APPENDIX D

EAW ITEM 16 - AIR

Air Quality Memo
TH 10 Auxiliary Lane Addition (SP 6205-39)
Arden Hills, MN

Project Description

The Minnesota Department of Transportation (MnDOT) and the Federal Highway Administration (FHWA), in coordination with Arden Hills and Ramsey County, are proposing to construct an auxiliary lane on eastbound Trunk Highway (TH) 10 from southbound Interstate (I)-35W to County State Aid Highway (CSAH) 96 in Arden Hills, Ramsey County, including constructing a 2nd lane on the exit ramp from southbound I-35W to TH 10.

Legislative Background[1]

The Clean Air Act (CAA), passed by Congress in 1970 and updated in 1977 and 1990, is comprehensive national legislation relating to air quality. The CAA of 1970 established six criteria pollutants (carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide) and required the United States Environmental Protection Agency (USEPA) to set National Ambient Air Quality Standards (NAAQS) for these pollutants that are set at levels protective of vulnerable persons, with a margin of safety. The standards must be review periodically to be reflective of new research findings.

The USEPA Conformity Rule, 40 CFR Part 93, requires each Metropolitan Planning Organization (MPO) in an air quality nonattainment or maintenance area to determine conformity of its Metropolitan Transportation Plans (MTP in the Twin Cities Region, the Transportation Policy Plan (TPP)) and Transportation Improvement Programs (TIP). The TPP and TIP conform to the implemented schedule of Transportation Control Measures (TCM) established in the air quality State Implementation Plan (SIP) and the SIP emissions budget. In addition to the conformity requirements that apply to the plan and TIP, USDOT is also required to make conformity determinations for individual federal projects.

Conformity is demonstrated if the plan, program or project does not:

- Cause new violations of the air quality standards,
- Exacerbate existing violations of the standards, or
- Delay attainment of the standards or achievement of any required interim milestones.

Currently in Minnesota, the conformity Rule requirements only apply only to the Twin Cities area. It is anticipated that the Twin Cities' maintenance area will be redesignated to attainment in 2019.

The National Environmental Policy Act (NEPA) is a broad national framework for the protection of the environment. It establishes environmental policy, provides an interdisciplinary framework to prevent undue environmental damage, and provides procedures to be followed so that environmental factors are considered by decision-makers.

[1] HPDP/Scoping/Subject Guidance, Minnesota Department of Transportation, page 2 of 15, May 18, 2017

There are no established criteria for determining when Mobile Source Air Toxics (MSAT) emissions become a significant issue in the NEPA context because tools and techniques for assessing project-specific health outcomes are limited.

Attainment Designation

Ramey County is in attainment for 3 of the six NAAQS and in maintenance for carbon monoxide (CO), particulate matter (PM10) and sulfur dioxide.

Air Quality Analysis

Based on MnDOT, FHWA and United States Environmental Protection Agency guidelines and procedures the air quality analysis will address CO and MSATs.

CO Hot Spot Screening

"The Twin Cities area has an EPA approved screening method where each potential hot spot project is compared to a set of the "worst" intersections (highest Annual Average Daily Traffic (AADT) and worst Level of Service (LOS). If the project does not meet the AADT benchmark criteria and does not affect one of the top ten modeled intersections, EPA has concluded it will not cause any carbon monoxide (CO) violations."[2]

The intersection benchmark criteria is 82,300 annual average daily traffic (AADT) approaching an intersection in the Twin Cities CO maintenance area. The approach volumes for the intersection of the southbound off-ramp from TH 10 with CSAH 96 in 2040 are as follows[3]:

- Southbound off-ramp from TH 10 7,400
- Eastbound CSAH 96 8,650
- Westbound CSAH 96 12,300

- 2040 Total Approach Volume 28,350

The results of the screening analysis demonstrate that the project does not require a CO hot-spot analysis.

MSATs

In compliance with FHWA Guidance on MSAT analysis, this memo presents background information on MSATs and a qualitative discussion.

In October 2016 FWHA issued updated guidance for the analysis of MSATs in the National Environmental Policy Act (NEPA) process for highway projects (*Updated Interim Guidance on Mobiles Source Air Toxic Analysis in NEPA Documents*). The following language is consistent with the FHWA guidance documents.[4]

[2] IBID, page 6 of 15.
[3] Jason Junge (DOT) to Natalie Ries (DOT), "RE: SP 6205-39 US 10 - traffic data for noise analysis", May 5, 2017.
[4] https://www.fhwa.dot.gov/Environment/air_quality/air_toxics/policy_and_guidance/index.cfm

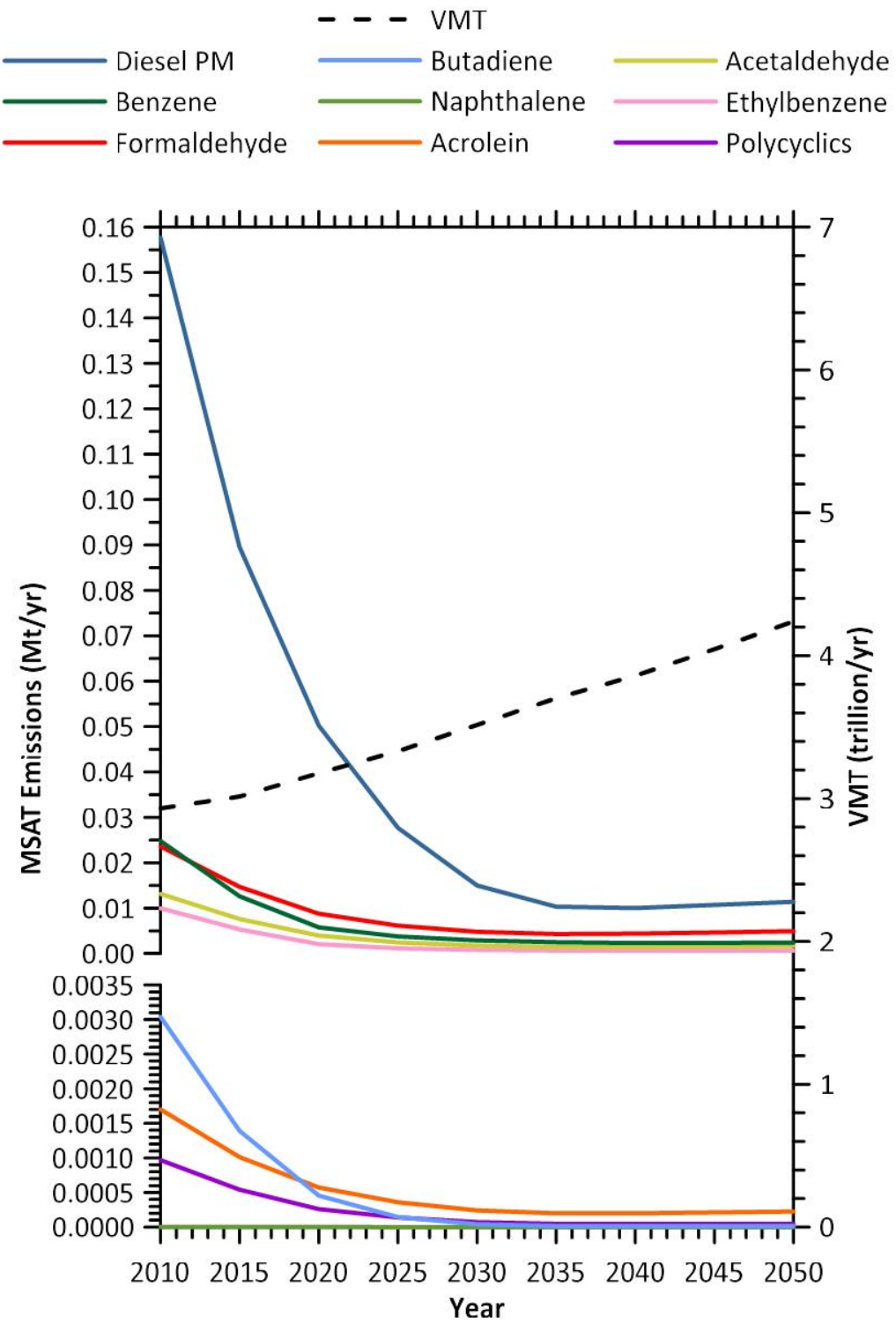
Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the U.S. Environmental Protection Agency (EPA) regulate 188 air toxics, also known as hazardous air pollutants. The EPA assessed this expansive list in its rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007), and identified a group of 93 compounds emitted from mobile sources that are part of EPA's Integrated Risk Information System (IRIS).[5] In addition, EPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers or contributors and non-cancer hazard contributors from the 2011 National Air Toxics Assessment (NATA).[6] These are *1,3-butadiene,acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter.* While FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules.

Motor Vehicle Emissions Simulator (MOVES)

According to the USEPA, MOVES2014 is a major revision to MOVES2010 and improves upon it in many respects. MOVES2014 includes new data, new emissions standards, and new functional improvements and features. It incorporates substantial new data for emissions, fleet, and activity developed since the release of MOVES2010. These new emissions data are for light- and heavy-duty vehicles, exhaust and evaporative emissions, and fuel effects. MOVES2014 also adds updated vehicle sales, population, age distribution, and vehicle miles travelled (VMT) data. MOVES2014 incorporates the effects of three new Federal emissions standard rules not included in MOVES2010. These new standards are all expected to impact MSAT emissions and include Tier 3 emissions and fuel standards starting in 2017 (79 FR 60344), heavy-duty greenhouse gas regulations that phase in during model years 2014-2018 (79 FR 60344), and the second phase of light duty greenhouse gas regulations that phase in during model years 2017-2025 (79 FR60344). Since the release of MOVES2014, EPA has released MOVES2014a. In the November 2015 MOVES2014a Questions and Answers Guide,[7] EPA states that for on-road emissions, MOVES2014a adds new options requested by users for the input of local VMT, includes minor updates to the default fuel tables, and corrects an error in MOVES2014 brake wear emissions. The change in brake wear emissions results in small decreases in PM emissions, while emissions for other criteria pollutants remain essentially the same as MOVES2014.

Using USEPA's MOVES2014a model, as shown in Figure 1, FHWA estimates that even if VMT increases by 45 percent from 2010 to 2050 as forecast, a combined reduction of 91 percent in the total annual emissions for the priority MSAT is projected for the same time period.

[5] https://www.epa.gov/iris
[6] https://www.epa.gov/national-air-toxics-assessment
[7] https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100NNR0.txt



Note: Trends for specific locations may be different, depending on locally derived information representing vehicle-miles travelled, vehicle speeds, vehicle mix, fuels, emission control programs, meteorology, and other factors

Source: EPA MOVES2014a model runs conducted by FHWA, September 2016.

Figure 1
MSAT Trends

Diesel PM is the dominant component of MSAT emissions, making up 50 to 70 percent of all priority MSAT pollutants by mass, depending on calendar year. Users of MOVES2014a will notice some differences in emissions compared with MOVES2010b. MOVES2014a is based on updated data on some emissions and pollutant processes compared to MOVES2010b, and also reflects the latest Federal emissions standards in place at the time of its release. In addition, MOVES2014a emissions forecasts are based on lower VMT projections than MOVES2010b, consistent with recent trends suggesting reduced nationwide VMT growth compared to historical trends.

MSAT Research

Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede the ability to evaluate how potential public health risks posed by MSAT exposure should be factored into project-level decision-making within the context of NEPA.

Nonetheless, air toxics concerns continue to arise on highway projects during the NEPA process. Even as the science emerges, the public and other agencies expect FHWA to address MSAT impacts in its environmental documents. The FHWA, EPA, the Health Effects Institute, and others have funded and conducted research studies to try to more clearly define potential risks from MSAT emissions associated with highway projects. The FHWA will continue to monitor the developing research in this field.

NEPA Context

The NEPA requires, to the fullest extent possible, that the policies, regulations, and laws of the Federal Government be interpreted and administered in accordance with its environmental protection goals, and that Federal agencies use an interdisciplinary approach in planning and decision-making for any action that adversely impacts the environment (42 U.S.C. 4332). In addition to evaluating the potential environmental effects, FHWA must also take into account the need for safe and efficient transportation in reaching a decision that is in the best overall public interest (23 U.S.C. 109(h)). The FHWA policies and procedures for implementing NEPA are contained in regulation at 23 CFR Part 771.

Consideration Of MSAT In NEPA Documents

The FHWA developed a tiered approach with three categories for analyzing MSAT in NEPA documents, depending on specific project circumstances:

(1) No analysis for projects with no potential for meaningful MSAT effects;
(2) Qualitative analysis for projects with low potential MSAT effects; or
(3) Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects.

For projects warranting MSAT analysis, all nine priority MSAT should be considered.

The proposed TH 10 project would take place within the existing right-of-way along an established area of Arden Hills with an estimated 2040 AADT of 57,900 vehicles. Therefore, since this project has a low potential to affect MSAT emissions, a Tier II qualitative analysis was deemed appropriate by the FHWA and MnDOT.

Tier II Qualitative Project-Level MSAT Analysis

The amount of mobile source air toxics (MSAT) emitted for the No Build and Preferred Alternative in this environmental document would be similar as the AADT for both alternatives is the same. According to the USEPA's MOVES2014 model, emissions of all of the priority MSAT decrease as speed increases. Therefore, the construction of the auxiliary lane could reduce congestion and result in lower MSAT emissions. Regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of USEPA's national control programs that are projected to reduce annual MSAT emissions by over 90 percent between 2010 and 2050 (Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents, Federal Highway Administration, October 12, 2016). Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

The auxiliary lane contemplated as part of the project alternatives will have the effect of moving some traffic closer to nearby homes and businesses; therefore, under the build alternative there may be localized areas where ambient concentrations of MSAT could be higher than with the No Build Alternative. The localized increases in MSAT concentrations would likely be most pronounced along TH 10 from I-35W to CSAH 96 under the proposed Build Alternative. However, the magnitude and the duration of these potential increases compared to the No-Build alternative cannot be reliably quantified due to incomplete or unavailable information in forecasting project-specific MSAT health impacts. In sum, when a highway is widened, the localized level of MSAT emissions for the Build Alternative could be higher relative to the No Build Alternative, but this could be offset due to increases in speeds and reductions in congestion (which are associated with lower MSAT emissions). However, on a regional basis, USEPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be significantly lower than today.

Incomplete or Unavailable Information for Project-Specific MSAT Health Impacts Analysis

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in mobile source air toxic (MSAT) emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The USEPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air

pollutants and MSAT. The USEPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (EPA, https://www.epa.gov/iris). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). A number of HEI studies are summarized in Appendix D of FHWA's Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents. Among the adverse health effects linked to MSAT compounds at high exposures are: cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations (HEI Special Report 16, https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects) or in the future as vehicle emissions substantially decrease.

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts – each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI (Special Report 16, https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-review-literature-exposure-and-health-effects). As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The EPA states that with respect to diesel engine exhaust, "[t]he absence of adequate data to develop a sufficiently confident dose-response relationship from the epidemiologic studies has prevented the estimation of inhalation carcinogenic risk (EPA IRIS database, Diesel Engine Exhaust, Section II.C. https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0642.htm#quainhal)."

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the

maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine an "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA's approach to addressing risk in its two step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable (https://www.cadc.uscourts.gov/internet/opinions.nsf/284E23FFE079CD59852578000050C9DA/$file/07-1053-1120274.pdf).

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

Conclusion

Based on the CO Hot Spot Screening the proposed TH 10 auxiliary lane will not create a violation of the CO NAAQS or delay attainment of the standards or achievement of any required interim milestones. In addition, the FHWA and MnDOT have provided a qualitative analysis of MSAT emissions relative to the No-Build and Build Alternatives. The FHWA and MnDOT have acknowledged that the project may result in increased exposure to MSAT emissions in certain locations, although the concentrations and duration of exposures are uncertain, and because of this uncertainty, the health effects from these emissions cannot be reliably estimated.