Efforts to Understand Wildland Fire Emissions and Impacts and to Inform Strategies Aimed at Decreasing Negative Effects

The following table lists anticipated Air and Energy (A-E) deliverables relevant to Charge Question 3. The Outputs and Products may change as new scientific findings emerge. Completion of Outputs and Products is contingent on appropriate resources being available. A-E will continue to actively engage with EPA Partners to meet their needs and improve understanding of wildfires and inform strategies aimed at decreasing related negative health and environmental effects.

Number	Research Area, Output, or Product Title
	Research Area 2: Approaches for characterizing source emissions, air quality, exposure, and mitigation strategies
Output 2.1	**Progress update on the characterization and mitigation of key combustion sources**
AE.2.1.6	The SPECIATE Database
AE.2.1.8	Summary of emissions from a pilot-scale investigation for the co-combustion of various biomass materials and coal
AE2.1.13	Chemical composition of biomass burning emissions by fuel type and combustion conditions
Output 2.2	**Development, Evaluation, and Implementation of Updated Ambient Air Measurement Methods**
AE.2.2.1	Summary of Ozone Measurement Methods in Biomass Burning Plumes
AE.2.2.2	Evaluation of Small Form Factor, Battery Powered, Filter Based PM Samplers for Use in Community Monitoring during Wildland Fire Smoke Events
AE.2.2.3	Summary of PM2.5 Measurement Artifacts Associated with the Teledyne T640 PM Mass Analyzer during Wildland Fire Smoke Events
Output 2.3	**Progress update on fugitive, area source, fenceline, and roadway emissions research**
AE.2.3.1	Summary of Emission Factors of Reduced Nitrogen and Sulfur Compounds from Biomass Combustion
AE.2.3.2	Development of Aerial Emission Sampling Methods
AE.2.3.8	Emission Sampling from Wildland Fires to Inform Improved Emission Factors
Output 2.4	**Summary of research advancements to characterize emissions, exposures, and related health and environmental impacts associated with solid-fuel combustion for household energy needs (cooking, heating, and lighting) and outline of priorities for future research**

Number	Research Area, Output, or Product Title
	Research Area 3: Public health and environmental responses to air pollution
Output 3.2	**Summary of advancements in understanding health impacts of air pollutants in healthy and at-risk populations and lifestages and identification of remaining critical knowledge gaps.**
AE.3.2.1	Peer-reviewed article identifying and characterizing key factors that influence maternal, reproductive and developmental susceptibility to air pollution
AE.3.2.2	Peer-reviewed article(s) and summary report describing the role of sociodemographic factors in air pollution health disparities: interactions of acute and chronic stressors
AE.3.2.4	Peer-reviewed articles describing factors impacting long-term wellness, progression of chronic disease and responses to air pollution.
Output 3.3	**Synthesis of enhanced understanding of peak/intermittent/short-term/cumulative exposures and relationship to longer term exposures; development of health messages, in collaboration with partners, to communicate risks.**
AE.3.3.1	Journal articles describing health effects of multi-day vs single-day exposures and air filtration interventions in controlled human exposure, animal, and in vitro models
AE.3.3.2	Journal articles describing the health impacts and susceptibility of peak air pollution exposure in vulnerable populations and associated mechanisms.
AE.3.3.3	Journal articles will provide evaluation of health impacts from wildfire smoke and identify mitigation strategies.
Output 3.5	**Summary of advancements in interactions of environmental changes on PM, ozone, wildfires and associated human health impacts**
AE.3.5.1	Estimates of the effect of changing environmental conditions on the chemistry and health impact of air pollution mixtures.
AE.3.5.2	Estimated effects of changing environmental conditions on responsiveness to air pollution.
AE.3.5.3	Estimates of modifying effects of air pollution on subsequent responsiveness to air pollutant exposure

Number	Research Area, Output, or Product Title
	Research Area 7: Emerging Approaches to Improve Air Quality and Exposure Characterization
Output 7.1	**Advancement of Methods in Combining Different Types of Observational and Model Data for Air Pollution Characterization**
AE.7.1.3	Summary of Exposure Characterization Using Data from Air Sensors, Reference Monitors, Satellites, and/or Air Quality Models to Understand Potential Public Health Impacts
Output 7.3	**Air Quality Sensors-Performance Evaluation, Targets Development, Testing Protocols, and Best Practices Guidance**
AE.7.3.5	EPA Wildland Fire Air Sensor Challenge: Summary of Performance and Evaluation of Submitted Sensor Pods
AE.7.3.6	Summary of Evaluation of Commercially Available Air Sensor Performance in Biomass Burning Plumes
AE.7.3.7	A Sensor Toolkit for Air Quality Assessment of Wildfire Smoke Impacts
	Research Area 8: Novel approaches to assess human health and ecosystem impacts and risks
Output 8.2	**Integration of atmospheric, fire, ecosystem, and watershed models and approaches to assess the impacts of wildfires on multiple health, ecosystem and environmental management endpoints, jointly where possible to account for adverse and beneficial impacts**
AE.8.2.1	Integrated modeling platform to assess the multi-media effects of wildfire and potential benefits and costs of management action
AE.8.2.2	Fuel load and air quality assessment tools for informing local and regional prescribed burning and smoke management planning
AE.8.2.3	Models of wildfire effects on stream and lake water quality
AE.8.2.5	Bayesian networks for assessing and managing wildfire risks to humans and the environment

Number	Research Area, Output, or Product Title
	Research Area 9: Wildland fires
Output 9.1	**Interim Progress Update on Wildland Fire Research Summarizing Multidisciplinary Research Being Conducted Across A-E Research Topics**
AE.9.1.1	Synthesis of the Understanding Emission Factors, Chemistry and Human and Ecological Health Hazards from Fires at the Wildland Urban Interface
AE.9.1.2	Literature Assessment of Wildland Fire Effects on Air Quality and Water Quality
AE.9.1.3	Multi-year Fire Activity and Emissions Inventory Using the Best Available Data and Reconciliation Techniques
AE.9.1.4	Criteria Pollutant Concentrations Attributable to Wildland Fires and Residential Biomass Home Heating Measured at Three Western Community Locations as part of the EPA MASIC and AQUARIUS Studies
AE.9.1.5	Advanced Individual-Level Air Pollution Exposure Models for Improving Exposure Assessments for Wildland Fires
AE.9.1.6	Database of Vulnerability of Public Drinking Water Supplies to Wildland Fire-Related Degradation in Water Quality
AE.9.1.7	A Framework for Assessing Trade-Offs in Wildland Fire Management
AE.9.1.8	Estimated Health Impact of Wildfires in the Vulnerable Community
Output 9.2	**Public Health Actions to Reduce Risks from Exposure to Wildland Fire Smoke**
AE.9.2.1	Wildland Fire Solutions-Driven Research Pilot: Clean Air Spaces
AE.9.2.2	Strategies for Effective Health Risk Communication during Wildfire Smoke Episodes

Number	Research Area, Output, or Product Title
AE.9.2.3	Strategies for Improving Public Health Wildland Fire Smoke Communication
Output 9.3	**State of the Science: Synthesis of Wildland Fire Research Findings Related to Improved Modeling and Measurement Methodologies, Public Health Impacts and Interventions, and Ecosystem Impacts**