



**COORDINATING RESEARCH COUNCIL, INC.**

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**September 28, 2021**

In reply, refer to:

CRC Project No. RW-119

Dear Prospective Bidder:

The Coordinating Research Council (CRC) invites you to submit a written proposal to provide services for “Review and Evaluation of EPA’s MOVES3 Model,” (CRC Project No. RW-119). A description of the project is presented in Exhibit A, “Statement of Work.”

Please indicate by letter, fax, or email by **October 13, 2021** if you or your organization intends to submit a written proposal for this research program. CRC will answer technical questions regarding the Request for Proposal if they are submitted in writing at least one week before the proposal submission deadline. CRC will then return written answers to all of the bidders, along with a copy of the original questions. Questions submitted within a week of the deadline may not be answered before the proposal submission deadline.

A CRC technical group composed of industry representatives will evaluate your proposal. CRC reserves the right to accept or reject any or all proposals.

The reporting requirements will be monthly progress reports and a summary technical report at the end of the contractual period. The reporting requirements are described in more detail in the attachment entitled “Reports” (Exhibit B).

The proposal must be submitted as two separate documents. The technical approach to the problem will be described in part one, and a cost breakdown that is priced by task will be described in part two. The cost proposal document should include all costs associated with conducting the proposed program. The technical proposal shall not be longer than 10 pages in length. Please include all information relevant to the technical proposal, including the proposed time line and references for key personnel in Part 1. These additional attachments are not counted in your 10 page limit.

CRC expects to negotiate a cost-plus fixed fee or cost reimbursement contract for the research program.

Contract language for intellectual property and liability clauses is presented in Exhibit C and in Exhibit D, respectively.

Important selection factors to be taken into account are listed in Exhibit E. CRC evaluation procedures require the technical group to complete a thorough technical evaluation before considering costs. After developing a recommendation based on technical considerations, the costs are revealed and the recommendation is modified as needed.

Electronic copies of the technical and cost proposals should be submitted to:

Amber B. Leland  
Coordinating Research Council  
5755 North Point Parkway, Suite 265  
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Fax: 678-795-0509  
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The deadline for receipt of your proposal is **October 29, 2021**.

Yours truly,

Amber B. Leland  
Deputy Director

## **CRC Project Statement of Work**

### **Statement of Work**

CRC Project RW-119

## **Review and Evaluation of EPA's MOVES3 Model**

### **Background**

The MOTO Vehicle Emissions Simulator (MOVES) model was designed by the U.S. Environmental Protection Agency (EPA or "the Agency"), Office of Transportation and Air Quality (OTAQ), to estimate highway and non-road mobile source inventories of criteria air pollutants, greenhouse gases and air toxics at levels ranging from the micro-scale (individual projects or roadways) to the macro-scale (county, state, and nationwide). The most recent public version of MOVES (MOVES3) was officially released on January 7, 2021 and is being used by state and local air quality and transportation planning agencies to aid the development of State Implementation Plans (SIPs), Transportation Conformity Analyses (TCAs) and other purposes.<sup>1</sup> MOVES3 has been updated from the previous version by: (a) incorporating the latest data on vehicle populations, travel activity, and default emission rates as well as updated fuel property characteristics (b) adjusting model algorithms to better reflect vehicle operating characteristics (e.g., starts, long-haul truck hoteling, and off-network idling) and fuel factor effects on emissions, (c) incorporating the impacts of recent federal rules (i.e., the 2016 Heavy-Duty Greenhouse Gas Phase 2 rule and the 2020 Safer Affordable Fuel-Efficient Vehicles rule); and (d) enhancing the user interface, inputs and outputs in conjunction with improving the efficiency and functionality of the underlying software.

The Coordinating Research Council (CRC) has in the past worked cooperatively with the Agency to independently review earlier versions of the MOVES model. The most recent assessment provided recommendations to EPA based on a critical evaluation of modeling methods, inventory analyses applied to three locations, and a validation of the model's fuel methodology using independent data sources.<sup>2</sup> In addition, CRC conducted a detailed review of the evaporative inputs used in MOVES2014.<sup>3</sup> EPA has used assessments such as these to help prioritize its efforts on forthcoming versions of MOVES.<sup>4</sup>

### **Objective**

The objective of the present effort is to: (a) critically assess the major changes to the model algorithms and data inputs that EPA made in transitioning from MOVES2014 to MOVES3,<sup>5</sup> (b) identify those areas that were not addressed in the EPA MOVES 3 development process that may be candidates for forthcoming model update efforts given considerations of their importance for future emissions inventories and policy evaluations, and (c) develop recommendations on those areas of the model which could be improved or augmented based on analyses of ongoing (and/or recently completed) test programs focused on real world emissions and related data collection efforts sponsored by CRC, EPA, CARB and others.

Additionally, the objective of a potential follow-on (i.e., Phase 2) to this effort is to incorporate publicly available data collected from Remote Sensing Devices (RSD) in recent roadside Monitoring campaigns into

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<sup>1</sup> [86 FR 1106, January 7, 2021](#)

<sup>2</sup> Sierra Research, [Review of EPA's MOVES2014 Model](#). CRC Project No. E-101. August 2016

<sup>3</sup> Sierra Research, [Assessment of MOVES Model Evaporative Emission Inputs](#). CRC Project No. E-116. June 2017

<sup>4</sup> US EPA, [Overview of EPA's MOTO Vehicle Emission Simulator \(MOVES3\)](#), March 2021

<sup>5</sup> For a summary of these changes, see Table 2-1 in US EPA, [Overview of EPA's MOTO Vehicle Emission Simulator \(MOVES3\)](#)

MOVES3 and assess the ability of the model to estimate real-world emissions using the RSD data as 'ground truth.'

## **Statement of Work**

### **Phase 1**

Based on a review of the technical reports and other documentation published by EPA in connection with the public release of MOVES3, the contractor will develop a detailed plan for evaluating the model methodologies, inputs and outputs in relation to both (a) the prior version of MOVES (MOVES 2014b) and (b) recent data sources representative of real-world emissions measurements (e.g., recent programs focused on the use of onboard Portable Emissions Measurement Systems and/or Remote Sensing Devices). Note that the evaluation plan (and overall scope of this Phase 1 effort) should encompass all of the onroad vehicles, fuels and emissions processes represented in MOVES3.

Areas of interest to CRC include the representation of evaporative and exhaust emissions (criteria pollutants and air toxics) as well as the effects of fuel properties and temperature adjustments in the model. CRC also is interested in understanding the changes incorporated into MOVES3 with respect to the inputs and algorithms related to the durability of vehicle evaporative and exhaust emission control systems and the related impacts on model outputs.

In addition, the contractor is expected to perform sensitivity analyses to assess the robustness of MOVES3 predictions for various source/use categories to changes in selected model inputs.

The output of this effort shall include: (a) an identification of areas of the model needing improvement and calculations of concern and (b) recommendations for future work (e.g., data to be collected and/or analyses to be performed) to facilitate changes/updates (if/where needed) to incorporate into MOVES.

### **Phase 2**

The contractor shall: (a) review various RSD datasets that may, for example, be available from CARB, EPA, or Denver University, (b) propose one or more approaches for modifying MOVES3 to incorporate these datasets into the model, and (c) exercise MOVES3 to demonstrate how well the model output predicts real-world emissions using the RSD data as 'ground truth.'

Bidders are asked to provide a separate quote for Phase 2 as this additional effort may or may not be funded at the outset of the project.

## **Project Management**

CRC and its project technical panel will provide management and oversight for this project. These entities are here after referred to collectively as the project sponsor.

## **Schedule**

CRC expects that this effort should be performed over a 18 to 24-month period following contract execution. However, please propose an appropriate timeline for completing the study, including milestones for study deliverables.

**Deliverables**

Deliverables include:

- A kickoff call with the CRC project technical panel to discuss project scope and align expectations.
- Tri-annual progress presentations to the CRC Real World Emissions (RWE) Group to highlight recent progress and clarify project direction as well as monthly calls with the CRC project technical panel and contractor to discuss preliminary results and identify any information gaps before finalizing findings and starting the final report.
- Monthly technical progress reports, as described in exhibit B.
- A final report, the draft of which will be reviewed by the CRC project panel and RWE Group before final release.

**Contractor Qualifications**

Bidders require a good working knowledge of MOVES.

## **EXHIBIT B**

### **REPORTS**

#### **MONTHLY TECHNICAL PROGRESS REPORTS**

The contractor shall submit a monthly technical progress report covering work accomplished during each calendar month of the contract performance. An electronic Microsoft® Word compatible file (<1 MB) of the monthly technical progress report shall be distributed by the contractor within ten (10) calendar days after the end of each reporting period. The report shall contain a description of overall progress, plus a separate description for each task or other logical segment of work on which effort was expended during the reporting period.

#### **FINAL REPORT**

The contractor shall submit to or distribute for CRC an electronic (Microsoft Word) copy transmittable via email) of a rough draft of a final report within thirty (30) days after completion of the technical effort specified in the contract. The report shall document, in detail, the test program and all of the work performed under the contract. The report shall include tables, graphs, diagrams, curves, sketches, photographs and drawings in sufficient detail to comprehensively explain the test program and results achieved under the contract. The report shall be complete in itself and contain no reference, directly or indirectly, to the monthly report(s).

The draft report must have appropriate editorial review corrections made by the contractor prior to submission to CRC to avoid obvious formatting, grammar, and spelling errors. The report should be written in a formal technical style employing a format that best communicates the work conducted, results observed, and conclusions derived. Standard practice typically calls for a CRC Title Page, Disclaimer Statement, Foreword/Preface, Table of Contents, List of Figures, List of Tables, List of Acronyms and Abbreviations, Executive Summary, Background, Approach (including a full description of all experimental materials and methods), Results, Conclusions, List of References, and Appendices as appropriate for the scope of the study. Reports submitted to CRC shall be written with a degree of skill and care customarily required by professionals engaged in the same trade and /or profession.

Within thirty (30) days after receipt of the approved draft copy of the final report, the contractor shall make the requested changes and deliver to CRC ten (10) hardcopies including a reproducible master copy of the final report. The final report shall also be submitted as electronic copies in a pdf and Microsoft Word file format. The final report may be prepared using the contractor's standard format, acknowledging author and sponsors. An outside CRC cover page will be provided by CRC. The electronic copy will be made available for posting on the CRC website.

## **EXHIBIT C**

### **INTELLECTUAL PROPERTY RIGHTS**

Title to all inventions, improvements, and data, hereinafter, collectively referred to as (“Inventions”), whether or not patentable, resulting from the performance of work under this Agreement shall be assigned to CRC. Contractor X shall promptly disclose to CRC any Invention which is made or conceived by Contractor X, its employees, agents, or representatives, either alone or jointly with others, during the term of this agreement, which result from the performance of work under this agreement, or are a result of confidential information provided to Contractor X by CRC or its Participants. Contractor X agrees to assign to CRC the entire right, title, and interest in and to any and all such Inventions, and to execute and cause its employees or representatives to execute such documents as may be required to file applications and to obtain patents covering such Inventions in CRC’s name or in the name of CRC’s Participants or nominees. At CRC’s expense, Contractor X shall provide reasonable assistance to CRC or its designee in obtaining patents on such Inventions.

To the extent that a CRC member makes available any of its intellectual property (including but not limited to patents, patent applications, copyrighted material, trade secrets, or trademarks) to Contractor X, Contractor X shall have only a limited license to such intellectual property for the sole purpose of performing work pursuant to this Agreement and shall have no other right or license, express or implied, or by estoppel. To the extent a CRC member contributes materials, tangible items, or information for use in the project, Contractor X acknowledges that it obtains only the right to use the materials, items, or information supplied for the purposes of performing the work provided for in this Agreement, and obtains no rights to copy, distribute, disclose, make, use, sell or offer to sell such materials or items outside of the performance of this Agreement.

## **EXHIBIT D**

### **LIABILITY**

It is agreed and understood that \_\_\_\_\_ is acting as an independent contractor in the performance of any and all work hereunder and, as such, has control over the performance of such work. \_\_\_\_\_ agrees to indemnify and defend CRC from and against any and all liabilities, claims, and expenses incident thereto (including, for example, reasonable attorneys' fees) which CRC may hereafter incur, become responsible for or pay out as a result of death or bodily injury to any person or destruction or damage to any property, caused, in whole or in part, by \_\_\_\_\_'s performance of, or failure to perform, the work hereunder or any other act of omission in connection therewith.

## **EXHIBIT E**

### **PROPOSAL EVALUATION CRITERIA**

- 1) Merits of proposed technical approach.
- 2) Previous performance on related research studies.
- 3) Personnel available for proposed study – related experience.
- 4) Timeliness of study completion.
- 5) Cost.