

REQUEST FOR PROPOSALS

CENTRAL CALIFORNIA OZONE STUDY (CCOS)

Development and Evaluation of Corroborative Analysis Methods

September 02, 2008

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1. BACKGROUND

As in any major field study conducted to date, air quality simulations are already an integral part of the Central California Ozone Study (CCOS). To increase the confidence in simulated results, operational/diagnostic evaluations and corroborative analyses are being used. A variety of “observation-based methods” (OBM) have been developed to infer important relationships between ozone, its precursors, and the sources of these precursors. These methods are driven principally by observed data as opposed to air quality simulation models that are driven by emission estimates and meteorology. OBMs include receptor models, regression and transport characterization techniques, ambient pollutant ratios, multivariate trend analysis, indicator species and semi-empirical methods. OBMs are used to assess emission inventories, infer the effects of VOC and/or NO_x controls on observed ozone concentrations, and to assess the contribution of transport of ozone and its precursors to ozone exceedances in downwind areas. These methods are expected to provide an independent evaluation of the accuracy of emission-based model predictions. However, these methods are not without their own limitations and uncertainties, and as a result their ability to provide independent evaluation of the accuracy of emission-based models may be limited.

Various reviews of OBMs have been published in the peer-reviewed literature. Of particular note is a three-part series of papers that discuss the use of OBMs in developing ozone process insights from field measurement programs. Hidy (2000) provides an overview of selected approaches recently adopted to analyze observations from field experiments that characterize the tropospheric physics and chemistry of ozone and related oxidation products. Kleinman (2000) discusses techniques based on whether predicted quantities pertain to the present state of an air parcel or its history. Blanchard (2000) examines a quantity known as the extent of reaction, which is an indicator of the sensitivity of instantaneous ozone production to changes in VOC or NO_x concentrations. Trainer et al. (2000) discuss approaches applied by the NOAA Aeronomy Laboratory to determine the rate and amount of ozone that is photochemically produced in the atmosphere by ozone precursors of both anthropogenic and natural origin. A more recent critical review of OBMs was conducted by Sillman (2002). A subsequent paper by Liang, Jackson and Kaduwela (2006) discusses criteria for evaluating indicator ratios and presents an assessment of their possible regulatory utility in determining VOC- and NO_x-limited conditions in various areas of central California. This paper also includes a comprehensive list of references to previous investigations of indicator ratios and related methods.

On August 2, 2005, the CCOS Technical Committee (TC) sponsored a workshop to discuss alternative methodologies for corroborating photochemical modeling results developed to support State Implementation Plan (SIP) updates for central and northern California. The workshop was intended to promote the free exchange of information between those engaged in the development and application of corroborative analysis approaches and those responsible for performing and assessing SIP modeling studies in central and northern California. The presentations given at this workshop may be viewed at <http://www.arb.ca.gov/airways/ccos/pages/TCmeetings.htm>.

The corroborative analysis approaches of interest in the present study should make appropriate use of the extensive ambient air quality and meteorological database resulting from the summer 2000 CCOS field measurement program. The analysis approaches should be sufficiently rigorous for potential use in corroborating photochemical modeling results indicating the effectiveness of VOC and NO_x emission controls in reducing future 1- and 8-hour ozone concentrations in the study area. There is also a need to examine how the results of this study can be effectively combined with already existing information (such as the findings from CCOS data analyses and other projects) to increase the confidence in CCOS photochemical modeling results.

2. TECHNICAL OBJECTIVES

There will be three primary areas of focus for this project. The first area of emphasis will be to conduct a critical assessment of ambient pollutant ratios and other semi-empirical based models that have the potential to infer the effects of VOC and/or NO_x controls on observed ozone concentrations. The second area of emphasis will be to identify other promising innovative corroborative methods, some of which may require significant developmental support. The third area of emphasis will be to demonstrate how the full range of corroborative approaches (including conventional corroborative analyses, other innovative approaches, and the findings of CCOS and other studies) can be employed to gain more confidence in photochemical modeling results for central California.

3. SCOPE OF WORK

Task 1. Review Corroborative Analysis Methods and Develop Final Work Plan

Perform a comprehensive review of ambient pollutant ratios and other semi-empirical methods that may be useful in corroborating photochemical modeling estimates of the effectiveness of VOC and NO_x emissions reductions on 1- and 8-hour ozone concentrations in central California. This review should include all methods currently described in the scientific literature and new methods the Contractor wishes to propose. For new methods, please indicate the development needs. For each approach, identify its input data requirements and assess its strengths, limitations, and soundness of the theoretical basis. Give particular attention to key assumptions upon which the methodology is based. Such assumptions might include reliance on data collected in smog chamber experiments, use of chemical kinetic mechanisms that do not accurately represent some portions of the complex ozone formation process, and simplified representations of pollutant transport and dispersion processes. This review should include all such methods irrespective of the routine availability/accuracy of measured pollutant concentrations necessary for use of the methods. The intent of this task is to identify and evaluate the merits (or lack thereof) of all available methods and to specify appropriate data collection needs for future field studies to support the use of corroborative methods. The analysis should discuss the difficulty of data collection for a

proposed method if collection of data for the requisite parameters for application of the technique is not considered to be technically viable with existing monitoring capabilities. Consideration should also be given to the cost of collecting the needed data, especially in situations where the measurements may be technically feasible but costly to obtain. This review should improve our understanding of strengths and limitations of OBMs significantly beyond what is already presented by Sillman (2002).

Identify criteria for selecting methods to be subject to further development and evaluation in Tasks 2 through 4. While the availability/accuracy of ambient data need not be a primary criterion for selecting candidate methods for further development in Task 2, the selected methods should provide a practical means for corroborating photochemical modeling results using suitable ambient data that could be collected (if not currently available) at a reasonable cost. The criteria could include, but not be limited to, soundness of theoretical basis, feasibility of testing, range of application, universality, ease of use, monotonic behavior, and a sharp transition from VOC to NO_x limitation with minimal or no undetermined range. Since most methods were developed to address the 1-hour ozone standard, it is anticipated that many of the methods satisfying the given set of criteria will need further development for application to the 8-hour ozone standard. Based on application of the selection criteria, identify those methods that will be subject to further development and assessment in Task 2.

Document the findings of the technical analyses, selection criteria, and recommendations for methods to be developed in Task 2 in a draft technical memorandum. Based on the findings of the comprehensive review and method selection, prepare a draft work plan for the conduct of Tasks 2 through 6. Submit the draft technical memorandum and draft work plan to the CCOS Technical Committee (TC) for review and comment. Provide a presentation summarizing the findings of Task 1 and the proposed work plan at a meeting with the TC to be held in Sacramento, California. Upon receipt of comments from the TC, prepare a final technical memorandum and a final work plan.

NOTE: Work on Tasks 2 through 6 is not to be initiated prior to approval of the final work plan and receipt of authorization from the ARB Program Manager.

Task 2. Further Development and Analysis of Selected Corroborative Analysis Methods

In accordance with the final work plan, implement modifications to the selected methodologies for corroborating both 1- and 8-hour photochemical modeling ozone results. For each methodology that needs further development, identify its input data requirements and assess its strengths, limitations, and soundness of the theoretical basis. Identify those methods that will be included in the method intercomparison study to be performed in Task 3. Document the methodology development work and plans for the Task 3 intercomparison study in a technical memorandum. Submit the technical memorandum to the TC for review and comments. Incorporate any needed modifications to planned Task 3 activities based the comments provided by the TC.

Task 3. Intercomparison of Corroborative Analysis Methods

Carry out an intercomparison (or "method shootout") of all selected (and further developed in Task 2) methods. Apply these methods to a common set of measurements and/or simulated concentration fields. Preference is to be given to measurements and/or modeling results for areas in California. If appropriate, recommend using measurements and/or modeling results for other areas outside California where such information provides an opportunity to evaluate corroborative analysis methods that would not otherwise be possible using existing information for areas in California. Work with the TC to identify and provide justification for the use of any such information for areas outside California. As appropriate, work with the TC to identify and acquire appropriate simulated concentration fields.

To the extent feasible, compare the predictions of each method against others and against the simulated VOC and NO_x limitations to examine the reliability of each method. Specify criteria indicating the appropriate sites and/or conditions for which each methodology is applicable. Also, clearly state the strengths and weaknesses of each methodology as applied to appropriate sites and/or conditions. Simulated concentration fields may need to be used in circumstances where the lack of observed data limits or prevents an equitable comparison of methods. Document the findings of the intercomparison study in a technical memorandum. This intercomparison should be significantly more rigorous than that presented by Liang et al. (2006).

Task 4. Application of Corroborative Analysis Methods

To the extent allowed by the existing ambient database, apply methods selected in consultation with the TC using ambient data to infer the effects of changes in VOC and/or NO_x emissions on observed 1- and 8-hour ozone concentrations in the CCOS domain. In selecting methods for this analysis, also consider the availability and the accuracy of the ambient data. Not all methods that have been reviewed, selected, further developed, and tested would be included in this analysis due to a lack of availability and/or suitable accuracy of available measurements. However, consideration of methods in Tasks 1 through 3 above will be useful in future field program design. Prepare a technical memorandum for the review and approval of the TC describing in detail plans for the application of corroborative analysis methods to the CCOS domain. The technical memorandum should discuss the methods selected for application as well as the ambient measurements and modeling results. Work with the TC to implement any needed modifications to the plan. Based on the approved plan, compare, with appropriate consideration of strengths and weaknesses, the inferences obtained from pollutant ratios and semi-empirical methods with each other and with those obtained from a photochemical model that simulated the ambient measurements used.

Examine the feasibility of evaluating selected corroborative analysis methods by applying them using ambient pollutant measurements collected during the 2000 CCOS field measurement program in conjunction with pre-2000 and post-2000 precursor emissions trends information to estimate the expected change in peak 1- and 8-hour

ozone levels in various areas of the CCOS domain including San Joaquin Valley, Sacramento, and Bay Area air basins. Determine at what sites and under what conditions useful insights into the performance of corroborative analysis approaches (either quantitative or qualitative) can be derived by such comparisons. For appropriate sites and conditions where meaningful results are anticipated, use information on the changes in 1- and 8-hour ambient ozone concentrations and precursor emissions over the period from 1990 to 2004 being developed in an ongoing CCOS study entitled "Understanding Relationships between Changes in Ambient Ozone and Precursor Concentrations and Changes in VOC and NO_x Emissions from 1990 to 2004 in Central California" to evaluate the consistency of the results provided by the corroborative analysis methods with the actual observed changes in 1- and 8-hour ambient ozone concentrations over the 1990 to 2004 time period. A draft final report of this study will be available to prospective contractors on request. Careful consideration of the zone of influence and the spatial and temporal scales of the ambient measurements should be incorporated into the analyses.

The Contractor will review pertinent results from CCOS data analysis projects that also serve to provide independent corroboration of CCOS modeling results. A summary of CCOS results will be prepared as part of a separate study. Such results may provide indications as to how well components of the CCOS modeling system represent emissions as well as other key physical and chemical atmospheric phenomena in the study domain. Based on an examination of the summary of CCOS results, the Contractor will conduct any further reviews of CCOS data analysis findings as may be appropriate to derive corroborative evidence for assessing the soundness of CCOS modeling results. The Contractor will state clearly the strengths and weaknesses of the methods used for such data analyses so that they could be directly compared with the methods evaluated/developed during this project.

Task 5. Final Report and Journal Paper

Prepare a draft final report that discusses the work carried out in Tasks 1 through 4 as well as a draft manuscript suitable for submission to a peer-reviewed journal. Submit both the draft final report and manuscript to the TC for review. Give a presentation to the TC summarizing the work carried out and the findings of the study at a meeting to be held in Sacramento, California. The draft report and manuscript will be finalized responding to comments from the TC. Submit for the manuscript to the journal for review and publication. The Contractor will be responsible for paying any page or other costs associated with the publication of the manuscript. The Contractor may include in the project budget sufficient funding to cover page charge or other publication costs.

Task 6. Provision of Data, Software, and Documentation

Transfer of all data sets, computer codes, and customized software as well as documentation for all of these items to ARB staff in a well organized and documented electronic package.

4. REFERENCES

Blanchard, C.L. (2000). Ozone process insights from field experiments - Part III: Extent of reaction and ozone formation. *Atmos. Environ.*, **34**, 2035-2043.

Hidy, G.M. (2000). Ozone process insights from field experiments - Part I: Overview. *Atmos. Environ.*, **34**, 2001-2022.

Kleinman, L.I. (2000). Ozone process insights from field experiments – Part II: Observation-based analysis for ozone production. *Atmos. Environ.*, **34**, 2023-2033.

Liang, J.; Jackson, B.; Kaduwela, A. (2006). Evaluation of the ability of indicator species ratios to determine the sensitivity of ozone to reductions in emissions of volatile organic compounds and oxides of nitrogen in northern California. *Atmos. Environ.*, **40**, 5156-5166.

Sillman, S. (2002). Evaluation of observation-based methods for analyzing ozone production and ozone-NO_x-VOC sensitivity. A report to US EPA, June. (Available at <http://www-personal.umich.edu/~sillman/web-publications/OBMdraftreport4f.pdf>)

Trainer, M.; Parrish, D.D.; Goldan, P.D.; Roberts, J; Fehsenfeld, F.C. (2000). Review of observation-based analysis of the regional factors influencing ozone concentrations. *Atmos. Environ.*, **34**, 2045-2-61.

5. MANAGEMENT STRUCTURE

The CCOS is a 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, a joint powers agency (JPA) 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 all technical reports produced from the Study.

On a day-to-day basis, the ARB is responsible for management of the Study under the direction of the Program Manager, Chief of the ARB Modeling and

8. ADMINISTRATION

The group selected to conduct this work will report to the ARB Program Manager. The period of performance of this contract will be 14 months, with work expected to commence in approximately end of November of 2008. Contract performance is not to begin until a contract is fully approved by the San Joaquin Valleywide Air Pollution Study Agency.

9. CONTRACT REQUIREMENTS

A. Reporting and Other Requirements

In Task 1, the Contractor shall deliver a draft technical memorandum. As part of Task 1, the Contractor will also deliver a draft work plan describing the analyses and deliverables to be performed or provided in Tasks 2 through 6 of this study. Responding to comments provided by the Technical Committee, the Contractor will submit a final technical memorandum and work plan within one month of receipt of comments from the Technical Committee. The Contractor will also submit technical memoranda describing the findings of Task 2 and 3 activities. At the end of the study, the Contractor will submit a draft final report discussing the findings of the complete study, as well as a draft manuscript suitable for publication in a peer reviewed journal. The Contractor will also deliver all software, data files, and appropriate documentation in accordance with the specifications provided in the work plan. Within 30 days of receipt of comments from the Technical Committee, the Contractor will submit final reports and a final manuscript for submission to a suitable technical journal for peer review and publication.

The Contractor will attend two one-day meetings in conjunction with the performance of Tasks 1 and 5. It should be assumed that these meetings will be held in Sacramento, California.

The Contractor shall deliver monthly progress reports to the ARB Program Manager. Payment of invoices will not be made until receipt of the associated progress report.

The Contractor shall deliver invoices to the ARB Program Manager. With respect to the payment period completed, the invoices 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 invoices shall also contain an itemization of all materials used for the project, including the purpose of its use and its cost. All work billed for in each invoice must be covered in an associated progress report. Therefore, if invoicing is done more frequently than quarterly, progress reports coincident with the payment period must also be provided.

The Contractor shall deliver a draft technical memorandum and work plan in Task 1, technical memoranda in Tasks 2 and 3, and a draft final report and draft

manuscript for publication in Task 5, each with two hardcopies, one electronic copy in Adobe Acrobat (PDF) format, and one in Microsoft Word (DOC) format. The Contractor will receive comments on these reports within 30 days of submission, with revisions due within 30 days after receipt of review comments (also with 2 hardcopies, PDF, and DOC versions). The Contractor may include provisions in the project budget to cover costs associated with publication of the manuscript.

All software embodying the corroborative analysis methods used or developed in this study, input and output files, and pertinent documentation will be provided in accordance with the specifications indicated in the work plan.

B. Correspondence

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

Mr. John DaMassa, Chief
Modeling & Meteorology Branch
Planning and Technical Support Division
California Air Resources Board
Program Manager
Central California Air Quality Studies
1001 "I" Street
Sacramento, California 95814

C. Contract Language

A copy of the contract language is presented in Appendix A. 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
San Joaquin Valley Unified Air Pollution Control District
1990 East Gettysburg Avenue
Fresno, California 93727
(559) 230-6033

10. PROPOSAL PREPARATION AND EVALUATION GUIDELINES

A. Proposal Contents

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 technically qualified decision-makers. Vague references to “standardized”, “EPA”, “ARB”, or other unexplained and non-documented methods will be considered unresponsive and rejected.

The proposal should be clear and concise (typically not more than 30 pages maximum for each question or task, and preferably exclusive of resumes and proponent facilities/experience, which should also be minimal and can be incorporated by reference to a corporate web site). The proposal should address the following issues:

1. *The technical approach for answering each question/task.* The technical approach should build upon, verify or challenge, and add to existing knowledge. The technical approach should include re-formulation or better articulation of the tasks, a brief summary of current knowledge on the topic from central California and elsewhere (where relevant), available methods to answer the questions and a rationale for selecting the proposed method(s), a description of the analysis approach and the data to be used, methods to verify the generality of the results, methods to qualify the conclusions, and a brief outline for the final report and publication. Knowledge should also be demonstrated concerning how corroborative analyses can be employed in weight of evidence arguments as part of ozone attainment demonstrations.
2. *Staffing, management oversight, and data management.* Extensive management oversight is not solicited or encouraged, as it is expected that each task will require substantial commitment and participation of an experienced specialist in the area with appropriate delegation to support personnel.
3. *A brief statement of qualifications for the proposed participants and a description of the duties they will perform, including a specific discussion of relatively recent project experience.* Greater detail may be incorporated by reference to a corporate website (preferred) or as a standard package. Extensive corporate experience is not as important as the qualifications of the principals who will be dedicated to the proposed task.
4. *The estimated budget for each task should be summarized on the cost reporting form shown in Table 1.* This cost summary form should be supplemented with appended documentation detailing:
 - a. Commitments and hourly rates for personnel.
 - b. Types and costs for travel, equipment, or supplies procured as part of the project.
 - c. One-time costs that apply to all tasks, but that are only listed in one (identify the costs and the tasks in which they are included or excluded).

- d. Expected cost increases such as annual salary adjustments should also be specified. It is anticipated that this contract will be awarded on a time and materials basis with a maximum (not to exceed) value.
5. *The management approach for dealing with routine operations, unexpected problems, and changes in work scope.*
6. *A project schedule, describing the start and end dates for each task, and the completion date for each deliverable specified in the scope of work.*

B. Guidelines and Criteria for Proposal Evaluation

Respondents should demonstrate knowledge and experience in the development and application of corroborative analysis approaches. An awareness should also be evident of pertinent measurements collected in central California during the CCOS summer 2000 field measurement program. The following specific criteria will be used to evaluate the proposals:

1. Technical approach for implementing the tasks specified under the Scope of Work. (30 points)
2. The experience, competence, capability, and commitment of the proposed personnel to be assigned to the project. (30 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. (25 points)
4. The overall proposed cost of the work as well as cost-effectiveness, and the proponent's willingness to enter into a contractual agreement that minimizes the risk of cost overrun. (15 points)

C. Conflict of Interest Requirements

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 CCOS, 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 CCAQS and the work that the consultant 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 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, California 93727
(559) 230-6033

D. Submittal Requirements

An original and two (2) hardcopies of your proposal and an electronic PDF file of the proposal shall be sent with a cover letter to the ARB Program Manager, Mr. John DaMassa, at the address listed in the Contract Requirements section. Hand carried or express mail packages may be delivered to Mr. John DaMassa at the California Air Resources Board, 1001 "I" Street, Sacramento, California 95814.

**TABLE 1
PROPOSAL BUDGET SUMMARY**

DIRECT COSTS:

- | | |
|------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| 1. Labor & Employee Fringe Benefits (provide detailed breakdown by task and employee on separate sheet [including Subcontractors]) | \$ _____ |
| 2. Equipment (provide detailed breakdown on separate sheet) | \$ _____ |
| 3. Travel & Subsistence | \$ _____ |
| 4. Electronic Data Processing | \$ _____ |
| 5. Photocopying/Printing/Mail/Telephone/FAX | \$ _____ |
| 6. Materials and Supplies | \$ _____ |
| 7. Miscellaneous (please specify) | \$ _____ |
| TOTAL DIRECT COST: | \$ _____ |

INDIRECT COSTS:

- | | |
|-----------------------------------------------------|-----------------|
| 8. Overhead (specify rate) | \$ _____ |
| 9. General & Administrative Expenses (specify rate) | \$ _____ |
| 10. Other Indirect Costs (please specify) | \$ _____ |
| 11. Fee or Profit (specify rate) | \$ _____ |
| TOTAL INDIRECT COST: | \$ _____ |

TOTAL DIRECT AND INDIRECT COST: \$ _____

APPENDIX A

CONTRACT LANGUAGE

CONTRACT NO. 08-x CCOS

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").

WITNESSETH:

WHEREAS, STUDY AGENCY has the need to develop and evaluate corroborative analysis methods;

WHEREAS, STUDY AGENCY released its Request for Proposal entitled "Development and Evaluation of Corroborative Analysis Methods" dated August 15, 2008 ("the RFP"), which is incorporated herein, to those persons determined by STUDY AGENCY to be capable of reviewing and assessing corroborative analysis methods;

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, one (1) bound copy of each written work product, one (1) electronic copy in Adobe Acrobat, and one (1) electronic copy in Microsoft Word.

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 Modeling and Meteorology Branch, Planning & Technical Support Division, Air Resources Board. The consent

of the Chief of the Modeling and Meteorology Branch, Planning & 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, Modeling and Meteorology Branch, 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 Modeling and Meteorology Branch, Planning and 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: John DaMassa, 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
POLLUTION STUDY AGENCY

CONTRACTOR

By _____
Chair

By _____
Print Name and Title

Tax I.D. No.

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

Approved as to legal form:
SAN JOAQUIN VALLEY UNIFIED AIR
POLLUTION CONTROL STUDY
AGENCY

By _____
Title _____

By _____
Philip M. Jay
Study Agency Counsel

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

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

By _____
Title _____

By _____
Roger W. McCoy
Finance Officer