



**COORDINATING RESEARCH COUNCIL, INC.**

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**April 3, 2020**

In reply, refer to:

CRC Project No. E-132

Dear Prospective Bidder:

The Coordinating Research Council (CRC) invites you to submit a written proposal to provide services for “Tier 3 Vapor Pressure Vehicle Testing” (CRC Project No. E-132). A description of the project is presented in Exhibit A, “Statement of Work.”

Please indicate by letter, fax, or email by **April 22, 2020** 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.

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  
Alpharetta, GA 30022

Phone: 678-795-0506  
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E-mail: [aleland@crcao.org](mailto:aleland@crcao.org)

The deadline for receipt of your proposal is **May 12, 2020**.

Yours truly,

Amber B. Leland  
Deputy Director

**EXHIBIT A: STATEMENT OF WORK**  
**CRC Project E-132 Statement of Work**  
**Tier 3 Vapor Pressure Vehicle Testing**

**Introduction:**

As tailpipe standards get more stringent, so do evaporative emissions standards. Vehicles in the field are also subject to multiple different blends of ethanol and vapor pressure. This study begins to examine the effects of various fuel blends on diurnal emissions as well as permeation emissions measured with the CRC E-77 permeation procedure. The work will require full vehicle SHEDs as well as canister conditioning and hot room facilities.

**Vehicle Selection:**

Two, or more, test vehicles will be needed ranging from 2018 to present that are certified LEV3/Tier3. Ideal vehicles would be a small/mid-size SUV (Chevrolet Equinox, Jeep Cherokee, Ford Explorer, etc.) and a full-size light duty pickup truck (Chevrolet Silverado 1500, Dodge Ram 1500, Ford F150, etc.) These vehicles should not be a HEV or PHEV with a non-integrated evaporative emissions systems. In addition, the vehicle/s should meet all of the requirements below.

**Individual Vehicle Requirements:**

- Minimum of 4,000 miles (New vehicle “mileaged up” or a used vehicle are both acceptable)
  - If using a new vehicle, mileage will be accumulated with station grade fuel. At each re-fueling event, a fuel sample shall be taken and analyzed for RVP, ethanol content and distillation curve per ASTM D-86. This data will be reported in the final report.
  - If using a used vehicle, a sample of the fuel in tank shall be taken and analyzed for RVP, ethanol content and distillation curve per ASTM D-86. This data will be reported in the final report.
- Maximum of 75,000 miles.
- Never been in an accident and clean CarFax history.
- No active or pending MILs/DTCs.
- No repairs on the evaporative emissions control system.
- No major repairs on AC system.
- Serviceable and safe tires, but not new tires (minimum of 6 months or 4000 miles)
  - Tire data of manufacture should be documented to ensure the above is met.
- Manufacturer fuel cap or capless, and not aftermarket cap, if that can be determined.
- No significant modifications by previous owner and no aftermarket equipment.
- Passes evaporative emissions inspection, including pressure decay check.
- VIN, and emissions certification family check by the test house and recorded in the test report. Selected vehicles should also complete an abbreviated screening test to ensure emissions are within applicable standards, as follows:
  - Road Load Derivation per the CFR.
  - Drain and Refuel with specific test fuel based on the CRC Report No E-94-2, Appendix B; ‘Fuel Change, Conditioning, and Test Procedure’ page 107.
  - Soak 12-36 hrs. @ 68-86F.

- Canister purge on the bench with 300BV of clean air with 50 grains +/-25 grains of moisture.
- Canister Load at 40g/hr. with 50/50 butane nitrogen mix until 2g break through as measured with FID or slave canister.
- Cold FTP-75 Bag Only.
- SHED one-hour hot soak. If the value is 50% or greater than the total vehicle allocation the test vehicle shall be replaced.

### **Vehicle Preparation:**

Following recruitment, the vehicles should be conditioned for evaporative emissions testing. The conditioning process is necessary to remove or otherwise “off-gas” interior surface treatments (e.g., “Armor All”), tire treatments, and vehicle finish polishes, and to minimize any street fuel carry-over effects. Preparation should be done for each fuel change (E10 to E15 or 7RVP to 9RVP or 9RVP to 11RVP). Fuel changes should be done according to appendix A Fuel Change Procedure in this statement of work. Conditioning included the following tasks and be run in the order defined below:

1. Remove windshield washer fluid and flush washer bottle with water (must be done initially, but not again so long as no washer fluid was added post drain and clean)
2. Wash vehicle with degreaser to ensure vehicle is free from any/all foreign materials including but not limited too; oils, fuels, corrosion inhibitors, etc. that would affect emission SHED performance. Post wash due care needs to be taken to keep vehicle in a clean and contaminate free state.
3. When transitioning from E10 based fuels to E15 based fuel, the vehicle should be soaked for 21 days @ 68-86F with E15 fuel to ensure the fuel system is properly exposed to E15 fuel.
4. Bake the vehicle at 105°F in a ventilated environment for 48 to 72 hours. Vent the tank to a slave canister.
5. Complete a Standard Road Cycle (SRC) drive on the chassis dynamometer every other day, for a total of 7 drives over a 14-day period using the correct test fuel.
6. Soak vehicle at 68-86F with 50 grains +/-25 grains of moisture in the soak chamber.

### **Fuels:**

Fuels to be used in this study and the order in which testing should occur are listed below:

1. E10 7 lb VP (Acceptable VP Range 6.8 -7.2lb) (Tier3 Cert fuel, VP reduction by bubbling dry Nitrogen)
2. E10 9 lb VP (Acceptable VP Range 8.7 -9.2lb) (Tier3 Cert fuel)
3. E10 10 lb VP (Acceptable VP Range 9.8 -10.2lb) (Tier3 Cert fuel, VP increased by bubbling Butane)
4. E10 11 lb VP (Acceptable VP Range 10.8 -11.2lb) (Tier3 Cert fuel, VP increased by bubbling Butane)
5. E15 7 lb VP (Acceptable VP Range 6.8 -7.2lb) (Tier3 Cert fuel, VP reduction by bubbling dry Nitrogen, Ethanol increased by splash blending)
6. E15 9 lb VP (Acceptable VP Range 8.8 -9.2lb) (Tier3 Cert fuel, Ethanol increased by splash blending)

7. E15 10 lb VP (Acceptable VP Range 9.8 -10.2lb) (Tier3 Cert fuel, VP increased by bubbling Butane, Ethanol increased by splash blending)
8. E15 11 lb VP (Acceptable VP Range 10.8 -11.2lb) (Tier3 Cert fuel, VP increased by bubbling Butane, Ethanol increased by splash blending)

All fuels should be +/- 1% from as listed for ethanol content. All fuels must be tested for a full distillation curve profile per the ASTM D-86. Reference CRC E-77-2 table 12 for full list of outputs.

### **Testing Procedure**

Each vehicle will be tested on each fuel two (2) times to be run consecutively. Fuel to be refreshed after each test cycle, a test cycle is defined as one (1) 2 day diurnal and one (1) 1-hr hot soak. Fuel changes should be done according to appendix A Fuel Change Procedure in this statement of work. Following vehicle preparation, each vehicle/fuel configuration should be tested in the SHED to establish levels of evaporative emissions and permeation. The evaporative emissions portion will be represented by the 2-day diurnal per 40CFR86 Subpart B. The permeation portion will be represented by the process defined in Appendix B – Fuel Permeation in this statement of work. If the evaporative emissions (highest hydrocarbon reading corrected for ethanol content per 40CFR86.1813-17 Evaporative and refueling emission standards part 4.) from day 1 or day 2, vary more than +/- 50mg, two (2) additional tests should be run. If the permeation portion (highest hydrocarbon reading, corrected for ethanol content per 40CFR86.1813-17 Evaporative and refueling emission standards part 4 ) vary more than +/- 15mg two (2) additional tests should be run.

### **Data Reporting**

The contractor will provide CRC with monthly progress reports. Any questions or information needed to make project decisions will be communicated in a timely manner. The data report will provide detailed information on vehicles per test run. This analysis will be based on test data measurement requirements.

- Analyze for correlation and trends to ‘Y outputs’ vs ‘X inputs’ on all test data collected
  - SHED data will be taken every hour and reported as such.
- Plot data accordingly
- Vehicles will be blinded as necessary.
- Data to be reserved for a later statistical analysis by CRC or USCAR.

### **Final report**

The contractor will collect, and analyze the relevant data recorded during the test campaign. The test procedures, instrument calibration, and test data will be described in a project final report. This draft report will be reviewed by CRC and revised as necessary following reporting requirements given in Exhibit B.

## **Quotation**

CRC expects to negotiate a cost-plus fixed fee or cost reimbursement contract for the research program. Please submit your cost proposal as separate documentation from the technical proposal.

The quotation should be prepared for one vehicle with three fuels as a base price. Optional work should be quoted for testing with each additional fuel (up to 8 fuels described) as well as for additional vehicles (a per fuel, per vehicle basis).

## **Appendix A – Fuel Change Procedure**

1. Drain the fuel via the fuel rail. Care should be taken to not spray or spill fuel on the vehicle or service technician.
2. Turn vehicle ignition to RUN for 30 seconds to allow controls to show stabilized fuel tank volume. Confirm the gauge show zero (0) fuel in the tank.
3. Turn vehicle ignition to OFF. Fill vehicle via the fuel filler pipe with the specific test fuel to 40% of rated capacity per the manual. Fuel temperature should be less than 65°F.
4. Take fuel sample from the dispensing nozzle for distillation curve testing per ASTM D-86.
5. Start the engine to charge the system. Engine run time should be limited 30 seconds or less.
6. Soak vehicle for a minimum of 12hrs. for fuel temperature to stabilize to test temperatures.
7. Move vehicle to test area without starting the engine.

## **Appendix B – Fuel Permeation**

1. Drive vehicle to a EPA3 (EPA 75, cold start) drive cycle to ensure a sufficiently clean canister.
2. Soak 12hrs. @ 105°F +/- 2°F
3. 1hr. Hot Soak @ 105°F +/- 2°F
  - a. The SHED's internal air circulation fan is to remain on for entire 1-hour hot soak test, as specified in Federal Registry CFR 40, part 86 for SHED requirements
4. Cool Down 12hrs. @ 65°F +/- 2°F
5. 24hr CARB Diurnal
6. Record 1hr. Hot Soak + 24hr CARB Diurnal (highest value) this is your permeation contribution.

## **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.