

San Joaquin Valleywide Air Pollution STUDY AGENCY

Funding air quality research in Central California

REQUEST FOR PROPOSAL for PM2.5 MASS RECONSTRUCTION, SPECIATION, AND INVESTIGATION

Prepared by the Staff of San Joaquin Valley Unified Air Pollution Control District

Authorized by the Policy Committee of the San Joaquin Valleywide Air Pollution Study Agency

*Funded by the California Regional PM10/PM2.5 Air Quality Study
under the authority of the San Joaquin Valleywide Air Pollution Study Agency*

Submittal Deadline: Proposals must be received at the address below on or before **Monday, August 8**, 2011 - 5:00 PM.

Proposals received after the date and time stated above will not be accepted.

Submissions Must Include: two (2) signed copies of Proposal delivered by mail or messenger to establish official receipt;
one (1) unbound master suitable for black and white reproduction; and
one (1) electronic copy (on CD-ROM) of all submittal documents in PDF format.

Address Jon Klassen, Air Quality Specialist
Submissions to: San Joaquin Valley Unified Air Pollution Control District
1990 East Gettysburg Avenue
Fresno, CA 93726-0244

Mark Envelope: "PROPOSAL: PM2.5 Speciation, Mass Reconstruction, and Investigation"

RFP Issuance Date: July 11, 2011

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**REQUEST FOR PROPOSAL
for
PM2.5 MASS RECONSTRUCTION, SPECIATION, AND INVESTIGATION**

PROJECT ABSTRACT

This project involves assessing the chemical composition of PM2.5 samples through mass reconstruction and speciation in order to improve the understanding of the sources that contribute to unhealthy particulate matter air pollution in the San Joaquin Valley Air Basin. The project's main tasks are the following:

- Evaluate existing PM2.5 mass reconstruction assumptions and develop new assumptions utilizing published literature and informed or verified by filter analysis. Upon authorization by the Study Agency, the updated assumptions will be used in subsequent analysis.
- Assess the practicality and limitations of using PM2.5 Beta Attenuation Mass (BAM) monitor filter tapes for speciation purposes. If authorized by the Study Agency as based on the foregoing assessment, develop a standard operating procedure (SOP) for using BAM filter tapes for routine speciation.
- Install, operate, and maintain a PM2.5 filter-based sampler for three months at the Tranquillity air monitoring site in rural Fresno County. The sampler will collect samples every three days, in accordance with established air monitoring schedules.
- Speciate up to 300 PM2.5 samples including those collected by the San Joaquin Valley Air Pollution Control District (District), those from the Tranquillity site, and BAM filter tapes provided by the District. Speciation analysis may be conducted by standard methods or by cost-effective, innovative approaches.
- Use the new mass reconstruction assumptions and new speciation data to compare and contrast the PM2.5 compositions at the new speciation sites, and at four San Joaquin Valley sites that currently have routine speciation.

Current funding for this project is \$270,500, and the project – including final reporting - should be completed by June 2012. Analysis will be limited to San Joaquin Valley sites and filters; however, the Study Agency may consider amendments to this program of work for additional years or geographic areas of study should supplemental funding be acquired.

1. BACKGROUND

State and federal air quality standards for particulate matter (PM) are consistently exceeded throughout central California, adversely affecting the health and quality of life

of more than 10 million people living in the region. Particulate matter pollution also affects crop yields, causes material damage, and reduces visibility. The federal Clean Air Act requires the State of California and California's air districts to adopt air pollution control measures and achieve emission reductions to attain the national air quality standards for particulate matter smaller than 10 microns in diameter (PM10) and for particulate matter smaller than 2.5 microns (PM2.5). Plans to improve air quality and provide attainment of the standards must have an effective distribution of controls among the various contributing sources, and therefore rely on a sound understanding of the local and regional sources of air pollution. Current understanding is limited on how much various source types contribute to direct PM2.5 emissions and to formation of secondary particulates in the atmosphere.

To improve the understanding of the various source contributions to ambient PM2.5 concentrations, the San Joaquin Valleywide Air Pollution Study Agency (Study Agency) is issuing this Request for Proposal (RFP) as part of the California Regional PM10/PM2.5 Air Quality Study (CRPAQS). CRPAQS is a multi-year program of meteorological and air quality monitoring, emission inventory development, data analysis, and air quality simulation modeling designed to 1) provide an improved understanding of emissions and dynamic atmospheric processes that influence particle formation and distribution and determine the contributing sources of high PM10 and PM2.5 concentrations; 2) develop and demonstrate methods useful to decision makers in formulating and comparing candidate control strategies for attaining the federal and State PM10/PM2.5 standards in central California; and 3) provide reliable means for estimating the impacts of PM10/PM2.5 control measures on visibility, air toxics, and acidic aerosols and on attainment strategies for other regulated pollutants. The CRPAQS domain covers all of central California and most of northern California. The domain includes the San Joaquin Valley, the San Francisco Bay Area, and the Sacramento Valley.

The sponsor of this project, the Study Agency, is a joint powers agency whose purpose is to combine financial contributions from the private and public sectors to fund scientific research on PM and ozone air quality in central California. These studies are collectively known as the Central California Air Quality Studies or CCAQS. The Study Agency's decision-making body is a Governing Board consisting of one supervisor from each of the eight counties in the San Joaquin Valley. The Study Agency manages the finances of CCAQS, and relies on the CCAQS Policy Committee (state, federal, and district air agency staff; and public- and private-sector stakeholders) to provide guidance on the objectives and funding levels of Study Agency projects. The staff of San Joaquin Valley Air Pollution Control District (SJVAPCD) provides financial and legal services to the Study Agency, while the California Air Resources Board (ARB) staff provides coordination for the CCAQS Policy Committee. CCAQS projects are typically carried out by contractors who are coordinated and managed by the staff of the ARB and SJVAPCD.

2. PROJECT PURPOSE

This project is intended to improve the understanding of the chemical composition and the sources of the San Joaquin Valley's ambient particulate matter. This improved understanding will contribute to improved analysis in upcoming attainment plans, allow for refined control strategies, and provide data for future studies focused on the physiological impacts of various components of PM2.5.

This project will evaluate the assumptions for mass reconstruction for PM2.5 so that efforts to identify source origins are as accurate as possible. Incorrect identification of source origins may result in decreased effectiveness particulate matter control strategies, and may waste resources on unneeded controls.

This project will investigate if it is possible to reliably speciate PM2.5 samples collected on the continuous tape of a Beta Attenuation Method (BAM) monitor. Depending on the results of the investigation, the project would then develop a methodology for ongoing implementation. Using real-time BAM monitors to collect PM2.5 speciation samples could expand the number of monitoring sites that can be analyzed, providing a better regional evaluation of variations throughout the CRPAQS domain.

The project will also generate and evaluate PM2.5 samples at urban and rural monitoring sites where samples are not being routinely speciated by the ARB. While there is expected to be a high degree of commonality among source contributions at the region's urban sites, this project will assess how urban sites differ so that control efforts implemented on a regional basis can be evaluated for their benefit throughout the domain and can be adjusted to assure maximum effectiveness. The evaluation of rural sites serves a similar purpose: evaluating how much the rural sites are dominated by urban sources and how much rural sources contribute to observed particulates will improve the understanding of the effectiveness of rural control strategies.

3. PROJECT DESCRIPTION

This project involves a variety of types of work including PM2.5 mass reconstruction, chemical analysis of PM2.5 filters, assessment of a potential new method for collecting PM2.5 samples for chemical speciation, assessing the emission sources contributing to urban and rural PM2.5 samples, and the operation of a PM2.5 monitor.

3.1. Objectives

This project should be completed by end of June 2012, and the objectives are summarized below. As currently funded, this project will be limited to San Joaquin Valley sites; however, the Study Agency may consider amendments to this program of work for additional years or geographic areas of study, should supplemental funding be provided at a later date.

A responding Proposal should include commitment to perform the tasks identified in Section 3.2, and provide:

1. An updated methodology for PM2.5 mass reconstruction, including a set of assumptions and formulae appropriate for urban and rural sites in the San Joaquin Valley.
2. An assessment of, and possibly a standard operating procedure (SOP) for using PM2.5 BAM filter tape media for PM2.5 speciation samples.
3. Installation and three months of operation (e.g., sample preparation and collection, maintenance and repair, removal) of a PM2.5 filter-based speciation sampler at the District's Tranquillity air monitoring station.
4. Analytical results of the speciation of up to 300 PM2.5 samples. If a SOP is established, up to 100 of the total samples to be analyzed may be from PM2.5 BAM filter tapes.
5. Results from the application of the updated mass reconstruction assumptions (Task 1) to the new speciation data (Task 4).
6. A final report that fully documents all of the above, and includes the following:
 - a. A comparison of PM2.5 sample speciation results among urban and rural locations.
 - b. A comparison of newly-generated speciation data with data collected from the existing speciation network sites operated by the Air Resources Board.
 - c. An assessment of the mass capture efficiency of the revised methodology for PM2.5 mass reconstruction.

Once the program of work has been agreed to and initiated, the contractor must seek approval of the Study Agency Project Manager prior to recommending or implementing any changes to the proposed project. While conducting the project, additional data collection by the contractor beyond the specified program of work must remain within the authorized budget.

3.2. Tasks/Scope

3.2.1. Task 1: Mass Reconstruction Assumptions

Technical Background

The current calculation methods for reconstruction of PM2.5 mass needs to be examined for potential revision and technical updates.^{1, 2, 3} Currently, the same generic formula and assumptions are being used for both PM10 and PM2.5 mass reconstruction. This formula has not been revised since the mid 1990s.^{4, 5} Recent scientific journal publications report considerable variation in the overall fine mass

concentration ratios due to variability of subcomponents (organic mass/organic carbon ratio, metals, and ions).^{1, 2, 3, 6} Thus the reconstruction of the overall fine mass concentration ratios varies considerably. The PM10 and PM2.5 variability of the subcomponents have been shown to correlate with multiple factors including the proximity to marine influence, aridity, season, monitoring site location, and biogenic source contributions.⁶⁻¹²

PM10 and PM2.5 mass reflect different contributing source origins and should require specific assumptions appropriate to the particle size range. For example, measured PM10 emission rates from a motor vehicle tunnel (in Milwaukee) ranged from 38.7 to 201 mg km⁻¹ and were composed mainly of organic carbon (OC, 30%), inorganic ions (sulfate, chloride, nitrate, ammonium, 20%), metals (19%), and elemental carbon (EC, 9.3%).⁹ PM10 metal emissions were dominated by crustal elements silicon, iron, calcium, sodium, magnesium, aluminum, and potassium. Elements associated with tailpipe emissions and brake and tire wear, were copper, zinc, antimony, barium, lead, and sulfur. Metals emitted in PM2.5 were lower (11.6% of mass) than crustal metals.⁹ The smaller metals fraction is indicative that the PM2.5 metals are not fully oxidized and therefore have less mass than metals from soils found in PM10. Much of the oxidized metal is in the coarse particle range and not the fine range, thus using PM10 standard mass reconstruction formulas for PM2.5 will overstate the contribution of oxidized metals. This will also reduce proper source identification in Chemical Mass Balance (CMB) and similar evaluation approaches.

Seasonal differences in the PM2.5/PM10 ratio are not reflected in current mass reconstruction methods either. It has been shown that the mean California PM2.5/PM10 ratio (1980-2007 data collected from multiple sources, calibrated, standardized, and statistically corrected) tended to be greatest during the months of November through January and lowest during the months of May through September.⁶ It was concluded that this seasonal variation is due to higher concentrations of coarse PM (PM10 – PM2.5) during the drier months and from higher concentrations of ammonium nitrate during the cooler months.

Regional, area, or site-specific mass reconstruction assumptions may be required to improve the quality of source identification. Large inter-site variation has been shown to exist, therefore the use of generic fine mass reconstruction ratios may be inappropriate across sites; although when the PM2.5 mass concentrations were regressed against PM10 mass concentration by site and month, the reported correlation was high⁶. The wide variations in climate, soil type, biogenic diversity, and density and variations in major source types throughout the San Joaquin Valley may require area or site specific assumptions to improve mass reconstruction and source identification.

Work Elements

This task requires the contractor to review existing PM2.5 mass reconstruction assumptions and available literature and develop San Joaquin Valley seasonal and site-appropriate PM2.5 mass reconstruction ratios with greater spatial and temporal

resolution than is currently in use. The Proposal must include a workplan for this task and indicate strong knowledge and ability to perform this task. The methodology proposed for improving mass reconstruction must utilize processes, procedures, and/or analyses demonstrated to have acceptable reproducibility, reliability, and precision.

Mass reconstruction components should include all of the following or justify why any of these must be omitted. The Proposal should provide a recommendation and reasons as to whether the following assessments are included or excluded from their Proposal:

1. Carbon: organic carbon, elemental carbon, polycyclic aromatic hydrocarbons, and tracer compounds
2. Ions: sulfate, chloride, ammonium, and nitrates including peroxyacetyl nitrate (PAN), or their components and tracer compounds; these are important with regards to health effects
3. Soil component metals: silicon, aluminum, iron, calcium, magnesium, potassium, sodium, zinc, nickel, copper, and their oxidized states, or any soil components or tracers that may significantly contribute to and identify PM2.5
4. Anthropogenic source metals from tire and brake wear: iron, titanium, copper, barium, molybdenum, zinc, nickel, copper, and zirconium and their oxidized states, or any anthropogenic source components or tracer compounds that may significantly contribute to and/or identify PM2.5
5. PM2.5 biogenic sources: spores and endotoxins correlated to barium, calcium, iron, zinc, potassium, silicon; and coarse and fine sugars (arabinose, fucose, galactose, glucose, mannose, rhamnose, and xylose), levoglucosan, or any biogenic source components or tracer compounds that may significantly contribute to and/or identify PM2.5

At the conclusion of the task, the contractor will provide the Study Agency Project Manager a report documenting the updated mass reconstruction methodology, assumptions, and formulae. Upon approval by the Project Manager, the contractor will use the updated methodology in new speciation estimates in Task 5.

3.2.2. Task 2: Use of BAM Filter Tapes for PM2.5 Speciation

Technical Background

Currently, ARB uses four filter-based PM2.5 monitors in the San Joaquin Valley to generate samples for regular speciation, in order to characterize ambient particulate concentrations for the entire San Joaquin Valley. Recent changes in the Valley's air monitoring network design and changes in instrument selection for particulate monitors have led to a decrease in the number of filters available for traditional speciation methods. The switch to BAM monitors has been the result of a very strong need for real-time PM2.5 data, and the fact that these monitors require far fewer technician trips over the course of a year. The BAM's continuous filter tape has not yet been used to evaluate the components of the PM2.5 mass detected by the real time instrument.

Variations between monitors for the observed PM2.5 concentrations indicate that there are differences between sites that should be further investigated to ensure that the causes of these differences are understood, and that the strategies to reduce PM2.5 are effective for all sites. Additionally, exceptional events are detected as impacting these monitors but the determination of the extent to which the exceptional event dominated the observed mass is difficult to establish without filter evaluation. The differences detected by BAM hourly monitors do provide a potential filter media for evaluation; however, speciation of such samples has not to our knowledge been attempted or evaluated for the usefulness of the data obtainable from such analysis.

The filter tape for a BAM device is spooled into a cassette after the hourly reading has been obtained from the filter target. The collection of filter targets in a cassette without prompt removal for analysis is not ideal for high precision assessment, but the data may be suitable for site characterization and evaluation of many events. The filters are exposed to each other and to potential loss of sample from a variety of physical parameters while in the cassette; however, it may be possible to provide sufficient data from speciation of the mass on selected targets that such data will still be useful.

Identified technical issues:

- Identification of sources affecting a site would not be affected by cross contamination between filter targets; therefore, cross contamination within the cassette does not result in a degradation of the desired data
- Loss of mass may be determined by comparison to the BAM hourly readings to establish whether there has been significant loss. Seasonal influences such as equilibrium losses of nitrate may cause divergence of values to be significant for some circumstances; however, the technique may still be valuable for determination of other contributing sources even during such events.
- Some methods may include the filter media itself in the analysis and the contribution to species provided by the filter media must be subtracted by analysis of blank filter targets. Since there is variation between targets, a degree of uncertainty will remain and should be assessed. This may contribute to the establishment of lower concentration limits that should not be evaluated.
- Evaluation of 24 filter targets which are collected during a day may be an excessive approach, particularly if many of the hours have a low observed value or are very consistent in observed value. The results of this project are expected to identify methodology for selection of the number of targets to analyze to characterize PM2.5 sources of significance for an event or day and what minimum BAM mass reading of concentration should be used as a benchmark for filter target selection for speciation analysis.
- Visual examination of some high concentration BAM targets has revealed targets that do not appear much different than a blank. This may be either to sources which lack pigment or may be due to sample loss in the cassette. This indicates that visual screening of the BAM filter tape is not adequate for sample target selection.

Work Elements

- Evaluate the technical problems identified above and any others associated with using BAM filter tapes for PM2.5 speciation. Develop a preliminary methodology for speciation of PM2.5 BAM filter tapes, addressing and correcting for the identified issues, and incorporating the list of chemical assessments in Task 3. The methodology should consider whether it is necessary to evaluate all 24 samples for a day or only those with BAM readings above a minimum value.
- Test the preliminary methodology by applying it to BAM filter tapes provided by the SJVAPCD. Based on the testing, develop an overall assessment of the potential for BAM filter tapes to generate reliable, accurate speciation data, and include estimations of material loss, an assessment of the potential for cross contamination between samples, and any other technical issues encountered or considered. Provide a report to the Study Agency Project Manager documenting the effort undertaken on this task, and the potential for the use of BAM filter tapes for PM2.5 speciation.
- If authorized by the Study Agency Project Manager based on report prescribed above, prepare a standard operating procedure (SOP) for PM2.5 BAM filter tape speciation analysis. The SOP may be used for Task 3. The contractor should also develop a cost proposal for speciating BAM samples representing 100 site-days as part of Task 3.

The results of this task are expected to establish criteria for evaluation of BAM filter tapes which may include minimum concentrations for which the analysis is technically defensible, uncertainties associated with the sample analysis methodology, and identification of particulate types that are particularly vulnerable to loss in the cassette.

3.2.3. Task 3: Rural Site Monitor Operation

The contractor will be responsible for establishing and operating a filter-based PM2.5 speciation sampler at the San Joaquin Valley Air Pollution Control District's Tranquillity air monitoring site from November 2011 through February 2012, and then removing the equipment at the end of the monitoring period. The contractor will need to provide the ground-level PM2.5 sampler, any needed support structure, and cables for power. The sampler will need to meet California Air Resources Board (ARB) specifications for PM2.5 speciation samplers, and will need to be operated in accordance with ARB standard operating procedures. For this task, the contractor will also be responsible for preparing, collecting, handling, and shipping the filters to the laboratory where the analysis will be conducted in accordance with Task 4. The contractor will be responsible for preparing a brief report on the sampling campaign, including the operational specifics, the number of samples taken, and any issues encountered.

3.2.4. Task 4: Speciation of PM2.5 Filters

Work Elements – Test Methods

The Proposal should identify the analytical methods to be used to identify species on PM2.5 filter samples. Methods are not constrained to EPA methodology but should be demonstrated as reliable with a high degree of precision and detection accuracy. The Proposal should suggest methods that would be most illuminating for identification of PM2.5 constituents and source origins or that could provide the same data with less cost. Innovative approaches that obtain the required data with less expensive methods will be considered as a positive aspect of a proposal unless the alternative methods sacrifice capability to differentiate source origin or differences between urban and rural sites. A Proposal recommending more expensive test methods will be considered on its merits if there is good justification for how the more expensive testing will provide greater capability or precision in source identification or site contrast and comparison.

The Proposal should recommend which analyses they propose to conduct to retrieve an effective data set to meet the purpose and objectives. The Proposal's cost estimate and discussion should outline the benefits and limitations of each analytical method given the funding limitations and analysis goals. The Proposal should include a recommendation and reasons as to whether the following assessments are included or excluded from the Proposal:

1. Particulate mass by weighing
2. Inorganic elements
3. Organic and elemental particulate carbon
4. Water soluble anions
5. Water soluble potassium and/or levoglucosan as a wood smoke tracer
6. Ammonium, with relationship and quantification in respect to sulfate and nitrate ions and determination or calculation of trapped water associated with nitrate and sulfate particulate
7. Low volatility hydrocarbons between C8 and C20

The Proposal should identify any special assessments proposed to provide better identification of contributing sources and any special testing to validate methods and accuracy. If this testing is integral to quality assurance, the cost should be included in the Proposal budget. If additional tests are proposed for additional identification of source attribution, the cost may be reflected as an optional extension to the budget.

Limited special studies with analytic chemistry may also be proposed to identify differences between rural and urban filters. Other studies have reported that organic carbon and metals may differ in mass between urban and rural sites and investigative analysis to identify and assess these or other differences or to support Task 1 will be considered for what they add to the quality of the proposed program. Any proposed special studies should be shown as a separate cost component to allow the Study Agency to adjust the final program of work to conform to the available budget.

The Proposal should also incorporate the potential for analysis of PM2.5 samples using the BAM SOP developed in Task 2. If the BAM filter tape SOP is approved for use, the number of monitoring sites that can be evaluated would increase from three filter-based sites up to 12 BAM sites.

Work Elements – Scope of Analysis

The goal of this task is to generate speciation data representing approximately 200 urban daily samples and 100 rural daily samples. Samples include archived filters, newly-collected filter samples, and possibly BAM samples. The Proposal should be based on the cost for analyzing in 50-sample increments, filter-based samples (not BAM samples), and a total of 300 filters. Based on the 50-sample unit-cost, the Study Agency may adjust the final program of work and increase or decrease the number of samples to be analyzed to conform to the available budget. The ultimate number of samples to be speciated is dependent on the unit-cost for speciation, and will be determined after the budgets for other tasks have been determined and the amount of funds available for speciation has been identified.

Within this task, the contractor is to:

- Provide quality assurance (QA) of the data resulting from this analysis. A number of replicate filters may be analyzed to ensure precision.
- Create and manage a database to house all of the resulting data from this analysis. This database is to be in the form of a Microsoft Access database (.mdb format), upon which a copy will be delivered to the Project Manager along with the Final Report when the project is complete.

The contractor will receive shipments of archived PM2.5 filters from the SJVAPCD soon after the initiation of the project, and continuing through early 2012. The SJVUAPCD may also provide a limited number of PM10 samples for speciation as part of the total of 300 samples.

3.2.5. Task 5: Evaluate and Compare Resultant Speciation Data

Within this task, the contractor is to

- Summarize the speciation results for each sampled site. Describe any seasonal trends or differences related to known emissions changes or meteorology changes.
- Compare the speciation data among the urban air monitoring sites.
- Compare the speciation data from among the rural air monitoring sites.
- Compare the speciation data from the rural site to that of the urban site.
- Provide any other comparisons that the contractor may feel are of interest or value in understanding PM2.5 formation in the San Joaquin Valley

3.2.6. Task 6: Prepare a Final Report

After the Study Agency has approved all work for prior tasks, the contractor will provide a Draft Final Report. This report will describe the project approach and methodology and presents the results. The report shall include an executive summary containing an abstract of the project and a summary of key findings, a report on each task undertaken, and

- A comparison of newly-generated speciation data with data collected from the existing speciation network sites operated by the Air Resources Board.
- An assessment of the mass capture efficiency of the revised methodology for PM2.5 mass reconstruction.

After the contractor submits the Draft Final Report, the Study Agency Project Manager will provide comments to the contractor. The contractor will fulfill the Project Manager's requests for supplemental documentation and clarifications in the report and address the Project Manager's comments. The contractor will provide the Final Report within 45 days after receipt of the Project Manager's comments. The Final Report must be complete in providing documentation and results for all required objectives. The Study Agency requires the technical writing to be adequate to clearly explain the processes used to carry out the project. Multiple revisions may be required if the Final Report is not written to the satisfaction of the Study Agency.

3.3. Work Products/Deliverables

Initial Conference Call: At the start of the contract period, the contractor will meet with the Project Manager via telephone or in person to discuss the overall plan, details of performing the tasks, the project schedule, items related to personnel or changes in personnel, and any issues that should be resolved before work can begin. The Project Manager may include key personnel of the CCAQS Technical or Policy Committees in this discussion as needed.

Task Reports: The contractor will provide written reports to the Study Agency Project Manager upon completion of each of the tasks identified in Section 3.2, and participate in conference calls to discuss the reports. The contents of the reports shall adequately cover the work undertaken and results generated for each task, and shall include:

- Current status of work products and deliverables.
- A budget status summary indicating the percentage expended on the task and explanation for any items that are not in conformance with the submitted project budget (note: Study Agency agreements allow some reallocation of funding resources between tasks during the conduct of the project; however, exceeding the total budget is not authorized)
- A review of the project timeline and justification for any requested revisions to intermediate progress dates

Other Meetings and Deliverables: When requested by the Project Manager, the contractor shall meet with the Project Manager via telephone to discuss the overall plan, details of task progress, or concerns regarding compliance with required performance objectives or timelines. The Project Manager will notify the contractor in advance of any special topics so contractor may assemble key staff or information to respond. Contractor shall involve in this discussion key project personnel or subcontractors necessary to provide details of task progress. The day before the conference call, the contractor shall email the Project Manager a brief progress report or presentation material that includes:

- Current status of work products and deliverables
- Explanation for any delays in performance
- Justification for any revisions to project budget
- Action items for which the contractor desires direction or approval

The Study Agency may request other interim deliverables. Based on progress reports and preliminary results, the Study Agency may provide direction to contractor to delete or amend objectives and deliverables. Deletion of tasks or deliverables is fully within the authority of the Study Agency; however contractor will be compensated for work already completed on curtailed tasks. The contractor and Program Manager must ensure that any amended deliverables are within the authorized budget for the project. Any extra effort directed by the Study Agency that does not fall within the authorized budget requires formal amendment to the agreement. If the Study Agency determines a need for additional tasks or services not included in the Proposal, the contract may be amended by agreement of both parties to include additional tasks and related costs.

Electronic File Formats: The contractor shall provide reports as Adobe PDF documents. Methodology documents and data shall be provided to the Study Agency in the formats of Microsoft Office 2007 Professional software (Word, Excel or Access). Other work products such as databases or modeling files may be delivered in other appropriate file formats, as specified by the Project Manager.

Draft Final Report and Final Report: The contractor shall provide the Draft Final Report and Final Report in the electronic file formats specified above. Upon approval of the Final Report by the Study Agency, the contractor shall deliver to the Study Agency five bound copies and one unbound copy of the report incorporating all final alterations, additions and appendices, as well as a copy of the report in the electronic file formats specified above.

Compensation and Invoices: The contractor will be paid for each deliverable when the Study Agency deems that the deliverable satisfies the applicable requirements of the contract. Ten percent (10%) of each invoiced payment will be withheld until all work is complete and approved by the Study Agency. The total of payments shall be separated into four invoices:

- Invoice One should reflect costs for Tasks 1 and 2 and be submitted with the Report for Task 2.

- Invoice Two should reflect costs for Tasks 3, 4 and 5, and be submitted with the Report for Task 5.
- Invoice Three should reflect costs for preparing the Draft Final Report and Final Report and be submitted with the Final Report.
- Invoice Four should reflect the 10% retention from all previous invoices and be submitted upon Study Agency approval of the Final Report.

The contractor shall submit invoices in triplicate. Invoices must clearly show the Study Agency contract number.

Additional tasks performed by the contractor or its subcontractors to develop supporting information or analysis, which were not specified in the Proposal, will not be reimbursed without prior written approval from the Study Agency. Unapproved additional tasks are not reimbursable.

3.4. Utilization of Results

The results of this project will be valuable for improving the ability to accurately reconstruct PM2.5 mass, as well as developing a more robust spatial understanding of the differences in PM2.5 species throughout the San Joaquin Valley. Development of a method for speciating PM2.5 BAM filter tapes would improve the spatial understanding of PM2.5 species at additional sites and provide a means of analysis for unusual readings observed in hourly monitors at these sites, at similar sites in other areas of the CRPAQS domain, and in other regions. Results will be valuable in developing attainment plans of current and future PM2.5 National Ambient Air Quality Standards (NAAQS), including Chemical Mass Balance (CMB) modeling. The contractor should consider the intended end-use of the results and provide data suitable for this purpose. The contractor is not authorized to establish restrictions on the release or use of final products by the Study Agency.

4. PROJECT SCHEDULE

The Study Agency intends for the project to be completed according to the following schedule of deliverables. The Study Agency may agree to a different schedule, however, which would be specified in the contract. Compensation will correspond with the submission of task reports and final reports. Table 1 shows the deadlines associated with each task and Figure 1 shows the overlapping nature of the tasks.

Table 1: Project Schedule and Deliverables

Action/Work Product	Approximate Date
Release of RFP	July 11, 2011
Deadline for Proposal	August 8, 2011
Contractor Selection	August 9-19, 2011
Contract Execution	September 15, 2011
Report for Task 1	December 31, 2011
Report for Task 2	December 31, 2011
Report for Task 3	February 29, 2012
Report for Task 4	February 29, 2012
Report for Task 5	March 31, 2012
Draft Final Report	April 30, 2012
Final Report	June 30, 2012

Figure 1: Calendar of Tasks

	September 2011	October 2011	November 2011	December 2011	January 2012	February 2012	March 2012	April 2012	May 2012	June 2012
Execute contract	*									
Task 1 Mass Reconstruction Assumptions		*	*	D						
Task 2 Evaluate Use of BAM Filter Tapes		*	*	D						
Task 3 PM2.5 Monitor at Tranquillity										
Installation		*								
Operation			*	*	*					
Equipment removal						*				
Task Report						D				
Task 4 Speciation										
Archived filters		*	*	*						
Newly collected filters			*	*	*	*				
BAM tapes					*	*				
Task Report						D				
Task 5 Analytical Results					*	*	D			
Task 6 Complete Project Reports										
Draft Report							*	D		
Final Report									*	D
D = Deadline for Task Report										

5. BUDGET

Cost will be a factor in evaluating proposals responding to this RFP. Proposers are directed to provide task-related costs in their proposal budget summary rather than a lump sum amount. Proposals will be evaluated both by comparison of cost for

comparable tasks as well as projected total cost. The Study Agency's review committee is authorized to consider the comprehensiveness of proposed efforts as well as total proposed cost to provide reasonable comparisons of the proposals. Evaluation criteria are described in Section 10.2.

The Study Agency's budget for this project is \$270,500. The budgeted amount is available for research, analysis, coordination, teleconferences, meetings, report writing, subcontractors, and all other efforts undertaken by the contractor for this project.

Proposers shall use the format of Attachment C (or similar) to itemize the costs of the Proposal. Costs must be itemized by the following categories:

Task: Itemize the costs for each task. For PM2.5 filter speciation, show the unit-cost per 50 samples analyzed and assume that 300 filter samples will be analyzed. The Study Agency reserves the right to remove tasks as deemed necessary to remain within budget.

Labor: List the hourly labor rate for each assigned principal and technical specialist. The rate quoted must include labor and administrative overhead costs.

Subcontractor Costs: Identify subcontractors by name, list their cost per hour or per day, and the number of hours or days their services will be used.

Travel Costs: Identify estimated travel costs, including the number of trips required, destinations, and approximate costs of travel.

Miscellaneous Costs: Identify costs of any materials, and equipment purchases or rentals. Note that any equipment that is substantially purchased using Study Agency funds for conduct of this project becomes the property of the Study Agency.

It is expected that general overhead and administrative costs are included in the hourly rate for labor. It will be assumed that all contingencies and/or anticipated escalations are included. No additional funds will be paid above and beyond the contracted amount for the services specified in the Proposal. If the Study Agency determines a need for additional tasks or services not included in the Proposal, the contract may be amended by agreement of both parties to include additional tasks and related costs.

6. REQUIRED QUALIFICATIONS

To be selected, a contractor must have demonstrated extensive experience and expertise in the following areas:

- Experience and skill in performing the types of technical tasks required for completion of this project
- Excellent working relationships with government agencies
- Skill in preparing clear reports

- Excellent technical writing skills

To be selected, the contractor must also demonstrate the ability and resources to produce the deliverables requested in this RFP. The Study Agency reserves the right to reject any Proposal deemed non-responsive to the RFP, not responsible, and/or not reasonable.

6.1 Excluded Parties List System (EPLS)

A contractor or any individual identified in the Proposal that appears in the Excluded Parties List System (EPLS) is not eligible for award of a contract. The EPLS is a central registry that contains information regarding entities that are ineligible from receiving Federal contracts. Access to the EPLS is available at www.epls.gov.

The Proposer should complete and return Attachment A with the Proposal to certify eligibility for participation under federal assistance programs.

6.2 Compliance with Federal and State Requirements

The selected contractor shall comply with applicable federal requirements including but not limited to Office of Management and Budget Circular No. A-87 (Cost Principles for State, Local, and Indian Tribal Governments) and Circular No. A-102 (Grants and Cooperative Agreements With State and Local Governments), and Circular No. A-133 (Audits of States, Local Governments, and Non-Profit Organizations).

California Government Code Section 1090 generally prohibits a public official from being financially interested in a contract which he or she has made or participated in an official capacity. Under certain circumstances, persons who perform work pursuant to a contract with a government agency may be subject to the restrictions of Government Code Section 1090. With respect to the CRPAQS, this means that based on participation in the planning of the project, certain consultants are precluded from participating in all or some of the post-planning contracts. This preclusion would apply to a contractor as either a prime contractor or a subcontractor. In most cases, whether a particular contractor is eligible to bid will depend on an analysis of all of the circumstances surrounding the contractor's earlier participation in the CRPAQS and the work that that contractor now proposes to perform. Any response to this RFP which includes a paid participant who is ineligible based on Government Code Section 1090 will be rejected during the review of the Proposals.

Questions concerning the eligibility of a potential contractor must be directed to the Study Agency attorney at the address provided below prior to the preparation of a Proposal.

Catherine T. Redmond, Counsel
San Joaquin Valley Unified Air Pollution Control District
1990 East Gettysburg Avenue
Fresno, CA 93726

7. PROJECT DIRECTION

7.1. Management

The contractor selected to conduct this work shall report to the Study Agency Project Manager, who will be identified in the contract. For the purposes of this project, the staff of the SJVAPCD will write and monitor contracts with the participants and will be the primary interface between the contractor, the Policy and Technical Committees, and the Study Agency. The contractor must not begin work on the project until a contract is fully approved by the San Joaquin Valleywide Air Pollution Study Agency.

7.2. Submittal of Results

All completed files or reports shall be released by the contractor to the Project Manager for distribution and review by the Study Agency. The Study Agency may review any of the results in whole or in part and submit comments or questions to the contractor through the Project Manager. The contractor shall perform any additional work needed to address issues raised by this process for the items authorized by the Project Manager unless such effort would exceed the authorized budget. Any extra effort directed by the Study Agency that does not fall within the authorized budget requires formal amendment to the agreement. If the Study Agency determines a need for additional tasks or services not included in the Proposal, the contract may be amended by agreement of both parties to include additional tasks and related costs.

8. CONTENTS OF PROPOSALS

Proposals must be signed by a duly authorized official of the responder and must state that the proposal is valid for a period of not less than 90 days from the date of submittal. The Proposer's name and address as used in contractual agreements should be provided. The name, address, title, telephone number, fax number and email address of the person(s) authorized to execute agreements and the person(s) acting as principal for the work conducted in the proposal should be provided.

Information in the proposals shall become public property subject to disclosure under the Public Records Act. Proposals should convey a maximum of technical content related to the relevant task with a minimum of extraneous material. Proposals should convey a high degree of technical understanding and innovation while demonstrating the ability to present complex scientific results to decision-makers. The proposal should be clear and concise. The response to the RFP is expected to be brief, with text of the proposed approach to completing the tasks limited to less than 30 pages, not inclusive

of qualification information (e.g. attached resumes, etc.), budget summary table and timeline.

Submitted proposals must follow the format outlined below and all requested information must be supplied. The submitted proposal shall be limited to 30 pages, single-sided or 15 pages, double sided, with 1-inch margins. Proposal shall be printed on white paper and the font shall be black Arial and no smaller than 12 point. Failure to submit proposals in the required format may result in elimination from proposal evaluation.

Cover Letter – Must include the name, address, and telephone number of the Proposer’s company, total cost, the name of the contact person for the proposal, and be signed by the person or persons authorized to represent the firm.

Table of Contents – Clearly identify material contained in the proposal by section and page number.

Summary (Section I) – State the overall approach to the project and objectives. Demonstrate a clear understanding of the project goals and objectives. Include total project cost. Provide specific examples of steps to be taken to complete the project, as well as measures to assure repeatability, reliability and applicability.

Work Program (Section II) – Include the approach to completing tasks identified in Section 3 of this RFP. Describe work activities or tasks to be performed including the sequence of activities and a description of methodology or techniques to be used. Proposer may include suggestions of any missing tasks to add for fulfillment of Section 3 objectives.

Program Schedule (Section III) – Provide projected milestones or benchmarks for major products/reports within the total time allowed. This proposed schedule may include flexibility reflecting the investigative nature of the project. Include information on the availability of the Proposer and proposed subcontractors during the proposed term. Indicate and explain or justify adjustments to the schedule anticipated by or proposed by respondent.

Project Organization (Section IV) – Describe the proposed management structure, organization of the contracting group, and facilities available.

Assigned Personnel (Section V) – Identify the principals having primary responsibility for conducting the analysis. Discuss their professional and academic backgrounds. Provide a summary of similar work they have previously performed. List the amount of time, on a continuous basis, that each principal will spend on this project. Describe the responsibilities and capacity of the technical personnel involved. Substitution of the project manager and/or lead personnel shall not be permitted without prior written approval of the Study Agency Project Manager.

Study Agency and District Resources (Section VI) – Describe any Study Agency or District services and staff resources needed to supplement Contractor activities to achieve identified objectives.

Subcontractors (Section VII) – If subcontractors are to be used, identify each of them in the proposal. Describe the work to be performed by them and the number of hours or the percentage of time they will devote to the project. Provide a list of their assigned staff, their qualifications, and their relationship to project management, schedule, costs and hourly rates.

Costs of Proposal (Section VIII) – Identify all costs associated with the execution of this project and any additional identified tasks. The proposed payment for each deliverable identified in Table 1 should be provided, as well as hourly billing rates and amount of time for each staff member that will be a part of this project. Any additional services that may be necessary to complete additional processing identified by the investigative tasks, if authorized for completion by the Study Agency Project Manager, should be clearly stated and identified by an hourly billing rate. Also, provide a completed Proposal Budget Summary Table similar to Attachment B and a completed Proposal Budget Template Itemized by Task and Personnel similar to Attachment C.

Contractor Capability and Client References (Section IX) – Provide a summary of the firm's relevant background experience. Include a brief summary of related studies completed for other parties that are of a similar nature to the work requested by this RFP. Report examples (see Section 11) can be provided in an attachment. Also provide a list of client references for similar projects, including the client manager's name, title/function, and phone number for the most relevant projects.

Conflict of Interest (Section X) – Identify any current business relationship that might be affected by the conduct or results of this project. Proposal must disclose any recent or current contracts with business entities regulated by any air districts in central California. The Study Agency will consider the nature and extent of such work in evaluating the proposal (see Section 10.0).

Previous Work Samples (Section XI) – Attach a copy of any work prepared similar to what is requested in this RFP. These items shall not be considered part of the 30-page limitation set for the proposal.

Certificate of Eligibility for Federal Funding (Attachment A) – The Proposer should complete and return the certification regarding debarment, Attachment A, with the Proposal.

Supplemental Information – Extensive documentation is discouraged, but attachments for the budget summary table and resumes can be included in the proposal. Attached documents are not part of the 30-page limitation.

9. SUBMISSION OF PROPOSAL

All proposals must be submitted according to the specifications set forth below. Failure to adhere to these specifications may be cause for rejection of proposal.

- Due Date – Proposal must be received no later than 5:00 p.m. on August 8, 2011. Late proposals will not be accepted. Any correction or resubmission by the contractor will not extend the submittal due date.
- Delivery Address – Proposal must be directed to:

Jon Klassen, Air Quality Specialist
San Joaquin Valley Unified Air Pollution Control District
1990 E. Gettysburg Avenue
Fresno, CA 93726-0244

- Identification – To accommodate processing and identification of time of receipt, the contractor shall submit the required copies of the proposal in a sealed envelope, plainly marked in the upper left-hand corner with the name and address of the contractor and the words:

“PROPOSAL: PM2.5 Mass Reconstruction, Speciation, and Investigation”

- Electronic Copy (CD-ROM) – The submission shall include an electronic copy of the Proposal in PDF format.

Grounds For Rejection – A proposal may be immediately rejected if:

- It is received at any time after the exact due date and time set for receipt of proposals
- It is not prepared in the format prescribed
- It is not signed by an individual authorized to represent the firm

Once a proposal is submitted, the composition of the project team cannot be altered without prior written consent of the Study Agency. The proposal shall constitute a firm offer and may not be withdrawn for a period of 90 days following the last day to accept proposals. Proposals become the property of the Study Agency. The Study Agency reserves the right to reject all proposals and make no award.

10. PROCESS

10.1. Addenda and Supplements to the RFP

The Study Agency may modify this RFP and/or issue supplementary information or guidelines relating to the RFP before the Proposal deadline. In the event that it becomes necessary to revise any part of this RFP, or if additional information is necessary to enable adequate interpretation of the provisions of this RFP, or if it is necessary to extend the deadline for Proposals, a supplement to the RFP will be released and distributed in the same manner as the release of the RFP.

10.2. Proposal Evaluation and Contractor Selection Process

The Study Agency will evaluate all Proposals received by the deadline to determine responsiveness to the RFP, ensure the requirements for this project will be satisfied, and will then commend a contractor for approval by the CCAQS Policy Committee. Failure to adhere to specifications in this RFP may be cause for rejection of the Proposal. The Technical Committee, Policy Committee, Study Agency, and participating air districts retain the right to reject all Proposals received and conduct direct negotiations with a selected contractor if all Proposals are considered to be substantially nonresponsive to key elements.

Proposals will be rated on the following key factors:

1. A demonstration of the Proposer's qualifications and ability to perform the services requested in the RFP. Proposals should include specific discussions of (a) previous working relationships with government agencies, and (b) recent project experience. Extensive corporate experience is not as important as the capabilities of the principals who will be dedicated to the project. However, past performance issues may be considered in the selection process. Greater detail may be incorporated by reference to a corporate website.
2. Effectiveness of the proposed action to meet the goals of the RFP; thoroughness and appropriateness of the proposed work program; innovation in approach to work tasks.
3. Timeliness of the proposed schedule for the completion of tasks.
4. Efficiency and total cost of the Proposal.
5. Clarity and thoroughness of the Proposal; presentation, including good organization, formatting, and a minimum of grammatical errors;

During the selection process, the Study Agency may interview proposers with scores above a natural break, for clarification purposes only. No new material will be permitted at this time.

A contract will be awarded to the Proposer with the best acceptable Proposal based on cost effectiveness and the criteria described in this section. The selection of contractor, final project budget and award of contract are subject to approval by the Policy Committee and the San Joaquin Valleywide Air Pollution Study Agency Governing Board. The Study Agency may choose to reject all Proposals. All proposers will be notified of the selection process results by letter.

10.3. Contract Negotiation and Approval

Contract negotiation will be conducted after approval of contractor selection by the Policy Committee. All agreements must be approved and executed by the Study Agency. Standard contract language is available for advance review by request to the Program Manager.

11. INSURANCE

The contractor and any subcontractors must maintain the following insurance coverage throughout the term of the agreement with the Study Agency:

1. Liability insurance for bodily injury, including automobile liability, with limits of coverage of not less than Five Hundred Thousand Dollars (\$500,000) each person and One Million Dollars (\$1,000,000) each occurrence; and
2. Liability insurance for property damage with limits of coverage not less than Fifty Thousand Dollars (\$50,000) each occurrence; and
3. Workers compensation insurance in accordance with the California Labor Code; and
4. Commercial general liability insurance with minimum limits of coverage of not less than \$1,000,000 per occurrence.

The foregoing insurance policy(s) shall not be canceled, reduced, or changed without a minimum of 30 calendar days' advance, written notice given to Study Agency.

Prior to performing its obligations under this Agreement, the contractor shall provide the Study Agency with a certificate of insurance from an insurer acceptable to Study Agency as evidence of complying with the insurance requirements described above.

12. DATA OWNERSHIP AND PUBLICATION

The Study Agency shall have the right, at reasonable times during the project, to inspect and reproduce any data received, collected, produced, or developed by the contractor. No reports, professional papers, information, inventions, improvements, discoveries, or data obtained, prepared, assembled, or developed by contractor shall be released or

made available (except to the Study Agency) without prior, express written approval from the Project Manager. At the completion of the project, the contractor shall provide the Study Agency all data developed through conduct of the project that is in its possession. All data which is received, collected, produced, or developed from conduct of the project shall become the exclusive property of the Study Agency; however, the contractor shall be allowed to retain a copy of any non-confidential data received, collected, produced, or developed by the contractor. Should the contractor subsequently include data collected in this project for other evaluations and publications, the Study Agency would appreciate a notification of publication and/or a copy of the article or manuscript published.

13. CONFIDENTIAL INFORMATION

All responsible Proposals received by the Study Agency are public records available for review by the public after the selection process is completed. Proposals containing information the Proposer identifies as confidential or proprietary will be rejected as nonresponsive.

14. REFERENCES

1. El-Zanan H, Zielinska B, Mazzoleni L, & Hansen D. (2009). Analytical Determination of the Aerosol Organic Mass-to-Organic Carbon Ratio. *Journal of the Air & Waste Management Association*, 59, 58-69. DOI:10.3155/1047-3289.59.1.58.
2. Chen X, & Yu J. (2007). Measurement of organic mass to organic carbon ratio in ambient aerosol samples using a gravimetric technique in combination with chemical analysis. *Atmospheric Environment*, 41, 8857–8864.
3. El-Zanan H, Lowenthal D, Zielinska B, Chow J, & Kumar N. (2005). Determination of the Organic Aerosol Mass to Organic Carbon Ratio in IMPROVE Samples. *Chemosphere*, 60, 485–496.
4. Sisler J, Malm W, & Gebhart K. (1996). Spatial and Seasonal Patterns and Long Term Variability of the Composition of Haze in the United States: An Analysis of Data from the IMPROVE Network, 1996. *Interagency Monitoring of Protected Visual Environments, IMPROVE Reports, Report II, July 1996, Chapter 2, Optical and Aerosol Data*. Retrieved from <http://vista.cira.colostate.edu/IMPROVE/Publications/Reports/1996/PDF/CHAP2.NE W.96.pdf>
5. University of California, Davis, Crocker Nuclear Laboratory. (2008). IMPROVE Standard Operating Procedure, SOP 351 Version 2 (SOP 351-2), Data Processing and Validation. *Interagency Monitoring of Protected Visual Environments, IMPROVE Standard Operating Procedures (SOP), Particulate Monitoring Network, SOP 351, Data Processing and Validation Version 2*. Retrieved from

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9. Lough G, Schauer J, Park J, Shafer M, DeMinter J, & Weinstein J. (2005). Emissions of Metals Associated with Motor Vehicle Roadways. *Environmental Science & Technology*, 39(3), 826-836. DOI: 10.1021/es/048715f
10. Apeagyei E, Bank M, & Spengler J. (2011). Distribution of Heavy Metals in Road Dust along an Urban-Rural Gradient in Massachusetts. *Atmospheric Environment*, 45(13), 2310-2323 DOI: 10.1016/j.atmosenv.2010.11.015
11. Degobbi C, Lopes F, Carvalho-Oliveria R, Munoz J, & Saldiva P. (2011). Correlation of Fungi and Endotoxin with PM_{2.5} and Meteorological Parameters in Atmosphere of Sao Paulo, Brazil. *Atmospheric Environment*, 45, 2277-2283.
12. Tominaga S, Matsumoto K, Kaneyasu N, Shigihara A, Katono K, & Igawa M. (2011). Measurements of Particulate Sugars at Urban and Forested Suburban Sites. *Atmospheric Environment*, 45, 2335-2339.
13. Chow J & Watson J., Desert Research Institute (1998). *Guideline on Speciated Particulate Monitoring*. Retrieved from <http://epa.gov/ttnamti1/files/ambient/pm25/spec/drispec.pdf>
14. U.S. Environmental Protection Agency (EPA), Office of Air Quality Planning and Standards (1999). *Particulate Matter (PM_{2.5}) Speciation Guidance, Final Draft, Edition 1*. Retrieved from <http://www.epa.gov/ttnamti1/files/ambient/pm25/spec/specfinl.pdf>

ATTACHMENT A

Certification Regarding
Debarment, Suspension, Ineligibility and Voluntary Exclusion
Lower Tier Covered Transactions

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 29 CFR Part 98 Section 98.510, Participants' responsibilities. The regulations were published as Part VII of the May 26, 1988, Federal Register (pages 19160-19211).

(1) The prospective recipient of Federal assistance funds certifies that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) Where the prospective recipient of Federal assistance funds is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this Proposal.

Name and Title of Authorized Representative

Signature _____

Date _____

ATTACHMENT B
 Proposal Budget Summary

Direct Costs:	
1. Labor: Salaries and benefits paid to employees	\$
2. Subcontractors	\$
3. Travel	\$
4. Equipment, Materials and Supplies	\$
5. Miscellaneous (please specify)	\$
TOTAL DIRECT COST:	\$
Indirect Costs:	
6. Labor Overhead (as percentage of Labor Cost) _____ % rate	\$
7. Other Indirect Costs (please specify)	\$
8. Fee or Profit (as percentage of Total Cost) _____ % rate	\$
TOTAL INDIRECT COST:	\$
TOTAL COST:	\$

ATTACHMENT C

Proposal Budget Template, Itemized by Task and Personnel

Staff and Cost Categories	Hourly Rate*	Task 1 (hours)	Task 2 (hours)	Task 3 (hours)	Task 4 (hours)	Task 5 (hours)	Task 6 (hours)	Total Hours	Total Cost
Staff 1									
Staff 2									
Staff 3									
Staff 4									
Staff 5									
Subcontractor 1									
Subcontractor 2									
TOTAL HOURS BY TASK									
TOTAL COST BY TASK									
Travel									
Material and Other Direct Costs									
Speciation of 50 PM2.5 samples									
Fee									
Additional work (please specify)									
Miscellaneous (please specify)									
TOTAL FOR PROPOSAL									

* Hourly Rate = salary, benefits and administrative overhead to be charged to the client.