

**SSD**

**Contractor: UC Berkeley  
Contract # 07-405**

FUNDING FISCAL YEAR	FY 07/08	FY 08/09	FY 09/10	
TERM	02/01/08-11/30/09	02/01/08-11/30/09	02/01/08-11/30/09	
PCA	72480	72480	72480	
LINE ITEM/OBJECT	398	398	398	TOTAL
<b>DESCRIPTION</b>				

Contract \$	\$ 54,194.00	\$ 130,065.00	\$ 54,194.00	\$ 238,453.00
Adjustment memo per SSD (4/16/08)	\$ 184,259.00	\$ (130,065.00)	\$ (54,194.00)	\$ -
			\$	\$ -

<b>Total, Contract</b>	<b>\$ 238,453.00</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ 238,453.00</b>
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Payments to Contractor:

Inv. #	Inv. Date	Ser Per			C/S
77715-56989	08/07/08	4/8/08-6/30/08	13,860.90	<del>13,860.90</del>	C080127 ✓
77715-57360	08/14/08	7/1/08-7/31/08	12,535.65	<del>12,535.65</del>	C080127 ✓
77715-65859	11/14/08	08/01/08-10/31/08	27,974.24	<del>27,974.24</del>	C080495 ✓
77715-72613	02/12/09	11/1/08-1/31/09	8,655.08	<del>8,655.08</del>	C080711 ✓
77715-82141	05/13/09	02/01/09-04/30/09	8,446.65	<del>8,446.65</del>	C080853 ✓
93757	08/14/09	5/1 - 7/31/09	31,882.54	<del>31,882.54</del>	C090155 ✓

<b>Total, Payments</b>	<b>\$ 103,355.06</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ 103,355.06</b>
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<b>Balance Available to Pay Contractor</b>	<b>\$ 135,097.94</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ 135,097.94</b>
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Balance Must Be Spent By:                      6/30/2010                      6/30/2011                      6/30/2012

**Notes:**

Contract Manager: Harold Holmes

24



# University of California Berkeley

Accounting Services  
Extramural Funds Accounting

C080127

Invoice To:

Air Resources Board  
Accounting and Grants  
P.O. Box 1436  
Sacramento, CA 95812

Date: 8/7/2008

INVOICE NO. 77715 - 56989

RCVD AUG 12 2008

Contract/Grant/Agreement/Purchase Order Number: <b>07-405</b>		PI/Director: <b>O'Hare, Michael</b>	
Project Title <b>Low Carbon Fuel Standard Implementation</b>		Reference:	
	Period Billed 4/8/2008 - 6/30/2008		
	Cumulative	Current	
Salaries & Wages	11,100.00	11,100.00	
Employee Benefits	1,425.23	1,425.23	
Equipment & Facilities	0.00	0.00	
Supplies, Materials, & Services	252.36	252.36	
Travel	1,223.32	1,223.32	
Subcontract	0.00	0.00	
Indirect Cost	1,400.09	1,400.09	
<b>TOTAL</b>	<b>\$15,401.00</b>	<b>15,401.00</b>	
Less Withholding (10.0%):			<b>1,540.10</b>
<b>Amount Now Due</b>			<b>13,860.90</b>

*Approved  
withhold*

Refer to invoice # 77715 - 56989  
and make check payable to:  
THE REGENTS OF THE UNIVERSITY OF CALIFORNIA  
Extramural Funds Accounting  
2195 Hearst Ave RM 130 MC 1103  
Berkeley, California 94720-1103  
  
TIN # 94-6002123

It is hereby certified that all expenditures reported (or payment requested) are for appropriate purposes and in accordance with the agreements set forth in the application and award document

0.00  
0.00 G +  
13,860.90 +  
12,535.65 +  
002  
26,396.55 G +

*Cord*

Questions regarding this invoice should be directed to:  
Cornelia Kidney, Award  
Phone: (510) 642-9340  
Email: ck\_lee@berkeley



# University of California Berkeley

Accounting Services  
Extramural Funds Accounting

CO80127

Invoice To:

Air Resources Board  
Accounting and Grants  
P.O. Box 1436  
Sacramento, CA 95812

Date: 8/14/2008

RCVD AUG 20 2008

INVOICE NO. 77715 - 57360

Contract/Grant/Agreement/Purchase Order Number: <b>07-405</b>		PI/Director: <b>O'Hare, Michael</b>	
Project Title: <b>Low Carbon Fuel Standard Implementation</b>		Reference:	
		Period Billed 7/1/2008 - 7/31/2008	
		Cumulative	Current
Salaries & Wages		22,200.00	11,100.00
Employee Benefits		2,714.14	1,288.91
Equipment & Facilities	<i>Approved</i>	0.00	0.00
Supplies, Materials, & Services	<i>attached</i>	330.06	77.70
Travel		1,418.98	195.66
Subcontract		0.00	0.00
Indirect Cost		2,666.32	1,266.23
<b>TOTAL</b>		<b>\$29,329.50</b>	<b>13,928.50</b>
Less Withholding (10.0%):			<b>1,392.85</b>
<b>Amount Now Due</b>			<b>12,535.65</b>
<b>Refer to invoice # 77715 - 57360</b> and make check payable to: THE REGENTS OF THE UNIVERSITY OF CALIFORNIA Extramural Funds Accounting 2195 Hearst Ave RM 130 MC 1103 Berkeley, California 94720-1103  TIN # 94-6002123		It is hereby certified that all expenditures reported (or payment requested) are for appropriate purposes and in accordance with the agreements set forth in the application and award documents.  <div style="text-align: right;"><i>Cornelia Kidney</i></div>	
Questions regarding this invoice should be directed to:		Cornelia Kidney, Award Analyst Phone: (510) 642-9340 FAX: 510-643-8997 Email: ck_lee@berkeley.edu	



University of California Berkeley

Accounting Services  
Extramural Funds Accounting

C080495

Invoice To:

Air Resources Board  
Accounting and Grants  
P.O. Box 1436  
Sacramento, CA 95812

Date: 11/14/2008

RCVD NOV 21 2008

INVOICE NO. 77715 - 65859

Contract/Grant/Agreement/Purchase Order Number: <del>07-405</del>		PI/Director: O'Hare, Michael	
Project Title: Low Carbon Fuel Standard Implementation		Reference:	
		Period Billed 8/1/2008 - 10/31/2008	
		Cumulative	Current
Salaries & Wages		44,450.35	22,250.35
Employee Benefits		5,165.79	2,451.65
Equipment & Facilities		0.00	0.00
Supplies, Materials, & Services	<i>Approved</i>	485.81	155.75
Travel	<i>collect</i>	4,932.11	3,513.13
Subcontract		0.00	0.00
Indirect Cost		5,377.93	2,711.61
<b>TOTAL</b>		<b>\$60,411.99</b>	<b>31,082.49</b>
Less Withholding (10.0%):			<b>3,108.25</b>
<b>Amount Now Due</b>			<b>27,974.24</b>
<p>Refer to invoice # 77715 - 65859 and make check payable to: THE REGENTS OF THE UNIVERSITY OF CALIFORNIA Extramural Funds Accounting 2195 Hearst Ave RM 130 MC 1103 Berkeley, California 94720-1103</p> <p>TIN # 94-6002123</p>		<p>It is hereby certified that all expenditures reported (or payment requested) are for appropriate purposes and in accordance with the agreements set forth in the application and award documents.</p> <p style="text-align: right;"><i>Cornelia Kidney</i></p>	
Questions regarding this invoice should be directed to:		<p>Cornelia Kidney, Award Analyst Phone: (510) 642-9340 FAX: 510-643-8997 Email: ck_lee@berkeley.edu</p>	



# University of California Berkeley

## Accounting Services Extramural Funds Accounting

Invoice To:

**Air Resources Board  
Accounting and Grants  
P.O. Box 1436  
Sacramento, CA 95812**

Date: 2/12/2009

INVOICE NO. 77715 - 72613

Contract/Grant/Agreement/Purchase Order Number: 07-405		PI/Director: O'Hare, Michael	
Project Title Low Carbon Fuel Standard Implementation		Reference:	
		Period Billed 11/1/2008 - 1/31/2009	
		Cumulative	Current
Salaries & Wages		48,850.25	4,399.90
Employee Benefits		6,481.46	1,315.67
Equipment & Facilities	<i>Approved</i>	0.00	0.00
Supplies, Materials, & Services		216.61	-269.20
Travel	<i>Attached</i>	8,317.58	3,385.47
Subcontract		0.00	0.00
Indirect Cost		6,162.85	784.92
<b>TOTAL</b>		<b>\$70,028.75</b>	<b>9,616.76</b>
Less Withholding (10.0%):			961.68
<b>Amount Now Due</b>			<b>8,655.08</b>
<p>Refer to invoice # 77715 - 72613 and make check payable to: THE REGENTS OF THE UNIVERSITY OF CALIFORNIA Extramural Funds Accounting 2195 Hearst Ave RM 130 MC 1103 Berkeley, California 94720-1103</p> <p>TIN # 94-6002123</p>		<p>It is hereby certified that all expenditures reported (or payment requested) are for appropriate purposes and in accordance with the agreements set forth in the application and award documents.</p> <p style="text-align: right;">ROVD FEB 19 2009</p> <p style="text-align: center;"><i>Cornelia Kidney</i></p>	
Questions regarding this invoice should be directed to:		<p>Cornelia Kidney, Award Analyst Phone: (510) 642-9340 FAX: 510-643-8997 Email: ck_lee@berkeley.edu</p>	



University of California Berkeley

Accounting Services  
Extramural Funds Accounting

2009 MAY 19 2009

CO 80853

Invoice To:

Air Resources Board  
Accounting and Grants  
P.O. Box 1436  
Sacramento, CA 95812

Date: 5/13/2009

INVOICE NO. 77715 - 82141

Contract/Grant/Agreement/Purchase Order Number: 07-405 Project Title: Low Carbon Fuel Standard Implementation		PI/Director: O'Hare, Michael Reference:	
		Period Billed 2/1/2009 - 4/30/2009	
		Cumulative	Current
Salaries & Wages		52,397.89	3,547.64
Employee Benefits	<i>Apparent Attached</i>	6,532.54	51.08
Equipment & Facilities		0.00	0.00
Supplies, Materials, & Services		2,057.91	1,841.30
Travel		11,409.53	3,091.95
Subcontract		0.00	0.00
Indirect Cost		7,016.05	853.20
TOTAL		\$79,413.92	9,385.17
Less Withholding (10.0%):			938.52
<b>Amount Now Due</b>			<b>8,446.65</b>
Refer to invoice # 77715 - 82141 and make check payable to: THE REGENTS OF THE UNIVERSITY OF CALIFORNIA Extramural Funds Accounting 2195 Hearst Ave RM 130 MC 1103 Berkeley, California 94720-1103  TIN # 94-6002123		It is hereby certified that all expenditures reported (or payment requested) are for appropriate purposes and in accordance with the agreements set forth in the application and award documents.  <i>Cornelia Kidney</i>	
Questions regarding this invoice should be directed to:		Cornelia Kidney, Award Analyst Phone: (510) 642-9340 FAX: 510-643-8997 Email: ck_lee@berkeley.edu	

This invoice has been checked against our records and found to be the original claim presented for payment, and payment has not been previously made. We have recorded this payment to prevent a duplicate payment later.

*[Signature]*  
Accounting Officer



# University of California Berkeley

Accounting Services  
Extramural Funds Accounting

Invoice To:

Air Resources Board  
Accounting and Grants  
P.O. Box 1436  
Sacramento, CA 95812

Date: 8/14/2009

INVOICE NO. 77715 - 93759

Contract/Grant/Agreement/Purchase Order

PI/Director: O'Hare, Michael

Number: 07-405

Reference:

Project Title Low Carbon Fuel Standard  
Implementation

Period Billed

5/1/2009 - 7/31/2009

Cumulative

Current

Salaries & Wages

77,923.24

25,525.35

Employee Benefits

9,406.75

2,874.21

Equipment & Facilities

0.00

0.00

Supplies, Materials, & Services

2,256.82

198.91

Travel

15,015.64

3,606.11

Subcontract

0.00

0.00

Indirect Cost

10,236.51

3,220.46

TOTAL

\$114,838.96

35,425.04

Less Withholding (10.0%):

3,542.50

Amount Now Due

31,882.54

Refer to invoice # 77715 - 93759

and make check payable to:

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA  
Extramural Funds Accounting  
2195 Hearst Ave RM 130 MC 1103  
Berkeley, California 94720-1103

TIN # 94-6002123

It is hereby certified that all expenditures reported (or payment requested) are for appropriate purposes and in accordance with the agreements set forth in the application and award documents.

*Approval*  
*attached*

*Cornelia Kidney*

Questions regarding this invoice should be directed to:

Cornelia Kidney, Award Analyst

Phone: (510) 642-9340 FAX: 510-643-8997

Email: ck\_lee@berkeley.edu

Business Unit: 1 -- UC Berkeley  
 Fiscal Year: 2009 - 10  
 Month: July

CURRENT ACTIVITY DETAIL  
 By Fund

Selection Criteria: Account Code | Fund Code 77715 | Org Code | Program Code | Project No | Flexfield  
 Org L2 Node | Org L3 Node | Org L4 Node | Org L5 Node | Org L6 Node | Acct L2 Node: EXPENSES | Acct L3 Node: | Acct L4 Node:

Description	Department Desc.	Date	Doc Id	Reference	Budget	Expense	Encumbrance	Pre Encumb
<b>FUND 77715 - CAL EPA-07-405-OHARE-11/09</b>								
<b>DIRECT COSTS</b>								
<i>Academic Salaries</i>								
BUSH, NATHANIEL	GRAD STONT RES-PARTIAL FEE REM	07/31/09	PAY0449717	17.39% REG	0.00	646.91	0.00	0.00
OHARE MICHAEL	RES -- ACAD YR- 19TH PYMT	07/31/09	PAY0449717	100% OLN	0.00	11,100.00	0.00	0.00
PLEVIN, RICHARD J.	GRAD STONT RES- NO REMISSION	07/31/09	PAY0449717	50% REG	0.00	1,744.00	0.00	0.00
<b>Employee Benefits</b>					0.00	13,490.91	0.00	0.00
BUSH, NATHANIEL	GRAD STONT RES-PARTIAL FEE REM	07/31/09	PAY0449717		0.00	19.54	0.00	0.00
OHARE MICHAEL	RES -- ACAD YR- 19TH PYMT	07/31/09	PAY0449717		0.00	1,398.15	0.00	0.00
PLEVIN, RICHARD J.	GRAD STONT RES- NO REMISSION	07/31/09	PAY0449717		0.00	52.57	0.00	0.00
<b>Supplies &amp; Expenses</b>					0.00	1,470.36	0.00	0.00
JUL GAEI INS ASSESSMENT		07/31/09	GAEL449713		0.00	114.67	0.00	0.00
<b>Domestic Travel</b>					0.00	114.67	0.00	0.00
US BANK CTS	OHARE MICHAEL OAK DENIAD DEN	06/25/09	11485698		0.00	486.40	0.00	0.00
<b>TOTAL DIRECT COSTS</b>					0.00	15,562.34	0.00	0.00
<b>INDIRECT COSTS</b>								
<i>Indirect Cost Recovery</i>								
IDC JOURNAL		07/31/09	SOH0020008		0.00	1,556.23	0.00	0.00
<b>TOTAL INDIRECT COSTS</b>					0.00	1,556.23	0.00	0.00
<b>TOTAL FOR FUND 77715 - CAL EPA-07-405-OHARE-11/09</b>					0.00	17,118.57	0.00	0.00

Business Unit: 1 -- UC Berkeley  
 Fiscal Year: 2008 - 09  
 Month: From May to June

CURRENT ACTIVITY DETAIL  
 By Fund

Selection Criteria: Account Code | Fund Code 77715 | Org Code | Program Code | Project No. | Flexfield  
 Org L2 Node | Org L3 Node | Org L4 Node | Org L5 Node | Org L6 Node | Acct L2 Node: EXPENSES | Acct L3 Node: | Acct L4 Node:

Description	Department Desc.	Date	Doc Id	Reference	Budget	Expenses	Encumbrance	Pie Encumb
<b>FUND 77715 - CAL-EPA-07-405-OHARE-1109</b>								
<b>DIRECT COSTS</b>								
Academic Salaries								
OHARE, MICHAEL	RES --- ACAD YR-1/9TH PYMT	06/30/09	PAY0447873	100% OLN	0.00	11,100.00	0.00	0.00
PLEVIN, RICHARD J.	GRAD STDNT RES- NO REMISSION	05/31/09	PAY0445108	26.79% REG	0.00	934.44	0.00	0.00
					0.00	12,034.44	0.00	0.00
Employee Benefits								
OHARE, MICHAEL	RES --- ACAD YR-1/9TH PYMT	06/30/09	PAY0447873		0.00	1,390.39	0.00	0.00
PLEVIN, RICHARD J.	GRAD STDNT RES- NO REMISSION	05/31/09	PAY0445108		0.00	13.46	0.00	0.00
					0.00	1,403.85	0.00	0.00
Supplies & Expenses								
Beginning Balance								
JUN GAEL INS ASSESSMENT		05/01/09	BEGINNING		0.00	0.00	2,988.00	0.00
MAY GAEL INS ASSESSMENT		06/30/09	GAEL447871		0.00	77.70	0.00	0.00
ORACLE USA, INC.	SOFTWARE	05/31/09	GAEL445106		0.00	654	0.00	0.00
					0.00	0.00	-2,988.00	0.00
					0.00	84.24	0.00	0.00
Domestic Travel								
HERTEL, THOMAS	Cal EPA Air Resources Board re	05/29/09	11390248		0.00	593.68	0.00	0.00
OHARE, MICHAEL	Cal EPA CARB meetings	04/30/09	11347978		0.00	448.05	0.00	0.00
OHARE, MICHAEL	Cal EPA Air Resources Board re	06/17/09	11448556		0.00	1,349.38	0.00	0.00
US BANK CTS	OHARE/MICHAEL SFO ORD TYS IAD	05/18/09	11407305		0.00	897.60	0.00	0.00
US BANK CTS	OHARE/MICHAEL SFO ORD TYS IAD	05/18/09	11407306		0.00	31.00	0.00	0.00
					0.00	3,119.71	0.00	0.00
					0.00	16,642.24	0.00	0.00
<b>TOTAL DIRECT COSTS</b>								
<b>INDIRECT COSTS</b>								
Indirect Cost Recovery								
IDC JOURNAL		06/30/09	SOH0020008		0.00	1,464.61	0.00	0.00
IDC JOURNAL		05/31/09	SOH0020008		0.00	199.62	0.00	0.00
					0.00	1,664.23	0.00	0.00
<b>TOTAL INDIRECT COSTS</b>								
					0.00	18,306.47	0.00	0.00
<b>TOTAL FOR FUND 77715 - CAL-EPA-07-405-OHARE-1109</b>								

Harman, Guy@ARB

---

From: Clymer, Pam@ARB  
Sent: Wednesday, September 09, 2009 12:41 PM  
To: Harman, Guy@ARB  
Subject: FW: Invoice Approval: UC Berkeley 07-405

Attachments: AR-M550U\_20090903\_085351.pdf



AR-M550U\_20090903\_085351.pdf (...)

Hi Guy,

The attached invoice has been approved for payment.

Pam

-----Original Message-----

From: Harman, Guy@ARB  
Sent: Thursday, September 03, 2009 8:53 AM  
To: Clymer, Pam@ARB  
Subject: Invoice Approval: UC Berkeley 07-405

If charges are correct please approve attached invoice by 09/10/09 via e-mail.

Thank you

Guy Harman  
Accountant I (Specialist)  
California Air Resources Board  
Phone (916) 322-9390  
Fax (916) 322-9612

-----Original Message-----

From: sharpcopier@arb.ca.gov [mailto:sharpcopier@arb.ca.gov]  
Sent: Thursday, September 03, 2009 8:54 AM  
To: Harman, Guy@ARB  
Subject: Scanned image from Accounting Sharp Copier 20th Floor

DEVICE NAME: Accounting Sharp Copier 20th Floor  
DEVICE MODEL: SHARP AR-M550U  
LOCATION: 20th floor-South Side-Center

FILE FORMAT: PDF MMR(G4)  
RESOLUTION: 300dpi x 300dpi

Attached file is scanned image in PDF format.  
This file can be read by Adobe Acrobat Reader.  
The reader can be downloaded from the following URL:

<http://www.adobe.com/>

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

AGREEMENT NUMBER <b>07-405</b>
REGISTRATION NUMBER

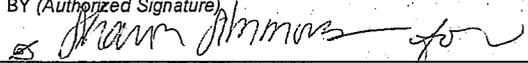
- This Agreement is entered into between the State Agency and the Contractor named below:
 

STATE AGENCY'S NAME Air Resources Board (ARB or State)
CONTRACTOR'S NAME University of California, Berkeley (UC Berkeley, UC or Contractor)
- The term of this Agreement is: February 1, 2008 or upon DGS approval through November 30, 2009
- The maximum amount of this Agreement is: \$ 238,453.00  
Two hundred thirty eight thousand, four hundred fifty three dollars and no cents
- 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 – Statement of work	1 page
Exhibit A – Attachment 1	7 pages
Exhibit B – Budget Detail and Payment Provisions	2 pages
Exhibit B – Attachment 1	2 pages
Exhibit C* – General Terms and Conditions	GIA 101
Check mark one item below as Exhibit D:	
<input checked="" type="checkbox"/> Exhibit - D Special Terms and Conditions (Attached hereto as part of this agreement)	1 page
<input type="checkbox"/> Exhibit - D* Special Terms and Conditions	
Exhibit E – Additional Provisions	6 pages

Items shown with an Asterisk (\*), are hereby incorporated by reference and made part of this agreement as if attached hereto. These documents can be viewed at [www.ols.dgs.ca.gov/Standard+Language](http://www.ols.dgs.ca.gov/Standard+Language)

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

CONTRACTOR	
CONTRACTOR'S NAME (if other than an individual, state whether a corporation, partnership, etc.) University of California, Berkeley	
BY (Authorized Signature) 	DATE SIGNED (Do not type) 2/20/08
PRINTED NAME AND TITLE OF PERSON SIGNING Jyl Balwin	
ADDRESS 2150 Shattuck Ave. Suite 313 Berkeley, CA 94704	
STATE OF CALIFORNIA	
AGENCY NAME Air Resources Board	
BY (Authorized Signature) 	DATE SIGNED (Do not type) 3/24/08
PRINTED NAME AND TITLE OF PERSON SIGNING Socorro Watkins, Chief, Business Management Branch	
ADDRESS P.O. Box 2815, Sacramento, CA 95812	

*California Department of General Services Use Only*

*Kmm*

**APPROVED**

**APR 8 2008**

**DEPT OF GENERAL SERVICES**

*Kyates*

Exempt per:

**EXHIBIT A**

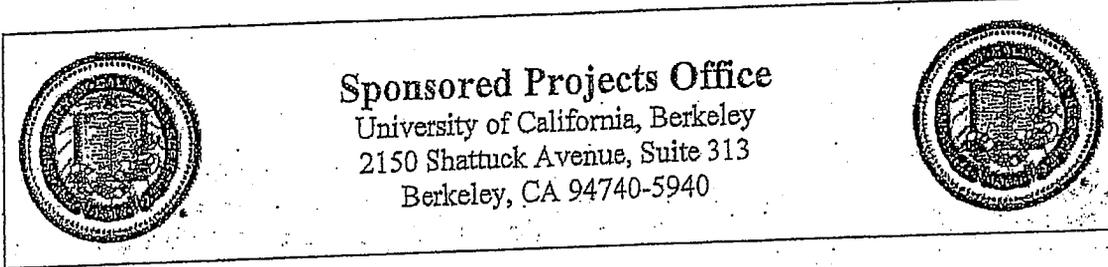
**STATEMENT OF WORK**

1. The University of California, Berkeley (UC Berkeley) agrees to provide the ARB Stationary Source Division technical and advisory support in the effort to develop and implement California' Low Carbon Fuel Standard in accordance to the detailed scope of work (Exhibit A- Attachment I).
2. The project representatives during the term of this agreement will be:

Requesting Agency: Air Resources Board	Contractor: University of California, Berkeley
Section/Unit: Stationary Source Division	Section/Unit: Energy and Resources Group
Attention: John Curtis	Attention: Prof. Alex Farrell
Address: Air Resources Board 1001 I Street, 6 <sup>th</sup> Floor Sacramento, CA 95814	Address: University of California, Berkeley Energy and Resources Group 310 Barrows Hall #3050 Berkeley, CA 94720
Phone: (916) 333-2661	Phone: (510) 642-1085
Fax: (916) 324-5684	Fax: (510) 642-1085
Email: jcourtis@arb.ca.gov	Email: aef@berkeley.edu

Direct all administrative inquiries to:

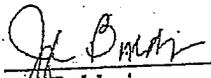
Requesting Agency: Air Resources Board	Contractor: University of California, Berkeley
Section/Unit: Administrative Services Division	Section/Unit: Sponsored Projects Office
Attention: Harold Pinkston	Attention: Jyl Baldwin
Address: Air Resources Board 1001 I Street, 20 <sup>th</sup> Floor Sacramento, CA 95814	Address: University of California, Berkeley Sponsored Projects Office 2150 Shattuck Ave., Suite 313 Berkeley, CA 94704-5940
Phone: (916) 327-8215	Phone: (510) 642-8117
Fax: (916) 327-2940	Fax: (510) 642-8236
Email: hpinksto@arb.ca.gov	Email: jbaldwin@berkeley.edu



Principal Investigator: Alexander Farrell  
Fellow:  
Project Title: Low Carbon Fuel Standard Implementation

Please accept the enclosed proposal submitted on behalf of The Regents of the University of California Berkeley campus. Should this proposal be selected for funding, award documents should be issued using the information provided below.

Endorsed for the Regents by:

 11/16/07  
\_\_\_\_\_  
Jill Baldwin  
Assistant Director  
Compliance & Special Projects

If you have any questions or need additional information regarding this proposal, please contact:

Dan Jacobs  
Principal Research Administrator  
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<p>AWARDS SHOULD BE MADE TO:</p> <p>The Regents of the University of California</p> <p>c/o Sponsored Projects Office University of California, Berkeley 2150 Shattuck Avenue, Suite 313 Berkeley, CA 94704-5940</p> <p>email address for electronics awards: spoawards@berkeley.edu</p> <p>Main Office: (510) 642-0120 Fax: (510) 642-8236 Website: <a href="http://spo.berkeley.edu">http://spo.berkeley.edu</a></p>	<p>CHECKS SHOULD BE MADE PAYABLE TO:</p> <p>The Regents of the University of California</p> <p>CHECKS SHOULD BE SENT TO:.....</p> <p>Cynthia Kane, Manager Extramural Funds Accounting University of California, Berkeley 2195 Hearst Avenue, Room 130 Berkeley, CA 94720-1103 Telephone: 510/642-1371 Fax: 510/643-8997 Email: <a href="mailto:cjkane@berkeley.edu">cjkane@berkeley.edu</a></p>
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## 1. BACKGROUND

The California Global Warming Solutions Act of 2006, also known as Assembly Bill 32 (see Attachment 1), establishes a comprehensive program of regulatory and market mechanisms to achieve real, quantifiable, cost-effective reduction of greenhouse gases (GHG). AB 32 charges the Air Resources Board (ARB or the Board) 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, AB 32 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 (see Attachment 2), 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 all 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 University of California 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 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, and limited data quality.

## 2. SCOPE OF WORK

The purpose of this work is to provide the ARB Stationary Source Division technical and advisory support in the effort to develop and implement California's Low Carbon Fuel Standard. This work is divided into the major projects listed below. Each is lead by the researcher identified and addresses the current issues with the development of LCFS, LCFS implementation, or providing additional studies on identified areas of uncertainty. The UC will also provide responses to specific issues that may emerge in the LCFS development process, prepare white papers in areas identified below and assist in coordinating between government and non-government agencies. Dr. Alex Farrell from the University of California, Berkeley will serve as the principal investigator and be responsible for overall project management and communication with ARB staff.

### *Task 1. Provide advisory support to ARB on lifecycle analysis improvement and tool development*

During the development of the LCFS, lifecycle analysis (LCA) will play a major role in determining the carbon intensity of various transportation fuels. Currently, several issues require additional research and development including system boundaries, land use and sustainability, default carbon intensity values and uncertainty of values. Additionally, new fuel pathways will need to be identified, evaluated, and incorporated into existing lifecycle models. LCA work by ARB must be harmonized with similar work conducted by the United States Environmental Protection Agency (USEPA) and European Union (EU). This task will focus on addressing the policy and technical issues associated with LCA model development and providing consultation support to ARB staff in our efforts to modify existing LCA methods during the LCFS development phase.

In addition to LCA, white papers that summarize UC Berkeley research related to the bigger issues pertinent to the Life Cycle Analysis Working Group will be provided to the ARB. The topics may include, but not limited to, those discussed below, and the white paper topics prepared under this task will be decided collectively by ARB and UC Berkeley.

*Deliverable:* LCFS lifecycle advisory support addressing issues pertinent to Life Cycle Analysis Working Group.

*Researchers:* Prof. Alex Farrell, Dr. Jim Bushnell, Prof. Dan Farber, Mr. Rick Frank, Prof. Rob Harley, Prof. Arpad Horvath, Prof. Dan Kammen, Prof. Mike O'Hare, Ms. Cymie Payne, Dr. Sabrina Spatari, Prof. Margaret Taylor, Dr. Margaret Tom, Prof. Catherine Wolfram, plus one or more graduate students

### *List of White Paper Topics (Preliminary):*

*Robustness Analysis of Life-cycle Results, Including Land Use and Biomass Production Scenarios.* (Alex Farrell, Arpad Horvath, Mike O'Hare, Dan Kammen, Sabrina Spatari plus one or more graduate students)

Much progress to date has been made on biofuels LCAs focused on the effects of marginal production of "average" biofuels. Unfortunately, extrapolating these results does not properly account for impacts that emerge at a larger scale and longer timeframes, and this approach

is recognized as inadequate for a future of technological change and large scale implementation. A more rigorous and policy-relevant approach would examine the effects of large-scale implementation of specific biofuel pathways, including market-mediated impacts such as land use conversion. This type of analysis requires assumptions about a wide range of policies affecting agriculture, food, land, climate, and biofuels, as well as assumptions about technological advances and the price of petroleum. Many of these factors are deeply uncertain in that the functional forms or probability distributions are unknown. Under these conditions, a point estimate with error bars does not sufficiently characterize the wide range of outcomes nor allow estimation of confidence in results. This white paper will develop a rigorous approach that recognizes that large-scale results are necessarily contingent on a range of input assumptions, and would perform the LCA on a large number of parameterizations (scenarios) defining plausible futures. Rather than producing a point estimate with uncertainty, this approach will generate a data set which could be explored to examine the robustness of the results. For example, we might ask: Which of a set of parameters has the most leverage over total GHG emissions? How sensitive are the climate benefits to land use conversion policies, or does large-scale implementation robustly reduce climate impacts? Under what crop-to-conversion combinations does large-scale implementation of biofuels fail to reduce climate impacts vis-a-vis petroleum? This work will involve the development of methods and tools to enable a systematic evaluation of an LCA or economic model under a large number of alternative parameterizations.

*GHG emissions from cultivation, fertilizer use, and land-use change in the lifecycle of biofuels (Mark Delucchi and Andy Jones)*

The production of biomass to make biofuels (such as corn-ethanol) involves the use of fertilizer, the cultivation of land, and even changes in the types of land uses, as increased production of biofuel feedstocks pushes agricultural production onto uncultivated lands. Our preliminary analyses indicate that these effects -- which are omitted or treated poorly in the major published lifecycle analyses (LCAs) -- may be quite important, accounting for more than 25% of total lifecycle CO<sub>2</sub>-equivalent greenhouse gas (GHG) emissions. We propose to perform a detailed examination of these poorly characterized but potentially quite important sources of GHG emissions in biofuel lifecycles. Our efforts will focus on a developing a comprehensive characterization of the nitrogen (N) cycle in biofuel systems (because the flows and fate of N have significant direct and indirect effects on climate), understanding how biofuels policies will affect land uses and hence carbon sequestration in plants and soils, and incorporating the biogeophysical effects of land-use change (such as changes in albedo) into LCAs.

*Low carbon fuel supply curves (Alex Farrell, Margaret Torn, Mike O'Hare, plus one or more graduate students)*

The supply of fuels that can meet the requirements of the LCFS is necessary to understand what its costs and benefits may be. This project will evaluate potential supply scenarios for biofuels, electricity, and low-carbon fossil fuels, taking into consideration current technologies as well as potential future technological innovation. The potential costs and quantities of low-carbon fuels will be estimated. This analysis will evaluate changes in cropping practice for existing feedstocks and retrofits of existing biofuel facilities to lower GHG emissions, as well as potential new technologies. One or more "sustainability screens" will be applied to feedstock supply to illustrate how restricting access to some feedstocks (e.g. wood from National Forests) affects the supply of low-carbon fuels.

*International Aspects of LCA methods and Low Carbon Fuel Supply (Alex Farrell, Mike O'Hare, Cymie Payne, Rick Frank, plus one or more graduate students)*

The global markets for fuels and the rapid development of LCFS proposals in several countries (e.g. Canada, Germany, and the United Kingdom) and the European Union indicate that the supply of low carbon fuels will be affected by international law, rules, procedures, and markets. This includes the LCA methods used, and standards and goals adopted by other market participants, as well as international and trade law involving the production of both biofuels and petroleum-based fuels. Coordination with these emerging conditions and work to ensure they are compatible with California's interests and approach to the LCFS will be important to ensuring successful implementation of the LCFS and the overall achievement of the goals of AB 32. This project will involve participation in developing these emerging international aspects of LCA methods and low carbon fuel supply, including periodic updates as needed and a summary report at the end of the project.

***Task 2. Provide advisory support to ARB on the development of LCFS compliance and enforcement system.***

The goal of this task is to provide issue analyses and consultation support to ARB staff on methods of determining compliance and executing enforcement during the implementation of LCFS. Key issues that will be addressed, among several others, include policy and trade issues associated with the tracking and certification of fuels and feedstocks and the reporting criteria for regulated entities.

*Deliverable:* LCFS lifecycle advisory support addressing issues pertinent to Compliance and Enforcement Working Group. The deliverables for this project include emails, phone calls, meetings, memos and presentations as needed.

*Researchers:* Alex Farrell, Mike O'Hare, Cymie Payne, Rick Frank, plus one or more graduate students

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

This project will focus on conducting policy analysis and providing advisory support to ARB on key issues identified in development of the LCFS regulation. 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. One or more white papers will be provided to the ARB on these topics. The list of white papers prepared under this task will be decided collectively by ARB and UC Berkeley. The advisory services by UC to support ARB staff in investigating and addressing these issues will be critical to the development of LCFS.

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

*Researchers:* Prof. Alex Farrell, Dr. Jim Bushnell, Prof. Dan Farber, Mr. Rick Frank, Prof. Dan Kammen, Prof. Mike O'Hare, Ms. Cymie Payne, Dr. Sabrina Spataro, Prof. Margaret Taylor, Prof. Catherine Wolfram, plus one or more graduate students

*Project Schedule*

The following schedule is tentative; the exact start and completion date for each task is subject to the changes and shall be decided collectively by ARB and UC Berkeley.

**Proposed Project Schedule (subject to change)**

	2007Q4	2008Q1	2008Q2	2008Q3	2008Q4	2009Q1	2009Q2	2009Q3
Task 1	LCFS advisory support on lifecycle analysis and tool development							
			Draft white paper on low carbon fuel supply	Draft white paper on international Aspects		Other draft white papers		All white papers complete
Task 2	LCFS compliance and enforcement advisory support							Summary report
Task 3	LCFS policy and regulatory development advisory support							Summary report

**Personnel**

Principal Investigator

Alex Farrell  
Associate Professor, Energy and Resources Group  
Director, Transportation Sustainability Research Center

Co-Investigators

Severin Borenstein\*  
Professor, Haas School of Business  
University of California Energy Institute

Jim Bushnell\*  
Lecturer, Haas School of Business  
University of California Energy Institute

Daniel Farber\*  
Professor, Boalt Hall School of Law

Rick Frank  
Exec. Director, California Center for Environmental Law & Policy, Boalt Hall School of Law

Robert Harley  
Professor, Civil and Environmental Engineering

Arpad Horvath  
Associate Professor, Civil and Environmental Engineering

Daniel Kammen  
Professor, Energy and Resources Group and Goldman School of Public Policy

Mike O'Hare  
Professor, Goldman School of Public Policy

Cymie Payne  
Assoc. Director, California Center for Environmental Law & Policy, Boalt Hall School of Law

Margaret Taylor,  
Assistant Professor, Goldman School of Public Policy

Margaret Torn  
Adjunct Professor, Energy and Resources Group  
Head - Climate Change & Carbon Management, Lawrence Berkeley National Laboratory

Catherine Wolfram\*  
Associate Professor, Haas School of Business  
University of California Energy Institute

\* Participants budgeted for no salary at this time

**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 details all charges, the Air Resources Board agrees to compensate the Regents of the University of California, Berkeley for actual expenditures incurred in accordance with the rates specified in the attached Exhibit B, Attachment 1.
- B. Invoices shall include the Agreement Number and shall be submitted in triplicate not more frequently than quarterly in arrears to:

Air Resources Board  
P.O. Box 1436  
Sacramento, CA 95812-1436  
Attn: Accounting Section

- C. University may rebudget funds up to a maximum of ten percent between major budget categories with prior notice to ARB's Contract Manager.
- D. Upon mutual agreement, ARB will give consideration to request to rebudget funds in excess of ten percent, however, no rebudgeting in excess of ten percent and no rebudgeting of funds into the travel category may be performed without ARB's approval. The total agreement cost will remain unchanged.

**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.

**3. Payment**

- A. Costs for this Agreement shall be computed in accordance with State Administrative Manual Sections 8752 and 8752.1.

**EXHIBIT B**

- 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 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.

Project Name: Low Carbon Fuel Standard Implementation

Principal Investigator: Alex Farrell

BUDGET SUMMARY SHEET

Personnel:	YEAR 1	YEAR 2	salary + benefits
	Months	Months	
Farrell	1.5	1.5	33385
Borenstein	0.0	0.0	
Bushnell	0.0	0.0	
Farber	0.25	0.25	3381
Frank	0.25	0.25	7767
Harley	0.25	0.25	6561
Horvath	0.25	0.25	8357
Kammen	0.50	0.50	9514
O'Hare	0.25	0.25	2657
Payne	0.25	0.25	4799
Taylor	0.25	0.25	9359
Torn	0.0	0.0	
Wolfram	7.5	7.5	71834
Graduate Student Researcher	3.0	3.0	19312
Post-doctoral Researcher	1.8	1.8	14851
Financial Administrator			
	Subtotal		\$191,767

Travel:	YEAR 1	YEAR 2	
Domestic and International	\$10,000	\$10,000	\$20,000
	Subtotal		\$20,000

Supplies and Equipment:	YEAR 1	YEAR 2	
GAL	\$ 413.00	\$ 414.00	\$827
Supplies and Materials	\$3,000	\$3,000	\$6,000
	Subtotal		\$6,827

Total Direct Costs \$218,594

Overhead rate 10% MTDC \$19,859

Indirect Costs \$238,453

**TOTAL PROJECT BUDGET**

Exhibit B  
Attachment I

BUDGET DETAIL		Months	Rate	Salary	Benefits	Total/Yr	Total/Person*
<b>Personnel:</b>							
Year 1	Farrell	1.5	\$ 9,325.00	\$ 13,987.50	1.17	\$ 16,965.38	
Year 2	Farrell	1.5	\$ 9,688.00	\$ 14,647.00	1.17	\$ 17,019.89	\$ 33,985.37
Year 1	Borenstein	0.0					
Year 2	Borenstein	0.0					
Year 1	Bushnell	0.0					
Year 2	Bushnell	0.0					
Year 1	Farber	0.0					
Year 2	Farber	0.0					
Year 1	Frank	0.25	\$ 5,390.00	\$ 1,347.50	1.23	\$ 1,657.43	
Year 2	Frank	0.25	\$ 5,805.60	\$ 1,401.40	1.23	\$ 1,723.72	\$ 3,981.15
Year 1	Harley	0.25	\$ 13,000.00	\$ 3,250.00	1.17	\$ 3,802.50	
Year 2	Harley	0.25	\$ 13,520.00	\$ 3,380.00	1.17	\$ 3,954.60	\$ 7,757.10
Year 1	Horvath	0.25	\$ 10,895.00	\$ 2,748.75	1.17	\$ 3,276.04	
Year 2	Horvath	0.25	\$ 11,494.80	\$ 2,858.70	1.17	\$ 3,344.68	\$ 6,590.72
Year 1	Kammen	0.25	\$ 14,005.00	\$ 3,501.25	1.17	\$ 4,096.46	
Year 2	Kammen	0.25	\$ 14,565.20	\$ 3,641.30	1.17	\$ 4,280.32	\$ 8,959.78
Year 1	O'Hare	0.50	\$ 10,700.00	\$ 2,675.00	1.17	\$ 3,254.94	
Year 2	O'Hare	0.25	\$ 11,128.00	\$ 2,782.00	1.17	\$ 3,254.94	\$ 9,514.44
Year 1	Rayne	0.25	\$ 4,285.00	\$ 1,058.75	1.23	\$ 1,302.28	
Year 2	Rayne	0.25	\$ 4,404.40	\$ 1,101.10	1.23	\$ 1,354.35	\$ 2,656.62
Year 1	Taylor	0.25	\$ 8,042.00	\$ 2,010.50	1.17	\$ 2,448.47	
Year 2	Taylor	0.25	\$ 8,864.00	\$ 2,091.00	1.17	\$ 2,448.47	\$ 4,788.76
Year 1	Torn	0.25	\$ 12,665.00	\$ 3,166.25	1.449	\$ 4,587.90	
Year 2	Torn	0.25	\$ 13,171.80	\$ 3,292.90	1.449	\$ 4,771.41	\$ 9,359.31
Year 1	Wolfram	0.0					
Year 2	Wolfram	0.0					
Year 1	Post-Doc	3.00	\$ 2,892.00	\$ 8,076.00	1.17	\$ 9,448.92	
Year 2	Post-Doc	3.00	\$ 2,810.00	\$ 8,430.00	1.17	\$ 9,863.10	\$ 19,312.02
Year 1	GSR, academic yr	4.50	\$ 3,322.00	\$ 14,848.00	1.019	\$ 25,143.34	
Year 1	GSR, summer	3.00	\$ 3,322.00	\$ 9,966.00	1.03	\$ 10,264.98	
Year 2	GSR, academic yr	4.50	\$ 3,455.00	\$ 15,647.50	1.03	\$ 25,749.62	
Year 2	GSR, summer	3.00	\$ 3,455.00	\$ 10,365.00	1.03	\$ 10,675.95	\$ 71,833.88
Year 1	Financial assistant	1.75	\$ 3,200.00	\$ 5,800.00	1.3	\$ 7,280.00	
Year 2	Financial assistant	1.75	\$ 3,328.00	\$ 5,824.00	1.3	\$ 7,671.20	\$ 14,851.20
<b>Totals:</b>				\$ 150,273.40		\$ 191,757.34	\$ 191,757.34

\* GSR total cost includes fee remission of \$5000/semester for 3 semesters (not subject to indirect costs)

Travel:			
Year 1	Meetings with Stakeholders in California:		
	Northern California, \$75 per person-trip X 10 trips	\$	750.00
	Southern California, \$400 per person-trip X 5 trips	\$	2,000.00
	Meetings with Air Resources Board:		
	Northern California, \$40 per person-trip X 6 trips	\$	240.00
	Meetings to coordinate with other states and US government:		
	\$1000 per person-trip X 5 trips	\$	5,000.00
	Meetings to coordinate Internationally:		
	\$2000 per person-trip X 1 trip	\$	2,010.00
	<b>Year 1 total</b>	\$	10,000.00

Year 2	Meetings with Stakeholders in California:		
	Northern California, \$75 per person-trip X 10 trips	\$	750.00
	Southern California, \$400 per person-trip X 5 trips	\$	2,000.00
	Meetings with Air Resources Board:		
	Northern California, \$40 per person-trip X 6 trips	\$	240.00
	Meetings to coordinate with other states and US government:		
	\$1000 per person-trip X 5 trips	\$	5,000.00
	Meetings to coordinate Internationally:		
	\$2000 per person-trip X 1 trip	\$	2,010.00
	<b>Year 2 total</b>	\$	10,000.00

**Total Travel:** \$ 20,000.00

Supplies:			
Year 1	General and Employment Liability Insurance (.55/\$100 payroll)	\$	413.00
	Books, datasets, presentation materials	\$	3,000.00
	<b>Year 1 total</b>	\$	3,413.00
Year 2	General and Employment Liability Insurance (.55/\$100 payroll)	\$	414.00
	Books, datasets, presentation materials	\$	3,000.00
	<b>Year 2 total</b>	\$	3,414.00

**Total Supplies and Expenses** \$ 6,827.00

**Total Direct Costs** \$ 218,594.34

**Indirect costs at 10% of modified total direct costs (excludes fee remission)** \$ 19,859.43

**TOTAL PROJECT BUDGET:** \$ 238,453.77

## EXHIBIT D

### SPECIAL TERMS AND CONDITIONS

#### 1. Termination

- A. The State reserves the right to terminate this Agreement at its sole discretion at any time.
- 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 that in the opinion of ARB are justified, and shall include labor, and materials purchased or utilized (including all noncancellable 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

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

- 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, and all required data compilations.
- 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. 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. 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

- 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 the ARB staff and 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.

### 6. Studies Involving Human or Animal Subjects

A copy of the institutional review board approval must be submitted to ARB upon receipt by the investigator.

### 7. Patent Provisions

These provisions apply only to non-state entity subcontractors that may be a part of this Agreement.

#### A. Definitions

1. "Invention" means any discovery or product of creative imagination, thought, mental synthesis, or purposeful experimentation conceived or first reduce to practice in the course of or under this Agreement. The term "invention" includes, but is not limited to, any art, method, process, device, machine, manufacture, design, or composition

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of matter, or any new and useful improvement or application thereof, or any variety of plant, that is or may be patentable under the patent laws of the United States of America.

2. "Agreement" means any legally enforceable agreement, covenant, compact grant, or other arrangement or subcontract setting forth terms and conditions to do or not to do

something and entered into by or for the benefit of the State where a purpose of the agreement is the conduct of experimental, developmental, or research work.

3. "Subcontract" means an agreement under or subordinate to a previous or prime agreement, including this Agreement.
4. "Subcontractor" means an individual or firms that contract with Contractor to perform part or all of the prime Contractor's work under this Agreement.
5. "To bring to the point of practical application" means to manufacture in the case of a composition or product, to practice in the case of a process, or to operate in the case of a machine, device, or system and, in each case, under such conditions as to establish that the invention is being worked, operated, or utilized, and that its benefits are reasonable accessible to the public.

### B. Rights Granted to the State

Subcontractor agrees to grant to State all right, title, and interest in and to each invention discovered, conceived, or first reduced to practical application during performance of the Subcontract, subject to the reservation of a non-exclusive paid-up worldwide license to Subcontractor.

### C. Invention Disclosures and Reports

With respect to each invention, Subcontractor shall furnish to ARB:

1. A written disclosure of each invention within six (6) months after conception or first actual reduction to practice, whichever occurs first under the Subcontract, sufficiently complete in technical detail to convey to one skilled in the art to which the invention pertains a clear understanding to the nature, purpose, and operation, and the physical, chemical, and electrical characteristics of the invention;
2. A final report listing all inventions, including all those previously disclosed, or certifying that there are no inventions prior to final payment under this Subcontract.
3. Information in writing, as soon as is practicable, of the date and identity of any public use, sale, or publication of any such invention made by or known to Subcontractor, or of any contemplated publication by Subcontractor;
4. Upon request, such duly executed instruments and other papers as deemed by ARB necessary to vest in State the rights granted it under this patent provision and

**EXHIBIT E**

to enable State to apply for and prosecute any patent application in any country covering such invention where State has the right under this patent provision to file such application; and

5. Upon request, an irrevocable power of attorney to inspect and make copies of any United States patent application filed by or on behalf of Subcontractor. This demand may also be made under subdivision 8.

**D. License Granted by Subcontractor to Others Subject to State's Rights**

Subcontractor recognizes that State may contract for property or services with respect to which the vendor may be liable to Subcontractor for royalties for the use of an invention on account of such a contract. Subcontractor further recognizes that it is the policy of State not to pay, in connection with its agreements, charges for use of patents in which the State holds title. In recognition of this policy, Subcontractor agrees to participate in and make appropriate arrangements for the exclusion of such charges from such agreements or for the refund of amounts received by Subcontractor with respect to any such charges not so excluded.

**E. Subcontracts**

1. Contractor shall, unless otherwise authorized or directed by State, include a patent rights clause containing all the terms of this patent provision in any Subcontract hereunder where the purpose of the subcontract is the conduct of experimental, developmental, or research work. In the event of refusal by a Subcontractor to accept this patent provision, Contractor:

- (a) shall promptly submit a written report to the State setting forth the Subcontractor's reasons for such refusal or the reasons Contractor is of the opinion that the inclusion of this clause would be unacceptable, and other pertinent information that may expedite disposition of this matter; and

- (b) shall not proceed with the Subcontract without the written authorization of State.

2. Contractor shall not, in any Subcontract or by using such a Subcontract as consideration thereof, acquire any rights to inventions for its own use (as distinguished from such rights as may be required solely to fulfill its agreement obligations to State in the performance of this Agreement).

3. Contractor, at the earliest practicable date, shall also notify State in writing of any Subcontract containing a patent rights clause, furnish to State a copy of such Subcontract, and notify State when such Subcontract is completed. It is understood that State is a third party beneficiary of any Subcontract clause granting rights to State in inventions, and Contractor hereby assigns to State all the rights that Contractor would have to enforce the Subcontractor's obligations for the benefit of State with respect to inventions. Contractor shall not be obligated to enforce the agreements of any Subcontractor to State with regard to inventions.

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**F. Right to Disclose Inventions**

State may duplicate and disclose reports and disclosures of inventions required to be furnished by Subcontractor pursuant to this patent provision.

**G. Forfeiture of Rights in Unreported Inventions**

Subcontractor shall forfeit to State all rights in any invention which Subcontractor fails to report to State, at or prior to the time Subcontractor (1) files or causes to be filed a United States or foreign application thereon, or (2) submits the final report required by 3. B of this patent provision, whichever is later, provided that Subcontractor shall not forfeit rights in an invention if (a) contending that the invention is not an invention, it nevertheless reports the invention and all the facts pertinent to Subcontractor's contention to State, the time specified in 3. A above, or (b) Subcontractor establishes that the failure to report was due entirely to causes beyond Subcontractor's control and without Subcontractor's fault or negligence. Subcontractor shall be deemed to hold any such forfeited invention and the patent applications and patent pertaining thereto, in trust for State pending written assignment of the invention. The right accruing to State under this paragraph shall be in addition to and shall not supersede any other rights State may have in relation to unreported inventions.

**H. Examination of Records Relating to Inventions**

State shall, until the expiration of three years after final payment under this agreement, have the right to examine any books, records, documents, and other supporting data of Subcontractor that State shall reasonably deem directly pertinent to the discovery or identification of inventions or to compliance by Subcontractor with the requirements of this patent provision.