

GRANTS/CONTINGENT AWARD REQUEST



To: Grants and Loans Office

Date: 10/12/2011

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)

[X] New Agreement: (include items A-F from below) Agreement Number: GEO-10-003
Program: GRDA / Renewables
Solicitation Name and/or Number: PON-10-501-10 (2011 APPLICATION MANUAL FOR THE GEOTHERMAL
Legal Name of Recipient: Renovitas, LLC
Recipient's Full Mailing Address: 4760 Bamboo Way
Fair Oaks, CA 95628-6041
Recipient's Project Officer: George Crandell Phone Number: 916.320.6818
Agreement Start Date: 6/30/2011 Agreement End Date: 3/29/2013

[ ] Amendment: (Check all that apply) Agreement Number:
[ ] Term Extension - New End Date:
[ ] Work Statement Revision (include Item A from below)
[ ] Budget Revision (include Item B from below)
[ ] Change of Scope (include Items A - F as applicable from below)
[ ] Other:

ITEMS TO ATTACH WITH REQUEST:

- A. Work Statement
B. Budget
C. Recipient Resolution, if applicable. (Resolution may be requested in Special Conditions if not currently available.)
D. Special Conditions, if applicable.
E. CEQA Compliance Form
F. Other Documents as applicable
• Copy of Score Sheets
• Copy of Pre-Award Correspondence
• Copy of All Other Relevant Documents

California Environmental Quality Act (CEQA)

[ ] CEC finds, based on recipient's documentation in compliance with CEQA:
[ ] Project exempt: NOE filed:
[ ] Environmental Document prepared: NOD filed:
[ ] Other:
[X] CEC has made CEQA finding described in CEC-280, attached

Funding Information:

\*Source #1: GRDA Amount: \$ 1,492,722.00 Statute: 09- FY: 11-12 Budget List #: 501.008A
\*Source #2: Amount: \$ Statute: FY: Budget List #:
\*Source #3: Amount: \$ Statute: FY: 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)

Proposed Business Meeting Date: 11/2/2011 [ ] Consent [X] Discussion
Business Meeting Participant: Cheryl Closson Time Needed: 5 minutes

Agenda Notice Statement: (state purpose in layperson terms)

Possible approval of a [X] Grant / [ ] Contingent Award to...
Possible approval of an agreement with Renovitas, LLC, in the amount of \$1,492,722 for geothermal exploration and assessment of the Wilbur Hot Springs area, and approval of Phase I work to review existing data and perform geological and geophysical field studies. Contact: Cheryl Closson. (5 minutes)

# Memorandum

To: James D. Boyd, Vice Chair  
California Energy Commission

Date : October 11, 2011

Telephone: CALNET (xxx ) Type here  
(xxx ) Type here

From : **California Energy Commission**  
1516 Ninth Street  
Sacramento CA 95814-5512

Subject: INFORMATIONAL MEMO – NON-SUBSTANTIVE CHANGES TO STATEMENT OF WORK  
FOR RENOVITAS GEOTHERMAL GRANT #GEO-10-003

## Issue

After the June 29, 2011 Energy Commission approval of Phase I of the geothermal grant with Renovitas, staff was contacted by staff of the California Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board) and informed of the potential for cleanup liability under the California Water Code and the federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) if grant activities disturb existing mining wastes or areas impaired by mercury pollution in the watersheds in and around Wilbur Hot Springs.

To prevent the Energy Commission from incurring CERCLA or state cleanup liability for the proposed grant activities, staff postponed execution of the approved grant agreement until statement of work language addressing the grant phasing and cleanup liability concerns could be developed. Staff worked with the Central Valley Water Board and the grant recipient to develop the attached non-substantive revisions to the originally approved statement of work. These revisions include the following:

- Clarification of the project phases and how Energy Commission review and approval of Phases II and III would be accomplished;
- Clarification of the potential for cleanup liability and the Energy Commission's position that the grant recipient undertake only those activities that do not give rise to liability under federal and/or State pollution control laws and regulations; and
- Inclusion of provisions for Central Valley Water Board review of task workplans in advance of conducting work to help ensure that grant activities are consistent with applicable environmental laws and do not disturb mining wastes or mercury impaired areas.

The Energy Commission's legal office was involved with meetings between the Commission, the Water Board, and the applicant, and also reviewed the changes to the work statement. This is not a grant amendment. There are no substantive changes to the grant tasks, budget or grantees. The Energy Commission's legal office is in agreement that these changes are necessary to protect the Commission, add specificity to the individual tasks and are not substantive in nature..

Staff proposes to move forward with execution of the grant to Renovitas with the non-substantive revisions to the grant statement of work as identified in the attached revised statement of work document. Execution of the grant needs to move ahead quickly due to funding time restrictions and the time needed to the complete grant exploration tasks.

## Background

This grant is for geothermal exploration and assessment in the Wilbur Hot Springs area in Colusa County, California, an area that is viewed as a significant target for the discovery and development of geothermal energy for power generation. The area has been a focal point for geothermal, gold and mercury exploration for over 100 years. Samples from thermal springs, mine shafts, and deep wells in the area indicate a possible high temperature geothermal resource with potential for power generation. However, extensive resource evaluation work is needed for drilling and geothermal power development.

Phase I of this geothermal grant agreement was approved by the Energy Commission at the June 29, 2011 Business Meeting. Phase I includes grant administrative activities along with literature review and non-drilling field mapping, testing and data gathering. The grant agreement was divided into phases to allow for Energy Commission review of environmental documents prior to approval of Phase II (temperature gradient well drilling) and Phase III (deep exploratory well drilling).

## Proposed Work

The objectives of Phase I of this project are to perform pre-drilling literature reviews along with geological and geophysical field assessments in the Wilbur Hot Springs area to identify potential targets for temperature gradient and deep exploration well drilling and further resource assessment. The project will acquire open-filed records and public-domain geologic and geophysical data and other information on the subsurface characteristics of the resources to complete conceptual geothermal exploration model and better determine exploration approach. Future geothermal exploratory drilling may be approved by the Energy Commission after review of permits and environmental documents adopted by the appropriate lead agencies. The project will conclude with the analysis all information to determine if further development of the resource is appropriate. The ultimate objective is to prove this resource area to be viable for geothermal electrical production.

Energy Commission Funding by Phase:

Phase I (Tasks 1 and 2)	= \$696,949
Phase II (Task 3)	= \$347,699
Phase III (Tasks 4, 5, and 6)	= \$448,074

## Benefits to California

If successful, this project will provide favorable economic impacts for Colusa County and will stimulate possible further geothermal development in an area where presently there is none. It would also potentially add a new liquid-dominated resource to northern California's geothermal assets.

# Exhibit A WORK STATEMENT

## TECHNICAL TASK LIST

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

**Exhibit A**  
**WORK STATEMENT**

<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

# **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 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,

## **Exhibit A WORK STATEMENT**

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 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 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/kilowatt-hour (kWh) (current or nominal dollar).

## **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

## **Exhibit A WORK STATEMENT**

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)

### **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

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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 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 10 calendar days in advance of each CPR meeting.

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- 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 and confidential Products
- Final invoicing and release of retention
- Prepare a schedule for completing the closeout activities for this Agreement

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### **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.

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.

# Exhibit A WORK STATEMENT

## 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 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

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- 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.

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,

## **Exhibit A WORK STATEMENT**

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

## **Exhibit A WORK STATEMENT**

### **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 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 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 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

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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:**

- 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.

## **Exhibit A WORK STATEMENT**

- 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.

### **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 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

## **Exhibit A WORK STATEMENT**

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 workplan for review by the Central Valley Water Board. The workplan shall 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).
- 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:**

## **Exhibit A WORK STATEMENT**

- 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 and testing 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 and testing for deep exploratory well drilling.
- 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:**

## **Exhibit A WORK STATEMENT**

- 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.
- 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.
- 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 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

## **Exhibit A WORK STATEMENT**

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).

### **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)

Exhibit B

<b>Match Funding (\$)</b>		Direct Labor	Fringe Benefits	Travel	Equipment	Materials	Contractual	Misc	Indirect Overhead	G&A	Total
<b>Task 1</b>	<b>Project Administration Activities</b>										
1.1	Attend Kick-off Meeting	0	0	0	0	0	0	0	0	0	\$0
1.2	Critical Project Review Meetings	0	0	0	0	0	0	0	0	0	\$0
1.3	Final Meeting	0	0	0	0	0	0	0	0	0	\$0
1.4	Monthly Progress Reports	0	0	0	0	0	0	0	0	0	\$0
1.5	Final Report	0	0	0	0	0	0	0	0	0	\$0
1.6	Identify & Obtain Matching Funds	0	0	0	0	0	0	0	0	0	\$0
1.7	Identify & Obtain Required Permits	0	0	0	0	0	18,182.00	-	-	1,818.20	20,000.20
	<b>Administration Activities Subtotals</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>18,182.00</b>	<b>-</b>	<b>-</b>	<b>1,818.20</b>	<b>20,000.20</b>
<b>Task</b>	<b>Project Technical Activities</b>										
<b>Phase I</b>											
2	Geologic, Geochemical, Geophysical Studies	0	0	0	0	0	63,636.00	-	-	6,363.60	69,999.60
<b>Phase II</b>											
3	Temperature Gradient Drilling	0	0	0	0	0	500,000.00	-	-	50,000.00	550,000.00
<b>Phase III</b>											
4	Deep Exploratory Drilling	0	0	0	0	0	1,338,182.00	-	-	133,818.20	1,472,000.20
5	Feasibility Assessment for Power Development	0	0	0	0	0	68,000.00	-	-	6,800.00	74,800.00
6	Technology Transfer Activities	0	0	0	0	0	56,000.00	-	-	5,600.00	61,600.00
	<b>Technical Activities Subtotals</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>2,025,818.00</b>	<b>-</b>	<b>-</b>	<b>202,581.80</b>	<b>2,228,399.80</b>
		Direct Labor	Fringe Benefits	Travel	Equipment	Materials	Contractual	Misc	Indirect Overhead	G&A	Total
	<b>Match Funds Totals</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>2,044,000.00</b>	<b>-</b>	<b>-</b>	<b>204,400.00</b>	<b>2,248,400.00</b>
	<b>Percentage of the Total</b>	0%	0%	0%	0%	0%	0.91	-	-	0.09	1.00

Match Funding by Task

Exhibit D

Special Terms and Conditions

**PREVAILING WAGE**

For purposes of this paragraph, “public works” means construction, alteration, demolition, installation, repair or maintenance work over \$1,000; and “Contractor” means all contractors that provide public works activities for the Project.

**(a) Recipient/General Requirements**

- (i) Recipient shall comply with state prevailing wage law, Chapter 1 of Part 7 of Division 2 of the Labor Code, commencing with Section 1720; and Title 8, California Code of Regulations, Chapter 8, Subchapter 3, commencing with Section 16000, for any public works activities performed on the Project funded by this Agreement. For purpose of compliance with prevailing wage law, the Recipient shall comply with provisions applicable to an awarding body. Compliance with state prevailing wage law includes without limitation: payment of prevailing wage as applicable; overtime and working hour requirements; apprenticeship obligations; payroll recordkeeping requirements; and other obligations as required by law.
- (ii) Recipient shall submit to the Energy Commission with each Payment Request Form, a certification stating that prevailing wages were paid to eligible workers who provided labor for work covered by the payment request and that the Recipient and all contractors complied with prevailing wage laws.
- (iii) Prior to the release of any retained funds under this Agreement, the Recipient shall submit to the Energy Commission a certificate signed by the Recipient and all contractors performing public works activities stating that prevailing wages were paid as required by law. The required certificate follows these special condition.

**(b) Flowdown Requirements**

Recipient shall ensure that all agreements with contractors for public works activities for the Project contain the following provisions:

Exhibit D

Special Terms and Conditions

- (i) Contractor shall comply with state prevailing wage law, Chapter 1 of Part 7 of Division 2 of the Labor Code, commencing with Section 1720; and Title 8, California Code of Regulations, Chapter 8, Subchapter 3, commencing with Section 16000, for all construction, alteration, demolition, installation, repair or maintenance work over \$1,000 performed under the contract. Contractor's obligations under prevailing wage laws include without limitation: pay not less than the applicable prevailing wage for public works activities performed on the Project; comply with overtime and working hour requirements; comply with apprenticeship obligations; comply with payroll recordkeeping requirements; and comply with other obligations as required by law.
- (ii) Contractor shall ensure that the above requirements are included in all subcontracts for public works activities for the Project.

**RESPONSIBILITY FOR DRILL SITES AND WELLS**

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 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 drill site, including without limitation proper site management and well operation, maintenance, and abandonment as necessary, at all times during and after this Agreement.

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**PROJECT PHASING AND CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)**

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.

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- (a) Phase I

The Energy Commission approved funding for Phase I (Task 2) 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.

## Exhibit D

### Special Terms and Conditions

#### (b) Phase II

- (i) 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 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.
- (ii) 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.

#### (c) Phase III

- (i) 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.

#### (d) Cost of CEQA Compliance

## Exhibit D

### Special Terms and Conditions

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.

(e) Authorization to Expend Funds/Work

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.

### MERCURY-LADEN MINE WASTE

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 by not limited to, CERCLA, the California Water Code, and the California Environmental Quality Act (CEQA). 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.

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