



COORDINATING RESEARCH COUNCIL, INC.

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August 9, 2017

In reply, refer to:

CRC Project No. E-129

Dear Prospective Bidder:

The Coordinating Research Council (CRC) invites you to submit a written proposal to provide services for “Alternative Oxygenate Effects on Emissions” (CRC Project No. E-129). A description of the project is presented in Exhibit A, “Statement of Work.”

Please indicate by letter, fax, or email by **August 23, 2017** 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 (not including resumes). The schedule / timeline information should be included in the technical proposal.

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 Leland
Coordinating Research Council
5755 North Point Parkway, Suite 265
Alpharetta, GA 30022

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

The deadline for receipt of your proposal is **September 6, 2017**.

Yours truly,

Amber Leland
Deputy Director

EXHIBIT A
Statement of Work
Alternative Oxygenate Effects on Emissions

Background

CAFE and GHG emissions standards for model year 2017-2025 light-duty vehicles are significantly more stringent than those applicable to earlier model year production. This has influenced manufacturers to employ engine technologies, such as spark ignited direct injection (SIDI) combined with downsizing and turbo charging to improve fuel economy. Previous CRC projects, E-94-1, E-94-2, and E-94-3, investigated the fuel's impacts on tailpipe emissions of in-use vehicles with SIDI engines for gaseous (regulated and unregulated) and particulate matter (PM) emissions. There is an interest in evaluating the impact of higher ethanol blends as well as other oxygenated gasoline blendstock components on emissions.

Objectives

The objective of this study is to evaluate the impact of oxygenated blendstocks on tailpipe emissions, in particulate PM emissions, from current in-use SIDI vehicles. Four SIDI vehicles from the CRC E-94-2 program will be used for testing program.

Scope of Work

Project Management

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

Fuels

The fuels for use in this program will be purchased by CRC directly and should not be budgeted for in the quote. The fuels will be blended using a single base hydrocarbon, with properties approximating typical market summer-grade gasoline. In order to compare results back to E-94-2 and E-94-3 testing, the same hydrocarbon base fuel will be used, detailed below. Oxygenated blendstocks will be blended into this base hydrocarbon fuel in order to isolate the effect of the oxygenated blendstock on emissions. Including the base hydrocarbon fuel, a total of 7 fuels will be tested on each vehicle. The blends are as follows:

Ethanol

- 10% Volume Ethanol
- 15% Volume Ethanol

Isobutanol

- 16% Volume Isobutanol
- 24% Volume Isobutanol

Ether

- 19% Volume MTBE
- 29% Volume MTBE

Note: Fuels will be purchased by CRC and provided for testing.

Optionally, an eighth fuel, a 12.5% volume blend of isobutanol, if funding allows, may be included in the test fuel matrix. Please include an optional line item in the quotation for additional costs associated with inclusion of one additional fuel into the testing matrix.

Fuel properties will be independently measured by CRC.
The fuel will be stored at the testing facility in drums for the duration of the project.

Vehicles

The following four test vehicles will be provided by CRC for the project:

2013 Chevrolet Malibu	2.0L Turbocharged, I4
2013 Chevrolet Malibu	2.5L Naturally Aspirated, I4
2013 Honda Accord	2.4L Naturally Aspirated, I4
2012 VW Jetta GLI	2.0L Turbocharged, I4

- For the purpose of submitting a quotation, please include a line item in the quote for transportation of the vehicles to the testing facility. Vehicles are currently located in San Antonio, TX.
- Upon receipt of test vehicles, engine oil and filter should be changed according to the OEM recommendations. The fresh engine oil should be “de-greened” with an appropriate accumulation of mileage on a dynamometer. Further guidance will be provided by the project technical panel.
- Test vehicles shall be evaluated for malfunctions, OBD codes, etc. to ensure they are in proper working order prior to start of testing. Any issues should be raised with the CRC project technical panel.
- The CRC project panel could request that additional vehicles be added to the program. To address this possibility, please provide a supplemental quote on a per-vehicle basis. This quote would cover all related program costs, but would exclude the vehicle purchase cost.
- The quote should have a separate line item cost to obtain vehicle information, (spark advance/retard, fuel trim, etc.) on a per test fuel per test vehicle basis.
- Baseline emission testing over a standard cold start Federal Test Procedure (FTP) using the E0 fuel shall be performed to confirm that the vehicle emissions system is performing properly. If the vehicle fails to perform properly, the CRC project panel shall be contacted for guidance.

Chassis Dynamometer Test Procedure

1. Prepare each of the vehicles by performing a single oil drain and fill and filter change meeting the OEM specifications and recommendations. A 250 mile de-greening procedure should be performed on each vehicle to break-in the new oil. No additional oil changes should occur unless mileage is accumulated, reaching the recommended oil drain interval.
2. Drain existing fuel from the vehicle. Flush with the test fuel using appropriate fuel change procedures, provided in Appendix 1 – Fuel Change. Fill tank with nominally 40% of fuel tank volume of test fuel. It may be challenging to completely drain the existing fuel in some vehicles, due to the tank design, therefore a tank flush with the next test fuel has been incorporated into Appendix 1.
3. Equip the vehicle with a “scan tool,” and configure the device to continuously record the following parameters in real time:

Absolute Throttle Position (%)
Relative Throttle Position (%)
Absolute Throttle Position B (%)
Commanded Throttle Actuator Control (%)
Intake Manifold Absolute Pressure (kPaA)
MAF (g/s)
Ignition Timing Advance Cyl. #1 (Deg)
Bank 1 - Sensor 1 lambda (Wide Range O2S)
Absolute Load Value (%)
Short Term Fuel Trim - Bank 1 (%)
Short Term Fuel Trim - Bank 2 (%)
Long-term Fuel trim Bank 1 (%)
Long-term Fuel trim Bank 2 (%)
Engine RPM (RPM)
Vehicle Speed (km/hr)
Calculated LOAD Value (%)
Engine Coolant Temperature (C)
Commanded Evaporative Purge (%)
Bank 1 - Sensor 1 O2 Voltage (v)
Intake Air Temp (Deg C)
Commanded Equivalence Ratio ()

Note: Any MIL lights and codes should be noted

4. One LA92 test cycle shall be run as a prep cycle (no emissions testing since vehicles have previously been baseline evaluated) followed by a soak time of at least eight hours, but no more than 24 hours, Appendix 2, before running the LA92 emissions test cycle, Appendix 3.

5. While on the LA92 test cycle the following should be monitored using bags:
 - Tailpipe gaseous emissions
 - Particulate matter emissions (PM Only)
 - GHG emissions – CO₂, N₂O, and methane
6. Proposals should include a list of equipment and protocols for measurement of the desired emissions.
7. Note any drivability issues. Drivability is not a focus of this program, but obvious issues should be noted. Examples include long crank times, rough idle, hesitation/stumble, etc. Note any instances of MIL illumination. In some cases, the MIL may go out after an engine stop/start event; such “temporary” MILs should also be recorded.
8. Run a second test, repeating the initial test procedure, on the same fuel before moving to the next test fuel.
9. Check to see if the two test results are within the test protocol before moving to the next fuel. A potential to have 25% of the testing run a third test should be included in the budget. An outline of the prep and test procedure is included in Appendix 4.
10. Test repeat protocol:

Emissions Criteria	% Between Tests
Total Hydrocarbons (g/mi)	30%
Carbon Monoxide (g/mi)	50%
NOx (g/mi)	50%

Test Repeat Protocol

11. Repeat steps 1 through 6 with each test fuel. If the vehicle experiences no apparent problems (driveability, DTC, MIL, etc.) with a particular fuel blend, contact the CRC project panel to inform them the fuel has been completed and proceed to the next test fuel.

Project Schedule

As part of proposal submission, the contractor should include a schedule for the tasks outlined above, along with an overall estimate on the timing to complete all of the tasks/testing.

Deliverables

As outlined in the subsequent “Exhibit” section, the contractor should submit monthly reports in addition to the draft and final reports. Monthly reports should contain all data acquired during the report month, including data from the OBD scan tool, when appropriate. Emission test results and driveability notes should also be included. Depending on the final program schedule, the contractor may be requested to issue an interim report. This interim report would be structured in format of a final report, and would address all vehicles that had completed testing to that point.

Appendix 1 - Fuel Change

1. Drain vehicle fuel completely via fuel rail whenever possible.
2. Turn vehicle ignition to RUN position for 30 seconds to allow controls to allow fuel level reading to stabilize. Confirm the return of fuel gauge reading to zero.
3. Turn ignition off. Fill fuel tank to 40% with next test fuel in sequence. Fill-up fuel should be at an appropriate temperature to prevent loss of volatiles, approximately 50°F.
4. Start vehicle and execute catalyst sulfur removal procedure described in Attachment B. Apply side fan cooling to the fuel tank to alleviate the heating effect of the exhaust system. Engine oil temperature in the sump will be measured and recorded during the sulfur removal cycle.
5. Perform four vehicle coast downs from 70 to 30 mph, with the last two measured. The vehicle will be checked for any obvious and gross source of change in the vehicle's mechanical friction if the individual run fails to meet the following repeatability criteria: 1) maximum difference of 0.5 seconds between back-to-back coast down runs from 70 to 30 mph; and 2) maximum ± 7 percent difference in average 70 to 30 mph coast down time from the running average for a given vehicle.
6. Drain fuel and refill to 40% with test fuel. Fill-up fuel should be at approximately 50°F.
7. Drain fuel again and refill to 40% with test fuel. Fill-up fuel should be at approximately 50°F.
8. Soak vehicle for at least 12 hours to allow fuel temperature to stabilize to the test temperature.

Appendix 2 – Vehicle Conditioning

1. Move vehicle to test area without starting engine. Start vehicle and perform UDDS followed by two HWYFET followed by a US06 test. During these prep cycles, apply side fan cooling to the fuel tank to alleviate the heating effect of the exhaust system. Following the first two prep cycles, allow vehicle to idle in park for two minutes, then shut-down the engine for 2-5 minutes. Following the last prep cycle, allow the vehicle to idle for two minutes, then shut down the engine in preparation for the soak.
2. Move vehicle to soak area without starting the engine.
3. Park vehicle in soak area at proper temperature (75 °F) for 12-36 hours. During the soak period, maintain the nominal charge of the vehicle's battery using an appropriate charging device.
4. Move vehicle to test area without starting engine.
5. Conduct LA-92 prep cycle. And then soak vehicle for 12-36 hours.

Appendix 3 - Test Procedure

1. Move vehicle to test area without starting engine.
2. Perform LA92 cycle emissions test.
3. Move vehicle to soak area without starting the engine.

4. Park vehicle in soak area of proper temperature for 12-36 hours. During the soak period, maintain the nominal charge of the vehicle's battery using an appropriate charging device.
5. Move vehicle to test area without starting the engine.
6. Perform LA92 emissions test.
7. Determine whether third replicate is necessary, based on data variability criteria (CRC will provide).
8. If a third replicate is required, repeat steps 16, 17, 18 and 19.
9. If third replicate is not required, return to step 1 and proceed with next vehicle in test sequence.

Appendix 4 – Prep and Test Procedure

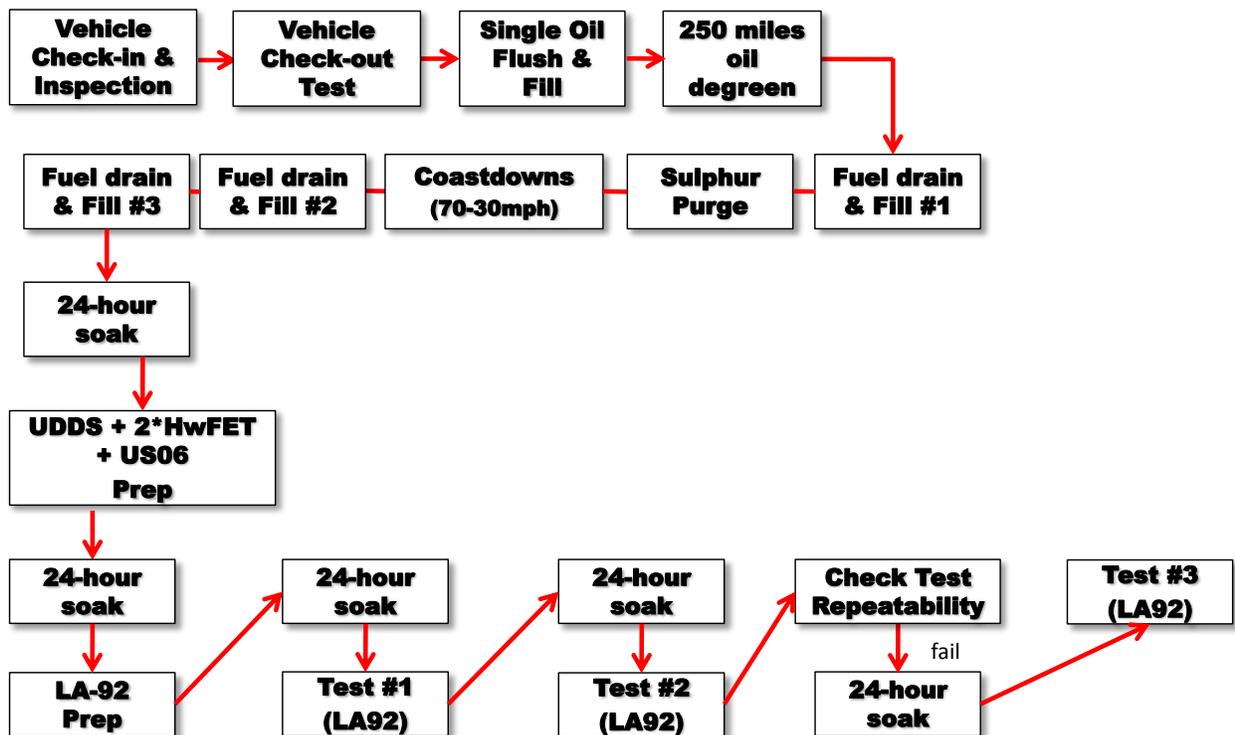


EXHIBIT B

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 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.