COORDINATING RESEARCH COUNCIL, INC.
5755 NORTH POINT PARKWAY, SUITE 265
ALPHARETTA, GA 30022
TEL: 678/795-0506 FAX: 678/795-0509
WWW.CRCAO.ORG

September 30, 2014
In reply, refer to:
CRC Project No. E-99-2

Dear Prospective Bidder:

The Coordinating Research Council (CRC) invites you to submit a written proposal to provide services for "Very Low PM Mass Measurement Phase 2: Evaluation of Partial Flow Dilution" (CRC Project No. E-99-2). A description of the project is presented in Exhibit A, "Statement of Work."

Please indicate by letter, fax, or email by October 14, 2014 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. CRC will then return written answers to all of the bidders, along with a copy of the original questions.

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.

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:

Dr. Chris Tennant
Coordinating Research Council
5755 North Point Parkway, Suite 265
Alpharetta, GA 30022

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

The deadline for receipt of your proposal is October 28, 2014.

Yours truly,

Chris Tennant
Deputy Director

Exhibit A

Statement of Work
Project E-99-2
Very Low PM Mass Measurement Phase 2: Evaluation of Partial Flow Dilution

Objective

Evaluate commercial partial flow PM sampling systems (PFSS) relative to full flow CVS tunnels for the capability to make robust, low variability, light duty vehicle PM measurements at LEV III / Tier 3 levels. In addition to comparing the relative PM mass accuracy of the two methods, the study needs to address the comparative needs for sample system conditioning and the impact of exhaust flow measurement on PFSS capabilities.

Background

Phase 1 of E-99 "Very Low PM Mass Measurement" is making use of a commercially available partial flow diluter to augment the full flow dilution tunnel and permit simultaneous measurements of parallel filters. Owing to the added cost and possible diversion from the main goals of E-99 Phase 1, the project panel recommended choosing a single partial flow unit as opposed to examining multiple commercial units. The testing of this unit during its set-up indicated favorable performance relative to the full flow dilution tunnel. Hence, the purpose of E-99 Phase 2 is to compare commercially available partial flow diluters, both unit-to-unit and against a CVS tunnel, particularly in regards to their ability to provide reproducible measurements at very low PM levels.

Present motor vehicle PM emissions measurement regulations (CFR 40 Part 1065, 1066) require gravimetric determination of particulate matter collected onto filter media from diluted exhaust. They permit use of both full flow CVS tunnel sampling as well partial flow dilution. The latter potentially offer significant cost savings, sampling flexibility, and performance benefits. A previous CRC project, E-66, demonstrated that the current, improved partial flow diluters are capable of meeting Part 1065 dilution sampling requirements. However, E66 investigated partial flow dilution as it applies to heavy-duty engine dynamometer emissions measurements. There are numerous differences between heavy-duty engine dynamometer and light-duty chassis dynamometer testing that creates the need to re-examine the capabilities of commercial partial flow diluters for light-duty exhaust testing.

Purpose

The aim of E-99 Phase 2 is to examine the ability of current commercial partial flow diluters to meet LEV III / Tier 3 requirements to measure PM emissions at below 3 mg/mi.

Specific questions include, but are not limited to:

1) Do the partial flow units meet equivalency to full flow (CVS) exhaust sampling, including during cold start and for the US06 cycle? Are there any systematic differences?
2) What are the noise sources for PFD versus CVS sampling? What measures can be taken to control the variability?
3) What is needed to "condition" the sampling system (PFD / CVS tunnel)? How does this differ for PFDs versus CVS? Experience shows that there are artifacts associated with the state of the sampling system prior to a test (possibly storage release artifacts), and we need to know how best to manage these sources of variability

4) How sensitive is partial flow diluter performance to the exhaust flow measurement? How well do the PFDs maintain proportionality? How much variability is introduced by the flow meter into the PM mass measurement?
5) Can a simple model be developed that can predict the optimum exhaust extraction fraction based on readily available vehicle parameters, such as test cycle, engine displacement, vehicle weight?
6) What are the relative performance attributes of the individual PFSS units and what are the issues?
7) What improvements are recommended for efficient and accurate partial flow system performance in light duty chassis dynamometer testing at LEV III / Tier3?

The proposal for E-99 Phase 2 should include a technical plan that describes in significant detail the approach to address the above questions, as well as others that the bidder thinks are important. It should include suggestions to maximize the potential benefit of partial flow dilution. The proposal should include discussion of 1) what metrics will be used for the comparison, 2) the measurement procedures, 3) the statistical procedures that will be applied to determine equivalence between partial flow diluters and full flow CVS (see CFR Part 1065.12), and 4) what vehicle preparation / conditioning steps are and other steps will be taken to minimize test to test variability.

Details

Based on the above background and purpose, the project proposal should specify how the following tasks and project deliverables will be accomplished: The proposed program must be approved by the CRC review committee prior to implementation.

Tasks

1. Identify what testing is needed to answer the aims of this project.
2. Prepare and submit the project test plan for CRC committee review and approval. The matrix should include test method, test vehicles, test cycles, and fuels. It should include a verification of the accuracies of the exhaust flow meters. Note: The selected project contractor is expected to collaborate with CRC project panel to refine test plan.
3. Perform testing according to test plan. Change plan accordingly to ensure a sufficient number of tests and repeatability. Provide a statistical assessment. Identify and quantify any ancillary impacts of the method modifications.
4. Analyze data set and produce final report.

Project Deliverables

1. Partial flow diluter test plan
2. Raw data from each partial flow unit and CVS tunnel
3. Milestone progress reports
4. Final report

Timing

1. Test plan development – Q1 2015
2. Vehicle selection & testing – Q2 – Q3 2015
3. Data analysis & final report – Q4 2015

Contact

Chris Tennant, Coordinating Research Council
(678) 795-0506 ext. 105, ctennant@crcao.org

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 pdf-compatible 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).

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 thirty (30) hardcopies including a reproducible master copy of the final report. The final report shall also be submitted as an electronic copy in a pdf or pdf-convertible 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 of Contractor 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.