A-E Research Area 1: Approaches to Support Air Quality Management for Multiple Pollutants at Multiple Scales

Research Area Coordinator (RAC) – Beth Hassett-Sipple, Assistant Center Director for A-E, CEMM

The following table lists anticipated Air and Energy (A-E) deliverables for Research Area 1 (RA1). 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 throughout implementation of our research program.

Number	Output or Product Title
Output 1.1	**Release of CMAQv5.3 and Instrumented Versions Supporting Source Apportionment**
Output 1.2	**Release Updates to CMAQ and Instrumented Versions Supporting Source Apportionment**
1.2.1	Evaluation of CMAQv5.3
1.2.2	Factors Contributing to Ozone Formation Along Land-water Interfaces: Model-observed Inferences during the LISTOS Field Experiment
1.2.3	Improvements for the Representation of the Emissions, Multiphase Chemistry, and Meteorology that Lead to Extreme Particle Episodes during Cold Conditions using a Modeling Testbed for Alaska
1.2.4	Improved Model Representation of Local, Regional and Global Distribution of Atmospheric Aerosols
1.2.5	Land-use Specific Atmospheric Deposition Estimates to Support Chesapeake Bay TMDL Assessments
1.2.6	Multi-model Inter-comparison of Deposition Estimates through Grid-based and Box Modeling
1.2.7	Strengthening Transparency through Documentation of Air Quality Modeling Configurations and Delivery of Data Sets
1.2.8	Modeling Evaluation of Ultrafine Particle Sources and Concentrations in the United States
Output 1.3	**Development of Advanced Approaches to Estimate Background Contributions of Particulate Matter and Ozone**
1.3.1	Development, Evaluation, and Application of a Multi-scale Modeling Platform to Estimate Ozone Concentrations and Source Contributions Over the Greater Denver Area
1.3.2	Quantification of the Effects of Advances in the H-CMAQ and NextGen Modeling Systems on Simulated Background Pollution
1.3.3	Development and Application of a Modeling Testbed for Improving the Characterization of the Natural Atmosphere
1.3.4	An Intercomparison of Modeling and Source Apportionment Approaches through External Collaborations Organized under the Task Force for Hemispheric Transport of Air Pollution (TF-HTAP)
1.3.5	Estimated Decadal-Scale Changes in Background Pollution Due to Divergent Trends in Global Emissions
1.3.6	Comparison of Statistical/Observation-based and Model Estimates of Background Pollution and Source Contributions

Number	Output or Product Title
Output 1.4	**Enhanced Monitoring and Modeling Approaches to Characterize Mesoscale Pollution Episodes**
1.4.1	Evaluation of WRF-CMAQ Performance Using Advance Measurements from the Long Island Sound Tropospheric Ozone Study (LISTOS) Field Study
1.4.2	Development and Implementation of a Common Mixing Height Algorithm and Prototype National Data Archive to Support the Photochemical Assessment Monitoring Stations (PAMS) Program (40 CFR part 58):
1.4.3	Enhanced Monitoring of Column NO_2 and Formaldehyde via Ground-based Sun Spectrometers in Collaboration with the NASA and ESA Pandonia Global Network to Support PAMS Program (40 CFR part 58)
1.4.4	Summary of Measurements and Modeling Approaches to Address the Atmospheric Loss of Reactive Nitrogen via Deposition (NO_2 and NH_3)
1.4.5	Improved Access to Enhanced Monitoring Data to Support EPA, State, and Local Air Quality Analysis via EPA Remote Sensing Information Gateway
1.4.6	Advanced Measurements of Emissions, Chemistry, and Meteorological Parameters in US Persistent Nonattainment Areas: LISTOS Type Mesoscale Field Study
Output 1.5	**Fine-scale Assessment and Mitigation Methods for Near-source Impacts**
1.5.1	Development of Algorithm for Solid Noise Barriers for Use in Dispersion Models
1.5.2	Summary of Approaches for Mitigating Near-Source Ambient Air Impacts Using Urban Design
1.5.3	Estimates of Community Air Quality Impacts from Freight Transport Operations
1.5.4	Summary of Factors Influencing Criteria Air Pollutant Concentrations at Near-Road Monitoring Network Sites
1.5.5	Summary of Techniques to Incorporate Satellite Data to Improve Characterization of Fine-Scale Air Quality and Source Impacts
1.5.6	Summary of Spatial Analysis of Volatile Organic Compounds in Rubbertown Area of Louisville, Kentucky using Passive Samplers
1.5.7	Improved Modeling Approaches for Characterizing the Flow and Dispersion of Air Pollutants in Urban Areas for Use in Dispersion Models

A-E Research Area 2: Approaches for Characterizing Source Emissions, Air Quality, Exposure, and Mitigation Strategies

Research Area Coordinator (RAC) – Beth Hassett-Sipple, Assistant Center Director for A-E, CEMM

The following table lists anticipated Air and Energy (A-E) deliverables for Research Area 2 (RA2). 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 throughout implementation of our research program.

Number	Output or Product Title
Output 2.1	**Progress update on the characterization and mitigation of key combustion sources**
2.1.1	Description of carbonaceous particle emissions from a pellet-burning biomass boiler
2.1.2	ISO-protocol research evaluation of biomass pellet fuels for household energy applications
2.1.3	Summary and dataset on emissions characterization of NOx, VOC, SVOC, PM emissions from both light and heavy-duty vehicles
2.1.4	Ultrafine Particle Workshop
2.1.5	Summary of emissions from off-road stationary diesel gensets operating on traditional and alternative fuels
2.1.6	The SPECIATE Database
2.1.7	Summary of Emissions Measurements and Exposures from Non-Road Engines
2.1.8	Summary of emissions from a pilot-scale investigation for the co-combustion of various biomass materials and coal
2.1.9	Summary of Investigation of Stationary Source Condensable PM Measurements
2.1.10	Summary of Program Office Source Emissions Methods Development and Revisions Support
2.1.11	ISO method development for evaluation of combustion emissions from stoves used for both space-heating and cooking, and examination of secondary organic aerosols
Output 2.2	**Development, Evaluation, and Implementation of Updated Ambient Air Measurement Methods**
2.2.1	Summary of Ozone Measurement Methods in Biomass Burning Plumes
2.2.2	Evaluation of Small Form Factor, Battery Powered, Filter Based PM Samplers for Use in Community Monitoring during Wildland Fire Smoke Events
2.2.3	Summary of $PM_{2.5}$ Measurement Artifacts Associated with the Teledyne T640 PM Mass Analyzer during Wildland Fire Smoke Events
2.2.4	Activity Report of ORD's Reference and Equivalent Methods Designation Program
2.2.5	Continuous Formaldehyde Method Development and Evaluation

Number	Output or Product Title
Output 2.3	**Progress update on fugitive, area source, fenceline, and roadway emissions research**
2.3.1	Summary of Emission Factors of Reduced Nitrogen and Sulfur Compounds from Biomass Combustion
2.3.2	Development of Aerial Emission Sampling Methods
2.3.3	FY20 Annual Summary of NGEM and Fugitive, Area Source, and Fenceline Research
2.3.4	FY21 Annual Summary of NGEM and Fugitive, Area Source, and Fenceline Research
2.3.5	Summary of Study Results of Brake and Tire Wear from On-Road Motor Vehicles
2.3.6	Summary of results of field evaluation of portable automated gas chromatographs for near source VOC monitoring
2.3.7	FY22 Annual Summary of NGEM and Fugitive, Area Source, and Fenceline Research
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**
Output 2.5	**Emission Estimating Methodologies (EEMs) and future research needs for emissions from agricultural sources**
2.5.1	Draft Emission Estimating Methodologies (EEMs) for ammonia, hydrogen sulfide, volatile organic compounds, and particulate matter emissions from swine, poultry (broiler and layer), and dairy farms
Output 2.6	**Methods for Estimating Methane Emissions from Surface Water Reservoirs for the U.S. GHG Inventory Report**
2.6.1	Summary of Temporal Patterns and Biophysical Controls on Methane Emissions from Reservoirs
2.6.2	An Estimate of Methane Emissions for U.S. Reservoirs for Inclusion in the Annual Inventory of U.S. Greenhouse Gas Emissions and Sinks

A-E Research Area 3: Public health and environmental responses to air pollution

Research Area Coordinator (RAC) – Tom Long, Assistant Center Director for A-E, CPHEA

The following table lists anticipated Air and Energy (A-E) deliverables for Research Area 3 (RA3). 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 throughout implementation of our research program.

Number	Output or Product Title
Output 3.1	**Report synthesizing progress to improve characterization of nitrogen deposition budgets for North America and identification of remaining critical knowledge gaps related to nitrogen deposition for assessments of critical loads**
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.3.2.3	Peer-reviewed article describing the dietary impacts on air pollution responses and interventional strategies to reduce adverse health effects.
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 3.4	**Grantee report summarizing results of multiple epidemiology studies evaluating health impacts of lower ambient concentrations of criteria pollutants**
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
Output 3.6	**Synthesis of the scientific advances on deposition and critical load-related research**
AE.3.6.1	Advanced measurements of air-surface exchange and ecosystem exposure.

Number	Output or Product Title
AE.3.6.2	Advanced modeling of air-surface exchange processes to produce improved deposition estimates.
AE.3.6.3	Atmospheric modeling to develop air quality and deposition estimates to support human health and ecosystem assessments.
AE.3.6.4	Advanced Estimates of Critical Loads and Impacts from Atmospheric Deposition on Natural Ecosystems.

A-E Research Area 4: Public Health and Environmental Exposures and Responses to Emerging Air Pollutants and Sources

Research Area Coordinator (RAC) – Beth Hassett-Sipple, Assistant Center Director for A-E, CEMM

The following table lists anticipated Air and Energy (A-E) deliverables for Research Area 4 (RA4). 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 throughout implementation of our research program.

Number	Output or Product Title
Output 4.1	**State-of-the Science: Synthesis of Research on Airborne PFAS Emissions, Sources, Measurement Methods, Control, Dispersion, Environmental Fate, and Impacts and Identification of Remaining Critical Knowledge Gaps**
Measurement Methods Development - Source	
4.1.1	PFAS Source Emissions Measurement Methods and Approaches
4.1.2	PFAS Source Emissions Measurement Methods – Summary of Field Evaluation and Validation
4.1.3	Summary of PFAS Source Emission Characterization
Measurement Methods Development – Ambient	
4.1.4	Ambient Air Measurement Approaches for PFAS Compounds
4.1.5	Summary of Field Evaluations of Ambient Air Measurement Approaches for PFAS Compounds
4.1.6	Summary of PFAS Ambient Air Characterization
Measurement Methods Development - Deposition	
4.1.7	Atmospheric Deposition Measurement Approaches for PFAS Compounds
4.1.8	Summary of Field Evaluations of Atmospheric Deposition Methods for PFAS Compounds
4.1.9	Summary of PFAS Wet Deposition Characterization
Additional PFAS Research	
4.1.10	Summary of Modeling PFAS Air Emissions, Chemistry, and Deposition
4.1.11	Summary of Computational Study of the Atmospheric Lifetimes and Fate of Volatile PFAS
4.1.12	Summary of Characterization and Mitigation of PFAS Air Emissions from Fabric Thermal Application Processes
4.1.13	PFAS Literature Review Paper - Air Sources and Pathways for Perfluorinated Compounds

Number	Output or Product Title
Output 4.2	**Evaluation of Organic Species Impacting Criteria Pollutant Formation**
4.2.1	New Insights in Atmospheric Science Seminar Series
4.2.2	Summary of Implications of VCPs for Ozone and PM in Urban Atmospheres (California and the Northeast US)
4.2.3	Summary of Mechanistic Study of the Oxidation Processes of Limonene
4.2.4	Summary of Identification of VCP-driven Criteria Pollutant Exceedances Nationwide in the Context of Changing NOx
4.2.5	Summary of Laboratory Determination of SOA and Ozone from Volatile Chemical Products (VCPs)
4.2.6	Summary of Constraints on Recently Identified Atmospheric Chemistry Pathways
4.2.7	Summary of Next Generation Mechanisms for Atmospheric Chemical Transport Models
4.2.8	Summary of a Multimodel Approach to Chemical Prioritization Based on Primary and Secondary Pollutant Exposure Across Environments Resulting from Volatile Chemical Products
4.2.9	A Generalized Approach to Emission Mapping
Output 4.3	**Ethylene Oxide – State of the Science and Methods Development**
4.3.2	Summary of Instrumentation and Measurement Capabilities for Fugitive and Source Emissions of EtO
4.3.3	Summary of Field Evaluation of Current EPA Method TO-15A Analysis for Ambient Monitoring of Ethylene Oxide
4.3.4	Toxic Organics Method TO-15A Supplement, Canister Analysis Method for Ethylene Oxide in Ambient Air
4.3.5	Summary of EtO Emissions from Motor Vehicles
4.3.6	Summary of Source Impacts through Ambient Air Sampling

A-E Research Area 5: Methods to Evaluate Environmental Benefits and Consequences of a Changing Energy System

Research Area Coordinator (RAC) – Beth Hassett-Sipple, Assistant Center Director for A-E, CEMM

The following table lists anticipated Air and Energy (A-E) deliverables for Research Area 5 (RA5). 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 throughout implementation of our research program.

Number	Output or Product Title
Output 5.1	**Report on Air Quality Under Future Energy Scenarios**
5.1.1	Updated energy system modeling frameworks to incorporate estimation of air quality impacts
5.1.2	Summary of method and an analysis using the method for projecting future-year emission inventories for non-EGU sources such as industrial sources
5.1.3	Scientific data of the characterization of cost and emissions savings associated with Energy Efficiency and Renewable Energy to support control strategy development
5.1.4	Summary of formal scenarios methods to investigate the efficacy of existing regulations and potential policies in protecting air quality
5.1.5	Updates and improvements to GLIMPSE framework
5.1.6	Summary of NYC Ozone Responsiveness to Regional and Local NOx Reductions: A Multi-sector analysis
Output 5.2	**Biofuels and the Environment: The Third Triennial Report to Congress (RtC3)**
5.2.1	Technical Input White Papers for de novo analyses for the RtC3
5.2.2	Internal Review Draft (IRD) for the RtC3
5.2.3	External Review Draft (ERD) for the RtC3
5.2.4	White paper describing foundation for RtC4
Output 5.3	**Progress Update on Environmental Consequences of Emerging Transportation Technologies, Policies, and Practices**
5.3.1	Analysis of the energy and emission implications of deploying low-emission hydrogen fuels in the transportation sector
5.3.2	Updated GCAM-USA model with enhancements to support Agency applications

A-E Research Area 6: Methods to enable resilience to future environmental stressors

Research Area Coordinator (RAC) – Darrell Winner, Research Area Coordinator, CPHEA

The following table lists anticipated Air and Energy (A-E) deliverables for Research Area 6 (RA6). 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 throughout implementation of our research program.

Number	Output or Product Title
Output 6.1	**Updated and expanded scenario data for population, land use, and extreme events to inform risk communication and management**
AE.6.1.1	Updated LASSO Web Application
AE.6.1.2	ICLUS Scenario Data
AE.6.1.3	Dynamically downscaled projections of changes to extreme weather across the CONUS
AE.6.1.4	Projected changes to IDF curves from dynamically downscaled scenarios
AE.6.1.5	Summary of improved high-resolution simulation of extreme weather events
Output 6.2	**Summary of Advancements in Interactions of Environmental Changes on PM, Ozone, Wildfires and Associated Human Health Impacts**
AE.6.2.1	Summary of changes in air quality and health impacts in the U.S. at 2050 and 2090 projected using multiple earth system models and emission scenarios
AE.6.2.2	Summary of projected air quality and health impacts of wildfire in the U.S. under different temperature scenarios
AE.6.2.3	Summary of estimated relationship between national temperatures and air quality (O3/PM2.5 concentrations) based on multiple models
Output 6.3	**Analysis of environmental impacts and vulnerabilities due to effects of changing conditions and extreme events on water quality and aquatic resources**
AE.6.3.1	Summary of coastal water program risk mapping and adaptation analysis for resilient infrastructure
AE.6.3.2	Summary of hydroclimatic change effects on stormwater BMPs in different regions of the U.S.
AE.6.3.3	National Stormwater Calculator Update – informing management of extreme storm events
AE.6.3.4	Summary of the effects of extreme events on and emerging risks to forested watersheds
AE.6.3.5	Summary of impacts to watersheds from wildland fire and extreme events on salmonid refugia and population viability
AE.6.3.6	Identification of resilient watershed BMPs under scenarios of future climate and land-use change: Regions 1, 7, and 10 case studies

Number	Output or Product Title
Output 6.4	**Methods for adaptation planning and decision analysis to improve environmental resilience to changing conditions and extreme events**
AE.6.4.1	Report estimating site-specific gains and losses of tidal wetland ecosystem services due to sea level rise and extreme weather events
AE.6.4.2	Report characterizing and assessing the resilience and recovery potential of watersheds challenged by extreme events to identify key refugia
AE.6.4.3	Report on the application of vulnerability assessment results and innovative methods to identify resilient sites and assess trends
AE.6.4.4	Synthetic principles for adaptation planning and decision analysis to improve resilience of natural resources under changing environmental conditions

A-E RA7: Emerging Approaches to Improve Air Quality and Exposure Characterization

Research Area Coordinator (RAC) – Beth Hassett-Sipple, Assistant Center Director for A-E, CEMM

The following table lists anticipated Air and Energy (A-E) deliverables for Research Area 7 (RA7). 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 throughout implementation of our research program.

Number	Output or Product Title
Output 7.1	**Advancement of Methods in Combining Different Types of Observational and Model Data for Air Pollution Characterization**
7.1.2	Summary of Next Generation Methods and Citizen Science Data to Evaluate Source Emissions and Impacts
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 7.2	**Improved Capability to Manage, Process, Analyze, and Visualize Next-generation Air Pollution Data**
7.2.1	Report on Stakeholder Needs Assessment for Air Sensors
7.2.2	Report on Data Solutions for Air Sensors
7.2.3	Summary of Internal Pilot of an Air Sensor Data Management Scheme to Support EPA Research and Air Quality Messaging
7.2.4	Summary of Air Sensor Data/Network Data Quality Assurance Methodology
7.2.5	Air Sensor Data Analysis Application
7.2.6	Summary of Workshop on Metadata Standards Development for Air Sensors Data Management
Output 7.3	**Air Quality Sensors – Performance Evaluation, Targets Development, Testing Protocols, and Best Practices Guidance**
7.3.1	Air Sensor Performance Targets and Test Protocols for $PM_{2.5}$ and Ozone
7.3.2	Air Sensor Performance Targets and Test Protocols for PM_{10}, NO_2, SO_2, CO
7.3.3	Update to Air Sensor Guidebook
7.3.4	Summary of Air Sensor Evaluations
7.3.5	EPA Wildland Fire Air Sensor Challenge: Summary of Performance and Evaluation of Submitted Sensor Pods
7.3.6	Summary of Evaluation of Commercially Available Air Sensor Performance in Biomass Burning Plumes
7.3.7	A Sensor Toolkit for Air Quality Assessment of Wildfire Smoke Impacts

Number	Output or Product Title
Output 7.4	**Development of Advanced Air Quality Modeling Approaches for Global to Urban Scales**
7.4.1	Summary and Evaluation of MPAS Retrospective Meteorology Applied to Global Air Quality Modeling
7.4.2	An Advanced Visualization Environment for Rich Data Interpretation (VERDI) Visualization and Analysis Tool for Next Generation Air Quality Modeling on Global Icosahedral-type Grid Meshes
7.4.3	Updated Model with Atmospheric Chemistry Over Marine Environments and Evaluation
7.4.4	Software Tools for the Generation of MPAS Horizontal Meshes to Support Global to Regional Coupled Meteorology and Air Quality Modeling
7.4.5	Advanced Urban Canopy Model Components for High-resolution Meteorology and Air Quality in Urban Areas
7.4.6	Updated Global Air Quality Model with Improved Soil and Surface Representation Incorporating Global Satellite Products
7.4.7	Updated Air Quality Model with Aerosol-Met Interactions Including Direct and Indirect Radiative Feedback Effects
7.4.8	Prototype Regional Version of the Advanced Air Quality Modeling System
7.4.9	2-way Coupled MPAS-AQ Model

A-E Research Area 8: Novel approaches to assess human health and ecosystem impacts and risks

Research Area Coordinator (RAC) – Tom Long, Assistant Center Director for A-E, CPHEA

The following table lists anticipated Air and Energy (A-E) deliverables for Research Area 8 (RA8). 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 throughout implementation of our research program.

Number	Output or Product Title
Output 8.1	**Development of new health research approaches that take advantage of newly available electronic health databases, molecular data cohorts, and advanced cellular models**
AE.8.1.1	Peer-reviewed articles describing advanced pollutant detection and toxicity screening through novel data systems and cellular methodologies
AE.8.1.2	Articles on subclinical and clinical effects of PM2.5, its composition, and sources on sensitive groups evaluated via novel electronic health records, traditional data sources and in vivo models
AE.8.1.3	Assessment of air pollution health effects in sensitive populations using novel electronic health record cohorts
AE.8.1.4	Novel cellular models and cohort approaches to understanding biomarkers of susceptibility and identification of at-risk populations
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 and a wildfire-water quality portal
AE.8.2.4	Analysis of effects of fire-induced land surface changes on air quality impacts
AE.8.2.5	Bayesian networks for assessing and managing wildfire risks to humans and the environment

A-E Research Area 9: Wildland fires

Research Area Coordinator (RAC) – Tom Long, Assistant Center Director for A-E, CPHEA

The following table lists anticipated Air and Energy (A-E) deliverables for Research Area 9 (RA9). 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 throughout implementation of our research program.

Number	Output or Product Title
Output 9.1 & Output 9.3	**Interim Progress Update on Wildland Fire Research Summarizing Multidisciplinary Research Being Conducted Across A-E Research Topics & 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**
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, Water Quality, and Human Health
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
AE.9.2.3	Strategies for Improving Public Health Wildland Fire Smoke Communication