



COORDINATING RESEARCH COUNCIL, INC.

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April 4th, 2025

In reply, refer to:

CRC Project No. AV-35-24

Dear Prospective Bidder:

The Coordinating Research Council (CRC) invites you to submit a written proposal to provide services for “Evaluation of Modern Experimental Methods and Equipment to Determine the Calorific Energy Content of Aviation Fuels” (CRC Project No. AV-35-24. A description of the project is presented in Exhibit A, “Statement of Work.”

Please indicate your intention to bid at [this link](#) on or before **April 18th, 2025** 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 here: [Q & A Link](#). 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:

Chris Tennant
Coordinating Research Council
1 Concourse Parkway Suite 800
Atlanta, GA, 30328

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

The deadline for receipt of your proposal is **May 2nd, 2025**.

Yours truly,

Chris Tennant
Executive Director

EXHIBIT A

CRC Project Statement of Work

“AV-35-24 / EI-SC-B-10 - Evaluation of Modern Experimental Methods and Equipment to Determine the Calorific Energy Content of Aviation Fuels”

Background

Aviation fuel energy content represents a fundamental thermodynamic property, the energy available when a given weight of fuel is fully burnt under ideal conditions. Results are usually expressed as MJ/kg or Btu/lb. Aviation specifications set minimum values for this property to ensure aircraft will have sufficient flight range when loading a given quantity of fuel, for example:

- Aviation Gasoline ASTM D910 43.5 MJ/kg minimum.
- Aviation Turbine Fuel ASTM D1655 42.8 MJ/kg minimum.

Experimental determination of energy content can be achieved by complete combustion of a known mass of fuel in excess oxygen using a Bomb Calorimeter. Such instruments must be carefully designed and operated to ensure accurate measurements, for example taking into account heat loss / gain from surroundings and thermal mass. Due to this complexity the aviation industry prefer to utilize correlations to estimate fuel energy content, for example ASTM D3338 based on distillation, density and sulfur.

CRC project AV-23-15/17 *Review of Existing Test Methods Used for Aviation Jet Fuel and Additive Property Evaluations with Respect to Alternative Fuel Compositions*, identified possible issues with applying correlation energy content methods to non-standard fuel compositions. Given the importance of such information for fuel development and flight operations, a more detailed evaluation was undertaken, CRC project AV-29-20 *A Review of Current Experimental and Correlation Methods to Determine the Calorific Energy Content of Liquid Fuels*. This further highlighted:

- Advancements in laboratory equipment to accurately determine fuel energy content, potentially superseding traditional, listed, methods.
- The limitation of correlation methods developed on data sets from many years ago to estimate fuel energy content.

As the industry move forward with sustainable aviation fuel development and unleaded Avgas, an evaluation of modern experimental methods to determine fuel energy content would be helpful in comparison with traditional methods D4809 / IP 12 and D3338 correlation techniques.

Objective

The proposed project is not to undertake a full Inter Laboratory Study as this is more aligned with ASTM / Energy Institute programs. Rather, the aim is to perform a technical evaluation using a set of pure samples / fuels to identify appropriate experimental methods which offer the potential precision for aviation use. Results will be compared with D4809 / IP 12 experimental methods and also D3338 correlation estimates adding technical value.

Scope of Work

The scope of work is to:

- Identify 2 to 3 different modern bomb calorimeters from AV-29-20 for inclusion in the study.
- Undertake a laboratory program featuring
 - (i) Procurement of a set of the following aviation fuel samples:
 - 5 Aviation gasolines, (<10, 10-25% v/v aromatics + high octane unleaded proposals)
 - 5 Jet A / A-1 aviation turbine fuels (<10, 10-20, 20-25% v/v aromatics, <10% and >30% cycloparaffins)
 - 3 Synthetic aviation turbine fuel components (synthetic paraffinic, synthetic aromatic and synthetic cycloparaffin based).
 - 3 pure reference chemicals (Iso-octane, n-Decane, Dodecane)
 - (ii) Analysis of the above in:
 - 2 traditional (ASTM D4809 / IP 12) calorimeters located in separate laboratories
 - 2 or 3 modern calorimeters of different design located in separate laboratories as a blinded matrix in duplicate.
- Comparing the results with ASTM D3338 correlation estimates for energy content.
- Preparing a report summarizing the methods and results.

Schedule

A 5 stage schedule is proposed

Stage 1

Identify and agree the set of modern and traditional calorimeters to be included in the program together with laboratories to undertake the test work. 3 months.

Stage 2

Source the pure components and fuel samples from industry members together with Certificates of Analysis to quantify quality. 4 months.

Stage 3

Package and send the samples to the participating laboratories for analysis as a blinded, randomized, sample set. 3 months.

Stage 4

Gather the laboratory results and compare with correlation estimates. 1 month.

Stage 5

Prepare a report summarizing the study, experimental and estimated energy content results for the test matrix. 1 month.

Deliverables

A report detailing experimental and ASTM D3338 correlation calorimetry results for the test fuels when analyzed by 2 – 3 modern calorimeters in comparison with 2 traditional calorimeters (ASTM D4809 / IP 12), related observations and conclusions.

Key Words

Calorimeter, ASTM D3338, ASTM D4809, IP 12

References

AV-29-20 A Review of Current Experimental and Correlation Methods to Determine the Calorific Energy Content of Liquid Fuels

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.