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

October 28, 2021
In reply, refer to:
CRC Project No. CM-136-20

Dear Prospective Bidder:

The Coordinating Research Council (CRC) invites you to submit a written proposal to provide services for "Develop Precision Statements for Oxidation Stability Test Methods ASTM D525 and ASTM D7525 / Correlation Study Between Instruments For Operating Range 240-1440 Minutes." (CRC Project No. CM-136-20). A description of the project is presented in Exhibit A, "Statement of Work." *Note: This project is revised in scope from a Request for Proposals released in 2020.*

Please indicate by letter, fax, or email by **November 11th, 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. 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. Key contract language examples are presented in Exhibits B, C, D, and E. CRC must adhere to standard contract language with minor adjustments only in extraordinary circumstances. **Failure to agree to these contract clauses as written may result in the project being awarded to another contractor.**

Important selection factors 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.

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 should not be longer than 10 pages in length (not including resumes). **The schedule / timeline information must be included in the technical proposal; failure to do so may result in your proposal being set aside as non-responsive.**

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

The technical and cost proposals should be submitted to:
Christopher J. Tennant Email: **ctennant@crcao.org**

The deadline for receipt of your proposal is **November 30, 2021.**

EXHIBIT A

Statement of Work for CRC Project CM-136-20, "Develop Precision Statements for Oxidation Stability Test Methods ASTM D525 and ASTM D7525 / Correlation Study Between Instruments For Operating Range 240-1440 Minutes."

Summary

In the 1930's, ASTM D525 (a 4-hour minimum Induction Period Test Method) was developed to predictively monitor the oxidative stability of gasolines at the refinery and during storage so as to ensure they were fit for purpose. There have been many changes to modern gasoline that have likely improved its oxidation stability and thus its ability to remain fit for purpose upon extended storage in a fuel tank or container. However, there is little to no controlled experimental correlation among the legacy and new laboratory stability tests for non-oxygenated gasoline. This CRC project is aimed at accomplishing this task.

Project

Develop a robust statistical design of experiments using ASTM D6300 for an interlaboratory Study (ILS) on the current gasoline oxidation stability tests ASTM D525 Pressurized Cylinder Induction Period test and the ASTM D7525 Rapid Small-Scale Oxidation Test (RSSOT). Execute a statistically robust ILS with participating external laboratories from the CRC project participants. Develop the data for updated precision statements for both tests. Develop a statistically robust correlation between the pressurized cylinder test and the RSSOT. Perform this task with North American fuels to develop a robust correlation useful in multiple jurisdictions. ASTM may assist with the round-robin Interlaboratory Study (ILS) support. The intent is to perform the test comparisons and precision and bias in accord with ASTM D6300 to meet ASTM requirements for precision determination and correlation.

Background

It is important to recognize that newer, faster, and more reliable test methods may be available to the industry in the form of D7525. In addition, it is desirable to develop a correlation among accelerated oxidation tests ASTM D7525 and accelerated oxidation standard tests D525. In the course of the work, precision statements will be developed for the two tests to update and complete their respective ASTM standards.

When conceived in 1939, D525 was the state of the art when only when non-oxygenated and sometimes unstable thermally cracked gasolines existed. However, in today's technological environment where safe, cost effective, and more flexible technologies exist to test non-oxygenated gasolines, ASTM D525 Induction Period accelerated stability test is now a cumbersome and lengthy test to run with associated safety issues of pressurizing 50 ml. of flammable gasoline with pure oxygen and then immersing in a 100º C heated bath or block heater. The test is run until the "break point" defined by a pressure loss of the oxygen over two defined periods. Current ASTM D4814 spark ignition fuel stability requirements are for a minimum of 240 minutes break period for cargos of gasoline that leave the refinery. But many labs find this test procedure too lengthy, attendant with safety issues involving pressuring a flammable material with oxygen.

Hence there is a strong desire by many fuel test laboratories to move to the more rapid ASTM D7525 test that involves smaller quantities of the test fuel, is inherently safer, and performs the test in a significantly shorter timeframe. However, ASTM D7525 is not approved for testing the stability requirements for gasoline in the D4814 standard. Hence, there is a need to develop a correlation between ASTM D525 and ASTM D7525, as well as develop precision statements for both methods.

Experimental

The details of the experiment procedure need to be defined to provide statistical rigor, but flexible that some general direction may be given. The experimental details will be defined with the help of a statistician using design of experiments to yield the most desired information with the least cost and effort. Hence the program could be executed in two stages. The first stage would be to develop statistically-designed test programs that would produce D6300/ compliant interlaboratory studies (ILS's) and a correlation for the two test methods. Initial bidding and contracting of statistical help for the program design and data analysis would need to be subcontracted if in-house statistical professionals are not available. Then the management and execution of the experimental program could be executed. Alternatively, one contractor with statistical design ability could bid out both the statistical experimental planning and the execution of the testing. The choice would be dependent upon the abilities of the contractor.

Gasolines:

Finished non-oxygenated gasolines will be procured from several areas of the US and in sufficient quantities to perform the tests. In addition, a pre-evaluated chemical dopant will be formulated into various gasoline samples to cause the gasoline to experience a break point along a preset time continuum from approximately 240min to 1440min.

Samples will also be taken from the stored drums after mixing to ensure homogeneity and then be divided by the contractor for shipment to the participating laboratories. Shipment samples will be purged of oxygen and nitrogen blanketed prior to shipping if necessary.

Analysis:

Samples will be analyzed by ASTM D525 and ASTM D7525 RSSOT for oxidation stability. Note, it may be beneficial to select participating laboratories that have the capability to perform both ASTM D525 and ASTM D7525. For those participating labs that only have the ability to perform ASTM D525, the manufacturer of the RSSOT will provide a "loaner" unit.

Work Plan:

Detailed Work plan for the project bidder will include the following:

1. Either from the contractor's laboratory a statistician or a subcontracted statistician to design the experiments for:
    a. Administer ASTM D6300 to develop repeatability and reproducibility statements for ASTM D525 and ASTM D7525.
    b. perform the work necessary to develop a correlation between the two accelerated test methods ASTM D525 and D7525, and
2. Based on the test plans, secure enough quantities of the test fuels and chemical dopant from a contract fuel supplier and/or CRC participating members or other sources. Keep these fuels in a condition that prevents degradation (e.g. chilling and/or inerting).
3. CRC will offer the list of volunteer participating laboratories (North America and Europe) to run the round robin samples as designated in the experimental test plan. Involve ASTM Interlaboratory test program assistance to facilitate the test program. Ideally, participating laboratories should be selected on the basis that they routinely perform ASTM D525. Additionally, the participating laboratory have the ability to perform ASTM D7525 if not the manufacturer of the RSSOT can provide a loaner unit with training.
4. Addition per the statistical design requirements.
5. Prepare and share monthly progress reports to the project team on progress of the program.
6. At the end of the program, prepare and distribute an acceptable report on the study. The information in the final report shall be sufficient in order to prepare ASTM Research Reports required by ASTM Form and Style to document the justification for the precision statements for ASTM D525, ASTM D7525 as well as the correlation study for both ASTM test methods.

7. Once the correlation study between D525 and D7525 has been developed and accepted, begin planning of Phase 2 of the study to determine the oxidation stability of oxygenated gasolines in North America and possibly Europe).
8. Additionally, a Phase 3 could be undertaken to examine impacts of gasoline stability on modern vehicles, including hybrids.
9. Awarding of Phase 1 of the program is not conditional on the ability to conduct Phases 2 and/or 3.

EXHIBIT B

REPORTS

A. CONTRACTOR shall submit a technical progress report covering work accomplished during each month of the contract performance. 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. Periodic conference calls may also be requested by CRC to update the technical committee overseeing the project.

B. CONTRACTOR shall submit to CRC a draft final report on or before DRAFT FINAL REPORT DUE DATE. The *Draft Final Report* shall be reviewed and returned to CONTRACTOR with comments no later than forty-five (45) days thereafter. The report shall document, in detail, all of the work performed under the contract including data, analyses, and interpretations, as well as recommendations and conclusions based upon results obtained. The report shall include tables, graphs, diagrams, curves, sketches, photographs, and drawings in sufficient detail to comprehensively explain the results achieved under the contract. The report shall be complete in itself and contain no reference, directly or indirectly, to the monthly progress reports and should be suitable for publication in the peer-review literature. Additional rounds of review may be required prior to acceptance of the Final Report. If applicable, data from the research shall be provided in a format suitable for releasing to the public along with the final report.

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 report structure that includes:

- CRC Title Page and Disclaimer Statement (both provided by CRC)
- 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 (may also include Recommendations if CRC requests them)
- List of References
- Appendices as appropriate for the scope of the study.

Incomplete draft reports or reports of poor quality requiring additional outside editorial review may have outside editorial services charged back to the project budget.

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

RELATIONSHIP OF PARTIES

It is agreed and understood that CONTRACTOR is acting as an independent contractor in the performance of any and all work hereunder, and to the extent caused by CONTRACTOR, CONTRACTOR shall be solely liable and responsible for the payment of all legal claims for damages made by its employees or agents, or by another person or persons, on account of any property damage or on account of personal injury sustained or suffered by, or on account of the death, of any person or persons, or on account of any other legal claims arising or growing out of CONTRACTOR's negligence in the performance of the agreement; and CONTRACTOR undertakes to indemnify CRC against any such liability.

EXHIBIT E

KEY PERSONNEL REQUIREMENTS

Certain skilled experienced professional and/or technical personnel are essential for successful performance by CONTRACTOR of its obligations and work under this Agreement. These personnel are persons whose resumes were submitted for evaluation of the Proposal and are identified by CRC as "Key Personnel". CRC awards contracts based on several requirements and the reputation and experience of Key Personnel are a significant requirement. CONTRACTOR agrees that CONTRACTOR will not remove or replace any Key Personnel from the contract work without compliance with paragraphs (a) and (b) hereof.

(a) If any Key Personnel for whatever reason becomes, or is expected to become, unavailable for work under this Agreement (or any specific Project) for a continuous period exceeding thirty (30) work days, or is not expected to perform the work hours and volume of work indicated in the proposal or initially anticipated, the CONTRACTOR shall immediately notify CRC and shall, subject to the concurrence of CRC, promptly replace such Key Personnel with personnel of at least substantially equal ability and qualifications acceptable to CRC.

(b) All requests for approval of substitutions of Key Personnel hereunder must be in writing to CRC and provide a detailed explanation of the circumstances necessitating the proposed substitutions. Requests for substitution must contain a complete resume for the proposed substitute Key Personnel, and any other information requested by CRC needed to approve or disapprove the proposed substitution. CRC will evaluate such requests and notify CONTRACTOR of approval or disapproval thereof in writing. CRC is not responsible for, and shall not be charged, any fees or other costs related to such replacement Key Personnel's performance of the services until the replacement Key Consultant has obtained the same proficiency and knowledge regarding the services as the former Key Personnel.

(c) If CRC determines that suitable and timely replacement of Key Personnel who have been reassigned, terminated or have otherwise become unavailable for the contract work is not reasonably forthcoming or that the proposed replacement Key Personnel would impair the successful completion of the contract or the services ordered, at the option of CRC, (i) the Agreement (in whole or in part related to the applicable contract work) may be terminated by CRC or (ii) the contract price or fixed fee may be equitably adjusted downward to compensate CRC for any resultant delay, loss, or damage, in an amount acceptable to CRC

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.