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Seyed Sadredin
Executive Director
Air Pollution Control Officer

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4800 Enterprise Way
Modesto, CA 95356-8718
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34946 Flyover Court
Bakersfield, CA 93308-9725
(661) 392-5500 • FAX (661) 392-5585

DATE: April 17, 2014

TO: SJVUAPCD Governing Board



FROM: Seyed Sadredin, Executive Director/APCO
Project Coordinator: David Lighthall

RE: **ITEM NUMBER 9: APPROVE STUDY OF
TRANSBOUNDARY OZONE IMPACTS ON
SURFACE OZONE LEVELS IN THE SAN JOAQUIN
VALLEY**

RECOMMENDATIONS:

1. Authorize the Executive Director/ACPO to execute, with Board Chair signature, an 18-month research award to University of California, Davis (UC Davis) not to exceed \$91,245 that will measure long distance (transboundary) flows of ozone into the San Joaquin Valley from transpacific sources.
2. Authorize the Executive Director/ACPO to organize and convene a summit in 2015 to bring together researchers, local/state/federal agencies, and stakeholders to discuss and present transboundary research findings and lay the foundation for the development of implementation policies with technical assistance from the UC Davis research team.

BACKGROUND:

Under the US Clean Air Act (CAA), regions are required to control the following contributing sources of ground level ozone: (1) US anthropogenic emissions (2) natural background ozone generated within the US, and (3) natural background ozone that is transported via the troposphere or stratosphere to the US from beyond its borders. However, per §179B of the CAA, regions are not responsible to increase the stringency of control measures to offset the contributions of transboundary ozone generated by anthropogenic emissions in other countries, known as transboundary anthropogenic ozone (TAO).

In the case of California, during spring and summer transboundary ozone is delivered onshore by prevailing tropospheric wind currents flowing across the Pacific Ocean. Some of this transboundary ozone is from natural sources but an increasing proportion is due to a dramatic increase in fossil fuel combustion in Asia over the past two decades.

There are several reasons why it is critical for the District to scientifically estimate the net contribution made by TAO to ground level ozone concentrations. First, just as Asian sources of ozone precursors have risen dramatically, control measures and associated investments by Valley businesses have substantially reduced ozone precursors in the San Joaquin Valley. Rising levels of TAO pose a serious threat to the continued effectiveness of these control measures because the District and other impacted regions, in effect, have to compensate for rising TAO impacts in addition to reducing ozone resulting from local emission sources. Additionally, the newest federal 8 hour standard was significantly tightened in 2008 and is going to be further tightened in 2014 or 2015. The net result is a tightening vise for the District and other Western regions caught between rising levels of TAO beyond their control and the additional control requirements necessitated by more stringent federal standards. The potential impact of transboundary ozone on the Valley is significant, given that non-attainment with federal ozone standards is accompanied by fines, additional regulatory costs, de-facto bans on new businesses, and the threat of lost federal highway funding.

DISCUSSION:

In recognition of these concerns, your Board authorized a contract in 2011 with UC Davis researchers headed by Dr. Ian Faloon to establish a field site for monitoring flows of transboundary ozone at the Monterey Institute for Research in Astronomy (MIRA) observatory located on Chews Ridge at 1,525 meters in the Santa Lucia range just 28 kilometers from the Big Sur coast (see Figure 1). Measurements in 2012 at the Chews Ridge observatory have provided the District with a wealth of information needed for assessing transboundary ozone impacts, including hourly wind direction, wind speed, relative humidity, and PM2.5 and ozone concentrations. Additionally, your Board approved funding in 2013 for a related study involving intensive aircraft-based measurements of ozone formation in the southern Valley in conjunction with the Arvin/Kern County saturation study during the 2013 summer season.

Because the field site has been maintained in near-continuous operation for two years, it is also providing academic and government agency researchers with an important source of data regarding the impact of transboundary ozone from Asia on California and the Valley. Data gathered at the site has made it possible to quantify the varying concentrations of transboundary ozone found in transpacific air mass flows that are traveling across the Pacific Ocean from Asia. For example, Figure 2 shows the monthly average concentrations of transboundary ozone at Chews Ridge for 2012 and 2013.

The District has also been able to establish that concentrations of transboundary ozone measured at Chews Ridge are highly representative of concentrations found at the same time in transpacific air masses flowing through the gap in the coast range between Pt. Reyes and the Carquinez Strait. This area has been identified by National Oceanic and Atmospheric Administration (NOAA) researchers as the primary entryway for transboundary ozone that is affecting the San Joaquin Valley. UC Davis researchers have concluded that this same pathway was followed by flows of transboundary ozone into the Valley prior to the August 10, 2012 Fresno Drummond Ave. exceedance of the 1 hour ozone standard (see Figure 3). Overall, data from the Chews Ridge field station coupled with the findings from the Arvin/Kern aircraft research has provided sound scientific evidence in support of the District's submission of documentation to the EPA under §179B that the 1 hour ozone exceedance of August 10, 2012 at the Drummond Ave. monitor would not have occurred but for transboundary anthropogenic ozone travelling across the Pacific Ocean from Asia.

PROPOSED PROJECT:

The proposed project will provide the District with an additional 18 months of field operation and data collection at the Chews Ridge field station, beginning in April 2014 and continuing through September 2015. UC Davis has continued to operate the ozone monitor with no funding from the District since January 1, 2014. If funded, this project will provide the District with observational data for four full ozone seasons—2012 through 2015.

One of the primary benefits of these additional observations relates to its contribution to the future development of State Implementation Plans (SIP) by the District to address increasingly stringent federal ozone standards. EPA has indicated its willingness to begin a process through the 2015 conference described below to develop policy that enables regions that can scientifically quantify TAO impacts to incorporate those estimated impacts into their SIP modeling. The policy-related outcome of this incorporation will be to refine ozone design values for Valley ozone monitors based on impacts from TAO. This will result in reduced ozone monitor design values. This reduction, in turn, will ultimately reduce the District's risk of future Section 185 penalties due to non-attainment with a parallel reduction in the overall ozone regulatory burden facing the Valley.

Maintaining the continuity of observations at Chews Ridge will also assist in future cases of individual 8 hour exceedances comparable to the estimations under §179B of the TAO contribution to the 1 hour exceedance that occurred on August 10, 2012. The Chews Ridge observations may also provide additional evidence of rising levels of transboundary ozone that are resulting from the growth of Asian anthropogenic emissions.

In conjunction with continued operation of the Chews Ridge field station, the District has the opportunity to organize and sponsor a summit in 2015 regarding the impacts of

transboundary ozone and PM2.5 on ground level concentrations in the western United States. With technical assistance from the UC Davis research team, the summit would consist of three elements: (1) a kickoff day focusing on scientific presentations regarding the forces that are driving the growing trend of transboundary pollution; (2) a second day that explores the policy implications of rising transboundary impacts, particularly from ozone, with an emphasis on input from regulatory agencies including EPA, ARB, the District, and other western air agencies; and (3) a subsequent closed door, half day workshop involving EPA and other air quality regulatory agency staff with the goal of formulating concrete guidelines from EPA that will allow air agencies to formally account for the impacts of transboundary pollutants in SIP development and in §179B submissions.

FISCAL IMPACT:

Sufficient appropriations for the proposed study are included in the District's 2013-14 Budget. If the summit takes the form of a conference, the 2014-15 Budget will include sufficient appropriations with a significant portion of the associated cost recoverable through registration fees provided by participants.

Attachments:

Attachment A: Draft Agreement Between SJVAPCD and the Regents of UC Davis (13 pages)

Attachment B: Technical Proposal – A Study of Long Range Transport of Air Pollutants to the San Joaquin Valley: Phase II (7 pages)

Figure 1. MIRA observatory at Chews Ridge and related monitoring equipment operated by UC Davis.

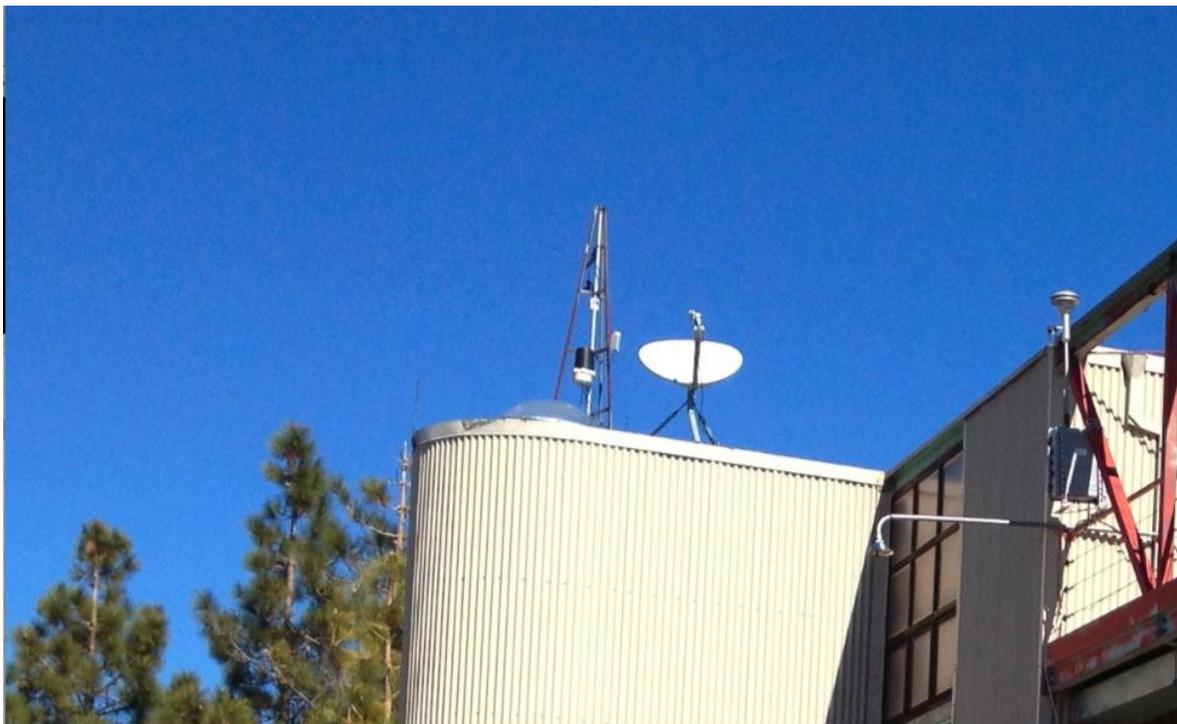


Figure 2. Monthly transboundary ozone concentrations (ppbv, with +/- 1 standard deviation) measured at Chews Ridge during nocturnal hours of onshore flow.

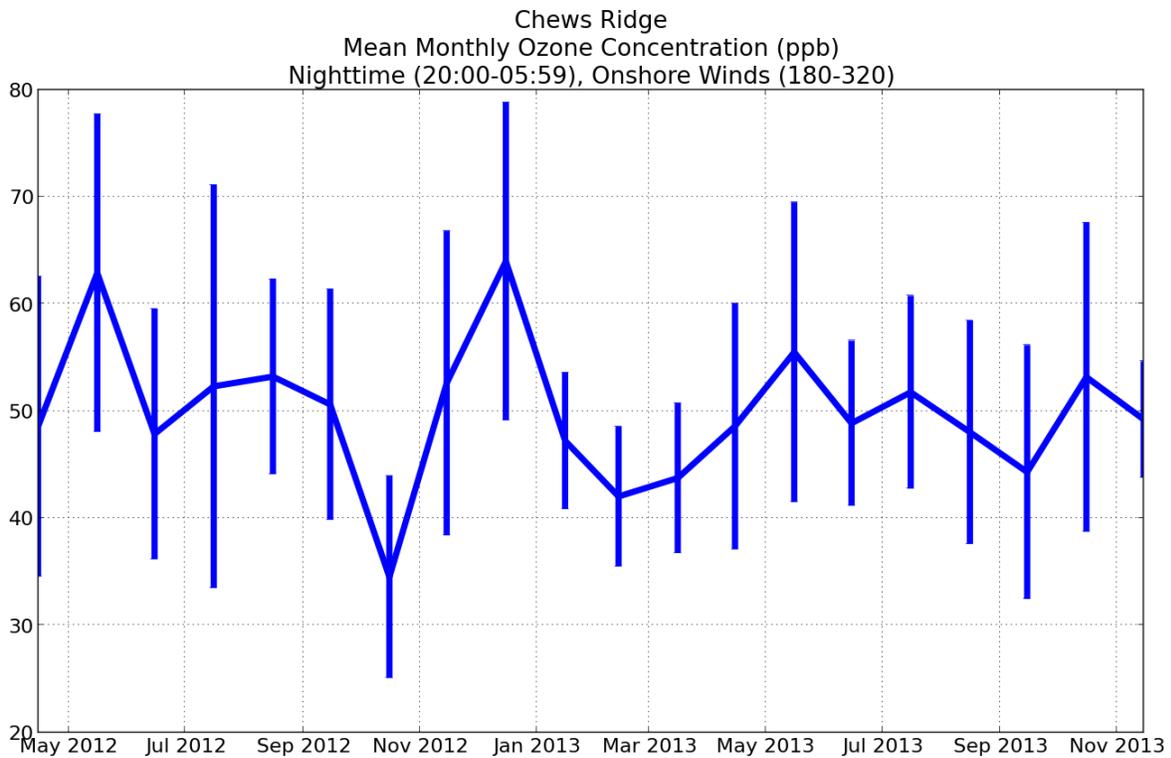
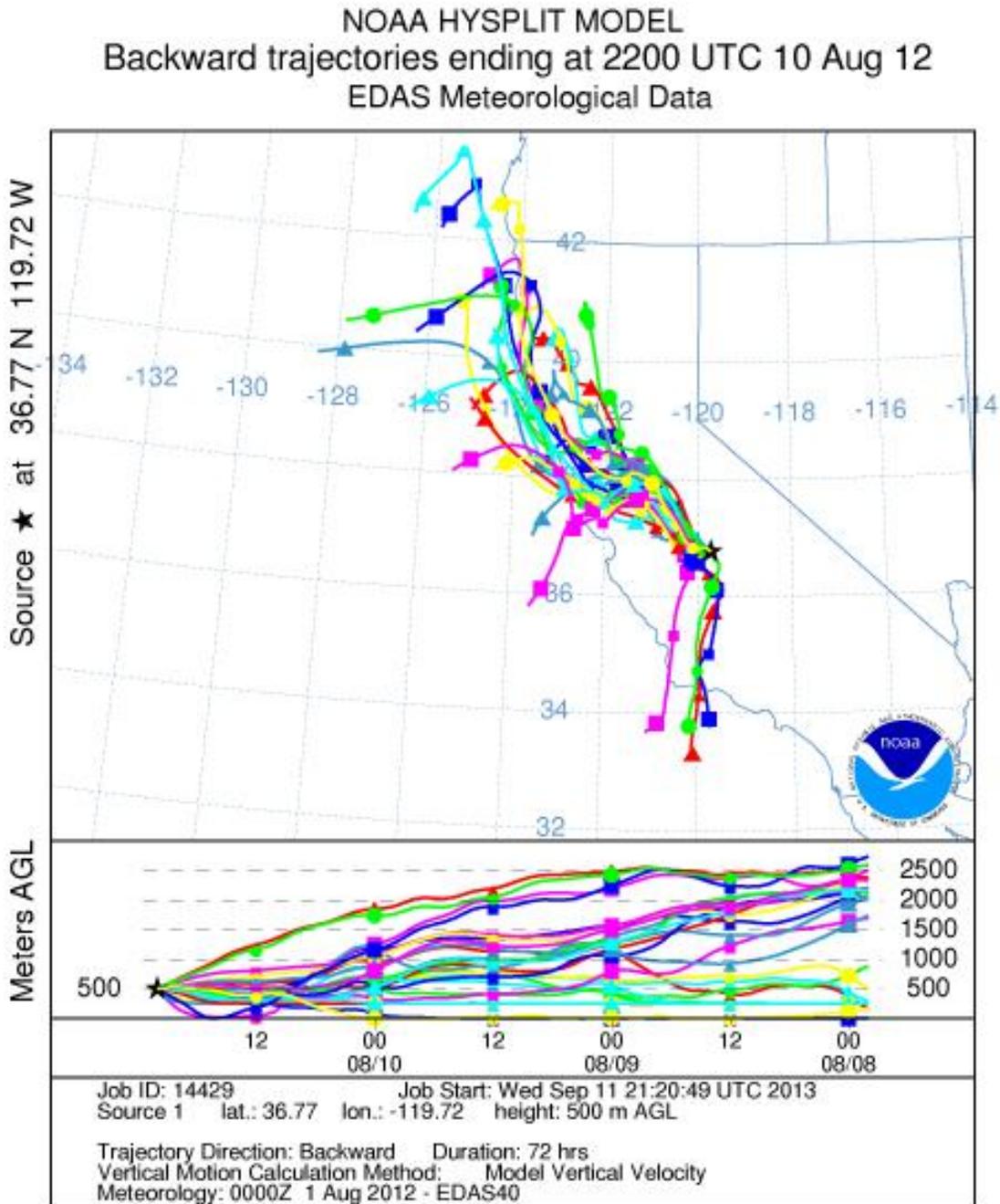


Figure 3. 72 hour air mass back trajectories from Fresno for 5 pm, Aug. 10, 2012 showing pathways of transboundary air masses to Fresno (top) and their descent from the free troposphere (above 1,000 meters) downward into the Valley boundary layer (bottom).

Source: NOAA and UC Davis



San Joaquin Valley Unified Air Pollution Control District
Meeting of the Governing Board
April 17, 2014

**APPROVE STUDY OF TRANSBOUNDARY OZONE IMPACTS ON
SURFACE OZONE LEVELS IN THE SAN JOAQUIN VALLEY**

Attachment A:

**Draft Agreement Between SJVAPCD and the Regents of UC
Davis (13 Pages)**

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AGREEMENT

BETWEEN

SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT

AND

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA AT DAVIS

This Agreement is made and entered into this 17th day of April, 2014, by and between the SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT, a unified air pollution control district formed pursuant to California Health and Safety Code section 40150 et seq. (hereafter referred to as the "District"), and THE REGENTS OF THE UNIVERSITY OF CALIFORNIA AT Davis, (hereafter referred to as "UC Davis").

WITNESSETH:

WHEREAS, the San Joaquin Valley ("Valley") is currently classified as a nonattainment area for the federal 8 hr. ozone standard;

WHEREAS, the Valley's extremely low carrying capacity for air pollution combined with its proximity to the Pacific Ocean makes it imperative to quantify the contribution of all sources of ozone and ozone precursors that contribute to ground level ozone in the region;

WHEREAS, under the United States Clean Air Act, § 179B (42 U.S.C. § 7509a), if the District establishes that, but for emissions emanating from outside of the United States (hereafter referred to as "transboundary anthropogenic ozone"), it would have attained the national ambient air quality standard ("NAAQS") for ozone by the applicable attainment date , it may demonstrate attainment of the NAAQS for ozone and is not subject to the penalty fee provisions of § 185 of the Clean Air Act (42 U.S.C. § 7511d);

WHEREAS, a substantial body of peer-reviewed scientific research conducted in the Sacramento and San Joaquin Valleys has found evidence that (1) transboundary ozone is resulting in higher ground level ozone concentrations and (2) a significant fraction of transboundary ozone is transboundary anthropogenic ozone

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1 from transpacific sources;

2 **WHEREAS**, since February 2012 and with funding from the District, UC
3 Davis researchers have successfully and continuously measured flows of
4 transboundary ozone from transpacific sources at a field research station located on
5 Chews Ridge in the Santa Maria range, located southwest of the central San Joaquin
6 Valley at an altitude of 5,200 ft. To date, UC Davis has fulfilled all requirements
7 specified by previous contracts with the District related to the operation of the Chews
8 Ridge field station;

9 **WHEREAS**, the measurement of these flows of transboundary ozone at
10 this strategic location provides the District with essential scientific evidence for
11 accurately estimating the contribution of transboundary anthropogenic zone to ground
12 level ozone in the Valley;

13 **WHEREAS**, with assistance from the UC Davis research team, 2012
14 data collected at the Chews Ridge observatory has played a key role in District's
15 submission to the United States Environmental Protection Agency ("EPA") under
16 § 179B of compelling scientific evidence that transboundary anthropogenic ozone
17 from transpacific sources led to exceedance of the 1 hour ozone NAAQS that
18 occurred on August 10, 2012 at the Drummond Ave. ozone monitor;

19 **WHEREAS**, the project will support an additional 18 months of
20 continuous ozone monitoring spanning the 2014 and 2015 ozone seasons, resulting in
21 four consecutive seasons of transboundary ozone data that can be effectively
22 incorporated into the District's next State Implementation Plan for the 8 hour ozone
23 standard;

24 **WHEREAS**, the District currently has funding available for research
25 dedicated to estimating influence of transboundary anthropogenic ozone on surface
26 ozone concentrations in the San Joaquin Valley;

27 **WHEREAS**, UC Davis represents that it has maintained monitoring of
28 hourly transboundary ozone at Chews Ridge to date and is willing to maintain

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1 operation of this monitoring facility from April 1, 2014 until September 30 2015 at a
2 cost of \$91,245, and possesses the technical knowledge necessary for analyzing the
3 contribution made by transboundary anthropogenic ozone to surface ozone levels in
4 the San Joaquin Valley;

5 **NOW, THEREFORE**, based on their mutual promises, covenants, and
6 conditions, the parties hereby agree as follows:

7 **1. PROJECT**

8 As more specifically outlined in Exhibit A which is attached hereto and
9 incorporated herein, UC Davis shall conduct field research at the Chews Ridge
10 monitoring station for 18 months in order to make a scientifically sound estimate of the
11 fraction of ozone concentrations found at District monitoring locations in the San
12 Joaquin Valley that can be attributed to transboundary ozone from anthropogenic
13 sources.

14 UC Davis agrees to furnish all labor, materials, equipment, licenses,
15 permits, fees, and other incidentals necessary to perform and complete, per schedule,
16 in a professional manner, the services described herein. UC Davis represents that it
17 possesses the expertise necessary to adequately perform the project specified in
18 Exhibit A. The UC Davis research team will pursue publication of the findings of its
19 transboundary ozone research in peer-reviewed scientific journals. The UC Davis
20 research team also agrees to provide the District with technical assistance in
21 developing a District-sponsored summit on transboundary pollution to be held in 2015
22 where the UC Davis research findings will be presented to researchers, policymakers,
23 and stakeholders.

24 In the event of any conflict between or among the terms and conditions
25 of this Agreement, the exhibits incorporated herein, and the documents referred to
26 and incorporated herein, such conflict shall be resolved by giving precedence in the
27 following order of priority:

- 28 1. To the text of this Agreement; and

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2. Exhibit A to this Agreement.

2. PERIOD OF PERFORMANCE/TIMETABLE

UC Davis shall commence performance of the activities outlined in Exhibit A and shall produce all work product in accordance with the work schedule and deadlines for performance identified in Exhibit A of this Agreement, which is attached hereto and incorporated herein, unless this Agreement is terminated sooner as provided for elsewhere in this Agreement.

If requested by the District, UC Davis shall submit and present regular progress reports, at intervals determined by the District, detailing the work performed during the current reporting period; work planned for the next reporting period; problems identified, solved, and/or unresolved; and the percentage of each task completed. Upon completion of all work as described in this Agreement and Exhibit A, UC Davis shall provide the District with a comprehensive final written report which shall document all work performed under this Agreement.

3. COMPENSATION

The total obligation of District under this Agreement shall not exceed Ninety-Two Thousand, Two Hundred and Forty-Five Dollars (\$92,245) to perform the research and reporting activities as described in Exhibit A. Said funding will be provided upon confirmation by District of completion of the work as described in this agreement and Exhibit A, attached. UC Davis is solely responsible for all costs not included in the funding breakdown provided in Exhibit A of this Agreement.

A. Payments: Following the completion of scheduled objectives and submission of each milestone report described in Exhibit A of this Agreement, the District will disburse approximately one third (1/3) of the project funds to UC Davis within thirty (30) calendar days. Unless required by justifiable circumstances, the District will not pay on invoices sent more than 60 days following completion of all work required to be performed as described in Exhibit A.

B. Surplus Funds: Any compensation which is not expended by

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1 UC Davis pursuant to the terms and conditions of this Agreement by the project
2 completion date shall automatically revert to District. Only expenditures incurred by
3 UC Davis in the direct performance of this Agreement will be reimbursed by District.
4 Allowable expenditures under this Agreement are specifically established and
5 included in Exhibit A attached hereto and incorporated herein. If the actual costs of
6 the project are lower than the anticipated costs as stated in Exhibit A of this
7 Agreement, the District shall only pay the actual costs. If the actual costs of the
8 project exceed the anticipated costs as stated in Exhibit A, page 6, of this Agreement,
9 the District will not be responsible for the additional costs.

10 **4. NON-ALLOCATION OF FUNDS**

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

16 **5. INDEPENDENT CONTRACTOR**

17 In performance of the work, duties, and obligations assumed by UC
18 Davis under this Agreement, it is mutually understood and agreed that UC Davis,
19 including any and all of its officers, agents, and employees, will at all times be acting
20 and performing as an independent contractor and shall act in an independent capacity
21 and not as an officer, agent, servant, employee, joint venturer, partner, or associate of
22 the District. Furthermore, the District shall have no right to control or supervise or
23 direct the manner or method by which UC Davis shall perform its work and function.
24 However, the District shall retain the right to administer this Agreement so as to verify
25 that UC Davis is performing its obligations in accordance with the terms and
26 conditions thereof. UC Davis and the District shall comply with all applicable
27 provisions of law and the rules and regulations, if any, of governmental authorities
28 having jurisdiction over matters the subject thereof.

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1 Because of its status as an independent contractor, UC Davis shall have
2 absolutely no right to employment rights and benefits available to District employees.
3 UC Davis shall be solely liable and responsible for providing to, or on behalf of, itself
4 all legally required employee benefits. In addition, UC Davis shall be solely
5 responsible and save District harmless from all matters relating to payment of UC
6 Davis's employees, including compliance with social security, withholding, and all
7 other regulations governing such matters. It is acknowledged that during the term of
8 this Agreement, UC Davis may be providing services to others unrelated to the District
9 or to this Agreement.

10 **6. TERMINATION**

11 **A. Breach of Agreement:** District may immediately suspend or
12 terminate this Agreement, in whole or in part, where in the determination of District
13 there is:

- 14 1. An illegal or improper use of funds;
- 15 2. A failure to comply with any term of this Agreement;
- 16 3. A substantially incorrect or incomplete report submitted to District; or
- 17 4. Improperly performed services.

18 In no event shall any payment by District constitute a waiver by District
19 of any breach of this Agreement or any default which may then exist on the part of UC
20 Davis. Neither shall such payment impair or prejudice any remedy available to District
21 with respect to the breach or default. District shall have the right to demand of UC
22 Davis the repayment to District of any funds disbursed to UC Davis under this
23 Agreement which in the judgment of District were not expended in accordance with
24 the terms of this Agreement. UC Davis shall promptly refund any such funds upon
25 demand.

26 In addition to immediate suspension or termination, District may impose
27 any other remedies available at law, in equity, or otherwise specified in this
28 Agreement.

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1 **B. Without Cause:** Either party may terminate this Agreement at
2 any time upon giving the other party at least thirty (30) days' advance written notice of
3 intention to terminate. In such case, UC Davis shall, subject to paragraph 3, be paid
4 the reasonable value of all services rendered as outlined in Exhibit A and actual,
5 reasonable costs incurred up to the time of the termination including all noncancelable
6 obligations. Upon such termination, all the work produced by UC Davis shall be
7 promptly delivered to District.

8 **7. MODIFICATION**

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

11 **8. NON-ASSIGNMENT**

12 No party to this Agreement shall assign, transfer, or subcontract this
13 Agreement, nor their rights or duties under this Agreement, without the prior express,
14 written consent of the other parties.

15 **9. INDEMNIFICATION**

16 UC Davis agrees to indemnify, save, hold harmless, and at District's
17 request, defend District, its boards, committees, representatives, officers, agents, and
18 employees from and against any and all costs and expenses (including reasonable
19 attorneys' fees and litigation costs), damages, liabilities, claims, and losses (whether
20 in contract, tort, or strict liability, including, but not limited to, personal injury, death,
21 and property damage) occurring or resulting to District which arises from any negligent
22 or wrongful acts or omissions of UC Davis, its officers, agents, or employees in their
23 performance of this Agreement.

24 **10. INSURANCE**

25 **A.** UC Davis represents that it is self-insured and that it has sufficient
26 funds and assets to provide coverage of at least One Million Dollars (\$1,000,000) per
27 occurrence for general commercial liability and One Million Dollars (\$1,000,000) per
28 occurrence for commercial automobile liability, without contribution from District or its

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1 insurers. UC Davis's responsibility for worker injuries is governed by California law,
2 and/or other applicable statutes.

3 **B.** Prior to the commencement of performing its obligations under
4 this Agreement, UC Davis shall provide evidence of self-insurance as required herein,
5 stating that such self-insurance is in full force; that District, its officers, agents, and
6 employees will not be responsible for any fees, costs or premiums associated with
7 such self-insurance; that the District, its officers, agents, and employees, individually
8 and collectively, are additional insureds, but only insofar as the operations under this
9 Agreement are concerned; that such coverage for additional insureds shall apply as
10 primary insurance and any other insurance maintained by District, its officers, agents,
11 and employees, shall be excess only and not contributing with the self-insurance
12 provided by UC Davis.

13 **C.** If UC Davis acquires applicable insurance coverages during the
14 term of this Agreement, UC Davis shall provide certifications of insurance on the
15 applicable policies to District, stating that such insurance coverages have been
16 obtained and are in full force; that District, its officers, agents, and employees will not
17 be responsible for any premiums on the policies; that such coverages shall apply as
18 primary insurance, and any other insurance maintained by District, its officers, agents,
19 and employees shall be excess only and not contributing with insurance provided
20 under UC Davis's policies herein. This insurance shall not be canceled or changed
21 without a minimum of thirty (30) days' advance, written notice given to District by UC
22 Davis.

23 **D.** In the event UC Davis fails to keep in effect at all times insurance
24 coverage as herein provide, District may, in addition to other remedies it may have,
25 suspend or terminate this Agreement upon the occurrence of such event.

26 **11. AUDITS AND INSPECTIONS**

27 To the extent such requests are reasonable and do not unreasonably
28 interfere with UC Davis' regular business operations, UC Davis shall at any time

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1 during regular business hours, and as often as District may deem necessary, make
2 available to District for examination all of its records and data with respect to the
3 matters covered in this Agreement. UC Davis shall, and upon request by District,
4 permit District to audit and inspect all of such records and data necessary to ensure
5 UC Davis's compliance with the terms of this Agreement.

6 UC Davis shall be subject to an audit by the District or its authorized
7 representative to determine if the revenues received by UC Davis were spent for the
8 analysis of transboundary ozone and to determine whether said funds were utilized as
9 provided by law and this Agreement. If, after an audit District makes a determination
10 that funds provided to UC Davis pursuant to this Agreement were not spent in
11 conformance with this Agreement or any other applicable provisions of law, UC Davis
12 agrees to immediately reimburse District all funds determined to have been expended
13 not in conformance with said provisions.

14 UC Davis shall retain all records and data for activities performed under
15 this Agreement for at least three (3) years from the date of final payment under this
16 Agreement or until all state and federal audits are completed for that fiscal year,
17 whichever is later.

18 Because this Agreement exceeds Ten Thousand Dollars (\$10,000), UC
19 Davis shall be subject to the examination and audit of the auditor general for a period
20 of three (3) years after final payment under contract (Government Code § 8546.7).

21 **12. NOTICES**

22 The persons and their addresses having authority to give and receive
23 notices under this Agreement are as follows:

24 **UC Davis**

25 Ahmad Hakim-Elahi, Ph.D, J.D.
26 Executive Director, Research Administration
27 Office of Research, Sponsored Programs
28 University of California, Davis
1850 Research Park Drive, Suite 300
Davis, CA 95618

DISTRICT

Seyed Sadredin
Executive Director/APCO
SJVAPCD
1990 East Gettysburg Ave.
Fresno, CA 93726

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1 Any and all notices between the District and UC Davis provided for or
2 permitted under this Agreement or by law shall be in writing and shall be deemed duly
3 served when personally delivered to one of the parties, or in lieu of such personal
4 service, when deposited in the United States mail, postage prepared, addressed to
5 such party.

6 **13. POLITICAL ACTIVITY PROHIBITED**

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

11 **14. LOBBYING PROHIBITED**

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

16 **15. CONFLICT OF INTEREST**

17 No officer, employee, or agent of District who exercises any function or
18 responsibility for planning and carrying out the services provided under this
19 Agreement shall have any direct or indirect personal financial interest in this
20 Agreement. UC Davis shall comply with all federal and state conflict of interest laws,
21 statutes, and regulations, which shall be applicable to all parties and beneficiaries
22 under this Agreement and any officer, agent, or employee of District.

23 **16. GOVERNING LAW**

24 This Agreement shall be governed in all respects by the laws of the
25 State of California.

26 **17. BINDING ON SUCCESSORS**

27 This Agreement, including all covenants and conditions contained
28 herein, shall be binding upon and inure to the benefit of the parties, including their

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1 respective successors-in-interest, assigns, and legal representatives.

2 **18. TIME IS OF THE ESSENCE**

3 It is understood that for UC Davis's performance under this Agreement,
4 time is of the essence. The parties reasonably anticipate that UC Davis will, to the
5 reasonable satisfaction of District, complete all activities provided herein within the
6 time schedule outlined in Exhibit A, page 5, provided that UC Davis is not caused
7 unreasonable delay in such performance.

8 **19. DATA OWNERSHIP**

9 Consistent with its own policies concerning technology transfer, UC
10 Davis will retain ownership and copyright of any data, materials, publications, or like
11 copyrightable intellectual property UC Davis or its employees develop under this
12 Agreement ("Project IP"). To the extent legally able to do so, UC Davis shall grant the
13 District a non-exclusive, royalty-free, non-commercial license to use and reproduce
14 Project IP for non-commercial purposes. Accordingly, UC Davis shall, if requested,
15 provide District copies of all such Project IP which is in its possession (including their
16 subcontractors or agents).

17 Consistent with the terms of paragraph 11, District shall have the right at
18 reasonable times during the term of this Agreement to inspect and reproduce any
19 Project IP received, collected, produced, or developed by UC Davis under this
20 Agreement.

21 **20. NO THIRD-PARTY BENEFICIARIES**

22 Notwithstanding anything else stated to the contrary herein, it is
23 understood that UC Davis's services and activities under this Agreement are being
24 rendered only for the benefit of District, and no other person, firm, corporation, or
25 entity shall be deemed an intended third-party beneficiary of this Agreement.

26 **21. SEVERABILITY**

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

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

4 **22. SPECIAL CONDITIONS**

5 The entire proposed project must be completed based upon the
6 schedule proposed in Exhibit A.

7 Funds may not be used to meet Americans with Disabilities Act (ADA)
8 requirements.

9 **23. ENTIRE AGREEMENT**

10 This Agreement constitutes the entire agreement between UC Davis and
11 the District with respect to the subject matter hereof and supersedes all previous
12 negotiations, proposals, commitments, writings, advertisements, publications, and
13 understandings of any nature whatsoever unless expressly included in this
14 Agreement.

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1 **IN WITNESS WHEREOF**, the parties hereto have caused this Agreement
2 to be executed as of the day and year first hereinabove written.

3 **UC DAVIS**

DISTRICT

4 The Regents of the University of
5 California

San Joaquin Valley Unified Air Pollution
Control District

6 _____
7 Randi Jenkins, J.D.
Associate Director, Sponsored Programs

Hub Walsh
Governing Board Chair

8 _____
9 **94-6036494**
Tax I.D. No.

Recommended for approval:
San Joaquin Valley Unified Air Pollution
Control District

10 _____
11 **Approved as to legal form:**
12 University of California Davis

Seyed Sadredin
Executive Director/APCO

13 _____
14 _____
15 **Approved as to legal form:**
16 San Joaquin Valley Unified Air Pollution
Control District

Annette Ballatore-Williamson
District Counsel

Approved as to accounting form:

17 _____
18 Mehri Barati
Director of Administrative Services

19 _____
20 _____
21 **For accounting use only:**
22 San Joaquin Valley Unified Air Pollution
Control District

23 Fund: 100

24 Sub Department: 43

25 Account No: 6666

San Joaquin Valley Unified Air Pollution Control District
Meeting of the Governing Board
April 17, 2014

**APPROVE STUDY OF TRANSBOUNDARY OZONE IMPACTS ON
SURFACE OZONE LEVELS IN THE SAN JOAQUIN VALLEY**

Attachment B:

**Technical Proposal – A Study of Long Range Transport of Ozone to the
San Joaquin Valley: Phase II
(7 Pages)**

Exhibit A

Technical Proposal

A Study of Long Range Transport of Ozone to the San Joaquin Valley Phase II

Submitted by:

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Background and Rationale

Atmospheric emissions from rapidly developing Asian countries are still on the rise and leading to significant increases in background levels of criteria pollutants entering California, including ozone and PM. Consequently the difference in concentration between this background and our national air quality standards is steadily eroding. The San Joaquin Valley (SJV) suffers from one of the most vexing air quality problems in the nation. Recent federal, state and SJVAPCD regulations have lowered pollutant concentrations in the SJV but these early gains are becoming more difficult to continue, possibly due to an increasing hemispheric background. In the last two years, we have established a monitoring station on Cahto Peak in Mendocino County that has now collected nearly two full years of continuous ozone data at high altitude (1.5 km) near the upwind edge of California. This monitoring has led to a much better understanding of the magnitude and variability of ozone levels entering California air. Furthermore, the analysis of the data has uncovered substantial correlations between ozone on Chews Ridge (during onshore winds) and airborne measurements over Fresno, as well as maximum O₃ levels the following afternoon at surface sites in Fresno and Arvin. From continuous measurements of ozone at this important boundary site we are able to more quantitatively come to grips with the inputs of this air pollutant from distant sources to the San Joaquin Valley.

The ozone pollution rose of Figure 1 illustrates the wind directions and corresponding ozone levels observed at Chews Ridge during the ozone season (June-September) for 2012 and 2013. The radial measure is the frequency of the wind from that direction, and the colors denote the frequency of each binned ozone concentration in each wind sector. A very similar bimodal distribution of winds is seen for the daytime data, characterized by lower average ozone concentrations due to uptake by vegetation when the surface is strongly coupled to the flow in the lower free troposphere (FT) and photosynthesis is active. Figure 1 shows that while the median ozone is higher during northeasterly wind (~55 ppbv) due to the influence from continental sources, the range of concentrations experienced is much greater during the onshore winds when, in fact, the highest ozone levels are observed. This then represents the variability in the background ozone that is transported from distant sources to Central California.

Chews Ridge-JJAS 2012 & 2013, Night (20:00-05:59)

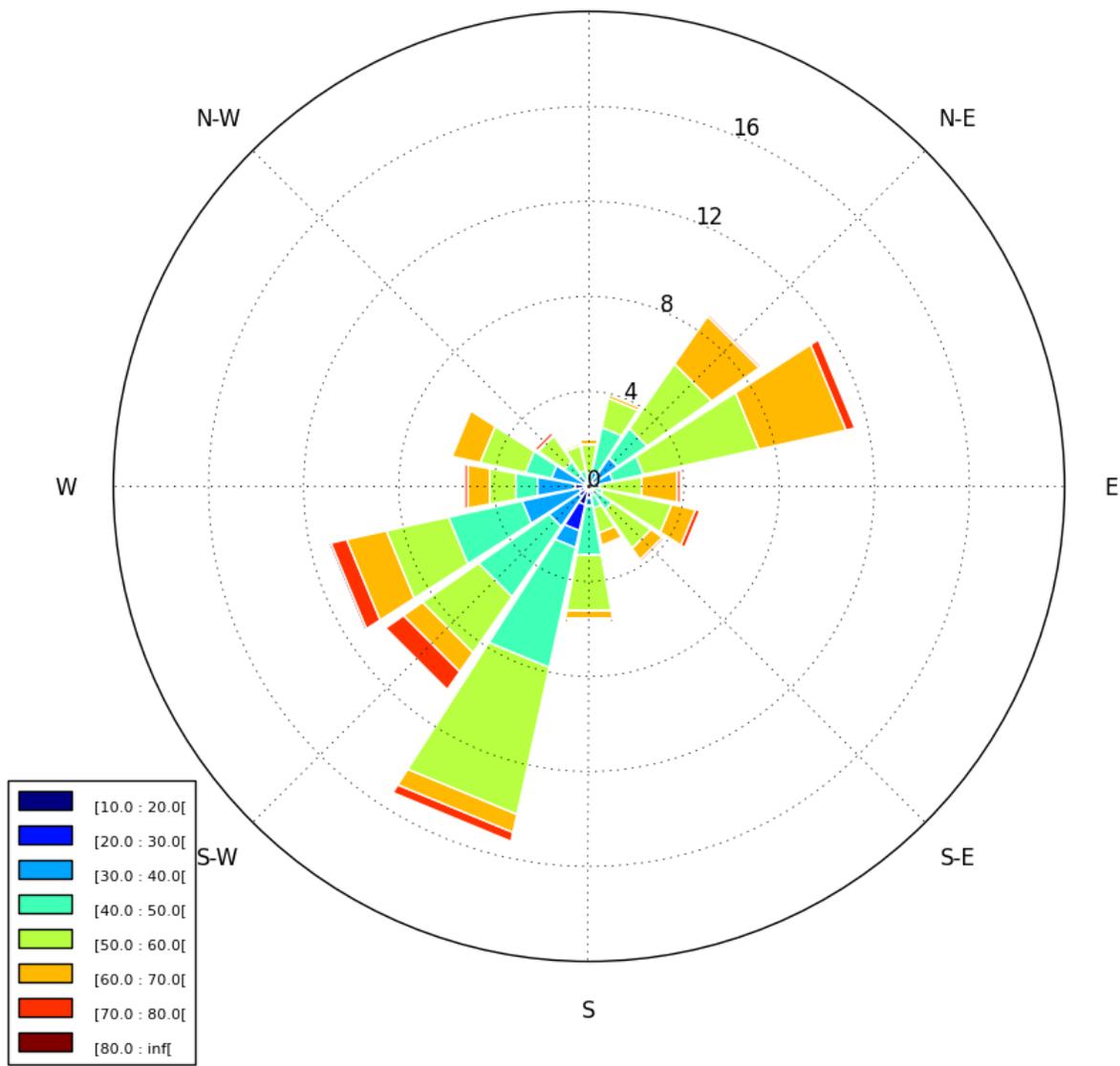


Figure 1. Ozone "pollution rose" showing the frequencies of nighttime wind directions and ozone concentrations observed at Chews Ridge during June-September 2012 & 2013.

Figure 2 shows the monthly mean ozone (± 1 standard deviation) for nocturnal conditions of onshore flow, which are most characteristic of background free tropospheric ozone concentrations and least likely to be influenced by North American pollution sources. The seasonal ozone patterns observed on Chews Ridge are similar to the ozonesonde climatology at 2 km altitude reported for Trinidad Head in Northern California (Parrish et al., 2010) in that there is a springtime peak. It is also important to

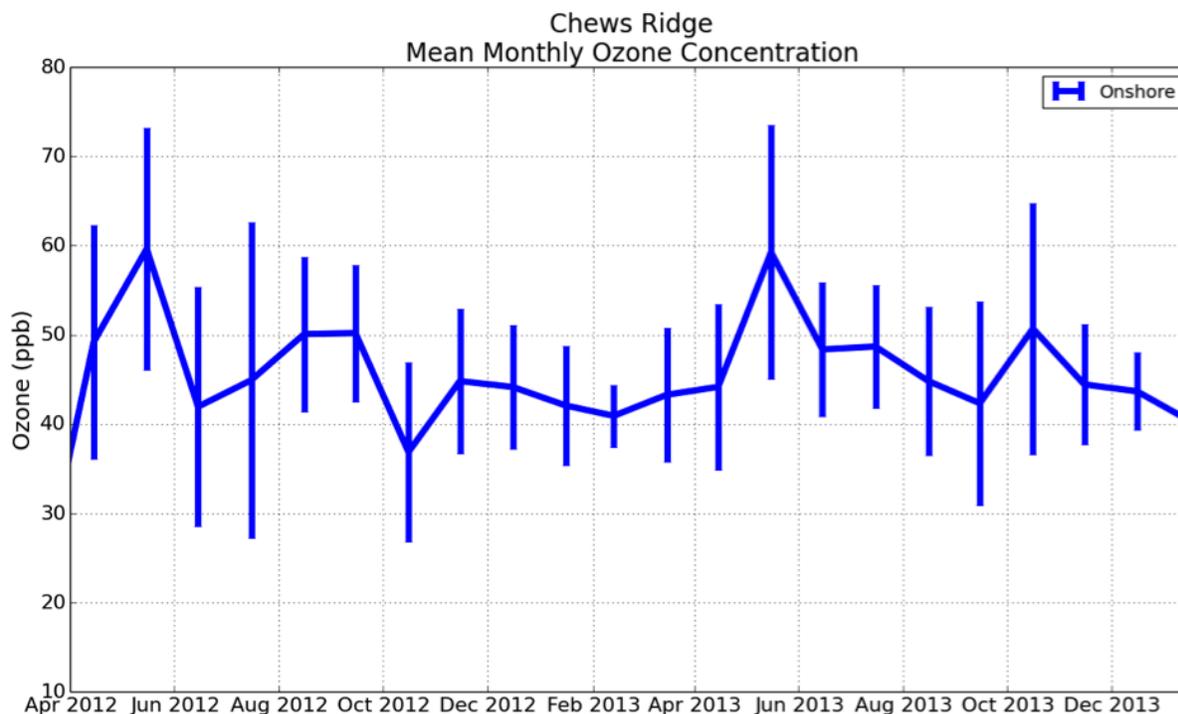


Figure 2. Monthly average ozone concentrations during nighttime onshore wind flow measured at Chews Ridge. The vertical bars indicate ± 1 standard deviation.

note that unlike surface marine background sites such as Trinidad Head or Pt. Reyes (Parrish et al., 2009), which exhibit a summertime minimum in ozone due to photochemical destruction, the amplitude of annual variation in the relatively dry free troposphere is more muted. Armed with these data we can get a sense for the magnitude of variability of the transboundary ozone that winds up over the Central Valley and mixes with air from the surface during the daytime.

Project Objectives

The proposed 18 month research project will continue ozone monitoring at our air quality sampling station at the Monterey Institute for Research in Astronomy (MIRA) observatory located on Chews Ridge (east of Big Sur) in Monterey County. Prior funding from the SJVAPCD has established this very unique monitoring site, therefore many of the initial start-up costs have been invested. We propose to keep this station operational, measuring only ozone, for an additional 18 months, through the end of the

2015 ozone season (1-Apr-2014 to 30-Sept-2015). This will then overlap with an airborne investigation planned under the auspices of the California Air Resources Board for the summer of 2015 to investigate the dynamics of the residual layer above the southern San Joaquin Valley. The study will provide approximately 15 days of airborne ozone data collected in the lower free troposphere, which will be very useful in tracking correlations between the monitoring site at Chews Ridge and the boundary condition of ozone present at the top of the midday boundary layer above the Valley. Furthermore, these data, continuing through four continuous ozone seasons, may make it possible to establish trends in the continental background and thus long-range transport into the San Joaquin Valley. Previous studies at coastal sites by Parrish et al. (2009) indicate that typical springtime background ozone has been increasing at about 0.5 ppb/yr, so after four years we may see a statistically discernable rise in background ozone at Chews Ridge.

Another advantage to making an extended period of background ozone measurements is that it can lead to a better understanding of the variability in transport from the high altitude inflow to the surface ozone in the Valley. For example, correlation coefficients between the MDA O₃ in Arvin and the hourly ozone at Chews Ridge varied substantially between the summers of 2012 and 2013 (0.36 and 0.48, respectively.) The correlations at any of the surface sites also appeared greater during the springtime period, when the concentrations at Chews were near their annual peak. Obtaining four full years of continuous measurements can provide insights into the meteorological parameters that influence the overall relationship between ozone at these sites, and further constrain the amount of transboundary ozone that contributes to surface NAAQS violations.

Objective I: Continue Monitoring of Ozone

Continued maintenance and calibration and upkeep of the observatory on Chews Ridge.

Objective II: Data collection, quality assurance, and analysis

Weekly remote interrogation of instrumentation; Monthly site visits for instrument maintenance and diagnostics.

Objective III: Data integration and report writing

Thorough analysis of all sources of data (site air quality and meteorological measurements, airborne O₃/wind measurements, ancillary external data such as satellite tropospheric ozone, etc.) and preparation of annual reports, as well as integrative analysis and interpretation of the long term monitoring results.

Project Objective Schedule

	1 st Qtr Apr/May/June 2014	2 nd Qtr Jul/Aug/Sep 2014	3 rd Qtr J Oct/Nov/Dec 2014	4 th Qtr Jan/Feb/Mar 2015	5 th Qtr Apr/May/June 2015	6 th Qtr Jul/Aug/Sep 2015
I						
II						
III						
IV						
V						
VI			1 st Rpt.		2 nd Rpt.	Final Rpt.

Project Budget

Continued Ozone Sampling at MIRA Chews Ridge Observatory California for SJVAPCD	
Budget	
A. PERSONNEL	
1. Postdoctoral Researcher	\$0
2. Graduate Student Researcher (1.5 years)	\$40,187
3. Financial Administrator	\$750
Total Wages & Salaries	\$40,937
B. FRINGE BENEFITS	
A1 (@25%)	\$0
A2 (@1-3%)	\$522
Student Fees (domestic)	\$17,310
A3 (@48.3% FY 13/14; @ 51.1% FY 14/15; @ 54.2% FY 15/16)	\$384
Total Fringe plus Fees	\$18,216
C. TRAVEL	
1. Domestic	
Mileage, per diem at ALS (sample analysis)	
Mileage, per diem at MIRA (400 mi round trip, 1 site visit per 6 weeks)	\$3,048
Total Travel	\$3,048
D. EQUIPMENT	
	\$0
Total Equipment	\$0
E. OTHER DIRECT COSTS	
1. Materials & Supplies (lab expendables)	\$1,200
2. Other Costs	
Aircraft Sampling (\$1800/flight * 4 flights/year)	\$0
RDI Analysis	\$0
Battery pack for power at MIRA site	\$8,000
Generator maintenance/fuel	\$3,000
MIRA Lease (\$400/month for 1.5 years)	\$7,200
Total Other Costs	\$18,200
Total Other Direct Costs	\$19,400
F. TOTAL DIRECT COSTS	
	\$81,601

G. INDIRECT COSTS (Air District Government Rate) net of Equipment and student fees	
Total Indirect Costs (15%)	\$9,644
H. TOTAL Project (=DIRECT AND INDIRECT) COSTS	\$91,245

Detailed Budget Justification

A – Personnel: 18 months of student stipend is requested, 15 months of which will occur after the candidate has passed his qualifying exam, moving him to a GSR (graduate student researcher) step VII. \$750 is requested for financial oversight of the project by the staff of the Air Quality Research Center because of the low campus overhead rate of 15%, which does not cover direct project administration costs. The effort of the PI is not charged.

B – Fringe Benefits: The graduate student benefits are 1.3% of the stipend, while that of the financial administrator is 48.3% – 54.2% over the course of the three fiscal years of the project. Student tuition fees are requested for four quarters (one academic year plus one quarter), with the provost GSR buy-down alleviation of 25% of the fees factored in.

C – Travel: Routine calibrations and system maintenance are required at least every 6 weeks which entails a 400 mile round trip journey with \$50 per diem and \$0.51 per mile.

E – Other Direct Costs: 1.) \$1,200 is requested for consumables and miscellaneous lab supplies (tubing, fittings, data storage drives, etc.); 2.) The owners of the site have requested that we replace the battery bank when it expires because of the increased load the equipment has placed on their system; 3.) The operators of the facility have also requested that we cover a portion of the generator fuel and upkeep estimated at \$3,000 for an additional 18 months; 4.) Finally, \$7,200 is requested for the extended 18 months of \$400 rent that the owners are charging us for use of the facility.

G – Indirect Costs: The agreed upon indirect cost of 15% established between the SJVAPCD and UCD is applied to the adjusted total direct costs minus the student fees (tuition).