

San Joaquin Valleywide Air Pollution STUDY AGENCY

Funding air quality research in Central California

REQUEST FOR PROPOSAL

for

EVALUATION OF STATE OF SCIENCE AND METHODOLOGY RECOMMENDATIONS FOR NO_x AND SO_x PRECURSOR RELATIONSHIPS TO PARTICULATE FORMATION IN CENTRAL CALIFORNIA

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 Central California Ozone Study
under the authority of the San Joaquin Valleywide Air Pollution Study Agency*

Submittal: Proposals must be received at the address below on or before
Monday, September 19, 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 (CD-ROM) of all submittal documents in Word or PDF format.

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

Mark Envelope: "PROPOSAL: NO_x and SO_x Relationships to PM_{2.5}"

RFP Issuance Date: August 19, 2011

Contact: David Nunes, (559) 230-5825, david.nunes@valleyair.org

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METHODOLOGY RECOMMENDATIONS FOR
NOx AND SOx PRECURSOR RELATIONSHIPS
TO PARTICULATE FORMATION IN CENTRAL CALIFORNIA**

PROJECT ABSTRACT

The objective of this project is to document the complex interactions important to PM2.5 formation in Central California and develop techniques to quantify the role of NOx and SOx emission reductions in controlling PM2.5. This project will explore the existing science and assumptions used by SANDWICH, SMAT, and regional particulate models and recommend techniques for utilizing these or similar tools to assess NOx and SOx impacts on PM2.5 for future policy decisions. Some of the complex issues this project could address include the impact of surplus ammonia for the determination of NOx and SOx particulate formation dynamics, sampling artifact associated with inorganic compounds, mass closure assumptions, and differences in modeling procedures due to the low levels of SOx emissions in the CRPAQS domain. This project is to be completed in approximately one year, with a budget determined by competitive bidding for no more than \$100,000. Proposals should include a budget that is sufficient to thoroughly address the goals of this project, and that is itemized by the tasks identified in the RFP. The District reserves the right to exclude tasks from the final work program.

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.

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 (California Regional Particulate Air Quality Study, or CRPAQS) and ozone (Central California Ozone Study, or CCOS) air quality in Central California. Collectively known as the Central California Air Quality Studies (CCAQS), CCOS and

CRPAQS allow for evaluation of the chemical composition, spatial and temporal distributions, and chemical transformation of pollutants. 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 the 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

The Study Agency is issuing this RFP to establish scientific findings applicable to Central California regarding NOx and SOx precursor relationships to particulate matter PM2.5 and for the dynamics of dependent or independent response to changes in concentrations of each of these two precursors. The project is expected to review and document findings by evaluation of technical literature and analyses performed for CRPAQS and the State Implementation Plans which have used the products of these studies and have addressed these issues. The second element of the project is to compare California-applicable state-of-the-science established from this review to U.S. Environmental Protection Agency (EPA) guidance for addressing these subjects as provided by the measured Sulfate, Adjusted Nitrate, Derived Water, Inferred Carbonaceous mass Hybrid Material Balance Approach (SANDWICH) and Speciation Modeled Attainment Test (SMAT) techniques and related modeling guidance. The final goal of the project is to define and document methodology appropriate for area(s) in the Central California CRPAQS domain for consideration in technical analysis of these matters for air quality data interpretation and adjustments, and for modeling analysis to support future PM2.5 attainment plans

The purpose of this project is to better understand the role of anthropogenic NOx and SOx control measures on the formation of PM2.5 in Central California. Recommendations and improved modeling techniques developed from this project may be used in policy decisions that consider NOx and SOx emissions influence on particulate formation.

2.1 Technical Discussion of Purpose

The intent of this project is to carefully document CRPAQS findings as well as available technical literature that will identify the best methods for quantifying and predicting the impact of changing NOx and SOx emissions on particulate formation.

Many areas of the country have particulate concentrations dominated by sulfate particulate with ammonia emissions small enough to limit particle formation. California particulate concentrations, however, are dominated by nitrate particulates, including the San Joaquin Valley which has ammonia emissions large enough that ammonia is not a limiting factor for particulate formation. Since PM2.5 control programs are highly dependent on our understanding of PM2.5 constituents, accurate characterization of particulate species and formation is critical for developing successful control programs.

Much of the modeling guidance developed by EPA is geared toward regions with high SOx and limited ammonia emissions. Various modeling efforts to establish the amount of particulate generated by SOx and NOx emissions have provided divergent results. Central California has unique circumstances that drive formation reactions to completion by virtue of surplus NOx emissions. The dynamics of this situation must be documented for the significance this has on policy decisions.

PM2.5 and PM10 filter sampling can be accompanied by positive and negative sampling artifacts. Sampling artifacts can result in mischaracterization of species that contribute to particulate concentrations. Mischaracterization of this fraction can result in ineffective control strategies. The SANDWICH method (Frank, 2006) was developed as a procedure to address sampling artifact by estimating artifact-free particulate. This method assumes PM2.5 mass closure. Unfortunately, many particulate species, both organic and inorganic, are not measured on Teflon® filters used by PM2.5 federal reference monitors, making mass closure challenging at best.

Although chemical mechanisms used by regional models are constantly evolving, critical formation mechanisms associated with direct and indirect effects of NOx and SOx chemistry on PM2.5 are not well represented in models, if represented at all. Missing pathways and gaps in scientific understanding lead to models that produce uncertain results for Central California.

Using SMAT to assess relative changes in particulate species from regional model output creates additional uncertainties from assumptions that may be inappropriate for central California. SMAT guidance recommends establishing balance equations external to modeling computation to calculate increase in nitrate particulate with reductions of SOx; however, that premise does not anticipate the central California situation of excess ammonia where such an interactive assumption may be inappropriate. One of the elements of this project is to assess whether such modifications should be made, whether a model evaluation must be used to determine if there is increased nitrate from SOx reduction in the CRPAQS domain, or whether it can be clearly established that equilibrium projections should not be used due to the presence of surplus ammonia.

Addressing uncertainties of sampling artifacts, mass closure, modeling techniques, and the direct and indirect roles NOx and SOx particulate formation is critical for interpreting the influence of emission reductions on PM2.5 formation.

3. PROJECT DESCRIPTION

3.1 Objective

The objective of this project is to develop recommendations and tools to quantify the role of NOx and SOx emission reductions in controlling PM2.5 formation in Central California. This project will document the complex NOx and SOx interactions important to PM2.5 formation in Central California, address sampling artifact issues in measurement and modeling techniques, describe shortcomings of regional particulate models related to nitrate and sulfate production, and address control strategy implications associated with current assumptions. This theoretical work should then be connected to PM2.5 observations in the CRPAQS domain and to other analyses found in literature and in the SJVAPCD 2008 PM2.5 Plan and Modeling Protocol (see section 14 References). Considering current modeling limitations, the project will recommend techniques for assessing NOx and SOx impacts on PM2.5 in Central California which may be used in future policy decisions.

3.2 Tasks/Scope

This project consists of three tasks and the preparation of a Final Report:

- 1) Literature review and evaluation of current modeling techniques
 - a. Conduct a scientific literature review of complex NOx and SOx interactions important to PM2.5 formation in Central California.
 - b. Address sampling artifact issues in SANDWICH and provide recommendations for estimating artifact-free particulate.
 - c. Evaluate shortcomings of particulate regional models in regard to the influence of SOx and NOx on production of particulate and document implication.
 - d. Evaluate SMAT assumptions and recommend modifications for Central California.
- 2) Develop a recommended approach for assessing NOx and SOx impacts on PM2.5 which may be considered for use in future attainment analysis efforts for Central California policy decisions.
- 3) Using the approach recommended in Task 2, assess the contributions of NOx and SOx to particulate formation in Central California. Evaluate the methods and assumptions in the most recent Central California PM2.5 Plans which were used to assess NOx and SOx contribution to PM2.5 and document the agreement or variation from knowledge gained from Task 1.
- 4) Document all findings and results in a comprehensive final report.

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. During conduct of the project, additional data collection by the contractor beyond the specified program of work must remain within the authorized budget.

Supplemental data collection or measurement programs are not anticipated to be included as products required under this agreement. Additional efforts of any type not specified as a work product for this agreement will only be authorized by the Study Agency Project Manager for conduct by the contractor if these additional tasks are within the approved project budget and do not impair completion of other assigned tasks.

This project will be carried out at the same time as the companion project (*Evaluation of State of Science and Methodology Recommendations for VOC Sampling Artifact, SOA Prediction and VOC/NOx Photochemistry Influence on Nitrate Formation*). If the projects are conducted by two separate contractors, it is expected that the contractors should maintain some general awareness of the technical approach and findings of the other project.

Task 1: Literature Review and Evaluation of Techniques

- a) **Literature Review:** The contractor will document from CRPAQS results, literature review and theoretical assessments, the role of NOx and SOx emissions in PM2.5 formation with consideration of Central California's unique geography, climate, and emission sources. How the science applies to 24-hr average PM2.5 and annual average PM2.5 should be discussed. The following topics and any other topics the contractor identifies as important to accurately addressing NOx and SOx in PM2.5 attainment planning should be discussed:

- The impact of surplus ammonia for the determination of NOx and SOx particulate formation dynamics.
- The difference from national norms in modeling procedures due to the low levels of SOx emissions in the CRPAQS domain.
- How the lack of domination by large sources in Central California affects modeling approaches and evaluations (point source inventories dominate many areas, but area and mobile emissions are more significant in the CRPAQS domain).
- Sampling artifact
- Sample handling artifact
- Mass closure assumptions
- Seasonal variations

The contractor will produce an annotated bibliography and evidence-based report summarizing the state-of-the-science for identified topics, including knowledge gaps and areas in which consensus have not been reached.

- b) **SANDWICH Evaluation:** Considering the topics in Task 1a, the contractor will evaluate the assumptions for using SANDWICH in Central California. The task should include evaluation of EPA's guidelines for implementing SANDWICH and assertions made in SJVAPCD's 2008 PM2.5 Plan. Recommendations should be

developed to address mass closure and estimate artifact-free particulate in the specific regions of Central California using SANDWICH or a similar method.

- c) **Regional Model Evaluation:** Considering the topics in Task 1a, the contractor will discuss regional model sensitivity to NOx and SOx controls. This task will focus on the evaluation of current versions of regulatory models (e.g., CMAQ) and those used in the most recent round of Central California Plans. Evaluation should include the degree to which SOx and NOx can be determined to be dependent or independent in their influence on particle formation in Central California. Attention to missing chemical pathways, both direct and indirect, and the implications to control strategies should be included. The focus of this task is to develop recommendations for assessing the role of NOx and SOx in a PM2.5 reduction strategy through appropriate interpretation of model results.
- d) **SMAT Evaluation:** Considering the topics in Task 1a, the contractor will evaluate the assumptions for using SMAT in Central California. The task should include evaluation of EPA's guidelines for implementing SMAT and assertions made in SJVAPCD's 2008 PM2.5 Plan. Recommendations should be developed for using model response in a relative sense in the specific regions of Central California using SMAT or a similar method. Additional topics to cover include recommendations for addressing trapped water and missing mass.

Task 2: Recommended Methodology for Assessing NOx and SOx Impacts on PM2.5

Considering topics and recommendations from Task 1, the contractor will document the recommended assumptions and processes suitable for the CRPAQS domain and discuss the policy implications of this approach in comparison to applying EPA default assumptions to Central California. This task will bring together components of Task 1 to describe a recommended attainment analysis framework for consideration in policy decisions. Depending on recommendations, development of technical tools necessary to implement the attainment analysis framework should be considered and coordinated with the Study Agency Project Manager.

The intent of this project is to provide methodology documents for use by member agencies; therefore, recommended techniques should be able to be implemented with a reasonable level of staff resources and obtainable data. While innovation and new approaches are encouraged, methodologies should not require great expense to acquire data or conduct the processing. The contractor should make every effort to use inputs that are widely and freely available.

The results of this task will be provided as a technical paper for review and discussion by the Study Agency Project Manager and Technical Committee. Based upon the findings of Task 1, the Technical Committee may request that this paper take the form of a manuscript discussing the findings of the study for submission to a peer-reviewed journal.

Task 3: Assessment of NOx and SOx Contribution to PM2.5 in Central California

- a) **Case Study:** The contractor will include calculations in the form of a case study for a representative area within the CRPAQS domain. The Study Agency Project Manager will assist in selection of these areas. The case study will demonstrate the assessment of NOx and SOx impact for the selected area. The contractor will include all spreadsheets or databases with necessary data and equations and calculated emissions used for the case study. Final analysis files and model output files will be provided as a product of this task.

- b) **Reassessment:** Using the recommended methodology and/or tools from Task 2, the contractor will reassess NOx and SOx contribution to PM2.5 as documented in the most recent Central California PM2.5 Plans. The normal procedure for sensitivity evaluation is to model a 10-25% reduction in precursor emissions. Modeling for the SJVAPCD 2008 PM2.5 Plan, however, modeled 50% reduction in emissions. This task would be to quantify the relationship at a more reasonable emission reduction of 25% or specify and implement an alternative approach for this assessment. Methodology development and implementation for quantification of nitrate and sulfate formation interaction or independence in this analysis is also requested.

Task 4: Final Report

After the Study Agency has approved all work for prior tasks, the contractor will provide a Draft Final Report and a Final Report. This report will describe the project approach and present the results. The report shall include the following:

- An executive summary which will contain an abstract of the project and a summary of key findings.
- The literature review with an annotated bibliography and a discussion of the state-of-the-science for each topic covered.
- Discussion of the findings and recommendations of Task 1.
- A summary of the technical recommendations and/or tools of Task 2, including comments from the contractor or received from the Technical Committee regarding uncertainties remaining in the approach.
- A summary of results of Task 3.
- Supporting technical documents and calculations shall be included with the report as appendices. Files too large to be included as text documents shall be provided in electronic format as specified by the Study Agency Project Manager

After the contractor submits the Draft Final Report, the Study Agency Project Manager will provide comments to the contractor. The contractor shall comply with the Study Agency Project Manager's requests for supplemental documentation and clarifications in the report and address the Study Agency Project Manager's comments. The

contractor will provide the Final Report within 45 days after receipt of the Study Agency Project Manager's comments. The Final Report must be complete in providing documentation and results for all required objectives. The Study Agency requires that the technical writing 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 Study Agency 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 Study Agency Project Manager may include key personnel of the Technical or Policy Committees in this discussion as needed.

Progress Reports: The contractor will provide brief, written progress reports to the Study Agency Project Manager every month and participate in conference calls to discuss the progress reports.

Progress reports shall include:

- Current status of work products and deliverables,
- Evidence or submittal of items deemed to be complete,
- A budget status summary indicating the percentage expended on major elements and explanation for any items that are not in conformance with the submitted project budget. Note: Provisions of Study Agency agreements allow some reallocation of funding resources during 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
- Action items for which the contractor desires direction or approval.

When requested by the Study Agency Project Manager, the contractor shall meet with the Study Agency Project Manager via telephone to discuss the overall plan, details of task progress, or concerns regarding compliance with required performance objectives or timelines. The Study Agency Project Manager will notify the contractor in advance of any special topics so contractor may assemble key staff or information to respond. The 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 Study Agency Project Manager the progress report and any presentation material necessary for the meeting.

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 the 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 Data Submittal: The contractor shall provide reports and data to the Study Agency in a format specified by the Study Agency using Microsoft Office software (Word, Excel or Access) and shall provide draft and final computer code, supporting data, and input files if applicable in formats agreed upon by the contractor and Study Agency Project Manager. Supporting files or additional final products such as databases, model input files or related technical data shall be delivered in the format specified by the Study Agency Project Manager.

Deliverables: The contractor shall deliver an electronic copy for each of the following:

- **Task 1:** Report documenting state-of-the-science NOx and SOx influence on particulate formation and specific recommendations for applying SANDWICH, regional models and SMAT in Central California.
- **Task 2:** Report discussing the recommended methodology, assumptions and processes suitable for assessing NOx and SOx contribution to PM2.5 in Central California in the CRPAQS domain.
- **Task 3:** Report documenting the assessment of NOx and SOx contribution to PM2.5 in Central California using recommendations and/or tools from Task 2.
- **Task 4:** Comprehensive Final Report of the entire project.

The Study Agency requires that the technical writing of all final products be adequate to clearly explain the processes used to carry out the project. Multiple document revisions may be required if reports are not written to the satisfaction of the Study Agency.

Draft and Final Report: The contractor shall deliver an electronic copy of the draft and final Reports in MS Word to the Study Agency Project Manager for review by the Study Agency Committees. The Study Agency requires that the technical writing be adequate to clearly explain the processes used to carry out the project. Multiple document revisions may be required if reports are not written to the satisfaction of the Study Agency. The contractor is expected to comply with requests for supplemental documentation and clarification of discussion in the draft report. The report must be complete in providing documentation and results for all required objectives. The contractor will be expected to provide revisions in the final report within 45 days after receipt of the Study Agency Project Manager's comments. General standards for completeness of the final report include:

- The executive summary of the final report shall include a summary of the key findings.
- The report shall present all methodologies, calculations, and assumptions critical to the development of conclusions.
- Modeling source code documentation shall include information such as the algorithms, assumptions, calculations, externally written source code utilized, and other support data if used.
- Calculations utilized to complete each task, and utilized within the modeling source code, shall be completely documented and referenced.
- Supporting technical documents and calculations shall be included with the report as appendices or may be cited as references if publically published and available for free electronic download.
- The report shall also include a bibliography of data sources referenced or used to support the evaluation and completion of each task. The Study Agency may request that a copy of these reference documents accompany the final report in order to provide complete documentation of the report unless these documents are publically published and available for free electronic download in which case an internet address should be included along with the bibliography citation.

Copies of Final Report: Upon approval of the final report by the Study Agency, the contractor shall deliver to the Study Agency five bound copies and one unbound reproduction master copy of the report incorporating all final alterations, additions and appendices. The contractor shall also deliver an electronic copy of the final report produced in Microsoft Office.

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

- Invoice one should reflect costs for Task 1 (State-of-the-Science Review and Evaluation of Techniques) and should be submitted with the report,
- Invoice two should reflect costs for Task 2 (Recommended Methodology for Assessing NOx and SOx Impacts on PM2.5) and should be submitted with the report,
- Invoice three should reflect costs for Task 3 (Assessment of NOx and SOx Contribution to PM2.5 in Central California) and should be submitted with the report,
- Invoice four should reflect costs for the comprehensive final report of the entire project and should be submitted with the final report, and
- Invoice five 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. The invoices shall be included with the reports indicated above. The invoices must list the 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

Results from this project may be used to interpret and/or quantify the influence of SOx and NOx precursors on the formation of PM2.5 in Central California. This information is expected to improve the accuracy of modeling projections to assess the impact of control measures involving various precursor emissions. Recommendations and improved modeling techniques to assess NOx and SOx influence on particulate formation may be used in policy decisions including modifications to default guidance provided by EPA for related issues. The Proposer should consider the intended end-use of the results and provide data suitable for this purpose. The Proposer 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 which would be specified in the contract). Payments must correspond with the submission of interim and final reports. Progress reports and conference calls are not included in Table 2.

Table 1: Project Schedule and Deliverables

Action/Work Product	Approximate Date
Release of RFP	August 19, 2011
Deadline for Proposal	September 19, 2011
Contractor Selection	September 2011
Contract Development	September 2011
Contract Approval	October 20, 2011
Deadline for completion of each task shall be determined by a schedule defined by the proposal and approved by the Study Agency Project Manager to ensure progression of the project to timely completion	Provide estimated timeline in proposal
Deadline for Final Report	August 2012
Report Presentation	September 2012

5. BUDGET

Costs 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. All evaluation criteria are described in Section 10.2.

The Study Agency's budget for this project is \$100,000. The budgeted amount is available to the contractor for research, analysis, coordination, teleconferences, meetings, report writing, subcontractors, and all other efforts undertaken by the contractor for this project.

The Proposer's costs must be itemized by the following categories:

Task: List a total cost per task. The Study Agency reserves the right to remove tasks as deemed necessary to remain within budget.

Labor: List an hourly labor rate for each assigned principal and technical specialist. The rate quoted must include labor, general, administrative, and 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. Travel costs are reimbursed at prevailing rates for the contracting company or rates approved by the Study Agency, whichever is lower, unless negotiated otherwise.

Miscellaneous Costs: If any.

Total cost must be clearly indicated in the Costs of Proposal section of the proposal.

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 Proposer must have demonstrated extensive experience and expertise in the following areas:

- 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; and
- Excellent technical writing skills.

To be selected, the Proposer 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 Proposer 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 debarred, suspended, proposed for debarment, excluded, or otherwise declared ineligible from receiving Federal contracts. Access to the EPLS is available at www.epls.gov.

The Proposer certifies by signing the signature page of the original copy of the submitted proposal and any amendment signature page(s) that the Proposer is not presently debarred, suspended, proposed for debarment, declared ineligible, voluntarily excluded from participation, or otherwise excluded from or ineligible for participation under federal assistance programs. The Proposer should complete and return the attached certification regarding debarment, etc., i.e. Attachment A, with their bid. This document must be satisfactorily completed prior to award of the contract.

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.

General Counsel
San Joaquin Valleywide Air Pollution Study Agency
San Joaquin Valley 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 Study Agency 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 Study Agency Project Manager. The contractor shall perform any additional work needed to address issues raised by this process for the items authorized by the Study Agency 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 ninety (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 analysis and objective(s). Demonstrate a clear understanding of the analysis goal. Include total project cost. Provide specific examples of steps to be taken to complete the analysis, as well as measures to assure repeatability, reliability and applicability of analysis.

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 RFP 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, attach a Proposal Budget Summary Table similar to Attachment B of this RFP, which includes task costs, overhead, travel, and other administrative costs. Proposals should include a budget that is sufficient to thoroughly address the goals of this project, and that is itemized by the tasks identified in the RFP. The District reserves the right to exclude tasks from the final work program.

Contractor Capability and Client References (Section IX) - Provide a summary of the firm's relevant background experience. Discuss the applicability of each experience to this RFP. Qualifications of the Proposer, including in-house staff and subcontractors, to complete the required tasks should be included in this section. 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. Attached documents are not part of the 30-page limitation.). Also provide a

list of client references, including the client manager's name, title/function, and phone number for the most relevant projects.

Conflict of Interest (Section X) - Identify any actual or potential conflicts of interest resulting from any contractual work performed, or to be performed, for other clients, as well as any such work done, or to be done, by proposed subcontractors. Specifically, Proposer must disclose any recent or current contracts with the Study Agency, business entities regulated by any of the participating air districts, and/or any environmental group or business interest group. 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 their 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 Monday, September 19, 2011**. Late proposals will not be accepted. Any correction or resubmission by the Proposer will not extend the submittal due date.
- **Delivery Address** - Proposal must be directed to and received at the address below and should be directed to:

David Nunes, Senior Air Quality Specialist
San Joaquin Valley Air Pollution Control District
1990 E. Gettysburg Avenue
Fresno, CA 93726-0244

- **Identification** – To accommodate processing and identification of time of receipt, the Proposer 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 Proposer and the words:

“PROPOSAL: NOx and SOx Relationships to PM2.5”

- Electronic Copy (Compact Disc, read-only-memory) - The Proposer shall also submit an electronic copy of the proposal in Microsoft Word. The electronic copy shall be emailed to david.nunes@valleyair.org

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; or
- It is not signed by an individual authorized to represent the firm.

Once a proposal is submitted, the composition of the proposal 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 ninety (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

The following section describes the process the Study Agency will follow to select the contractor from among the responsive proposals. The Study Agency retains the right to reject all proposals received and conduct direct negotiations with a selected Proposer if all Proposals are considered to be substantially nonresponsive to key issues. The Study Agency also retains the right to omit specific tasks from the final work program during the development of the contract.

10.1. Addenda and Supplements to the RFP

The Study Agency may modify the RFP and/or issue supplementary information or guidelines relating to the RFP during the proposal preparation period. 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. Evaluation Criteria for Qualification for Respondents

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 Policy Committee. Failure to adhere to specifications in this RFP may be cause for rejection of the Proposal.

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 a brief statement of qualifications of the proposed participants and a description of the duties they will perform, including specific discussions of (a) previous working relationships with government agencies, and (b) recent project experience. Extensive corporate experience is not as important as the qualifications of the principals who will be dedicated to the project. Greater detail may be incorporated by reference to a corporate website (preferred) or as a standard package.
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 minimal 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 shall provide insurance in coverage and amount acceptable to the Study Agency. The Study Agency will require that any contractor prior to endorsement of a contract meet the following insurance requirements for this project.

Without limiting Study Agency's right to obtain indemnification from contractor or any third parties, the contractor, at its sole expense, shall maintain in full force and effect throughout the term of this Agreement the following insurance policy(s):

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 One Million Dollars (\$1,000,000) per occurrence.

The foregoing insurance policy(s) shall not be canceled, reduced, or changed without a minimum of thirty (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 Study Agency 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

A considerable number of papers have been published in a variety of journals. Some of these papers, along with completed reports for CRPAQS are available for download at: <http://www.arb.ca.gov/airways/ccaqqs.htm>

Technical analysis for issues regarding SMAT and SANDWICH are provided in the 2008 PM_{2.5} and its associated protocol, available for download at: http://www.valleyair.org/Air_Quality_Plans/AQ_Final_Adopted_PM25_2008.htm

Primary attention should be directed to:
Chapter 3: What is Needed to Demonstrate Attainment?
Appendix E: District Additions to the Conceptual Model
Appendix F: SJV PM_{2.5} SIP Modeling Protocol
Appendix G: Regional Air Quality Modeling
Appendix H: Weight of Evidence

A variety of documents prepared by EPA for SANDWICH and SMAT are accessible through the internet, many of these were documented as references in the PM_{2.5} Plan or its Protocol. If these references are no longer available for download, please contact the SJVAPCD for assistance in obtaining a copy.

Frank, N. H. (2006). Retained nitrate, hydrated sulfates, and carbonaceous mass in Federal Reference Method fine particulate matter for six eastern cities. *J. Air Waste Management Association*, 56(4), 500-511.

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: Employee Salaries and Benefits	\$
2. Subcontractors	\$
3. Travel	\$
4. 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									
Fee									
Additional work (please specify)									
Miscellaneous (please specify)									
TOTAL FOR PROPOSAL									

* Salary, benefits, and overhead