Federal Advisory Committee Act
Clean Air Act Advisory Committee

Mobile Sources Technical Review Subcommittee

October 18, 2016
The Willard Intercontinental Hotel
1401 Pennsylvania Ave NW
Washington, DC 20004

Introduction/Opening Remarks

Ms. Gay MacGregor opened the meeting at 9:00am on October 18, 2016. The meeting was called to order and the meeting minutes from the prior MSTRS meeting held on June 16, 2016, were approved.

Mr. Rich Kassel with the Tri-State Transportation Campaign, replacing Mr. Drew Kodjak as MSTRS co-chair, introduced himself and expressed that he is here to assist the EPA in navigating through regulatory and non-regulatory issues. Mr. Kassel emphasized the importance of working together and finding ways to contribute towards the common goal of improving the environment. Mr. Kassel stressed that everyone on the subcommittee focus on the issues and associated emissions implications. Mr. Kassel noted that the MSTRS meetings provide a venue to start conversations related to mobile source emissions, not end them. Next, all members introduced themselves followed by non-member introductions. The list of meeting attendees is provided in the appendix.

Office of Transportation and Air Quality Update

The Director of the EPA's Office of Transportation and Air Quality (OTAQ), Mr. Chris Grundler, pointed to the agenda for today's meeting, noting that the agenda is relevant to everyone's work and asked that everyone stay connected between meetings. Mr. Grundler expressed that he values this time and these meetings. Mr. Grundler stated that it has been a big year for the EPA, with many consequential actions, and a year like no other for the Agency. He highlighted that the mid-term evaluation draft technical assessment report for the light-duty vehicle GHG standards was recently released for public comment. He also noted that the renewable fuel standard (RFS) regulations are back on track. Mr. Grundler indicated that the rule is currently in the public comment period and that the planned 2017 proposal is on time. Mr. Grundler stated that the EPA is continuing to work on the standards for Medium- and Heavy-Duty Trucks, highlighting that California has worked extensively with the Agency in this effort. The work has been focused on real-world effects via modeling efforts and test results, and rigorous test procedures are being pursued. Mr. Grundler indicated that more than one billion tons of carbon will be reduced over the fleet lifetime with the implementation of these standards.

Mr. Grundler announced that the endangerment finding for aircraft GHG emissions has been finalized. Based on the endangerment finding for aircrafts' contribution to GHG emissions,

international and domestic carbon dioxide (CO_2) standards aircraft standards will be on the horizon.

Mr. Grundler stressed that the implications for the future cannot be understated in terms of all the work that has been done this past year and emphasized the role of government in enforcing standards. He mentioned that Europe has assembled a 44-member oversight committee, which is looking to the EPA, the U.S., and California for guidance and answers to questions on how the U.S. develops and enforces emissions standards.

Mr. Grundler stopped to ask if there were any questions from the group. He noted that he would not be available for the afternoon's discussion, which he said was on an interesting topic concerning the future of public policy in automated vehicles, greater freedom of mobility and a lower carbon footprint.

Comments and Discussion

Dr. Mridul Gautaum with the Mid-Atlantic Research Institute expressed that he agrees with what the U.S. has done and that industry wants to do the right thing. However, Dr. Gautaum questioned how well the in-use procedures and testing are working. Dr. Gautaum noted that he believes a lot of the emissions data out there are suspect. In addition, there are different measurement procedures being used, underlining that it is important how the data are analyzed. Dr. Gautaum said that the procedures are reliable for fixed labs but stated that just because portable measurement capability is available does not mean it is accurate. Mr. Grundler acknowledged the comment, noting that the EPA recommends a comprehensive approach, but that there is no simple way of doing this.

Ms. Pamela Campos with the Environmental Defense Fund stated that Mr. Grundler provided a great overview of accomplishments and asked what is on the regulatory agenda in the near year for transportation. Mr. Grundler replied that the Agency is busy wrapping up and finalizing the on-going work and that we will see what happens after the change in administration. With respect to the RFS, decisions will be made in the D.C. Circuit. Regarding the vehicle standards, the EPA needs to make a decision regarding the first passenger GHG standards by April 1, 2018. Mr. Grundler stated that there is a body of work that needs to be addressed under the new administration and that the new team will set the regulatory agenda.

Mr. Jim Kliesch with American Honda Motor Company asked if there was any evaluation in the mid-term with respect to the April 1, 2018 date, to which Mr. Grundler responded that it is too soon to tell. Mr. Grundler noted that there are about 2,000 pages of comments that the Agency is in the process of reviewing, and the EPA is committed to reviewing and responding to these comments. Mr. Robert Anderson with Chevron Global asked if the April 1, 2018 date is when the real emission standard is set or if that is simply the date when the EPA will decide if something will be done. Mr. Grundler responded that it will depend upon whether the EPA decides to conduct a one-step or two-step process.

In terms of members of MSTRS, Dr. Roberto Ayala with the California Air Resources Board (CARB) asked what the process is for adding and removing members. Ms. MacGregor

responded that members on the subcommittee have a 3-year term which can be renewed for another 3 years. She noted that the goal is to not have more than one-third of the committee replaced at one time, so as not to disrupt the work of the committee. There is a public process soliciting members, which involves publication in the Federal Register, and the EPA also informs companies and other potential stakeholders that the solicitation process is happening.

Presentation – MOVES FACA Review Work Group Update

Mr. Kliesch gave a presentation on the EPA's Motor Vehicle Emission Simulator (MOVES) model Work Group process and progress. The MOVES model is an emissions model that estimates emissions and energy use from onroad vehicles and nonroad equipment, which is used by the EPA to estimate emission impacts of mobile source emissions regulations and policies and to generate national inventories of air pollutants. State and local agencies use MOVES to prepare emission inventories for State Implementation Plans (SIPs), and MOVES is used in academia to model effects of policy choices. The emissions model considers Federal, state and local standards and regulations, vehicle populations and activity, local rules, fuels, and meteorology. Mr. Kliesch indicated that the EPA is in the process of updating the MOVES model, and a number of modifications are being made, with major updates planned for the areas of emission rates, fleet and activity, and emission adjustment factors. The updates are estimated to be completed by 2018. The purpose of the Work Group is to evaluate and provide recommendations on the inputs proposed for use in MOVES, and a broad array of members from the EPA, academia, industry etc. are involved in providing input and recommendations to the model. The Work Group had its first meeting in September 2016, and the next meeting is planned for December 2016.

Comments and Discussion

Dr. Rasto Brezny with the Manufacturers of Emissions Controls Association asked how new data and information is incorporated into MOVES and whether it would incorporate data from the update to the EMFAC model used in California. Dr. Alberto Ayala of the California Air Resources Board (CARB) noted that CARB has been actively engaged in this process, noting that MOVES is being compared to CARB's EMFAC model. Dr. Ayala emphasized that the EPA and CARB are coordinating on this effort and that this coordination will continue.

Mr. Reynaldo Agama with Caterpillar asked if any efforts were being made to validate emission inventories from a Photochemical Assessment Monitoring Station (PAMS) perspective. Mr. Grundler responded that he was unsure of the specific validation efforts being done, but that the EPA would get back to him to provide an answer to that question. Dr. Ayala noted that MOVES and EMFAC are not air quality models themselves, and the air quality models have undergone separate validation efforts. Mr. Agama noted, however, that PAMS stations actually do measure NOx and VOCs, and thus can be used as comparisons to emissions inventories. He also noted that the Engine Manufacturers Association has started trying to do some comparisons of ambient measured NOx and VOCs to those emissions inventories.

In terms of GHG emissions, Mr. Kassel asked how MOVES will be updated. Mr. Kliesch replied that he is not the spokes-person for the work group, but in the update efforts, the work group and the EPA are considering how the model will be used in the coming years.

Presentation – Ports Initiative Update

Dr. Lee Kindberg with MAERSK provided a brief overview of the Ports Workgroup's recent activities, noting that the final Workgroup report was presented to the CAAAC in September. The report can be found at https://www.epa.gov/caaac/final-ports-initiative-workgroup-report-recommendations-us-epa. Ms. MacGregor noted that a cross-EPA retreat is planned, where an evaluation of the Workgroup's recommendations for a Ports program and its components will take place. Ms. MacGregor also announced that a new freight group will be established that will go beyond the Ports program.

Ms. MacGregor provided a brief presentation of the ports initiative update and pointed to the ports initiative website at https://www.epa.gov/ports-initiative/national-port-strategy-assessment. Ms. MacGregor also indicated that an executive summary of the recently released assessment report was provided for the MSTRS members in their meeting packets. The Ports Initiative aims to reduce air pollution and GHG emissions near ports, and Ms. MacGregor noted that while progress is being made, additional emission reductions can be realized. The National Port Strategy Assessment report was published September 22, 2016, and was developed by the EPA in consultation with the MSTRS Ports Workgroup. This report includes an assessment of baseline port emissions and potential future emissions, considering different emissions reductions scenarios. As part of the Ports Initiative, the EPA will also be working with Port Everglades to conduct a pilot program for that port, involving the development of an emission inventory and an examination of emissions reduction scenarios for that port.

Comments and Discussion

Dr. Kindberg noted that regarding the projections for 2050, it is important to note that container shipping was invented in 1956, and projections for the future may not be correct because the projections assume constancy for a business that has been changing over time.

Ms. Peg Hanna with the New Jersey Department of Environmental Protection asked if there has been any thought on incorporating orphan categories, such as rail, into MOVES. Mr. Kliesch responded that the EPA is looking at potentially adding cargo handling equipment to the nonroad part of the model.

Mr. Kassel commented that there are two big issues with modeling port emissions, with one being where to attribute the emissions in some instances, such as to the state of New York or New Jersey from the Port of New York and New Jersey, and the other being legal authority, where state agencies often do not have authority over marine or rail emissions.

Ms. Campos announced that there has recently been a major political action where 191 countries in the International Civil Aviation Organization (ICAO) have come together and agreed to cap CO_2 emissions from the aviation industry. The agreement is to reduce global emissions via an

offsetting mechanism, and the program will be implemented in three phases via a pilot program, voluntary program and an obligatory final phase. Many states are also opting in, and the program will kick-off by 2020, according to Ms. Campos.

Presentation – Final Phase 2 Fuel Efficiency and GHG Emission Standards for Heavy-Duty Vehicles

Ms. Lauren Steele with the EPA provided an overview of the Phase 2 GHG program for Heavy-Duty Vehicles. Ms. Steele noted that the Phase 2 standards are more ambitious than the Phase 1 standards. The first compliance year will be 2018 for some portions of the program, with full compliance anticipated in year 2027. In order to meet the standards and achieve emissions reductions, there is a large menu of technologies available. Ms. Steele indicated that there has been significant stakeholder and public participation in the development of the Phase 2 standards. Ms. Steele's presentation highlighted elements such as the types of vehicles that are regulated (vehicle categories), changes from the proposal, and cost-effectiveness associated with the rule. The final Phase 2 standards are estimated to reduce CO_2 emissions by more than 1 billion tons and up to 2 billion barrels in fuel savings.

Comments and Discussion

Mr. Michael Iden of the Association of American Railroads asked if there were any requirements for deployment of the technologies, noting that many trailer tails are not deployed. Ms. Steele responded that the EPA received a lot of questions on that after the Phase 1 rule, and she indicated that there are provisions for manufacturers to provide guidance. For instance, there are provisions associated with tampering and provisions related to removing aero-dynamic fairings being acceptable if the vehicle is deployed off-road.

Mr. Rashid Shaikh asked about the tradeoff between GHGs and NOx emissions. Ms. Steele noted that the test procedures of the rule require simultaneously tests for GHG and NOx, which will ensure that no back-sliding will occur. Mr. Grundler emphasized that these standards address the nitrogen oxides (NO_x) issues, but acknowledged the need to further reduce NO_x emissions in the U.S. The Agency is interested in both NO_x and GHG emissions being reduced, and there should not be a trade-off between the two.

Mr. John Viera with Ford directed his comments towards Mr. Grundler and congratulated the EPA and CARB on the heavy-duty rule. In Mr. Viera's opinion, the development of the rule was a good and collaborative process. However, from Ford's perspective, the process addressing light-duty vehicle emissions has been less smooth, and he asked whether the EPA has noticed differences with the original equipment manufacturers (OEMs) in how they are working through the process. Mr. Grundler indicated that he did not necessarily agree and did not see the differences that Mr. Viera and Ford believes there are between the heavy-duty and light-duty process. Mr. Grundler stressed that the EPA will continue to be transparent and work with stakeholders, but the EPA is not in the rulemaking stage yet for light-duty vehicles. There may or may not be a rule, Mr. Grundler indicated, and the first step is to sit down with stakeholders if a rulemaking is initiated. Dr. Ayala encouraged cooperation and input from the stakeholders in how to improve the process.

Mr. Agama expressed that based on the data he has seen, he believes there is a trade-off between GHG and NO_x emissions. For example, with selective catalytic reduction, in order to reduce NO_x emissions, the energy requirement is increased, which subsequently leads to an increase in GHG emissions. Dr. Brezny added, however, that there are existing technologies not related to combustion that can be used on vehicles in order to lower both NO_x and CO_2 emissions simultaneously. Mr. Agama said again that due to the laws of thermodynamics, there will be a trade-off in terms of NO_x and GHG emissions unless the energy source is solar.

Panel 1 Presentations - Connected Automated Vehicles and Shared Mobility

Ms. Sharyn Lie of the EPA introduced the presenters and the topics to be discussed in this panel.

Presentation – A Low-Carbon Vision for Shared Light-Duty Vehicles

Ms. Lauren Belive with Lyft gave a presentation on connected automated vehicles and shared mobility. Ms. Belive discussed current driving trends, including the fact that many commuters drive alone, and that this causes a loss of constructive time and an economic toll. Lyft launched in 2012 and provided over 1 million rides by the end of 2013. In 2014, Lyft Line, a ridesharing service was introduced, and over 40 percent of passengers choose this option where it is offered. Lyft has now grown to provide over 14 million rides per month in 2016. In the future, Lyft will have an autonomous vehicle fleet via a partnership with General Motors and expects that within five years, the majority of rides will be provided through autonomous vehicles. In addition, Lyft is planning to partner with mass transit. The use of these Lyft services has the potential to reduce emissions from the light-duty fleet, which makes up 61 percent of the GHG footprint from the transportation sector.

Comments and discussion were held until after all panel presentations were delivered.

Presentation – Ford Perspectives on Mobility and Autonomy

Mr. Viera with Ford presented Ford's perspective regarding connected automated vehicles and shared mobility. Mr. Viera indicated that global societal trends are changing, and Ford is looking at emerging opportunities in the field of automated vehicles and other mobility solutions. Ford sees autonomous vehicles as an emerging opportunity outside of its core business of producing and selling cars and trucks to provide additional mobility solutions for its traditional and new customers. Mobility solutions provide an opportunity to reduce emissions and enhance sustainability in this process through ridesharing, car sharing and through providing easier access to other modes of public transportation. Moving forward with autonomous vehicles, Ford is focused on developing fully-autonomous vehicles for commercial operation by 2021.

Comments and discussion were held until after all panel presentations were delivered.

Presentation – General Motors Presentation on Connected Automated Vehicles and Shared Mobility

Mr. Alex Keros with General Motors provided a presentation on this subject from GM's perspective. There is a lot happening in this field and connected automated vehicles and shared mobility is something that we as a society are going to be figuring out for a long time. In Mr. Keros' opinion it is important to look at everything together and focus on having a good experience. Connectivity is fundamental, Mr. Keros said. To make progress, it is critical to be flexible to learn, grow and adapt.

Comments and discussion for Panel 1 panelists

Ms. Lie asked the panelists how likely vehicle automation is and what the barriers are going out to the year 2040. Ms. Belive noted that there is currently a big hurdle in getting customers to trust and feel safe in automated vehicles, as well as with vehicle sharing and a shared economy. Mr. Viera added that autonomous vehicles are definitely coming by the late 2020's. He also noted that cost effectiveness will drive the switch to electrification of vehicles. Mr. Keros indicated that there is a lot of inertia pushing the market to both automated and electric vehicles.

Ms. Jacky Grimshaw with the Center for Neighborhood Technology asked if the impact on the environment from car sharing is known. Mr. Viera responded that there have only been some initial assessments. He noted that several studies have started in different worldwide locations, and the automakers need to collaborate with non-governmental organizations (NGOs) and other organizations to ensure the right data is obtained. Mr. Keros noted that there is a need to better understand how users do ridesharing, but he believes car sharing will positively impact the environment. Mr. Keros also noted that there is currently an imperfect electric charging station system, but when this system is improved, the electrification of vehicles and ridesharing may change. Ms. Belive commented that the University of California, Berkley is working on a study about ridesharing and is expected to have results within 6 months.

Ms. Simone Sagovac with the Southwest Detroit Community Benefits Coalition made the point that, in Detroit, there are communities that do not even always have a functioning bus system. She is concerned that investment in new technology may harm investments in mass transit systems. Ms. Believe commented that Lyft is not competing with mass transit, emphasizing that accessibility for all is important. Ms. Belive clarified that Lyft is a full alternative to a car, not a taxi as many thought originally. She also noted that Lyft thinks of itself as a complement to mass transit, and over 30 percent of Lyft rides end or begin at metro stops. Mr. Keros also made the point that everyone understands that the system needs to be complimentary, and that new technologies can help with the first/last mile problem for mass transit. Mr. Viera noted that these technologies should help the underserved where mass transit is not available and help the underserved access mass transit where it is available.

Ms. Campos asked about the potential for vehicle accessibility to those who are disabled. Mr. Keros responded that automated vehicles would provide mobility options for the disabled population.

Mr. Don Anair asked whether automation would be a disincentive to ridesharing, as the automated rides through Lyft would be low in terms of price. Ms. Belive responded that Lyft expects to eventually be using fully automated and electric vehicles. The prices for ridesharing would still be lower when using these vehicles than without sharing.

Panel 2 Presentations - Connected Automated Vehicles and Shared Mobility

Ms. Susan Burke with the EPA introduced the presenters and the topics to be discussed in this panel.

Presentation – Shared-Use and Automated Mobility: Are We There Yet?

Mr. Deron Lovaas with the National Resources Defense Council- Urban Solutions Program opened the second panel on connected automated vehicles and shared mobility with his presentation. Transportation is now the primary source of carbon dioxide emissions in the U.S. While it is possible that CO_2 emissions could be significantly reduced with electric, automated vehicles, the use of automated vehicles could also drive up the number of vehicle miles traveled. The road ahead is unclear for shared-use and automated mobility, and more credible studies are needed, Ms. Lovaas emphasized. The DOT proposed a draft rule with performance measures to assess the performance of the National Highway System, Freight Movement on the Interstate System, and the Congestion Mitigation and Air Quality Improvement Program. At issue in this proposal is whether and how states and regions should track carbon pollution and set GHG reduction targets. The DOT has also issued automated vehicles guidance that includes vehicle performance guidance, model state policy, discusses current regulatory tools, and identifies potential new regulatory tools that could be used to address automated vehicles.

Comments and discussion were held until after all panel presentations were delivered.

Presentation – US Department of Transportation Presentation on Connected and Automated Vehicles and Shared Mobility

Ms. Sophie Shulman with the Department of Transportation (DOT) continued presenting on the topic of connected vehicles and shared mobility, stating that the DOT's main emphasis is safety. Connected vehicles can be used to identify problems, such as traffic hot spots, and help solve them, such as through vehicle speed management. Ms. Shulman announced that the Federal Automated Vehicles Policy was recently released, which will assist in ensuring that the implementation of automated vehicles occurs in a safe way. The policy is also intended to lead to a reduction of emissions from transportation and to make transportation more accessible and efficient. Ms. Shulman noted the importance of flexibility and open stakeholder involvement. Another significant DOT program is the Smart City Challenge, for which over 78 cities applied for up to $40 million in funding to develop a program to integrate connected and automated vehicles into the city's transportation network. Columbus, Ohio was the winner of that Challenge, but Ms. Shulman indicated that there are many other projects underway and grant money has been distributed to help communities implement advanced transportation technologies.

Comments and discussion were held until after all panel presentations were delivered.

Presentation – The Automotive Industry to 2025 and Beyond

Dr. Chris Atkinson with the Advanced Research Projects Agency-Energy (ARPA-E), an agency within the Department of Energy, continued the panel presentations. One of the main goals of ARPA-E is to ensure the U.S. remains in the lead in the development and deployment of advanced energy technologies. Dr. Atkinson highlighted three significant trends for the future in automotive transportation: improved fuel economy, increasing vehicle connectivity and greater levels of vehicle automation. The future in fuel economy is a much higher fuel efficiency for light-duty vehicles than today (54.5 miles per gallon corporate average fuel economy (CAFÉ) by 2025). For heavy-duty vehicles, future fuel economy will be regulated by the Phase 2 GHG rules. In terms of the second trend – vehicle connectivity, Dr. Atkinson indicated that future vehicles will use higher levels of connectivity with respect to vehicle-to-vehicle (V2V) connectivity, vehicle-to-infrastructure (V2I) and vehicle-to-everything (V2X). Vehicle automation, the last trend in automated transportation, is that vehicles in the future will have a higher level of automation, according to Mr. Atkinson. This means that future vehicles will employ a range of automation from L0 (no automation) to L1 and L1 advanced driver assistance (ADAS) to L3 automation, consisting of automated operation with a driver, to L4, which is fully automated with no driver needed. Dr. Atkinson stated that it is possible that the future of automated vehicles may lead to higher vehicle miles traveled (VMT). Dr. Atkinson lastly mentioned NEXTCAR, which is short for NEXT-Generation Energy Technologies for Connected and Automated on-Road vehicles. This program enables technologies that use connectivity and automation to improve dynamic controls and powertrain operation and consequently reduces vehicle energy consumption. ARPA-E anticipates that the NEXTCAR program will lead to an energy consumption reduction of 20 percent over a 2016 and 2017 baseline emissions.

Comments and discussion were held until after all panel presentations were delivered.

Presentation – CAVs and Shared MobilityPotential Energy and GHG Impact

Mr. Chris Gearhart with the National Renewable Energy Laboratory (NREL) Transportation and Hydrogen Systems Center indicated that NREL is dedicated to renewable energy and also to work on sustainable transportation. The goal is to develop deep decarbonization of transportation. Vehicle connectivity and automation are here, Mr. Gearhart stated, but it is possible that VMT could double due to vehicle automation, or vehicle automation and connectivity could lead to a reduction in VMT. Mr. Gearhart explained that NREL is evaluating green routing and truck platooning efficiency benefits. The NREL is not operating alone, but is part of the SMART Consortium to investigate GHG and other impacts of connected and automated vehicles.

Comments and discussion for Panel 2 panelists

Michael Iden with the Association of American Railroads had a question about what happens to the existing petroleum-based infrastructure and whether we will have stranded infrastructure as we move to electricity-based transportation. He also asked how taxes will be raised for

infrastructure as more vehicles switch from liquid fuel to electricity. Mr. Gearhart responded that connectivity information could provide the answer and that there may be a VMT-based tax rather than a fuel-based tax. In terms of stranded assets, Mr. Gearhart noted that it will be more difficult to electrify large heavy-duty vehicles, and liquid fuel will be needed for some time, so stranded assets may not be an issue. Mr. Lovaas said that the switch to electric vehicles would exacerbate existing problems with infrastructure funding, as there has been no increase in the gas tax for many years.

Regarding acceptance of connected and automated vehicles, Mr. Solomon noted that customer acceptance presents a barrier to implementation. Mr. Gearhart indicated that there are potential ways to make truck platooning work, such as putting a screen on the first truck showing the road in front of that truck, but that behavioral acceptance is a hurdle. Mr. Anderson said that the privacy issue is going to be an obstacle to acceptance of connected vehicles. Dr. Ayala emphasized that California will be heavily engaged in dialogue related to the issues associated with connected, automated vehicles. He noted that he hopes there can be a process and momentum for the MSTRS to look at the issues with connected and automated vehicles systematically.

Mr. Lovaas posed a question about the potential behavioral changes of different generations related to automated vehicles. He noted that there needs to be some research about whether and to what degree aging babyboomers will move back to cities, whether teenagers will delay getting drivers licenses and whether young couples and families may choose not to move to suburbs. Ms. Campos agreed, but also thought that a lot is already known about the mobility needs for each stage of life. Ms. Shulman commented that acceptability of new technology increases as people become more familiar with it. Dr. Atkinson noted that another issue to consider is how older vehicles will interact with new automated and connected vehicles. Mr. Andrew Green with Puget Sound Clean Air Agency indicated that one thing air quality agencies can do, as these technologies are introduced, is to influence the trajectory of the technology toward more climate-friendly options. Dr. Gautam indicated that he believes collaboration between agencies will be critical for progress toward cleaner technologies.

Final Remarks and Adjourn

Ms. MacGregor thanked the panel and moderators and mentioned the possibility of hosting a webinar in the future on specific topics. Ms. MacGregor mentioned that the next MSTRS meeting is planned for the spring of 2017, and she noted that a poll will be sent to members asking for input on dates of availability for that meeting. She also noted that the next meeting may not be held in Washington, D.C. Ms. MacGregor thanked everyone for their attendance and adjourned the meeting.

All presentations and meeting materials from this meeting are available online at: https://www.epa.gov/caaac/mobile-sources-technical-review-subcommittee-meeting-october-18-2016

Appendix

MSTRS Meeting Attendance List	
Subcommittee Members and Presenters	
Name	**Organization**
Reynaldo Agama	Caterpillar
Don Anair	Union of Concerned Scientists
Robert Anderson	Chevron Global
Dr. Chris Atkinson	U.S. Department of Energy
Dr. Alberto Ayala	California Air Resources Board
Robert Babik	General Motors Corporation
Lauren Belive	Lyft
Dr. Rasto Brezny	Manufacturers of Emission Controls Association
Pamela Campos	Environmental Defense Fund
Blair Chikasuye	Hewlett Packard
Dr. Mridul Gautam	Mid-Atlantic Research Institute
Chris Gearhart	National Renewable Energy Lab
Andrew Green	Puget Sound Clean Air Agency
Jacky Grimshaw	Center for Neighborhood Technology
Chris Grundler	U.S. Environmental Protection Agency
Peg Hanna	New Jersey Department of Environmental Protection
Michael Iden	Association of American Railroads
Dr. Tracey Jacksier	AIR LIQUIDE Research & Development
Rich Kassel	Tri-State Transportation Campaign
Alex Keros	General Motors
Dr. Lee Kindberg	MAERSK
Jim Kliesch	American Honda Motor Company
Drew Kodjak	International Council on Clean Transportation
Daron Lovaas	National Resource Defense Council
Gay MacGregor	U.S. Environmental Protection Agency
Courtney McCubbin	U.S. Environmental Protection Agency
Dr. Matt Miyasato	South Coast Air Quality Management District
Chris Nevers	Alliance of Automobile Manufacturers
Simone Sagovac	Southwest Detroit Community Benefits Coalition
Rashid Shaikh	Health Effects Institute
Dr. Daniel Short	Marathon Petroleum Company
Sophie Shulman	U.S. Department of Transportation
Matt Solomon	NESCAUM
Lauren Steele	U.S. Environmental Protection Agency
Luke Tonachel	Natural Resources Defense Council
John Viera	Ford Motor Company
Rich Wagner	Cummins
Moderators	
Sharon Lie	U.S. Environmental Protection Agency

MSTRS Meeting Attendance List	
Susan Burke	U.S. Environmental Protection Agency
Other Attendees	
Joe Kubsh	Manufacturers of Emission Controls Association
Chris Bliley	Growth Energy
Pat Ambrosio	Bloomberg BNA
Allen Schaeffer	Diesel Technology Forum
Julia Rege	Global Automakers
Amandine Muskus	Global Automakers
Patty Strabbing	FCA US LLC
Patrick Kelly	American Petroleum Institute
David Lax	American Petroleum Institute
Sarah Froman	Environmental Protection Agency
Doug Obey	Inside EPA
Barbara Kiss	General Motors
Rachel Leven	Bloomberg
Contractor Support	
Lesley Stobert	EC/R Incorporated (a wholly owned subsidiary of SC&A)
Tanya Parise	EC/R Incorporated (a wholly owned subsidiary of SC&A)