

CONTRACT REQUESTS FORM (CRF)



New Contract _____ Amendment to Existing Contract: _____ Amendment Number: _____

Division	Contract Manager:	MS-	Phone	CM Training Date
Energy Research and Development	Guido Franco	43	916-327-2392	12/3/1997

Contractor's Legal Name	Federal ID Number
DOE- Lawrence Berkeley National Laboratory	94-2951741

Title of Project
 Evaluation of Opportunities to Mitigate Fugitive Methane Emissions from the California Natural Gas System

Term	Start Date	End Date	Amount
New/Original Contract	6/29/2012	3/31/2015	\$ 1,100,000

Line up the Amendment information as best as possible within the following table.

Amendment #	End Date (mm/dd/yy)	Amount

Business Meeting Information

Proposed Business Meeting Date	6/13/2012	<input type="checkbox"/> Consent	<input checked="" type="checkbox"/> Discussion
Business Meeting Presenter	Guido Franco	Time Needed:	5 minutes

Agenda Item Subject and Description [This agenda item should be sent to the Research List Serve (Energy RD&D/PIER program)]
 Possible approval of Contract 500-11-027 for \$1,100,000.00 with Lawrence Berkeley National Laboratory to conduct a comprehensive investigation of emissions and leakages from the natural gas system and evaluate opportunities to reduce methane emissions from the California natural gas system. In consultation with industry partners, researchers will identify cost-effective reduction strategies and technologies. (PIER natural gas funding) Contact: Guido Franco. (5 minutes)

Business Meeting approval is not required for the following types of contracts: *Executive Director's signature is required in all cases.*

- Contracts less than \$10k (*Policy Committee's signature is also required*)
- Amendment for a no-cost time extension. Must be first extension, less than one year and original contract less than \$100k.
- Contracts less than \$25k for Expert Witness in Energy Facility licensing cases and amendments.

Purpose of Contract or Purpose of Amendment, if applicable

The purpose of this contract is to conduct a comprehensive investigation of sources of emission/leakages from the natural gas system and explore mitigation opportunities and cost effective technologies in consultation with industry partners. Promising new mitigative technologies will be field tested and the results will be compared with existing methods to develop cost curves on mitigation options. The final product of this project will be recommendations on cost effective natural gas mitigation activities supporting AB 32.

California Environmental Quality Act (CEQA) Compliance

1. Is Contract considered a "Project" under CEQA?
 - Yes: skip to question 2
 - No: complete the following (PRC 21065 and 14 CCR 15378):
 Explain why contract is not considered a "Project":
 Contract will not cause direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because its tasks involve a comprehensive survey of known sources of emission and mitigation strategies, and further investigation of possible new sources and novel mitigation opportunities and technologies.
2. If contract is considered a "Project" under CEQA:
 - a) Contract **IS** exempt. (Draft NOE required)
 - Statutory Exemption. List PRC and/or CCR section number: _____
 - Categorical Exemption. List CCR section number: _____
 - Common Sense Exemption. 14 CCR 15061 (b) (3)
 Explain reason why contract is exempt under the above section: _____
 - b) Contract **IS NOT** exempt. The Contract Manager needs to consult with the Energy Commission attorney assigned to their division and the Siting Office regarding a possible Initial Study.

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CEC-94 (Revised 5/11)

CALIFORNIA ENERGY COMMISSION



Budgets Information								
Contract Amount Funded		Breakdown by FY			Funding Sources			
Funding Source	Amount	FY	Amount	Approved?	Funding Source	FY	Budget List No.	Amount
ARFVTF	\$							
ECAA	\$		\$					\$
State- ERPA	\$		\$					\$
Federal	\$		\$					\$
PIER - E	\$		\$					\$
PIER - NG	\$1,100,000	11-12	\$1,100,000	Yes	NG Subaccount, PIERDD	10-11	501.001E	\$1,100,000
Reimbursement	\$		\$					\$
Other	\$		\$					\$
TOTAL:	\$1,100,000	TOTAL:	\$1,100,000				TOTAL:	\$1,100,000
Reimbursement Contract #:					Federal Agreement			

Contractor's Administrator/ Officer		Contractor's Project Manager	
Name:	Betsy Quayle	Name:	Marc Fischer
Address:	1 CYCLOTRON RD BLDG 90R2000	Address:	1 Cyclotron Road
City, State, Zip:	BERKELEY, CA 94720-8130	City, State, Zip:	Berkeley, CA 94720-8099
Phone/ Fax:	510-486-4218 / 510-486-4673	Phone/ Fax:	510-486-5539 / 510-486-5928
E-Mail:	bequayle@lbl.gov	E-Mail:	mlfischer@lbl.gov

Contractor Is
<input type="checkbox"/> Private Company (including non-profits)
<input type="checkbox"/> CA State Agency (including UC and CSU)
<input checked="" type="checkbox"/> Government Entity (i.e. city, county, federal government, air/water/school district, joint power authorities, university from another state)

Selection Process Used
<input type="checkbox"/> Solicitation <u>Select Type</u> Solicitation #: _____ # of Bids: _____ Low Bid? <input type="checkbox"/> No <input type="checkbox"/> Yes
<input type="checkbox"/> Non Competitive Bid (Attach CEC 96)
<input checked="" type="checkbox"/> Exempt Other Government Entity

Civil Service Considerations
<input checked="" type="checkbox"/> Not Applicable (Contract is with a CA State Entity or a membership/co-sponsorship)
<input type="checkbox"/> Public Resources Code 25620, et seq., authorizes the Commission to contract for the subject work. (PIER)
<input type="checkbox"/> The Services Contracted:
<input type="checkbox"/> are not available within civil service
<input type="checkbox"/> cannot be performed satisfactorily by civil service employees
<input type="checkbox"/> are of such a highly specialized or technical nature that the expert knowledge, expertise, and ability are not available through the civil service system.
<input type="checkbox"/> The Services are of such an:
<input type="checkbox"/> urgent
<input type="checkbox"/> temporary, or
<input type="checkbox"/> occasional nature
that the delay to implement under civil service would frustrate their very purpose.
Justification:
The Contract is with another government entity, which exempts this Contract from the civil service considerations.

Payment Method
<input type="checkbox"/> A. Reimbursement in arrears based on:
<input type="checkbox"/> Itemized Monthly <input type="checkbox"/> Itemized Quarterly <input type="checkbox"/> Flat Rate <input type="checkbox"/> One-time
<input checked="" type="checkbox"/> B. Advanced Payment
<input type="checkbox"/> C. Other, explain:

CONTRACT REQUESTS FORM (CRF)



Retention		
1. Is contract subject to retention?	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes
If Yes, Do you plan to release retention prior to contract termination?	<input type="checkbox"/> No	<input type="checkbox"/> Yes

Justification of Rates
The contract price is reasonable, particularly considering the facility and expertise provided by the contract terms. The research will be conducted by a national laboratory; salaries and wages are in accordance with costing practice for all Department of Energy programs.

Disabled Veteran Business Enterprise Program (DVBE)	
1. <input checked="" type="checkbox"/> Not Applicable	
2. <input type="checkbox"/> Meets DVBE Requirements	DVBE Amount:\$ _____ DVBE %: _____
<input type="checkbox"/> Contractor is Certified DVBE	
<input type="checkbox"/> Contractor is Subcontracting with a DVBE:	_____
3. <input type="checkbox"/> Requesting DVBE Exemption (attach CEC 95)	

Is Contractor a certified Small Business (SB), Micro Business (MB) or DVBE?	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes
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Is Contractor subcontracting any services?	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes
If yes, give company name and identify if they are a Small Business (SB), Micro Business (MB) and/or DVBE:		
CSU Fullerton Auxiliary Services Corporation	<input checked="" type="checkbox"/> No	<input type="checkbox"/> SB <input type="checkbox"/> MB <input type="checkbox"/> DVBE

Miscellaneous Contract Information		
1. Will there be Work Authorizations?	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes
2. Is the Contractor providing confidential information?	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes
3. Is the contractor going to purchase equipment?	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes
4. Check frequency of progress reports	<input type="checkbox"/> Monthly <input checked="" type="checkbox"/> Quarterly <input type="checkbox"/> _____	
5. Will a final report be required?	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes
6. Is the contract, with amendments, longer than a year? If yes, why?	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes
The Department of General Services has agreed to give the Commission blanket authority to execute multi-year contracts to support the Commission's RD&D Programs.		

The following items should be attached to this CRF		
1. Scope of Work, Attach as Exhibit A.	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Attached
2. Budget Detail, Attach as Exhibit B.	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Attached
3. CEC 96, NCB Request	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Attached
4. CEC 30, Survey of Prior Work	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Attached
5. CEC 95, DVBE Exemption Request	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Attached
6. Draft CEQA Notice of Exemption (NOE)	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Attached
7. Resumes	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Attached
8. CEC 105, Questionnaire for Identifying Conflicts		<input checked="" type="checkbox"/> Attached

Contract Manager Date Office Manager Date Deputy Director Date

The following signatures are only required when contract approval is delegated to the Executive Office and not approved at a Business Meeting. See Business Meeting Information Section.

Presiding Policy Committee Date Associate Policy Committee Date Executive Director Date

Exhibit A - Statement of Work

Title of project

Evaluation of Opportunities to Mitigate Fugitive Methane Emissions from the California Natural Gas System

Background

The U.S. Department of Energy has directed the University of California to perform the work stated in this Appendix A for the Energy Commission. Lawrence Berkeley National Laboratory, a laboratory owned by the Department of Energy, is located at 1 Cyclotron Road, Berkeley, CA, 94720. The University of California, a not-for-profit corporation organized under the laws of the State of California, with its principal place of business at 1111 Franklin Street, Oakland, CA 94607-5200, manages and operates Lawrence Berkeley National Laboratory under DOE Contract No. DE-AC02-05CH11231.

The California Energy Resources Conservation and Development Commission (Energy Commission) is an agency organized under the laws of the State of California with a principal place of business at 1516 Ninth Street, Sacramento, California 95814.

Project Goals and Objectives

Problem Statement

Emissions of natural gas from California's energy infrastructure are estimated to be 1-2% of consumption (US-EIA, 2012). Identifying and controlling these losses will provide the public benefits for local safety, regional air quality, and global climate. While losses likely occur throughout the natural gas system, significant opportunities for control of emissions from both operational process and unintended events likely exist at the stages of production, processing, transmission, storage, and distribution (Choate, et al., 2005). A recent study by Kuo (2012) found that although rates of emission varied widely, system components such as open-ended lines, seals, and flanges are the main sources and generate large and variable leaks.

The goal of this project is to identify control strategies that provide the highest ratios of mitigated emissions to cost of implementation (Rufo et al., 2003). This work will be conducted to assist the natural gas industry in reducing emissions in a cost effective manner to comply with the greenhouse gas (GHG) emission requirements of AB-32.

The objectives of this project are to:

- Work with industry and utility partners to identify missing information on sources of emission and possible control measures.
- Experimentally determine emissions for an appropriate subset of infrastructure components that were not captured in previous work.
- Conduct initial experiments that evaluate the reduction in emissions from selected mitigation measures.
- Use available information to estimate bottom-up natural gas emissions at the facility-scale for comparison with atmospheric validation efforts.
Estimate the likely costs and emissions control benefits of different mitigation measures.

Technical and economic/cost performance objectives

- A. The overall technical goal of this project is to provide an improved estimate of the cost-effectiveness of control strategies for natural gas emissions.

The specific, technical objectives upon which this project's success will be evaluated are:

- Reduction in the uncertainties for component-level and facility-scale emissions.
- Reductions in component-level emissions obtained through mitigation control experiments.

- B. The overall economic/cost goal of this project is to refine cost estimates for existing and new approaches to mitigation of component-level emissions.

The specific, economic/cost objectives upon which project's success will be evaluated are:

- To identify which mitigation actions are likely to cost less than the combined value of the natural gas as a commodity and the value of the avoided GHG emission, assuming Methane (CH₄) is traded along with Carbon Dioxide (CO₂) at a price commensurate with the warming potential of CH₄.

References

California Energy Commission. 2011. Energy Almanac, <http://energyalmanac.ca.gov/naturalgas/index.html>

Kuo, Jeff. 2012. Estimation of Methane Emission from the California Natural Gas System. California Energy Commission (to be published).

Rufo, Michael. 2003. Developing Greenhouse Gas Mitigation Supply Curves for In- State Sources. April 2003. California Energy Commission. Public Interest Energy Research Program. P500-03-025FAV. http://www.energy.ca.gov/reports/2003-04-16_500-03-025FA-V.pdf

Choate, A., R. Kantamaneni, D. Lieberman, P. Mathis, B. Moore, D. Pape, L. Pederson, M. Van Pelt, and J. Venezia. 2005. Emission Reduction Opportunities for Non-CO₂ Greenhouse Gases in California. California Energy Commission, PIER Energy-Related Environmental Research. CEC- 500-2005-121. <http://www.energy.ca.gov/2005publications/CEC-500-2005-121/CEC-500-2005-121.pdf>

US-EIA. 2012. Estimates of Gross Natural Gas Production and Consumption. http://www.eia.gov/pub/oil_gas/natural_gas/data_publications/natural_gas_annual/current/pdf/table_a01.pdf

1.0 Preliminary Activities

1.1 Attend Kick Off Meeting

The Facility Operator's Project Manager (Principal Investigator) shall attend a "kick off" meeting with the Commission Contract Manager to review the Energy Commission's expectations for: accomplishing tasks described in the work statement; administrative requirements in the terms and conditions of the contract (e.g., invoicing, statements vesting title, prior approvals, data disclosure limitations, monthly progress reporting format and content, etc.); and the Energy Commission's roles and responsibilities. The location of this meeting shall be designated by the Commission Contract Manager.

1.2 Describe Synergistic Projects

We expect that results from the Energy Commission study recently completed by Kuo (2012) will provide useful information to guide experimental aspects of this proposal.

Documentation of synergistic project value assessments will be received, reviewed and approved in writing by the Commission Contract Manager before: 1) any PIER funds under this contract are disbursed, and 2) PIER-funded work on Technical Tasks may begin.

Provide the following information about the synergistic projects that will enhance information and technology exchanges with this project:

- Assessed value of each synergistic project.
- Title, contact name, address and telephone number for each identified synergistic project.
- Written concurrence from each technical manager of the identified synergistic projects that information and technology derived from the synergistic project is unrestricted and available for exchange and collaboration in conjunction with this project.

1.3 Identify Required Permits

No permits are required for this work.

1.4 Obtain Required Permits

No permits are required for this work.

1.5 Prepare Production Readiness Plan

A production readiness plan is not required for this work.

TECHNICAL TASKS

GLOSSARY

Specific terms and acronyms used throughout this work statement are defined as follows:

Acronym	Definition
CH ₄	Methane
CO ₂	Carbon Dioxide
Energy Commission	California Energy Commission
CPR	Critical Project Review
CPUC	California Public Utilities Commission
DOE	US Department of Energy
EPA	Environmental Protection Agency
GHG	Greenhouse Gas
LBNL	Lawrence Berkeley National Laboratory
PIER	Public Interest Energy Research
PIER Natural Gas	A public interest R & D program charged with improving natural gas energy efficiency and environmental quality, and developing renewable technologies.
R&D	Research and Development
TAC	Technical Advisory Committee

SCOPE OF WORK

This agreement includes a set of administrative tasks and a set of Technical Tasks. The remainder of this work statement defines these Technical Tasks. Task descriptions include goals, Contractor activities, and deliverables. The deliverables, such as test plans, technical reports and other interim deliverables, for each task are defined to the extent possible, but are subject to change based on recommendations from the Project Manager and the approval of the Commission Contract Manager. The Contractor shall submit a draft of each deliverable, unless described differently in the Technical Tasks, to the Commission Contract Manager for review and comment in accordance with the approved Schedule of Deliverables. Deliverables not requiring a draft version are indicated by marking "(no draft)" after the deliverable name.

The Commission Contract Manager will provide written comments back to the Contractor on the draft deliverable within 10 working days of receipt. Once agreement has been reached on the draft, the Contractor shall submit the final deliverable to the Commission Contract Manager. The Commission Contract Manager shall provide written approval of the final deliverable within 5 working days of receipt. Key elements from this deliverable shall be included in the Final Report for this project.

When creating technical deliverables, the Facility Operator shall use and follow, unless otherwise instructed in writing by the Commission Contract Manager, the latest version of the PIER Style Manual published on the Energy Commission's web site:

<http://www.energy.ca.gov/contracts/pier/contractors/index.html>

Technical Task List

Task 2.1	Revise Component Emission Estimates
Task 2.2	Estimate Facility-Level Emissions
Task 2.3	Emission Mitigation Experiments
Task 2.4	Mitigation Cost Benefit Analyses

Task 2.1 Revise Component Emission Estimates

The goal of this task is to evaluate the need for additional field emission measurements on systems/components/processes that were not tested in the previous studies, conduct additional testing of component emissions, and report results.

The Contractor shall:

- Identify representatives from the natural gas and petroleum producers and utilities, relevant State and Federal agencies and convene a technical advisory committee (TAC) meeting to identify plans.
- Prepare literature review on the technological options for reducing process and unintended emissions. Potential sources of information include US Environmental Protection Agency (EPA) Natural Gas Star Best Management Practices, and EPA GHG reporting (e.g., Subpart W, scheduled for initial release in 2012).
- Conduct emission measurements in coordination with industry partners to quantify component and system-level emissions to reduce uncertainties for component classes not covered sufficiently in previous work (e.g., open-ended lines, compressor seals, and pressure relief valves).
- Prepare a brief technical memorandum entitled “Reducing Uncertainties in Emission Estimates of Fugitive Methane Emissions in California” presenting the results of this task.

Deliverables:

- Technical memorandum: “Reducing Uncertainties in Emission Estimates of Fugitive Methane Emissions in California” (no draft)

Task 2.2 Estimate Facility-Level Emissions

The goal of this task is to estimate total emissions for one or more natural gas facilities.

The Contractor shall:

- Use existing information on component emission factors to estimate facility scale natural gas leakage emission sums for one or more facilities.
- Identify and purchase CH₄ sensing instrument to measure aggregate emissions such as cameras designed to detect and quantify fugitive methane emissions from components larger than can be measured with standard high flow sampler.
- Identify available independent top-down facility-scale emission measurements (e.g., atmospheric observations) and compare with facility-scale emission sums.
- Estimate component-level emission sums for example facilities.
- Compare top-down facility-scale emissions with component level emission sums.
- Prepare a technical memorandum entitled “Estimation of Facility-Level Methane Emissions Using Top-Down and Bottom-up Methods” presenting the results of this task.

Deliverables:

- Technical memorandum: “Estimation of Facility-Level Methane Emissions Using Top-Down and Bottom-up Methods” (no draft)

Task 2.3 Emission Mitigation Experiments

The goal of this task is to prioritize technological options for reduction of process and unintended emissions evaluate and conduct emission mitigation experiments in the field.

The Contractor shall:

- Consult with TAC and industry partners to identify and prioritize the technological options for reduction of process and unintended emissions that are to be field-tested.
- Work with industrial partners to determine the feasibility of demonstration tests (e.g., actual implementation) of control technologies and, if so, conduct before-and-after measurements on controlled components.
- Prepare a technical memorandum recommending mitigation experiments.
- Prepare a test plan for demonstration mitigation experiments comparing standard and modified components.
- Perform measurements and analysis of emissions reductions obtained from mitigation measures.
- Prepare a technical memorandum entitled “Verifying Reductions of Fugitive Methane Emissions from Promising Control Options.”

Deliverables:

- Technical memorandum: “Test Plan for Mitigation Experiments to Mitigate Methane Emissions” (no draft)
- Technical memorandum: “Verifying Reductions of Fugitive Methane Emissions from Promising Control Options” (no draft)

Task 2.4 Mitigation Cost Benefit Analyses

The goal of this task is to combine the results of the prior technical tasks and extrapolate results to the natural gas system in California to refine costs for existing and new mitigation measures that can be used to produce mitigation-cost curves (e.g., Rufo et al., 2003) for the natural gas system. Mitigation-cost curves show the amount of emissions, in this case fugitive CH₄ emissions, can be reduced at different cost levels.

The Contractor shall:

- Work with industrial representatives from the TAC to re-evaluate component-level costs for mitigation.
- Prepare cost curves for selected mitigation measures.
- Prepare a memorandum summarizing the results of the work performed under this task entitled “Mitigation-Cost Curves for Methane Emissions from the Natural Gas System.”

Deliverables:

- Technical memorandum: “Mitigation-Cost Curves for Methane Emissions from the Natural Gas System” (no draft)

Task 3.0 Reporting Tasks

All reports shall be delivered to:

Accounting Office, MS-2
California Energy Commission
1516 9th Street, 1st Floor
Sacramento, CA 95814

Task 3.1 Quarterly Progress Reports

The Contractor shall prepare *written* Quarterly Progress Reports to the Commission Contract Manager by the 30th of the following month, starting after the Department of General Service's contract approval date and shall continue each month until the Final Report has been accepted by the Commission Contract Manager. The progress report should summarize all Agreement activities conducted by the Contractor for the reporting period, including an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. Attachment A-2 provides a recommended format and content requirements for the Quarterly Progress Report.

Task 3.2 Final Report

The Final Report shall be a public document. If the Contractor will be preparing a confidential version of the final report as well, the Contractor shall perform the following tasks for both the public and confidential versions of the Final Report. When creating the Final Report, the Facility Operator shall use and follow, unless otherwise instructed in writing by the Commission Contract Manager, the latest version of the PIER Style Manual published on the Energy Commission's web site:

<http://www.energy.ca.gov/contracts/pier/contractors/index.html>

Subtask 3.2.1 Final Report Outline

- Contractor shall prepare and submit to the Commission Contract Manager for review an outline of the Final Report describing the original purpose, approach and results of the project.
- The outline shall be submitted to the Commission Contract Manager for review. The Commission Contract Manager shall determine if the outline is satisfactory. If the Commission Contract Manager determines that the outline is unsatisfactory, he or she will, in a timely manner, provide to the Contractor written comments, which indicate how the outline can be improved. The Contractor shall revise the outline to meet the Commission Contract Manager's requirements. Upon finding the final report outline satisfactory, the Commission Contract Manager shall provide to the Contractor written approval of it.

Subtask 3.2.2 Draft Final Report for Comment

- The Contractor shall prepare and submit to the Commission Contract Manager a draft Final Report on the project. The format of the report shall follow the approved outline.

- The draft final report shall be submitted to the Commission Contract Manager for review and to determine, in a timely manner, if it is satisfactory. If the Commission Contract Manager determines that it is unsatisfactory, he or she will, provide to the Contractor written comments, which indicate how it can be improved. The Contractor shall revise the draft final report incorporating the Commission Contract Manager's corrections and required changes. Upon finding the revised draft to be satisfactory, the Commission Contract Manager shall provide to the Contractor written approval of it.

Subtask 3.2.3 Final Report

- The Contractor shall prepare Final Report and submit it to the Commission Contract Manager after receiving the Commission Contract Manager's written approval of the draft Final Report. This task shall be deemed complete and accepted by the Commission only when the Commission Contract Manager approves the Final Report in writing. Upon approval, the Contractor shall submit two unbound copies of the Final Report to the Commission Contract Manager.

Task 3.3 Final Meeting

Contractor shall meet with the Commission Contract Manager to present findings, conclusions, and recommended next steps (if any) for the project.

Contractor will also discuss with the Commission Contract Manager the following contract close-out items:

- What to do with any state-owned equipment (Options), if applicable
- Commission's request for specific "generated" data (not already provided in contract deliverables)
- Need to document Contractor's disclosure of "subject inventions" developed under the contract
- Need to file UCC-1 form re: Commission's interest in patented technology
- Other "surviving" contracts provisions.

Critical Project Reviews

The Energy Commission will conduct critical project reviews at the conclusion of the following tasks:

No CPR is required for this project.

Critical project reviews are meetings between the Facility Operator, the Energy Commission Contract Manager and other individuals selected by the Commission Contract Manager to provide objective, technical support to the Energy Commission. The purpose of these meetings is to discuss with the Facility Operator the status of the project and its progress toward achieving its goals and objectives. These meetings may take place at the Energy Commission offices in Sacramento, or at another, reasonable location determined by the Commission Contract Manager.

Prior to the critical project review meeting, the Facility Operator will provide the task deliverable(s) to the Commission Contract Manager sufficiently in advance to allow the Contract Manager's review of the deliverable document(s) before the review meeting. If not already defined in the Work Statement, the Commission Contract Manager shall specify the contents of the deliverable document(s).

At the critical project review meeting, the Facility Operator shall present the required technical information and participate in a discussion about the project with the Commission Contract Manager and other meeting attendees, if any.

Following the critical project review meeting, the Energy Commission will determine whether the Facility Operator is complying satisfactorily with the Work Statement and whether the project is demonstrating sufficient progress toward achieving its goals and objectives to warrant continued PIER financial support for the project.

Sponsor's Key Personnel and Agreement Management

- A. The name and area code/phone number of the California Energy Commission's Contract Manager is listed on Exhibit F and is the official technical contact for the Energy Commission.

The Sponsor's Contract Manager is responsible for the day to day project status, decisions and communications with the Facility Operator Project Manager (Principal Investigator). The Commission Contract Manager will review and approve all project deliverables, reports, and invoices.

The Sponsor may change the Contract Manager by notice given to the Facility Operator at any time signed by the Contract Officer of the Energy Commission.

- B. The name and area code/phone number of the California Energy Commission's Contract Officer is listed on Exhibit F and will be the Contract Officer for the Agreement and is the official administrative contact for the Energy Commission.

Facility Operator's Key Personnel and Agreement Administration

The Facility Operator is obligated to comply with the terms and conditions of its Management and Operating (M&O) Contract with the DOE when performing work under this agreement. The DOE may require substitution of the named "key personnel" under this agreement should the DOE determine that the services of the Project Manager (Principal Investigator) or other named key personnel are necessary to meet the Facility Operator's M&O Contract obligations to the DOE. Should the DOE direct the Facility Operator to substitute the named key personnel under this agreement, the Facility Operator shall inform the Energy Commission of the directed substitution in accordance with paragraphs A and B below. In the event that the Energy Commission does not concur with the substitution of named key personnel as directed by the DOE, this agreement shall be terminated in accordance with the Termination provision of the terms and conditions.

- A. The name and area code/phone number of the National Laboratory's Project Manager (Principal Investigator) is on Exhibit F and will be the Project Manager (Principal Investigator) for this project and is the official technical contact for Lawrence Berkeley National Laboratory.

The Facility Operator's Project Manager (Principal Investigator) is responsible for the day to day project status, decisions, and communications with the Sponsor's Contract Manager. The Facility Operator's Project Manager (Principal Investigator) will review and approve all project deliverables and reports.

The Facility Operator's Project Manager (Principal Investigator) is designated as "key personnel" under the Agreement. The Energy Commission reserves the right to prior written concurrence of any substitution of the Project Manager (Principal Investigator).

- B. The key personnel are listed on Exhibit F in this agreement.

Facility Operator's key personnel may not be substituted without the Commission Contract Manager's prior written concurrence. Such concurrence shall not be unreasonably withheld. All other personnel may be substituted by Facility Operator, with written notification made to the Commission Contract Manager.

- C. The name and area code/phone number of National Laboratory Agreement Administrator is on Exhibit F and will be the Agreement Administrator for this Agreement and is the official administrative contact for Lawrence Berkeley National Laboratory.

Facility Operator's key subcontractors

The Facility Operator's key subcontractors are listed on Exhibit F in this agreement.

Facility Operator's key subcontractors may not be substituted without the Commission Contract Manager's prior written concurrence. Such concurrence shall be timely provided and not unreasonably withheld. Delay in written concurrence may result in a work stoppage of subcontract work. All other subcontractors may be substituted by Facility Operator, with written notification made to the Commission Contract Manager.