APPENDIX L. AIR QUALITY TECHNICAL REPORT

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America's River Crossing on I-55 over the Mississippi River Bridge Replacement

Shelby County, TN | Crittenden County, AR

TDOT PIN 132733.01

ARDOT Job 110836

FAP NHPP-01-8(74)

Air Quality Technical Report

US Army Corps of Engineers

Last Updated: September 2024

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Executive Summary

The air quality evaluation was conducted per TDOT's *Tennessee Environmental Procedures Manual* (TDOT, 2011).

The purposes of this analysis are to address the transportation conformity requirements for the project, the potential Mobile Source Air Toxics (MSATs) effects, Green House Gases (GHG) (climate change), and construction air quality.

The proposed project would replace the existing I-55 bridge with a new bridge from Bridgeport Road in West Memphis, Arkansas at Exit 1 to the E.H. Crump interchange in Memphis. The proposed project is approximately 1.5 miles long and the new bridge would be located approximately 200 feet south of the existing bridge, with two travel lanes and one auxiliary lane in each direction. The proposed project is located in Shelby County, Arkansas and Crittenden County, Arkansas, within the Memphis, TN-MS-AR Area, which is in maintenance status for 8-hour (2008) ozone (O_3).

This project will be included in the updated Transportation Improvement Program (TIP) and an abbreviated conformity analysis will be prepared so that the project conforms to the State Implementation Plan (SIP). A copy of the updated TIP page will be included in Appendix A once published.

The proposed project would consist of replacing the existing I-55 bridge with a new bridge. The highest projected design year 2050 average annual daily traffic (AADT) on I-55 is 70,000 vehicles per day, which is substantially lower than the Federal Highway Administration (FHWA) criterion. Therefore, the project qualifies as a project with low potential for MSATs effects and a qualitative analysis was completed. The projected VMT for the No-Build Alternative is 757,961 miles and the projected VMT for the Build Alternative is 805,634 miles, a 6 percent increase. The 6 percent increase in VMT is not considered an appreciable difference in VMT, and therefore, is not expected to result in a measurable difference in overall MSATs emissions. Reduced MSATs emissions are expected in the immediate project area under the Build Alternative in the design year, relative to the No-Build Alternative. The reductions are due to the reduced VMT associated with more direct routing and EPA's MSATs reduction programs. Additionally, EPA's vehicle and fuel regulations coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region wide MSATs levels to be significantly lower than today.

An GHG analysis that presents the relationship between current and projected Tennessee highway carbon dioxide (CO_2) emissions and total global CO_2 emissions, as well as

information on the scale of the project relative to statewide travel activity was completed for the proposed project. CO_2 emissions from motor vehicles in the entire state of Tennessee are projected to contribute less than one half of one percent of global emissions in 2020 (0.120 percent). These emissions are projected to contribute an even smaller fraction (0.087 percent) in Design Year 2050. Vehicle miles traveled (VMT) in the project study area in Design Year 2050 represents 0.018 percent of total Tennessee travel activity, and the project itself would increase statewide VMT by 0.297 percent. As a result, FHWA estimates that the proposed project could result in a potential increase in global CO_2 emissions in Design Year 2050 of 0.00002 percent (approximately 0.02-thousandths of one percent), and a corresponding increase in Tennessee's share of global emissions in 2050 from 0.08746 to 0.08748 percent. MOVES projections suggest that Tennessee motor vehicle CO_2 emissions may decrease by 9 percent between 2020 and 2050; even though VMT increases; this is due to EPA's GHG emissions standards and tighter fuel economy standards.

FHWA has concluded, based on the nature of GHG emissions and the potential GHG impacts of the proposed action, that the GHG emissions from the proposed action will not result in "reasonably foreseeable significant effects on the human environment" (40 CFR 1502.21).

Construction activities will generate intermittent and temporary construction-related pollutant emissions and dust. TDOT's construction specifications will apply to this project. Construction procedures should be governed by the *Standard Specifications for Road and Bridge Construction* as issued by TDOT and as amended by the most recent applicable supplements.

1.0 Introduction

This report summarizes the results of an analysis of the potential air quality effects of the proposed replacement of the I-55 bridge. The western endpoint of this corridor aligns with the existing I-55, located just east of Bridgeport Road in Arkansas at Mile Marker 1. The route would generally follow the path of the existing I-55 alignment and the existing I-55 Mississippi River Bridge. The proposed centerline of the new bridge would be positioned approximately 200 feet to the south of the outermost southern edge of the existing bridge. Upon entering Tennessee, the corridor traverses E.H. Crump Park and seamlessly connects with the existing I-55, situated just north of the French Fort neighborhood and to the west of the proposed E. H. Crump Interchange at Mile Marker 12, which is currently under construction. The proposed project is located in Shelby County, Tennessee and Crittenden County, Arkansas and is approximately 1.5 miles long. The project area is shown in **Figure 1.**

2.0 Air Quality Evaluation

The air quality evaluation was conducted per TDOT's *Tennessee Environmental Procedures Manual* (TDOT 2011).

The purposes of this analysis are to address the transportation conformity requirements for the project, the potential Mobile Source Air Toxics (MSATs) effects, Green House Gases (GHG) (climate change), and construction air quality.

2.1 National Ambient Air Quality Standards (NAAQS)

The United States Environmental Protection Agency (EPA) has established allowable concentrations and exposure limits called the National Ambient Air Quality Standards (NAAQS) for various "criteria" pollutants. These pollutants include carbon monoxide (CO), nitrogen oxides (NO_x), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), sulfur oxides (SO_x), and lead (Pb).

Per the Clean Air Act Amendments of 1990 (CAAA of 1990), EPA identified areas that did not meet the NAAQS for the criteria pollutants and designated them as "nonattainment" areas. Once a nonattainment area meets the NAAQS, it is redesignated as a "maintenance" area.

The project is in the Memphis, TN-MS-AR Area ozone (O_3) maintenance area.

2.2 Transportation Conformity

Transportation conformity is a process required of Metropolitan Planning Organizations (MPOs) under the CAAA of 1990. CAAA requires that transportation plans, programs, and projects in nonattainment or maintenance areas that are funded or approved by the FHWA conform to the State Implementation Plan (SIP), which represents the state's plan to either achieve or maintain the NAAQS for a particular pollutant.

Projects conform to the SIP if they are included in a fiscally constrained and conforming Transportation Improvement Program (TIP).

The project is located in the Memphis, TN-MS-AR Area. This project will be included in the updated TIP and an abbreviated conformity analysis will be prepared so that the project conforms to the SIP. A copy of the updated TIP page will be included in Appendix A once published.

2.3 Mobile Source Air Toxics

On February 3, 2006, the FHWA released "*Interim Guidance on Air Toxic Analysis in NEPA Documents.*" This guidance was superseded on September 30, 2009, December 6, 2012, October 16, 2016 and most recently on January 23, 2023 by FHWA's "*Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents.*" (FHWA 2023). The purpose of FHWA's guidance is to advise on when and how to analyze Mobile Source Air Toxics (MSATs) in the NEPA process for highways. This guidance is interim, because MSATs science is still evolving. As the science progresses, FHWA will continue to revise and update the guidance.

The qualitative analysis presented below provides a basis for identifying and comparing the potential differences among MSATs emissions, if any, from the various alternatives. The assessment is derived in part from a study conducted by the FHWA entitled *"A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives"* (Claggett, 2006). Appendix B provides additional information regarding MSATs.

FHWA's Interim Guidance groups projects into the following categories:

- Exempt Projects and Projects with no Meaningful Potential MSATs Effects;
- Projects with Low Potential MSATs Effects; and
- Projects with Higher Potential MSATs Effects.

FHWA's Updated Interim Guidance provides examples of "Projects with Low Potential MSAT Effects." These projects include minor widening projects and new interchanges, such as those that replace a signalized intersection on a surface street, or where design year traffic projections are less than 140,000 to 150,000 average annual daily traffic (AADT).

The Build Alternative includes replacing the existing I-55 bridge with a new bridge. The new bridge would be located approximately 200 feet south of the existing bridge, with two travel lanes and one auxiliary lane in each direction. The project would include inside and outside shoulders. The highest projected design year 2050 AADT on I-55 is 70,000 vehicles per day and substantially lower than the FHWA criterion. Therefore, the project meets the criteria for a "Project with Low Potential MSATs Effects."

For both the Build and No-Build Alternatives, the amount of MSATs emitted would be proportional to the vehicle miles traveled, or VMT, assuming that other variables such as fleet mix are the same for each alternative. As shown, the projected VMT for the No-Build Alternative is 757,961 miles and the projected VMT for the Build Alternative is 805,634, which represents an approximate increase in VMT of 6 percent over the No-Build Alternative. The 6 percent increase is not considered an appreciable difference in VMT, and therefore, is not expected to result in a measurable difference in overall MSATs emissions when compared to the No-Build Alternative.

Table 1: Design Year VMT Projections on Affected Roadway Network

Alternative	Year 2050 VMT
No-Build	757,961
Build	805,634
Change	47,673 (6 percent)

Table Note: The affected transportation network was derived using the Memphis Area Metropolitan Planning Organization (MPO) Travel Demand Model which includes, among others, roadway links within Shelby County, Tennessee and Crittenden County, Arkansas.

The project may also reduce emissions by increasing speeds; according to EPA's MOVES3 model, emissions of all the priority MSATs decrease as speed increases. Travel speeds for the Build Alternative are expected to be higher than for the No-Build Alternative.

In sum, reduced MSATs emissions are expected in the immediate project area under the Build Alternative in the design year, relative to the No-Build Alternative. The reductions are due to the reduced VMT associated with more direct routing and EPA's MSATs reduction programs. Additionally, EPA's vehicle and fuel regulations coupled with fleet turnover, will

over time cause substantial reductions that, in almost all cases, will cause region wide MSATs levels to be significantly lower than today.

Substantial construction related MSATs emissions are not anticipated for this project as construction is not planned to occur over an extended building period. However, construction activity may generate temporary increases in MSATs emissions in the project area.

2.4 Greenhouse Gas Emissions (Climate Change)

Climate change is an important national and global concern. While the earth has gone through many natural and historical climate changes, there is general agreement that the earth's climate is currently changing at an accelerated rate and will continue to do so for the foreseeable future. Anthropogenic (human-caused) greenhouse gas (GHG) emissions contribute to this rapid change. Carbon dioxide (CO_2) makes up the largest component of these GHG emissions. Other prominent transportation GHGs include methane (CH_4) and nitrous oxide (N_2O).

Many GHGs occur naturally. Water vapor is the most abundant GHG and makes up approximately two-thirds of the natural greenhouse effect. However, the burning of fossil fuels and other human activities are adding to the concentration of GHGs in the atmosphere. Many GHGs remain in the atmosphere for time periods ranging from decades to centuries. GHGs trap heat in the earth's atmosphere. Because atmospheric concentration of GHGs continues to climb, our planet will continue to experience climate-related phenomena. For example, warmer global temperatures can cause changes in precipitation and sea levels.

A considerable body of scientific literature exists addressing the sources of GHG emissions and their effects on climate, including reports from the Intergovernmental Panel on Climate Change, the US National Academy of Sciences, and EPA and other Federal agencies. GHGs are different from other air pollutants evaluated in Federal environmental reviews because their impacts are not localized or regional due to their rapid dispersion into the global atmosphere, which is characteristic of these gases. The affected environment for CO_2 and other GHG emissions is the entire planet. In addition, from a quantitative perspective, global climate change is the cumulative result of numerous and varied emissions sources (in terms of both absolute numbers and types), each of which makes a relatively small addition to global atmospheric GHG concentrations.

The transportation sector was responsible for approximately 27 percent of all anthropogenic GHG emissions in the U.S. in 2020 as calculated from EPA data (USEPA, April

2022). The majority of transportation GHG emissions are the result of fossil fuel combustion. CO_2 makes up the largest component of these GHG emissions. U.S. CO_2 emissions from the consumption of energy accounted for about 14 percent of worldwide energy consumption CO_2 emissions in 2020 as calculated from U.S. Energy Information Administration data (USEPA, April 2022). U.S. transportation CO_2 emissions accounted for about 15 percent of worldwide CO_2 emissions in 2019 (IEA, 2021) (USEPA, April 2022). Within the U.S., fossil fuel combustion accounted for 92.1 percent of CO2 emissions in 2020. Transportation was the largest emitter of CO_2 in 2020 followed by electric power generation (USEPA, April 2022). Transportation activities accounted for 36.2 percent of U.S. CO_2 emissions from fossil fuel combustion in 2020, with the largest contributors being passenger vehicles (38.5 percent), followed by freight trucks (26.3 percent) and light-duty trucks (18.9 percent) (USEPA, April 2022).

2.4.1 Emissions Standards

EPA has established emissions standards for motor vehicles, including the recently adopted final rulemaking (Docket ID No. EPA-HQ-OAR-2021-0208, Federal Register Vol. 86, No. 248 published on December 30, 2021) to address revised 2023 and later model year light-duty vehicle GHG emissions standards. The EPA is revising the GHG emissions standards to be more stringent in response to the January 20, 2021 Executive Order 13990 "Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis", wherein the EPA was directed to consider whether the propose suspending, revising, or rescinding the standard previously revised under the "The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks" promulgated in April 2020. EPA has revised the GHG standards to be more stringent that the SAFE rule standards in each model year from 2023 through 2026. EPA has also included temporary targeted flexibilities to address the lead time of the final standards and to incentivize the production of vehicles with zero and near-zero emissions technology. In addition, EPA has made technical amendments to clarify and streamline regulations. This final rule became effective on February 28, 2022. This action affects companies that manufacture or sell passenger automobiles (passenger cars) and nonpassenger automobiles (light trucks) as defined in 49 CFR part 523.

2.4.2 Quantitative Projected Emissions and Potential Effects of Proposed Action

While the contribution of GHGs from transportation in the U.S. is a large component of U.S. GHG emissions, the GHG contributions become quite small as the scale of analysis is reduced. Using CO_2 because of its predominant role in GHG emissions, Table 2 below presents the relationship between current and projected Tennessee highway CO_2 emissions and total global CO_2 emissions, as well as information on the scale of the project relative to statewide travel activity.

Table 2: Statewide and Project Emissions Potential, Relative to Global Totals

Year	CO_2 Emissions, MMT			Million Vehicle Miles of Travel (VMT)			
	Global	Tennessee Motor Vehicles	Tennessee Percentage Contribution to Global Total	Tennessee Statewide	Project Study Area	Change Due to Project	Percentage Change in Statewide VMT Due to Project
2020	34,343.3	41.2	0.120%	80,960	---	---	---
2050	42,839.4	37.5	0.087%	98,907	276.66	17.40%	0.018%

Table notes: MMT = million metric tons. Global emissions estimates are interpolated from International Energy Outlook 2021. Tennessee emissions and statewide VMT estimates are from MOVES3.

The values for Tennessee in Table 2 were derived from EPA's Motor Vehicle Emissions Simulator (MOVES3) model (USEPA, January 2021) and global CO_2 estimates and projections from the Energy Information Administration (EIA). EPA's MOVES model can be used to estimate vehicle exhaust emissions of CO_2 and other GHGs. CO_2 is frequently used as an indicator of overall transportation GHG emissions because the quantity of these emissions is much larger than that of all other transportation GHGs combined, and because CO_2 accounts for 90-95 percent of the overall climate impact from transportation sources. MOVES includes estimates of both emissions rates and VMT, and these were used to estimate the Tennessee statewide highway emissions in Table 2.

CO_2 emissions from motor vehicles in the entire state of Tennessee are projected to contribute less than one half of one percent of global emissions in 2020 (0.120 percent) (Table 2). These emissions are projected to contribute an even smaller fraction (0.087 percent) in Design Year 2050. Tennessee emissions represent a smaller share of global emissions in 2050 because global emissions increase at a faster rate. Vehicle miles traveled (VMT) in the project study area in Design Year 2050 represents 0.018 percent of total Tennessee travel activity, and the project itself would increase statewide VMT by 0.297 percent. As a result, FHWA estimates that the proposed project could result in a potential increase in global CO_2 emissions in Design Year 2050 of 0.00002 percent (approximately 0.02-thousandths of one percent), and a corresponding increase in Tennessee's share of global emissions in 2050 from 0.08746 to 0.08748 percent. This very small change in global emissions is well within the range of uncertainty associated with future emissions estimates.

MOVES projections suggest that Tennessee motor vehicle CO_2 emissions may decrease by 9 percent between 2020 and 2050; even though VMT increases; this is due to EPA's GHG emissions standards and tighter fuel economy standards.

Under NEPA, detailed environmental analysis should be focused on issues that are significant and meaningful to decision-making (CEQ, 2023). NEPA reviews should quantify proposed actions' GHG emissions, place GHG emissions in appropriate context, disclose relevant GHG emissions and relevant climate impacts, and identify alternatives and mitigation measures to avoid or reduce GHG emissions. CEQ encourages agencies to mitigate GHG emissions associated with their proposed actions to the greatest extent possible, consistent with national, science-based GHG reduction policies established to avoid the worst impacts of climate change.

FHWA has concluded, based on the nature of GHG emissions and the potential GHG impacts of the proposed action, as shown in Table 2, that the GHG emissions from the proposed action will not result in "reasonably foreseeable significant effects on the human environment" (40 CFR 1502.21). The GHG emissions from the project Build Alternative will not play a meaningful role in a determination of the environmentally preferable alternative or the selection of the Preferred Alternative. More detailed information on GHG emissions is not essential *"to a reasoned choice among alternatives"* (40 CFR 1502.21(b)) or to making a decision in the best overall public interest based on a balanced consideration of transportation, economic, social, and environmental needs and impacts (23 CFR 771.105(b)).

The context in which the emissions from the proposed project will occur, together with the expected GHG emissions contribution from the project, illustrate why the project's GHG emissions will not be a substantial factor in the decision-making.

2.4.3 Incomplete or Unavailable Information

Additionally, when an agency is evaluating reasonably foreseeable significant effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency is required make clear that such information is lacking (40 CFR 1502.21(a)). The methodologies for forecasting GHG emissions from transportation projects continue to evolve and the data provided should be considered in light of the constraints affecting the currently available methodologies. As previously stated, tools such as EPA's MOVES model can be used to estimate vehicle exhaust emissions of CO_2 and other GHGs. However, only rudimentary information is available regarding the GHG emissions impacts of highway construction and maintenance. Estimation of GHG emissions from vehicle exhaust is subject to the same types of uncertainty affecting other types of air quality analysis, including imprecise information about current and future estimates of vehicle miles traveled, vehicle travel speeds, and the effectiveness of vehicle emissions control technology. Finally, there presently is no scientific methodology that can

identify causal connections between individual source emissions and specific climate impacts at a particular location.

2.4.4 Mitigation for Global GHG Emissions

To help address the global issue of climate change, USDOT is committed to reducing GHG emissions from vehicles traveling on our nation's highways. USDOT and EPA are working together to reduce these emissions by substantially improving vehicle efficiency and shifting toward lower carbon intensive fuels. The agencies have jointly established new, more stringent fuel economy and first ever GHG emissions standards for model year 2012-2025 cars and light trucks, with an ultimate fuel economy standard of 55.2 miles per gallon for cars and 40.4 miles per gallon for light trucks by model year 2025 (NHTSA, 2020). On September 15, 2011, the agencies jointly published the first ever fuel economy and GHG emissions standards for heavy-duty trucks and buses (NHTSA, 2011). On April 1, 2022, the USDOT announced newer fuel economy standards for industrial fleet. The new Corporate Average Fuel Economy standards require an industry-wide fleet average of approximately 49 mpg for passenger cars and light trucks in model year 2026, the strongest cost savings and fuel efficiency standards to date. The new standards will increase fuel efficiency 8 percent annually for model years 2024-2025 and 10 percent annually for model year 2026. They will also increase the estimated fleetwide average by nearly 10 miles per gallon for model year 2026, relative to model year 2021.

More information on Corporate Average Fuel Economy can be found from the National Highway Traffic Safety Administration. Increasing use of technological innovations that can improve fuel economy, such as gasoline- and diesel-electric hybrid vehicles and electric vehicles, will improve air quality and reduce CO_2 emissions in future years.

Consistent with its view that broad-scale efforts hold the greatest promise for meaningfully addressing the global climate change problem, FHWA is engaged in developing strategies to reduce transportation's contribution to GHGs—particularly CO_2 emissions—and to assess the risks to transportation systems and services from climate change. To assist States and MPOs in performing GHG analyses, FHWA has developed a *Handbook for Estimating Transportation GHG Emissions for Integration into the Planning Process (FHWA-HEP-13-026)* (FHWA, 2013). The Handbook presents methodologies reflecting good practices for the evaluation of GHG emissions at the transportation program level and will demonstrate how such evaluation may be integrated into the transportation planning process. FHWA has also developed a tool for use at the statewide level to model a large number of GHG reduction scenarios and alternatives for use in transportation planning, climate action plans, scenario planning exercises, and in meeting state GHG reduction targets and goals. To assist states and MPOs in assessing climate change vulnerabilities to

their transportation networks, FHWA has developed a vulnerability and risk assessment conceptual model and has piloted it in several locations (FHWA-HEP-18-020) (FHWA, 2017).

While GHG impacts should be given consideration to a decision on the environmentally preferable alternative or to a choice among alternatives, the potential change in GHG emissions is small in the context of the affected environment. Additionally, this assessment enables agencies to better understand and address the effects of climate change on vulnerable communities, thereby responding to environmental justice concerns and promoting resilience and adaptation. As outlined above, FHWA is working to develop strategies to reduce transportation's contribution to GHGs—particularly CO_2 emissions—and to assess the risks to transportation systems and services from climate change. FHWA will continue to pursue these efforts as productive steps to address this important issue.

2.5 Construction Air Quality

Construction activities will generate intermittent and temporary construction-related pollutant emissions and dust.

TDOT's construction specifications will apply to this project. Construction procedures should be governed by the *Standard Specifications for Road and Bridge Construction* as issued by TDOT and as amended by the most recent applicable supplements. All construction equipment shall be maintained, repaired, and adjusted to keep it in full satisfactory condition.

Additionally, there are no air quality monitoring stations close to the project. The closest station is an ambient air quality monitoring system on Patriot Stadium (Colonial Park) in Marion, Arkansas approximately 8 miles northwest of the proposed project.

2.6 Indirect and Cumulative Effects

The forecasted traffic volumes for most projects typically account for any redistribution of traffic that would occur as a result of the project. Therefore, the air quality analysis addresses any indirect traffic-related air quality effects that might occur. Additionally, the forecast traffic volumes include expected traffic growth and other planned and programmed projects in the area. As a result, the air quality analysis addresses the traffic-related cumulative air quality effects of the project.

3.0 Conclusions

This air quality analyses for the proposed project addressed the transportation conformity requirements for the project, the potential MSATs effects, GHG (global climate change), and construction air quality.

The proposed project is located in Shelby County, Arkansas and Crittenden County, Arkansas, within the Memphis, TN-MS-AR Area, which is in maintenance status for ozone. This project will be included in the updated TIP and an abbreviated conformity analysis will be prepared so that the project conforms to the SIP.

The project qualifies as a "Project with Low Potential Mobile Source Air Toxic (MSAT) Effects" and is not anticipated to result in any adverse MSATs effects. EPA's vehicle and fuel regulations coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region wide MSATs levels to be significantly lower than today.

Based on the nature of GHG emissions and the potential GHG impacts of the proposed project, it is concluded that the GHG emissions from the proposed action will not result in "reasonably foreseeable significant effects on the human environment" (40 CFR 1502.21).

Construction activities will generate intermittent and temporary construction-related pollutant emissions and dust. TDOT's construction specifications will apply to this project. Construction procedures should be governed by the *Standard Specifications for Road and Bridge Construction* as issued by TDOT and as amended by the most recent applicable supplements.

4.0 References

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FIGURES

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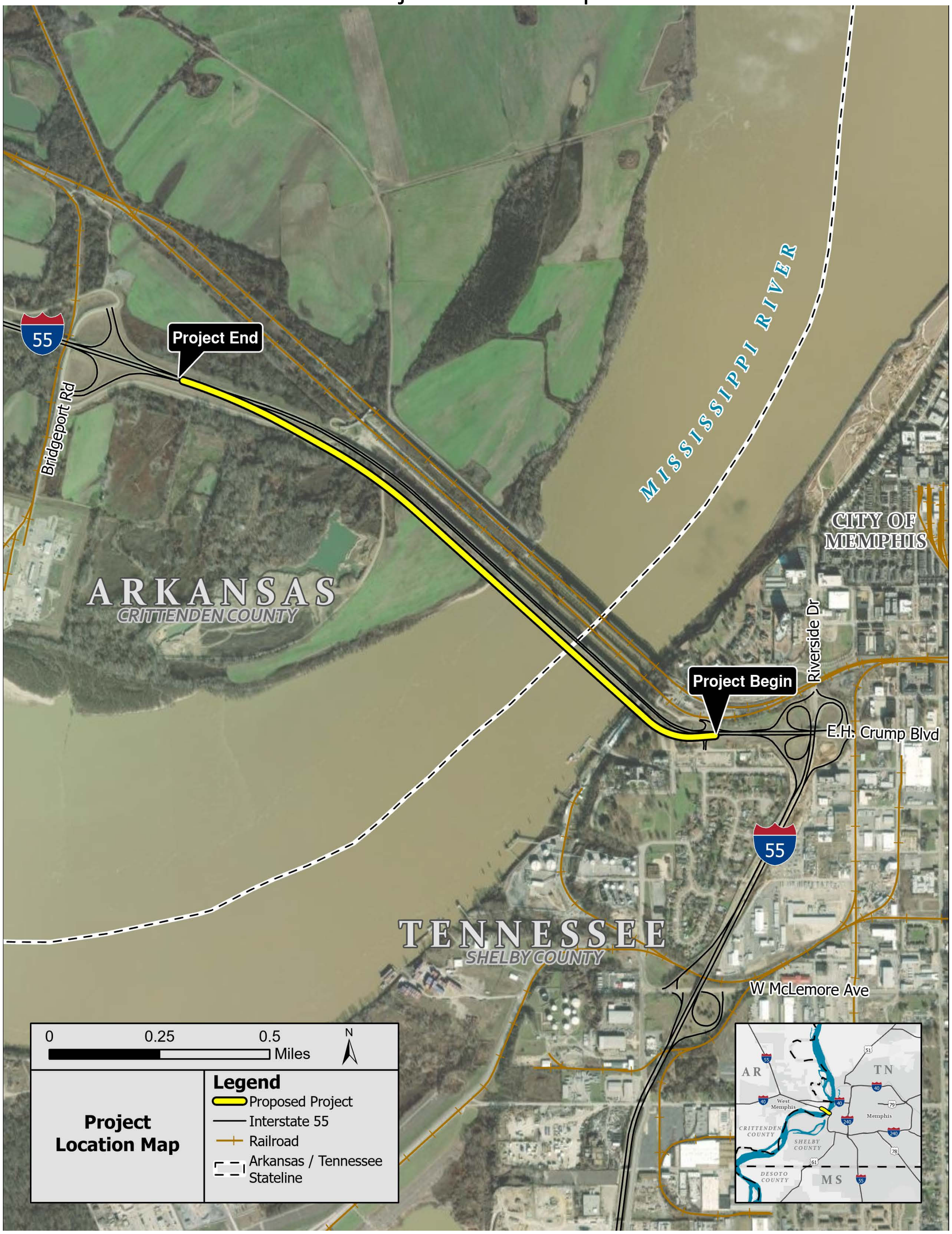
Figure 1
Project Location Map



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Appendix A

TIP Project Sheet

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Placeholder for the TIP Project Sheet

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Appendix B

MSATs Background Information

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MOBILE SOURCE AIR TOXICS (MSATs)

Background

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).[1] 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).[2] 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 EPA, MOVES3 is a major revision to MOVES2014 and improves upon it in many respects. MOVES3 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 MOVES2014. These new emissions data are for light- and heavy-duty vehicles, exhaust and evaporative emissions, and fuel effects. MOVES3 also adds updated vehicle sales, population, age distribution, and vehicle miles travelled (VMT) data. MOVES3 incorporates the effects of three new Federal emissions standard rules not included in MOVES2014. These new standards are all expected to impact MSATs 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 FR 60344). In the November 2020 EPA issued MOVES3 Mobile Source Emissions Model Questions and Answers[4] EPA states that for on-road emissions, MOVES3 updated heavy-duty (HD) diesel and compressed natural gas (CNG) emission running rates and updated HD gasoline emission rates. They updated light-duty (LD) emission rates for hydrocarbon (HC), carbon monoxide (CO) and nitrogen oxide (NOx) and updated light-duty (LD) particulate matter rates, incorporating new data on Gasoline Direct Injection (GDI) vehicles.

Using EPA's MOVES3 model, as shown in Figure 1, FHWA estimates that even if VMT increases by 31 percent from 2020 to 2060 as forecast, a combined reduction of 76 percent in the total annual emissions for the priority MSATs is projected for the same time period.

Diesel PM is the dominant component of MSATs emissions, making up 36 to 56 percent of all priority MSATs pollutants by mass, depending on calendar year. Users of MOVES3 will notice some differences in emissions compared with MOVES2014. MOVES3 is based on updated data on some emissions and pollutant processes compared to MOVES2014, and also reflects the latest Federal emissions standards in place at the time of its release. In addition, MOVES3
emissions forecasts are based on slightly higher VMT projections than MOVES2014, consistent with nationwide VMT trends.

MSATs 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 MSATs exposure remain limited. These limitations impede the ability to evaluate how potential public health risks posed by MSATs 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 MSATs 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 MSATs emissions associated with highway projects. The FHWA will continue to monitor the developing research in this field.

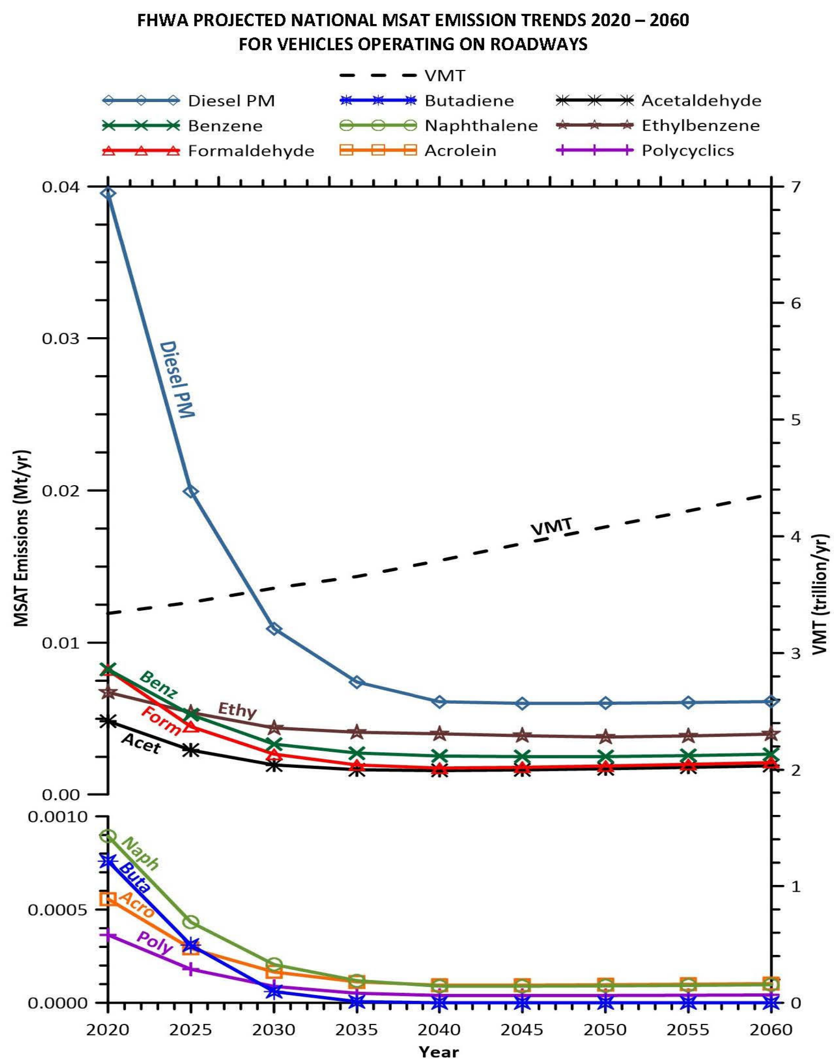
NEPA Context

The NEPA requires, to the fullest extent possible, that the policies, regulations, and laws of the Federal Government be interpreted and administered per 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.

Incomplete or Unavailable Information for Project-Specific MSATs 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 (MSATs) 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 MSATs exposure associated with a proposed action.

Figure 1
FHWA PROJECTED NATIONAL MSAT EMISSION TRENDS 2020 - 2060
FOR VEHICLES OPERATING ON ROADWAYS
USING EPA's MOVES3 MODEL



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 MOVES3 model runs conducted by FHWA, March 2021.

The Environmental Protection Agency (EPA) 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 for hazardous air pollutants and MSATs. The EPA 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 MSATs, including the Health Effects Institute (HEI). Several 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 MSATs 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 MSATs 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 a 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 MSATs 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 MSATs concentrations and exposure near roadways to determine the portion of time that people are 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 MSATs, 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 MSATs compounds, and in particular for diesel PM. The EPA states that concerning 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 (https://www.epa.gov/iris)."

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 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.