National Park Service and Western States Air Resources Council/Western Regional Air Partnership

Work Statement for the period October 2014 through February 2016

for the Three-State Air Quality Study

June 2, 2014

The proposed Task 2 is a substantial cooperative effort between WESTAR/WRAP and the NPS. Collaborative activities include Three State Air Quality Study (also known as Western Air Quality Study) coordination, ambient monitoring activities in the Utah portion of the Study region, air quality modeling, emission inventory development, and data warehouse operations and maintenance across the Study region.

For the proposed Task 2:

WESTAR/WRAP will:

- Serve as the project coordinator for the Three State Air Quality Study.
- Oversee technical tasks for the Three State Air Quality Study Cooperators to include:
  - Air Quality monitoring
  - Emission inventory development
  - Air quality modeling
- Support data warehouse operations and maintenance.
- Assist in education and outreach to stakeholders and the public.
- Organize and attend meetings, webinars, and conference calls.

The National Park Service will:

- Attend planning and management meetings, webinars, and calls, and provide input for the Three State Study.
- Provide information, data, statistical and/or GIS work products to contribute to products for the Three State Air Quality Study.
- Review and comment on all draft products.
- Provide financial support for WESTAR/WRAP for work performed as outlined under this agreement.

WESTAR/WRAP and NPS jointly agree to:

- Work together to develop projects, tasks, products and timelines related to the Three State Air Quality Study.

- Facilitate communication and information sharing between the Federal and State project Cooperators.

WESTAR/WRAP is uniquely qualified and experienced in providing air quality collaboration and coordination services that includes oversight of technical experts for states, tribes, local air agencies, and federal agencies across the western U.S. WESTAR/WRAP's extensive qualifications for this work were reviewed and bought off on by the State and Federal Cooperators in the Three State Air Quality Study.

More detailed information regarding the scope of the work being cooperatively undertaken follows.

1) Study Coordination.

The NPS and WESTAR/WRAP will work together to support the ongoing operation of the Three State Air Quality Study. WESTAR/WRAP will work toward meeting the Study objectives which include:

- Provide consistent protocols for technical data and its analysis for air quality impacts to be performed by the Western AQ Study partner agencies.
- Operate and maintain a consistent set of technical information in a data warehouse.
- Initiate and support collaborative work by the federal and state partners on National Environmental Policy Act (NEPA) air quality analyses relative to energy development and for a broad range of air quality planning activities, including emissions, meteorological and air quality modeling.
- Develop technical capacity, including training, and improved data sets for the cooperating agencies using standardized reproducible data collection, quality assessment, analysis, and storage protocols.
- Identify, document and apply criteria for base year and future year projections.
- Assist NPS, 3-State/FLF Study Governing Board, and other potential public agency partners in identifying ways and means of ongoing funding to support the data warehouse when operational
- Identify the mechanisms to be used by the technical work groups to report to the 3-State/FLF Steering Committee and Governing Board, and assist and facilitate involvement of additional public agencies and development of future oversight entities for the Western AQ Study.

2) Ambient Monitoring Activities in the Utah portion of the Study region.

The NPS and WESTAR/WRAP will work with the State of Utah – Division of Air Quality program to operate air quality monitors that comprise a portion of the Study network in Utah. This will include field support of these operations through equipment maintenance and quality assurance at the Fruitland and Price monitoring sites. WESTAR will provide funding to the State of Utah, one of its members, to support these activities. This supports the fourth bulleted objective in #1 above.

3) Air Quality Modeling for the Study region.

The NPS and WESTAR/WRAP will collaborate to provide air quality modeling analyses as listed below. NPS will provide oversight of these activities, and WESTAR/WRAP will manage the execution of the detailed technical work, using contractor support. As this is a continuation of the modeling work currently underway, the Cooperators would prefer the existing project team as the tasks described below are a continuation of current efforts. This supports the fourth bulleted objective in #1 above.

a. CMAQ Modeling

We will supplement the 3SAQS CAMx 2011 version A (3SAQS_CAMx_2011a) modeling platform with a CMAQ modeling platform (3SAQS_CMAQ_2011a). We will create CMAQ version 5.0.2-ready inputs from the same source data used to create the CAMx inputs.

b. Source Apportionment Modeling

We will apply the same types of source apportionment configuration used for the West-wide Jump-start Air Quality Modeling Study (WestJumpAQMS) using the 3SAQS 2011 modeling platform, and would analyze air source and impacts of interest to the Western AQ Study participants. These source apportionment simulations could use both the ozone (APCA) and PM (PSAT) source apportionment tools.

c. Air Quality Model Performance Improvements

We will conduct up to five modeling sensitivity simulations that focus on discrete episodes (< 2 weeks) and locations where the air quality modeling performance was particularly poor in the earlier 3SAQS base 2011 version A simulations.

d. Deposition and Visibility Analyses

We will analyze the 2011 CAMx and CMAQ visibility and deposition modeling results in more detail. This would include visibility and deposition model performance evaluation using both observed visibility based reconstructed mass, direct visibility measurements (e.g., nephelometer), and wet and dry deposition observations. The treatment of CAMx and CMAQ deposition would be analyzed, including the aqueous chemistry treatment in the two models. How the models treat liquid-phase chemistry, particularly within falling raindrops, may partly explain the differences in the model and observed differences in the split between wet ammonia and ammonium depositions.

e. Data Analysis and Modeling Plan Based on 2011 Work

We will prepare a Modeling Protocol describing how the 2014 modeling platform will be developed, including the analysis of the 2014 data and procedures for analyzing the 2014 modeling results. A "Lessons Learned" document would also be prepared describing what has been learned from the 2008 and 2011 modeling and how these lessons would be included in the 2014 Modeling Protocol.

f. WRF Modeling and Evaluation

We will use the Weather Research Forecast model with boundary condition data for 2014 to generate annual 2014 meteorology on the 36/12/4-km 3SAQS modeling domains. This simulation will use two different configurations: (1) a wintertime configuration (January – March, December) will be based on the results found under Task 3.h below and will optimize the model performance in the 4-km domain for winter ozone modeling; (2) a non-winter configuration (April – December) will use the same WRF configuration as the 3SAQS 2011 WRF runs to simulate meteorology outside of the winter months.

g. Preliminary Air Quality Modeling

We will use the preliminary 2014 emissions developed under Task 4.a below, the meteorology data developed under Task 3.f, and potential model improvements gleaned from Task 3.c to create a preliminary 2014 air quality modeling platform for the 3SAQS. The intent of this simulation is to develop and evaluate an initial air quality modeling configuration using both CAMx and CMAQ. We will conduct an annual 2014 simulation on the 3SAQS 36 and 12-km modeling grids using both models and evaluate the results against available observations. We will conduct a model performance evaluation of the modeling results, focusing on monitors in the three-state region. Our focus will be on the model performance for ozone, primary and secondary PM, visibility, and deposition. Following completion of the model performance evaluation and comparison, we will develop a trends report for 2008, 2011, and 2014. The report will compare observed air quality trends in the three-state region and the evolution of model performance through the triennial simulations conducted for the Study.

h. WRF Winter Ozone Modeling Platform

For the Study region, the University of Utah (UofU) and the Utah Division of Air Quality have developed a WRF modeling configuration to improve model performance in simulating cold air pooling in the Uintah Basin. While the configuration has shown promising results for reproducing the dynamical and radiative drivers of particular high ozone events, it has not been tested outside of a few limited time periods in the Uintah Basin. We will execute additional testing and evaluation to advance the WRF meteorological modeling tools, and implement the resulting modeling tools and capabilities in the Study.

4) Emission Inventory Development

The NPS and WESTAR/WRAP will collaborate to provide air quality emissions analyses as listed below. NPS will provide oversight of these activities, and WESTAR/WRAP will manage the execution of the detailed technical work, using contractor support. As this is a continuation of the modeling work currently underway, the Cooperators would prefer the existing project team as the tasks described below are a continuation of current efforts. This supports the fourth bulleted objective in #1 above.

a. Emissions Platform Development and Testing

We will start this task by preparing a 2014 emission inventory development plan for review by the 3SAQS cooperators. This plan will detail an approach for developing year 2014 emission inputs by Spring 2015. It will also include a plan for 2014 emissions beyond the preliminary platform, including the integration of the NEI 2014, 2014 oil and gas inventories, and other emissions improvements. The initial 2014 platform will likely use the latest version of the 2011 NEI for most of the anthropogenic sources. We will process the 3SAQS preliminary 2014 emissions through SMOKE (3SAQS_SMOKE_2014prelim) for the 3SAQS 36 and 12 km domains and create reports for comparing the data to the 2008 and 2011 3SAQS emissions platforms.

b. O&G Survey and Preliminary Emission Inventory

Under this subtask O&G operators in the Piceance Basins in Colorado and the Uinta Basin in Utah will be surveyed for updated information on survey-based sources. The objectives are to obtain key input data from operators to generate 2014 emission inventories for these three basins, as well as whatever information is available from operators to refine projections of emissions in these basins to 2020. Also under this task we would acquire and process the 2014 permit (state and tribal) data within CO, UT and WY and process and project non-permit O&G data to 2014 to generate a SMOKE-ready preliminary 2014 O&G emissions inventory.

In Subtasks 1 – 3, we will develop and implement surveys for the Denver-Julesburg (D-J), Piceance, and Uinta Basins, respectively. Subtasks 4 – 6 are to perform outreach to the O&G Operators in the three Basins to make sure the surveys are completed. We will follow the WRAP Phase III methodology for a survey outreach to O&G companies operating in these three basins. Survey instruments will be developed to request data from operators on basin average equipment, processes, activities, and gas compositions. Surveys will be developed using the latest methodologies and lessons learned from recent past projects since the original WRAP Phase III surveys were created; specifically this will include adding additional source categories including produced water ponds, fracing engines, and pipeline data. Under Subtask 7, we will acquire the 2014 “permitted” O&G emissions data for Colorado, Utah and Wyoming. The resulting “permitted” 2014 O&G emissions would be reformatted for SMOKE in Subtask 8 and a preliminary 2014 O&G inventory will be prepared for the “unpermitted” O&G data by extrapolating the WRAP 2011 inventory to 2014 and the results would be reformatted for SMOKE emission modeling in Subtask 9. Finally, a Technical Memorandum describing how to implement new NEPA future year Project emissions within a future year projected O&G inventory will be prepared in subtask 10.

Activity

Number of conference calls with Governing Board or Steering Committee	6
Number of face-to-face meetings	5
Technical milestones requiring special communication effort	4