EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 0-03

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-D-14-032	09/16/2014 To 09/15/2019 Base X Option Period Number	Data Develop for Benefits Calc

Contractor: INDUSTRIAL ECONOMICS, INCORPORATED

Specify Section and paragraph of Contract SOW: #1 and 2

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 09/16/2014 To 09/15/2015

Comments:
THE WORK ASSIGNMENT INCLUDES 150 HOURS FOR PREPARATION OF THE WORKPLAN/COST ESTIMATE AND TO BEGIN THE WORK ASSIGNMENT. THE CONTRACTOR SHALL PROPOSE THE HOURS NECESSARY TO COMPLETE ALL TASKS. NO PREVIOUSLY PERFORMED WORK SHALL BE DUPLICATED.

Accounting and Appropriations Data

☐ Superfund [X] Non-Superfund

SFO (Max 2) ☐

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 09/16/2014 To 09/15/2019 Cost/Fee: LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: Cost/Fee: LOE:

Cumulative Approved: Cost/Fee: LOE:

Work Assignment Manager Name Amanda CurryBrown (Signature) (Date)	Branch/Mail Code: Phone Number 919-541-3808 FAX Number:	
Project Officer Name Carolyn Blake (Signature) (Date)	Branch/Mail Code: Phone Number: 919-541-5256 FAX Number:	
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:	
Contracting Official Name Rob D. Flowers (Signature) 11/21/2014 (Date)	Branch/Mail Code: Phone Number: 919-541-2182 FAX Number:	

Statement of Work

I. Title: Data Development for Benefits Calculator
Contractor Name: Industrial Economics, Inc.
Contract #: EP-D-14-032
Period of Performance: WA Approval through 9/15/2015
WA #: 0-03

II. Work Assignment Manager (WAM):

Amanda Curry Brown
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Alt. WAM:
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III. Background:

The Climate and Clean Air Coalition (CCAC) has identified that developing national action planning to address short-lived climate pollutants (SLCP) is a key priority in the initial phase of its work. The CCAC Supporting National Action Planning initiative is being led by Mexico and the United Nations Environment Programme (UNEP), and a number of other countries (including Canada) have expressed support for investments in this area. The goal is for countries participating in the CCAC to design National Action Plans (NAPs) outlining the suite of mitigation measures that best suit their national circumstances. Developing these plans will require a host of resources to support decision-making and plan development and implementation in individual countries. Therefore, CCAC partners and UNEP have identified a number of tools that need to be developed and consolidated into a NAP toolkit ("toolkit") for ready use by countries (developing countries in particular) as they plan mitigation activities. Key elements of this toolkit include:

- Assessment tools for developing emission inventories and implementation scenarios
- Tools for estimating costs and benefits of mitigation measures
- A guidance document to support countries in designing the (NAPs)
- Information on sources of finance for plan development and implementation
- Resources to support capacity building and awareness raising

In designing NAPs, countries will be interested in maximizing the climate, public health, and environmental benefits of any mitigation measure they adopt. This requires detailed information about the emission changes and impacts that will flow from different mitigation choices. A well-designed and comprehensive toolkit will enable countries to quantitatively estimate the effects of different emission control measures. Information on the specific benefits that can be expected to accrue from individual SLCP mitigation measures can inform countries' choices as they develop NAPs and help them communicate to domestic and international audiences about the benefits of their mitigation investments. This, in turn, can help develop popular support for implementing NAPs, as well as for other individual SLCP mitigation actions developed independently of NAPs.

Accurately assessing the potential benefits of alternative mitigation options requires detailed information on technology choices, emissions, atmospheric concentrations of pollutants, and human health and environmental exposures and responses. EPA has been working with the Stockholm Environment Institute (SEI) to develop or expand tools to enable quantification of air pollution-related health impacts in all countries around the world without the need for resource-intensive air quality modeling. The "Benefits Calculator" is a rapid-assessment tool enabling analysts to quickly assess the climate, health, and agricultural benefits of emissions reductions. The Benefits Calculator is currently being developed as a module within SEI's Long-range Energy Alternatives Planning System (LEAP).

Climate and health impacts at the global scale, in addition to country-specific impacts modeling for four countries (Mexico, Ghana, Bangladesh, and Colombia) have been completed to date. The current work assignment (WA) expands this work to develop data inputs for all countries specified by WAM continues.

IV. Description and Tasks:

The WAM is authorized to provide technical direction in accordance with the contract. In accordance with the contract and as directed by the WAM, the Contractor shall provide all data (including software and programming code) obtained and developed under this WA. Data shall be delivered in complete form, in the media and format directed by the

WAM. The Contractor shall work in close collaboration with EPA and the Stockholm Environment Institute (SEI) to complete the tasks outlined below.

In accordance with the contract SOW, the Contractor shall perform the following tasks:

Task #1: Prepare Work Plan

Within one week of the WA effective date, the Contractor shall attend a kick-off meeting with EPA's WAM and EPA technical experts to discuss the goals and strategy for completing the work included in this WA. The Contractor shall then prepare a work plan and associated cost estimate in accordance with the terms of the contract. The work plan and cost estimate shall include a schedule that completes all tasks and deliverables as agreed on the kick-off meeting.

The Contractor shall hold conference calls with the WAM on at least a biweekly basis after approval of the work plan to plan and review progress of this WA.

Deliverables under Task #1

1-1 Kick-off meeting with EPA
1-2 Work plan

Task #2: Developing influence coefficients for all countries

The following subtasks describe the upfront computational modeling required to develop influence coefficients for all countries, either individually or in small groups, and incorporate them into the Benefits Calculator. Unless instructed otherwise, all model runs shall utilize the GEOS-Chem Adjoint model with state-of-the-art emissions inventories based on regional emissions inventories where possible, as described below.

The Contractor shall provide the WAM for approval a list that includes the data that are available for the model runs along with any assumptions before the sensitivities are modeled to ensure that there is agreement on the data to be used and the assumptions made. The Contractor shall work with EPA and SEI to identify the countries or groupings of countries to be modeled, including prioritizing some countries to be modeled before others. Upon WAM approval of data to be used and assumptions, countries and groupings of countries to be modeled, and prioritization of countries, the Contractor shall proceed to conduct the model runs described below. The Contractor shall work closely with SEI to determine the appropriate format in which to provide the influence coefficients. All influence coefficients shall be delivered in the format agreed with SEI and approved by EPA.

Sub-task #2a: Modeled particulate matter and ozone concentration sensitivities to globally gridded emissions

The Contractor shall model the sensitivities of population-weighted surface (first model level) fine particulate matter and ozone concentrations globally and in four individual countries (Mexico, Ghana, Bangladesh, and Colombia) to globally gridded emissions using the GEOS-Chem Adjoint model with state-of-the-art emissions inventories based on regional emissions inventories where possible. Population weighting must be based on future population projections for 2030 incorporating expected population migration from rural to urban areas globally. This task includes:

- Population-weighted annual average fine particulate matter concentration sensitivities to globally gridded emissions of primary particulate matter (e.g., black carbon, organic carbon) and particulate matter precursors (e.g., sulfur dioxide, nitrogen oxides, and ammonia) for all countries, either individually or in small groups of countries as approved by the WAM. These model runs shall utilize downscaled particulate matter concentrations using a methodology approved by the WAM. If necessary, the higher resolution may be applied only to the receptor country, with the rest of the world at 2x2.5° resolution.
- Ozone concentration sensitivities to globally gridded emissions of ozone precursors (e.g., nitrogen oxides, non-methane volatile organic compounds, carbon monoxide, and methane), at 2°x2.5° resolution for all countries, either individually or in small groups of countries as approved by the WAM. These model runs should use an ozone concentration metric consistent with estimates of the relative risk of mortality due to chronic ozone exposure based on the American Cancer Society cohort (i.e., maximum six month average of the 1-hr daily maximum concentration for each gridcell).

Sub-task #2b: Ozone-related impact influence coefficients for four staple crops

The Contractor shall estimate ozone-related agricultural yield impact coefficients for four staple crops (wheat, rice, maize, and soy) for all countries, either individually or in small groups, as directed by the WAM. The Contractor shall recommend to the WAM whether different methods for developing impact coefficients for crop-relevant ozone concentrations, which can then be used in a crop impact function, may be preferable to modeling impact coefficients for crop yields directly. Upon the WAM's approval of approach to develop impact coefficients, the Contractor shall proceed to develop them.

Sub-task #2c: Additional ozone-related agricultural/ecosystem impact influence coefficients

Under this WA, the Contractor shall also investigate the availability of other crop impact functions for the four staple crops, as well as impact functions for other agricultural and

ecosystem impacts including timber. Wherever possible, the Contractor shall leverage work currently ongoing for OAQPS looking at ozone's impact on agriculture. The Contractor shall provide the WAM the results of its investigation for input and approval. The Contractor shall provide an estimate of the cost per agricultural/ecosystem impact function, per country, for modeling the agricultural/ecosystem impacts of ambient ozone concentrations following the documentation and simulations requirements, as appropriate, and incorporating those estimated impacts into the Benefits Calculator. The Contactor shall perform approved model runs for additional agricultural/ecosystem impacts, using approved impact functions, and shall incorporate those results into the Benefits Calculator.

Deliverables under Task #2

2-1 List of data available and assumptions before modeling sensitivities for WAM approval

2-2 Format for delivering influence coefficients

2-3 Population weighted PM concentration influence coefficients for all countries

2-4 Document impact of PM downscaling on influence coefficients

2-5 Ozone concentration influence coefficients for all countries

2-6 Recommendation of approach for developing impact coefficient for four staple crops for WAM approval

2-7 Impact coefficients for four staple crops for all countries

2-8 Results of investigation on other crop impact functions for the 4 staple crops for WAM approval

2-9 Cost estimate for modeling the approved additional ozone-related agricultural/ecosystem impact influence coefficients and their incorporation into the Benefits Calculator

2-10 Approved impact coefficients incorporated in the Benefits Calculator

Task #3: Documenting Methods

The Contractor shall prepare documentation of all data, models, and formulas used to develop the sensitivity coefficients, including the configuration and model inputs (meteorology, emissions, etc.) of the GEOS-Chem Adjoint model used to generate sensitivity coefficients for the module. It shall also summarize the modeled sensitivity

relationships, providing an overview of the effects of air pollution in several key countries (e.g., countries that have extensive monitoring networks to validate modeled and downscaled concentrations and countries that have joined the CCAC) and for the globe as modeled by GEOS-Chem Adjoint. This documentation shall describe limitations of the linearized sensitivity model and other assumptions made in the tool development. The documentation shall also describe data needed for future updates to the module.

Deliverables under Task #3

3-1 Documentation of all data, models, and formulas used to develop sensitivity coefficients including configuration and model inputs of GEOS-Chem Adjoint model including limitations, assumptions

3-2 Summary of model sensitivity relationships

V. QA Requirements:

The Contractor shall identify or include references of where to find the quality assurance criteria (e.g., data completeness minimum number of observations) that will be or that was applied to the data used in this WA. The implemented quality assurance procedures, data sources (and data acquisition date), explanation of the appropriateness of the data for the intended use and other pertinent data qualifications shall be stipulated in all deliverables produced via this WA.

VI. Deliverables:

The Contractor shall adhere to the following schedule:

Task	Deliverable	Delivery Schedule
1-1	Kick-off meeting with EPA	Within 1 week of WA effective date
1-2	Workplan	According to Contract Requirement
2-1	List of data available and assumptions before modeling sensitivities for WAM approval	TBD
2-2	Format for delivering influence coefficients	TBD
2-3	Population weighted PM concentration influence coefficients for all countries	TBD
2-4	Document impact of PM downscaling on influence coefficients	TBD

2-5	Ozone concentration influence coefficients for all countries	TBD
2-6	Recommendation of approach for developing impact coefficient for four staple crops for WAM approval	TBD
2-7	Impact coefficients for four staple crops for all countries	TBD
2-8	Results of investigation on other crop impact functions for the 4 staple crops for WAM approval	TBD
2-9	Cost estimate for modeling the approved additional ozone-related agricultural/ecosystem impact influence coefficients and their incorporation into the Benefits Calculator	TBD
2-10	Approved impact coefficients incorporated in the Benefits Calculator	TBD
3-1	Documentation of all data, models, and formulas used to develop sensitivity coefficients including configuration and model inputs of GEOS-Chem Adjoint model including limitations, assumptions	TBD
3-2	Summary of model sensitivity relationships	TBD

VII. Reporting Requirements:

The Contractor shall submit a detailed cost estimate within 20 calendar days of the effective date of this WA. The estimated cost shall include direct labor, overhead, consultant and subcontractor fee, other direct costs, and estimated total fee.

The Contractor shall provide monthly progress reports in accordance with the terms of the contract. The Contractor shall submit work products in electronic as well as hard copy form. In addition, the Contractor shall deliver to the WAM each draft and final report in electronic format that is readable by windows-based word-processing (Microsoft Word 2003), graphics (Microsoft PowerPoint 2003), spreadsheet (Excel 2003), and database (Access 2003) programs. The Contractor shall also provide electronic copies of reports in PDF format.

During the period of performance of this contract, the Contractor shall inform the WAM immediately (by telephone and email) of any problem(s) that may impede performance, as well as corrective actions needed from the Contractor and the EPA to resolve the problem(s).