MANAGING MEMBERS
ACTION ITEM

Item No. 4B

Date of Meeting November 6, 2018

DATE: October 24, 2018

TO: Managing Members, The Northwest Seaport Alliance

FROM: John Wolfe, Chief Executive Officer

Sponsor: Jason Jordan, Director, Environmental and Planning Services

Project Manager: Graham VanderSchelden, Environmental Project Manager I

SUBJECT: ILA with WSU for Air Quality Monitoring Study

A. ACTION REQUESTED

As referenced in NWSA Resolution No. 2016-04, Exhibit A, Delegation of Authority Master Policy, Paragraph 8.b.i. requires authorization from Managing Members to enter into an Interlocal Agreement (ILA) with another public agency.

Request authorization for the NWSA CEO to enter into an Interlocal Agreement (ILA) with Washington State University (WSU) in the amount of $130,823 for work associated with the WSU Ports Air Quality Modeling Study, funded under NWSA Master Identification No. 201007.01.

B. SYNOPSIS

The costs of the services being provided by WSU will cover labor, equipment, and facilities to complete an air quality modeling study, designed to assess the exposure of the Puget Sound community to the major sources of port-related air pollution. The model, operated by WSU, will provide estimated concentrations of air pollution that originate from port-related sources (ocean-going vessels, harbor vessels, heavy-duty trucks, locomotives, and cargo-handling equipment) for each 1.3 kilometer by 1.3 kilometer “cell” of the Puget Sound Region. The modeled concentrations will be correlated spatially with population to develop a metric that quantifies the exposure of the population to port-related air pollution. The exposure metric will be provided for each source category, allowing the relative impacts of each to be compared.

Comparing the relative public exposure to air pollution from each port-related source will allow emission reduction measures in the Northwest Ports Clean Air Strategy (NWPCAS) to be prioritized for the sources that truly pose the largest health risk to the public. Because past efforts to quantify the impacts of port-related air pollution (Puget Sound Maritime Air Emissions Inventories) have simply provided aggregate annual emission totals for the entire region, without quantitative consideration of where the emissions occur relative to population centers,

this analysis would provide significant opportunity to design air quality programs more effectively and efficiently.

Value Added Beyond the Scope of Puget Sound Maritime Air Emissions Inventory:

- Assessment of the spatial distribution of emissions for each port-related source.
    - Traditionally, emissions that occur off port terminals have been quantified in aggregate across large spatial scales.
    - Refining the spatial allocation of emissions allows the location of emissions relative to population centers to be considered.
- Quantify public health risk associated with port-related air pollution.
    - Use location of emissions, dispersion of pollutants, and spatially specific population data to assess the public health risk from port-related air pollution.
    - Contextualize the port-related air pollution risk with other regional sources.
- Understand the relative public health impacts of each source.
    - Allows emission reduction programs to be prioritized for sources that pose the largest public health risk.

C. BACKGROUND

Northwest Ports Clean Air Strategy

In 2007, the Ports of Tacoma, Seattle, and Vancouver B.C. came together to create the Northwest Ports Clean Air Strategy (NWPCAS), a joint initiative to reduce air pollutant and greenhouse gas (GHG) emissions from port operations[1]. In 2015, The Northwest Seaport Alliance (NWSA) was formed and was included as a member of the strategy. The ports developed the strategy in collaboration with government agencies, including the Puget Sound Clean Air Agency, the EPA, and Washington State Department of Ecology. The strategy sets overarching emission reduction targets for the ports in addition to activity-based targets for each emission sector encompassed in port operations. The NWPCAS is updated every five years to realign the targets with the latest science and technology, industry best practices, regional, national, and international policy, and port, community, and agency priorities. The ports are currently beginning the process of updating the NWPCAS for years 2020 and beyond to guide air quality programs at the port.

Puget Sound Maritime Air Emissions Inventory

The NWSA, Port of Tacoma, and Port of Seattle have participated in a regional effort, called the Puget Sound Maritime Air Emissions Inventory (PSEI) to quantify air pollutant and greenhouse gas emissions from maritime related sources. The PSEI has been completed three times, for calendar years 2005, 2011, and 2016, using an activity-based methodology where emissions are calculated using reported vessel, equipment, and vehicle usage.

[1] EPA. Northwest Ports Clean Air Strategy. https://www.epa.gov/ports-initiative/northwest-ports-achievements-reducing-emissions-and-improving-performance

The emissions data presented in the PSEI has been used to inform air emission reduction efforts in the NWPCAS as well as other port initiatives. The PSEI provides emission data for each port and each emission sector over an entire year. Distinction is provided between emissions that occur on and off port terminals, but no further analysis is provided on the spatial distribution of emissions or the dispersion of port-related pollution relative to population locations.

Washington State University AIRPACT Model

The Laboratory for Atmospheric Research (LAR) at Washington State University (WSU) operates the AIRPACT numerical air quality forecast system for the Pacific Northwest[2]. This system uses state-of-the-art air quality modeling techniques to estimate ambient concentrations of ozone, fine particles ($PM_{2.5}$), and numerous toxic air pollutants on a one-hour time step over a 4 km x 4 km gridded domain covering Idaho, Oregon, Washington and peripheral areas. AIRPACT is currently used and funded by regional and state air quality agencies (including Puget Sound Clean Air Agency and the Department of Ecology) and used for a variety of air quality forecasting applications including assessment of wildfire smoke impacts, burn ban decision making, and assessment of ground level ozone. The AIRPACT framework is ideally suited, particularly after suitable modifications, to quantify the exposure of the population to port-related air pollution within the Puget Sound Airshed. Because WSU has this robust air quality modeling framework already in place and have experts in air quality modeling on staff, NWSA staff, after consulting with staff at the department of Ecology and the EPA, have determined that contracting with WSU is the best path forward for completing this work. An example of emissions and air pollutant concentration graphics from AIRPACT are shown in Figure 1.

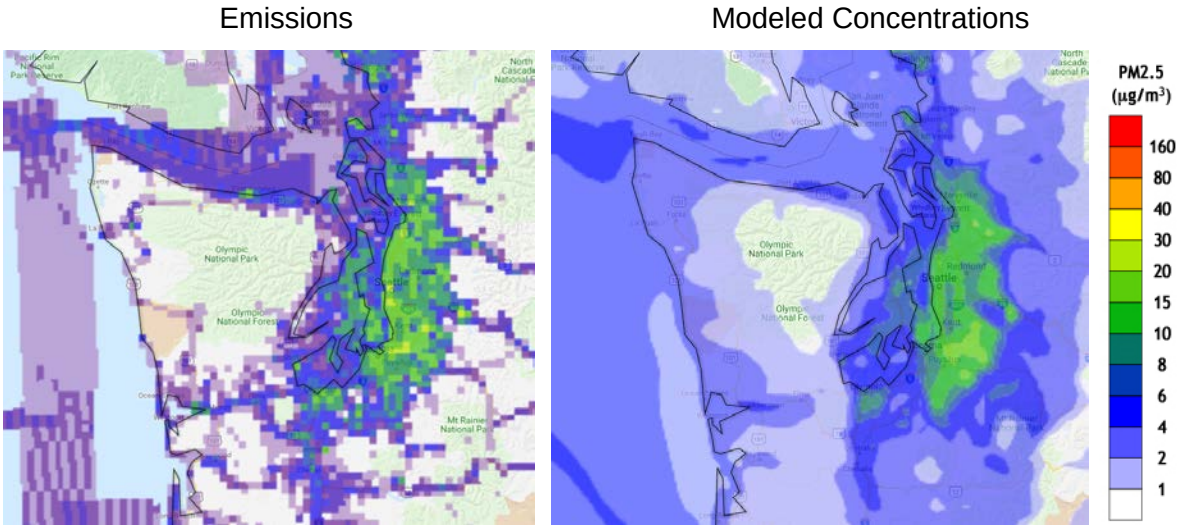

Figure 1. Example emissions and modeled $PM_{2.5}$ concentrations from AIRPACT.

[2] WSU, 2018. AIRPACT 5 Model. http://lar.wsu.edu/airpact/gmap/ap5/ap5.html

D. MOTIVATION

By assessing the population's exposure to pollution from each source, this study will provide a more robust basis for prioritizing emission reduction measures, by truly understanding which sources most significantly impact the community. For example, ships (ocean-going vessels) are the largest port-related source of diesel particulate matter (DPM) emissions, but a large percentage of their emissions occur while transiting through the Strait of Juan de Fuca and the Puget Sound. Because many of these emissions occur far away from major population centers, ship emissions may not contribute to public health risk as much as other sources that operate closer to population centers, such as heavy-duty trucks and locomotives. This study will ensure that the port has the most complete information possible when assessing health related benefits from emission reductions and prioritizing emission reduction efforts, ensuring that the air quality benefits are maximized for the money spent on air quality programs.

E. PROJECT METHODOLOGY AND DETAILS

The WSU AIRPACT model will be used to analyze air pollutant concentration for each 1.3 kilometer by 1.3 kilometer "cell" in the Puget Sound region. To do this, WSU will create a special modeling framework with a high-resolution domain (grid cell size of 1.3 km x 1.3 km) centered on the Puget Sound Airshed, operated by WSU on their "computing clusters". The overarching study design is to isolate emissions from operations related to the NWSA, Port of Tacoma, and Port of Seattle and to use these port specific emissions as inputs to the model to assess annual average and short-term maximum pollutant concentrations within the Puget Sound Airshed. A subsequent modeling exercise will assess the population's exposure to these air pollutants, using the BenMap health impact tool to spatially correlated air pollutant concentrations with population[3]. These exposure effects will be evaluated for each source type individually, as well as in aggregate, with the goal of assessing the spatial distribution of pollutant concentrations in addition to developing an airshed scale exposure metric for assessing the relative impacts of each source. The model will also estimate concentrations for non-port-related sources, allowing the port's impact to be contextualized with other regional emissions. A full description of the study methodology and scope can be found in Attachment B.

Research Products:

Within the analysis period, the magnitude and location of the maximum concentration of each pollutant (DPM, $PM_{2.5}$, ozone, and other air toxics if applicable) will be reported and their attribution to each source type. Annual average concentrations associated with each source type will be estimated for each grid cell as well as annual average concentrations for all sources together. Contour maps will be created to illustrate the concentration distribution. Gridded concentration data will be made available in a format appropriate for use in models that assesses community health effects. For each emission source category, an exposure metric will be calculated for each census block and total regional exposure will be calculated. Contour maps will be created to visually portray the spatial distribution of public health risk/exposure for each source type.

[3] EPA. BenMAP. https://www.epa.gov/benmap/benmap-downloads

Project Deliverables and Schedule:

Task 1 – Produce emission maps for each source and pollutant emitted.

- Completion Date: December 31, 2018

Tasks 2 and 3 – Perform modeling analyses and produce final report.

- Completion Date: May 31, 2019

The deliverable from WSU to NWSA is a final report detailing the methods, results, and conclusions of the study as follows:

- Description of all modeling methods used.
- Map graphics showing gridded emissions for each pollutant and source category.
- Map graphics that show the resulting annual average and maximum air pollutant concentrations for each air pollutant and source category.
- Metrics that quantify the Puget Sound Population's exposure to each air pollutant and the corresponding health risk (i.e., concentration x population exposed, acute and chronic health risk metrics).
- Analysis of results identifying which sources pose the largest risk to public health.
- Analysis of results characterizing the composition of secondary pollutants and which sources are most significant.
- Characterization of port-related emissions in context of other regional emissions.

F. FINANCIAL IMPLICATIONS

The cost to NWSA to fund this study is $130,823. This will be paid in two equal installments of $65,412, one in 2018 and one in 2019. All costs will be expensed as incurred.

Source of Funds

The Capital Investment Plan (CIP) allocates $750,000 in 2018 and $590,000 in 2019 for Northwest Ports Clean Air Strategy projects (MID 201007.01), with $80,000 budgeted for this project in each calendar year.

G. ATTACHMENTS TO THIS REQUEST

A. Interlocal Agreement between WSU and NWSA

B. Complete project scope of work