



Environment
Canada

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Assets, Contracting and Environmental Management
Corporate Services Branch
351 Saint-Joseph Boulevard
Gatineau, Quebec
J8Z 1T3

November 8, 2013

Solicitation number K2A20-13-0001

PROJECT TITLE: Evaluation of Alternative Approaches for the Calculation of the CESI Air Quality Indicators and Analyses of Ozone Trends

Dear Madam/Sir:

Environment Canada has a requirement for the services described in the attached "Terms of Reference". We are, as a result, soliciting proposals to perform this work.

If you are interested in providing these services, you must submit **three (3) copies of your technical proposal, two (2) copies of your completed signed Offer of Service, and two (2) copies of the former public servant certification** no later than **15:00 (local time) on December 3, 2013** to the following office:

**Environment Canada (BIDS)
Mailroom
171 Jean-Proulx
Gatineau, Quebec
J8Z 1W5**

in accordance with the following procedures:

1. Identify the solicitation number **K2A20-13-0001** on the outside of all proposal/courier envelopes.
2. Include the following in your proposal, in sufficient detail for evaluation purposes:
 - (a) a brief statement indicating your understanding of the work;
 - (b) a summary of your related experience;

- (c) a listing of staff (professional, technical, administrative, sub-contractors) who will be assigned to the work, and their respective personal résumés;
 - (d) an explanation of the intended approach and/or methodology; and
 - (e) contingency plans to be implemented in the event assigned staff become unavailable during the period of the contract.
3. Environment Canada requests that bidders provide their bid in separately bound sections as follows:

SECTION I: SUBMIT THREE (3) HARD COPIES OF YOUR TECHNICAL PROPOSAL;
SECTION II: SUBMIT TWO (2) SIGNED HARD COPIES OF THE OFFER OF SERVICE (WHICH REPRESENTS THE FINANCIAL BID).
SECTION III: SUBMIT TWO (2) SIGNED HARD COPIES OF THE FORMER PUBLIC SERVANT CERTIFICATION.

Prices must appear in the Offer of Service (Financial Bid) only. No prices must be indicated in any other section of the bid. Offer of Service must be signed.

Bids must be submitted only to Environment Canada's Mailroom by the date, time and place indicated on page 1 of the bid solicitation.

Due to the nature of the bid solicitation, bids transmitted to Environment Canada by facsimile or e-mail will not be accepted.

All questions concerning this project shall be submitted in writing by e-mail: david.anderson@ec.gc.ca

Yours sincerely,

David Anderson
Procurement and Contracting Officer
Materiel and Contract Management Branch

Attachments:

Offer of Service
Former Public Servant Certification
Mandatory Proposal Instructions
Terms of Reference
Evaluation Grid

MANDATORY PROPOSAL INSTRUCTIONS

- 1. Receipt**

The specified office will receive the sealed proposals (including the Offer of Service) or revisions up until the time and date specified in the letter of invitation.

Environment Canada shall no longer accept the Offer of Service/technical portion of the bidders' proposals by facsimile or by electronic mail.
- 2. Unacceptable Proposals**

Proposals received after the closing date and time will not be considered **and will be returned unopened.**

Proposals **NOT** submitted with duly completed Offer of Service forms in the format specified by the Department will not be accepted.

Incomplete proposals will be considered non-responsive and rejected.

Any Offer of Service that exceeds the stated ceiling or maximum price, if any, shall be considered non-responsive and rejected.

Any Offer of Service not signed in accordance with the letter of invitation shall be considered non-responsive and rejected.
- 3. Acceptance**

The Department will not necessarily accept the lowest or any of the proposals submitted.
- 4. Completion**

The Offer of Service form must be completed and submitted in the format presented by the Department.

Proposals must be submitted in accordance with these instructions and those contained in the letter of invitation.

It is the proposer's responsibility to ensure his/her complete understanding of the requirements and instructions specified by the Department. Enquiries concerning this solicitation must be submitted in writing to the contracting authority (David Anderson) no later than five (5) working days prior to the bid closing date specified herein to allow sufficient time to provide a response.
- 5. Reference**

The Department of Environment reserves the right, before awarding the Contract, to require the Contractor to submit such evidence of qualifications as it may deem necessary, and will consider evidence concerning the financial, technical and other qualifications and abilities of the contractor.



OFFER OF SERVICE

1. **Offer submitted by:** (Print or type complete business or corporate name, address, telephone number, fax number)

Tel. No. _____ Fax. No. _____

E-Mail _____

2. I (We), the undersigned, hereby offer to Her Majesty the Queen in Right of Canada, as represented by the Minister of Environment, to furnish all necessary expertise, supervision, materials, equipment and other things necessary to complete, to the entire satisfaction of the Minister or his/her authorized representative, the work as described in the Solicitation package according to the terms and conditions of the Department's service contract for the following prices:



2.1 Professional Services:

The following is a breakdown of the Professional Services (show fee structure all-inclusive of profit and overhead).

<u>Category of Personnel</u>	<u>Per Diem Rates</u>	<u>Number of Days Assigned</u>	<u>Total</u>
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2.2 Administrative Expenses:

(Courier, long distance calls, reproduction, etc.).

\$ _____

2.3 Travel Expenses:

Reimbursable at cost in accordance with the attached Travel Directive, to a financial limitation of

\$ _____

My/Our estimate for travel expenses is based upon the following anticipated travel requirements:

**2.4 TOTAL PROPOSAL PRICE
(Canadian Currency)**

\$ _____
(Total of 2.1 + 2.2 + 2.3 above)

+ G.S.T. \$ _____

TOTAL: \$ _____



- 3. I (We) agree that the Offer of Service will remain firm for a period of one hundred and twenty (120) calendar days after the tender closing date.
- 4. Payment for professional services and associated costs will be effected upon completion of each phase, submission of invoices detailing the work completed to date and upon confirmation by the departmental representative of the services rendered/deliverables received.

Claims for travel and accommodation expenses will be reimbursed at cost, in accordance with the Travel Directive, after they have been submitted with the aforementioned invoices and supported by receipts, vouchers, or other appropriate documents.

- 5. I (We) agree to submit herewith the following:
 - (a) a PROPOSAL to undertake the work, indicating an understanding of the objectives and responsibilities, a methodology and a time schedule as it relates to the requirements;
 - (b) a CORPORATE RESUME indicating relevant experience, the proposed personnel for the work team including their curriculum vitae;
 - (c) a list, if applicable, of SUBCONTRACTOR(S) including full names and addresses, portion(s) of work to be subcontracted and relevant firm experience;
 - (d) a duly completed OFFER OF SERVICE, **in two copies (2)**.
 - (e) a duly completed former public servant certification, **in two copies (2)**.
- 6. It is a condition that during the term of the contract all persons engaged in the course of carrying out this contract shall conduct themselves in compliance with the principles of the Conflict of Interest and Post-Employment Code for Public Office Holders. Should an interest be acquired or seem to cause a departure from the principles, the contractor shall declare it immediately to the departmental representative.

OFFERS WHICH DO NOT CONTAIN THE ABOVE-MENTIONED DOCUMENTATION OR DEVIATE FROM THE PRESCRIBED COSTING FORMAT SHALL BE CONSIDERED INCOMPLETE AND NON-RESPONSIVE AND SHALL BE REJECTED.

Dated this day of , 2013, at in the province of

by: (Signing Officer) Print & Sign

Title

Former Public Servant Certification – Competitive Requirement

Contracts with former public servants (FPS) in receipt of a pension or of a lump sum payment must bear the closest public scrutiny, and reflect fairness in the spending of public funds. In order to comply with Treasury Board policies and directives on contracts with FPS, bidders must provide the information required below.

Definitions

For the purposes of this clause, "former public servant" is any former member of a department as defined in the [Financial Administration Act](#), R.S., 1985, c. F-11, a former member of the Canadian Armed Forces or a former member of the Royal Canadian Mounted Police. A former public servant may be:

- a. an individual;
- b. an individual who has incorporated;
- c. a partnership made of former public servants; or
- d. a sole proprietorship or entity where the affected individual has a controlling or major interest in the entity.

"lump sum payment period" means the period measured in weeks of salary, for which payment has been made to facilitate the transition to retirement or to other employment as a result of the implementation of various programs to reduce the size of the Public Service. The lump sum payment period does not include the period of severance pay, which is measured in a like manner.

"pension" means, a pension or annual allowance paid under the [Public Service Superannuation Act](#) (PSSA), R.S., 1985, c.P-36, and any increases paid pursuant to the [Supplementary Retirement Benefits Act](#), R.S., 1985, c.S-24 as it affects the PSSA. It does not include pensions payable pursuant to the [Canadian Forces Superannuation Act](#), R.S., 1985, c.C-17, the [Defence Services Pension Continuation Act](#), 1970, c.D-3, the [Royal Canadian Mounted Police Pension Continuation Act](#), 1970, c.R-10, and the [Royal Canadian Mounted Police Superannuation Act](#), R.S., 1985, c.R-11, the [Members of Parliament Retiring Allowances Act](#), R.S., 1985, c.M-5, and that portion of pension payable to the [Canada Pension Plan Act](#), R.S., 1985, c.C-8.

Former Public Servant in Receipt of a Pension

As per the above definitions, is the Bidder a FPS in receipt of a pension? **Yes () No ()**

If so, the Bidder must provide the following information, for all FPS in receipt of a pension, as applicable:

- a. name of former public servant;
- b. date of termination of employment or retirement from the Public Service.

By providing this information, Bidders agree that the successful Bidder's status, with respect to being a former public servant in receipt of a pension, will be reported on departmental websites as part of the published proactive disclosure reports in accordance with [Contracting Policy Notice: 2012-2](#) and the [Guidelines on the Proactive Disclosure of Contracts](#).

Work Force Reduction Program

Is the Bidder a FPS who received a lump sum payment pursuant to the terms of a work force reduction program? **Yes** () **No** ()

If so, the Bidder must provide the following information:

- a. name of former public servant;
- b. conditions of the lump sum payment incentive;
- c. date of termination of employment;
- d. amount of lump sum payment;
- e. rate of pay on which lump sum payment is based;
- f. period of lump sum payment including start date, end date and number of weeks;
- g. number and amount (professional fees) of other contracts subject to the restrictions of a work force reduction program.

For all contracts awarded during the lump sum payment period, the total amount of fees that may be paid to a FPS who received a lump sum payment is \$5,000, including the Goods and Services Tax or Harmonized Sales Tax.

Certification

By submitting a bid, the Bidder certifies that the information submitted by the Bidder in response to the above requirements is accurate and complete.

Signed

Date

Terms of Reference

Solicitation: K2A20-13-0001

Evaluation of Alternative Approaches for the Calculation of the CESI Air Quality Indicators and Analyses of Ozone Trends

1. Title

Evaluation of Alternative Approaches for the Calculation of the CESI Air Quality Indicators and Analyses of Ozone Trends.

2. Background

The Canadian Environmental Sustainability Indicators (CESI¹) provides data and information to Canadians on the state of the environment and describes Canada's progress on key environmental sustainability issues such as air quality. The air quality indicators focus on reporting the ambient concentration of fine particles (PM_{2.5}), ozone, sulphur dioxide (SO₂), nitrogen dioxide (NO₂) and volatile organic compounds (VOC).

The air quality indicators are reported nationally and regionally for six regions consisting of the Atlantic provinces, Southern Québec, Southern Ontario, the Prairies and Northern Ontario, and British Columbia. Environment Canada is considering the development of regional air quality indicators that are based on the six regional airsheds (Figure 1) of the new Air Quality Management System (AQMS²), which is being implemented by the federal, provincial, and territorial governments to further protect the environment and the health of Canadians. Environment Canada wishes to evaluate the differences in regional indicator values and trends using the CESI air regions and the airsheds.

¹ <http://www.ec.gc.ca/indicateurs-indicators/>

² http://www.ccme.ca/ourwork/air.html?category_id=146

Figure 1: The airshed regions under the AQMS



Currently, the national CESI air quality indicator value for a given air pollutant statistic (e.g. an annual average concentration) in a given year is the average of the value of the statistic over all the monitoring stations considered in the year (the *station-averaging approach*). Similarly, the regional indicator value is calculated using data from all of the monitoring stations in a given region. The national and regional indicator values can also be calculated through an alternate approach, called the city-averaging approach. Under this approach, cities with two or more monitoring stations are first assigned a single indicator value, being the average of the value of the statistic over all monitoring stations in the city. The national CESI air quality indicator value for a given air pollutant statistic is then obtained by averaging over the city indicator values and the values of the statistic from the remaining individual stations which were not part of a city indicator values. Environment Canada wishes to explore the differences in indicator values and their trends between the station-averaging and the city-averaging approaches.

Ground-level ozone (ozone) is formed by chemical reactions between primarily oxides of nitrogen and VOC in the presence of sunlight, and can be influenced by many factors including weather conditions and origins of air masses as evaluated through back-trajectory analyses³. In some areas of Canada, the average ozone concentrations³ are affected by transboundary air pollution from the United States. A number of reports have also shown that trends in ozone concentrations are not uniform across the country. For example, in some locations peak ozone concentrations are decreasing while the average ozone concentrations are increasing. In Ontario, summer average ozone concentrations have decreased during the past years, while the winter average ozone concentrations have increased.⁴ Ozone trends also differ between urban and rural locations, and for locations downwind of large urban centres. Environment Canada wishes to identify some of the possible factors influencing the different trends in ozone across the country.

3. Objectives

The main objectives of this contract are for the Contractor to:

- 1) Objective 1: Develop regional air quality indicators using the current CESI air regions and the airsheds of the new AQMS and evaluate the differences, the benefits, and the issues of using them.
- 2) Objective 2: Develop national and regional air quality indicators and trends using the station-averaging and the city-averaging approaches and evaluate the advantages and disadvantages of each considering the intent and the goals of the CESI program.
- 3) Objective 3: Perform ozone trend analyses and other in-depth analyses to identify some of the factors that influence the ozone concentrations and trends across the country.

³ See for example, Mignacca, Yap, Fraser and Fudge in *Warm Season Ozone Concentration Distribution within the Urban Boundary Layer of Toronto, Ontario According to Air Flow Direction*, Canadian Meteorological and Oceanographic Bulletin, Vol. 22, No. 6, December 1994.

⁴ http://www.ene.gov.on.ca/stdprodconsume/groups/lr/@ene/@resources/documents/resource/stdprod_095558.pdf

4. Data Source and Methodologies

4.1 Data Source

The Canadian ambient air pollutant concentrations that are required to accomplish the tasks for this contract will be provided to the Contractor by Environment Canada. The data will be extracted from the Canada-wide Air Quality Database (managed by Environment Canada), which includes data from the National Air Pollution Surveillance (NAPS) program, from the Canadian Air and Precipitation Monitoring Network (CAPMoN), and provincial, territorial and municipal monitoring stations which are not part of NAPS. The Contractor will be responsible for acquiring the ambient concentration data from monitoring stations in the United States that is required to accomplish the tasks in relation to Objective (iii).

4.2 Calculation Methods and Data Completeness

The fine particulate matter (PM_{2.5}) daily 24-hour average concentrations (daily 24-hr PM_{2.5}) and the ozone daily maximum 8-hour average concentrations (daily max 8-hr O₃) must be calculated by the Contractor using the procedures and data completeness requirements specified in the *Guidance Document on Achievement Determination for the Canadian Ambient Air Quality Standards for Fine Particulate Matter and Ozone*⁵ (GDAD) published by the Canadian Council of Ministers of the Environment, in 2012.

The annual average of the daily 24-hr PM_{2.5}, the annual 98th percentile of the daily 24-hr PM_{2.5} and the annual 4th highest of the daily max 8-hr O₃ must be calculated by the Contractor using the procedures and data completeness requirements specified in the GDAD.

The annual average and quarterly average concentrations of nitric oxide (NO) and nitrogen dioxide (NO₂) must be calculated by the Contractor from the respective 1-hour average concentrations. The annual average and quarterly average concentrations of volatile organic compounds (VOC) will be calculated by the Contractor from the 24-hour average concentrations.

The data completeness requirements for all annual averages will be identical to those applicable to the annual average of the daily 24-hr PM_{2.5} as specified in the GDAD.

All quarterly statistics required of the Contractor under Objective (3) will be for the following quarters:

Winter: January 1 to March 31
Spring: April 1 to June 30
Summer: July 1 to September 30
Fall: October 1 to December 31

A given quarterly statistic will be considered valid if the data completeness for the quarter is at least 75%. For example, the winter average NO₂ concentration at a station is considered valid if there are at least 75% of all 1-hour concentrations in the quarter. For the calculation of trends, and the inclusion of a station in the national, regional and city indicator values, a station must be

⁵ http://www.ccme.ca/assets/pdf/pn_1483_gdad_eng.pdf

included by the Contractor if the value of the statistic being considered is available in at least 75% of the years over the trend period, corresponding to 11 years for a 15-year trend period, and for 10 years for a 13-year trend period. This criteria also applies for the trends by calendar quarters.

4.3 Trend Method

The temporal trends and the statistical significance of the trend at the 95% confidence level must be evaluated using the non-parametric Sen’s approach as described in *Estimates of the regression coefficient based on Kendall’s tau*”, by Pranab Kumar Sen, in *Journal of the American Statistical Association*, 63, pages 1379-1389, December, 1968.

5. Scope of Work for Objectives 1 and 2

For Objectives 1 and 2, the Contractor must undertake the necessary calculations and analyses, and provide a single combined report to summarise the work undertaken and one Power Point presentation to summarise the content of the report as described in Tables 2 and 3 below.

5.1 Statistics and Trend Periods

For Objectives 1 and 2, the Contractor must calculate the statistics described in Table 1 for the 13-year period from 2000 to 2012 for PM_{2.5}, and for the 15-year period from 1998 to 2012 for ozone. The statistics in Table 1 must be compiled by the Contractor for all monitoring stations that meet the requirements specified in Section 4.

Table 1: Annual statistics to be calculated for Objectives 1 and 2.

Pollutant	Statistic
PM _{2.5}	The annual average of the daily 24-hour average PM _{2.5} concentrations (daily 24-hr PM _{2.5}).
PM _{2.5}	The annual 98 th percentile of the daily 24-hr PM _{2.5}
Ozone	The 1-year average of the daily maximum 8-hour average concentrations (daily max 8-hr O ₃)
Ozone	The annual 4 th highest of daily max 8-hr O ₃

5.2 Tasks for Objective 1

The purpose of Objective 1 is to develop regional air quality indicators for PM_{2.5} and ozone using the current CESI air regions and the airsheds of the new AQMS, and to evaluate the differences, the benefits, and the issues of using them. The tasks the Contractor must complete for Objective 1 for both PM_{2.5} and ozone are outlined in Table 2. Environment Canada will provide the Contractor with a list of monitoring stations for the CESI air regions and for the AQMS airsheds.

Table 2: Tasks to be completed by Contractor for Objective 1

Task	Task Description
1.1	<p>Calculate the annual indicator values for the CESI air regions and for the airsheds for each year in the trend periods and for each statistic in Table 1 using the station-averaging approach,</p> <p>For the purpose of the work under Objective 1, the East Central airshed is to be separated into the <i>East Central – Ontario airshed</i> and the <i>East-Central - Quebec airshed</i>.</p>
1.2	<p>Show charts of the regional indicator values and their trend (<i>including the statistical significance</i>) for the CESI air regions and the airsheds (with the East Central airshed separated into the East Central – Ontario airshed and the East-Central - Quebec airshed).</p>
1.3	<p>Indicate on maps of Canada the direction (increasing or decreasing) and magnitude of the trend on a station basis for all considered stations. For the preparation of these maps, the Contractor should consider the format used in Figure 19 in the report <i>Fine Particles and Ozone in Canada, A Canada-wide Standards Perspective – 2003 National Summary</i> available at: http://www.ccme.ca/assets/pdf/2003_pm_oz_ntnlsmryrpt_e.pdf</p> <p>For these maps, the Contractor must identify the monitoring stations according to the population of the community in which they are located as follows:</p> <ul style="list-style-type: none"> • large urban (LU) stations, located in cities with population greater or equal to 500,000 • urban stations (U), located in cities with population between 100,000 and less than 500,000 • small urban (SU), located in cities with population less than 100,000 • non-urban (NU), these are non-urban stations • CAPMoN, for the CAPMoN stations
1.4	<p>Compare and discuss the trends for the indicator values between the CESI regions and the airsheds, including a discussion on the spatial representativeness of the regional indicator values.</p>
1.5	<p>Tabulate and present the number of monitoring stations used in the calculation of the regional indicators for the CESI air regions and for the airsheds.</p>

Task	Task Description
1.6	Prepare a report which must summarise the work undertaken to complete Objective 1, including describing the tasks and related analyses conducted and methodologies used, presenting the results of the analyses and comparisons, and a synthesis/discussion of the results obtained and conclusions. Appendices can be used to provide more detailed information on the analyses performed, the methodologies used, and the results obtained.
1.7	Prepare a presentation in Microsoft PowerPoint to summarise the content of the report.

5.3 Tasks for Objective 2

The purpose of Objective 2 is to develop national and regional air quality indicators and trends for PM_{2.5} and ozone using the station-averaging and the city-averaging approaches and evaluate the advantages and disadvantages of each considering the intent and the goals of the CESI program. The tasks to be completed by the Contractor for Objective 2 are outlined in Table 3. Annual regional indicator values must only be compiled by the Contractor for the CESI air regions.

For the purpose of Objective 2, “city ” means communities with a population of 5000 and more as defined by Statistic Canada’s census subdivisions which are available at: <http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/hlt-fst/pd-pl/Tables-Tableaux.cfm?LANG=Eng&T=300>. The Contractor and the Scientific Authority will agree on which cities to use for the calculation of the city indicators before beginning the work.

Table 3: Tasks to be completed by the Contractor for Objective 2

Task	Description of Task
2.1	Calculate the annual indicator values for the CESI air regions for each year of the trend periods and for each statistic provided in Table 1 using both the station-averaging and the city-indicator averaging approaches.
2.2	Show charts of the national and regional indicator values and their trends for each of the two averaging approaches.
2.3	For the national indicator, calculate, show and discuss how much each province and each city with two or more monitoring stations contributes (in absolute value and percentage) to the national indicator values for each year of the trend periods, under each of the two averaging approaches.
2.4	For the regional indicators, calculate, show and discuss how much each city with two or more monitoring stations contributes (in absolute value and percentage) to the regional indicator values for each year of the trend periods, under each of the two averaging approaches.

Task	Description of Task
2.5	Compare and discuss the indicator values and trends between the station-averaging approach and the city-averaging approach.
2.6	Discuss the advantages and disadvantages of the two approaches from a purely statistical context, a population exposure context, and as indicators to gauge the effectiveness of implemented emission reduction measures.
2.7	Prepare a report which must summarise the work undertaken to complete Objective 2, including describing the tasks and related analyses conducted and methodologies used, present the results of the analyses, and a synthesis/discussion of the results obtained and conclusions. Appendices may be used to provide more detailed information on the analyses performed, the methodologies used, and the results obtained.
2.8	Prepare a presentation in Microsoft PowerPoint to summarise the content of the report.

6. Scope of Work for Objective 3

The purpose of Objective 3 is to perform ozone trend analyses and other in-depth analyses to assist identify some of the factors influencing the ozone concentrations and trends. The tasks to be completed for Objective 3 are outlined in Table 4. The Contractor will identify representative urban and rural monitoring stations in the United States (U.S.) located within 500 km of the border and discuss with the Scientific Authority their suitability for use in the analyses before beginning the work. Unless otherwise mentioned, only stations that satisfy the requirements specified in Section 4 will be used for Objective 3.

Table 4: Tasks to be completed by the Contractor for Objective 3

Task	Task Description
3.1	<p>Calculate the following annual statistics and their trends (including the statistical significance) for the 15-year period from 1998 to 2012 for each monitoring station in the Canada-wide Air Quality Database and for selected monitoring stations in the U.S.</p> <ul style="list-style-type: none"> • annual highest 1-hour O₃, • annual highest daily max 8-hr O₃, • annual 4th highest daily max 8-hr O₃, • annual average daily max 8-hr O₃, • annual average 1-hour nitric oxide (NO), • annual average 1-hour NO₂, • annual average 24-hour VOC. <p>Show on maps the direction (increasing or decreasing) and the magnitude of the trends for all of the considered stations. For the preparation of these maps, the</p>

Task	Task Description
	<p>service provider will consider the format used in Figure 19 in the report <i>Fine Particles and Ozone in Canada, A Canada-wide Standards Perspective – 2003 National Summary</i> available at: http://www.ccme.ca/assets/pdf/2003_pm_oz_ntnlsmryrpt_e.pdf</p> <p>Provide tabulated trend data (i.e. rate of change and its statistical significance and the % change over the trend period) for each station.</p> <p>For these maps, the Contractor must identify the monitoring stations according to the population of the community in which they are located:</p> <ul style="list-style-type: none"> • large urban (LU) stations, located in cities with population greater or equal to 500,000 • urban stations (U), located in cities with population between 100,000 and less than 500,000 • small urban (SU), located in cities with population less than 100,000 • non-urban (NU), these are non-urban stations • CAPMoN, for the CAPMoN stations
3.2	<p>Calculate quarterly statistics and their trends for the 15-year period from 1998 to 2012 for each monitoring station in the Canada-wide Air Quality Database and for selected monitoring stations in the U.S. The statistics to calculate in each quarter are:</p> <ul style="list-style-type: none"> • the average 1-hour O₃, • the average daily max 8-hr O₃, • the average 1-hour NO, • the average 1-hour NO₂, • the average 24-hour VOC. <p>Show on maps the direction (increasing or decreasing) and magnitude of the trends by quarter for all considered stations as in Task 3.1. For these maps, identify the ozone monitoring stations according to the population of the community in which they are located as identified in Task 3.1.</p> <p>Calculate the annual composite quarterly average and its trend by province for the above statistics, and discuss how they compare to the data from individual stations.</p> <p>Show individual charts of the quarterly time series and their trends for representative key stations in Canada and the U.S. for each quarter. Representative stations would include, for example, a comparison of ozone concentrations in downtown areas with those in residential areas a comparison of concentrations between large urban areas and locations downwind of the large urban area (e.g., Toronto vs Peterborough); a comparison of concentrations between large urban areas and rural areas; and stations close to the Canada-U.S. border; and any other other analyses that would assist in identifying the factors that influence the changes in the ozone concentrations.</p>
3.3	<p>Compute 48-hour back-trajectories using a peer-reviewed model for each year in the period from 1998 to 2012 for Simcoe, Toronto, Dorset, Halifax, Winnipeg and</p>

Task	Task Description
	<p>Edmonton; and perform clustering analyses using a peer-reviewed approach to cluster the trajectories into not more than eight clusters considering both direction of movement and speed.</p> <p>The Contractor must discuss with the Scientific Authority the trajectory model to use; the clustering technique; the heights of the trajectories; and any other relevant information that will be used to complete this task.</p> <p>The Contractor must calculate and show, using tables and charts, the following statistics for each of the six locations:</p> <ol style="list-style-type: none"> 1. The quarterly average and standard deviation for 1-hour ozone and daily max 8-hr O₃ associated with each cluster for each year in the trend period. 2. The number of back-trajectories per cluster per quarter for each year in the trend period. 3. The trend in the average 1-hour ozone and the average daily max 8-hr O₃ by cluster and season. <p>Discuss how the trends by cluster and quarter compare with the overall trends.</p> <p>Discuss the results obtained and identify the possible factors which may have influenced any differences in concentrations and trends between clusters and between quarters. Discuss, in particular, how the annual variability in the number of trajectories within a given cluster might influenced the annual variability in ozone concentrations.</p> <p>Discuss the emissions of NO_x and VOC along each cluster and how their changes over the years might have influenced the ozone trends. Discuss the typical weather conditions associated with each cluster and their possible influence in favouring or hindering ozone formation.</p>
3.4	<p>Compile and show in charts the trends in emissions of NO_x for on-road vehicles at the provincial level, and as feasible, scale provincial emissions to urban centers with population of ≥ 500,000 for years within the trend period. Discuss how these relate to the trends of ambient concentrations of NO, NO₂ and ozone.</p>
3.5	<p>Compile and show in charts the trends in emissions of total anthropogenic VOC at the provincial level, and as feasible, scale provincial emissions to urban centers with population of ≥ 500,000 for years within the trend period. Discuss how these relate to the trends of ambient concentrations of VOC and ozone measured.</p>
3.6	<p>Previous work indicated that emissions from states located within the U.S. Pollutant Emission Management Area (PEMA) region contribute to ozone in southern Ontario and Southern Quebec. The PEMA states are shown in Figure 11 of the Canada-U.S. 2012 Air Quality Agreement progress report available at: http://www.ec.gc.ca/Publications/default.asp?lang=En&xml=D9D6380B-4834-41C4-9D36-B6E3348F1A39.</p> <p>Compile and show using charts the anthropogenic emissions of NO_x and VOC for the PEMA states and discuss how the changes in emissions might have influenced ozone</p>

Task	Task Description
	concentrations at downwind locations in Ontario and Quebec.
3.7	Conduct analyses to identify the monitoring stations located downwind of major urban areas (i.e. population \geq 500,000) or downwind of industrial complexes, and evaluate and discuss how the trends in ozone concentrations at these downwind locations may have been affected by the trend in upwind emissions of NO _x and VOC.
3.8	<p>Prepare a report which will address the objectives of the work, describes the tasks and related analyses conducted and methodologies used, present the results of the analyses, and a synthesis/discussion of the results and conclusions. Appendices can be used to provide more detailed information on the analyses performed, the methodologies used, and the results obtained.</p> <p>The report is to include discussions, considering the known chemistry of ozone, its precursors and transport, on the relationship between trends in ozone concentrations, NO_x concentrations, VOC concentrations, and freshly emitted and aged NO_x emissions, with the aim of elucidating any opposing trends, any difference in seasonal trends, difference in spatial trends, and differences in trends between traffic stations, urban stations and rural stations.</p> <p>Discuss how emission of NO in urban areas may suppress ozone already present in the air, while enhancing ozone formation downwind. Discuss how reductions in NO emissions in urban areas may have influenced ozone in both the urban area and in downwind areas. Discuss how emission trends of NO_x and VOC in the considered U.S. states may have influenced ozone in downwind areas in Canada. Discuss any influence of "global background" ozone and provide information to support any claim made.</p> <p>Perform and discuss the results of any other analyses conducted as needed to support the discussions.</p>
3.9	Prepare a presentation in Microsoft Power Point to summarise the content of the report.

7. Deliverables and timelines

The list of Deliverables to be provided by the Contractor to the Scientific Authority and the associated timelines are provided below. The deliverables produced by the Contractor will be reviewed by the Scientific Authority and other experts at Environment Canada.

Deliverable 1

A first draft report for Objectives 1 and 2 in Microsoft Word format no later than 10 weeks after contract award.

The Scientific Authority will provide timely written and verbal comments to the Contractor on these draft reports. The Scientific Authority will schedule conference calls with the Contractor to discuss the comments. The Contractor must indicate how the comments will be addressed and modify the draft report in consideration of the comments and discussions.

Deliverable 2

A first draft report for Objective 3 in Microsoft Word format no later than 3 weeks after acceptance of Deliverable 1.

The Scientific Authority will provide timely written and verbal comments to the Contractor on the draft report. The Scientific Authority will schedule conferences calls with the Contractor to discuss the comments. The Contractor will indicate how the comments will be addressed and modify the draft report in consideration of the comments and discussions.

Deliverable 3

A 2nd draft report for Objectives 1 and 2, and for Objective 3, and a first draft of their respective PowerPoint presentations no later than four weeks before the termination date of the contract. The 2nd draft reports for Objectives 1 and 2, and for Objective 3, must incorporate the discussed comments under Deliverables 1 and 2 respectively.

The Scientific Authority will provide timely written and verbal comments to the Contractor on the 2nd draft reports and presentations. The Scientific Authority will schedule conference calls with the Contractor to discuss the comments. The Contractor must indicate how the comments will be addressed and modify the draft reports and draft presentations in consideration of the comments and discussions.

Deliverable 4

Two hard copies of each of the final reports, electronic copies of the final reports (in Microsoft Word format), and electronic copies of each final presentation (in Microsoft Power Point) by the termination date of the contract. The two hard copies of the reports are to contain print on both sides of a page. The final reports for Objectives 1 and 2, and for Objective 3, and the final presentations must incorporate the discussed comments under Deliverables 3.

Deliverable 5

By the termination date of the contract, an electronic copy of:

- a) all raw data used for this contract in Microsoft Excel.
- b) all analysed data used to generate the charts, maps and tables appearing in the final report in a file format accessible with Microsoft Excel.

The detail of the data specified above must be sufficient enough to allow the generation of all charts, maps and tables appearing in the final report.

Deliverable 6

At the discretion of the Contracting Authority, an electronic copy of any other data used or generated under this contract not already provided under deliverable 5. This provision will remain in effect until three years after the termination date of the contract.

8. Budget, Meetings and Travel

Environment Canada has established funding for this project at a maximum amount of \$30,170 (excluding applicable taxes).

There will be no in-person meetings for this contract. All meetings will be by teleconference or video-conferences. No additional funds will be provided for attending the teleconferences and video-conferences. No travel expenses will be paid through this contract.

9. Payment Schedule

The Contractor will be paid as follows:

- i) 20% of the total contract value upon satisfactory completion of Deliverable 1, and reception by the Scientific Authority of a detailed invoice;
- ii) 20% of the total contract value upon satisfactory completion of Deliverable 2, and reception by the Scientific Authority of a detailed invoice;
- iii) 20% of the total contract value upon satisfactory completion of Deliverable 3, and reception by the Scientific Authority of a detailed invoice;
- iv) 40% of the contract value upon satisfactory completion of Deliverables 4 and 5, and reception by the Scientific Authority of a detailed invoice.

10. Contract Schedule

The contract will begin on the date of signature of the contract by both parties and terminate 31 March, 2013.

11. Content of Proposals

The proposals should be double-sided unless strictly necessary. The proposal should contain, as a minimum, a preliminary table of contents for each of the reports for Objectives 1 and 2, and for Objective 3.

BID EVALUATION CRITERIA

Introduction

To be declared responsive (i.e. considered), a bid (i.e. proposal) must:

- (a) Comply with all the requirements of the bid solicitation;
- (b) Meet all mandatory criteria; and
- (c) Obtain the required minimum points specified for each point rated criteria

The mandatory criteria and the point rated criteria are described below.

Mandatory Criteria

Proposals must meet all mandatory criteria on Table 1 to be considered acceptable.

Point Rated Criteria

The point rated criteria are displayed in Table 2 and Table 3, consisting of elements of qualifications and elements for evaluation of proposal respectively. The total score for the elements in Table 2 is 30 points and the total score for the elements in Table 3 is 65 points. Collectively, these elements are referred to as the “point rated criteria”, and their combined score as the point rated criteria score. The maximum total point rated criteria score is 95 (= 30 + 65).

Bid Consideration and Selection Process

To be considered for selection, a proposal must satisfy the mandatory criteria and must score at least 21 points for Table 2 and at least 45 points for Table 3. If any one of these is not satisfied, the proposal will be eliminated and will not be considered further.

Of the considered proposal, the Contractor selection will be based on the highest combined rating of the *technical evaluation score* and the *pricing score* of the bid. The ratio will be 70% for the technical evaluation score and 30% for the pricing score. The technical evaluation score for each responsive bid is the obtained total point rated criteria score divided by the maximum total point rated criteria score multiplied by 70. The pricing score of a given responsive bid is the lowest responsive bid price divided by the bid price of the given bid and then multiplied by 30. For each responsive bid, the technical evaluation score and the pricing score will then be added to determine its combined rating score.

The responsive bid with the highest combined rating score will be recommended for award of a contract.

The table below illustrates an example with three responsive bids and the selection of the contractor is determined by a 70/30 ratio of technical evaluation score and price, respectively. In this example, the total maximum technical evaluation score is 77 and the lowest evaluated bid price is \$30,000 (30).

Basis of Selection - Highest Combined Rating Technical evaluation criteria (70%) and Price (30%) (example)

	Bidder		
	Bidder 1	Bidder 2	Bidder 3
Point rated criteria score	69	59	63
Bid Evaluated Price	\$35,000.00	\$33,000.00	\$30,000.00
Technical evaluation criteria Score	$69/77 \times 70 = 62.7$	$59/77 \times 70 = 53.6$	$63/77 \times 70 = 57.3$
Pricing Score	$30/35 \times 30 = 25.7$	$30/33 \times 30 = 27.3$	$30/30 \times 30 = 30$
Combined Rating Score	88.4	80.9	87.3
Overall Rating	1st	3rd	2nd

Table 1: Mandatory qualification

	Mandatory Criteria	Met/Not Met
M1	The project manager or the leading team member must demonstrate direct experience in conducting back-trajectory cluster analyses. Direct experience means having run a back-trajectory model and performed a cluster analyses of the back-trajectories. Experience must be clearly demonstrated on the project manager's or leading team member's resume.	

Table 2: Point-rated criteria for qualifications.
(Total score: 30 points)

		Points
R2.1 Qualification of project manager responsible for the work under this contract.	The following experience must be clearly demonstrated on the project manager's resume.	Maximum of 10 points
	<ul style="list-style-type: none"> • Management of 4 or more projects requiring analyses of spatial and temporal averages and trends with ambient and emissions data, and trajectories and cluster analyses. 	10
	<ul style="list-style-type: none"> • Management of 4 or more projects requiring analyses of spatial and temporal averages and trends with ambient and emissions data. 	8
	<ul style="list-style-type: none"> • Management of 1 to 3 technical projects related to ambient air quality and air pollutant emissions and trajectory and cluster analyses 	7
	<ul style="list-style-type: none"> • Management of 1 to 3 technical projects related to ambient air quality and air pollutant emissions. <ul style="list-style-type: none"> • Management of other technical projects. 	6 5
R2.2 Qualifications of team members assigned to conduct the work under the contract	Each team member (excluding the Project Manager) will be assigned one of the scores below. The highest scoring team member's score will be used as the proposal score for criteria 2.2. Team member experience must be clearly demonstrated on team member resumes.	Maximum of 20 points
	<ul style="list-style-type: none"> • Team member has worked on 4 or more projects requiring analyses of spatial and temporal averages and trends with ambient and emissions data, and trajectories and cluster analyses. 	20

	<ul style="list-style-type: none"> Team member has worked on 4 or more projects requiring analyses of spatial and temporal averages and trends with ambient and emissions data. 	15
	<ul style="list-style-type: none"> Team member has worked on 1 to 3 projects requiring analyses of spatial and temporal averages and trends with ambient and emissions data, and trajectories and cluster analyses. 	17
	<ul style="list-style-type: none"> Team member has worked on 1 to 3 projects requiring analyses of spatial and temporal averages and trends with ambient and emissions data. 	14
	<ul style="list-style-type: none"> Team member has worked on technical projects related to ambient air quality and air pollutant emissions. 	10
	<ul style="list-style-type: none"> Team member has worked on other technical projects. 	8

Table 3: Point-rated criteria for evaluation of proposals.
Total Maximum Score: 65 points

		Points
R3.1 Demonstrated understanding of the project and its objectives. Maximum score 40 Points	R3.1 a) Proposal demonstrates an overall understanding of the scope of work and objective.	Maximum of 10 points
	<ul style="list-style-type: none"> Proposal discusses all objectives of the contract and the need for the analyses. 	10
	<ul style="list-style-type: none"> Proposal discusses some of the objectives and need for the analyses. 	7
	<ul style="list-style-type: none"> Proposal does not discuss either the objectives or the need for the analyses at all. 	0
	R3.1 b) Proposal demonstrates an understanding of the averaging by CESA air regions and averaging by airsheds	Maximum of 5 points

	<ul style="list-style-type: none"> • Averaging approach is clearly defined 	5
	<ul style="list-style-type: none"> • Averaging approach is ambiguous 	3
	<ul style="list-style-type: none"> • Averaging approach is not discussed 	0
	<p>R3.1 c) Proposal demonstrates an understanding of the differences and potential effects between the station averaging and city averaging approaches.</p>	Maximum of 10 points
	<ul style="list-style-type: none"> • The differences and effects of each averaging approach are well defined; the steps in the methodology are clearly outlined. 	10
	<ul style="list-style-type: none"> • The differences and effects of each averaging approach are not as clear as they could be; the steps in the methodology are clearly outlined 	8
	<ul style="list-style-type: none"> • The differences and effects of each averaging approach are ambiguous; the steps in the methodology are unclear. 	5
	<ul style="list-style-type: none"> • The differences and effects of each averaging approach are not addressed. 	0
	<p>R3.1 d) Factors influencing ozone levels</p>	Maximum of 10 points
	<ul style="list-style-type: none"> • Proposal clearly discusses all known factors that can influence ozone levels within a rural setting and within an urban center. 	10
	<ul style="list-style-type: none"> • Proposal addresses all but one or two known factors which can influence ozone levels. 	8
	<ul style="list-style-type: none"> • Proposal addresses some of the more common known factors which can influence ozone levels, but misses more than two 	7
	<ul style="list-style-type: none"> • Proposal addresses two or less of the known factors which can influence ozone levels. 	5
	<ul style="list-style-type: none"> • Proposal does not discuss factors that can influence ozone levels. 	0

	<p>R3.1 e) Back-trajectory model and cluster analyses</p> <ul style="list-style-type: none"> • Proposal provides excellent information on the back-trajectory model planned for use, including references on its previous use, and the cluster analyses approach. • Proposal provides adequate information on the back-trajectory model planned for use, including references on its previous use, and the cluster analyses approach. • Proposal provides less than adequate or no information on the back-trajectory model planned for use, including references on its previous use, and the cluster analyses approach. 	<p>Maximum of 10 points</p> <p>10</p> <p>7</p> <p>0</p>
<p>R3.2 Recognition of any potential concerns or obstacles</p>	<ul style="list-style-type: none"> • Proposal addresses potential concerns or obstacles and provides suggested solutions. • Proposal addresses potential concerns or obstacles but does not provide suggested solutions. 	<p>Maximum of 5 points</p> <p>5</p> <p>3</p>
<p>R3.3 Presentation of a preliminary work-plan</p>	<ul style="list-style-type: none"> • The work-plan clearly identifies the timelines and deliverables for all of the requirements in the Terms of Reference. • The proposal is missing information related to the timelines and deliverables for some of the requirements identified in the Terms of Reference. • The proposal is missing information related to the timelines and deliverables for many of the requirements identified in the Terms of Reference. • The proposal is missing information related to the timelines and deliverables for all of the requirements identified in the Terms of Reference. 	<p>Maximum of 5 points</p> <p>5</p> <p>3</p> <p>1</p> <p>0</p>

<p>R3.4 Presentation of a preliminary table of contents for the reports</p>	<ul style="list-style-type: none"> • The flow of sections for the reports is logical and consistent with generally accepted practices for writing of technical reports. • The flow of the sections is partially consistent with generally accepted practices. • The flow of the sections does not follow generally accepted practices. 	<p>Maximum of 10 points</p> <p>10</p> <p>7</p> <p>0</p>
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