

GRANTS/CONTINGENT AWARD REQUEST



To: Grants and Loans Office

Date: 7/17/2012

Project Manager: Cheryl Closson

Phone Number: 916-327-2312

Office: Energy Generation Research Office

Division: Energy Research and Development

MS- 43

Project Title: Exploration Drilling and Assessment of Wilbur Hot Springs, Colusa County, California

Type of Request: (check one)

Form for New Agreement with fields for Program, Solicitation Name, Recipient Name, Address, Project Officer, and Dates.

Form for Amendment with checkboxes for Term Extension, Work Statement Revision, Budget Revision, Change of Scope, and Other.

ITEMS TO ATTACH WITH REQUEST:

- List of items to attach: A. Work Statement, B. Budget, C. Recipient Resolution, D. Special Conditions, E. CEQA Compliance Form, F. Other Documents.

California Environmental Quality Act (CEQA)

Form for CEQA compliance with checkboxes for CEC finds, project exempt, environmental document, and CEQA finding.

Funding Information:

Funding information table with columns for Source #, Amount, Statute, FY, and Budget List #.

If federally funded, specify federal agreement number:

\* Source Examples include ERPA, PIER-E, PIER-NG, FED, GRDA, ARFVT, OTHER.

Business Meeting Approval: (refer to Business Meeting Schedule)

Business Meeting Approval form with fields for Date, Participant, and Time Needed, plus Consent/Discussion checkboxes.

Agenda Notice Statement: (state purpose in layperson terms)

Possible approval of a Grant / Contingent Award to...

Possible approval of Amendment 1 to Agreement GEO-10-003 with Renovitas, LLC to reduce the project scope and grant award by \$1,228,493.00.



Award Number: GEO-10-003-1

Date: 8 / 11 / 12

**Note:** The Energy Commission Project Managers Manual includes detailed instructions on how to complete this section, with examples of grants that are “Projects” and are not “Projects”. When the Project Manager is completing this section, if questions arise as to the appropriate answers to the questions below, please consult with the Energy Commission attorney assigned to review grants or loans for your division.

1. Is grant/loan considered a “Project” under CEQA?  Yes (skip to question #2)  No (continue with question #1)

Please complete the following: [Public Resources Code (PRC) 21065 and 14 California Code of Regulations (CCR) 15378]:

Explain why the grant/loan is **not** considered a “Project”? The grant/loan will not cause a direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because grant/loan involves:

2. If grant/loan is considered a “Project” under CEQA: (choose either **IS** or **IS NOT**)

Grant/loan **IS** exempt:

Statutory Exemption: (List PRC and/or CCR section numbers) \_\_\_\_\_

Categorical Exemption: (List CCR section number) 14 CCR 15306

Common Sense Exemption. (14 CCR 15061(b)(3))

Explain reason why the grant/loan is exempt under the above section:

The amended grant project work will consist only of the geologic mapping, sampling and geophysical studies previously identified under Phase I of the original project. The amended grant field work will proceed according to specific workplans developed for the geologic mapping/sampling field work, and possible geophysical surveys to be conducted after the initial mapping. At this time, due to surface access permission limitations, all geologic mapping and sampling will be conducted on public lands south of Wilbur Hot Springs. The amended grant geologic mapping and geophysical survey work consists of data gathering activities that will not have a significant impact on the environment.

Please attach draft Notice of Exemption (NOE). Consult with the Energy Commission attorney assigned to your division for instructions on how to complete the NOE.

Grant/loan **IS NOT** exempt. The Project Manager needs to consult with the Energy Commission attorney assigned to your division and the Siting Office regarding a possible initial study.

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## TECHNICAL TASK LIST

Task #	CPR	Task Name
Phase I		
1	N/A	Administration
2	X	Geologic, Geochemical and Geophysical Studies
Phase II		
3	X	<del>Temperature Gradient Drilling</del>
Phase III		
4	X	Deep Exploratory Drilling
5		Feasibility Assessment
6		Technology Transfer Activities

## KEY NAME LIST

Task #	Key Personnel	Key Subcontractor(s)	Key Partner(s)
1	George Crandell (Renovitas) Jodie Crandell (Renovitas)		Geonomics, Inc. SMUD
2	George Crandell (Renovitas)	GeothermEx	Geonomics, Inc. SMUD
3	<del>George Crandell (Renovitas)</del>	<del>GeothermEx ThermaSource</del>	<del>Geonomics, Inc. SMUD</del>
4	<del>George Crandell (Renovitas)</del>	<del>ThermaSource Geothermex</del>	<del>Geonomics, Inc. SMUD</del>
5	Bill Walden (Renovitas)	ThermaSource Geothermex	Geonomics, Inc. SMUD
6	Bill Walden (Renovitas) <del>George Crandell (Renovitas)</del>	Geothermex	Geonomics, Inc. SMUD

## GLOSSARY

Term/ Acronym	Definition
BLM	Bureau of Land Management
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CPR	Critical Project Review

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<b>Term/ Acronym</b>	<b>Definition</b>
Central Valley Water Board	California Regional Water Quality Control Board, Central Valley Region
Energy Commission	California Energy Commission
°F	Degrees Fahrenheit
GIS	Geographic Information System
GRDA	Geothermal Resources Development Account
kWh	Kilowatt-hour
LCOE	Levelized Cost of Electricity
MW	Megawatt
RD&D	Research, Development and Demonstration
SMUD	Sacramento Municipal Utility District
State Water Board	State Water Resources Control Board
USEPA	United States Environmental Protection Agency

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## Problem Statement

Wilbur Springs and vicinity is viewed as a significant target for the discovery and development of geothermal energy for power generation. There are several thermal springs in the area (in addition to Wilbur Springs proper), plus thermal waters that were encountered in mine tunnels and shafts. Other evidence of youthful magmatic activity in the region include the numerous sulfur and mercury deposits, localized areas of gold mineralization, extensive zones of hydrothermally altered ground and silica carbonate rock, and waters enriched in boron, sulfur and fluoride. Geothermometry was performed for waters from Wilbur Springs and Jones Hot Springs (mine shaft water), and for samples obtained from the two deep wells. The results consistently cluster between 300 and 360 degrees Fahrenheit (°F) for spring waters and well waters believed to be originated from 3,000 to 7,000 feet in depth. The most optimistic value for power generation, based on the higher temperature range, is 112 megawatts (MW). This estimate remains to be proven by the drilling and testing of commercially productive wells. Extensive resource evaluation work is needed for drilling and geothermal power development.

Elemental mercury is present in the vicinity of the proposed project exploration area. Many stream segments within the Sulphur Creek watershed are recognized by the United States Environmental Protection Agency (USEPA), the State Water Resources Control Board (State Water Board), and the California Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board) as impaired due to mercury pollution. Mercury sources include naturally-occurring mercury-containing minerals, rocks, and soils, geothermal springs and waters, and mine waste. The Central Valley Water Board is addressing the mercury impairments within the Sulphur Creek watershed through basin planning actions (which include the establishment of Total Maximum Daily Load programs under the federal Clean Water Act) and through the imposition of requirements for remediation, restoration and cleanup of the former mine sites.

Activities that disturb mercury-laden mine waste located in the vicinity of the project exploration area may give rise to liability under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the Porter-Cologne Water Quality Control Act (California Water Code, section 13000 et seq.). Avoidance of the mercury-laden mine waste during project exploration of the geothermal resources is therefore important so that the Recipient (and subcontractors as appropriate) and the California Energy Commission (Energy Commission) will not incur any environmental liability by virtue of any project exploration and development activities. The Recipient shall consult with the Central Valley Water Board to reduce the likelihood that project activities will come in contact with mine waste.

The Energy Commission does not approve of activities or expenditures the Recipient or any subcontractor takes (or fails to take) that result in environmental cleanup liability or any violation of any federal or State laws or regulations, including but not limited to,

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CERCLA, the California Water Code, and the California Environmental Quality Act (CEQA).

Staff of the Energy Commission will work with the Recipient and its subcontractors to meet with the appropriate representatives of the Central Valley Water Board to obtain their general concurrence (Task 1.7) regarding activities and locations within the project area to be studied under each task of the agreement, so that the chances of encountering mine waste during project activities are minimized. However, it is the responsibility of the Recipient and its subcontractors to undertake only those activities that do not give rise to liability under federal and State pollution control laws and regulations. Any substantive change in activities or location for a work task already reviewed by the Central Valley Water Board will need review by the Central Valley Water Board before the change in activity or location can be approved by the Energy Commission.

### Goal of the Agreement

The goals of this agreement are ~~is~~ to **conduct the preliminary resource assessment geologic mapping and geophysical surveying work necessary to site future temperature gradient wells in the area. This will help support future work (not part of this agreement) to** ascertain if there is sufficient geothermal potential in the project area and ~~verify a commercially viable geothermal reservoir that will support the development of a~~ **for** power plant **development.** ~~to the satisfaction of the developer, agreement financing funding sources, and host utility for power uptake.~~

### Objectives of the Agreement

The objectives of this agreement are to perform **the pre-drilling geologic mapping, sampling and geophysical surveys programs, necessary to site temperature gradient wells in the project area.** ~~and to drill exploration wells in the resource area near Wilbur Hot Springs. The ultimate objective is to prove this resource area to be viable for geothermal electrical production.~~

The specific technical performance objectives are:

- ~~• To drill successfully up to four temperature gradient wells and two slim-hole exploratory wells that will help confirm the economic viability of a geothermal reservoir at Wilbur Hot Springs, Colusa County, California.~~
- ~~• To ascertain the reservoir capacity or target MW for binary power development (up to 50 MW).~~

The specific economic performance objective is:

- ~~• To evaluate the economic viability of the resource and estimate the levelized cost of electricity (LCOE). The target LCOE should be less than \$0.12/kilowatt-hour (kWh) (current or nominal dollar).~~

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## **TASK 1 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 Energy 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 Energy 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 Energy 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 and consultation with Central Valley Water Board (Task 1.7)

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

- The Energy 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 Energy 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 and Consultation with Central Valley Water Board (no draft)

#### **Energy Commission Project Manager Product:**

- Kick-Off Meeting Agenda (no draft)

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

The goal of this task is to determine if the agreement 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 Energy Commission Project Manager and as shown in the Technical Task List above. However, the Energy Commission Project Manager may schedule additional CPRs as necessary, and any additional costs will be borne by the Recipient.

Participants include the Energy Commission Project Manager and the Recipient and may include the Energy Commission Grants Officer, the Geothermal Resources Development Account (GRDA) Program Team Lead, other Energy Commission staff and Management as well as other individuals selected by the Energy Commission Project Manager to provide support to the Energy Commission.

### **The Energy 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 Energy 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

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the agreements. This report shall be submitted along with any other products identified in this scope of work. The Recipient shall submit these documents to the Energy 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.

### **Energy 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)

### **Task 1.3 Final Meeting**

The goal of this task is to closeout this Agreement.

#### **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 Energy Commission Grants Office Officer, and the Energy 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 Energy 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 Energy Commission Project Manager will determine the appropriate meeting participants.

The administrative portion of the meeting shall be a discussion with the Energy 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

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- “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

### **Products:**

- Written documentation of meeting agreements (no draft)
- Schedule for completing closeout activities (no draft)

### **Task 1.4 Monthly Progress Reports**

The goal of this 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.

### **The Recipient shall:**

- Prepare a Monthly Progress Report which summarizes 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 Energy Commission Project Manager within 10 days of the end of the reporting period. The recommended specifications for each progress report are contained in Exhibit A, Attachment A-2.

### **Product:**

- Monthly Progress Reports (no draft)

### **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 objectives of the Final Report are to clearly and completely describe the project’s purpose, approach, activities performed, results, and advancements in science and technology; to present a public assessment of the success of the project as measured by the degree to which goals and objectives were achieved; to make insightful observations based on results obtained; to draw conclusions; and to make recommendations for further RD&D projects and improvements to the GRDA project management processes.

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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:**

- Prepare an Outline of the Final Report.
- Prepare a Final Report following the approved outline and the latest version of the GRDA Final Report guidelines published on the Energy Commission's website at <http://www.energy.ca.gov/contracts/pier/contractors/index.html> at the time the Recipient begins performing this task, unless otherwise instructed in writing by the Energy Commission Project Manager. Instead of the timeframe listed in the Product Guidelines located in Section 5 of the Terms and Conditions, the Energy Commission Project Manager shall provide written comments on the Draft Final Report within fifteen (15) working days of receipt. The Final Report must be completed on or before the end of the Agreement Term.
- Submit one bound copy of the Final Report with the final invoice.

### **Products:**

- Draft Outline of the Final Report
- Final Outline of the Final Report
- Draft Final Report
- Final Report

### **Task 1.6 Identify and Obtain Matching Funds**

The goal of this 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 GRDA 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 GRDA 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 Energy Commission Project Manager at least 2 working days prior to the kick-off meeting. If no match funds were part of the proposal that led to the Energy Commission awarding this Agreement and none have been identified at the time this Agreement

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starts, then state such in the letter. If match funds were a part of the proposal that led to the Energy Commission awarding this Agreement, then provide in the letter a list of the match funds that identifies the:

- 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 Energy Commission Project Manager if during the course of the Agreement additional match funds are received.
- Notify the Energy 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.

### **Products:**

- A letter regarding match funds or stating that no match funds are provided (no draft)
- Copy(ies) of each match fund commitment letter(s) (if applicable) (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 and Consult with Central Valley Water Board**

The goal of this 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.

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In addition to any permits required for project activities, there is a need to avoid liability under CERCLA and other environmental laws due to the presence of mercury in the project exploration area. To reduce the likelihood that project activities will disturb mine waste or other areas of concern, the Recipient must consult with the Central Valley Water Board prior to initiating exploration and development activities. However, consultation with the Central Valley Water Board is not a guarantee that activities will not result in liability pursuant to federal and state pollution control laws.

Permit costs and the expenses associated with obtaining permits, documenting geothermal and surface access rights and permission, and consulting with the Central Valley Water Board are not reimbursable under this Agreement. Although the GRDA budget for this task will be zero dollars, the Recipient shall budget match funds for any expected expenditures associated with obtaining permits, documenting geothermal rights and surface access, and consulting with the Central Valley Water Board. Permits must be identified in writing and obtained before the Recipient can make any expenditures for which a permit or Central Valley Water Board consultation is required.

### **The Recipient shall:**

- Prepare a letter documenting the permits required to conduct this Agreement and submit it to the Energy 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.
- Provide documentation that the Recipient has permission and right to access surface properties, conduct exploration activities and drill in the proposed project exploration area(s).
- 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 or other environmental agency reviews become necessary, provide the appropriate information on each permit and agency requirements and an updated schedule to the Energy Commission Project Manager.
- As permits are obtained, send a copy of each approved permit to the Energy Commission Project Manager.
- If during the course of the Agreement permits are not obtained on time or

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are denied, notify the Energy Commission Project Manager within 10 days. Either of these events may trigger an additional CPR.

### Products:

- Letter documenting the permits or stating that no permits are required (no draft)
- Documentation that the Recipient has the right to access the surface properties and conduct exploration activities and drilling in the proposed project exploration area(s).
- A copy of each approved permit (if applicable) (no draft)
- A copy of comments from each Central Valley Water Board consultation, or other environmental agency review (if applicable) (no draft)
- Updated list of permits, including any environmental agency review requirements, 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)

### TECHNICAL TASKS

The Recipient agrees that it and/or its subcontractors (as established by the Recipient in agreements with its subcontractors), and not the Energy Commission or the State of California, shall be solely responsible and liable for access, rights, structures and conditions at the project drill site or sites; ~~all drilled or otherwise placed temperature gradient, slim hole, exploratory, or other project-related wells;~~ and all activities conducted at the project drill site, ~~including without limitation proper site management and well operation, maintenance, and abandonment as necessary,~~ at all times during and after this Agreement.

### ~~Phased Project and California Environmental Quality Act~~

~~To allow for the development and adoption of the CEQA documents necessary for permitting of well drilling activities associated with this Agreement, the Energy Commission decided to approve funding for the Agreement in phases. The Energy Commission approved funding for Phase I at its regular business meeting held on June 29, 2011. During Phase I, the Recipient shall prepare, or cause to be prepared, all documents necessary to comply with CEQA for the Phase II temperature gradient well drilling activities (Task 3), including but not limited to, preparation of the appropriate environmental document(s) required by the well drilling and/or land use permitting lead agency. The Energy Commission will consider approval of Phase II funding at a future Energy Commission Business Meeting only after the required CEQA documents for the Task 3 temperature gradient well drilling activities have been completed and adopted by the lead agency. The Energy Commission will then review and consider the CEQA document or documents prepared by the lead agency in its decision on whether or not to approve funding for Phase II. Only if the Energy Commission so authorizes, after~~

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~~verification of completion of CEQA requirements, can the Recipient perform Phase II work. Neither party is bound under this Agreement regarding Phase II work unless and until the CEQA process for project Phase II drilling activities has been completed and the Energy Commission has authorized the Recipient to perform the work.~~

~~During Phase II, the Recipient shall identify preferred drilling sites for the Phase III deep exploratory well drilling (Task 4) and prepare, or cause to be prepared, all documents necessary to comply with CEQA for the Phase III deep exploratory well drilling activities, including but not limited to, preparation of the appropriate environmental documents required by the well drilling and/or land use permitting lead agency. The Energy Commission will consider approval of Phase III funding at a future Energy Commission Business Meeting only after the required CEQA documents for the Task 4 deep exploratory well drilling activities have been completed and adopted by the lead agency. The Energy Commission will then review and consider the CEQA document or documents prepared by the lead agency in its decision on whether or not to approve funding for Phase III. Only if the Energy Commission so authorizes, after verification of completion of CEQA requirements, can the Recipient perform Phase III work. Neither party is bound under this Agreement regarding Phase III work unless and until the CEQA process for project Phase III drilling activities has been completed and the Energy Commission has authorized the Recipient to perform the work.~~

The cost of all CEQA compliance will be at the sole expense of the Recipient and not reimbursable under this Agreement. However, the Recipient may consider its cost as match under this Agreement.

~~Neither the Recipient nor any of its subcontractors are authorized to expend funds or perform any work on any Phase II or Phase III drilling activities until the well drilling and/or land use lead agency approves and adopts an appropriate CEQA document, issues the requisite permit or permits for the well drilling activities, and the Energy Commission approves funding for Phase II and/or Phase III.~~

### **TASK 2: Geologic, Geochemical and Geophysical Studies (Phase I)**

The goal of this task is to acquire open-filed records and public-domain geologic and geophysical data and other information on the subsurface characteristics of the resources to complete a conceptual geothermal exploration model and better determine an exploration approach.

#### **Subtask 2.1: Existing Data Evaluation, Geologic Mapping and Rock/Water Sampling**

The goal of this subtask is to develop preliminary information and reports on the geothermal resource in the Wilbur Hot Springs project area through the review of existing literature, data, maps and drilling records, and geologic field mapping and surface rock and water sampling and testing.

#### **The Recipient will:**

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- Prepare a Geographic Information System (GIS) map of the project exploration target area(s) that identifies areas with mining waste and areas impaired due to mercury pollution.
- Prepare a geologic mapping and rock/water sampling workplan for review by the Central Valley Water Board. The workplan shall provide detailed information, maps, locations, and descriptions of the proposed geologic mapping and sampling, and clearly show how the activity will not impact areas of mine tailings or mercury pollution areas of concern. The Recipient shall share all Central Valley Water Board review comments with the Energy Commission Project Manager. The Recipient shall revise the workplan as necessary to address any Central Valley Water Board review comments and/or recommendations. No geologic mapping or sampling shall be initiated until the Central Valley Water Board has the opportunity to review the workplan for the geologic mapping and sampling activities and the Energy Commission Project Manager approves starting field work.
- Conduct geologic mapping/interpretation and rock/water sampling and field testing with the assistance of key subcontractor.
- Acquire available open-file geothermal and oil and gas drilling records, as well as germane scientific papers on geology and geophysics to integrate into the exploration conceptual model.
- ~~Prepare a detailed Geologic Mapping Report, with emphasis on locating evidence of hydrothermal alteration and recent faulting and folding that could reflect basement structures.~~
- Conduct chemical analyses of water samples collected in the project area.
- ~~Prepare a Preliminary Exploration Water Geochemical and Stable Water Isotopic Sampling Report of selected creeks, springs, seeps, and flowing groundwater wells.~~
- **Prepare a detailed Geologic Mapping and Preliminary Exploration Water Geochemical and Stable Isotopic Sampling Report, with emphasis on locating evidence of hydrothermal alteration and recent faulting and folding that could reflect basement structures.**

### Products:

- GIS Map of Target Area and Area(s) with Mining Waste and Areas Impaired due to Mercury Pollution.
- Geologic Mapping and Rock/Water Sampling Workplan (~~no draft~~).
- Geologic Mapping Report and Preliminary Exploration Water Geochemical and Stable Water Isotopic Sampling Report (draft).
- Geologic Mapping and Preliminary Exploration Water Geochemical and Stable Water Isotopic Sampling Report (final).

### Sub-task 2.2: Geophysical Surveys

The goals of this subtask are to determine what geophysical survey methods are necessary in the project area, conduct the necessary geophysical surveys, and prepare

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a preliminary exploration plan and field development plan for the project area, including plans and documents for temperature gradient well drilling.

### The Recipient will:

- Prepare a geophysical survey workplan for review by the Central Valley Water Board. The workplan shall provide detailed information, maps, locations, and descriptions of the proposed geophysical surveys to be employed and clearly show how the activity will not impact areas of mine tailings or mercury pollution areas of concern. The Recipient shall share all Central Valley Water Board review comments with the Energy Commission Project Manager. The Recipient shall revise the workplan as necessary to address any Central Valley Water Board review comments and/or recommendations. No geophysical surveys shall be initiated until the Central Valley Water Board has the opportunity to review the workplan for the geophysical survey activities and the Energy Commission Project Manager approves starting geophysical survey work .
- Conduct geophysical survey(s) in the project area with the assistance of key subcontractor, in accordance with the workplan and any permits required as indicated in Task 1.7 above.
- Prepare a detailed Gravity and Electrical Methods Geophysical Surveys Report designed to investigate structures affecting the geothermal reservoir (if necessary).
- ~~Prepare a proposed drilling plan for temperature gradient wells.~~
- Prepare a temperature gradient well **drilling** workplan for review by the Central Valley Water Board. The workplan shall **provide detailed information, including maps and diagrams as appropriate, on the proposed numbers of wells and well locations, well designs, and plans for well drilling and testing.** ~~provide detailed information, maps, well locations, and descriptions of the proposed drilling activities and drill sites and clearly show how the activities will not impact areas of mine tailings or mercury pollution areas of concern. The Recipient shall share all Central Valley Water Board review comments with the Energy Commission Project Manager. The Recipient shall revise the workplan as necessary to address any Central Valley Water Board review comments and/or recommendations.~~
- ~~Prepare all well drilling plans and CEQA/permit documents necessary to permit temperature gradient well drilling activities to be conducted as part of Task 3.~~
- Participate in a Critical Project Review Meeting per Task 1.2.

### Products:

- Geophysical survey workplan.
- Gravity and Electrical Methods Geophysical Surveys Report ~~(no draft)~~ (if necessary).
- ~~Proposed drilling plan for temperature gradient wells (no draft).~~
- Temperature gradient well drilling workplan.
- ~~Lead-agency adopted CEQA documents and permits for Task 3 temperature gradient well drilling (no draft).~~

## Exhibit A WORK STATEMENT

- CPR Report (no draft).

### **TASK 3: Temperature Gradient Drilling (Phase II)**

The goal of this task is to drill 3-4 temperature gradient wells and gather more information on the subsurface characteristics of the resource to better determine the resource potential and locations for drilling exploratory wells.

#### **The Recipient will:**

- ~~Execute the drilling plan for temperature gradient wells prepared in Task 2, consistent with the lead agency adopted CEQA documents and permit requirements, as well as the workplan that has been reviewed by the Central Valley Water Board. No temperature gradient well drilling activities shall be initiated until the Central Valley Water Board has the opportunity to review the workplan and the Energy Commission Project Manager approves starting the work.~~
- ~~Start mobilizing the drill rig.~~
- ~~Follow the proposed drilling program, permits and workplan. Modifications to the drilling program based on data gathered while drilling must be consistent with applicable permits and Central Valley Water Board reviewed drilling workplan.~~
- ~~Monitor temperature gradient wells and collect temperature data as necessary to assess geothermal resource. Prepare a Drilled Temperature Gradient Holes Report including results and recommendations for deep exploratory drilling.~~
- ~~Prepare a deep exploratory well drilling and testing workplan for review by the Central Valley Water Board. The workplan shall provide detailed information, maps, well locations, and descriptions of the proposed drilling and testing activities and drill sites and clearly show how the activities will not impact areas of mine tailings or mercury pollution areas of concern. The Recipient shall share all Central Valley Water Board review comments with the Energy Commission Project Manager. The Recipient shall revise the workplan as necessary to address any Central Valley Water Board review comments and/or recommendations.~~
- ~~Prepare well drilling plans and CEQA/permit documents necessary to permit deep exploratory well drilling and testing activities to be conducted as part of Task 4.~~
- ~~Prepare a plan for the proper abandonment of all temperature gradient wells (if necessary).~~
- ~~Participate in a Critical Project Review Meeting per Task 1.2.~~

#### **Products:**

- ~~Drilled Temperature Gradient Holes Report (no draft)~~
- ~~Deep exploratory well drilling and testing workplan~~
- ~~Drilling plan for deep exploratory well drilling.~~

## Exhibit A WORK STATEMENT

- ~~Lead agency adopted CEQA documents and permits for Task 4 deep exploratory well drilling and testing.~~
- ~~CPR Report (no draft)~~

### **TASK 4: Deep Exploratory Well Drilling (Phase III)**

~~The goal of this task is to drill 2 slim-hole exploratory wells and test the geothermal potential and any possible natural gas availability in the resource area.~~

#### **The Recipient will:**

- ~~Execute the drilling plan for deep exploratory wells prepared in Task 3, consistent with the lead agency adopted CEQA documents and permit requirements, as well as the workplan. No deep exploratory well drilling activities shall be initiated until the Central Valley Water Board has the opportunity to review the workplan and the Energy Commission Project Manager approves starting the work.~~
- ~~Start mobilizing the drill rig.~~
- ~~Follow the proposed drilling program, permits and workplan. Modifications to the drilling program based on data gathered while drilling must be consistent with applicable permits and Central Valley Water Board reviewed drilling workplan.~~
- ~~Prepare a draft test plan for well tests; the draft test plan shall include but not limited to:~~
  - ~~A description of the wells to be tested for geothermal resources, including the test of natural gas occurrence.~~
  - ~~A rationale for why the tests are needed.~~
  - ~~Test objectives and technical approach.~~
  - ~~A candidate test matrix showing the operating conditions and characteristics of the well.~~
  - ~~A description of the equipment and instrumentation required to conduct the tests.~~
  - ~~A description of test procedures, including parameters to be varied, variation ranges to be tested, parameters to be measured and the instrumentation used to measure them, calibration procedures to be used including calibration intervals, and data sheets to be completed.~~
  - ~~A description of the data analysis procedures.~~
  - ~~A description of the quality assurance procedures.~~
  - ~~Contingency measures to be considered if test objectives are not met.~~
- ~~Submit the draft test plan to the Commission Project Manager for review and comment. Once agreement on the draft test plan has been reached, the final test plan shall be submitted to the Commission Project Manager for written approval, which shall be provided within 10 working days of receipt of the final test plan. Key elements of the test plan shall be included in the Final Report for this project.~~
- ~~Perform well tests per the approved test plan.~~
- ~~Analyze data and results.~~

## Exhibit A WORK STATEMENT

- Evaluate the MW potential of the estimated reservoir.
- Prepare the draft Deep Hole Results and Potential MW Report. Once agreement on the draft Deep Hole Results and Potential MW Report has been reached, the final document shall be submitted to the Commission Project Manager for written approval. This document shall be submitted to the Commission Project Manager for review at least 15 working days prior to the Critical Project Review Meeting. This document will be one of the main topics for discussion at the Critical Project Review.
- Participate in a Critical Project Review Meeting per Task 1.2.
- Perform well abandonment (if the drilled wells in Tasks 3 and 4 are not successful) following the rules and requirements by Division of Oil and Gas and Geothermal Resources.

### Products:

- Draft Test Plan for Well Tests
- Final Test Plan for Well Tests
- Draft Deep Hole Results and Potential MW Report
- Final Deep Hole Results and Potential MW Report
- CPR Report (no draft)

### TASK 5: Feasibility Assessment for Power Development

The goal of this task is to analyze all the information from the previous tasks to determine if further development of the resource is appropriate.

#### The Recipient will:

- Hire a contractor to conduct a feasibility assessment.
- Analyze test data and prepare a Feasibility Assessment Report for Power Development with particular attention to:
  - Reservoir volume investigated.
  - Probable commercial potential.
  - Consistency of test results with the working geologic model.
  - Further testing that may be needed to resolve commercial uncertainties.
  - Ascertaining the target MW for binary power plant
- Review and analyze the potential for a Hybrid Energy Project. Older test data has shown a high presence of methane in the hot water sources. Geonomics predicates as much as 25 percent (%) of the liquid stream may be usable methane that could easily be separated. Potential is to have a geothermal binary power plant and a smaller methane fired generation system in tandem.
- Review the potential to utilize the newly developed GTherm "Single-Well Engineered Geothermal System". The advantage of this in-hole heat exchange technology would be to eliminate the need for pumping water from the resource area, causing less environmental issues and retaining the recreational value of the area.

## **Exhibit A WORK STATEMENT**

- ~~Review and prepare an analysis of using hybrid configuration of water-cooled and air-cooled cooling towers.~~
- ~~Calculate or estimate the LCOE using the revenue requirement approach (both current and constant dollar analyses).~~

**Products:**

- ~~Feasibility Assessment Report for Power Development (no draft)~~

### **TASK 6: Technology Transfer Activities**

~~The goal of this task is to develop a plan to make the knowledge gained, experimental results and lessons learned available to key decision-makers.~~

**The Recipient will:**

- ~~Prepare a Technology Transfer Plan. The plan shall explain how the knowledge gained in this agreement will be made available to the public. The level of detail expected is least for research-related agreements and highest for demonstration agreements. Key elements from this report shall be included in the Final Report for this agreement.~~
- ~~Conduct technology transfer activities in accordance with the Technology Transfer Plan. These activities shall be reported in the Quarterly Progress Reports.~~

**Products: —**

- ~~Final Technology Transfer Plan (no draft)~~