmiLink calls a GISDK module in TransCAD to concatenate all nine county files created in stage two. Then, the module matches the link IDs within the files with links in the original roadway network file and aggregates the emissions, volume, and VMT for each link. The aggregation of all rows corresponding to a link is simply the sum of the values. For example, the aggregate volume of a link is the sum of the volumes for all rows with the same link ID, and the aggregate pollutant emissions of a link are the sum of the emissions for that pollutant for all rows with the same link ID. The resulting file contains the link ID, functional class, volume, VMT, and daily emissions for each pollutant. This file is called the daily Link-Emissions file.

The annual Link-Emissions file is also created by multiplying the volume, VMT, and daily emissions for each pollutant in the daily Link-Emissions file by 365. The details of the output files are documented in the next section.

Output Files

EmiLink output files include the daily Link-Emissions file, the annual Link Emissions file, the County Totals file, the Air Quality Report Information file, the Error Log file, and the Link Emissions Bin file. The main outputs of EmiLink are the daily and annual Link-Emissions files, which list the daily and annual emissions for each link respectively. In addition, the County Totals files generated after stage two summarize the link emissions by pollutant, time of day, and functional class. EmiLink also creates supplementary output files which include reports and logs that list input settings and intermediate stage output. The main output files are described in the sections below.

Daily Link-Emissions File

The daily Link-Emission File is a Dbase file which lists each link in the roadway network along with corresponding functional class, volume, VMT, and total pounds of emissions for each pollutant occurring each day. The total pounds of emission for each pollutant

equals the total pounds of emissions from all vehicle classes for the emission type “Composite.” An example of the daily Link-Emission file is shown in **Figure 4**.

Figure 4. Daily Link-Emission File Example

LINK_ID	FUNCL	VOLUME	VMT	SO4	OCARBON	ECARBON	PMTOTAL
4	3	833.7400	2334.4300	0.0016672448	0.0127499286	0.0280800937	0.0424972693
12	3	968.5600	1423.7300	0.0010136589	0.0075660506	0.0166416531	0.0252213639
33	2	11598.1000	23080.2500	0.0164843853	0.1260916629	0.2777043815	0.4202804514
35	3	1142.3800	1724.9900	0.0012257959	0.0090110446	0.0198034393	0.0300402814
63	3	4729.2800	9978.7800	0.0071239661	0.0543115531	0.1195947821	0.1810303107
373	3	2466.7600	6857.4900	0.0048892277	0.0368980459	0.0812060703	0.1229933504
501	2	12336.5400	40463.7900	0.0288846088	0.2200363724	0.4845028297	0.7334238490
1167	2	17613.0600	35930.5600	0.0267512101	0.1971530692	0.4342983749	0.6582026880
2969	4	829.6300	813.0400	0.0008510300	0.0038658155	0.0090316367	0.0137484823
3316	4	6764.6300	5141.1000	0.0053189338	0.0278278245	0.0656997580	0.0988465169
3460	4	2785.8700	1086.4900	0.0013638178	0.0055904145	0.0131468626	0.0201010951
3485	2	25585.8600	57824.0900	0.0510847314	0.5644883142	1.4039490009	2.0195220561
4268	1	29591.0900	29295.1900	0.0288155697	0.5470463805	1.4954162243	2.0712781816
4283	6	1975.8600	414.9200	0.0003532982	0.0041083002	0.0102237017	0.0146853002
4284	7	97.5300	142.4100	0.0001083426	0.0006175135	0.0014305935	0.0021564496
4285	3	22967.5700	14010.2000	0.0139476872	0.1379719515	0.3432747059	0.4951943470
4324	1	32342.9200	9056.0200	0.0089001319	0.1686176763	0.4609073169	0.6384251272
4349	7	6634.6400	2587.5100	0.0020171286	0.0143555563	0.0339549000	0.0503275853
4613	3	5556.2600	3944.9600	0.0033354316	0.0381357745	0.0948099973	0.1362812042
5218	4	5.1400	9.1000	0.0000071390	0.0000393159	0.0000910513	0.0001375062
5867	3	3483.7700	8465.5300	0.0070965875	0.0799040508	0.1984525202	0.2854531599
5923	3	1187.9900	3920.4500	0.0032997547	0.0378703631	0.0941472282	0.1353173467
6365	3	5490.6400	5216.1100	0.0043834921	0.0499428687	0.1241144328	0.1784407944
8136	3	7979.2700	27927.4000	0.0243239841	0.2717150582	0.6726209033	0.9686599481
8730	3	6942.9200	5970.8700	0.0051405061	0.0593459590	0.1470523908	0.2115388564
9138	4	1175.7800	1293.3400	0.0012768382	0.0060291107	0.0139150967	0.0212210456
9261	7	35.8700	23.3200	0.0000182488	0.0001100264	0.0002542453	0.0003825206
9262	6	4553.0800	637.4300	0.0005520669	0.0063027282	0.0156137429	0.0224685380
9285	6	3540.2300	601.8400	0.0005210118	0.0059354801	0.0147022333	0.0211587253
9286	7	0.0000	0.0000	0.0000000000	0.0000000000	0.0000000000	0.0000000000
9371	1	18479.4000	9424.4900	0.0094038721	0.1763838290	0.4811446076	0.6669323102

Annual Link-Emissions File

The annual Link Emission File is a Dbase file that lists each link in the roadway network along with the corresponding functional class, volume, VMT, and pounds of emissions for each pollutant occurring during the year. To obtain the values in the annual file, the values of volume, VMT, and pounds of emissions in the Daily Link-Emissions file are multiplied by 365.

County Totals Files

The County Totals text files are tab-delimited files that list the daily volume, VMT, and pounds of emissions for each pollutant for each functional class for each time-of-day period within a 24-hour period.

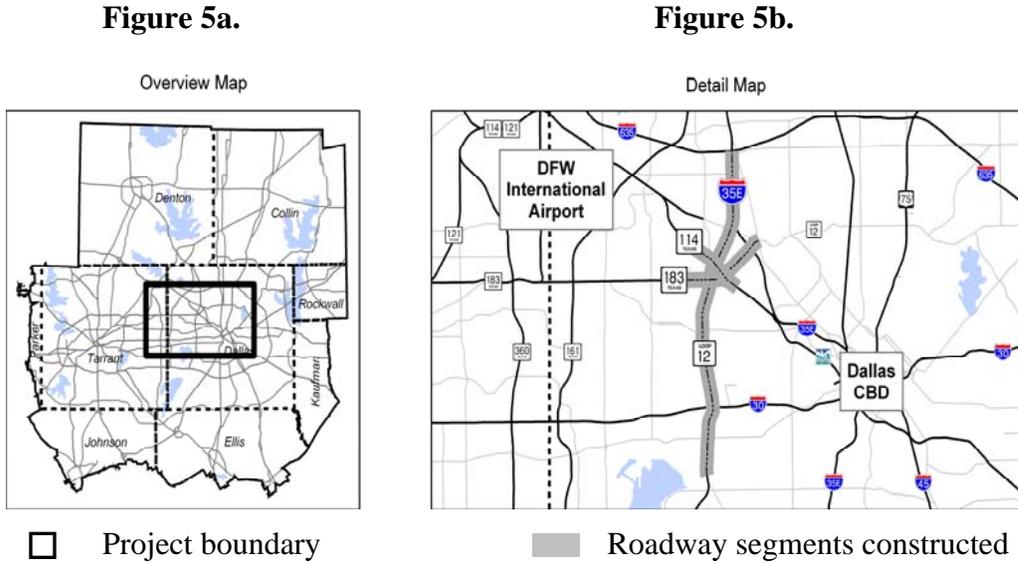
LOOP 12 ROADWAY CASE STUDY USING EMILINK

The EmiLink module was tested on the Loop 12 project in the DFW area to check the quality and reliability of the results. The results were consistent with the Texas Transportation Institute modules that were traditionally used for modeling emissions in the DFW region. The MSAT analysis using EmiLink accounts for traffic conditions during the directional peak (AM and PM) and off-peak periods throughout the day. Therefore, the analysis takes into account congestion speeds and associated traffic volumes during the morning and afternoon peak periods as well as the Off-peak conditions are modeled for the rest of the day. MSAT emissions are then calculated by applying emission factors (EFs) obtained from the EPA MOBILE6.2 vehicle emission factor model. When analyzing the Loop 12 project for MSATs, certain alternative scenarios were performed to identify affected transportation using different parameters including volume (recommended by FHWA), VMT, and emissions. It should be noted that the analyses in the following sections will not include local streets and ramps.

Geographic Location of the Loop 12 Roadway Project in DFW Area

Loop 12 is one of the major facilities west of Dallas that transports a large volume of vehicles in the DFW area (**Figure 5a**); it intersects with Interstate 30, Interstate 20, Highway 183, Highway 114, and connects with Interstate 35E. Several roadway segments are under construction in the Loop 12 corridor, as shown in the **Figure 5b**. This project has an AADT of more than 140,000; and therefore, to fulfill the FHWA requirements, this project requires a quantitative MSAT analysis be conducted and included in the corresponding NEPA document. The MSAT emission impact and alternative scenarios were analyzed for the 2015 build and no-build analysis year, the year the construction will be complete and the facility is open for use.

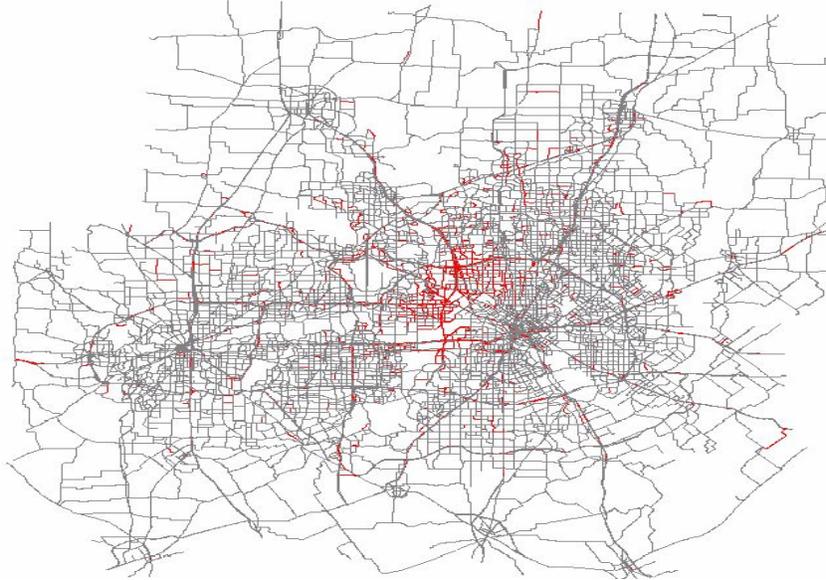
Figure 5. Roadway segments constructed as a part of projects near Loop 12 in the DFW area.



Identifying Affected Transportation Network Using Link Based Volumes (FHWA Recommended) and VMT Change

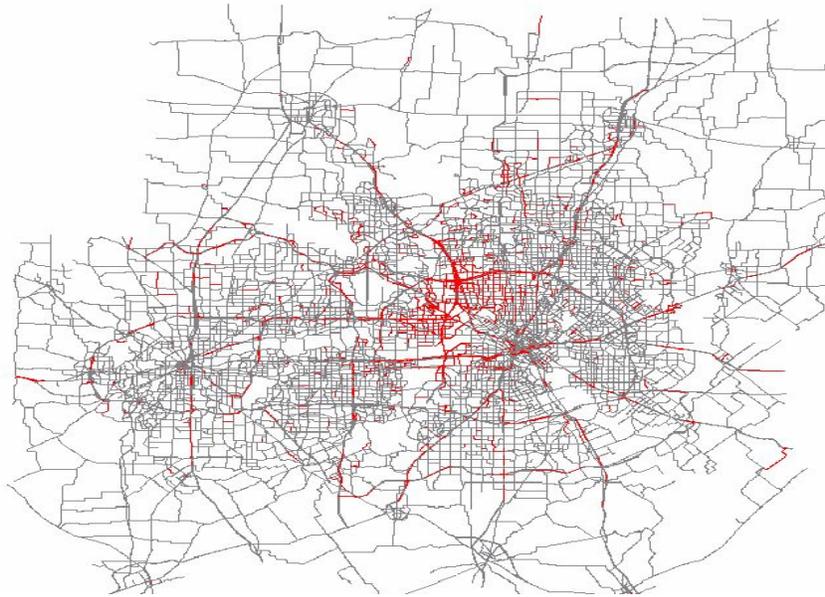
In this analysis, the 2015 affected transportation network is identified using a link-based volume change of ± 5 percent between a build and no-build alternative. As shown in **Figure 6**, affected links are identified throughout the DFW network. When the network was further examined, it revealed 2,177 links that had a ± 5 percent change in the volume, of which 911 links had an increase in volume while 1,266 links had a decrease in the volume. The change in total MSAT emissions in the affected transportation network of 2,177 links is only 3.38 lbs/day. It should be noted, some affected links are as far as 50 miles away from the project area, which does not truly represent project-affected links. The travel demand model works on an equilibrium assignment of volume, so a change at any geographic location in the network will have an impact on the entire network.

Figure 6. Affected transportation network based on a $\pm 5\%$ volume change



Similarly VMT was used to identify the affected transportation network. Similar to the volume analysis, the results reveal 2,181 links having an effect due to the Loop 12 project; this is shown in **Figure 7**. Of these affected links, only 918 links had an increase in VMT and the total MSAT emissions difference between a build and no-build alternative was 4.39 lbs/day.

Figure 7. Affected transportation network based on a $\pm 5\%$ VMT change



To identify the affected transportation network, link-based VMT and volume change of ± 10 percent were also analyzed. The affected links decreased drastically from 2,177 to 917 for ± 10 percent volume and 2,181 to 923 for ± 10 percent VMT. Still, the affected transportation links includes some that were far away from the project area. The total MSAT emissions from the affected links increased for both ± 10 percent volume and ± 10 percent VMT analysis. This shows that the ± 10 percent analysis targets more links that have increased emissions from a no-build to a build scenario. Similar analysis was also conducted for ± 5 percent or ± 10 percent change in emissions; the results were similar to VMT and volume analysis and are shown in the Analysis Summary section.

Correlation of Volume and Vehicle Miles of Travel against Emissions

FHWA uses volume as a surrogate for emissions to identify the affected transportation network. This was based on the judgment that ± 5 percent volume change will incorporate ± 5 percent change in the emissions on the congested highway links.⁶ From Figures 8a and 8b; it is evident that ± 5 percent change in the volume will yield ± 5 percent change in the emission and this is true with VMT also. Any percentage increase in the volume will have the same percentage increase in the emissions (**Equation 1**), with the exception of those caused

by link length changes. Results show that the MSAT emissions have a slightly higher correlation with VMT than with the volume.

Equation 1. $(\text{Volume}) * (\text{Link length}) * (\text{Emission factor}) = (\text{Emissions})$

8. Correlation between emission changes with volume (Figure 8a), and with VMT (Figure 8b)

Figure 8a
Volume vs. Emissions

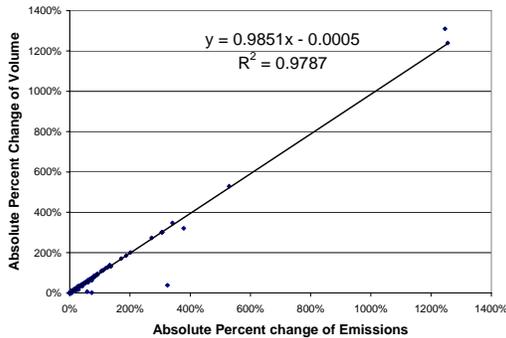
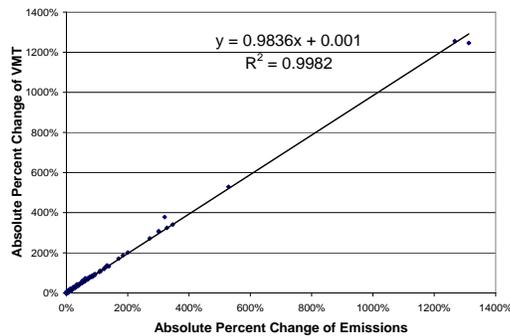


Figure 8b
VMT vs. Emissions



Emissions In Terms Of Volume and VMT

The percent change in volume/VMT is relative to the link-based volume/VMT between a build and a no-build alternative. One link may have a higher volume (> 1000) and another may have a smaller volume (< 100), but both may show up within the affected transportation network when ± 5 percent or ± 10 percent analysis is performed. The purpose of the MSAT analysis is to identify the roadway links that might have an adverse impact on public health. Due to the limitation in the dispersion modeling, exposure and risk analysis, it is difficult to assess project-level health impacts. Moreover, EPA does not have set standards for priority MSATs.

Numerous links were identified when a ± 5 percent or a ± 10 percent change in volume or VMT analysis was performed. Irrespective of the quantity of VMT or volume change, links were identified based on the relative change from a build to a no-build alternative. **Figure 9a** and **9b** show the average VMT and volume change bins on the freeway in the Loop 12 study and associated change in the emissions. We will find higher emission changes on freeways when compared to arterials for the same VMT; this difference can be attributed to speeds which affect emission factor and vehicle mix. But generally as VMT change bins increase, the associated emissions gradually increase. In the case of volumes, there is no linear relationship between volume change bins and emissions, and this is because of the difference in the link lengths. The charts below show how much emissions will change when there is an absolute VMT/volume change as a result of implementing the project.

Figure 9. MSAT emission changes with the corresponding volume changes (Figure 9a) and with the VMT changes (Figure 9b).

Figure 9a
Volume vs. Emissions

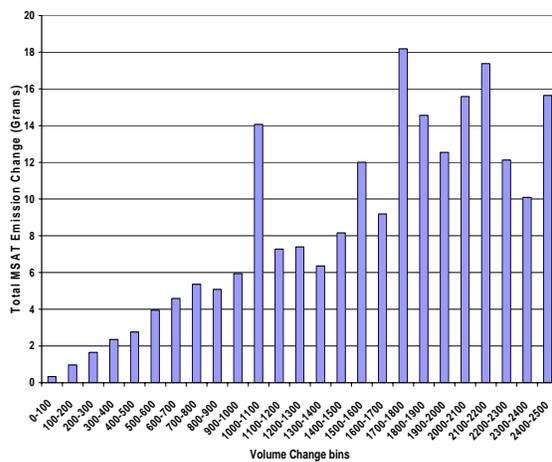
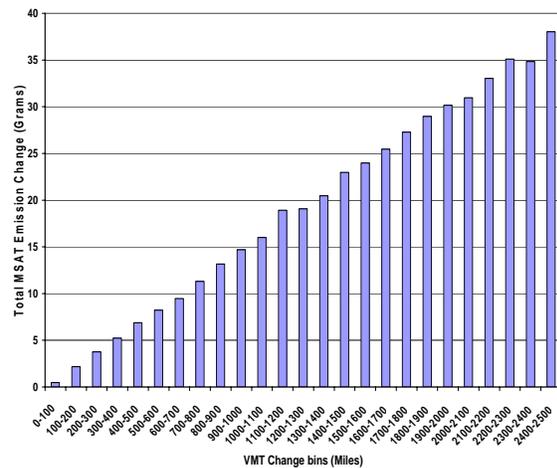


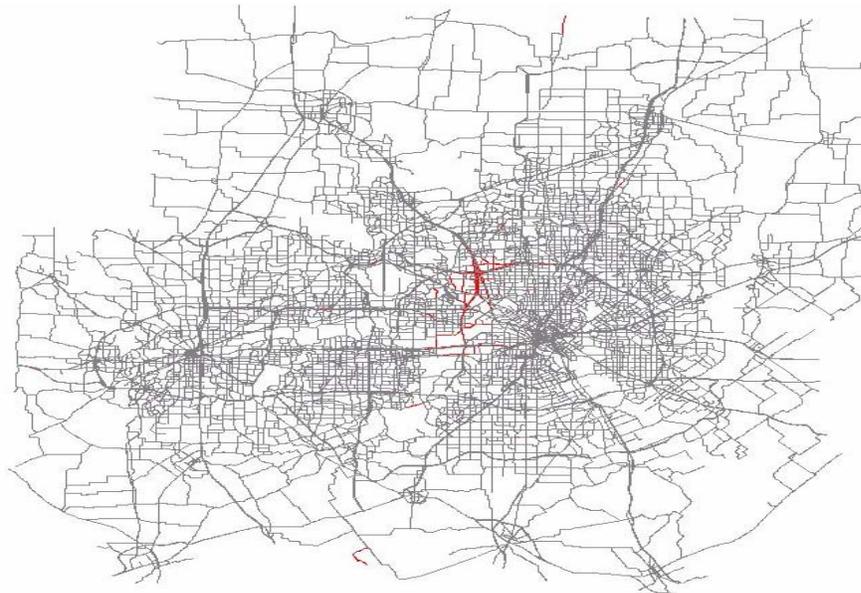
Figure 9b
VMT vs. Emissions



Emission Threshold Analysis (0.04 Lbs/Day)

As shown in the previous sections, a ± 5 percent or a ± 10 percent volume, VMT or emissions change by link was unable to capture the project area of influence because links were identified throughout the transportation network. As a result, an absolute emission threshold of 0.04 lbs/day (18.1 grams) was used as an emission threshold; this threshold is an arbitrary value, and not based on scientific study. When this absolute threshold value of 0.04 lbs/day emission change per link was applied as a condition to identify the affected transportation network, more than 95 percent of the links were identified at the vicinity of the project area as shown in **Figure 10**. Another important aspect of this study is the total MSAT emissions difference between build and no-build for the affected transportation network is 14.55 lbs/day, which captured the largest emission changes among the various analysis performed in this case study as shown in Table 1.

Figure 10. Affected transportation network based on 0.04 lbs/day threshold of emission changes



Analysis Summary

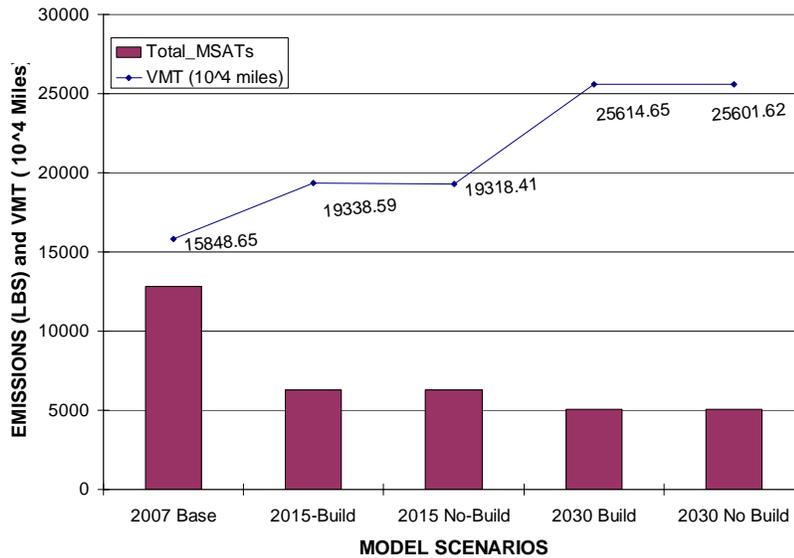
Table 1 summarizes results for all scenarios performed as part of the Loop 12 project. Table 1 clearly shows that a ± 5 percent or a ± 10 percent volume, VMT, and emissions change analysis produces similar results and the minimum and maximum emission changes captured are also the same. Even though only 268 links were identified as being part of the affected transportation network in the case of the emission threshold scenario, the net emission change from a no-build to a build alternative was high. Also, the area of influence from the project is very small.

Table 1. Summary statistics of Loop 12 Project Analysis

Approach	No. of Affected Links	Net MSAT Emissions (lbs/day)	Minimum Emissions (lbs/day)	Maximum Emissions (lbs/day)	Region Covered	Comments
A. $\pm 5\%$ volume change/link	2177	3.380	-0.583	1.109	Large	This does not capture the maximum increase in emissions
B. $\pm 10\%$ volume change/link	917	3.523	-0.583	1.109	Medium	
C. $\pm 5\%$ VMT change/link	2181	4.398	-0.583	1.109	Large	
D. $\pm 10\%$ VMT change/link	923	5.923	-0.583	1.109	Medium	
E. $\pm 5\%$ emissions change/link	2301	4.183	-0.583	1.109	Large	
F. $\pm 10\%$ emissions change/link	969	5.577	-0.583	1.109	Medium	
G. >0.04 lbs/day (18.1 grams) of Absolute emissions change/link	268	14.555	-0.583	1.326	Small	This captures the maximum increase in emissions

The regional level emission change from a build to no-build alternative for the Loop 12 project is negligible as shown in **Figure 11**. Results also show the overall region-wide VMT change is only 0.1%. The national control programs that are projected by EPA are going to reduce MSAT emissions significantly by the design year even though they are high in the base year (**Figure 11**).

Figure 11. Temporal trend of MSAT and VMT in the DFW area



CONCLUSION AND RECOMMENDATIONS

EmiLink was initially created to provide consistent calculations of MSATs for roadway links for projects within the DFW metropolitan area. It was used successfully for a number of projects and was able to reduce the calculation time as well as significantly decrease the cost from initial estimates.

For the ease of use in development, EmiLink was created to work with the NCTCOG regional travel model, DFWRTM, and their current transportation planning environment of TransCAD. After it was implemented, tested, and applied to many projects successfully, it was realized that EmiLink also can be applied to other regions.

To apply EmiLink to other regions, the main changes needed would be to remove the application's use of TransCAD macros and file types, and remove the user interface's connection to the DFWRTM folder structure. Since not all regions use the TransCAD software, TransCAD file types could no longer be the only acceptable input format. To implement this change, stage one of the process would have to be modified to accept roadway network data for each link in a more universal format, such as a Dbase format. Similarly, stage one and stage three use macros currently written in TransCAD's GISDK programming language would have to be rewritten in a planning software-independent programming language. In the user interface, folder locations of certain files such as pollutant-emission type files and roadway network files are hard-coded in the system; although, specific filenames are specified by the user. The user interface would need to be modified to remove restrictions on folder location of input files. When these changes can be made, EmiLink can help other regions calculate their link emissions and handle MSAT analyses more reliably, consistently, and efficiently.

A small percentage change on every network link will always be observed because the model uses a user equilibrium approach. The affected network area will always be questionable because there is no limit as to what specific volume, VMT, and emissions change puts the public health in danger. The current MSAT analysis practiced in Texas is

a laborious process, which involves identifying affected links in the design year and matching the links with intermediate and base years. Instead, the MSAT analysis should target only the links that have increased emissions from a build to a no-build alternative. After analyzing all the scenarios used for identifying the affected transportation network and taking the time and current knowledge into consideration, this case study shows that applying an emission threshold yields better results. Further studies are required to establish an appropriate threshold. One of the shortcomings with this method would be the initial (no-build) emission levels for different roadway types and for different geographic location types will be different. So, it would be unreasonable to employ a universal change of 0.04lbs/day to identify the affected transportation network. Finally, findings of this study recommend that the U.S. EPA and FHWA develop a tiered process for quantitative MSAT analysis, which will target only the affected roadway links.

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KEYWORDS

- Air Toxic
- MSATs
- EmiLink
- Project-level analysis
- MSAT analysis