

**GRANT AMENDMENT REQUEST FORM (GARF)**



Original Agreement #	PIR-10-062	Amendment #	2
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<b>Division</b>	<b>Agreement Manager:</b>	<b>MS-</b>	<b>Phone</b>
ERDD	Cheryl Closson	43	916-327-2312

<b>Recipient's Legal Name</b>	<b>Federal ID Number</b>
Terralog Technologies	

<b>Revisions:</b> (check all that apply)		
<input type="checkbox"/> Term Extension	New End Date: 10/31/2014	Include revised schedule and complete items A, B, C, & F below.
<input type="checkbox"/> Budget Augmentation	Amendment Amount: \$ 0	Include revised budget and complete items A, B, C, D & F below.
<input type="checkbox"/> Budget Reallocation		Include revised budget and complete items A, B, C, & F below.
<input type="checkbox"/> Scope of Work Revision		Include revised scope of work and complete items A, B, C, E & F below.
<input type="checkbox"/> Change in Project Location or Demonstration Site		Include revised scope of work and complete items A, B, C, E & F below.
<input checked="" type="checkbox"/> Novation/Name Change of Prime Contractor/Recipient		Include novation documentation and complete items A, B, C, & F below.
<input type="checkbox"/> Terms and Conditions Modification		Include applicable exhibits with bold/underline/strikeout and complete items A, B, C, & F below.

**A) Business Meeting Information**

**Business Meeting approval is not required for the following types of Agreements:**

ARFVTP agreements under \$75K delegated to Executive Director.

Proposed Business Meeting Date	8/14/2013	<input checked="" type="checkbox"/> Consent	<input type="checkbox"/> Discussion
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Business Meeting Presenter	Cheryl Closson	Time Needed:	minutes
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Please select one list serve. Select

**Agenda Item Subject and Description**

Possible approval Amendment 2 to agreement PIR-10-062 with Terralog Technologies, of this novation. The purpose of this amendment is to change the grant recipient name from Terralog Technologies to GeoMechanics Technologies, Inc. There is no scope, budget or term change to this amendment. (PIER Electric Funding) Contact: Cheryl Closson

**B) List all subcontractors (major and minor) and equipment vendors: (attach additional sheets as necessary)**

Legal Company Name:	Budget
	\$
	\$
	\$
	\$
	\$
	\$
	\$
	\$
	\$
	\$

**c) List all key partners: (attach additional sheets as necessary)**

Legal Company Name:



## Exhibit A WORK STATEMENT

### TECHNICAL TASK LIST\*

Task #	CPR	Task Name
1	N/A	Administration
2		Seismic Data Analysis and Interpretation
3		Well Data Review and Formation Evaluation
4		New Well Drilling, Logging, and Core Analysis
5	X	Geologic Model Development
6		Geomechanical Model Development
7		CO <sub>2</sub> Injection and Migration Modeling
8		Risk Assessment and Characterization
9		Technology Transfer and Data Sharing Activities

\*Note: This agreement will provide cost share funding only for Tasks 1, 3, 5, 6, 7, 8, and 9. Tasks 2 and 4 are being completely funded by the United States Department of Energy (DOE) and **GeoMechanics Technologies, Inc.** ~~Terralog Technologies.~~

### KEY NAME LIST

Task #	Key Personnel	Key Subcontractor(s)	Key Partner(s)
1	Jean Young Mike Bruno		
2-9	Mike Bruno		

### GLOSSARY

*Specific terms and acronyms used throughout this scope of work are defined as follows:*

Term/ Acronym	Definition
2D	two-dimensional
3D	three-dimensional
AB32	Assembly Bill 32
CO <sub>2</sub>	carbon dioxide
Energy Commission	California Energy Commission
CPR	Critical Project Review
DOE	United States Department of Energy
GHG	greenhouse gas
NATCARB	National Carbon Sequestration Database and Geographic Information System

<b>Term/ Acronym</b>	<b>Definition</b>
PIER	Public Interest Energy Research
RD&D	Research, Development and Demonstration
USGS	United States Geological Survey
WESTCARB	West Coast Regional Carbon Sequestration Partnership

**Problem Statement:**

Carbon dioxide (CO<sub>2</sub>) emissions have increased significantly worldwide due to man’s industrial activities. While CO<sub>2</sub> is a natural component of our atmosphere, the increasing concentrations of atmospheric CO<sub>2</sub> contribute to global warming and drive a need to reduce CO<sub>2</sub> emissions. To support reduction of CO<sub>2</sub> and other greenhouse gas (GHG) emissions and combat climate change, the State of California enacted legislation (most notably the Global Warming Solution Act of 2006, also known as AB32) establishing target reduction levels and performance standards for GHG emissions in California.

In considering ways to reduce CO<sub>2</sub> emissions, the United States Department of Energy (DOE) identified geologic sequestration of CO<sub>2</sub> as one of the most promising methods for reducing CO<sub>2</sub> emissions to the atmosphere. Geologic sequestration involves taking the CO<sub>2</sub> that has been captured from power plants, refineries, and other sources, and storing it in deep underground geologic formations in such a way that the CO<sub>2</sub> will remain permanently stored. However, a critical and necessary first step to implementation of CO<sub>2</sub> geologic storage is proper characterization of potential storage areas and development of comprehensive risk assessments for those areas.

For California, the Los Angeles Basin presents a unique and special combination of great need and great opportunity for large scale geologic storage of CO<sub>2</sub>. With its geologic setting as one of the most prolific oil and gas producing basins in the United States, the region is home to more than a dozen major power plants and oil refineries which produce more than five million metric tons of CO<sub>2</sub> emissions each year. Given the current population density (and complex land ownership), it would be impractical to site a large-scale CO<sub>2</sub> storage project onshore beneath urban areas. The offshore Wilmington Graben region is estimated to contain storage capacity for more than 50 million tons of CO<sub>2</sub> and may represent a suitable area for storage of CO<sub>2</sub> generated in the Los Angeles Basin. While there is some geologic data available from existing oil exploration wells, validating the estimated CO<sub>2</sub> storage potential and site suitability of the region requires more information and analyses of the subsurface structures and lithologic details of target storage formations and seals.

**Goals of the Agreement:**

The goal of this agreement is to characterize Pliocene and Miocene sediments in the Wilmington Graben and surrounding area for high volume CO<sub>2</sub> geologic storage.

### **Objectives of the Agreement:**

The objectives of this Agreement are to:

1. Evaluate well logs from historical exploration wells in the area;
2. Develop 3D geologic models, geomechanical models, and CO<sub>2</sub> injection models for the region;
3. Comprehensively evaluate target zone storage capacity, seals, and risk assessment;
4. Provide detailed review, quantification and documentation of top 20 industrial sources of CO<sub>2</sub> emissions;
5. Provide detailed engineering review and analysis of existing and new pipeline and gas storage systems in the Los Angeles Basin;
6. Provide guidance for evaluation of similar subsurface geologic regimes present in other areas of California (i.e., fault-bounded turbidite structures); and
7. Contribute data to both California-specific and national CO<sub>2</sub> sequestration investigations and GHG emission reduction efforts.

### **Product Guidelines:**

For complete product guidelines, refer to Section 5 in the Terms and Conditions.

## **TASK 1.0 ADMINISTRATION**

### **Task 1.1 Attend Kick-off Meeting**

The goal of this task is to establish the lines of communication and procedures for implementing this Agreement.

#### **The Recipient shall:**

- Attend a “Kick-Off” meeting with the Commission Project Manager, the Grants Officer, and a representative of the Accounting Office. The Recipient shall bring its Project Manager, Agreement Administrator, Accounting Officer, and others designated by the Commission Project Manager to this meeting. The administrative and technical aspects of this Agreement will be discussed at the meeting. Prior to the kick-off meeting, the Commission Project Manager will provide an agenda to all potential meeting participants.

The administrative portion of the meeting shall include, but not be limited to, the following:

- Discussion of the terms and conditions of the Agreement
- Discussion of Critical Project Review (Task 1.2)
- Match fund documentation (Task 1.6)
- Permit documentation (Task 1.7)

The technical portion of the meeting shall include, but not be limited to, the following:

- The Commission Project Manager's expectations for accomplishing tasks described in the Scope of Work
- An updated Schedule of Products
- Discussion of Progress Reports (Task 1.4)
- Discussion of Technical Products (Product Guidelines located in Section 5 of the Terms and Conditions)
- Discussion of the Final Report (Task 1.5)

The Commission Project Manager shall designate the date and location of this meeting.

**Recipient Products:**

- Updated Schedule of Products (no draft)
- Updated List of Match Funds (no draft)
- Updated List of Permits (no draft)

**Commission Project Manager Product:**

- Kick-Off Meeting Agenda (no draft)

**Task 1.2 Critical Project Review (CPR) Meetings**

The goal of this task is to determine if the project should continue to receive Energy Commission funding to complete this Agreement and to identify any needed modifications to the tasks, products, schedule or budget.

CPRs provide the opportunity for frank discussions between the Energy Commission and the Recipient. CPRs generally take place at key, predetermined points in the Agreement, as determined by the Commission Project Manager and as shown in the Technical Task List above. However, the Commission Project Manager may schedule additional CPRs as necessary, and any additional costs will be borne by the Recipient.

Participants include the Commission Project Manager and the Recipient and may include the Commission Grants Officer, the Public Interest Energy Research (PIER) Program Team Lead, other Energy Commission staff and Management as well as other individuals selected by the Commission Project Manager to provide support to the Energy Commission.

If DOE is conducting similar meetings, the Recipient shall notify and invite the Commission project manager to participate, either by teleconference or by actual meeting attendance. The DOE required meetings can be used in place of the Commission's CPR meetings, at the discretion of the Commission Project Manager.

**The Commission Project Manager shall:**

- Determine the location, date, and time of each CPR meeting with the Recipient. These meetings generally take place at the Energy Commission, but they may take place at another location.
- Send the Recipient the agenda and a list of expected participants in advance of each CPR. If applicable, the agenda shall include a discussion on both match funding and permits.
- Conduct and make a record of each CPR meeting. One of the outcomes of this meeting will be a schedule for providing the written determination described below.
- Determine whether to continue the project, and if continuing, whether or not modifications are needed to the tasks, schedule, products, and/or budget for the remainder of the Agreement. Modifications to the Agreement may require a formal amendment (please see the Terms and Conditions). If the Commission Project Manager concludes that satisfactory progress is not being made, this conclusion will be referred to the Energy Commission's Research, Development and Demonstration (RD&D) Policy Committee for its concurrence.
- Provide the Recipient with a written determination in accordance with the schedule. The written response may include a requirement for the Recipient to revise one or more product(s) that were included in the CPR.

**The Recipient shall:**

- Prepare a CPR Report for each CPR that discusses the progress of the Agreement toward achieving its goals and objectives. This report shall include recommendations and conclusions regarding continued work of the projects. This report shall be submitted along with any other products identified in this scope of work. The Recipient shall submit these documents to the Commission Project Manager and any other designated reviewers at least 15 working days in advance of each CPR meeting.
- Present the required information at each CPR meeting and participate in a discussion about the Agreement.
- Provide copies of any DOE correspondence (emails, reports, letters, etc.) that relate to the project status. This includes copies of project performance reviews on Recipient work and summaries and results of project review meetings with DOE.

**Commission Project Manager Products:**

- Agenda and a list of expected participants (no draft)
- Schedule for written determination (no draft)
- Written determination (no draft)

**Recipient Product:**

- CPR Report(s) (no draft)
- DOE correspondence and reporting not previously submitted in Quarterly Progress Report (no draft)

### **Task 1.3 Final Meeting**

The goal of this sub-task is to closeout this Agreement. If DOE is conducting a similar final meeting, the Recipient shall notify and invite the Commission project manager to participate, either by teleconference or by actual meeting attendance. The DOE required meeting can be used in place of the Commission's final meeting, at the discretion of the Commission Project Manager. However, all items listed in this task will need to be covered in the meeting.

#### **The Recipient shall:**

- Meet with Energy Commission staff to present the findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement.

This meeting will be attended by, at a minimum, the Recipient, the Commission Grants Office Officer, and the Commission Project Manager. The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be two separate meetings at the discretion of the Commission Project Manager.

The technical portion of the meeting shall present an assessment of the degree to which project and task goals and objectives were achieved, findings, conclusions, recommended next steps (if any) for the Agreement, and recommendations for improvements. The Commission Project Manager will determine the appropriate meeting participants.

The administrative portion of the meeting shall be a discussion with the Commission Project Manager and the Grants Officer about the following Agreement closeout items:

- What to do with any equipment purchased with Energy Commission funds (Options)
- Energy Commission's request for specific "generated" data (not already provided in Agreement products)
- Need to document Recipient's disclosure of "subject inventions" developed under the Agreement
- "Surviving" Agreement provisions, such as repayment provisions and confidential Products
- Final invoicing and release of retention
- Prepare a schedule for completing the closeout activities for this Agreement.
- Copies of all correspondence and reports discussing DOE's findings on the project, and future disposition of the project, if applicable. When directed by the Commission Project manager, Recipient will provide copies of any DOE correspondence (emails, reports, letters, etc.) that relate to project performance.

**Recipient Products:**

- Written documentation of meeting agreements (no draft)
- Schedule for completing closeout activities (no draft)
- DOE correspondence on project findings and results (no draft)

**Task 1.4 Quarterly Progress Reports**

The goal of this sub-task is to periodically verify that satisfactory and continued progress is made towards achieving the research objectives of this Agreement on time and within budget.

The objectives of this task are to summarize activities performed during the reporting period, to identify activities planned for the next reporting period, to identify issues that may affect performance and expenditures, and to form the basis for determining whether invoices are consistent with work performed.

With Commission Project Manager approval, the Recipient can submit a DOE Progress Report in lieu of the required Commission report if it contains the information listed in Attachment 1 of the Terms and Conditions.

**The Recipient shall:**

- Prepare Quarterly Progress Reports which summarize all Agreement activities conducted by the Recipient for the reporting period, including an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. Each progress report is due to the Commission Project Manager within 30 days of the end of the reporting period. The recommended specifications for each progress report are contained in the terms and conditions of this Agreement.
- Unless otherwise directed by the Commission project manager, each Progress Report must contain any reports made to DOE, including summaries of meetings with DOE related to the project outcome and performance. Include names and contacts of DOE representatives.

**Recipient Products:**

- Quarterly Progress Reports
- Copies of DOE progress reports, correspondence, meeting summaries, and special status reports as set forth in the Federal Financial Assistance Reporting Checklist and Instructions

**Task 1.5 Final Report**

The goal of the Final Report is to assess the project's success in achieving its goals and objectives, advancing science and technology, and providing energy-related and other benefits to California.

The final report shall describe the following at a minimum: a) original purpose, approach, activities performed, results and conclusions of the work done under this Agreement; b) how the project advanced science and technology to the benefit of California's ratepayers

and the barriers overcome; c) assessment of the success of the project as measured by the degree to which goals and objectives were achieved; d) how the project supported California's economic recovery in the near term and number of jobs created or sustained; e) how the project results will be used by California industry, markets and others; f) projected cost reduction impact and other benefits resulting from the project; g) discuss the project budget, including the total project cost and all the funding partners and their cost share; h) discuss how the Energy Commission funding was spent on the project, including any unique products and benefits; and i) observations, conclusions and recommendations for further RD&D projects and improvements to the PIER project management process.

If a final report is required by DOE, the Recipient will include a copy of it along with the Energy Commission's final report requirements. In addition, the Recipient shall submit the draft final DOE report to the Energy Commission for review at the same time it submits it to DOE.

The Final Report shall be a public document. If the Recipient has obtained confidential status from the Energy Commission and will be preparing a confidential version of the Final Report as well, the Recipient shall perform the following activities for both the public and confidential versions of the Final Report.

**The Recipient shall:**

- Provide a draft copy of the Final Report, including a copy of the draft submitted to the U.S. DOE in response to the American Recovery and Reinvestment Act Funding Opportunity Notice for which an award was received. The Final Report must be completed on or before the end of the Agreement Term.
- Provide copies of DOE final closeout reports.
- Submit written correspondence from DOE regarding acceptance of the final report.

**Recipient Products:**

- Draft Final Report, including a copy of the draft report submitted to DOE
- Final Report, including a copy of the final report submitted to DOE
- Copies of DOE final closeout reports
- Written correspondence from DOE regarding acceptance of final report (no draft)

**Task 1.6 Identify and Obtain Matching Funds**

The goal of this sub-task is to ensure that the match funds planned for this Agreement are obtained for and applied to this Agreement during the term of this Agreement.

The costs to obtain and document match fund commitments are not reimbursable through this Agreement. Although the PIER budget for this task will be zero dollars, the Recipient may utilize match funds for this task. Match funds shall be spent concurrently or in advance of PIER funds for each task during the term of this Agreement. Match

funds must be identified in writing and the associated commitments obtained before the Recipient can incur any costs for which the Recipient will request reimbursement.

**The Recipient shall:**

- Prepare a letter documenting the match funding committed to this Agreement and submit it to the Commission Project Manager at least 2 working days prior to the kick-off meeting. The letter needs to identify the following at a minimum:
  - Amount of each cash match fund, its source, including a contact name, address and telephone number and the task(s) to which the match funds will be applied.
  - Amount of each in-kind contribution, a description, documented market or book value, and its source, including a contact name, address and telephone number and the task(s) to which the match funds will be applied. If the in-kind contribution is equipment or other tangible or real property, the Recipient shall identify its owner and provide a contact name, address and telephone number, and the address where the property is located.
- Provide a copy of the letter of commitment from an authorized representative of each source of cash match funding or in-kind contributions that these funds or contributions have been secured.
- Discuss match funds and the implications to the Agreement if they are reduced or not obtained as committed, at the kick-off meeting. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide the appropriate information to the Commission Project Manager if during the course of the Agreement additional match funds are received.
- Notify the Commission Project Manager within 10 days if during the course of the Agreement existing match funds are reduced. Reduction in match funds must be approved through a formal amendment to the Agreement and may trigger an additional CPR.

**Recipient Products:**

- A letter regarding match funds (no draft)
- Copy(ies) of each match fund commitment letter(s) (no draft)
- Letter(s) for new match funds (if applicable) (no draft)
- Letter that match funds were reduced (if applicable) (no draft)

**Task 1.7 Identify and Obtain Required Permits**

The goal of this sub-task is to obtain all permits required for work completed under this Agreement in advance of the date they are needed to keep the Agreement schedule on track.

Permit costs and the expenses associated with obtaining permits are not reimbursable under this Agreement. Although the PIER budget for this task will be zero dollars, the Recipient shall budget match funds for any expected expenditures associated with

obtaining permits. Permits must be identified in writing and obtained before the Recipient can make any expenditure for which a permit is required.

**The Recipient shall:**

- Prepare a letter documenting the permits required to conduct this Agreement and submit it to the Commission Project Manager at least 2 working days prior to the kick-off meeting. If there are no permits required at the start of this Agreement, then state such in the letter. If it is known at the beginning of the Agreement that permits will be required during the course of the Agreement, provide in the letter:
  - A list of the permits that identifies the:
    - Type of permit
    - Name, address and telephone number of the permitting jurisdictions
    - or lead agencies
  - The schedule the Recipient will follow in applying for and obtaining these permits.
- Discuss the list of permits and the schedule for obtaining them at the kick-off meeting and develop a timetable for submitting the updated list, schedule and the copies of the permits. The implications to the Agreement if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in the Progress Reports and will be a topic at CPR meetings.
- If during the course of the Agreement additional permits become necessary, provide the appropriate information on each permit and an updated schedule to the Commission Project Manager.
- As permits are obtained, send a copy of each approved permit to the Commission Project Manager.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the Commission Project Manager within 5 days. Either of these events may trigger an additional CPR.

**Recipient Products:**

- Letter documenting the permits or stating that no permits are required (no draft)
- A copy of each approved permit (if applicable) (no draft)
- Updated list of permits as they change during the term of the Agreement (if applicable) (no draft)
- Updated schedule for acquiring permits as changes occur during the term of the Agreement (if applicable) (no draft)

**Task 1.8 DOE Contract Management**

The goal of this sub-task is to help ensure compliance with the Recipient's DOE contract and submittal of all documents and deliverables as appropriate for both DOE and Energy Commission agreements.

**The Recipient shall:**

- Perform administrative tasks as required by the DOE.

**TECHNICAL TASKS**

**TASK 2.0 SEISMIC DATA ANALYSIS AND INTERPRETATION (Task not funded by the Energy Commission)**

The goals of this task are to perform a detailed review and evaluation of the existing 2D and 3D seismic data and to acquire and analyze new seismic lines in the data gap area of the Pliocene and Miocene-age sedimentary formations for CO<sub>2</sub> sequestration.

**The Recipient shall:**

- Process existing seismic data.
- Acquire new 2D seismic lines in the data gap area.
- Load seismic and well data into the Geographic Interpretation Workstation for seismic interpretation and well log correlation.
- Analyze and interpret existing and new seismic data.
- Prepare interim and final structure and isopach maps for the Wilmington Graben (to be included in the DOE Quarterly and Final Reports)
- Provide task-related DOE scientific/technical reports, conference papers/proceedings, and special status reports per DOE's reporting requirements, as applicable.

**Recipient Products:**

- Interim and final structure and isopach maps (no drafts)
- One copy each of any task-related DOE scientific/technical reports, conference papers/proceedings, and special status reports, as applicable (no drafts)

**TASK 3.0 WELL DATA REVIEW AND FORMATION EVALUATION**

The goal of this task is to review well log data available from historical exploration wells with a focus on identifying, characterizing, and quantifying likely CO<sub>2</sub> storage targets and seals within the Pliocene and Miocene-age sedimentary formations.

**The Recipient shall:**

- Collaborate with the United States Geological Survey (USGS) and California State University at Long Beach to acquire necessary well data.
- Assemble and review existing well data.
- Tie well data to seismic data.
- Quantify Pliocene and Miocene targets and seals for CO<sub>2</sub> sequestration.
- Provide task-related DOE scientific/technical reports, conference papers/proceedings, and special status reports per DOE's reporting requirements, as applicable.

**Recipient Products:**

- One copy each of any task-related DOE scientific/technical reports, conference papers/proceedings, and special status reports, as applicable (no drafts)

**TASK 4.0 NEW WELL DRILLING, LOGGING, AND CORE ANALYSIS (Task not funded by the Energy Commission)**

The goals of this task are to design, drill, core, log, test, and take fluid and gas sampling from two new wells (to be designated well DOE#2 and well DOE#3) within the Wilmington Graben to help determine the properties of the sedimentary formations and make interpretations of the structures in the region.

**The Recipient shall:**

- Design and select drilling contractors for two new wells (DOE#2 and DOE#3).
- Provide engineering oversight for the drilling, logging and coring of the two new wells.
- Perform log and core analysis on the two new wells.
- Perform well injection testing and interpretation on the two new wells.
- Perform comprehensive fluid and gas sampling and analysis from the two new wells.
- Update geologic interpretation with new wells data.
- Plug and abandon or transfer the custody of the new wells.
- Provide task-related DOE scientific/technical reports, conference papers/proceedings, and special status reports per DOE's reporting requirements, as applicable.

**Recipient Products:**

- Copy of daily drilling activity report for first new well (DOE#2) (no draft)
- Copy of daily drilling activity report for second new well (DOE#3) (no draft)
- One copy each of any task-related DOE scientific/technical reports, conference papers/proceedings, and special status reports, as applicable (no drafts)

**TASK 5.0 GEOLOGIC MODEL DEVELOPMENT**

The goals of this task are to design and assemble a 3D geologic model to represent a realistic cross section within the Wilmington Graben for CO<sub>2</sub> sequestration evaluation.

**The Recipient shall:**

- Design and assemble a 3D geologic model for the region.
- Populate grid with lithology and property estimates.

- Perform analysis and interpretation.
- Provide task-related DOE scientific/technical reports, conference papers/proceedings, and special status reports per DOE's reporting requirements, as applicable.
- Participate in CPR meeting per Task 1.2.

**Recipient Products:**

- One copy each of any task-related DOE scientific/technical reports, conference papers/proceedings, and special status reports, as applicable (no drafts)
- CPR report

**TASK 6.0 GEOMECHANICAL MODEL DEVELOPMENT**

The goals of this task are to design and assemble a 3D geomechanic model to estimate in situ stress and mechanical stiffness and strength of the rock within the Wilmington Graben area.

**The Recipient shall:**

- Estimate in situ stress for the Wilmington Graben area.
- Estimate mechanical stiffness and strength properties for rock within the graben region.
- Assemble a 3D geomechanical model for the region.
- Provide task-related DOE scientific/technical reports, conference papers/proceedings, and special status reports per DOE's reporting requirements, as applicable.

**Recipient Products:**

- One copy each of any task-related DOE scientific/technical reports, conference papers/proceedings, and special status reports, as applicable (no drafts)

**TASK 7.0 CO<sub>2</sub> INJECTION AND MIGRATION MODELING**

The goal of this task is to design and assemble a CO<sub>2</sub> injection model, using the TOUGH2 numerical simulation computer program, to simulate the varying injection scenarios and interpret the pressure and saturation changes versus time.

**The Recipient shall:**

- Design and assemble a TOUGH2 CO<sub>2</sub> injection model.
- Simulate varying injection scenarios.
- Interpret pressure and saturation changes versus time.
- Provide task-related DOE scientific/technical reports, conference papers/proceedings, and special status reports per DOE's reporting requirements, as applicable.

**Recipient Products:**

- One copy each of any task-related DOE scientific/technical reports, conference papers/proceedings, and special status reports, as applicable (no drafts)

**TASK 8.0 RISK ASSESSMENT AND CHARACTERIZATION**

The goals of this task are to evaluate and update geologic uncertainty assumptions for the Wilmington Graben region to identify and minimize potential well path leakage risks, induced seismic risks, and long term storage security risks. The Recipient shall also quantify the top 20 industrial sources of CO<sub>2</sub> emissions in the Los Angeles Basin and analyze the existing and new pipeline and gas storage systems within the basin.

**The Recipient shall:**

- Evaluate and update geologic uncertainty assumptions.
- Evaluate and update potential well leakage paths.
- Characterize induced and natural seismicity risks.
- Evaluate and update long term security risk for CO<sub>2</sub> storage.
- Review and quantify top 20 industrial sources of CO<sub>2</sub> emissions in the Los Angeles Basin.
- Perform engineering review and analysis of existing and new pipeline and gas storage systems in the Los Angeles Basin.
- Provide task-related DOE scientific/technical reports, conference papers/proceedings, and special status reports per DOE's reporting requirements, as applicable.

**Recipient Products:**

- One copy each of any task-related DOE scientific/technical reports, conference papers/proceedings, and special status reports, as applicable (no drafts)

**TASK 9.0 TECHNOLOGY TRANSFER AND DATA SHARING ACTIVITIES**

The goals of this task are to develop and implement a plan to make the knowledge gained, data generated, and lessons learned from this project available to key decision-makers, interested parties, and the general public.

**The Recipient shall:**

- Prepare a Technology Transfer and Data Sharing Plan. The plan shall explain how the knowledge gained in this project will be made available to key decision-makers, interested parties, and the public, such as through participation in briefings and/or presenting the project results at appropriate technical conferences or meetings as specified by the DOE and Energy Commission Project Manager. The plan shall also include identification of the data to be provided and procedures for submittal of data for inclusion in the NATCARB/WESTCARB Carbon Atlas. Key

elements from this report shall be included in the Final Report for this project.

- Conduct technology transfer and data sharing activities in accordance with the Technology Transfer and Data Sharing Plan. These activities shall be reported in the Progress Reports.

**Recipient Products:**

- Draft Technology Transfer Plan
- Final Technology Transfer Plan