

**SSD**  
**Contractor: UC, Berkeley**  
**Contract # 08-408**

FUNDING FISCAL YEAR	FY 08/09	
TERM	6/30/2009-12/31/10	
PCA	72480	
LINE ITEM/OBJECT	398	TOTAL
DESCRIPTION		
Contract \$	413,000.00	413,000.00

Total, Contract	413,000.00	413,000.00
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Payments to Contractor:

Inv. #	Inv. Date	Ser Per		C/S
<div style="text-align: center; margin-top: 100px;">D</div>				

Total, Payments		
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Balance Available to Pay Contractor	413,000.00	413,000.00
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Balance Must Be Spent By:	06/30/11	06/30/12	06/30/13	
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**Notes:**

Contract Manager: John Couris

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STATE OF CALIFORNIA  
**STANDARD AGREEMENT**  
 STD 213 (Rev 06/03)

AGREEMENT NUMBER <b>08-408</b>
REGISTRATION NUMBER

1. This Agreement is entered into between the State Agency and the Contractor named below:

STATE AGENCY'S NAME  
 Air Resources Board (ARB, CARB, State)

CONTRACTOR'S NAME  
 The Regents of the University of California, Berkeley (UC Berkeley, UCB, or Contractor)

2. The term of this Agreement is: **June 30, 2009 through December 31, 2010**

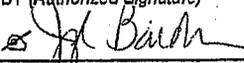
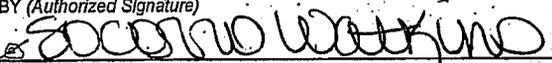
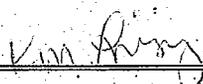
3. The maximum amount of this Agreement is: **\$413,000.00**  
**Four Hundred Thirteen Thousand Dollars and Zero Cents**

4. The parties agree to comply with the terms and conditions of the following exhibits which are by this reference made a part of the Agreement.

Exhibit A – Scope of Work	6 pages
Exhibit B – Budget Detail and Payment Provisions	2 pages
Exhibit B, Attachment 1 – Detailed Budget	2 pages
Exhibit C* – General Terms and Conditions	GIA 101*
Exhibit D – Special Terms and Conditions	1 page
Exhibit E – Additional Provisions	3 pages
Exhibit F – Contract Report Format Guidelines	5 pages

Items shown with an Asterisk (\*), are hereby incorporated by reference and made part of this agreement

IN WITNESS WHEREOF, this Agreement has been executed by the parties hereto.

CONTRACTOR		California Department of General Services Use Only	
CONTRACTOR'S NAME (if other than an individual, state whether a corporation, partnership, etc.) The Regents of the University of California, Berkeley		<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: auto;">           APPROVED   <div style="border: 1px solid black; padding: 5px; display: inline-block;">AUG - 5 2009</div> </div> DEPT OF GENERAL SERVICES	
BY (Authorized Signature) 	DATE SIGNED (Do not type) 6/24/09		
PRINTED NAME AND TITLE OF PERSON SIGNING Jyl Baldwin, Associate Director			
ADDRESS 2150 Shattuck Avenue, Suite 313, Berkeley, CA 94704			
STATE OF CALIFORNIA			
AGENCY NAME Air Resources Board			
BY (Authorized Signature) 	DATE SIGNED (Do not type) 6/30/09		
PRINTED NAME AND TITLE OF PERSON SIGNING Socorro Watkins, Chief, Business Management Branch			
ADDRESS 1001 I Street, 20 <sup>th</sup> Floor, Sacramento, CA 95814		<input type="checkbox"/> Exempt per: 	

## **EXHIBIT A** **SCOPE OF WORK**

### **Background**

The California Global Warming Solutions Act of 2006 (the Act), also known as Assembly Bill 32 (AB 32, Chapter 488, Statutes of 2006), establishes a comprehensive program of regulatory and market mechanisms to achieve real, quantifiable, cost-effective reduction of greenhouse gases (GHG). The Act charges the Air Resources Board (ARB) as the agency responsible for monitoring and reducing GHG emissions to 1990 levels by 2020 and requires ARB to adopt a plan by January 1, 2009 to indicate how emissions reductions will be achieved from significant GHG sources via regulation, market mechanisms and other actions. The Board has until January 1, 2011 to adopt the necessary regulations to implement that plan. Implementation begins no later than January 1, 2012 and the emissions reduction target must be fully achieved by January 1, 2020.

The Act recognizes that such an ambitious effort requires careful planning and a comprehensive strategy. Along with a deliberate approach, the Act recognizes that immediate progress in reducing GHG emissions can and should be made. Accordingly, the Act requires ARB to identify a list of "discrete early action greenhouse gas reduction measures." Once on the list, these measures are to be developed into regulatory proposals, adopted by the Board, and made enforceable by January 1, 2010.

At its June 21, 2007 hearing, the Board reviewed and approved the Low Carbon Fuel Standard (LCFS), recommended by the Governor's Executive Order S-01-07, as one of the early action items to be developed into a regulatory proposal. The LCFS creates a state-wide goal of reducing the carbon intensity of California's transportation fuel by 10% by 2020 and applies to fuel providers, including refiners, blenders, producers and importers.

To develop the LCFS, both technical and policy issues need to be addressed. For instance, staff is required to evaluate several factors, including but not limited to: impacts on California's economy, the environment, public health, equity between regulated entities, electricity reliability, conformance with other environmental laws, and to ensure that the rules do not negatively impact low income communities. Additionally, fuel lifecycle analysis, as one of the central tools of LCFS, must be inclusive of environmental impact estimates based on the entire life cycle of the products including land use, sustainability, and production of feedstock.

The Regents of the University of California, Berkeley (UCB), has prepared a two-phase study to assess both the low-carbon fuels options that might be used to meet the LCFS and to examine the specific policy issues to meet this goal. The University of California Report on the Low Carbon Fuel Standard for California (UC Report) identified several major areas of incompleteness and uncertainty including: land use, climate impacts of emission, treatment of market-mediated effects, sustainability and limited data quality.

This contract describes additional work supporting the implementation of the Low Carbon Fuel Standard to be provided by the UCB to the ARB. Many technical and policy issues germane to LCFS implementation have been illuminated by academic research at UCB and elsewhere. Many of the questions are still in the phase of becoming more complicated and more perplexing than they first appeared, and new issues have appeared on the research agenda for vehicle fuels policy.

## **EXHIBIT A** **SCOPE OF WORK**

### **SCOPE OF WORK**

UCB agrees to provide the ARB Stationary Source Division technical and advisory support in the effort to develop a better understanding of the economic, policy, and technical issues associated with the development and implementation of California's Low Carbon Fuel Standard. The Scope of Work is to expand on work from the previous contract No. 07-405, which initiated research in the following areas: advisory support on lifecycle improvement and tool development, advisory support on the development of LCFS compliance and enforcement system and advisory support on policy and regulatory development. Michael O'Hare will serve as principal investigator and be responsible for overall project management and communication with ARB staff. The work described here will, to the extent possible, be carried out in close coordination with research at the University of California, Davis (UCD).

Results of our work to date, and that of others, consistently indicates that implementation of the LCFS will involve review and updating of rules and data as experience and continued research proceeds.

### **Task 1. Provide policy-analytic and scientific support to ARB on lifecycle analysis improvement and tool development.**

#### *1A. Determine Uncertainty in the Complete Fuel Life-cycle Analysis*

UCB will develop models and theory to allow the uncertainty in estimates of fuel Carbon Intensity (CI) to be characterized probabilistically. These models will apply not only to the calculation of direct CI of fuels but also to the so-called *indirect land use change* (iLUC).

We will continue the refinement and use of the Global Trade Analysis Project model at Purdue University under a subcontract to model iLUC and the effects of coproducts on the overall analysis of biofuels and biofuel feedstocks. This work continues and expands the work under a contract between Energy Biosciences Institute (EBI) and Purdue University to other biofuels and biofuel blendstocks, especially regarding cellulosic ethanol, imported biofuels such as Brazilian ethanol and biodiesel from various sources. This includes better estimation of carbon stocks in wild lands, better modeling of wildlands with no market price, and integration of uncertainty measures in the economic model. UCB will also prepare a meta-analysis of models developed by others, and our own, to characterize the existing uncertainties and sources of variation in the estimates they provide. The UCB modeling work is currently the focus of attention by other states, USEPA and USDA, and international agencies and NGOs. Additional international travel and researcher time is needed to participate appropriately in these activities.

*Deliverables: Formal papers describing work and results, presentations regarding subject matter for workshops and internal meetings, as well as email and telephone support.*

#### *1B. Annualization of iLUC*

Modeling of iLUC to date has not accounted for the differential costs of GHG releases over the period of analysis. The analysis of time effects begun in the first phase will be expanded to better characterize different discounting functions that recognize specific scenarios including new technologies and properly accounting for irreversible and catastrophic discontinuities in the global warming trajectory.

## **EXHIBIT A** **SCOPE OF WORK**

*Deliverables: Formal papers describing work and results, presentations regarding subject matter for workshops and internal meetings, as well as email and telephone support.*

### *1C. GHG Emissions from Cultivation, Fertilizer Use, and Land-Use Change from Crop-Derived Fuels*

In the last six months, estimating the quantity of greenhouse gas (GHG) emissions from iLUC has become a dominating issue in the analysis of not only the LCFS but also US and international "renewable fuel" mandates. Most of this analysis has focused on carbon dioxide releases from land conversion, but other GHG gases, notably N<sub>2</sub>O from fertilizer used to increase yields, are important absolutely, and as differentiation among biofuels. We will examine the changes in fertilizer use and yield issues (by evaluating current and historical data. Additionally, we will examine cultivation practices and public policies that affect them, both predictively and descriptively, to improve our estimate of fuel GHG indices. In particular, we will examine the potential of biochar (terra preta) agronomy, a promising practice with the potential for nearly carbon-neutral feedstock production according to early studies.

*Deliverables: Formal papers describing work and results, presentations regarding subject matter for workshops and internal meetings, as well as email and telephone support.*

### *1D. Land Use Effects and Other GHG Effects of Petroleum Production*

In the LCFS, biofuels are implicitly compared with other transportation fuels (i.e. gasoline, diesel, CNG, electricity, etc.). While land use effects of biofuel production are known to be important, the land use GHG effects of petroleum production where it occurs on arable or non-desert land, are not. We will estimate these effects for fossil fuels, electricity and others. This work will be in close cooperation with the UCD group.

*Deliverables: Formal papers describing work and results, presentations regarding subject matter for workshops and internal meetings, as well as email and telephone support.*

### *1E. Potential Compliance Strategies*

To meet long term goals, it becomes essential to further evaluate the evolution and contribution of alternative compliance strategies to reduce the state's fuel supply CI. We will, in cooperation with UCD, study alternatives including increased use of diesel, waste-sourced ethanol, electricity, and other non-crop biofuels to determine (i) their capacity to meet the LCFS requirements and (ii) policy interventions by ARB and others needed to make these alternatives effective.

Because California's electric supply is relatively non-fossil-fuel based and is likely to include more renewable sources, electric vehicles, including PHEVs, are an important potential compliance path. For the LCFS to take proper account of electric transportation requires a complete understanding of the medium- and long-term prospects for electric vehicles, and interaction between the LCFS and a cap-and-trade program to be developed by ARB. The cap and trade program will initially address GHG emissions from major stationary sources but will include transportation in 2015.

*Deliverables: Formal papers describing work and results, presentations regarding subject matter for workshops and internal meetings, as well as email and telephone support.*

## **EXHIBIT A** **SCOPE OF WORK**

### *1F. International and Intergovernmental Aspects of Low Carbon Fuel Supply*

Among potential compliance paths for the LCFS that do not include much domestic bioethanol is imported ethanol, especially from Brazil, and biodiesel, especially from Latin America and Southeast Asia. Currently the former faces a large tariff, which is increasingly under review partly in response to domestic interests and partly in response to Brazilian pressure that may lead to an action under WTO.

If these fuels become attractive to blenders in California, it will be important for CARB to have a complete understanding of the GHG and sustainability implications of increasing their production for the California market. We have, partly through EBI-funded research with which we expect to collaborate closely, begun field research and collaborations with scholars in Brazil and in Indonesia and Malaysia.

GHG effects of any fuel depend on production practices, importantly including regulatory and other means of controlling negative externalities. These controls vary widely across national regimes and significantly across states, and between states and the US federal government. This task includes three main projects:

(1) Characterizing the land use change implications of an expansion of Brazilian ethanol production. This effect has not been estimated scientifically, and debate is so far assertive and general. On the other hand, cattle expansion into the rain forest and the cerrado continues, at relatively low productive efficiency, and deforestation is a major component of global GHG release. Estimating the land use effects of cane expansion consequently requires understanding the current and probable policy environment in Brazil and economic modeling of land use change for this important biofuel.

(2) Any requirements or conditions, especially including sustainability considerations, CARB may impose on imported fuels will be subject to challenge under existing international trade rules and agreements. This project will analyze these constraints and their implications for CARB rulemaking in this context.

(3) Sustainability and iLUC GHG effects of fuel production depend not only on impersonal economic forces but also on government policies in regions producing fuels, and affected by biofuel markets. These include subsidies, land use regulations and controls, and mandates, and their effects depend not only on laws and regulations but importantly on enforcement efforts and capacity. It can reasonably be asked whether fuels covered by the LCFS should be scored according to (i) their effects if policies outside California were optimal *de lege* and in implementation (with any additional GHG effects attributed to those governments' choices), (ii) their effects as they would be if those policies were implemented as currently written, (iii) their effects in the world as it is, or (iv) anywhere in between. This project will analyze conceptual frameworks for policy in this spirit and estimate their respective implications for the LCFS.

*Deliverables: Formal papers describing work and results, presentations regarding subject matter for workshops and internal meetings, as well as email and telephone support.*

## **EXHIBIT A** **SCOPE OF WORK**

### **OVERVIEW OF TASK 1:**

*Deliverables: Listed for each subtask.*

*Budget: \$147,940.00*

*Timeline: July 2009 – December 2010, deliverables throughout*

### **Task 2. Sustainability Effects of the LCFS**

A variety of sustainability issues for different LCFS-compliant fuels are to be considered by ARB in the LCFS. These include employment, biodiversity, food security and price risks, and many other dimensions of system performance. Preliminary work has included literature reviews and data gathering, as well as analysis of which issues can feasibly be addressed within the scope of the LCFS. Sustainability issues that fall under the jurisdiction of the LCFS and that can realistically be addressed will be further analyzed to quantify the impacts of the regulation of both society and the environment.

Among these, water is especially important as a resource of increasing scarcity and a critical determinant of the viability of biofeedstocks in different places. We have assessed the California water requirements under different cultivation scenarios of various biofuel scenarios, but this work needs to be extended to water considerations for other biofuels and fuels from outside the state.

Gasoline, diesel, electricity, and ethanol have different local air pollution effects, especially discharges of NOx and particulates, effects that are partly fuel- and partly engine/power station-design related; some of these also have Global Warming effects. We will review these effects for LCFS compliance pathways.

This task will expand and extend the investigation of sustainability concerns begin in the first phase of the work. A specific sustainability action plan will be developed with recommendations for feasible sustainability components.

*2A. Deliverables: Formal papers describing work and results, presentations regarding subject matter for workshops and internal meetings, as well as email and telephone support.*

*Budget: \$145,000.00*

*Timeline: July 2009 - November 2010, deliverables throughout*

### **Task 3. Provide advisory support to ARB on policy and regulatory development.**

This project includes rapid response policy analysis and advisory support to ARB on key issues identified as development of the LCFS regulation proceeds. Areas that will be addressed may include, but not limited to, the market-based cap and trade system, technical and policy considerations in allocating the credits to fuels and/or vehicles, fuel shuffling, the integration of vehicle efficiency in LCFS, inclusion of upstream emissions, and conformity with other policies already in place, and others identified in the UC Report. This also includes advisory support during the preparation of both the ISOR and FSOR.

**EXHIBIT A**  
**SCOPE OF WORK**

3A. Deliverable: LCFS policy and regulatory development advisory support. The deliverables for this project include emails, formal papers, phone calls, meetings, memos and presentations as needed.

Budget: \$120,060

Timeline: July 2009 through December 2010, deliverables throughout

1. The project representatives during the term of this agreement will be:

<b>Requesting Agency: ARB</b>	<b>Providing Agency: Regents of the UC Berkeley</b>
Division: Stationary Source Division	Division: Goldman School of Public Policy
Contact: John Courtis	Contact: Michael O'Hare
Address: 1001 I Street, Floor 6 Sacramento, CA 95814	Address: Goldman School of Public Policy 2607 Hearst Avenue Berkeley, CA 94720
Phone: (916) 323-2661	Phone: (510) 642-7576
Fax: (916) 324-5684	Fax: (510) 643-9657
Email: jcourtis@arb.ca.gov	Email: ohare@berkeley.edu

The ARB Contract Administrator is:

The University's Contract Administrator is:

<b>Requesting Agency: ARB</b>	<b>Providing Agency: Regents of the UC Berkeley</b>
Division: Administrative Services	Division: Sponsored Projects Office
Contact: Sue Bayoneta	Contact: Jyl Baldwin
Address: 1001 I Street, Floor 20 Sacramento, CA 95814	Address: 2150 Shattuck Ave., Ste. 313 Berkeley, CA 94704
Phone: (916) 327-8215	Phone: (510) 642-8110
Fax: (916) 327-2940	Fax: (510) 642-8236
Email: sbayonet@arb.ca.gov	Email: jlbaldwin@berkeley.edu

**Term**

The term of this agreement is June 30, 2009 through December 31, 2010; however no work shall commence until receipt of final approval from the Department of General Services (DGS). Consequently, all dates contained in the Exhibits and Attachments shall be considered revised to conform to the actual term of this agreement, and the schedule shall not begin until Contractor receives written notice from ARB of final approval by DGS.

**EXHIBIT B**  
**BUDGET DETAIL AND PAYMENT PROVISIONS**

**1. Invoicing**

- A. For services satisfactorily rendered in accordance with this Agreement and upon receipt and approval of the invoices which properly detail all charges the ARB agrees to compensate the Regents of the University of California, Berkeley, for actual expenditures incurred in accordance with the rates specified below and in Exhibit B, Attachment 1, attached hereto.

FY 08/09	\$169,090.37
FY 09/10	<u>\$243,909.63</u>
<b>Not to exceed</b>	<b>\$413,000.00</b>

- B. Invoices shall include the Agreement Number and shall be submitted in triplicate not more frequently than quarterly in arrears to:

Air Resources Board  
Accounting Section  
P.O. Box 2815  
Sacramento, CA 95812

- C. BUDGET FLEXIBILITY: Subject to the prior review and approval of the contract manager, line items shifts of up to \$25,000 or ten percent of the annual contract total, whichever is less, may be made up to a cumulative maximum of \$25,000 or 10%, whichever is less, for all line item shifts over the life of the contract. There must be a substantial business justification for any shifts made. Fund shifts which increase Indirect, Overhead or General Expense line items are prohibited. Line item shifts may be proposed/requested by either the State or the University in writing and must not increase or decrease the total contract amount allocated. Any line item shifts must be approved in writing by the Division Chief of Stationary Source Division or his or her designee, and must be sent to Contracts Section within 10 days of approval for inclusion in contract folder. If the contract is formally amended, any line item shifts agreed to by the parties must be included in the amendment.

**2. Budget Contingency Clause**

- A. It is mutually agreed that if the Budget Act of the current year and/or any subsequent years covered under this Agreement does not appropriate sufficient funds for the program, this Agreement shall be of no further force and effect. In this event, the State shall have no liability to pay any funds whatsoever to Contractor or to furnish any other considerations under this Agreement and Contractor shall not be obligated to perform any provisions of this Agreement.
- B. If funding for any fiscal year is reduced or deleted by the Budget Act for purposes of this program, the State shall have the option to either cancel this Agreement with no liability occurring to the State, or offer an agreement amendment to Contractor to reflect the reduced amount.

**EXHIBIT B**  
**BUDGET DETAIL AND PAYMENT PROVISIONS**

**3. Payment**

- A. Costs for this Agreement shall be computed in accordance with State Administrative Manual Sections 8752 and 8752.1.
- B. Nothing herein contained shall preclude advance payments pursuant to Article 1, Chapter 3, Part 1, Division 3, Title 2 of the Government Code of the State of California.
- C. ARB shall withhold payment equal to ten percent of the total Agreement cost until completion of all work and submission to ARB by University of a final report (including computer diskette copy) approved in accordance with Exhibit F, by ARB. It is University's responsibility to submit an invoice in triplicate with the revised final report for ten percent withheld.
- D. University will be paid for the payment period completed upon receipt, by ARB, of an invoice and progress report satisfying the requirements of this Agreement. The invoice and progress report must be deemed by ARB to reflect reasonable work performed in accordance with the Agreement.
- E. The amount to be paid to University under this Agreement includes all sales and use taxes incurred pursuant to this Agreement. University shall not receive additional compensation for reimbursement of such taxes and shall not decrease work to compensate therefore.

**EXHIBIT B  
 ATTACHMENT 1  
 DETAILED BUDGET**

<b>YEAR 1: 06/30/2009 - 12/31/09</b>					
<b>PAYROLL</b>					
<i>Personnel</i>	<i>Months</i>	<i>Rate</i>	<i>Salary</i>	<i>Benefits</i>	<i>Total/Yr*</i>
TBA	1	\$12,000.00	\$12,000.00	1.06	\$12,720.00
O'Hare, Principal Investigator	1	\$11,544.00	\$11,544.00	1.06	\$12,236.64
Torn, Associate Professor	0.25	\$13,171.60	\$3,292.90	1.449	\$4,771.41
Research Staff	5	\$10,200.00	\$51,000.00	1.23	\$62,730.00
Post-Doc	3	\$2,810.00	\$8,430.00	1.17	\$9,863.10
GSR, summer	2	\$3,455.00	\$6,910.00	1.03	\$12,117.30
GSR, academic yr	3	\$3,455.00	\$10,365.00	1.013	\$10,499.75
Fee remission					\$10,000.00
<b>Total</b>			<b>\$103,541.90</b>		<b>\$134,938.20</b>
<b>TRAVEL</b>					
<i>Description</i>		<i>Cost per trip</i>	<i># of trips</i>	<i>Total</i>	
Stakeholders in Northern California		\$80.00	2	\$160.00	
Stakeholders in Southern California		\$400.00	0	0	
Air Resources Board		\$80.00	2	\$160.00	
Other States and US Government		\$950.00	4	\$3,800.00	
International:		\$3,500.00	2	\$7,000.00	
<b>Total</b>				<b>\$11,120.00</b>	
<b>SUPPLIES - Year 1</b>					
General and Employment Liability Insurance (.55/\$100payroll)					\$569.41
Books, datasets, presentation materials, publication fees					\$4,000.00
Software					\$2,000.00
Equipment (videoconference)					\$2,000.00
<b>Total</b>					<b>\$8,569.41</b>
<b>Total direct costs for Year 1</b>					<b>154,627.61</b>
<b>Fee remission</b>					<b>\$10,000.00</b>
<b>Modified total direct costs</b>					<b>\$144,627.61</b>
<b>Indirect costs at 10% of modified total direct costs (excludes fee remission)</b>					<b>\$14,462.76</b>
<b>TOTAL PROJECT BUDGET:</b>					<b>\$169,090.37</b>

**EXHIBIT B  
 ATTACHMENT 1  
 DETAILED BUDGET**

<b>YEAR 2: 01/01/10 - 12/31/10</b>					
<b>PAYROLL</b>					
<i>Personnel</i>	<i>Months</i>	<i>Rate</i>	<i>Salary</i>	<i>Benefits</i>	<i>Total/Yr*</i>
TBA	1	\$12,480.00	\$12,480.00	1.06	\$13,228.80
Frank	0.25	\$5,829.82	\$1,457.46	1.23	\$1,792.67
Kammen	0.25	\$15,147.81	\$3,786.95	1.06	\$4,014.17
O'Hare	2.5	\$12,005.76	\$30,014.40	1.06	\$31,815.26
Payne	0.25	\$4,580.58	\$1,145.14	1.23	\$1,408.53
Torn	0.5	\$13,698.46	\$6,849.23	1.449	\$9,924.54
Research Staff	5.25	\$10,649.00	\$55,907.25	1.23	\$68,765.92
Post-Doc	3	\$2,922.37	\$8,767.11	1.17	\$10,257.52
GSR, summer	3	\$3,593.20	\$10,779.60	1.03	\$11,102.99
GSR, academic yr	6	\$3,593.20	\$21,559.20	1.013	\$21,839.47
Fee remission					\$20,000.00
Financial assistant	1.75	\$3,461.12	\$6,056.96	1.3	\$7,874.05
<b>Total</b>			<b>\$158,803.30</b>		<b>\$202,023.92</b>
<b>TRAVEL</b>					
<i>Description</i>		<i>Cost per trip</i>	<i># of trips</i>	<i>Total</i>	
Stakeholders in Northern California		\$83.81	6	\$502.86	
Stakeholders in Southern California		\$416.00	1	\$416.00	
Air Resources Board		\$83.43	14	\$1,168.02	
Other States and US Government		\$1,040.00	4	\$4,160.00	
International:		\$3,640.00	3	\$10,920.00	
<b>Total</b>				<b>\$17,166.88</b>	
<b>SUPPLIES - Year 2</b>					
General and Employment Liability Insurance (.55/\$100payroll)					\$873.42
Books, datasets, presentation materials, publication fees					\$2,490.00
Software					\$1,000.00
Equipment					\$0.00
<b>Total</b>					<b>\$4,363.42</b>
<b>Total direct costs for Year 2</b>					<b>\$223,554.21</b>
<b>Fee remission</b>					<b>\$20,000.00</b>
<b>Modified total direct costs</b>					<b>\$203,554.21</b>
<b>Indirect costs at 10% of modified total direct costs (excludes fee remission)</b>					<b>\$20,355.42</b>
<b>TOTAL PROJECT BUDGET:</b>					<b>\$243,909.63</b>

**EXHIBIT D**  
**SPECIAL TERMS AND CONDITIONS**

**1. Termination**

- A. This Agreement may be canceled at any time by either party, upon thirty (30) days written notice to the other party.
- B. In the case of early termination, the performing agency will submit an invoice in triplicate and a report in triplicate covering services to termination date, following the invoice and progress report requirements of this Agreement. A copy and description of any data collected up to termination date will also be provided to ARB.
- C. Upon receipt of the invoice, progress report, and data, a final payment will be made to the performing agency. This payment shall be for all ARB-approved, actually incurred costs in accordance with Exhibits A and B, and shall include labor, and materials purchased or utilized (including all non-cancellable commitments) to termination date, and pro rata indirect costs as specified in the proposal budget.

**2. Disputes**

- A. ARB reserves the right to issue an order to stop work in the event that a dispute should arise, or in the event that the ARB gives the performing agency a notice that this Agreement will be terminated. The stop-work order will be in effect until the dispute has been resolved or this Agreement has been terminated.
- B. Any dispute concerning a question of fact arising under the terms of this Agreement which is not disposed of within a reasonable period of time by agency employees normally responsible for the administration of this agreement, shall be brought to the attention of the Executive Officer or designated representative of each agency for joint resolution.

**3. Amendments**

ARB reserves the right to amend this agreement for additional time and/or additional funding.

**EXHIBIT E**  
**ADDITIONAL PROVISIONS**

**1. Reports and Data Compilations**

- A. ***With respect to each invoice period, University shall forward to the ARB Contract Administrator, one (1) electronic copy of the progress report and mail one (1) copy of the progress report along with each invoice. (Do not use Express Mail). When emailing the progress report, the "subject line" should state the contract number and the billing period. Each progress report will begin with the following disclaimer:***

*The statements and conclusions in this report are those of the University and not necessarily those of the California Air Resources Board. 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.*

- B. Each progress report will also include:
1. A brief narrative account of project tasks completed or partially completed since the last progress report;
  2. A brief discussion of problems encountered during the reporting period and how they were or are proposed to be resolved;
  3. A brief discussion of work planned, by project task, before the next progress report; and
  4. A graph or table showing allocation of the budget and amount used to date.
  5. A graph or table showing percent of work completion for each task.
- C. If the project is behind schedule, the progress report must contain an explanation of reasons and how the University plans to resume the schedule.
- D. Six months prior to Agreement termination date, University will deliver to ARB twenty (20) bound copies of a draft final report. The reports may be stapled or spiral bound, depending on size. The draft final report will conform to Exhibit F.
- E. Within forty-five (45) days of receipt of ARB's comments on the draft Final Report (Exhibit F), University will deliver to ARB's Contract Manager two (2) copies of the Final Report incorporating all reasonable alterations and additions requested by ARB. Upon approval of the amended final report approved by ARB in accordance to Exhibit F, University will within two (2) weeks, deliver to ARB two (2) camera ready UNBOUND originals of a Final Report incorporating all final alterations and additions. The final report will conform to the Contract Final Report Format, Exhibit F.
- F. Together with the final report, University will deliver a copy of the report on diskette/CD, using any common word processing software (please specify the software used) and a set of all data compilations as specified by the ARB Contract Manager.

**EXHIBIT E**  
**ADDITIONAL PROVISIONS**

- G. University's obligation under this Agreement shall be deemed discharged only upon submittal to ARB of an acceptable final report in accordance to Exhibit F, report diskette/CD, all required data compilations, and any other project deliverables.
- H. Prior to completion of this Agreement, University shall be entitled to release or make available reports, information, or other data prepared or assembled by it pursuant to this Agreement, in scientific journals and other publications and at scientific meetings, provided however, that a copy of the publication be submitted to ARB for review and comment 45 days prior to such publication. Further, University shall place the disclaimer statement in a conspicuous place on all such reports or publications. Health related reports should include an acknowledgment to the late Dr. Friedman. Nothing in this provision shall be construed to limit the right of State to release information obtained from the University or to publish reports, information, or data in State publications.

**2. Copyrightable Materials**

In recognition of the policy of ARB and University to promote and safeguard free and open inquiry by faculty, students and the members of the public and in furtherance of such policy, both parties agree to the following with respect to rights in data and copyrights under this Agreement:

- A. The term "Subject Data" shall mean all original and raw research data, notes, computer programs, writings, sound recordings, pictorial reproductions, drawings or other graphical representations, and works of any similar nature, produced by University in performance of this Agreement, but specifically excluding "Reports," as defined in this Agreement. Subject Data also excludes financial reports, cost analyses, and similar information incidental to contract administration.
- B. The term "Reports" shall have the meaning assigned to it in this Exhibit F of this Agreement.
- C. Ownership of all Subject Data and copyrights arising from Subject Data shall be vested in University while ownership of all Reports and copyrights arising from the Reports delivered under this Agreement shall be vested in ARB. University agrees to make available to the public for public benefit, to the extent the University shall have the legal right to do so, without license or fee, any scholarly articles which are published from the Subject Data.
- D. Nothing in this exhibit or Agreement shall be construed to limit the right of University faculty, students or staff to publish the Subject Data in the form of scholarly articles in academic journals nor to affect, abrogate or limit the right of University faculty, staff or students to make use of the Subject Data.

**3. Travel & Per Diem**

- A. Any reimbursement for necessary travel and per diem shall be at the University's approved travel rates.

**EXHIBIT E**  
**ADDITIONAL PROVISIONS**

- B. No foreign travel shall be reimbursed unless prior written authorization is obtained from ARB.

**4. Meetings**

- A. Initial meeting. Before work on the contract begins, the Principal Investigator and key personnel will meet with the ARB Contract Manager and other staff to discuss the overall plan, details of performing the tasks, the project schedule, items related to personnel or changes in personnel, and any issues that may need to be resolved before work can begin.
- B. Progress review meetings. The Principal Investigator and appropriate members of his or her staff will meet with ARB's Contract Manager at quarterly intervals to discuss the progress of the project. This meeting may be conducted by phone.
- C. Technical Seminar. The Contractor will present the results of the project to ARB staff and a possible webcast at a seminar at ARB facilities in Sacramento or El Monte.

**5. Confidentiality**

- A. It is understood that in the course of carrying out this Agreement, State may wish to provide University with proprietary or confidential information of State (Proprietary Information). University agrees to use its best efforts to hold proprietary information in confidence and shall return it to State upon the completion of the project.
- B. This obligation shall apply only to proprietary information that is designated or identified as such in writing by State prior to the disclosure thereof. All proprietary information shall be sent only to the Principal Investigator. Moreover, this obligation shall not apply to any proprietary information which: a) is or becomes publicly known through no wrongful or negligent act on the part of University; b) is already known to University at the time of disclosure; c) independently developed by University without breach of this agreement; or d) is generally disclosed to third parties by State without similar restrictions on such third parties.

## **EXHIBIT F** **FINAL REPORT FORMAT**

The research contract Final Report (Report) is as important to the contract as the research itself. The Report is a record of the project and its results, and is used in several ways. Therefore, the Report must be well organized and contain certain specific information. The ARB reviews all draft Final Reports, paying special attention to the Abstract and Executive Summary. If the ARB finds that the Report does not fulfill the requirements stated in this Appendix, the document will not be approved for release, and final payment for the work completed may be withheld. This Appendix outlines the requirements that must be met when producing the Report.

*Note:* In partial fulfillment of the Final Report requirements, the Contractor shall submit a copy of the Report on a CD in PDF format and in a word-processing format, preferably in Word - Version 6.0 or later. This is in addition to the submission of any paper copies required. The diskette shall be clearly labeled with the contract title, ARB contract number, the words "Final Report", and the date the report was submitted.

*Legibility.* Each page of the approved Final Report must be legible and camera-ready.

*Binding.* The draft Report, including its appendices, must be either spiral bound or stapled, depending on size. The revised Report and its appendices should be spiral bound, except for two unbound, camera-ready originals.

*Cover.* Do not supply a cover for the Report. ARB will provide its standard cover.

*One-sided vs. two-sided.* To conserve paper, both the draft Report and the revised Report, except for the unbound camera-ready copies, should be printed on both sides of the page. The unbound camera-ready copies must be printed on only one side of the page.

*Title.* The title of the Report should exactly duplicate the title of the contract unless a change is approved in writing by the contract manager.

*Spacing.* In order to conserve paper, copying costs, and postage, please use single or one-line (1) spacing.

*Page size.* All pages should be of standard size (8 1/2" x 11") to allow for photo-reproduction.

*Large tables or figures.* Foldout or photo-reduced tables or figures are not acceptable because they cannot be readily reproduced. Large tables and figures should be presented on consecutive 8 1/2" x 11" pages, each page containing one portion of the larger chart.

*Color.* Color presentations are not acceptable; printing shall be black on white only.

*Corporate identification.* Do not include corporate identification on any page of the Final Report, except the title page.

*Unit notation.* Measurements in the Reports should be expressed in metric units. However, for the convenience of engineers and other scientists accustomed to using the British system, values may be given in British units as well in parentheses after the value in metric units. The expression of measurements in both systems is especially encouraged for engineering reports.

## **EXHIBIT F** **FINAL REPORT FORMAT**

*Section order.* The Report should contain the following sections, in the order listed below:

Title page  
Disclaimer  
Acknowledgment  
Table of Contents  
List of Figures  
List of Tables  
Abstract  
Executive Summary  
Body of Report  
References  
List of inventions reported and copyrighted materials produced  
Glossary of Terms, Abbreviations, and Symbols  
Appendices

*Page numbering.* Beginning with the body of the Report, pages shall be numbered consecutively beginning with "1", including all appendices and attachments. Pages preceding the body of the Report shall be numbered consecutively, in ascending order, with small Roman numerals.

*Title page.* The title page should include, at a minimum, the contract number, contract title, name of the principal investigator, contractor organization, date, and this statement: "Prepared for the California Air Resources Board and the California Environmental Protection Agency"

*Disclaimer.* A page dedicated to this statement must follow the Title Page:

The statements and conclusions in this Report are those of the contractor and not necessarily those of the California Air Resources Board. 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.

*Acknowledgment.* Only this section should contain acknowledgments of key personnel and organizations who were associated with the project. The last paragraph of the acknowledgments must read as follows:

This Report was submitted in fulfillment of [ARB contract number and project title] by [contractor organization] under the [partial] sponsorship of the California Air Resources Board. Work was completed as of [date].

*Table of Contents.* This should list all the sections, chapters, and appendices, together with their page numbers. Check for completeness and correct reference to pages in the Report.

*List of Figures.* This list is optional if there are fewer than five illustrations.

*List of Tables.* This list is optional if there are fewer than five tables.

## **EXHIBIT F** **FINAL REPORT FORMAT**

*Abstract.* The abstract should tell the reader, in nontechnical terms, the purpose and scope of the work undertaken, describe the work performed, and present the results obtained and conclusions. The purpose of the abstract is to provide the reader with useful information and a means of determining whether the complete document should be obtained for study. The length of the abstract should be no more than about 200 words. Only those concepts that are addressed in the executive summary should be included in the abstract.

Example of an abstract:

A recently developed ground-based instrument, employing light detecting and ranging (lidar) technology, was evaluated and found to accurately measure ozone concentrations at altitudes of up to 3,000 meters. The novel approach used in this study provides true vertical distributions of ozone concentrations aloft and better temporal coverage of these distributions than other, more common methods, such as those using aircraft and ozonesonde (balloon) techniques. The ozone and aerosol measurements from this study, in conjunction with temperature and wind measurements, will provide a better characterization of atmospheric conditions aloft and the processes involved in the formation of unhealthy ozone concentrations than can be achieved with traditional ground-based monitors.

*Executive Summary.* The function of the executive summary is to inform the reader about the important aspects of the work that was done, permitting the reader to understand the research without reading the entire Report. It should state the objectives of the research and briefly describe the experimental methodology[ies] used, results, conclusions, and recommendations for further study. All of the concepts brought out in the abstract should be expanded upon in the Executive Summary. Conversely, the Executive Summary should not contain concepts that are not expanded upon in the body of the Report.

The Executive Summary will be used in several applications as written; therefore, please observe the style considerations discussed below.

Limit the Executive Summary to two pages, single spaced.

Use narrative form. Use a style and vocabulary level comparable to that in Scientific American or the New York Times.

Do not list contract tasks in lieu of discussing the methodology.

Discuss the results rather than listing them.

Avoid jargon.

Define technical terms.

Use passive voice if active voice is awkward.

Avoid the temptation to lump separate topics together in one sentence to cut down on length.

The Executive Summary should contain four sections: Background, Methods, Results, and Conclusions, described below:

## **EXHIBIT F** **FINAL REPORT FORMAT**

**THE BACKGROUND SECTION.** For the Background, provide a one-paragraph discussion of the reasons the research was needed. Relate the research to the Board's regulatory functions, such as establishing ambient air quality standards for the protection of human health, crops, and ecosystems; the improvement and updating of emissions inventories; and the development of air pollution control strategies.

**THE METHODS SECTION.** At the beginning of the Methods section, state what was done in general, in one or two sentences.

The methodology should be described in general, nontechnical terms, unless the purpose of the research was to develop a new methodology or demonstrate a new apparatus or technique. Even in those cases, technical aspects of the methodology should be kept to the minimum necessary for understanding the project. Use terminology with which the reader is likely to be familiar. If it is necessary to use

technical terms, define them. Details, such as names of manufacturers and statistical analysis techniques, should be omitted.

Specify when and where the study was performed, if it is important in interpreting the results.

The findings should not be mentioned in the Methods section.

**THE RESULTS SECTION.** The Results section should be a single paragraph in which the main findings are cited and their significance briefly discussed. The results should be presented as a narrative, not a list. This section must include a discussion of the implications of the work for the Board's relevant regulatory programs.

**THE CONCLUSIONS SECTION.** The Conclusions section should be a single short paragraph in which the results are related to the background, objectives, and methods. Again, this should be presented as a narrative rather than a list. Include a short discussion of recommendations for further study, adhering to the guidelines for the Recommendations section in the body of the Report.

*Body of Report.* The body of the Report should contain the details of the research, divided into the following sections:

*Introduction.* Clearly identify the scope and purpose of the project. Provide a general background of the project. Explicitly state the assumptions of the study.

Clearly describe the hypothesis or problem the research was designed to address. Discuss previous related work and provide a brief review of the relevant literature on the topic.

*Materials and Methods.* Describe the various phases of the project, the theoretical approach to the solution of the problem being addressed, and limitations to the work. Describe the design and construction phases of the project, materials, equipment, instrumentation, and methodology. Describe quality assurance and quality control procedures used. Describe the experimental or evaluation phase of the project.

## **EXHIBIT F**

### **FINAL REPORT FORMAT**

*Results.* Present the results in an orderly and coherent sequence. Describe statistical procedures used and their assumptions. Discuss information presented in tables, figures and graphs. The titles and heading of tables, graphs, and figures, should be understandable without reference to the text. Include all necessary explanatory footnotes. Clearly indicate the measurement units used.

*Discussion.* Interpret the data in the context of the original hypothesis or problem. Does the data support the hypothesis or provide solutions to the research problem? If appropriate, discuss how the results compare to data from similar or related studies. What are the implications of the findings? Identify innovations or development of new techniques or processes. If appropriate, discuss cost projections and economic analyses.

*Summary and Conclusions.* This is the most important part of the Report because it is the section that will probably be read most frequently. This section should begin with a clear, concise statement of what, why, and how the project was done. Major results and conclusions of the study should then be presented, using clear, concise statements. Make sure the conclusions reached are fully supported by the results of the study. Do not overstate or overinterpret the results. It may be useful to itemize primary results and conclusions. A simple table or graph may be used to illustrate.

*Recommendations.* Use clear, concise statements to recommend (if appropriate) future research that is a reasonable progression of the study and can be supported by the results and discussion.

*References.* Use a consistent style to fully cite work referenced throughout the Report and references to closely related work, background material, and publications that offer additional information on aspects of the work. Please list these together in a separate section, following the body of the Report. If the Report is lengthy, you may list the references at the end of each chapter.

*List of inventions reported and publications produced.* If any inventions have been reported, or publications or pending publications have been produced as a result of the project, the titles, authors, journals or magazines, and identifying numbers that will assist in locating such information should be included in this section.

*Glossary of terms, abbreviations, and symbols.* When more than five of these items are used in the text of the Report, prepare a complete listing with explanations and definitions. It is expected that every abbreviation and symbol will be written out at its first appearance in the Report, with the abbreviation or symbol following in parentheses [i.e., carbon dioxide (CO<sub>2</sub>)]. Symbols listed in table and figure legends need not be listed in the Glossary.

*Appendices.* Related or additional material that is too bulky or detailed to include within the discussion portion of the Report shall be placed in appendices. If a Report has only one appendix, it should be entitled "APPENDIX". If a Report has more than one appendix, each should be designated with a capital letter (APPENDIX A, APPENDIX B). If the appendices are too large for inclusion in the Report, they should be collated, following the binding requirements for the Report, as a separate document. The contract manager will determine whether appendices are to be included in the Report or treated separately. Page numbers of appendices included in the Report should continue the page numbering of the Report body. Pages of separated appendices should be numbered consecutively, beginning at "1".