STATE OF CALIFORNIA

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 02/13) CALIFORNIA ENERGY COMMISSION

New Agreement GEO-14-003 (To be completed by CGL Office)

Division	Agreement Manager:	MS-	Phone
Choose Division	Cheryl Closson	45	916-651-0315

Recipient's Legal Name	Federal ID Number
County of Modoc	94-6000522

Title of Project
Geothermal Exploration, Economic Feasibility and Market Analysis and Distributed Energy Resource Demonstration

Term and Amount	Start Date	End Date	Amount
	2 / 13 / 2015	3 / 31 / 2017	$ 1,129,619

Business Meeting Information

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

Proposed Business Meeting Date	1 / 14 / 2015	☐ Consent	☒ Discussion
Business Meeting Presenter	Cheryl Closson	Time Needed:	5 minutes

Please select one list serve. Geothermal

Agenda Item Subject and Description

COUNTY OF MODOC. Proposed resolution approving agreement GEO-14-003 with the County of Modoc for a $1,129,619 grant to conduct geothermal resource assessments and exploratory drilling in the Surprise Valley Hot Springs area; install and demonstrate a small geothermal distributed energy unit to generate electricity at Surprise Valley Hot Springs; and conduct a geothermal economic feasibility and market analysis to provide information that can be used in future planning for expanded geothermal development in the area. Contact: Cheryl Closson (5 minutes)

California Environmental Quality Act (CEQA) Compliance

1. Is Agreement considered a "Project" under CEQA?
   ☒ Yes (skip to question 2) ☐ No (complete the following (PRC 21065 and 14 CCR 15378)):
   Explain why Agreement is not considered a "Project":
   Agreement will not cause direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because .
2. If Agreement is considered a "Project" under CEQA:
   ☐ a) Agreement **IS** exempt. (Attach draft NOE)
   ☐ Statutory Exemption. List PRC and/or CCR section number:
   ☐ Categorical Exemption. List CCR section number:
   ☐ Common Sense Exemption. 14 CCR 15061 (b) (3)
   Explain reason why Agreement is exempt under the above section:
   ☒ b) Agreement **IS NOT** exempt. (Consult with the legal office to determine next steps.)
   Check all that apply
   ☐ Initial Study ☐ Environmental Impact Report
   ☐ Negative Declaration ☐ Statement of Overriding Considerations
   ☒ Mitigated Negative Declaration

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

Legal Company Name:	Budget
University of California, Davis	$ 283,474
Warner Mountain Energy	$ 179,738
Welsco Drilling	$ 362,017

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

Legal Company Name:
Surprise Valley Hot Springs, Inc.

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Budget Information			
Funding Source	**Funding Year of Appropriation**	**Budget List No.**	**Amount**
GRDA	2014/2015	0497-3360-101-10	$1,129,619
Funding Source			$
Funding Source			$
Funding Source			$
Funding Source			$
R&D Program Area: N/A		TOTAL:	$1,129,619
Explanation for "Other" selection			
Reimbursement Contract #:		Federal Agreement #:	

Recipient's Administrator/ Officer				Recipient's Project Manager			
Name:	Jim Wills			Name:	Curtis Rose		
Address:	Modoc County 204 S. Court Street, #100			Address:	Warner Mountain Energy P.O. Box 592		
City, State, Zip:	Alturas, CA 96101			City, State, Zip:	Cedarville, CA 96104		
Phone:	530-233-7660	Fax:	530-233-6405	Phone:	775-527-3345	Fax:	- -
E-Mail:	jimwills@co.modoc.ca.us			E-Mail:	svgeothermal@yahoo.com		

Selection Process Used

☒ Competitive Solicitation
☐ First Come First Served Solicitation

Solicitation #: PON-13-507

The following items should be attached to this GRF		
1. Exhibit A, Scope of Work		☒ Attached
2. Exhibit B, Budget Detail		☒ Attached
3. CEC 105, Questionnaire for Identifying Conflicts		☒ Attached
4. Recipient Resolution	☐ N/A	☒ Attached
5. CEQA Documentation	☐ N/A	☒ Attached

Agreement Manager	Date	Office Manager	Date	Deputy Director	Date

Exhibit A
SCOPE OF WORK

TECHNICAL TASK LIST

Task #	Task Name
1	Administration
2	Deep Subsurface Geologic Exploration
3	Shallow Subsurface Geologic Exploration
4	Temperature Gradient Well Drilling and Logging
5	Economic Feasibility and Market Analysis
6	Installation and Commissioning of Distributed Energy Resource Unit
7	Public Outreach
8	Temperature Gradient Well Abandonment

KEY NAME LIST

Task #	Key Personnel	Key Subcontractor(s)	Key Partner(s)
1		Warner Mountain Energy	
2		University of California, Davis (UC Davis)	
3		Warner Mountain Energy	
4		Welsco Drilling; Warner Mountain Energy	
5		Sustainable Engineering	
6		ElectraTherm, Inc.; Warner Mountain Energy; Surprise Valley Electrification Corp.	
7		Warner Mountain Energy; UC Davis	Surprise Valley Hot Springs, Inc.

GLOSSARY

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

Term/ Acronym	Definition
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review
distributed energy resource	Small, modular power-generating technologies that can be combined with load management and energy storage systems to improve the quality and/or reliability of the electricity supply.
DOGGR	Division of Oil, Gas, and Geothermal Resources
°F	degrees Fahrenheit
ft	feet

Exhibit A
SCOPE OF WORK

Term/ Acronym	Definition
gpm	gallons per minute
Recipient	County of Modoc
SVHS	Surprise Valley Hot Springs
UC Davis	University of California, Davis

Problem Statement:

Of the 304 known hot springs in the State of California, Surprise Valley Hot Spring in Modoc County is listed as the third hottest at 208 degrees Fahrenheit (°F), with a total flow of 3,000 gallons per minute (gpm). An adjacent well measures 217°F at a depth of 160 feet (ft). Although geothermal resources are abundant in Surprise Valley and much research has been conducted, geothermal electricity is not yet being produced in this area of Northern California.

ENEL Green Power North America has drilled exploration wells on the west side of Surprise Valley, but no electricity is being produced there – reportedly because of the lack of a one-mile transmission line needed to transmit power to the more robust electricity markets in Central and Southern California. Overall, there is limited transmission capacity in existing lines and power sales to the Northern California markets are reportedly not profitable. However, Cedarville and other Modoc County communities experience periodic rolling blackouts, and local businesses are not getting the reliable, high-quality power they need to support economic growth. Two factors that contribute to this lack of reliable power include: 1) insufficient generating capacity to meet peak electricity demand in some parts of Modoc County, and 2) the fact that exploration, permitting, and construction of large power plants and high-voltage transmission lines are costly endeavors that take years to implement and complete.

To move forward with possible geothermal electrical generation in Modoc County, additional scientific exploration and economic data are needed, along with the ability to demonstrate that geothermal development is possible and profitable in Modoc County. Prior exploration in Surprise Valley indicates a possible deep geothermal reservoir temperature of about 347°F, but the source and pathways of geothermal fluids are not well-defined. Favorable subsurface characteristics (faults, temperature gradient) have also been identified on the west side of the valley, but are not well-defined on the east side where many hot springs exist. In addition, economic and market conditions for power generation and sales in the area are complex and are not well-defined. However, sufficient shallow geothermal resources exist to begin demonstrating a small-scale rural distributed electrical generation system while additional exploration is conducted for deeper, hotter geothermal resources.

Goals of the Agreement:

The goals of this Agreement are to demonstrate the ability of a rural community to produce its own electricity, and assist rural Modoc County in creating opportunities for economic development by conducting site-specific geologic studies to identify a deeper, hotter geothermal resource and define a target for large-scale geothermal development. These goals will be met using a team of professionals experienced in the exploration of Surprise Valley geologic resources and who are knowledgeable of local economic, institutional, environmental issues.

Objectives of the Agreement:

The objectives of this Agreement are to: 1) fill in scientific data gaps on the east side of Surprise Valley in the vicinity of Surprise Valley Hot Springs (SVHS) using an integration of multiple

geologic approaches, including geochemical analysis, geophysical surveys, a two-meter soil probe temperature survey, a soil gas survey, and exploratory drilling; 2) install and demonstrate the effectiveness of a small distributed energy geothermal unit to generate electricity immediately; and 3) to generate an economic feasibility and market analysis to facilitate steps in long-range geothermal development planning.

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 CAM shall designate the date and location of this meeting and provide an agenda to the Recipient prior to the meeting.

The Recipient shall:

- Attend a "Kick-Off" meeting with the Commission Agreement Manager (CAM), the Commission Agreement Officer (CAO), and a representative of the Energy Commission Accounting Office. The Recipient shall bring its Project Manager, Agreement Administrator, Accounting Officer, and others designated by the Commission Agreement Manager to this meeting.
- Discuss the following administrative and technical aspects of this Agreement:
  - Agreement Terms and Conditions
  - Critical Project Review (Task 1.2)
  - Match fund documentation (Task 1.6) No reimbursable work may be done until this documentation is in place.
  - Permit documentation (Task 1.7)
  - Subcontracts needed to carry out project (Task 1.8)
  - The CAM's expectations for accomplishing tasks described in the Scope of Work
  - An updated Schedule of Products and Due Dates
  - Monthly Progress Reports (Task 1.4)
  - Technical Products (Product Guidelines located in Section 5 of the Terms and Conditions)
  - Final Report (Task 1.5)

Recipient Products:

- Updated Schedule of Products
- Updated List of Match Funds
- Updated List of Permits

Commission Agreement Manager Product:

- Kick-Off Meeting Agenda

Task 1.2 Critical Project Review (CPR) Meetings

CPRs provide the opportunity for frank discussions between the Energy Commission and the Recipient. The goal of this task is to determine if the project should continue to receive Energy Commission funding to complete this Agreement and to identify any needed modifications to the tasks, products, schedule or budget.

CPRs generally take place at key predetermined points in the Agreement, as determined by the CAM and as shown in the Technical Tasks and Agreement Schedule. However, the CAM may schedule additional CPR meetings as necessary, and any additional meeting costs will be borne by the Recipient.

Meeting participants include the CAM and the Recipient and may include the CAO, Renewable Energy Division or other Energy Commission staff and management as well as other individuals selected by the CAM to provide support to the Energy Commission.

The CAM 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, by telephone, or by WebEx.
- 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. Prepare 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 section 8 of the Terms and Conditions). If the CAM concludes that satisfactory progress is not being made, this conclusion will be referred to the Lead Commissioner for Renewables for his or her concurrence.
- Provide the Recipient with a written determination in accordance with the schedule. The written response may include a requirement for the Recipient to revise one or more product(s) that were included in the CPR.

The Recipient shall:

- Prepare a CPR Report for each CPR that discusses the progress of the Agreement toward achieving its goals and objectives. This report shall include recommendations and conclusions regarding continued work of the projects. This report shall be submitted along with any other products identified in this scope of work. The Recipient shall submit these documents to the CAM 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.

CAM Products:

- Agenda and a list of expected participants

- Schedule for written determination
- Written determination

Recipient Product:

- CPR Report(s)

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 CAO, and the CAM. 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 CAM.

  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 CAM will determine the appropriate meeting participants.

  The administrative portion of the meeting shall be a discussion with the CAM and the CAO about the following Agreement closeout items:

  - What to do with any equipment purchased with Energy Commission funds (Options) (if applicable)
  - Energy Commission requests for specific "generated" data (not already provided in Agreement products)
  - Documentation of Recipient's disclosure of "subject inventions" developed under the Agreement (if applicable)
  - "Surviving" Agreement provisions (if applicable)
  - Final invoicing and release of retention
- Prepare a schedule for completing the closeout activities for this Agreement.

Products:

- Written documentation of meeting agreements
- Schedule for completing closeout activities

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 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 CAM within 10 days of the end of the reporting period. The recommended specifications for each progress report are contained in Section 6 of the Terms and Conditions of this Agreement.

Product:

- Monthly Progress Reports

Task 1.5 Final Report

The goal of the Final Report is to assess the project's success in achieving the Agreement's goals and objectives.

The objectives of the Final Report are to clearly and completely describe the project's purpose, approach, activities performed, and results

The Final Report shall be a public document. If the Recipient has obtained confidential status from the Energy Commission for any project tasks 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, if requested by the CAM.
- Prepare a Draft Final Report following the latest version of the Final Report guidelines which will be provided by the CAM. The CAM shall provide written comments on the Draft Final Report within fifteen (15) working days of receipt. The Draft Final Report must be submitted at least 60 days before the end of the Agreement Term.
- Prepare and submit a Final Report that addresses any comments from the CAM.
- Submit a hardcopy and electronic files (in both MS Word and .pdf formats) of the Final Report to the CAM for final review and formatting prior to Energy Commission publication of the report.
- Work with the CAM as necessary to address any questions about the Final Report or any formatting requirements necessary for Energy Commission publication of the Final Report.

Products:

- Outline of the Final Report, if requested
- 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 Energy Commission 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 Energy Commission funds for each task during the term of this Agreement. Match funds must be identified in writing and the associated commitments obtained before the Recipient can incur any costs for which the Recipient will request reimbursement.

The Recipient shall:

- Prepare a letter documenting the match funding committed to this Agreement and submit it to the Commission Agreement Manager at least 2 working days prior to the kick-off meeting. 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. For match funds provided by a grant a copy of the executed grant shall be submitted in place of a letter of commitment.
- 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 CAM if during the course of the Agreement additional match funds are received.
- Notify the CAM 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 meeting.

Products:

- A letter regarding match funds
- Copy(ies) of each match fund commitment letter(s)
- Letter(s) for new match funds (if applicable)
- Letter that match funds were reduced (if applicable)

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 Energy Commission budget for this task will be zero dollars, the Recipient shall budget match funds for any expected expenditures associated with obtaining permits. Permits must be identified in writing and obtained before the Recipient can make any expenditure for which a permit is required.

The Recipient shall:

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

Products:

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

- Updated schedule for acquiring permits as changes occur during the term of the Agreement (if applicable)
- A copy of each final approved permit (if applicable)

Task 1.8 Obtain and Execute Subcontracts

The goal of this task is to ensure quality products and to procure subcontractors required to carry out the tasks under this Agreement consistent with the Agreement Terms and Conditions and the Recipient's own procurement policies and procedures. It will also provide the Energy Commission an opportunity to review the subcontracts to ensure that the tasks are consistent with this Agreement, and that the budgeted expenditures are reasonable and consistent with applicable cost principles.

The Recipient shall:

- Manage and coordinate subcontractor activities.
- Submit a draft of each subcontract required to conduct the work under this Agreement to the Commission Agreement Manager for review.
- Submit a final copy of the executed subcontract.
- If Recipient decides to add new subcontractors, then the Recipient shall notify the CAM.

Products:

- Draft subcontracts
- Final subcontracts

TASK 2 DEEP SUBSURFACE GEOLOGIC EXPLORATION

The goal of this task is to provide models of subsurface structure to improve siting of the temperature gradient wells, better define site-specific and regional geothermal fluid flow, and characterize subsurface geology.

Task 2.1 Conduct Geophysical Surveys

The goal of this task is to develop models of the subsurface structure to improve the siting of the temperature gradient wells, better define site-specific and regional geothermal fluid flow, and characterize subsurface geology. This task will help reduce the risks associated with drilling.

The Recipient shall:

- Prepare a *Geophysical Surveys Implementation Plan*. The plan shall include, but not be limited to, descriptions of how the Recipient and its subcontractors will accomplish all of the following:
    - Conduct seismic reflection and refraction profiles in a grid crossing the potential drilling locations.
    - Conduct magnetotelluric surveys in the potential drilling locations.

  - Supplement earlier geophysical surveys in the area where appropriate, including conducting additional seismic reflection and refraction work as necessary.
  - Process and analyze the seismic reflection and refraction and magnetotelluric data, and combine it with data from prior geophysical work conducted in the area.
- Conduct the geophysical surveys and analyze data in accordance with the *Geophysical Surveys Implementation Plan*.
- Prepare a *Geophysical Survey Report* that summarizes the results of the geophysical (seismic and magnetotelluric) surveys and data analyses, and provides recommendations for drilling locations and any further geophysical work. The report shall also include, but not be limited to:
  - Seismic reflection and refraction data collected in the field.
  - A map(s) of subsurface structures, derived from the analysis of the seismic reflection and refraction data.
  - Graphs of conductivity verses depth results for each magnetotelluric sounding.
  - Color figures of three-dimensional conductivity structures, derived from interpolation between one-dimensional models.
  - Geophysical data in table form.
  - Graphs of the geophysical data.

Products:

- *Geophysical Surveys Implementation Plan* (no draft)
- *Geophysical Survey Report* (no draft)

Task 2.2 Geochemical Analysis

The goal of this task is to characterize and better define fluid flow within the project site which will provide a better understanding of the geothermal reservoir. This information will also contribute to regional knowledge of the Surprise Valley geothermal system.

The Recipient shall:

- Prepare a *Geochemical Sampling and Analysis Plan*. The plan shall include, but not be limited to, descriptions and information on how the Applicant and its subcontractors will accomplish all of the following:
  - Take water samples from the fluids recovered at the well site and at the nearby springs and bodies of water.
  - Analyze water samples for major elements and isotopes.
- Conduct water sampling and analysis in accordance with the *Geochemical Sampling and Analysis Plan*.

- Prepare a *Geophysical and Geochemical Analyses Report* that summarizes the results of the geochemical sampling and analysis, and provides system interpretations based on the geochemical analyses and geophysical survey results combined. The plan will also include fluid analyses in tabular form and include draft and final versions of the analyses as necessary.

Products:

- *Geochemical Sampling and Analysis Plan* (no draft)
- *Geophysical and Geochemical Analyses Report* (no draft)

Task 2.3 Drill Cutting Sample Collection and Analysis

The goal of this task is to use drilling cuttings from the exploration well(s) to determine zones of geothermal alteration in the area around the wells and facilitate the understanding of the depth of the geothermal reservoir. This information will also to help define the regional Surprise Valley geothermal system. Samples will be analyzed using an electron microscope under thin section at the laboratory.

The Recipient shall:

- Prepare a *Drill Cutting Sample and Analysis Plan* that describes how the Applicant and its subcontractors will do all of the following:
  - Collect drill cuttings (petrological samples) at the well sites during and following exploratory well drilling.
  - Make thin sections of samples where possible. The resulting sections will be analyzed
  - Analyze thin sections for major and minor element compositions.
- Collect and analyze drill cuttings in accordance with the *Drill Cutting Sample and Analysis Plan.*
- Prepare tables of the rock compositions for those drill cutting samples that were analyzed.

Products:

- *Drill Cutting Sample and Analysis Plan* (no draft)
- Tables of Drill Cutting Rock Compositions (no draft)

TASK 3 SHALLOW SUBSURFACE GEOLOGIC EXPLORATION

The goal of this task is locate geothermal anomalies using two different shallow subsurface exploration methods: a two-meter soil temperature probes survey and a soil gas measurement survey. Temperature measurements at a two-meter depth help identify thermal anomalies even where no surface manifestations are present. This technique can greatly reduce the number of temperature gradient wells used to identify zones of thermal upwelling. Soil gas measurements are used to detect hidden geothermal systems based on the concept that gases, which are

released from active geothermal systems, rise freely through the subsurface and can be detected at the near-surface by migration through faults zones. The largest gas proportion is carbon dioxide with lesser amounts of hydrogen sulfide and methane.

The Recipient shall:

- Prepare a *Shallow Subsurface Exploration Plan* that describes how the two-meter soil temperature probe and soil gas surveys will be accomplished. The plan will include, but not be limited to, descriptions of the probe and grid location selection process, probe and gas accumulation chamber installation, number of probes and gas accumulation chambers to be used, how measurements will be taken and constituents measured, probe and gas accumulation chamber removal, data analysis, and repeating measurements along finer grids.
- Conduct the two-meter soil temperature probe survey and soil gas survey in accordance with the *Shallow Subsurface Exploration Plan*.
- Prepare a *Shallow Subsurface Exploration Report* that discusses the soil temperature and soil gas survey results and the correlation of the results with geologic and other geotechnical data. The report shall also include, but not be limited to:
    - Color figure(s) showing two-meter probe temperatures and soil gas locations and concentrations.
    - A spreadsheet of the sample locations, dates, and results.
- Participate in a Critical Project Review Meeting per Task 1.2

Products:

- *Shallow Subsurface Exploration Plan* (no draft)
- *Shallow Subsurface Exploration Report* (no draft)

TASK 4 TEMPERATURE GRADIENT WELL DRILLING AND LOGGING

The goal of this task is to ensure a successful drilling program, obtain temperature gradient data with depth to help characterize the geothermal resource, and identify a target for confirmation/production drilling.

The Recipient shall:

- Prepare a *Temperature Gradient Well Drilling and Logging Plan*. The plan shall include, but not be limited to, descriptions of/information on all of the following: how previously collected exploratory data (i.e., seismic, magnetotelluric, two-meter probe temperature, soil gas, and geochemistry) will be evaluated and drilling target(s) selected; how many wells will be drilled; site conditions of concern that may impact drilling process or well construction (such as swelling clays); drilling process and requirements; well size and construction; and how and when temperature gradient well logging will be conducted. The plan shall also address responsibilities for and how all of the following will be accomplished:
    - Ensuring all permits are obtained and regulatory conditions have been met.

  - Preparing drill pads and site access as needed.
  - Mobilizing drilling equipment and crew.
  - Supervising drilling activities, obtaining and analyzing drill cuttings, maintaining a log of in/out drill mud temperatures.
  - Demobilizing and removing all equipment and debris from the well site, as well as restoring the site to acceptable levels, including leveling of drill cuttings.
- Conduct temperature gradient well drilling and logging in accordance with the *Temperature Gradient Well Drilling and Logging Plan*.
- Prepare a comprehensive *Geologic Setting and Geothermal Potential of the Surprise Valley Hot Springs Area* report that discusses the activities and results of Tasks 2, 3 and 4; provides data interpretations and a discussion of the potential for thermal energy, and structural or other geologic controls of the geothermal waters; and includes recommendations for next steps. The report shall also include, but not be limited to, all of the following:
  - A graph and spreadsheet showing temperature gradient for each well for at least two time intervals.
  - A lithologic log for each well.
  - A written interpretation of the results of well logging, which will be integrated with the geophysical and geochemical data generated from Tasks 2 and 3.

Products:

- *Temperature Gradient Well Drilling and Logging Plan* (no draft)
- *Geologic Setting and Geothermal Potential of the Surprise Valley Hot Springs Area* Report (no draft)

TASK 5 ECONOMIC FEASIBILITY AND MARKET ANALYSIS

The goals of this task are to provide an estimate of the economics of developing the geothermal resource in Surprise Valley Hot Springs area; identify the best energy markets to pursue; and generate information that can be used in a future plan for geothermal development.

Task 5.1 Model Potential Outputs from Geothermal Resource

The goal of this task is to assess the potential energy outputs or products that could be reasonably produced from a geothermal resource in the Surprise Valley Hot Springs area, given initial projections and data regarding the regional infrastructure (roads, industry, grid system, etc.).

The Recipient shall:

- Model the potential energy outputs/products from a geothermal resource in the Surprise Valley Hot Springs area, including electric and cascading and direct thermal uses.

- Identify energy inputs necessary to make the use of geothermal resources by businesses successful, including use for electric generation, agriculture, aquaculture and direct heating.
- Estimate development costs for each potential output/product.
- Prepare a *Geothermal Energy Outputs Report* that describes the modelling conducted, task results, and steps taken to define potential energy outputs/products from the geothermal resource, identify the energy inputs needed by businesses, and estimate development costs for each potential output/product. The report shall also include, but not be limited to, listings of potential energy inputs, outputs, and benefits of a single geothermal development scenario or multiple scenarios.

Products:

- *Geothermal Energy Outputs Report* (no draft)

Task 5.2 Market Analysis

The goal of this task is to assess the value of the geothermal energy outputs/products from the Surprise Valley Hot Springs area, both locally and in distant markets, in order to understand which markets create the largest economic activity for each potential output/product.

The Recipient shall:

- Perform an analysis of the market for the potential energy outputs/products from the geothermal resource in the Surprise Valley Hot Springs area. The market analysis shall consider both immediately surrounding and distant markets, and shall determine the market, its location, the pricing it will support, the size, and costs associated with getting the energy outputs/products to market.
- Prepare a *Geothermal Market Analysis Report* describing the process and assumptions used for the market analysis and listing market locations for each energy output/product, costs of getting the product to market, market price, market size, and criteria used for evaluating the market.

Products:

- *Geothermal Market Analysis Report* (no draft)

Task 5.3 Economic Analysis of Outputs and Market

The goal of this task is to combine or align the potential geothermal energy outputs/products and markets into an economic analysis that determines a rate of return for each product/market and prioritizes which products and which markets give the best chance for success.

The Recipient shall:

- Perform an analysis that combines energy output/product costs (production, labor, raw materials, and capital) and the Task 5.2 market analysis data to determine the economic feasibility of each energy output/product and identify the best product and market combinations.

- Evaluate and estimate market stability/risk and the long term viability of the geothermal resource.
- Prepare a *Geothermal Economic Analysis Report* that includes a cash flow analysis for a minimum of twenty years for each of the product/market combinations. The report shall also order the products/market combinations using internal rate of return, compatibility with the community, and risk.

Products:

- *Geothermal Economic Analysis Report* (no draft)

TASK 6 INSTALL AND COMMISSION DISTRIBUTED ENERGY RESOURCE UNIT

The goals of this task are to 1) demonstrate the operation and benefits of a small distributed electric energy resource unit (energy unit) using the existing Surprise Valley Hot Springs geothermal surface flow; 2) contribute energy to the local electrical grid; 3) provide a demonstration project that increases public exposure to the geothermal electrical generation technology (binary and distributed generation) while serving as an educational showcase; and 4) build support for a larger geothermal electrical generation development project in the future.

Task 6.1 Design and Planning of Distributed Energy Resource Unit System

The goal of this task is to complete the site design and planning for placement of the energy unit so that cost is minimized, the unit performs as predicted, and public education is maximized.

The Recipient shall:

- Prepare a *Distributed Energy Resource Unit System Design and Site Configuration Plan* that describes what is required for system design and site configuration, who will be responsible for completing the specific activities, and how all of the following will be accomplished:
  - Developing detailed engineered drawings.
  - Coordinating design and planning with Surprise Valley Electric and others.
  - Obtaining required permits.
  - Developing any necessary subcontracts and awarding jobs to subcontractors.
- Conduct system design and planning activities in accordance with the *Distributed Energy Resource Unit System Design and Site Configuration Plan*.
- Prepare schematic engineered drawings showing system design and layout in accordance with the *Distributed Energy Resource Unit System Design and Site Configuration Plan*.

Products:

- *Distributed Energy Resource Unit System Design and Site Configuration Plan* (no drafts)
- Schematic engineered drawings showing project design and layout (no drafts)

Task 6.2 Site Preparation

The goal of this task is to fully prepare the site to facilitate energy unit system installation, commissioning, long term maintenance, and access for demonstration tours.

The Recipient shall:

- Prepare a *Site Preparation Plan* that describes what is required for site preparation, who will be responsible for completing the specific activities, and how all of the following will be accomplished:
  - Surveying for elevations.
  - Clearing right-of-way.
  - Trenching for new power line to transformer location for the energy unit electrical panel.
  - Installing new power line (3-phase) to transformer location for the energy unit.
  - Backfilling trench and compacting soil.
  - Clearing site for a 30 ft by 60 ft pad for the energy unit and laying gravel.
  - Excavating for placement for the cistern which will be used as a control source for water from the spring source. Water from the spring will flow into the cistern and then be pumped to the energy unit.
  - Installing the hot water pump at the hot spring.
  - Welding pipe to cistern and installing insulated pipe from cistern to the energy unit.
  - Welding and installing discharge pipe from the energy unit.
  - Developing gravel access and gate to the energy unit from Surprise Valley Hot Springs resort for demonstration tours to showcase the technology.
  - Installing safety perimeter fence around the hot spring.
  - Making electrical connection and coordinating with Surprise Valley Electric.
- Conduct site preparation activities in accordance with the *Site Preparation Plan*.

Products:

- *Site Preparation Plan* (no draft)

Task 6.3 Installation and Commissioning

The goal of this task is to install and commission a fully functional energy unit that meets the demonstration, educational, and geothermal energy development support goals of the project.

The Recipient shall:

- Prepare a *Distributed Energy Resource Unit Installation and Commissioning Plan* that describes what is required for unit installation and commissioning, who will

be responsible for completing the specific activities, and how all of the following will be accomplished:

- o Accepting delivery of the energy unit, off-loading the energy unit and setting on pad.
- o Installing the energy unit and electrical interconnect gear.
- o Connecting the hot water source to the energy unit and installing discharge piping.
- o Commissioning the energy unit.
- o Beginning operation.

- Install, commission and operate the energy unit in accordance with the *Distributed Energy Resource Unit Installation and Commissioning Plan*.
- Prepare a *Distributed Energy Resource Unit Installation, Commissioning and Operation Report* for Task 6 that provides descriptions of task activities, any issues encountered, lessons learned; and an evaluation of the performance of the distributed energy resource unit and the integration of the unit with Surprise Valley Hot Springs power needs and the Surprise Valley Electrification Corporation system.

Products:

- *Distributed Energy Resource Unit Installation and Commissioning Plan*
- *Distributed Energy Resource Unit Installation, Commissioning and Operation Report*

TASK 7 PUBLIC OUTREACH

The goals of this task are to 1) keep the public and project stakeholders apprised of project activities and geothermal development progress at specific project sites, as well as in Modoc County in general; and 2) help create a synergistic community economic development environment supported by geothermal energy use and development.

The Recipient shall:

- Prepare a *Public Outreach and Communication Plan* identifying the proposed public events and outreach efforts to be used to highlight project activities and disseminate project data. The plan shall include, but not be limited to, information on possible public events and outreach; the steps that will be taken to accomplish the public events and outreach activities; mechanisms for soliciting public and stakeholder feedback on the outreach and/or project and measuring the effectiveness of the outreach activities; as well as the Recipient and subcontractor or partner roles and responsibilities for accomplishing the public events and outreach. Possible events and activities to be addressed in the plan include, but are not limited to, the following:
  - o A public gathering at the Surprise Valley Hot Springs to introduce the project, showcase the project team, and identify the technologies being used for geothermal exploration.

- A second public gathering tentatively planned for September 2015 to highlight other geothermal exploration in the Surprise Valley that uses a drone to collect geophysical data.
- A third public gathering at the Surprise Valley Hot Springs Resort, planned as the "ribbon cutting" for the commissioning of the distributed energy resource unit.
- Publication of project updates in bulletins, newsletters, and on websites of geothermal industry associations, such as the Geothermal Energy Association.
- Educational outreach to area schools and school children highlighting geothermal energy and energy sustainability opportunities.

- Conduct project public outreach in accordance with the *Public Outreach and Communication Plan*.

Products:

- *Public Outreach and Communication Plan* (no draft)
- Copies of meeting notices and materials, press releases, presentations or publications on the project, project data or project results that are completed or issued within the term of the agreement (no drafts).

TASK 8 TEMPERATURE GRADIENT WELL ABANDONMENT

The goal of this task is to properly plug and abandon the temperature gradient wells drilled as part of Task 4.

The Recipient Shall:

- Prepare a *Temperature Gradient Well Abandonment Plan*. The plan shall include, but not be limited to, information on the Division of Oil, Gas, and Geothermal Resources (DOGGR) requirements for temperature gradient well plugging and abandonment, as well as when and how each temperature gradient well will be plugged and abandoned in accordance with DOGGR requirements.
- Plug and abandon the temperature gradient wells in accordance with the *Temperature Gradient Well Abandonment Plan*.
- Provide documentation that the temperature gradient wells have been plugged and abandoned in accordance with DOGGR requirements.

Products:

- *Temperature Gradient Well Abandonment Plan* (no drafts)
- Documentation that the temperature gradient wells have been plugged and abandoned in accordance with DOGGR requirements. (no drafts)

RESOLUTION NO: 15-0114-8

STATE OF CALIFORNIA
STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: COUNTY OF MODOC

WHEREAS the County of Modoc proposes a project that consists of geologic exploration and the demonstration of a distributed geothermal energy resource, and

WHEREAS the County of Modoc, in accordance with the California Environmental Quality Act (CEQA), has prepared a mitigated negative declaration assessing the environmental impacts of the proposed project; and

WHEREAS the Modoc County Planning Commission reviewed the mitigated negative declaration and determined that with the imposition of the mitigation measures there was no substantial evidence that the proposed project would have a significant effect on the environment; and

WHEREAS the State Energy Resources Conservation and Development Commission (Energy Commission) has reviewed the mitigated negative declaration as a responsible agency under CEQA;

THEREFORE BE IT RESOLVED, that the Energy Commission finds, based on the entire record before it, that the project will have no significant environmental impact; and

FURTHER BE IT RESOLVED, that the mitigated negative declaration reflects the Energy Commission's independent judgment and analysis; and

FURTHER BE IT RESOLVED, that the Energy Commission approves Agreement GEO-14-003 with **County of Modoc** for a **$1,129,619** grant to conduct geothermal resource assessments and exploratory drilling in the Surprise Valley Hot Springs area; install and demonstrate a small geothermal distributed energy unit to generate electricity at Surprise Valley Hot Springs Resort; and conduct a geothermal economic feasibility and market analysis to provide information that can be used in future planning for expanded geothermal development in the area; and

FURTHER BE IT RESOLVED, that the Executive Director or his/her designee shall execute the same on behalf of the Energy Commission.

CERTIFICATION

The undersigned Secretariat to the Commission does hereby certify that the foregoing is a full, true, and correct copy of a Resolution duly and regularly adopted at a meeting of the California Energy Commission held on January 14, 2014.

AYE: [List of Commissioners]
NAY: [List of Commissioners]
ABSENT: [List of Commissioners]
ABSTAIN: [List of Commissioners]

Harriet Kallemeyn,
Secretariat