



COORDINATING RESEARCH COUNCIL, INC.

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February 22, 2008

In reply, refer to:

CRC Project Number A-71

Subject: CRC Request for Proposal No. A-71, "Development of Modeling Inventory Factors for Mobile Source Particulate Organic Carbon and Semi-Volatile Organic Compound Emissions".

Dear Prospective Bidder:

The Coordinating Research Council (CRC) is joining with the U.S. Department of Energy National Renewable Energy Laboratory (NREL) and the Mid-Atlantic Regional Air Management Association (MARAMA) in collaboration with the Lake Michigan Air Directors Consortium (LADCO) to invite you to submit a written proposal on the subject topic. A description of the project (CRC Project No. A-71) is given in Exhibit A

Please indicate by letter, fax, or email by **March 7, 2008** whether or not you intend to submit a written proposal for the project. CRC will answer technical questions regarding the Request for Proposal if they are submitted in writing. CRC will then return written answers to you, along with a copy of the original questions.

The CRC technical group composed of representatives from the above sponsors, industry, and government will evaluate your proposal. CRC reserves the right to accept or reject your proposal.

The reporting requirements will be quarterly progress reports and a summary technical report at the end of the contractual period along with associated model code. The reporting requirements are described in more detail in the attachment entitled, "Reports" (Exhibit B).

The "Intellectual Property Rights Clauses" (Exhibits C and D) and "Liability Clauses" (Exhibit E) will be a part of the agreement anticipated as a result of this Request for Proposal solicitation.

Certain federal government contract requirements may also be incorporated in the CRC agreement (http://www.nrel.gov/business_opportunities/related_docs.html) to allow for funding support from NREL.

All computer code developed in this project shall be free of copyright restrictions and licensing requirements. The contractor will assure CRC that it will comply with any copyright restrictions and licensing requirements for any software used in this program.

The proposal must be submitted as two separate documents. The technical approach to the problem will be described in part one (30 pages or less including the background and technical approach). 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. CRC expects to negotiate a cost-plus fixed fee or cost reimbursement contract. Note that there will be a performance requirement clause in the contract. Important selection factors to be taken into account are listed in Exhibit F. 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.

Thirty (30) copies of the technical proposal (or one electronic copy) and three (3) copies of the cost proposal (or one electronic copy) should be submitted to:

Mr. Brent K. Bailey
Coordinating Research Council
3650 Mansell Road, Suite 140
Alpharetta, GA 30022

Phone: 678-795-0506
Fax: 678-795-0509
E-mail: bkbailey@crcao.org

The deadline for receipt of your proposal is **March 21, 2008**.

Sincerely,

Brent K. Bailey
Executive Director

EXHIBIT A

Statement of Work
Coordinating Research Council Atmospheric Impacts Committee
Project No. A-71

Development of Modeling Inventory Factors for Mobile Source Particulate Organic Carbon and Semi-Volatile Organic Compound Emissions

Purpose. Evaluate and develop and demonstrate procedures for adjusting existing primary organic carbon particulate matter (primary OC) and semi-volatile organic compound (SVOC) mobile source emissions.

Objectives. The winning team responding to this RFP will have demonstrated insight into:

1. evaluating and adjusting the existing emissions inventories for selected metropolitan areas, using stochastic or deterministic methods:
 - on-road gasoline fleet not addressed in 3.), below;
 - on-road diesel;
 - off-road gasoline;
 - off-road diesel.
2. defining objective metrics for intercomparison of emissions inventories, monitored air quality data, and source apportionment model estimates; and
3. developing adjustments to the on-road light duty inventory using vehicle emissions testing results.

To ensure successful attainment of the objectives, the winning team will likely consist of:

- one contractor who is expert in emissions to support CTM applications and evaluating the on-road mobile source inventory using vehicle testing results, and
- another contractor who is expert in source apportionment modeling of ambient air pollution or other statistical data analysis techniques.

Coordination and collaboration with LADCO and MARAMA is recommended since they will use the results of this study for their PM modeling sensitivity studies.

Background. Analyses of nonattainment area monitoring data shows that in most areas, the primary chemical constituents of PM_{2.5} are sulfates, nitrates, organic carbonaceous mass (OC), and elemental carbon (EC). States are using chemical transport models (CTM) and dispersion models to develop control plans for PM_{2.5}. While model performance is good for sulfates and nitrates (in the eastern U.S.), model performance for OC is generally poor. Despite recent efforts to improve model chemistry and emissions for secondary organic aerosols (SOA), the model predictions of OC concentrations remain uncertain. One explanation for such discrepancies are VOC and primary OC emissions inventories and speciation profiles--in particular--mobile sources, which have been identified as a major source of primary OC (and SVOC) in urban areas by source apportionment studies. Another possible reason is that extensive secondary organic aerosol (SOA) is being formed not accounted in the chemical reactions used in the modeling (not

to be addressed here). For example, recent research suggests the phase partitioning of organic inventories and the photochemical oxidation products of low-volatility organic material may also play a role in determining CTM performance (Robinson et. al. 2007. *Rethinking Organic Aerosols: Semi volatile Emissions and Photochemical Aging*. Science 315: pp. 1257-1262).

The emissions inventory adjustments developed in this project will be used to support early planning by states to address upcoming air quality challenges. It should be noted that EPA is developing a draft MOVES model for public release in September 2008. This version of MOVES will include updated estimates of on-road gasoline and diesel PM, primarily from the Kansas City study and CRC E-55, respectively. This project is expected to provide information which will assist in an independent assessment of MOVES.

Methodology. We expect the proposed methodology will derive from a combination of analyses related to light-duty spark-ignition (LDSI) vehicular emission factors, source apportionment techniques, and chemical transport modeling of PM:

First analyzing and using the EPA/NREL/CRC/FHWA/EIIP Kansas City Gasoline Vehicle PM Emissions study (KC Study) data to adjust the KC inventory, where appropriate. This “adjusted” inventory will result in adjustment procedures and recommended factors that can be appropriately applied—proximately—to the on-road fleet emissions inventory in other venues. This phase of the proposed project is critical. The contractor may employ other emission factor studies, as appropriate.

“High emitter” emission factors and the fraction of high emitters may be different for other venues. Consequently, our goal is to obtain adjustment factors that place the mobile source emissions inventory within the realm of improving grid model-predicted OC performance for the venue.

We are interested in applying the real world emission measurements to revise the existing onroad light-duty gasoline inventory—which may result in increases, decreases, or no change in light-duty emissions. Subsequent to this work, the remainder of the mobile source emissions inventory factors are estimated.

Second, since the KC OC adjustment factors can be applied only to the on-road light-duty gasoline exhaust portion of the inventory, “other duty” gasoline (e.g., HDGV, MC, etc.) and on-road diesel must remain as in the existing inventory.

However, if the remainder of the on-road gasoline and diesel inventory can be adjusted—we encourage potential contractors to propose development of and provide the rationale behind the approach.

Third, the KC Study data do not address off-road emissions. Hence non-road emissions must also remain as in the existing inventory.

And, similar to the on-road, if the off-road gasoline and diesel inventory can be adjusted, we encourage potential contractors to propose development of and provide the rationale behind the approach.

Fourth, however adjusted, the inventory is then unique to Kansas City, and there are limited Kansas City ambient OC data to compare against. Hence the emissions inventory adjustments would need to be extended to another venue where CTM results and ambient monitoring data are available. At minimum, the contractor shall extend the adjustment to Detroit, Michigan—and a second is to be proposed separately by the potential contractor, perhaps Pittsburgh or New York City. St. Louis Supersite data may be beneficial to the work because of its proximity to Kansas-City. The KC Study data, or the KC adjusted inventory, might be comparable with the St. Louis measurements.

We expect the matrix for mapping the adjustment factors from the Kansas City adjusted mobile source inventory to the Detroit inventory would be required by season (temperature), vehicle class (LDGV, LDGT), emissions mode (LA92 or from continuous measurement), roadway classification (i.e., driving behavior), and other changes according to differences in on-road vehicle emissions modeling (MOBILE6.2 inputs).

Once mapped, the adjusted emissions inventory can be analyzed using Detroit receptor modeling chemical transport modeling, and other methods. Potential contractors are urged to differentiate the contributions of less proximate regional sources from the contributions of sources highly proximate to relevant monitors, the plumes of which may not be identified in CTMs. Also, contractors are urged to ensure that only the contributions of primary emissions and not photochemical formation are used for producing inventory adjustment factors.

Subsequent adjustments to the mobile source emissions inventory based on corroborating synthesis of a variety of analyses can be proposed by the contractor.

For example, if appropriate, the KC Study-specific light duty gasoline tracer species might be proposed for use to reinvestigate source apportionment modeling studies to determine the contribution of sources with similar source profiles for those venues, and whether existing profiles are specific enough to identify individual categories of mobile sources within the inventory (e.g. LDSI, nonroad SI engines, locomotives).

Reiterating, the goal of the work is to develop the KC Study OC data such that OC emissions can be defensibly adjusted in other modeling venues.

Scope of Work. The following multi-task process is proposed for developing inventory adjustment factors for on-road and off-road sources.

Task 1 Project Updates. Please propose to provide resources for:

- 1.1 Monthly conference calls.
- 1.2 Quarterly written progress summaries.

Task 2 Data Collection. Please propose to obtain all data:

- 2.1 Kansas City (KC) Study data, with special emphasis on OC and SVOC;
- 2.2 Emission inventory inputs for KC
 - 2.2.1 Existing on-road emissions inventory (i.e., MOBILE6.2) input data for mapping the KC study data to represent the KC fleet.
 - 2.2.2 Existing off-road emissions inventory (i.e., NON-ROAD 2005) input data—if needed for use in mapping other receptor modeling studies' results to represent the Kansas City off-road emissions.
- 2.3 Relevant air quality data suitable for evaluation of emission inventories.
 - 2.3.1 ambient VOC and PM measurements.
 - 2.3.2 conclusions from the following studies and corresponding data if necessary:
 - Northern Front Range Air Quality Study;
 - DOE Gasoline/Diesel PM Split Study;
 - Pittsburgh Air Quality Study;
 - Las Vegas Carbon Source Apportionment Study;
 - other recent source apportionment and source profile studies, and
 - chemical transport modeling results, if appropriate.
- 2.4 Identify two PM_{2.5} urban nonattainment areas for study:
 - 2.4.1 Please provide rationale for each nonattainment area to be studied, addressing:
 - data availability; and
 - relevance of OC in PM_{2.5} nonattainment.
 - 2.4.2 one area in the LADCO region (Detroit); and
 - 2.4.3 one area in another part of the country.
 - do not include California.
- 2.5 Only data available to/from the public domain can be used in this work.
- 2.6 Please provide separate cost estimates for each nonattainment area.

Note, the KC study data are not yet publicly available. Nevertheless, EPA will make these data available to potential bidders for the purpose of preparing a proposal in response to this RFP. To obtain the KC data, please contact Carl Fulper, fulper.carl@epa.gov, 734-214-4400.

Task 3 Data Analysis.

- 3.1 Conduct the appropriate analyses of the KC Study data for the purpose of developing on-road gasoline light duty vehicle fleet emissions inventory adjustment factors.

Please propose specific methodologies and metrics. The development of adjustment factors must take into account a variety of analyses, including those outlined below (in Item 4.2) and chemical transport modeling. (Note, appropriate chemical transport modeling will be conducted by LADCO or another organization, and not by the contractor. Further discussion is necessary to determine the appropriate modeling analyses.) It should be recognized that each analysis has limitations and uncertainties associated with it (e.g., spatial representativeness of air quality monitoring, chemical transport modeling, and emission inventories may not be consistent; available source profiles may not be sufficiently specific for individual source types; and treatment of secondary organic aerosols by models is evolving). By considering (and reconciling) a

variety of analyses, a stronger basis will exist for the recommended adjustments. Contractors are encouraged to propose methodologies for addressing these considerations, including qualitative weight-of-evidence approaches or other statistical methods for addressing uncertain data.

Task 4 Emission Factor Development.

4.1 Use KC Study data and KC emissions inventory data to develop adjustment factors:

4.1.1 for on-road light duty vehicle sources as a function of:

- MOBILE6.2 vehicle types by model year;
- ambient temperature.

4.1.2 for non-road sources:

- EPA NONROAD model categories;
- commercial marine engines;
- aircraft; and
- railroads.

4.1.3 Include—if possible--uncertainty estimates for the adjustment factors:

- on-road; and
- non-road.

4.2 Emissions factor development might be additionally be based on:

4.2.1 source-based methods (including, inverse modeling),

4.2.2 receptor-based methods (including, source apportionment analysis or other statistical techniques), and/or

4.2.3 fuel sales-based methods, and

4.2.4 day-of-week emissions (i.e., weekday/weekend) and ambient data,

4.2.5 optimization or simulation methods or other approaches for dealing with uncertain information,

Task 5 Recommendations.

Based on results of this work, provide recommendations for estimating primary OC (and SVOC) emissions from mobile sources.

Project Deliverables: The primary project deliverables shall include:

- a project work plan;
- quarterly progress reports;
- a journal article summarizing the completed work;
- a technical memorandum to be publicly released under CRC cover providing a more detailed review of the completed work;
- recommendations for estimating primary OC (and SVOC) emissions from mobile sources; and
- a database of inventory adjustment factors or code to develop the factors as a function of MOBILE6.2 input.

Schedule. Please provide a proposed project schedule. We expect that the project will take nine months to one year to complete but a schedule to develop your best deliverable is preferred. Specific project milestones (from the project start date) should include:

- Delivery of a draft work plan.
- Monthly project briefings (conference calls to discuss draft work products).
- Quarterly progress reports; no more than two pages in length.
- Delivery of: a draft technical memorandum; a draft journal article; recommendations; and inventory adjustment factors.

Delivery of: a final technical memorandum; recommendations; inventory adjustment factors; and a final journal article. Code can be applied to the venue-specific fuels scenarios.

Contact: Brent Bailey, Coordinating Research Council, 678 795 0506, extension 107.

EXHIBIT B

REPORTS

QUARTERLY TECHNICAL PROGRESS REPORTS

The contractor shall submit a quarterly technical progress report covering work accomplished during each calendar quarter of the contract performance. The Work Scope Document may serve as one of the progress reports. Thirty-five (35) hardcopies or one electronic Microsoft Word compatible file (<1 MB) of the quarterly 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, MODEL SOURCE CODE AND USER'S GUIDE

The contractor shall submit to or distribute for CRC thirty-five (35) hardcopies (or one hardcopy and one electronic pdf-compatible copy transmittable via email) of a rough draft of a final report and if applicable a model user's guide within thirty (30) days after completion of the technical effort specified in the contract. A CD ROM disc containing model source code and test case input and output files (if applicable) shall be submitted on an as-needed basis—not to exceed 35 copies. 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. One option for the single final report is to have it be composed of an overall project Executive Summary, a journal article, and attached exhibits containing relevant appendices, and/or supporting report chapters. The report shall be complete in itself and contain no reference, directly or indirectly, to the periodic progress report(s). The user's guide shall describe only the portions of the model developed under contract to CRC, including test case model input and output listings.

The CRC Steering Committee shall furnish comments regarding the report and user's guide to the contractor within one (1) month after the draft copy.

Within thirty (30) days after receipt of the approved draft copy of the final report and user's guide, the contractor shall make the requested changes and deliver to CRC fifty (50) hardcopies including a reproducible master copy of the final report. The final report shall also be submitted as an electronic copy in Microsoft Word file format. The electronic copy will be made available for posting on the CRC website.

EXHIBIT C

INTELLECTUAL PROPERTY RIGHTS

A. Protected Works

The term “Protected Works” as used in this agreement includes any and all works of authorship, inventions, discoveries, processes, machines, manufactures, compositions of matter, formulas, techniques, computer programs, systems, mask works, trade secrets, proprietary information, schematics, flow charts, databases, customer lists, marketing plans, product plans, business strategies, financial information, forecasts, trademarks, service marks, brand names, trade names, compilations, documents, data, notes, designs, drawings, ideas, concepts, technical data and/or training materials, and improvements to or derivatives from any of the above, whether or not patentable, or subject to copyright or trademark or trade secret protection, delivered by _____ to CRC under this Agreement or conceived, developed or produced by _____, whether alone or jointly with others, in connection with or pursuant to _____’s performance under this Agreement.

B. Assignment and Ownership of Protected Works

_____ agrees that except as provided in Section C below:

(1) All copyrightable Protected Works which are created by _____ pursuant to this Agreement shall be deemed “Works Made for Hire,” as that phrase is defined in Section 101 of the United States Copyright Act, 17 U.S.C. 101, and used in 17 U.S.C. 201, on behalf of CRC and that CRC shall own right, title, and interest, including the worldwide copyright, in and to such materials; and

(2) _____ hereby assigns and agrees to assign to CRC all of its respective rights, title, and interest in Protected Works, including all rights of inventorship and authorship, all patents and patent applications, all copyrights, all trademark and service mark rights, all rights in trade secret and proprietary information, all rights of attribution and integrity and other moral rights, and all other intellectual property rights of any type (collectively referred to herein as “Intellectual Property Rights”); and

(3) _____ and _____’s successors in interest will, at CRC’s request and without further consideration, communicate to CRC any facts known to them respecting the Protected Works, and testify in any legal proceedings, sign all lawful papers, make all rightful oaths, execute all divisional, continuing, continuation-in-part, or reissue applications, all assignments, all registration applications and all other instruments or papers to carry into full force and effect, the assignment, transfer and conveyance hereby made or intended to be made and generally do everything possible for title to Intellectual Property Rights in the Protected Works to be clearly and exclusively held by CRC, including the execution from time to time as requested by CRC, Confirmatory Assignment, Agreements in the form attached as Exhibit D; and

(4) _____ agrees that it will not apply for any state, federal, or other U.S. or foreign jurisdiction's registration of rights in any of the Protected Works, and that it will not oppose or object in any way to applications for registration of same by CRC or others designated by CRC; and

(5) _____ agrees to provide CRC a copy of the source code and all annotations thereto for all deliverables under this Agreement.

(6) The deliverables provided to CRC by _____ under this Agreement shall not include any Protected Works which infringe the Intellectual Property Rights of any third party or for which _____ does not have the ownership and authority necessary to make the conveyances of rights described in this Section B. _____ will obtain the express written consent of CRC prior to incorporating into the deliverables any works owned by parties other than _____.

C. Portions of Protected Work

With respect to portions of the Protected Works which were originally developed by _____ prior to and unrelated to the course of performance under this Agreement (Pre-Existing Protected Works), _____ will continue to own these Pre-Existing Protected Works. However, _____ hereby grants to CRC a fully paid, perpetual, irrevocable, worldwide, non-exclusive license to prepare derivative works from such Pre-Existing Protected Works (using either CRC's own employees, independent contractors, or sponsoring participants), and to reproduce Pre-Existing Protected Works and derivative works therefrom, and to make, use, distribute, perform, and display such Pre-Existing Protected Works and derivative works therefrom and reproductions thereof, both in connection with the Protected Works and otherwise, and to sublicense the rights granted to CRC in this paragraph.

EXHIBIT D

CONFIRMATORY ASSIGNMENT

For good and valuable consideration, receipt of which is hereby acknowledged, _____ (_____) has assigned and does hereby assign and transfer to CRC, _____'s entire right, title, and interest in and to any and all Intellectual Property Rights in Protected Works, as defined below, including but not limited to the Protected Works specifically identified below and the Protected Works delivered to CRC by _____ or conceived, developed, or produced by the _____, whether alone or jointly with others, in connection with the Projects identified below:

Specific Protected Works: _____

Specific Projects:

Additional Terms and Definitions:

1. The term Protected Works as used in this agreement includes any and all works of authorship, inventions, discoveries, processes, machines, manufactures, compositions of matter, formulas, techniques, computer programs, systems, software, source code, object code, hardware systems, mask words, trade secrets, proprietary information, schematics, flow charts, databases, customer lists, marketing plans, product plans, business strategies, financial information, forecasts, trademarks, service marks, brand names, trade names, compilations, documents, data, notes, designs, drawings, ideas, concepts, technical data and/or training materials, and improvements to or derivatives from any of the above, whether or not patentable, or subject to copyright or trademark or trade secret protection.
2. The term Intellectual Property Rights as used in this agreement includes all of _____'s rights, title, and interest in Protected Works, including all rights of inventorship and authorship, patents and patent applications, all copyrights, all trademark and service mark rights, all rights in trade secret and proprietary information, all rights of attribution and integrity and other moral rights, and all other intellectual property rights of any type.
3. _____ further agrees at CRC's request and without further consideration, _____ and _____ successors will communicate to CRC any facts known to them respecting said Protected Works, and testify in any legal proceedings, sign all lawful papers, make all rightful oaths, execute all divisional, continuing, continuation-in-part, or reissue applications, all assignments, all registration applications and all other instruments or papers to carry into full force and effect, the assignment transfer and conveyance

hereby made or intended to be made and generally do everything possible for title to Intellectual Property Rights in the Protected Works to be clearly and exclusively held by CRC.

4. _____ agrees that it will not apply for any state, federal, or other U.S. or foreign jurisdiction's registration of rights in and of the Protected Works, and that it will not oppose or object in any way to applications for registration of same by CRC or others designated by CRC.

5. _____ agrees to provide to CRC a copy of the source code and all annotations thereto for all Protected Works assigned under this Agreement.

Signed and sealed this ____ day of _____, _____.

Signed on behalf of CONSULTANT:

By: _____

Printed Name: _____

Title: _____

STATE OF _____

COUNTY OF _____

On this ____ day of _____, _____, before me personally appeared _____ personally known to me proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument, and acknowledged to me that he executed the same of his own free will for the purposes therein set forth.

Notary Public
[SEAL]

EXHIBIT E

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 of Contractor in connection therewith.

EXHIBIT F

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.