

REQUEST FOR PROPOSALS

CALIFORNIA REGIONAL PM10/PM2.5 AIR QUALITY STUDY (CRPAQS)

**AMMONIA EMISSIONS IMPROVEMENT PROJECTS
IN SUPPORT OF CRPAQS AEROSOL MODELING AND DATA ANALYSES:
Draft Ammonia Inventory Development**

1. PURPOSE AND OVERVIEW

The intent of this Request for Proposals (RFP) is to develop a draft, ground-level, gridded ammonia inventory for use in data analysis and grid-based aerosol modeling for the California Regional PM₁₀/PM_{2.5} Air Quality Study (CRPAQS). The CRPAQS will take place within California's San Joaquin Valley (SJV) and this draft inventory will be used to assess the sensitivity of aerosol model estimates to changes in variables such as the spatial resolution, temporal resolution, and emissions magnitudes for various categories of ammonia emissions.

The draft inventory will be developed using the best available ammonia emissions information for the study domain, determined through a review of literature and existing gridded ammonia emission inventories. At a minimum, the contractor will produce an ammonia inventory with 1-hour temporal resolution and 1-kilometer by 1-kilometer spatial resolution. Ideally, the contractor will develop and deliver an ammonia emissions model or adapt an existing emissions model to be used in generating gridded ammonia inventories. However, model development or adaptation is of secondary importance and the level of effort expended towards this is to be commensurate with the available funding.

In addition to the above, the contractor will deliver a User's Guide that includes detailed processing instructions, a library of all of the utilized processing routines, and a library of all of the utilized input data. These deliverables will be used to generate additional ammonia inventories in-house. Prospective contractors should take note that data products provided in response to this RFP might be combined with or used to improve emissions estimates in the California Air Resources Board emissions inventory database.

2. BACKGROUND

Ammonia plays a major role in determining secondary particulate concentrations in the CRPAQS domain. Chemical reaction of ammonia emissions with airborne oxides of sulfur and nitrogen produces fine airborne ammonium sulfate and ammonium nitrate particulate matter. These reaction products, especially ammonium nitrate, represent a large percentage of wintertime PM_{2.5} in the San Joaquin Valley (SJV).

The California Regional PM₁₀/PM_{2.5} Air Quality Study (CRPAQS) is a multi-year program to study particulate matter air pollution in Central California. The Study is comprised of meteorological and air quality monitoring, emissions inventory development, data analysis, and air quality simulation modeling. The objectives of the Study are to:

- Provide an improved understanding of emissions and dynamic atmospheric processes that influence particle formation and distribution;
- Develop and demonstrate methods useful to decision makers in formulating and comparing candidate control strategies for attaining the federal and state PM₁₀/PM_{2.5} standards in central California; and,
- Provide reliable means for estimating the impacts of control strategy options developed for PM₁₀/PM_{2.5} on visibility, air toxics, and acidic aerosols and on attainment strategies for other regulated pollutants, notably ozone.

Grid-based aerosol models will be applied to accurately simulate particulate matter concentrations in the SJV and to investigate the sensitivity of secondary matter particulate formation to various parameters. To check the accuracy of modeling results, the first step in the modeling process will be to demonstrate acceptable model performance. Model performance evaluation metrics include replicating, to an acceptable degree of accuracy, the hourly, chemical- and size-specific concentrations of airborne particulate matter at locations coincident with field study monitoring sites at or above ground level. This might include, for example, hourly concentrations of particulate ammonium nitrate ranging from 1.000 microns to 1.125 microns in size. Once acceptable model performance is established using field study data, computer simulations of air quality for years in the future will be performed. The purpose of these future year simulations is to assess potential emission control strategies that might lower elevated pollutant concentrations that are observed during the field study.

Two primary data inputs for aerosol modeling are 1) three-dimensional, hourly meteorology and 2) hourly, ground-level emission rate estimates for each grid-cell, particle size-range (if applicable), and chemical compound, such as ammonia. The aerosol model will use the three-dimensional meteorological inputs to set environmental conditions and to simulate the vertical and horizontal mixing of new emissions with pre-

existing pollutants in each grid cell. Meteorological inputs will also be used to simulate the three-dimensional transport of pollutants from grid-cell to grid-cell.

Spatially and temporally accurate emission estimates and meteorological data as well as accurate model formulations are important in order for aerosol models to perform adequately and to generate the right results for the right reason. However, because computer modeling of aerosols is a relatively new science, the minimum level accuracy required for these inputs is not well understood. Thus, it is not known how well currently available ammonia emissions estimates and processing techniques can accurately 'drive' aerosol models to produce results within acceptable model performance constraints. Recent work by AVES and SAI to update the gridded ammonia inventory for the South Coast Air Quality Management District (SCAQMD) suggests that further research into spatial and temporal allocation issues is needed for several categories of ammonia emissions¹.

Presently, most of the emissions data inputs that would be used to construct a gridded, hourly ammonia inventory for use in aerosol modeling are based on countywide, annual emissions estimates. This resolution is in great contrast to the grid-cell-specific, hourly emissions input requirement of aerosol models. Due to the difference in resolution between the available data and the aerosol model emissions input requirements, the existing emissions data must be processed (i.e. spatial and temporal allocation) to fit the required resolution of the aerosol model.

Current spatial and temporal data processing techniques primarily consist of allocating the less resolved emissions estimates to a smaller area and shorter time period by applying broad-based spatial surrogates and temporal profiles. In most cases, the allocation of large-time-frame emission estimates to a smaller time frame is accomplished by applying some generic quarterly, monthly, daily, or hourly scaling factor. The problem with this technique is that the utilized scaling factors are independent of important environmental factors, like ambient temperature, soil moisture content, soil pH, and relative humidity that affect ammonia emissions. These environmental factors can significantly affect the hour-to-hour flux rate and location of ammonia emissions that emanate from the largest sources of ammonia (livestock, soils, and others).

To better understand the applicability of the current ammonia emission data sources and ammonia emissions processing techniques to aerosol modeling, a three-phased approach will be used to develop the gridded ammonia inventory for CRPAQS. Phase 1 will consist of assembling the best, currently available emissions data and processing techniques to produce a draft, gridded ammonia inventory. Phase 2 will be performed in-house and will consist of utilizing the Phase 1 emissions estimates to preliminarily assess model performance and to perform aerosol model sensitivity studies. These studies will be designed to assess the need for further ammonia emissions refinements. If the need arises, Phase 3 will involve addressing any questions or concerns raised in Phase 2.

This RFP addresses Phase 1, described above. Thus the primary intent of this RFP is to generate a draft ammonia inventory, based on the best available information, to support aerosol modeling. A secondary goal is to develop an ammonia emission modeling system that can produce gridded ammonia inventories, if funding is available within the resources allocated. The draft inventory will be used in-house to evaluate the sensitivity of select aerosol models to various changes in ammonia emission characteristics and environmental parameters. These studies will help to better define the minimum required spatial and temporal resolution of ammonia emission inputs with respect to the planned modeling goals and may also help improve existing spatial and temporal allocation procedures. In addition, sensitivity study results will provide guidance as to whether the current, best available ammonia emissions estimates and processing techniques must be significantly modified for generating aerosol modeling inventories and where the best modifications could be made. Further ammonia inventory improvement work that is related to the sensitivity study results might be addressed in future RFPs.

The following CRPAQS and California Air Resources Board ammonia-related projects are in place, in progress, or have already been completed:

- Emissions activity data collection² (CRPAQS project, in place).
- Estimation and modeling of ammonia emissions from fertilizer use and background sources³ (ARB project, in progress).
- Preliminary ammonia measurements for livestock operations, POTW operations, and soil ammonia sources^{4,5} (CRPAQS project, completed).

Further information about ongoing and planned ammonia emissions work sponsored by the California Air Resources Board can be found at the agency's PM_{2.5} and Ammonia Inventory Research Web Page⁶.

The field programs phase of the CRPAQS will consist of 14 months of monitoring throughout the San Joaquin Valley (SJV) and surrounding regions. These field studies are currently planned for December 1, 1999, through January 31, 2001. The monitoring will extend over a domain from the Sacramento Valley in the north, to the Tehachapi Mountains in the south and from the Pacific Ocean on the west to the Mojave Desert on the east.

Surface and aloft air quality and meteorological measurements will be collected daily, utilizing a network of surface sites, radar profilers, and sodars. Air quality sampling locations in the annual network, operating from December 1, 1999, through January 31, 2001, will consist of three classes of monitoring sites:

- Full scale "anchor" monitoring sites measuring both gaseous and aerosol species;
- Supplemental monitoring sites measuring aerosol species using portable monitors at "satellite" sites; and
- Monitors in a "backbone" network of ARB and air pollution control district sites.

The annual program will overlap the episodic field programs. The winter episodic field study will take place over a period of eight weeks on a forecast basis during mid-November through January of 2001. The emphasis of the winter field program will be on collection of PM_{2.5} data. Special emphasis will be placed on collection of continuous and species specific particulate measurements to support both receptor and grid-based modeling approaches. The summer episodic field program will be conducted from July 1, 2000 through August 31, 2000 and will focus on transport into the southeast desert. The fall episodic program will take place over a period of eight weeks from September 15, 2000 through November 15, 2000 and will focus on both PM₁₀ and PM_{2.5} in the central portion of the San Joaquin Valley surrounding the small agricultural town of Corcoran.

Table 1 and Figure 1 provide a general idea of the extent of monitoring that will take place during the CRPAQS field study⁷. Five samples per day of water soluble sulfate, nitrate, ammonium, and potassium will be acquired during wintertime, episodic monitoring at anchor sites. Also, activities that might occur within distances of up to 1 kilometer from certain monitoring sites that are below the modeling grid resolution will be collected to explain some of the highest concentrations experienced at the ambient monitoring sites. In addition, many of the CRPAQS monitoring sites will operate continuous visibility monitors with five-minute averaging periods. Creative use of field study data will assist in identifying the measurement locations most affected by local sources and the magnitude and direction of those sources with respect to the monitor. These data could also help determine the level of homogeneity and baseline concentration levels of ammonia throughout the portions of the CRPAQS domain.

The draft Field Program Plan⁷ details the measurements and schedule intended for the field study. The plan is available on the study web site along with other reference documents at:

<http://www.arb.ca.gov/ccaq/ccaqs.htm>

Study documents can be found on the web site by clicking on "Publications."

During the CRPAQS field study it would be ideal to measure precursors, or reactants, as well as the secondary particulate matter products produced by precursor reactions. This would provide a more fundamental understanding of the causes of secondary particulate matter formation in the SJV. However, because there are technical difficulties in measuring ammonia and nitric acid that are still being researched, the primary focus of the CRPAQS field program will be on surface-based field measurements of secondary reaction products like ammonium, nitrate, and sulfate. Despite the technical difficulties in measuring some precursor concentrations, CRPAQS and the Air Resources Board will make some experimental measurements of ammonia both at ground level and above ground level elevations^{6,7}. It is hoped that these precursor measurements, although experimental, will further the understanding of three-dimensional ammonia-based secondary particle formation in the study domain.

Year-, month-, and day-specific emissions source activity data often cannot be reconstructed after the completion of the field program and therefore require collection

and documentation throughout the monitoring period. For this reason, in addition to measuring concentrations of airborne compounds, emissions activities will be collected for the sources of emissions known to contribute the greatest to ambient particulate concentrations ².

The Integrated Monitoring Study (IMS-95) study was implemented as a planning study for the CRPAQS and has a study domain that is a fraction of the size of the CRPAQS domain. IMS-95 occurred during the wintertime 1995-1996 and consisted of field monitoring within the central and southern portions of the San Joaquin Valley. IMS-95 field study results imply that the IMS-95 sub-domain is not ammonia limited at ground-level elevations. However, it is important to note that these IMS-95 results are only for secondary, ground level pollutant concentrations during wintertime conditions in the IMS-95 domain. Thus, it is unknown whether ammonia-limited conditions exist in other CRPAQS sub-domains or even in the IMS-95 sub-domain on a more refined spatial or temporal scale than has been studied to date.

3. CRPAQS MANAGEMENT STRUCTURE

The CRPAQS is a large-scale program involving many sponsors and participants. Three entities are involved in the overall management of the Study. The San Joaquin Valleywide Air Pollution Study Agency (JPA), a joint powers agency formed by the nine counties in the Valley, directs the fund-raising and contracting aspects of the Study. A Policy Committee comprised of four voting blocks: State, local, and federal government, and the private sector, provides guidance on the Study objectives and funding levels. The Policy Committee approves all proposal requests, contracts and reports. A Technical Committee parallels the Policy Committee in membership and provides overall technical guidance on proposal requests, direction and progress of work, contract work statements, and reviews of all technical reports produced from the study.

On a day-to-day basis, the California Air Resources Board (ARB) is responsible for management of the Study under the direction of the ARB Planning & Technical Support Division. The ARB writes and monitors contracts with the participants and is the primary interface between contractors, the Policy and Technical Committees, and the JPA.

4. ADMINISTRATION

The contractor selected to conduct this work will report to the ARB Program Manager. The period of performance of this contract will be approximately 2 ½ years with work expected to commence on approximately May 15, 2000. Contract performance is not to begin until a contract is fully approved by the San Joaquin Valleywide Air Pollution Study Agency.

5. STATEMENT OF WORK

A. TASK 1. Prepare a Detailed Work Plan.

Reviews of existing ammonia emissions literature, ammonia inventories, and processing techniques will be used to develop the detailed work plan. It is critical to control the amount of resources used for this task in order to maximize the resources available for subsequent tasks, in particular Task 4, which has the highest priority.

Identify the sources of ammonia emissions within the study domain. With this in mind, perform reviews of the most pertinent and promising ammonia emissions literature, ammonia inventories, and emissions processing techniques. Based on the reviews, identify the available emissions processing techniques and data sources that are suitable for use in generating a gridded ammonia inventory for the identified sources. Where the review results in multiple sources of data or processing techniques, assess the strengths and weaknesses of the information with respect to producing an accurate 1-kilometer by 1-kilometer, hourly ammonia emissions inventory. Also, address using or adapting currently available emissions modeling systems and data to produce a gridded ammonia inventory within the resource constraints of this RFP. The gridded inventory review will include, at a minimum, reviewing gridded inventories and emissions-related work sponsored by the Study Agency (e.g. IMS-95 Technical Support Study 15), California Air Resources Board (ARB), and the South Coast Air Quality Management District (SCAQMD).

Based on the literature/product reviews and for each ammonia emissions source category, identify the most promising, practical processing techniques that will produce accurate gridded, hourly emissions estimates statewide and for the CRPAQS domain. This may involve the identification of multiple approaches for a single ammonia emissions source category. This step will include identification of new or promising bottom-up approaches methods for spatial surrogate and temporal profile development. Include a brief discussion of the relative cost/benefits of each method over other methods.

For each source category of ammonia emissions, recommend the best processing method and data inputs for use in generating the draft inventories (e.g., top-down emissions estimation method and associated spatial/temporal allocation data or complete bottom-up approach). Also, justify the selection of the recommended processing method and data inputs over other alternatives.

Where top-down processing approaches are recommended, identify in detail the existing spatial surrogate and temporal profile data that will need to be collected or updated. Where spatial allocation methods or temporal allocation methods can be improved, provide details as to how to improve them as well as the relative magnitude of improvement that can be expected. The details to be provided will include recommendations for the collection of additional data inputs and collection or development of processing routines (all of which will be supplied as deliverables under this project).

With respect to recommended bottom-up emissions processing approaches, the collection of period-specific activity data may be required. To ensure the availability of sufficient bottom-up input data and to avoid duplicate data collection, it is necessary to confirm that the CRPAQS emissions activity data contractor or any other source will collect the needed activity data within the required time periods. In addition, since ARB and CRPAQS have existing contracts related to livestock and soil emissions, coordination with these projects and consideration of the associated results is required.

With respect to data inputs, the contractor is expected to collect the highest spatial resolution and spatial extent possible (e.g. State of California), where the spatial and temporal resolution is associated with little or no additional cost, other than additional storage requirements. Where multiple data sources are discovered and the quality of data is equivalent among these sources, the sources of data that provide regular updates are preferred over one-time data set sources. For each recommended data source, supply the following information in the work plan (where available):

- Associated categories of ammonia emissions,
- Data supplier contact information,
- Native file format and number of years in the specified format,
- Unit conventions,
- Available spatial extent,
- Spatial resolution and accuracy,
- Available periods of record and temporal resolution (if applicable),
- Geographic and GIS-specific attributes (e.g., projection, precision, etc.)
- The cost of data acquisition (provide both statewide and domain-only costs),
- Data licensing issues (e.g., annual fees or whether the data can be freely distributed).
- Frequency and cost of data updates,
- Rate the experience/reliability of the data source with respect to providing accurate, up-to-date information;
- Relative confidence in the associated data with respect to generating accurate 1-kilometer by 1-kilometer, hourly resolution emission estimates.

For each category of emissions, discuss the recommended processing method and recommended set of data inputs. Document the process of creating gridded emissions estimates from data collection to producing gridded, hourly emissions estimates. Provide details as to the data standards that will be used and document the process required to standardize each type of proposed data (e.g., GIS projection, emission rate units, etc.). Also, provide details as to the quality assurance (QA) and quality control (QC) procedures that will be implemented. Plan to perform all processing programmatically and justify exceptions where programmatic processing is not specified (e.g. cost or practicality). Define in detail the data library structure and file-naming conventions for data I/O and processing codes. Identify all software (application and OS) that will be used in addition to whether new or existing computer codes will be used for each processing step.

Discuss the feasibility, advantages, and disadvantages of integrating all of the recommended processing methods and input data (above) into an emission modeling system within the available funding (this relates to Task 3). Also, discuss the feasibility of basing the system on ArcInfo or ArcView (both are products by Environmental Systems Research Institute). If feasible, recommend whether to develop a new, stand-alone ammonia emissions modeling system based on ArcInfo or ArcView or whether to adapt an existing emissions model (and which one to use) and provide a detailed outline of emissions model development or adaptation. Address the need and cost for creating a 'fall-back', draft inventory for use in validating emissions model results and to buffer the effects of potential emissions model development delays. This may affect the order in which Task 3 and Task 4 are implemented as well as the range of data collected in Task 2.

At the completion of this project all data inputs, processing codes, processing documentation, and project hard disks will be provided to the Study Agency. This will facilitate future, in-house emissions processing. With this in mind, estimate the volume of disk space that will be required for Study Agency purchase. In addition, the contractor will be required to provide regular (e.g. monthly) system backups to the project manager. Thus, the workplan will specify the hardware, software, and procedures that will be used for system backups. If backup compatibility issues arise in the draft work plan, the Technical Committee will specify and purchase system backup hardware, media, and software to facilitate delivery of functional system backup tapes to the project manager (these items will be the property of the Study Agency).

Submit all recommendations to the Technical Committee for review and comment in the form of a draft work plan containing detailed tasks as well as task-specific estimates of the cost, resources, and timelines to create a draft gridded ammonia inventory. Modify the plan in accordance with Technical Committee suggestions and submit a final plan.

B. TASK 2. Collect Data and Create Standard Input Library.

Collect and create a data input library in accordance with the specifications in the approved work plan. Process input data to fit the data standards presented in the work plan (e.g., units, spatial/temporal extents, data model, etc.). Provide the project manager with documentation of the procedures used and with a system backup of all computer programs, input data (raw and standardized), and output data.

With respect to raw data and where little or no additional cost is involved (other than disk space requirements) the contractor will collect the largest spatial extent and highest spatial resolution possible (e.g. State of California). To avoid task duplication, the contractor will be required to coordinate data collection with the CRPAQS emissions activity data contractor and to be aware of other on going ARB-sponsored data collection activities.

Fully document the process required to obtain each source of data utilized to facilitate future data updates by project sponsors.

C. TASK 3. Develop Ammonia Emissions Model.

The feasibility of performing Task 3 will be discussed in the final work plan and the TC will grant specific authority to perform Task 3 work elements. The level of effort for this task will be such that it will not affect the timely completion of Task 4 or level of funding required to complete Task 4 and Task 5.

Thus, where funding is available and following specific TC approval, either adapt an existing emission modeling system (system) or develop a new, stand-alone system for use in producing ammonia emissions estimates. This system could be used to complete Task 4 deliverables and must be capable of producing output files in formats that can be directly imported into EMS-95 gridded, hourly emissions files.

Once completed and successfully tested, submit a fully documented draft system and a draft User's Guide to the TC for review and comment. At a minimum the documentation will detail the flow of processing, processing codes, and the system data model. Modify the draft system and the draft user's guide in accordance with TC comments and submit a final system and final User's Guide. Provide 24 hours of on-site training (if needed).

D. TASK 4. Produce Draft Ammonia Modeling Inventory

Produce and deliver draft, grid-based ammonia inventories for use in aerosol modeling and data analysis corresponding to two CRPAQS 1999-2001 field measurement study periods. These two periods will be determined by the Technical Committee (e.g. fall, winter, annual, or a selected episode). As specified under Task 1, all processing will be performed programmatically, to the extent possible. This will facilitate reproducing the delivered draft inventories, if desired, and producing inventories for other time periods of interest by Study personnel. Deliverables will include documentation of all sources of data, processing procedures, QA/QC checks, and computer codes utilized in producing each draft inventory. An electronic archive of all data and computer codes utilized in generating the draft inventories will also be delivered. Draft inventories will be provided in formats that can be directly imported into EMS-95 gridded, hourly emissions formats.

E. TASK 5. Documentation

Upon completion of all work elements of the contract, submit a master (cumulative) draft final report documenting every task performed. Submit the report to the TC for review and comment. Modify the draft master report in accordance with TC comments and submit a final report. Include an executive summary of methods, results, and recommendations.

All computer codes used or written to perform work under this contract will be submitted in electronic form and internally documented including, at a minimum, the following information: programmer name; date; purpose; relationship to master programs and list of subordinate program 'calls'; emissions source category (if applicable); input data specifications (e.g. file names, etc.); output data specifications (e.g. file names, etc.); and variable descriptions.

Submit all correspondence and reports in electronic form, compatible with Microsoft Word.

6. PRODUCTS AND SCHEDULE

The performance period of this project is expected to be 2 1/2 years from contract initiation. The table below provides a schedule of deliverables.

<u>Deliverable</u>	<u>Due Date</u>
Draft work plan	Within four months of contract initiation.
Final work plan	Within one month of receiving TC comments.
Inputs to draft inventories	Within 6 months of final work plan approval.
Draft inventories and Emissions Modeling System	Within 18 months of contract initiation. Specifics to be determined per review of draft work plan.
Draft final report	Within 6 months of final inventory and emissions modeling system receipt.
Final report	Within 2 months of receiving TC comments.

7. BUDGET

A budget of \$100,000 has been allocated for this project. If more funding becomes available, it will be allocated based on Study-wide priorities. Where large funding deficiencies seem evident in this RFP, contractors are encouraged to propose and justify enhanced work elements, additional work elements, or task-specific trade-offs in the Additional Proposed Work and Costs section of the proposal.

8. CONTRACT REQUIREMENTS

A. Hardware and Software

The contractor will be required to independently purchase and maintain all software and hardware used under this project using their own financial resources. The only exception to this will be for project-specific hard disk space and backup media which will be purchased by the JPA solely to store project-specific data. All project-specific data, source-code, documents, and developed applications will be stored on the JPA-purchased hard disks at the contractors site. Following completion of this project all JPA-purchased hard disks containing all project data and all backup media will be returned to the JPA.

B. Data Backup and Delivery Requirements

The contractor will be required to perform and deliver regular, monthly data backups of all project data.

C. Reporting Requirements

The contractor shall deliver to the ARB Program Manager a monthly invoice and technical progress report. Payment to the contractor will not be made until both the monthly technical progress report and invoice are received.

With respect to the payment period completed, the invoice shall set forth in detail by task, in accordance with the contract budget, charges for time expended on the project, including classification of personnel involved in such time expenditure, and the monthly, weekly, or hourly rates for such personnel, as appropriate. The invoice shall also contain an itemization of all materials used for the project, including the purpose of its use and its cost.

The technical progress report shall summarize the work carried out during the reporting period; problems encountered or anticipated and proposed means for their resolution; budget and schedule status; and planned activities for the next reporting period.

D. Correspondence

All correspondence regarding this contract should be sent to the Program Manager at the address listed below:

Mr. Don McNerny
Program Manager
California Regional PM10/PM2.5 Air Quality Study
c/o California Air Resources Board Planning & Technical Support Division
P.O. Box 2815
Sacramento, CA 95812

E. Contract Language

A sample copy of the contract language is presented in Appendix A. The insurance requirements for each contract will be determined by the JPA, in consultation with the Special District Risk Management Authority. Insurance requirements will be tailored to each contract based upon the specific scope of work to be conducted. Any proposed revisions to the contract language must be included as part of the proposal. Questions regarding the contract should be directed to the JPA attorney at the address provided below:

Mr. Philip Jay
San Joaquin Valleywide Air Pollution Study Agency Counsel
c/o San Joaquin Valley Unified Air Pollution Control District
1990 East Gettysburg Avenue
Fresno, CA 93726
(559) 230-6033

9. PROPOSAL PREPARATION AND EVALUATION

A. Proposal Structure/Organization

The proposal should be clear and concise and discuss the issues in section B in as much detail as possible. In addition, the proposal will adhere to the following document outline:

- I. Introduction and Project Purpose
- II. Gridded Ammonia Inventory Improvement Issues.
- III. Technical Approach for Improvements.
- IV. Technical Expertise and Experience of Proposed Staff.
- V. Hardware, Software, and Other Tools.
- VI. Cost and Schedule.
- VII. Additional Proposed Work and Costs (if any)
- VIII. Staff Qualifications

B. Proposal Content and Issues to Address.

i) Introduction and Project Purpose

State the purpose of this project.

ii) Gridded Ammonia Inventory Improvement Issues.

State the problems and issues specific to improving gridded ammonia emissions estimates and addressing the work elements presented in the Statement of Work section of this RFP. This is an opportunity for each proponent to demonstrate their knowledge of the issues pertaining to this RFP. Solutions will be discussed in the following section.

Responses to this RFP will discuss, at a minimum, the following technical issues pertaining to the proposed work elements:

- The status and ‘appropriateness’ of existing ammonia inventory estimates, methods, and inputs with respect to the development of an accurate grid-based emission ammonia inventory (e.g. categories of emissions, estimation techniques, emission factors, temporal profiles, spatial surrogates, bottom-up approaches, etc.).
- With respect to aerosol modeling, discuss potential gaps in existing ammonia inventories.
- Development and implementation of an ammonia emissions model.

iii) Technical Approach for Improvements.

State the technical approach in resolving the problems and issues defined above. Also identify any pitfalls to be avoided and potential solutions to these pitfalls. The more refined the technical discussion is in the proposal, the better.

Discuss the method and metrics by which gridded ammonia emission improvements that are best suited to improve CRPAQS aerosol-modeling results and enhance CRPAQS data analyses will be identified and prioritized within the available resource constraints. Also, discuss how the feasibility of developing an ammonia emissions modeling system will be assessed and how this aspect of this RFP might be implemented, if feasible. Where details are left out in the proposal or where issues are generally discussed, provide how any missing details or generalized discussions will be refined in a detailed work plan (See Task 1 of the Statement of Work).

Provide an overall outline and summary of the issues to be addressed in a work plan as well as potential literature and data sources (e.g., emission inventories) to be reviewed in Task 1 of the Statement of Work. Present this in as much detail as possible. Also, present the expected resource allocation to each of the tasks in the Statement of Work.

iv) Technical Expertise and Experience of Proposed Staff.

Proponents must convince the Technical Committee as to the merits of their proposal as well as to the capabilities and expertise of the proposed staff, not of the firm or organization. The proposed staff will be highly knowledgeable of ammonia emissions development and historical ammonia inventory research. The staff will also be familiar with on-going or recently completed ammonia emissions research that could benefit aerosol model performance and data analysis. In addition, the proposal will show that the proposed staff are highly qualified to perform data management tasks associated with combining new and existing ammonia emissions information, developing an emissions modeling system, and producing ammonia emissions inputs for use in aerosol modeling and data analysis. In light of this, the proposal will describe the staff's experience and recent projects involving the following:

- 1) Producing emissions inputs for use in grid-based aerosol models.
- 2) Using and developing applications with ARC/Info and ArcView.
- 3) Using and developing an emission modeling system or other applications having features similar to the features desired for this project.
- 4) Integrating, developing, or improving top-down:
 - a) Ammonia emissions rates (e.g. emission factors or activity data).
 - b) Spatial allocation data.
 - c) Temporal allocation data.
- 5) Integrating, developing, or improving bottom-up ammonia emissions estimates.

In addition to the above, the proposal will identify how, based on staff experience and knowledge, resources will be maximized for each task in the Statement of Work. For example, staff's level of experience is important with respect to minimizing the resources expended in performing a literature/data review (Task 1 of the Statement of Work). That is, it is in the best interest of this project to avoid literature reviews that will provide little potential for improvement of gridded ammonia emissions estimates over existing emissions inventories and processing techniques. This includes avoiding the conduct of literature reviews that simply recapitulate or reference literature or other reviews that are out-dated or not pertinent. Avoiding these situations requires broad, up-to-date knowledge of ammonia emissions, emissions inventory research, and currently utilized gridded inventory processing techniques. Thus, with respect to Task 1, the proponent will demonstrate that their staff is experienced enough to select and produce quick and productive reviews of pertinent literature, emissions inventory data, and emissions processing systems.

v) Hardware, Software and Other Tools.

Describe the facilities, hardware, software, and other tools that will be used. Greater detail may be incorporated by reference to a corporate web site or as a standard package.

vi) Cost and Schedule.

Present the expected resource allocation and schedule for each of the tasks in the Statement of Work in as much detail as possible. Also, discuss the management approach for dealing with routine operations, unexpected problems, changes in work scope, potential project-related limitations, pitfalls, and cost overruns.

Prepare a proposed budget for this work, to be summarized on the cost reporting form shown in Table 2. Supplement the cost summary form with appended spreadsheets detailing:

- Hours, hourly rates for individuals, and costs per task for all proposed personnel.
- Specifications and costs for any equipment, data, or supplies to be purchased .
- Any expected cost increases such as annual salary adjustments (It is anticipated that contracts related to this RFP will be awarded on a time and materials basis with a maximum, not-to-exceed value).

If large funding deficiencies seem evident, the proponent is welcome to propose and justify enhanced work elements, new work elements, or task-specific trade-offs in the Additional Proposed Work and Costs section of the proposal.

C. Guidelines and Criteria for Proposal Evaluation

A decision as to which contractor is selected will be based on the response to the above issues. The following specific criteria will be used to evaluate the proposals:

1. Technical approach. (30 points)
2. Experience and capabilities of lead and support staff. (20 points)
3. The proponent's technical performance on similar, past projects and the extent to which the participant can draw directly on past experience in meeting the requirements of the RFP. (20 points)
4. Management plan and commitment to schedule. (10 points)
5. Cost. (20 points)

D. Conflict of Interest Requirements

Government Code Section 1090 generally prohibits a public official from being financially interested in a contract that 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 Study, certain consultants are precluded from participating in all or some of the post-planning contracts. This preclusion would apply to these consultants as either a prime contractor or a subcontractor. In most cases, whether a particular consultant is eligible to bid will depend on an analysis of all of the circumstances surrounding the consultant's earlier participation in the CRPAQS and the work that the consultant now proposes to perform.

Any response to this RFP that includes a consultant who is ineligible based on Government Code Section 1090 will be rejected during the format review of the proposals.

Questions concerning the eligibility of a potential bidder must be directed to the JPA attorney at the address provided below prior to the preparation of a proposal.

Mr. Philip Jay
San Joaquin Valleywide Air Pollution Study Agency Counsel
San Joaquin Valley Unified Air Pollution Control District
1990 East Gettysburg Avenue
Fresno, CA 93726

E. Submittal Requirements

An original and twenty (20) hardcopies of your proposal, or 10 hardcopies and 10 electronic copies in Adobe Acrobat® on CD-ROM or floppy disk, shall be sent with a cover letter to the ARB Program Manager, Mr. Don McNerny, at the address listed in the Contract Requirements section. Hand carried or express mail packages may be delivered to Mr. Don McNerny at 2020 L Street, Sacramento, CA 95814. Proposals must be received no later than the date and time shown in the attached cover letter.

10. REFERENCES

1. Botsford, Charles et. al. (1999): *Draft 1997 Gridded Ammonia Emissions Inventory Update for the South Coast Air Basin*. Prepared by AVES for the South Coast Air Quality Management District under contract #99025.
2. Blumenthal, Donald L., et. al. (1999). *A Proposal for California Regional PM10/PM2.5 Air Quality Study: Development of Emissions Activity Data in Support of CRPAQS Annual and Episodic Field Studies*. A proposal prepared by Sonoma Technology Inc. for the California Regional PM10/PM2.5 Air Quality Study, STI-799390.
3. Krauter, Charles, et. al. (1998). *Development of Emissions Inventories for Ammonia in Agricultural Systems in California*. Proposal to the California Air Resources Board. California Air Resources Board Contract number 98-716 with the California State University, Fresno, NASA Ames Research Center, UC Riverside, and CSU Monterey. Project Completion: Late summer, 2000.
4. Coe, Dana L., et. al. (1997). *Technical Support Study 15: Evaluation and Improvement of Methods for Determining Ammonia Emissions in the San Joaquin Valley*. Prepared by Sonoma Technology Incorporated for the California Regional PM10/PM2.5 Air Quality Study. STI contract STI-95310-1759-DFR.
5. Fitz, D., et. al. (1997). *Evaluation and Improvement of Methods for Determining Ammonia Emissions in the San Joaquin Valley*. Field Data Report as part of Technical Support Study 15 (Coe, et. al.; above). Prepared by the College of Engineering- Center for Environmental Research (CE-CERT) for the California Regional PM10/PM2.5 Air Quality Study. CE-CERT Contract Number 94-338.
6. California Air Resources Board PM2.5 and Ammonia Inventory Research Web Page. <http://arbis.arb.ca.gov/emisinv/pmh3/pmInvResearch.htm>
7. Watson, John G., et. al. (1998). "Aerometric Monitoring Program Plan for the California Regional PM2.5/PM10 Air Quality Study". Prepared for the California Regional PM2.5/PM10 Air Quality Study Technical Committee by Desert Research Institute. <http://www.arb.ca.gov/ccaq/crpaqs/publications.htm>

8. Magliano, Karen, et. al. (1999) CRPAQS Objectives and Associated Data Analysis and Modeling Approaches. Prepared for the San Joaquin Valleywide Air Pollution Study Agency, Fresno, CA, by the California Air Resources Board, Envair, Chevron, and the Bay Area Air Quality Management District.
<http://www.arb.ca.gov/ccaqs/crpaqs/reports/objectiv.doc>
9. James, Teresa, et. al. (1997). *Field Estimates of Ammonia Volatilization from Cattle Production Facilities*. Written for the 1997 Air and Waste Management Conference on Emission Inventory: Planning for the Future.
10. Ashbaugh, Lowell L., et. al. (1998), *Ammonia Emissions from a Large Dairy in California's San Joaquin Valley*. Written for the 1998 Air and Waste Management Conference on Emissions Inventory: Living in a Global Environment.
11. Davidson, E. A., et. al. (1998). *Model Estimates of Regional Nitric Oxide Emissions from Soils of the Southeastern United States*. *Ecological Applications*, 8(3), pp. 748-759.

11. TABLES AND FIGURES

A. TABLE 1. CRPAQS field study monitoring sites.

Site ID	Name	Period of Operation	Type of Site	Purpose
ACP	Angels Camp	Annual & Winter	Saturation	Intrabasin Gradient
ALT	Altamont Pass-Tracy	Annual & Winter	Backbone	Intrabasin Gradient
ALTI	Altamont Pass	Annual & Winter	Saturation	Interbasin Transport
ANGI	Angiola	Annual, Fall & Winter	Anchor	Intrabasin Gradient Vertical Gradient Visibility
BAC	Bakersfield-5558 California Street	Annual & Winter	Anchor	Community Exposure Visibility
BARS	Barstow	Annual	Saturation	Visibility
BQUC	Bouquet Canyon	Summer	Saturation	Interbasin Transport Visibility
BRES	Residential area near BAC	Annual & Winter	Saturation	Source, woodburning
BTI	Bethel Island	Annual & Winter	Saturation (Annual) Anchor (Winter)	Interbasin Transport
BODG	Bodega Bay	Annual & Winter	Saturation (Annual) Anchor (Winter)	Background
C1-C31	Corcoran-Saturation	Fall	Saturation	Receptor
CAJP	Cajon Pass	Summer	Saturation	Interbasin Transport Visibility
CANT	Cantil	Summer	Saturation	Intrabasin Gradient Visibility
CARP	Carrizo Plain	Annual & Winter	Saturation	Interbasin Transport
CHL	China Lake	Annual	Saturation	Visibility
CLO	Clovis-908 N Villa Avenue	Annual & Winter	Backbone	Source
COP	Corcoran-Patterson Avenue	Annual, Fall & Winter	Backbone	Community Exposure
CRD	Crows Landing	Annual & Winter	Saturation	Intrabasin Gradient
DUB1	Dublin	Annual & Winter	Saturation (Annual) Anchor (Winter)	Intrabasin Gradient
EDI	Edison	Annual & Winter	Saturation	Intrabasin Gradient
EDW	Edwards Air Force Base	Annual & Summer	Saturation (Annual) Anchor (Summer)	Intrabasin Gradient Visibility
FEDL	Feedlot or Dairy	Annual & Winter	Saturation	Source, Animals
FEL	Fellows	Annual & Winter	Saturation	Source, Oilfields
FELF	Foothills above Fellows	Annual & Winter	Saturation	Intrabasin Gradient
FREM	Fresno- Motor Vehicle	Annual & Winter	Saturation	Source
FRES	Residential area near FSF	Annual & Winter	Saturation	Source, woodburning
FSD	Fresno Drummond	Annual	Backbone/Saturation	Community Exposure
FSF	Fresno-3425 First Street	Annual, Fall & Winter	Anchor	Community Exposure Visibility
HAN	Hanford-Irwin St.	Annual	Backbone/Saturation	Community Exposure
HELM	Helm-Central Fresno County	Annual & Winter	Saturation	Intrabasin Gradient
KCW	Kettleman City	Annual & Winter	Saturation	Intrabasin Gradient
KRV	Sierra Nevada Foothills-Kings River Valley	Annual & Winter	Saturation	Interbasin Transport

CONTINUED ON NEXT PAGE.

Annual: Operates during annual field program (12/1/99 – 1/31/01)
 Annual & Winter: Operates during annual field program (12/1/99 – 1/31/01) with additional measurements on 15 winter episodic days (12/1/00 – 1/31/01)
 Annual, Fall & Winter: Operates during annual field program (12/1/99 – 1/31/01) with additional measurements during the fall study (9/1/00 – 10/31/00) and additional measurements on 15 winter episodic days (12/1/00 – 1/31/01)
 Summer: Operate only during the summer study (7/1/00 – 8/31/00)
 Fall: Operate only during the fall study (9/1/00 – 10/31/00)

TABLE 1 (CONT.)

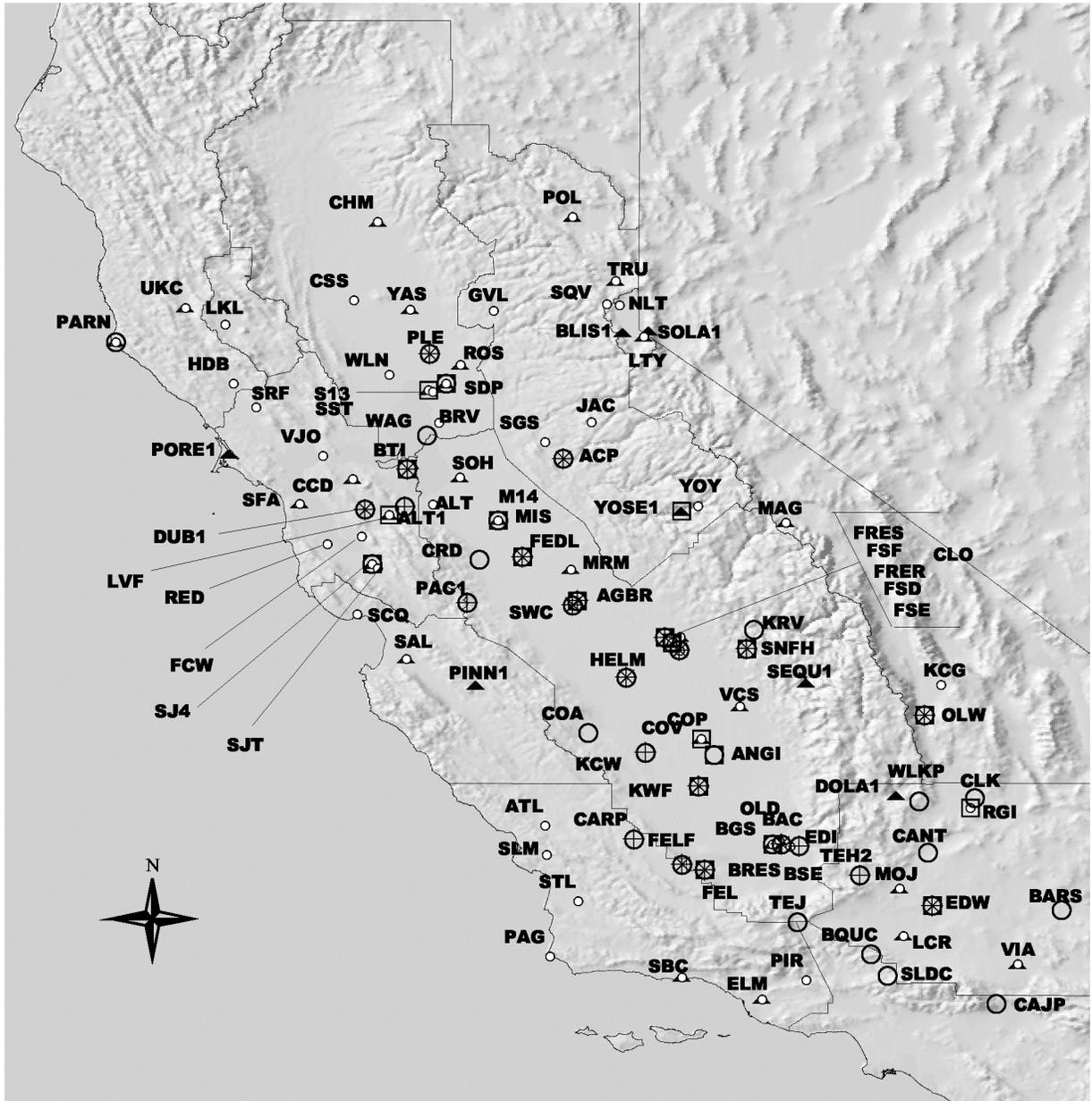
Site ID	Name	Period of Operation	Type of Site	Purpose
LVF	Livermore Old First Street	Annual & Winter	Backbone	Interbasin Transport
M14	Modesto-14 th Street	Annual	Backbone/Saturation	Community Exposure
MRM	Merced-Midtown	Annual & Winter	Backbone	Community Exposure
OLW	Olancho	Annual & Winter	Saturation	Background Visibility
PAC1	Pacheco Pass	Annual & Winter	Saturation	Interbasin Transport
PIXL	Pixley NWR	Annual & Winter	Saturation	Intrabasin Gradient
PLE	Pleasant Grove	Annual & Winter	Saturation	Intrabasin Gradient
S13	Sacramento-1309 T Street	Annual & Winter	Backbone	Community Exposure
SDP	Sacramento-Del Paso Manor	Annual & Winter	Anchor	Community Exposure
SJ4	San Jose-4 th Street	Annual & Winter	Anchor	Community Exposure
SELM	Selma	Annual & Winter	Saturation	Intrabasin Gradient
SLDC	Soledad Canyon	Summer	Saturation	Interbasin Transport Visibility
SNFH	Sierra Nevada Foothills	Annual & Winter	Saturation (Annual) Anchor (Winter)	Vertical Gradient Intrabasin Gradient Visibility
SOH	Stockton-Hazelton Street	Annual & Winter	Backbone	Community Exposure
SWC	SW Chowchilla	Annual & Winter	Saturation	Intrabasin Gradient
TEH2	Tehachapi Pass		Saturation	Interbasin Transport Visibility
TEJ	Tejon Pass	Annual & Winter	Saturation	Interbasin Transport
VCS	Visalia-North Church Street	Annual & Winter	Backbone	Community Exposure
WAG	Walnut Grove	Annual & Winter	Saturation (Annual) Anchor (Winter)	Vertical Gradient
WLKP	Walker Pass	Annual & Winter	Saturation	Interbasin Transport
YOT	Yosemite-Turtleback Dome	Annual & Winter	Backbone	Background Visibility

Annual: Operates during annual field program (12/1/99 – 1/31/01)
Annual & Winter: Operates during annual field program (12/1/99 – 1/31/01) with additional measurements on 15 winter episodic days (12/1/00 – 1/31/01)
Annual, Fall & Winter: Operates during annual field program (12/1/99 – 1/31/01) with additional measurements during the fall study (9/1/00 – 10/31/00) and additional measurements on 15 winter episodic days (12/1/00 – 1/31/01)
Summer: Operate only during the summer study (7/1/00 – 8/31/00)
Fall: Operate only during the fall study (9/1/00 – 10/31/00)

B. TABLE 2. Proposal Budget Summary

Item	Cost (\$)
<p>Direct Costs:</p> <ul style="list-style-type: none"> • Labor & Employee Fringe Benefits (provide detailed breakdown by task and employee on separate sheet [including subcontractors]) • Equipment (provide detailed breakdown on separate sheet) • Travel & Subsistence • Electronic Data Processing • Photocopying/Printing/Mail/Telephone/FAX • Materials and Supplies • Chemical Analyses (provide detailed breakdown by type of analysis on separate sheet) • Miscellaneous (please specify) <p>TOTAL DIRECT COST:</p>	<hr/>
<p>Indirect Costs:</p> <ul style="list-style-type: none"> • Overhead (specify rate) • General & Administrative Expenses (specify rate) • Other Indirect Costs (please specify) • Fee or Profit (specify rate) <p>TOTAL INDIRECT COST:</p>	<hr/> <hr/> <hr/> <hr/> <hr/>
<p>TOTAL DIRECT AND INDIRECT COST:</p>	<hr/> <hr/>

C. **FIGURE 1.** PM_{2.5} mass, chemical, and light scattering measurements at backbone, anchor, and satellite sites.



- × PM_{2.5} minivol with quartz-NaCl & IC, AC, AA & TOR
- + PM_{2.5} minivol with Teflon/citric acid & grav, XRF, AC
- Light Scattering/PM_{2.5} mass (nephelometer)
- PM_{2.5} minivol-Teflon coated glass fiber & GC/MS
- PM_{2.5} FRM single with Teflon & grav, XRF on 10 days
- ▲ PM_{2.5} EPA or IMPROVE speciation sampler
- Air Basins



12. APPENDIX A- SAMPLE CONTRACT

CONTRACT NO. 99-x PM
SAN JOAQUIN VALLEYWIDE AIR POLLUTION STUDY AGENCY AND
CONTRACTOR

This Agreement, which shall be effective upon the *DATE*, by and between the SAN JOAQUIN VALLEYWIDE AIR POLLUTION STUDY AGENCY (hereafter "STUDY AGENCY"), a joint powers agency, and *CONTRACTOR* (hereafter "CONTRACTOR").

W I T N E S S E T H:

WHEREAS, STUDY AGENCY has the need to *TASK*;
WHEREAS, STUDY AGENCY released its Request for Proposal entitled "*RFP TITLE*" dated *DATE* ("the RFP"), which is incorporated herein, to those persons determined by STUDY AGENCY to be capable of *TASK*
WHEREAS, CONTRACTOR responded to said RFP by sending STUDY AGENCY its Proposal, dated *DATE*, ("the Proposal"), which is incorporated herein;
WHEREAS, STUDY AGENCY has requested CONTRACTOR to perform such services pursuant to the terms and conditions of its RFP; and
WHEREAS, CONTRACTOR represents that it is willing and able to perform the foregoing services requested by STUDY AGENCY pursuant to the terms and conditions thereof.

NOW, THEREFORE, the parties hereby agree as follows:

1. EMPLOYMENT OF CONTRACTOR

1.1 STUDY AGENCY shall employ CONTRACTOR as an independent contractor to provide, to the reasonable satisfaction of the STUDY AGENCY, those expert consulting services requested to be performed pursuant to Exhibit A of this Agreement, "Scope of Work," which is attached hereto and incorporated herein, the RFP, and the Proposal. In the event of any conflict between or among the terms and conditions of this Agreement, the exhibits incorporated herein, and the documents referred to and incorporated herein be resolved by giving precedence in the following order of priority:

1.1.1 To the text of this Agreement, Exhibit A, "Scope of Work," to this Agreement, Exhibit B, "Schedule of Deliverables"; and

1.1.2 To the RFP.

1.2 In addition to those obligations stated in paragraph 1.1 of this Agreement, CONTRACTOR shall provide STUDY AGENCY with one (1) reproducible, master copy of each written work product completed pursuant to this Agreement and five (5) bound copies of each written work product. [or other format, such as Word Perfect 5.1]

1.3 All work product that CONTRACTOR shall deliver to STUDY AGENCY hereunder shall be performed according to the work schedule and deadlines for performance identified in Exhibit B, "Schedule of Deliverables," to this Agreement, which is attached hereto and incorporated herein.

1.4 CONTRACTOR shall provide its services through the following key persons: *KEY PERSONS*.

1.5 It is the express intent of the parties to preserve the respective teams of the aforementioned key persons through the entire term of this Agreement. In case of death, illness, or other incapacity of any of the foregoing key persons, CONTRACTOR shall use its best efforts to promptly provide a replacement key person of at least equal professional ability and experience as the key person replaced, without additional cost to STUDY AGENCY. CONTRACTOR may add to or replace persons on its support staff without STUDY AGENCY's approval, provided, however, that replacement support staff personnel shall be of at least equal ability as the person(s) replaced. Notwithstanding anything else stated to the contrary in this Agreement, it is understood that CONTRACTOR may not replace any of the aforementioned key persons without the prior, express written approval of the STUDY AGENCY.

1.6 Subject to any express limitations established by STUDY AGENCY as to the degree of care and amount of time and expense to be incurred and any other limitations expressly contained in this Agreement, CONTRACTOR shall perform the services under this Agreement with that level of due care and skill ordinarily exercised by other qualified professional consultants in the field of CONTRACTOR's expertise under similar circumstances at the time the services are being performed.

1.7 CONTRACTOR may retain such subcontractors and/or subconsultants as CONTRACTOR deems necessary to assist CONTRACTOR in completing the work under this Agreement. Such subcontractors and subconsultants, if any, shall be expressly approved in writing by STUDY AGENCY before they are retained to perform work under this Agreement. CONTRACTOR's use of any such subcontractors or subconsultants shall not, in any way whatsoever, relieve CONTRACTOR of its obligations under subparagraph 1.1 of this Agreement. It is understood that CONTRACTOR shall be STUDY AGENCY's sole point of contact in the performance of the services covered by this Agreement.

1.8 CONTRACTOR's obligation under this Agreement shall be deemed discharged only after all tasks identified in paragraph 1.1 have been completed and approved by the STUDY AGENCY "Technical Committee."

2. NO THIRD-PARTY BENEFICIARIES

2.1 It is understood that CONTRACTOR's services under this Agreement are being rendered only for the benefit of STUDY AGENCY, and no other person, firm, corporation, or entity shall be deemed an intended third-party beneficiary of this Agreement.

3. TERM

3.1 This Agreement shall become effective upon execution by the parties and shall continue until terminated as provided herein. In no event shall the term of this Agreement extend past *DATE*, without the express, written consent of the parties hereto.

4. TERMINATION

4.1 STUDY AGENCY shall have the right to terminate this Agreement at its discretion, and without cause, at any time upon the giving to CONTRACTOR thirty (30)

days' advance, written notice of an intention to terminate. If STUDY AGENCY terminates this Agreement in such event, CONTRACTOR shall be compensated for services satisfactorily provided to STUDY AGENCY up to the date of termination, as reasonably determined by STUDY AGENCY, together with such additional services performed after termination which are expressly authorized in writing by STUDY AGENCY to wind up such work.

4.2 The parties hereto may mutually agree to terminate this Agreement at any time, and in such case, upon any terms as are mutually agreeable, provided that such agreement is made pursuant to a written amendment to this Agreement.

4.3 CONTRACTOR shall have the right to terminate this Agreement immediately if:

4.3.1 STUDY AGENCY defaults in the payment of any sum due to be paid to CONTRACTOR; and

4.3.2 Such default for failure to pay or failure to perform any other obligation hereunder continues thirty (30) days after written notice thereof has been provided by CONTRACTOR to STUDY AGENCY.

4.4 Breach of Agreement: STUDY AGENCY may immediately suspend or terminate this Agreement, in whole or in part, where in the determination of STUDY AGENCY there is:

4.4.1 An illegal or improper use of funds;

4.4.2 A failure to comply with any term of this Agreement;

4.4.3 A substantially incorrect or incomplete report submitted to STUDY AGENCY;

4.4.4 Improperly performed services; or

4.4.5 Any other breach of the Agreement.

In no event shall any payment by STUDY AGENCY constitute a waiver by STUDY AGENCY of any breach of this Agreement or any default which may then exist on the part of CONTRACTOR. Neither shall such payment impair or prejudice any remedy available to STUDY AGENCY with respect to the breach or default. STUDY AGENCY shall have the right to demand of CONTRACTOR the repayment to STUDY AGENCY of any funds disbursed to CONTRACTOR under this Agreement which in the judgment of STUDY AGENCY were not expended in accordance with the terms of this Agreement. CONTRACTOR shall promptly refund any such funds upon demand.

In addition to immediate suspension or termination, STUDY AGENCY may impose any other remedies available at law, in equity, or otherwise specified in this Agreement.

In the event of any breach of this Agreement, STUDY AGENCY, upon the recommendation of the Policy Committee, may, without prejudice to any of its other legal remedies, terminate this Agreement upon five (5) days' written notice to CONTRACTOR. In such event, STUDY AGENCY shall pay CONTRACTOR only the reasonable value of the services theretofore rendered by CONTRACTOR as may be agreed upon by the parties or determined by a court of law, but not in excess of the total Agreement price.

5. DATA

5.1 No reports, professional papers, information, inventions, improvements, discoveries or data obtained, prepared, assembled, or developed by CONTRACTOR pursuant to this Agreement shall be released or made available (except as otherwise provided herein) without prior written approval of the Chief of the Planning & Technical Support Division, Air Resources Board. The consent of the Chief of the Technical Support Division, Air Resources Board, shall not be unreasonably withheld.

5.2 All models used must be in the public domain. All model codes, inputs, and outputs, and data obtained, prepared, assembled or developed shall be provided to the Program Manager in a magnetic media acceptable to the Program Manager

6. REPORTS

6.1 CONTRACTOR shall place the following language in a conspicuous place on all monthly progress reports and on the final report:

"The statements and conclusions in this report are those of the Contractor and not necessarily those of the California Air Resources Board, the San Joaquin Valleywide Air Pollution Study Agency, or its Policy Committee, their employees or their members. The mention of commercial products, their source, or their use in connection with material reported herein is not to be construed as actual or implied endorsement of such products."

7. COMPENSATION/INVOICING

7.1 STUDY AGENCY agrees to pay CONTRACTOR and CONTRACTOR agrees to receive compensation at the rate specified in paragraph 7.6 of this Agreement.

7.2 The amount to be paid to CONTRACTOR under this Agreement includes all sales and use taxes incurred pursuant to this Agreement, if any, including any such taxes due on equipment purchased by CONTRACTOR. CONTRACTOR shall not receive additional compensation for reimbursement of such taxes and shall not decrease work to compensate therefor.

7.3 Advance payments shall not be permitted. Payments will be permitted only at which time-equivalent services have been satisfactorily rendered. Progress payments shall be subject to review by the ARB Program Manager and the STUDY AGENCY Technical Committee. Progress payments shall be made monthly upon receipt of an invoice, a monthly progress report, and a claim for payment form, which is attached as Exhibit C and incorporated herein by reference. Invoices will be sent to Chief, Planning & Technical Support Division, Air Resources Board, P.O. Box 2815, Sacramento, CA 95812. With respect to the payment period completed, the invoice shall set forth in detail, in accordance with the Agreement budget, charges for time expended on the project, including the classification of personnel involved in such time expenditure, and the monthly, weekly, or hourly rates for such personnel, as appropriate. The invoice shall also contain an itemization of all materials used for the project, including the purpose of their use and their cost. Payment shall be made within thirty (30) days of receipt of the invoice.

7.4 Concurrently with the invoice, CONTRACTOR shall certify (i.e., through copies of issued invoices, checks, or receipts) that complete payment has been made to any and all subcontractors and subconsultants as provided.

7.5 It is understood that all expenses incidental to CONTRACTOR's performance of services under this Agreement shall be borne exclusively by CONTRACTOR.

7.6 In no event shall compensation paid by STUDY AGENCY to CONTRACTOR for the performance of all services under this Agreement exceed *COST*.

7.7 STUDY AGENCY shall be solely responsible for payment and not any of the parties to the Joint Powers Agreement forming the STUDY AGENCY.

7.8 STUDY AGENCY shall withhold payment equal to ten percent (10%) of each monthly invoice until completion of work requested by the STUDY AGENCY Technical Committee on the tasks specified in Exhibit A and approval by the ARB Program Manager and the STUDY AGENCY Technical Committee. It is CONTRACTOR's responsibility to submit an invoice in triplicate for the ten percent (10%) withheld.

7.9 The terms of this Agreement and the services to be provided thereunder are contingent on the approval of funds by the appropriating government agency. Should sufficient funds not be allocated, the services provided may be modified or this Agreement terminated at any time by giving CONTRACTOR thirty (30) days' prior written notice.

8. EXTRA SERVICES

8.1 CONTRACTOR shall not undertake any extra services not enumerated herein unless expressly authorized by STUDY AGENCY through an amendment to this Agreement, which shall be executed in the same manner as this Agreement, or by express, written authorization if such extra services are being performed by CONTRACTOR to wind up its services under this Agreement pursuant to subparagraph 4.1 of this Agreement.

8.2 When such extra services are being performed, CONTRACTOR shall keep complete records showing that STUDY AGENCY requested such extra services, the hours and description of activities worked by each person who worked on the project, the reason for such extra services, and all the costs and charges applicable to the extra services authorized.

9. INDEPENDENT CONTRACTOR

9.1 In performance of the work, duties, and obligations assumed by CONTRACTOR under this Agreement, it is mutually understood and agreed that CONTRACTOR, including any and all of CONTRACTOR's officers, agents, and employees, will at all times be acting and performing as an independent contractor, and shall act in an independent capacity and not as an officer, agent, servant, employee, joint venturer, partner, or associate of the STUDY AGENCY or the Policy Committee.

9.2 Furthermore, STUDY AGENCY shall have no right to control, supervise, or direct the manner or method by which CONTRACTOR shall perform its work and function. However, STUDY AGENCY shall retain the right to administer this Agreement so as to verify that CONTRACTOR is performing its obligations in accordance with the terms and conditions thereof. CONTRACTOR and STUDY AGENCY shall comply with all applicable provisions of law and the rules and

regulations, if any, of governmental authorities having jurisdiction over matters the subject thereof.

9.3 Because of its status as an independent contractor, CONTRACTOR shall have absolutely no right to employment rights and benefits available to STUDY AGENCY employees. CONTRACTOR shall be solely liable and responsible for providing all legally required employee benefits. In addition, CONTRACTOR shall be solely responsible and save STUDY AGENCY harmless from all matters relating to payment of CONTRACTOR's employees, including compliance with Social Security, withholding, and all other regulations governing such matters. It is acknowledged that during the term of this Agreement, CONTRACTOR may be providing services to others unrelated to STUDY AGENCY or to this Agreement.

10. MODIFICATION

10.1 Any matters of this Agreement may be modified from time to time by the written consent of all the parties without, in any way, affecting the remainder.

11. NON-ASSIGNMENT

11.1 Neither party shall assign, transfer, or subcontract this Agreement nor their rights or duties under this Agreement without the prior, express written consent of the other party.

12. INDEMNIFICATION

12.1 CONTRACTOR agrees to indemnify, save, hold harmless, and at STUDY AGENCY's request, defend STUDY AGENCY, its boards, committees, representatives, officers, agents, and employees from and against any and all costs and expenses (including reasonable attorneys fees and litigation costs), damages, liabilities, claims, and losses (whether in contract, tort, or strict liability, including, but not limited to, personal injury, death, and property damage) occurring or resulting to STUDY AGENCY which arises from any negligent or wrongful acts or omissions of CONTRACTOR, its officers, agents, subcontractors, subconsultants, or employees in their performance of this Agreement, and from any and all costs and expenses (including reasonable attorneys fees and litigation costs), damages, liabilities, claims, and losses (whether in contract, tort, or strict liability, including, but not limited to, personal injury, death, and property damage) occurring or resulting to any person, firm, corporation, or entity who may be injured or damaged when such injury or damage arises from any negligent or wrongful acts, or omissions of CONTRACTOR, its officers, agents, subcontractors, subconsultants, or employees in their performance of this Agreement.

13. INSURANCE

13.1 Without limiting STUDY AGENCY's right to obtain indemnification from CONTRACTOR or any third parties, CONTRACTOR, at its sole expense, shall maintain in full force and effect the following insurance policies throughout the term of this Agreement:

13.1.1 Comprehensive general liability insurance with minimum limits of coverage in the amount of _____ Million Dollars (\$) per occurrence;

13.1.2 Commercial automobile liability insurance for owned and non-owned vehicles which covers bodily injury and property damage with a combined single limit with minimum limits of coverage in the amount of _____ Million Dollars (\$) per occurrence;

13.1.3 Workers Compensation Insurance, in accordance with California law.

13.2 Such insurance policies shall name STUDY AGENCY, its officers, agents, and employees, individually and collectively, as additional insured but only insofar as the operations under this Agreement are concerned. Such coverage for additional insured shall apply as primary insurance, and any other insurance, or self-insurance, maintained by STUDY AGENCY, its officers, agents, and employees shall be excess only and not contributing with insurance provided under CONTRACTOR's policies herein. This insurance shall not be cancelled or changed without a minimum of thirty (30) days' advance, written notice given to STUDY AGENCY.

13.3 Prior to the commencement of performing its obligations under this Agreement, CONTRACTOR shall provide certificates of insurance on the foregoing policies, as required herein, to STUDY AGENCY stating that such insurance coverages have been obtained and are in full force; that STUDY AGENCY, its officers, agents, and employees will not be responsible for any premiums on the policies; that such insurance names STUDY AGENCY, its officers, agents, and employees, individually and collectively, as additional insured, but only insofar as the operations under this Agreement are concerned; that such coverage for additional insured shall apply as primary insurance, and any other insurance or self-insurance maintained by STUDY AGENCY, its officers, agents, and employees, shall be excess only and not contributing with insurance provided under CONTRACTOR's policies herein. This insurance shall not be cancelled or changed without a minimum of thirty (30) days' advance, written notice given to the STUDY AGENCY.

13.4 In the event CONTRACTOR fails to keep in effect at all times insurance coverage as herein provided, STUDY AGENCY may, in addition to other remedies it may have, suspend or terminate this Agreement upon the occurrence of such event.

13.5 If the CONTRACTOR is a government entity, then it may self-insure such of those risks identified in paragraphs 13.1.1 through 13.1.3 of this Agreement, provided, however, that:

13.5.1 STUDY AGENCY, its officers, agents, and employees, individually and collectively, shall be named as additional insured (except for Workers Compensation Insurance) on CONTRACTOR's self-insurance plan, but only insofar as the operations under this Agreement are concerned;

13.5.2 Such self-insurance plan shall be reasonably satisfactory to STUDY AGENCY; and

13.5.3 All those provisions identified in subparagraph 13.2 of this Agreement concerning the relationship of CONTRACTOR's primary and STUDY AGENCY's excess insurance to each other, the requirement of CONTRACTOR delivering a certificate of insurance or other suitable evidence to STUDY AGENCY, and the cancellation/change of insurance requirements shall apply to such self-insurance plan.

14. AUDITS AND INSPECTIONS

14.1 CONTRACTOR shall at any time during business hours, and as often as STUDY AGENCY may deem necessary, make available to STUDY AGENCY for examination all of its records and data with respect to the matters covered by this Agreement. CONTRACTOR shall, upon request by STUDY AGENCY, permit STUDY AGENCY to audit and inspect all of such records and data necessary to ensure CONTRACTOR's compliance with the terms of this Agreement.

14.2 CONTRACTOR shall maintain books, records, documents, and other evidence pertaining to the reimbursable time and materials and hold them available for audit and inspection by STUDY AGENCY for a minimum of three (3) years from the date this Agreement is completed or otherwise terminated.

15. BUDGET

15.1 CONTRACTOR shall be authorized to rebudget funds up to a maximum of twenty percent (20%) between major categories in the contract budget as contained in Exhibit A. All rebudgeting in excess of twenty percent (20%) requires the prior written approval of the Chief of the Planning & Technical Support Division, Air Resources Board, or his representative. Under no circumstances shall the total contract amount exceed *COST*.

16. NOTICES

16.1 The persons and their addresses having authority to give and receive notices under this Agreement include the following:

STUDY AGENCY: Don McNerny, Branch Chief
Modeling and Meteorology Branch
Planning & Technical Support Division
Air Resources Board
P.O. Box 2815
Sacramento, CA 95812

CONTRACTOR: *CONTACT PERSON*
ADDRESS

16.2 Any and all notices between STUDY AGENCY and CONTRACTOR provided for or permitted under this Agreement or by law shall be in writing and shall be deemed duly served when personally delivered to one of the parties, or in lieu of such personal services, when deposited in the United States mail, postage prepaid, addressed to such party.

17. DISPUTES

17.1 In the event a dispute between CONTRACTOR and the ARB Program Manager, CONTRACTOR should first discuss the problem informally with the ARB Program Manager. If the dispute is not resolved, the following two-step procedure shall be followed by both parties:

17.1.1 CONTRACTOR and the ARB Program Manager shall each write to the STUDY AGENCY Technical Committee stating the issues in the dispute and the basis for their positions. The STUDY AGENCY Technical Committee shall make a determination within fourteen (14) working days after receipt of the written communications from CONTRACTOR and ARB Program Manager. The STUDY

AGENCY Technical Committee shall notify CONTRACTOR and the ARB Program Manager in writing of the decision and the reasons therefor.

17.1.2 If CONTRACTOR or the ARB Program Manager disagrees with the STUDY AGENCY Technical Committee's decision, written notice shall be provided to the other party of an intention to seek non-binding third-party mediation of the dispute. Both parties must agree to submit to mediation. The dispute shall be considered by a panel of three (3) experts in the field of dispute. Each party shall have the right to select one panelist. The selected panel will then select a third member. The panel shall set a hearing date, time, and place convenient to the parties within thirty (30) days of panel selection. Within five (5) working days of the hearing date, each party shall submit a written statement to the panel and the other party setting forth the issues and arguments to be presented. The hearing shall be informal with an opportunity for both parties to present their arguments. The panel shall provide the parties with a written decision within thirty (30) days of the hearing. The decision shall be binding on the parties, unless referred to the Governing Board within thirty (30) days. The costs of the panel shall be borne equally by the parties.

17.1.3 If either party has so requested, the matter shall be heard by the STUDY AGENCY Board, and the Board's determination shall be final.

18. POLITICAL ACTIVITY PROHIBITED

18.1 None of the funds, materials, property, or services provided under this Agreement shall be used for any political activity, or to further the election or defeat of any candidate for public office contrary to federal or state laws, statutes, regulations, rules or guidelines.

19. LOBBYING PROHIBITED

19.1 None of the funds provided under this Agreement shall be used for publicity, lobbying, or propaganda purposes designed to support or defeat legislation before the Congress of the United States of America or the Legislature of the State of California.

20. CONFLICT OF INTEREST

20.1 No officer, employee, or agent of STUDY AGENCY who exercises any function or responsibility for planning and carrying out the services provided under this Agreement shall have any direct or indirect personal financial interest in this Agreement. CONTRACTOR shall comply with all federal and state conflict of interest laws, statutes, and regulations which shall be applicable to all parties and beneficiaries under this Agreement and any officer, agent, or employee of STUDY AGENCY.

21. COMPLIANCE WITH LAWS

21.1 CONTRACTOR shall comply with all federal and state laws, statutes, regulations, rules, and guidelines which apply to its performance under this Agreement.

22. SEVERABILITY

22.1 In the event that any one or more provisions contained in this Agreement shall for any reason be held to be unenforceable in any respect by a court of competent

jurisdiction, such holding shall not affect any other provisions of this Agreement, and the Agreement shall then be construed as if such unenforceable provisions are not a part hereof.

23. TIME IS OF THE ESSENCE

23.1 It is understood that for CONTRACTOR's performance under this Agreement, time is of the essence. The parties reasonably anticipate that CONTRACTOR will, to the reasonable satisfaction of STUDY AGENCY, complete all services to be provided hereunder by *DATE*, provided that CONTRACTOR neither causes nor is caused unreasonable delay in such performance.

24. GOVERNING LAW

24.1 Venue for any action arising out of or relating to this Agreement shall only be in Fresno County, California.

24.2 The rights and obligations of the parties and all interpretation and performance of this Agreement shall be governed in all respects by the laws of the State of California.

25. BINDING UPON SUCCESSORS

25.1 This Agreement, including all covenants and conditions maintained herein, shall be binding upon and inure to the benefit of the parties, including their respective successors-in-interest, assigns, and legal representatives.

26. INSPECTION AND RELEASE OF DATA

26.1 Upon termination or expiration of this Agreement, all data which is received, collected, produced, or developed by CONTRACTOR under this Agreement shall become the exclusive property of STUDY AGENCY, provided, however, CONTRACTOR shall be allowed to retain a copy of any non-confidential data received, collected, produced, or developed by CONTRACTOR under this Agreement, subject to STUDY AGENCY's exclusive ownership rights stated herein. Accordingly, CONTRACTOR shall surrender to STUDY AGENCY all such data which is in its (including its subcontractors, subconsultants, or agents) possession, without any reservation of right or title not otherwise enumerated herein.

26.2 STUDY AGENCY shall have the right, at reasonable times during the term of this Agreement, to inspect and reproduce any data received, collected, produced, or developed by CONTRACTOR under this Agreement. No reports, professional papers, information, inventions, improvements, discoveries, or data obtained, prepared, assembled, or developed by CONTRACTOR, pursuant to this Agreement, shall be released or made available (except to STUDY AGENCY) without prior, express written approval of STUDY AGENCY while this Agreement is in force.

27. NONDISCRIMINATION

27.1 The provisions of Exhibit D, the "Nondiscrimination Clause," is attached hereto and incorporated herein.

28. ENTIRE AGREEMENT

28.1 This Agreement, including all attached exhibits and documents which are referred to and incorporated herein, constitutes the entire agreement between CONTRACTOR and STUDY AGENCY with respect to the subject matter hereof and supersedes all previous negotiations, proposals, commitments, writings, advertisements, publications, and understandings of any nature whatsoever unless expressly included in this Agreement.

29. WAIVER

29.1 No waiver of any breach of this Agreement shall be held to be a waiver of any other or subsequent breach. All remedies afforded in this Agreement shall be taken and construed as cumulative, that is, in addition to every other remedy provided therein or by law. The failure of STUDY AGENCY to enforce at any time any of the provisions of this Agreement or to require at any time performance by CONTRACTOR of any of the provisions therefor, shall in no way be construed to be a waiver of such provisions nor in any way affect the validity of this Agreement or any part thereof or the right of STUDY AGENCY to thereafter enforce each and every such provision.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day and year first hereinabove written through their respective duly appointed and authorized representatives.

STUDY AGENCY
SAN JOAQUIN VALLEYWIDE AIR

CONTRACTOR

POLLUTION STUDY AGENCY

By _____

Chair

By

Print Name and Title

Recommended for approval:
SAN JOAQUIN VALLEYWIDE AIR
UNIFIED AIR
POLLUTION STUDY AGENCY
AGENCY
POLICY COMMITTEE

Tax I.D. No.
Approved as to legal form:
SAN JOAQUIN VALLEY
POLLUTION CONTROL STUDY

By _____
Title _____

Philip M. Jay
STUDY AGENCY Counsel

Recommended for approval:
SAN JOAQUIN VALLEYWIDE AIR
UNIFIED AIR
POLLUTION STUDY AGENCY
AGENCY
TECHNICAL COMMITTEE

Approved as to accounting form:
SAN JOAQUIN VALLEY
POLLUTION CONTROL STUDY

By _____
Title _____

Roger W. McCoy
Finance Officer