

REQUEST FOR PROPOSALS

A Model for Calculating Canadian Environmental Quality Guidelines for Polyaromatic Hydrocarbons

Water Guidelines Working Group Canadian Council of Ministers of the Environment

1.0 BACKGROUND

The Canadian Council of Ministers of the Environment (CCME) is the primary minister-led intergovernmental forum for collective action on environmental issues of national and international concern. The 14 member governments work as partners in developing consistent environmental standards and practices.

CCME established the Water Guidelines Working Group (WGWG) to develop Canadian Environmental Quality Guidelines (CEQGs) for water. This includes relevant guidelines for protection of aquatic life (including water, tissue residue, and sediment). CEQGs for the Protection of Aquatic Life are critical tools for environmental management, providing credible scientific guidance on long-term no-effect concentrations as well as guidance on impacts from short-term events, such as spills.

WGWG's Polyaromatic Hydrocarbon (PAH) Project Team (hereafter "the Project Team") is developing long-term freshwater and marine guidelines for the protection of aquatic life for PAHs. The guidelines will be based on the narcotic target limit model (NTLM) and phototoxic target lipid model (PTLM) (McGrath *et al.* 2018; Marzooghi *et al.* 2017) and will include the ability to determine site-specific guidelines based on the location and water quality conditions of a water body.

Calculation of PAH water quality guidelines (WQGs) using the PTLM requires several inputs, including one key unknown, the moles of photons absorbed per mole of PAH (P_{abs}). P_{abs} depends on the spectral irradiance reaching a (PAH-contaminated) receptor within the water, the duration of light exposure and the light absorption spectrum of the specific PAH. Light exposure is fixed at a constant value to yield consistent PAH guideline values while PAH-specific light absorption spectra are constants that can be gleaned from the literature. Since measured spectral irradiance for water bodies is scarce, radiative transfer models can be used to estimate spectral irradiance.

To that end, the Project Team has selected the Tropospheric Ultraviolet and Visible Radiation Model (TUV; <https://www2.acom.ucar.edu/modeling/tropospheric-ultraviolet-and-visible-tuv-radiation-model>) to calculate the spectral irradiance at depth (within a specific water body, on a specific date), given the water body's light attenuation coefficient (k_d). One key gap to completing the P_{abs} calculation is determining site-specific light attenuation coefficient $k_d(\lambda)$ values for diverse water bodies with varying water chemistries. One way around this challenge is to develop $k_d(\lambda)$ models for freshwater and marine ecosystems based on commonly measured water quality

parameters. For that reason, some progress has been made on developing a $k_d(\lambda)$ model for freshwater based on dissolved organic carbon (DOC).

2.0 STATEMENT OF WORK

The Contractor will develop a comprehensive model for calculating site-specific PAH WQGs. The model will include:

- a further refined and validated $k_d(\lambda)$ freshwater model, that is currently under development (hereafter referred to as the “ $k_d(\lambda)$ freshwater model”)
- a refined and validated marine $k_d(\lambda)$ model
- recommended inputs for some parameters in the TUV
- R code for calculating these site-specific guidelines.

The Contractor will prepare a report written for a scientific audience that documents all components of the model and modifications, specifications and assumptions used to calculate PAH WQGs, and includes the R code and associated instructions.

3.0 SCOPE OF WORK

The project will commence by June 23, 2023 and will be completed by March 31, 2024.

3.1 Tasks

Without limiting the scope of work, the Contractor shall carry out the main items of work as described herein.

Task 1: Project Initiation Meeting

The Contractor, Project Authority and Contract Authority will meet via teleconference within a week of the signing of the contract to discuss and agree upon the scope of the project, expectations for deliverables and periodic reports, format of deliverables and expected timelines.

In advance of the project initiation meeting, the Contract Authority will provide to the Contractor a proof-of-concept report that includes recommendations for the $k_d(\lambda)$ freshwater model.

As part of the kick-off meeting, the Project Team will discuss validation criteria for tasks 2(i) and 2(ii).

Task 2: Initial draft report

By September 15, 2023 the Contractor will provide to the Project Authority and Contract Authority, an initial draft report that:

- i. Validates the $k_d(\lambda)$ freshwater model
This will include identifying publicly accessible Canadian or, if necessary, international limnological datasets representative of Canadian conditions, which at minimum, include measurements of k_d and DOC concentrations. The Contractor will use these datasets to validate the $k_d(\lambda)$ freshwater model and help refine the model if necessary. The Contractor will prioritize studies that measure additional water quality parameters (e.g., total suspended solids, chlorophyll) to help refine the model and/or establish water quality parameter bounds to which the model applies.
- ii. Provides a validated, marine $k_d(\lambda)$ model
The Contractor will develop or recommend a model for estimating $k_d(\lambda)$ in coastal marine ecosystems. The Contractor will validate and refine the model as was done in Task 2(i) using publicly accessible Canadian or, if necessary, international oceanic datasets representative of Canadian conditions. The datasets must contain, at minimum, measurements of k_d and the specific water quality parameters on which the $k_d(\lambda)$ marine model is based.
- iii. Recommends aerosol and albedo default values
The Contractor will recommend aerosol and albedo values that consider site location for use in the TUV model. Similar to the Fortuin and Kelder (1998) ozone climatology available for 17 latitude bands and included as a data file in the TUV code, the Contractor will glean aerosol and albedo values from similar latitude-based climatologies, if available and/or recommend default values to derive guideline values. The Contractor will develop scientifically defensible recommendations based on current scientific literature.
- iv. Recommends simplifying assumptions for calculation of WQGs
Simplifying assumptions are suggested in the $k_d(\lambda)$ freshwater model. These include defaults for the TUV model (e.g., date, overhead ozone column, cloud cover), exposure time and time discretization for determining photon absorption over the exposure duration. The Contractor will review and confirm or revise the assumptions based on scientific literature and/or expert judgement.

The Contractor will include all necessary information to demonstrate that the models developed or recommended for Tasks 2(i) and (ii) are scientifically defensible and reproducible. This will include example calculations in Excel or R, including the Excel worksheets or R code used to validate the models.

The Contractor will conduct a maximum two-hour virtual meeting with the Project Team the week of October 9, 2023 to review and obtain agreement from the Project Team on the recommended assumptions, including all the variables included in tasks 2 (i)–(iv), used to calculate the PAH guidelines. This meeting will also provide Project Team members the opportunity to ask the Contractor questions on any aspect related to the initial draft report.

The Contractor will draft the meeting agenda for review by the Project Authority and Contract Authority two weeks prior to the meeting and finalize the agenda based on comments received.

The Contract Authority will circulate the final agenda to all meeting participants one week before the meeting. The Contractor will chair the meeting. The Contractor will not be responsible for logistics of the meeting such as web hosting, scheduling and creating an invite list. The Contract Authority may record the meeting for reference.

The Project Team will provide comments on the initial draft report to the Contractor three weeks after the virtual meeting.

The Contractor will incorporate Project Team comments into the R code (Task 3) and draft report (Task 4).

Task 3: Develop R code to calculate phototoxic PAH WQGs

The Contractor will develop R code for calculating phototoxic PAH WQGs. This may include working with others with necessary expertise, including consultants and/or government employees, to oversee the necessary changes to the TUV model to allow user input of water depth and $k_d(\lambda)$. The TUV user interface is available online and its associated code (in Fortran) is available for download. The TUV code for versions 5.3 and 5.4 has the ability to calculate underwater light intensity, however, the current user interface does not permit user input of water depth and $k_d(\lambda)$. The Contractor will produce annotated R code that contains adequate details and instructions for running the code. The R code will be included in the draft report (Task 4).

Task 4: Draft report

By February 2, 2024, the Contractor will provide the Project Authority and Contract Authority with a draft report. The draft report will:

- build on the initial draft report
- be written for a scientific audience
- document all model components for calculating the water quality guidelines including selection, validation and testing of the models for $k_d(\lambda)$ for freshwater and marine systems
- document modifications of, and input specifications for the TUV and the simplifying assumptions that were required to calculate phototoxic PAH WQGs
- include the R code and associated instructions for running the code.

The Project Team will provide comments on the draft report to the Contractor by February 14, 2024.

Task 5: Final Report

The Contractor will incorporate Project Team comments on the draft report and provide final report to the Project Authority and Contract Authority by March 25, 2024.

Task 6: Project Close Meeting

The Contractor, Project Authority and Contract Authority will meet by March 31, 2024 to review the project to identify successes, challenges, and opportunities for improvement.

3.2 Payment and Deliverables

Payments will be based upon the Contractor's completion of tasks and as evidenced by the production of the specified deliverables listed below. Payments will be made only after receipt of such deliverables and acceptance thereof by the Project Authority and the Contract Authority. Except as otherwise specifically provided for herein or in the professional services contract entered into with CCME, CCME will not be required to pay for partially completed tasks or for any additional work that may be required that the Contractor may not have budgeted for in its proposal. CCME shall not be committed to any other basis of payment by virtue of CCME having requested or received information regarding the Contractor's method of determining its bid for the completion of the Project, including, without limitation, any information regarding estimates of time spent and hourly rates of the Contractor's employees, contractors and agents involved in the Project.

Payment will be made by CCME via electronic funds transfer (TelPay is CCME's current provider) to the Contractor according to the following schedule, subject to the deliverables listed below having been received and accepted by the Project Authority and the Contract Authority, and invoices having been submitted by the Contractor, and approved by the Project Authority and the Contract Authority and received by CCME. The Contractor will provide all necessary information to enable electronic funds transfers before initiating work on the project. If the electronic payment information provided by the Contractor is incorrect and results in a returned payment, the Contractor will be responsible for reimbursing CCME for the service fees charged by CCME's electronic funds transfer provider.

Deliverables	Payment Amount (% of contract value, inclusive of all applicable taxes)	Target Date
Tasks 1-2: project initiation meeting; refine and validate $k_d(\lambda)$ freshwater model; recommend or develop and validate marine $k_d(\lambda)$ model; recommend TUV input values; initial report; project team meeting with Contractor	40%	October 9, 2023
Tasks 3-4: Liaise with experts to modify TUV code; develop R code; draft report	35%	February 2, 2024
Tasks 5-6: final report; project close meeting	25%	March 31, 2024

The Contractor agrees to initiate work on the project by June 23, 2023.

The Contractor must provide all deliverables in electronic format to the Project Authority and Contract Authority no later than the dates specified above. All records, including but not limited to documents, R code, Excel spreadsheets, reports, briefing notes and correspondence, generated by the Contractor during the course of this project must be prepared in English using *Microsoft Word* for word processing, *Microsoft Excel* for data management, and *Microsoft PowerPoint* for presentations and other graphics.

All deliverables are the property of CCME and CCME reserves the right to publish them. The copyright in all materials produced as a product of the services, including the R code which will be licensed under Apache 2.0, shall belong exclusively to CCME. The Contractor shall waive all moral rights to all materials produced as a product of the services. The Contractor must advise the Project Authority of any information provided by a third party on a confidential basis for the purpose of the study and is to transmit the original documents containing any such information to the Project Authority under separate cover.

All discussion papers, reports and correspondence produced by the Contractor are subject to review by people designated by the Project Authority. The Contractor must perform all work to the satisfaction of the Project Authority and the Project Team.

Sufficient flexibility is required of the Contractor to respond to changing schedules and developments.

3.3 Budget

The maximum budget for this project is \$25,000 Canadian, inclusive of all fees, expenses and applicable taxes; proposals in excess of the maximum budget will not be considered. Proposed professional fees must be inclusive of all office and administrative costs. Project-specific expenses such as travel costs, where required, must be estimated and included in the total estimated cost of the project. These project-specific expenses may be billed on an “as incurred” (or monthly) basis and payment will be made after written confirmation from the Project Authority that the expenses were authorized and approved. The Contractor must supply reasonable and adequate documentation to support the expense claims. Travel-related expenses must follow *CCME Guidelines for Reimbursement of Expenses*.

Bidders from HST jurisdictions are advised that CCME’s office is located in Winnipeg, Manitoba and accordingly only GST should be applied.

4.0 PROPOSALS

4.1 The proposal shall not exceed a maximum of 10 pages in length, excluding appendices. The proposal must:

- Provide an outline of the intended approach including basic tasks, schedule of activities, and budget.

- Describe the personnel of the project team, areas of responsibility, time allotted and charge out rates.
- Document contingent procedures and personnel to be used if key team members become unavailable.
- Provide a brief description of any similar projects undertaken. Include the timeframe that the work was undertaken and key individuals involved in its completion.
- Include the names and contact information of three references.
- Include as an appendix *curricula vitae* and contact information of key team members.
- Include as an appendix:
 - the bidder's legal name and mailing address
 - the name and contact information of the bidder's authorized signing officer
 - the name and contact information for the bidder's administrator of the contract if different from the signing officer
 - the bidder's GST registration number or if exempt, proof of exempt status.

4.2 Personal information requested above is required to enable CCME to evaluate the proposal. All individuals noted in the proposal should be advised of and approve the release of personal information for the purpose of the proposal and the bidder is responsible for obtaining such approval.

4.3 The Contractor shall not, without written consent of CCME, subcontract any obligation of the Contractor.

5.0 CONDITIONS

5.1 CCME reserves the right in its sole discretion to consider or reject any and all proposals. CCME reserves the further right to extend the deadline for proposals and to add, delete and/or change the terms of this Request for Proposals (RFP) and issue corrections and amendments to it. CCME has made every effort to ensure the completeness and accuracy of the information contained in this RFP. CCME shall not be liable for any errors or omissions or responsible for any bidder interpretations or conclusions regarding the information contained in this RFP. Contractors who submit proposals will not acquire any legal or equitable rights or privileges whatsoever until a contract is signed with CCME. CCME will not pay any compensation for the preparation of the proposal and all proposals become the property of CCME.

5.2 The successful bidder is required to agree to a professional services contract with CCME. A sample CCME professional services contract is posted with this RFP. Bidders must identify in their proposals any changes requested to CCME's sample professional services contract and CCME reserves the right in its sole discretion to consider, accept, reject or amend such requested changes. CCME further reserves the right to revoke any offer to enter into a professional services contract. As part of a commitment to environmentally-sound business practice, it is CCME's practice to prepare, sign and transmit contracts electronically.

5.3 Proposal Deadline

The Contract Authority must receive proposals no later than June 9, 2023 noon Central Daylight Time; proposals received after the deadline will not be considered. The time stamp on CCME's email server shall be deemed to be conclusive evidence of time of receipt.

5.4 Method of Submission

Bidders must submit proposals by email to the Contract Authority in an unsecured electronic format, file size to be no larger than 5.0 MB, compatible with MS Word or Adobe Acrobat.

5.5 Ineligible Bidders

The following organizations and individuals, and organizations proposing such individuals as part of a project team, are ineligible to bid on this project:

- 5.5.1 Federal, provincial and territorial governments and all their departments and ministries and Crown corporations, boards, commissions and agencies and any officials and employees of them.
- 5.5.2 Members of the House of Commons and provincial and territorial legislative assemblies.
- 5.5.3 Persons providing administrative and related services to the CCME group responsible for the project.
- 5.5.4 Members and participants of CCME committees and groups, and for a period of six months after such membership ends.
- 5.5.5 Any company that is ineligible to bid on federal, provincial or territorial government contracts.

6.0 CONTACTS

Prospective bidders should direct questions to the Contract Authority.

6.1 Contract Authority

Olivier Berreville
Canadian Council of Ministers of the Environment
123 Main Street, Suite 360
Winnipeg, MB R3C 1A3
Tel: (204) 451-6571
Email: Oberreville@ccme.ca

6.2 Project Authority

Allison Dunn
 Environment and Climate Change Canada
 351 Boulevard Saint-Joseph
 Tel: (819) 307-1920
 Email: Allison.Dunn@ec.gc.ca

7.0 PROPOSAL EVALUATION

All assessments and weighting of criteria is at the sole discretion of CCME. The Project Team will evaluate proposals based on the following criteria:

Technical and Management Proposal Evaluation Criteria

TECHNICAL PROPOSAL	Score
Demonstrated understanding of the project scope and objectives	10
Technical approach and methodology to meet project objectives	30
a) Knowledge and understanding of narcotic and phototoxic target lipid models	
b) Knowledge and understanding of TUV model, including input parameters and sources of information for input parameters	
c) Knowledge and understanding of programming language, including Fortran and R	
d) Experience in writing R code	
Work plan feasibility and organization	10
Recognition of possible problems, proposed solutions and additional innovative suggestions	10
MANAGEMENT PROPOSAL	
Experience and qualification of Program/Project Manager	10
Experience and qualifications of project team members, and alternate team members in case of unforeseen availability:	10
(a) qualifications of team members	
(b) depth and breadth of the team's experience	
(c) depth and breadth of individual team members experience in similar assignments	
Experience of organization in similar assignments	10
Ability to communicate effectively and to provide leadership/ coordination/ management under multi-partnership team setting	10

Value for money	10
COMPLETENESS OF PROPOSAL	
All information described in section 4.1 has been provided	10

8.0 AWARD OF CONTRACT

The Project Team will determine award of the contract by June 16, 2023. The lowest or any bid will not necessarily be accepted.

Upon award, the work must proceed on a timely basis as outlined in the table of deliverables. The successful proponent must not commence work until a contract is in place.

Contractors can view the status of this project on the CCME website, www.ccme.ca, on the What's New page.