

# Exhibit A WORK STATEMENT

## TECHNICAL TASK LIST

Task #	CPR	Task Name
1	N/A	Administration
2		Geologic, Geochemical and Geophysical Studies
3	X	Temperature Gradient Drilling
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 Quintana
2	George Crandell (Renovitas) John Torok (Geonomics)	GeothermEx	Geonomics, Inc. Quintana
3	George Crandell (Renovitas) John Torok (Geonomics)	GeothermEx ThermaSource	Geonomics, Inc. Quintana
4	George Crandell (Renovitas) John Torok (Geonomics)	ThermaSource	Geonomics, Inc. Quintana
5	Bill Walden (Renovitas)	ThermaSource	Geonomics, Inc. SMUD Quintana
6	Bill Walden (Renovitas) George Crandell (Renovitas)		Geonomics, Inc. SMUD Quintana

## GLOSSARY

Term/ Acronym	Definition
BLM	Bureau of Land Management
CEQA	California Environmental Quality Act
CPR	Critical Project Review
Energy Commission	California Energy Commission
GRDA	Geothermal Resources Development Account
LCOE	Levelized Cost of Electricity
MW	Megawatt

# **Exhibit A WORK STATEMENT**

## **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°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.

## **Goal of the Agreement**

The goal of this agreement is to ascertain if there is sufficient geothermal potential and verify a commercially viable geothermal reservoir that will support the development of a power plant 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 pre-drilling geology and geophysical programs, 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/kWh (current or nominal dollar).

# **Exhibit A WORK STATEMENT**

## **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 California Energy Commission (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 (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 (no draft)

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

- Kick-Off Meeting Agenda (no draft)

## **Exhibit A WORK STATEMENT**

### **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 the agreements. This report shall be submitted along with any other

## **Exhibit A WORK STATEMENT**

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
- "Surviving" Agreement provisions, such as repayment provisions

## **Exhibit A WORK STATEMENT**

- 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.

## **Exhibit A WORK STATEMENT**

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 starts, then state such in the letter. If match funds were a part of the

## **Exhibit A WORK STATEMENT**

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**

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.

Permit costs and the expenses associated with obtaining permits are not reimbursable under this Agreement. Although the GRDA budget for this task will be zero dollars, the

## **Exhibit A WORK STATEMENT**

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 expenditures 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 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.
- 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 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 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)
- 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)

# **Exhibit A WORK STATEMENT**

## **TECHNICAL TASKS**

The Contractor understands and agrees that it and/or its subcontractors (based on language it works out in its agreements with its subcontractors), and not the Energy Commission or the State of California, shall be solely responsible and liable for the drill site, all drilled wells, and all activities conducted at the drill site, including without limitation filling and capping them if necessary, at all times during and after this Agreement.

### **2-Phased Project and California Environmental Quality Act (CEQA)**

Neither the Contractor nor any of its subcontractors are authorized to expend funds or perform any work on any Phase II activities until further approval by the Energy Commission that the Contractor has completed its CEQA obligations. The Energy Commission has only approved Phase I activities.

During Phase I, the Contractor shall act as lead agency and prepare all documents necessary to comply with CEQA for Phase II, including but not limited to, preparation of an appropriate environmental document. The Energy Commission will consider approval of Phase II funding at an Energy Commission Business Meeting. Only if the Energy Commission so authorizes after verification of completion of CEQA requirements can the Contractor perform Phase II; neither party is bound under this Agreement regarding Phase II work until the Contractor has completed its CEQA process and the Energy Commission has authorized the Contractor to perform the work. The cost of all CEQA compliance will be at the sole expense of the Contractor and not reimbursable under this Agreement. However, the Contractor may consider its cost as match under this Agreement.

### **TASK 2: Geologic, Geochemical and Geophysical Studies**

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.

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

- Conduct the geologic mapping/interpretation, geochemical surveys and geophysical surveys 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.
- Prepare a detailed Gravity and Electrical Methods Geophysical Surveys Report designed to investigate structures affecting the geothermal reservoir.

## **Exhibit A WORK STATEMENT**

- Conduct preliminary petrographic and X-Ray diffraction analysis of selected surface rock samples and vein material.
- Prepare a Preliminary Exploration Water Geochemical and Stable Water Isotopic Sampling Report of selected creeks, springs, seeps, and flowing groundwater wells.
- Prepare a memo on proposed drilling plans for temperature gradient wells and slim-hole exploratory wells.

### **Products:**

- Geologic Mapping Report (no draft)
- Gravity and Electrical Methods Geophysical Surveys Report (no draft)
- Preliminary Exploration Water Geochemical and Stable Water Isotopic Sampling Report (no draft)
- Memo on proposed drilling plans for temperature gradient wells and slim-hole exploratory wells (no draft)

### **TASK 3: Temperature Gradient Drilling**

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:**

- Prepare a drilling plan for temperature gradient holes based on the proposed drilling plan in Task 2.
- Execute the drilling plan for temperature gradient wells.
- Start mobilizing the drill rig.
- Follow the proposed drilling program, modifying as needed based on data gathered while drilling.
- Prepare a Drilled Temperature Gradient Holes Report including results and recommendations.
- Participate in a Critical Project Review Meeting per Task 1.2.

#### **Products:**

- Drilling plan for the temperature gradient holes (no draft)
- Drilled Temperature Gradient Holes Report (no draft)

### **TASK 4: Deep Exploratory Drilling**

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

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

- Prepare a drilling plan for the slim holes exploratory wells based on the proposed drilling plan in Task 2.

## **Exhibit A**

### **WORK STATEMENT**

- Execute a drilling program plan.
- Start mobilizing the drill rig.
- Follow the proposed drilling program, modifying as needed based on data gathered while drilling.
- 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.
- 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:**

- Drilling plan for the exploratory wells (no draft)
- Draft Test Plan for Well Tests

## **Exhibit A WORK STATEMENT**

- Final Test Plan for Well Tests
- Draft Deep Hole Results and Potential MW Report (no draft)
- Final Deep Hole Results and Potential MW 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% 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.
- 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).
- Begin negotiation for possible power purchase agreement with Sacramento Municipal Utility District (SMUD) and discuss possible ownership options (depending on the result of feasibility assessment).

#### **Products:**

- Feasibility Assessment Report for Power Development (no draft)

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

## **Exhibit A WORK STATEMENT**

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)