

Workshop Summary Report
California Geothermal Development Plan Workshop
Woodland, California
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Prepared for:
The California Geothermal Energy Collaborative
P.O. Box 1677
Davis, CA 95617

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National Renewable Energy Laboratory
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Golden, CO 80401
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Prepared by:
Millennium Energy LLC
26596 Columbine Glen Avenue
Golden, CO 80401
(303) 526-2972
www.millennium-energy.net

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1 OVERVIEW

On June 20, 2007 the California Geothermal Energy Collaborative (CGEC) sponsored and conducted the *California Geothermal Development Plan Workshop* at the Hendrick Ag History Center in Woodland, California. The purpose of the meeting was to bring together geothermal stakeholders and provide them an opportunity to give input into the *California Geothermal Development Plan*.

The goal of the plan is to provide strategies and recommendations for enhancing geothermal development in California. This planning report will also provide input to the California Energy Commission as they develop a new renewables roadmap. Building upon the Bureau of Land Management Programmatic Environmental Impact Statement (PEIS) and the US Geological Survey Geothermal Resource Assessment, the CGEC planning document development efforts will provide stakeholders with an opportunity to contribute directly to this process. The *CGEC California Development Plan Workshop* in Woodland was one such opportunity for input in the areas of geothermal resources, permitting and leasing, and governmental policies and procedures.

The meeting was organized into three main sessions: 1) Geothermal Resources, 2) Leasing and Permitting, and 3) Governmental Policies and Marketplace. Within each of these sessions, presentations were provided by CGEC Committee Co-Chairs followed immediately by facilitated discussion sessions allowing for questions and answers, comments, and recommendations for inclusion in the plan. The following sections summarize these presentations and discussions. The meeting agenda is provided as Appendix A. Forty-five people attended this planning session, and a complete attendee roster list is provided as Appendix B.

2 PRESENTATION AND DISCUSSION SUMMARIES

The following sections provide summaries of speaker presentations, as well as synopses of the subsequent discussion and comment sessions.

2.1 Welcoming Remarks

The meeting commenced at 9:00 a.m. with Bill Glassley, Geothermal Project Manager of the California Energy Commission, welcoming the participants to the *California Geothermal Development Plan Workshop*. Dr. Glassley began his remarks by stating that out of all the renewable energy resources in California, geothermal is the preeminent one, but is also the least recognized. He highlighted this point by stating that:

- 1) Incentives for geothermal development are significantly less than those for other renewables;
- 2) Geothermal is rarely pointed to by the governor as an important resource for California; and that
- 3) Geothermal stakeholders need to develop a comprehensive plan for increasing geothermal development in the state – and that the time for development of this strategic plan is now.

He highlighted the coordinated efforts involved in supporting the development of this plan including those of Gerry Braun, Team Lead for the California Energy Commission PIER Renewable Energy Technologies Program Area, who is working on the renewables roadmap, the USGS which is working on the geothermal resource assessment, and the BLM which is working on the PEIS to support leasing in the Western US. In addition, the Executive Committee of the CGEC decided to focus the strategic plan into three key areas: 1) Geothermal Resources, 2) Leasing and Permitting, and 3) Government Policies and the Marketplace. Dr. Glassley noted that the purpose of the planning workshop was to focus on those three areas to gather comments and to discuss the pros and cons of specific comments, ideas, and suggestions. In turn, the CGEC will take the information gathered at the workshop and fold it into the strategic plan and release it for additional comments at the next GRC meeting.

Dr. Glassley concluded his welcoming remarks by reviewing the handouts and materials in the attendees' folders, and discussed the ground rules for the meeting which were to 1) keep comments to one sentence

initially so that they could be easily recorded, and 2) keep on track since time was limited and there were a lot of topics to cover.

2.2 Session One: Geothermal Resources Subcommittee Presentation and Discussion

The first session of the workshop focused on the topic of “geothermal resources” through discussions of areas and lands that hold the greatest promise for potential geothermal leasing and development over the next ten years. The primary focus was on resources to support all types of power production, including EGS and low-temperature binary projects.

Dr. Mack Kennedy of Lawrence Berkeley National Laboratories led the presentation on geothermal resources and was supported by Mr. Paul Brophy of EGS, Inc. Dr. Kennedy began his presentation by stating that two key questions need to be answered in California with regard to its geothermal resource: 1) “How big can we say our resource is?” and 2) “How much of it can we get at economically?” He commented that MIT had just completed a study documenting the national geothermal resource potential, and that we now need to determine what role California will play in meeting this national potential. He then showed a map of the estimated resource base, as well as, a map highlighting how much has been developed to date and where. Next, Dr. Kennedy laid out three suggested goals for the geothermal resource subcommittee of the CGEC, as follows:

- 1) Evaluate the geothermal resource potential;
- 2) Identify impediments to exploration and development; and
- 3) Provide a California Geothermal Resource Development Plan.

Next, Dr. Kennedy discussed the existing sources of information on the geothermal resource base in California, including information from the CGEC Geothermal Summits, CEC reports and documents, and the USGS Circular 790 from 1978. He commented on the outdated nature of the 1978 assessment and how changes in technology (i.e., low-temperature binary power technology, EGS) have altered the applicability of older assessments – as well as the fact that the older assessments do not take into consideration the potential of direct use technologies either.

Dr. Kennedy provided a list of impediments to geothermal resource development in California, namely:

- The wide variety of resource types in California;
- The restricted number of capable exploration entities;
- The need for improved development of exploration tools to identify hidden resources;
- The lack of understanding of resource risk, and
- Restricted access to lands.

Following his discussion on impediments to development, he discussed potential strategies for increasing and/or developing flow and permeability data for existing and known resources.

Dr. Kennedy laid the framework for the ensuing discussion session by highlighting a number of issues and initial recommendations for discussion. The following is a summary of the initial issues and proposed recommendations offered to the group:

- **Issue:** Need a better understanding of the types of resources and applications in the state
- **Recommendation:** Develop a clearer understanding of resource types and their geologic and structural settings

- **Issue:** Do we need to encourage more companies to participate in geothermal exploration in California?
- **Recommendation:** If yes, then we need to develop incentives for those companies to participate

- **Issue:** The exploration tools currently available are not sufficiently accurate to confidently locate drilling targets, and exploration tools to locate hidden hydrothermal resources need development

- **Recommendation:** The industry needs continued research funding to develop additional exploration tools
- **Issue:** The lack of understanding of resource risk often results in potential geothermal resources not being fully evaluated
- **Recommendation:** Need more education regarding real and perceived risk
- **Issue:** Geothermal development requires access to land in specific areas
- **Recommendation:** Develop maps that identify lands that have a long term potential for producing fluids from all types of geothermal resources

Dr. Kennedy concluded his presentation by providing some additional suggestions on what needs to be done to keep geothermal resource exploration activities moving forward in the state, including:

- Encouragement, in the form of incentives, for existing and new explorers;
- Improved/increased funding for geothermal research;
- Better measurement or tool? for exploration and resource risk evaluation; and
- Input from stakeholders in the geothermal community.

Following the presentation, Dr. Kennedy and Mr. Brophy led a discussion session to gather comments and recommendations for possible inclusion in the California Geothermal Development Plan. The following is a synopsis of the discussions and comments:

- The first comment from the audience was a statement that “We don’t understand the Central Valley geothermal resource very well.” Many of the maps of this area are based on shallow depth surface maps, and while the heat flow is not particularly high in the Central Valley there are likely relatively high temperatures at greater depths. This is an area that needs to be looked at in more detail. In addition, there are many areas in California that have high heat flow that can be developed.
- **Question:** Do changes in technology (i.e., small binary units) impact the resource assessment?
Answer: We don’t have a good handle on the impact of these new technologies, and in the same light we also need to take a look at direct use technologies and how they impact the resource assessment.
- Incorporating Ground Source Heat Pumps (GHPs) would also have a dramatic increase in the resource potentials denoted on the maps. We need to discuss and identify impediments to increased GHP penetration in the marketplace. The MIT analysis included GHPs in their projections of market potential, and GHPs also provide an indirect cooling opportunity for utilities.
- We need to explore opportunities for distributed generation with geothermal technologies (i.e., UTC (what does UTC mean?) low-temperature binary units). SMUD could be interested in looking at this technology in distributed generation applications. We need a better understanding of distributed opportunities throughout California. In addition, Federal and state policies related to distributed generation do not include geothermal technologies, and we need to look into how we change that.
- Demonstration projects of the distributed generation potential of geothermal technologies are critical to moving the market forward in California. We need to demonstrate, via pilot projects (i.e., 1 MW power projects), that the technology and benefits are there.
- From a state perspective, we are trying to look at lower temperature resources for the USGS assessment. However, someone needs to look at the temperature difference between an available geothermal resource and the temperature of adjacent cooling capability (delta T’s) of resources in California, since evaluating those delta Ts would be too detailed an effort to be part of the national level assessment by USGS. An important consideration to understand is that the national assessment is not going to give the level of detail the industry needs – particularly in relation to low-temperature technologies. Therefore, the CEC needs to look at developing a supplemental state-wide assessment to capture the additional resource

potential of these technologies, as well as look at cold water temperatures throughout the state to determine co-located cold water and geothermal resources to identify areas/locations with high delta T's.

- **Question:** How much oil and gas drilling data is available to assist in the resource mapping?
Answer: Limited research has been done on the temperature of the water from oil and gas drilling projects, and more importantly what the make-up of the water is (i.e., brine, quality, pressure). The USGS has prepared a Geothermal Resources Council paper on oil fields in Southern California that explore this issue.
- **Question:** How would we go about developing a detailed supplemental assessment of geothermal resources in California?
Answer: It's a matter of detail. The most detailed information exists in the larger resource areas, while the smaller resources have much more limited data.
- **Question:** What can we do to increase geothermal exploration activities in the state?
Answer: Federal and state agencies should collaborate on joint development of exploration projects in California. For example, DOE should work with USGS on scientific exploration on Federal lands in the state. If nothing is found, then move on; but if a resource is found then put it up for lease.
- It costs ~\$2.5M per site to conduct exploration activities. Venture Capitalists are not interested in funding these types of projects because of the long time frames (10 years) to obtain a return-on-investment. Maybe we need to look at more government funding to support exploratory drilling, as well as looking at new ways of thinking to increase exploration activities in the state.
- There is a fundamental gap between the large, known resources and the smaller, individual resources that have not been explored to any extent. This lack of understanding of the lesser known resources has been an impediment to increased exploration. In addition, the costs of exploration are also an impediment, since about 80% of a Greenfield project's costs are related to underground expenses, and about 50% of the project's costs are related to the cost of money over time (finance costs).
- There are a large number of resources in the state that we don't know anything more than we did in the 1970s.
- **Question:** Is it worth it to spend money looking for hidden resources when we haven't improved our exploration tools?
Answer: We need to look at the big picture now. We need to look at the combination of technology advances and its impact on resource potential estimates. In doing so we should spend some money to support strategic projects and applications to justify spending more money on resource exploration activities. In addition, the state should be involved and focused on improving exploration tools for a wider range of technology applications.
- We also need to be sure to include distributed generation resources as part of the resource assessment. Distributed generation via geothermal technologies in high load centers is a high value commodity. In addition, we need to investigate the indirect cooling potential opportunities from Ground Source Heat Pumps.
- What we have is a two-phase problem: 1) We need to find new resources in a short amount of time, and 2) we need to determine how to identify hidden resources.
- From the CEC perspective, it needs to look at how to fund more exploration activities and it needs to develop some smart tools and techniques for exploration.
- **Question:** Is there any way to leverage CEC with DOE funding to support exploration activities?
- **Answer:** DOE will be funding these areas (if and when a budget is passed) and California should step up and go after cost-shared DOE funding. But, we also need to have incentives for private companies to do exploration as well. Such an approach could result in a dual thrust of exploration in both the government

and private sector. An exploration tax credit could also be a mechanism for increasing private sector exploration activities.

2.3 Session Two: Leasing and Permitting Subcommittee Presentation and Discussion

The second session of the workshop focused on the topic of “leasing and permitting concerns” as they impact water, air, cultural, and other issues. The intent of this subcommittee is to develop a “best practices” approach that could be utilized throughout the state to streamline considerations and review of lease applications by governing agencies. The BLM PEIS will be included in this process. Ms. Charlene Wardlow of Ormat led the initial presentation on leasing and permitting and was supported by Ms. Laurie McClenahan Hietter of MHA/RMT who provided the second part of the presentation.

Ms. Wardlow began her presentation by announcing that the California Geothermal Energy Collaborative Geothermal Permitting Guide prepared by Blaydes & Associates was completed, and it will be available soon via download on the CEC web site as CEC-500-2007-027. [Note: This document is now available on the CEC website at http://www.energy.ca.gov/pier/final_project_reports/index.html]. She also mentioned that there were some additional resources available on permitting and related topics that might be useful to the audience, including publications from the Western Governors Association’s Clean Diversified Energy Advisory Council as well as from the National Geothermal Collaborative. These documents address the spectrum of environmental issues related to geothermal, which are essentially the same wherever a plant is being considered or developed.

Next, Ms. Wardlow presented a list of barriers to geothermal permitting including:

- A lack of knowledge or fear of geothermal by government agency staff, environmental groups, and the public;
- A lack of trained staff for timely permitting within Federal, state, and local government agencies; and
- A lack of established interagency coordination in the areas of land leasing, environmental review (CEQA and NEPA), and permitting.

In identifying these barriers, Ms. Wardlow noted that both industry and agency staffs are aging and retiring. As result we are losing embedded knowledge in these agencies while environmental groups continue to be wary of geothermal resources. To address these identified barriers, Ms. Wardlow provided three keys to streamlining the permitting process: education, collaboration, and facilitation.

Next, Ms. Wardlow and Ms. McClenahan Hietter presented some suggestions for the subsequent discussion session by highlighting a number of issues and initial recommendations for consideration. The following is a summary of the issues and recommendations offered to the group:

- **Issue:** Lack of knowledge of geothermal energy, its benefits, and potential impacts creates delays and opposition to projects
- **Recommendation #1:** The CGEC should conduct geothermal education workshops to address “What is geothermal energy development”
- **Recommendation #2:** Hold open houses at operating geothermal facilities
- **Recommendation #3:** Facilitate a traveling training session for media in Los Angeles, Sacramento, San Diego, and the Bay Area
- **Recommendation #4:** Prepare a follow-up document to the “Outreach Principles and Comment Analyses Report” (by the National Geothermal Collaborative) to provide case studies of producing projects to support mitigation success (i.e., document the lack of impacts previously perceived to exist)
- **Recommendation #5:** Coordinate training for tribes, industry, and agencies on the Section 108 process under the National Historic Preservation Act
- **Issue:** Geothermal development requires extensive interagency coordination and permitting

- **Recommendation #6:** Create a geothermal “Agency SWAT Team” to provide educated and dedicated agency personnel; interagency collaboration and facilitation is key to geothermal development (i.e., BLM, Forest Service, and others each have their own regulations and processes – we need to get agencies together and get them on the same page); it is critical to put people together from various agencies and get them trained and working together to process permits
- **Recommendation #7:** Fund one or more positions to process permits
- **Issue:** Industry needs assistance with facilitation of permitting
- **Recommendation #8:** Prepare Memorandums of Understanding between the agencies at leasing; develop a template that could be used for various projects
- **Issue:** The geothermal industry needs assistance with streamlining permitting
- **Recommendation #9:** Identify geothermal activities that are not significant and obtain CE or CX under CEQA and NEPA
- **Recommendation #10:** Thoroughly define all typical exploration and development activities in PEIS to streamline future NEPA analysis; get the full range of geothermal activities defined in the Programmatic EIS so that individual projects can pull out relevant sections to their projects, as needed.
- **Recommendation #11:** Make Programmatic EIS a joint PEIS/EIR; the industry needs to include as much in the PEIS as possible so that portions can be pulled out to form the basis for the CEQA process

Following their presentation, Ms. Wardlow and Ms. McClenahan Hietter led a group discussion and question and answer session on the 11 recommendations suggested for inclusion in the California Geothermal Development Plan. A synopsis of this session is provided below:

- The first comment related to public outreach with the participant stating that he is impressed with the Calpine Geothermal Visitor Center in Middletown, CA but it is remote, and that similar facilities to educate the public should be funded in places like Mammoth and Steamboat, Nevada. He also commented that it would be appropriate to spend some grant money on developing geothermal visitor centers and publicize these centers as tourist attractions. It would also be appropriate to include web cams at some of these visitor centers for people who can’t go there to see them in person. (I think this person said to put a camera at a drilling rig instead of at a VC)
- Related to the tourist visitor centers, Marilyn Nemzer of the Geothermal Energy Office is working on a “3-D” animation of a geothermal power plant that is almost complete, but needs more funding. When finished, this animation could be posted on the CEC and CGEC web sites, as well as GEO’s, to serve as a virtual tourist trip.
- **Question:** If you did a Programmatic EIS/EIR what exactly could you include in this process that would address delays in leasing and other permitting processes?
Answer: Elements of the PEIS/EIR could be used to address CEQA permitting and other permitting requirements based on known exploration and development impacts.
- **Question:** Is this process for Federal or state land?
Answer: Both.
- Another audience member commented that Truckhaven BLM leasing EIS is using this process to help streamline state and local permitting reviews required under CEQA.
- Geothermal education needs to target legislators.
- The industry needs to take advantage of “free advertising” via development of documentaries. The renewable industry is in the spotlight right now and we need to focus on documentaries showing how geothermal works, and target the Discovery Channel and similar educational channels. The History Channel and Discovery Channel are working on programs highlighting geothermal; we need to focus on

direct use and Ground Source Heat Pumps in addition to power plants. We need to look at the resource as a whole and its entirety of applications.

Next, the moderators asked the audience, "What are the priorities for implementing the recommendations provided today?" The following is a list of the ten priorities identified by the audience members:

- 1) A major priority is Truckhaven and getting all the agencies on the same page. The key is to implement the suggestions put forth today and getting them "in the can" and in front of the public.
- 2) One of the issues of getting funding from DOE is the perception that geothermal is only applicable to one or two states, which is untrue. We need to get the word out on its national applicability.
- 3) We, as a group, should consider a ballot initiative to invest in the geothermal solution (i.e., a bond initiative). We should look at the Stem Cell Initiative in California as a model. Whether a geothermal funding initiative passed or failed it would be a tremendous opportunity for education and getting the word out.
- 4) Target the Governor's Office, as well as legislators, to bring geothermal to the forefront of the RPS and Climate Change Initiatives.
- 5) Target legislators with geothermal resources in their districts and educate them on the economic development opportunities provided by geothermal projects.
- 6) Educate the public on the fact that 26-28% of California's RPS resources will come from geothermal and that approximately 5% of all power in the state is already from geothermal.
- 7) We need to make a linkage in educating both the public and politicians; we need to provide a simple message, such as "geothermal – a clean, reliable, electric power supply" and establish the promise of California as the leader in geothermal energy across the country and to countries around the Pacific Rim.
- 8) As part of our educational efforts we need to re-brand geothermal with a fresh set of eyes and think about it from a new perspective. We need to re-brand it and re-frame it and give it a new term – maybe something like "Earth Power".
- 9) The market demand for Ground Source Heat Pumps is being pulled by the opportunity of individuals to see the impact of their actions and to do something for the right reasons – we need to capitalize on this as well.
- 10) Wind and Solar have a strong message. Geothermal, via the GEA/GRC/CGEC organizations needs to re-brand with a simple "all-positive" message.

2.4 Session Three: Governmental Policies and Marketplace Approaches Subcommittee Presentation and Discussion

The third session of the workshop focused on the topic of "government policies and marketplace approaches" and reviewed the impact of state and Federal government policies, practices and incentives on geothermal development in California. The session also examined general marketplace approaches to expanding geothermal regarding how best to encourage consumer interest, financing, and investor backing.

Mr. Karl Gawell, Executive Director of the Geothermal Energy Association and the California Geothermal Energy Association led and moderated the session. Mr. Gawell began his presentation by quoting LBJ, "You don't sell the government solutions, you sell them problems and government will solve them." He commented that we need to keep this mind in terms of promoting the geothermal industry to government. He then segued into the President's proposed budget related to geothermal activities, which he summarized as follows:

- No geothermal research program;
- No tax credit extension or changes;
- Limited funds for the USGS resource assessment;
- Repeal of BLM dedicated funding;
- Repeal of County shares of geothermal royalties;
- Funds for BLM Programmatic EIS activities;

- Funds for a DOE EGS workshop; and
- Exclusion of geothermal from the second round of the DOE Loan Guarantee Program.

Mr. Gawell said that conversely, things have changed a bit in Congress citing that:

- The Science Committee passed a soup-to-nuts \$90M per year Advanced Geothermal Research Bill including funds for exploration, co-located fluids energy production, and a design competition – noting that its passage had bipartisan support;
- The House Energy and Water Committee appropriated \$44M for the DOE Geothermal Research Program in FY08, and it is apparent they are no longer funding the old DOE program, but do support funding of a whole new DOE program.
- Bi-partisan Senators introduced a National Geothermal Initiative Bill;
- The Senate Finance Committee approved a 5-year Production Tax Credit (PTC) extension; and
- The Budget Committees rejected proposals to repeal the county share of geothermal royalties as well as BLM dedicated funds.

Mr. Gawell suggested that there are questions whether vetoes are looming over these congressional actions, but that it sure helps to have bi-partisan support of these measures.

Next, Mr. Gawell discussed the California market for geothermal noting that in 2005 about 5% of California's electricity generation came from geothermal power plants. This amounted to a net total of 14,379 GWh. Also in 2005, California's geothermal capacity exceeded that of every country in the world, and currently the state has 2492.1 MW of installed capacity. There are also 15 geothermal projects currently under review or slated for development which would add another 921 to 969 MW of geothermal capacity in the state. With respect to policies in the state, Mr. Gawell commented that the CEC Energy Plan has very few geothermal specific policies. In addition, while that state has biomass, solar, and wind initiatives, it has no comparable geothermal plan. However, it is important to realize that meeting the state's RPS and climate change goals will be more costly and difficult without a significant contribution from geothermal energy resources.

Mr. Gawell then highlighted a number of problems in the policy and market development arena, and suggested a number of recommended policy actions for discussion and consideration by the group. The following is a summary of the identified problems and recommended policy actions:

- **Problem:** We need to find the resource
- **Policy Recommendation #1:** Enact tax incentives for exploration costs – a 10% Federal tax incentive should be enacted that is separate and in addition to any other credits or incentives
- **Policy Recommendation #2:** Fund USGS/DOGGER enhanced resource assessment efforts
- **Policy Recommendation #3:** Enact special exploration leasing rights to include an exploration permit that becomes a lease under certain conditions
- **Policy Recommendation #4:** Explore opportunities for government/ industry cost-shared exploration and drilling
- **Policy Recommendation #5:** Designate geothermal development “regions” or “areas”, and tie these regions to transmission needs.
- **Policy Recommendation #6:** Fund research and development of new exploration technologies, including development of new tools to support advanced exploration technologies. It is estimated that each new research technology would cost about \$30-40M to develop, and private sector companies don't have that amount of money in their research budgets. Therefore it would be imperative to research the possibility of obtaining government funds for the development of these new exploration tools and technologies.
- **Policy Recommendation #7:** Develop a geothermal/ geologic data clearinghouse to collect and disseminate old data, as well as compile new data on geothermal resources. Currently, no single clearinghouse with readily accessible information exists.

- **Problem**: Securing development rights is very uncertain and can take years
- **Policy Recommendation #8**: Explore the opportunities with the Programmatic EIS further; saving even a few steps in the process could have huge impacts
- **Policy Recommendation #9**: Similarly, we need to look at development of a State Land EIS and a Statewide BLM EIS
- **Policy Recommendation #10**: Convene an advisory group made up of industry, environmental, Federal/state government stakeholders to work through land acquisition issues; it is imperative that a coordinated effort be developed among these stakeholders to help streamline projects and avoid delays.
- **Policy Recommendation #11**: Hold regular federal and state lease sales – California may hold a lease sale for state land for geothermal development
- **Policy Recommendation #12**: Hold contingent right sales
- **Policy Recommendation #13**: Coordinate Federal-state leasing and permitting efforts. A big problem is that resources are often located on a mix of Federal, state, and private lands; no exploration will be done without securing the land rights first.
- **Issue**: Those with development rights need to have development capability – both technical and financial
- **Policy Recommendation #14**: Establish a geothermal development fund to finance new ventures; finance rates have a huge impact on project economics as evidenced by the fact that commercially financed projects average about 9 cents/kWh in production costs while investor-owned utility financed projects at lower interest rates are averaging about 6 cents/kWh.
- **Policy Recommendation #15**: Consider establishment of loan guarantees, although this is not being clamored for by industry
- **Policy Recommendation #16**: Provide incentives for “geothermal dedicated” drilling rigs – consider special tax treatment for dedicated rigs
- **Policy Recommendation #17**: Provide incentives for construction/engineering firms to build geothermal capabilities
- **Policy Recommendation #18**: Provide incentives for equipment suppliers
- **Policy Recommendation #19**: Develop uniform permitting/EIS procedures (i.e., develop a cookie cutter approach for specific technology types)
- **Policy Recommendation #20**: Provide long-term financing fund to reduce costs over the period of the project
- **Issue**: Projects must make economic sense
- **Policy Recommendation #21**: Continue to extend the Federal PTC – however, the problem with the PTC is that it does not kick in until production starts.
- **Policy Recommendation #22**: Continue to make Federal Clean Energy Bonds (CREBS) available to municipal utilities and cooperatives
- **Policy Recommendation #23**: Continue to develop and expand the state Renewable Portfolio Standards (RPS)
- **Policy Recommendation #24**: Establish Feed-in Tariffs for geothermal resources which remove a lot of the uncertainty of project finances by providing a fixed price of power for a specified period of time.
- **Issue**: Securing transmission for geothermal power is a major issue
- **Policy Recommendation #25**: This is a large and rapidly growing issue that needs to be addressed and policy initiatives developed to alleviate transmission access issues
- **Issue**: We need to encourage development of all geothermal technologies, including direct use (DU) and ground source heat pumps

- **Policy Recommendation #26:** Develop and/or expand incentives for direct use and heat pump technologies
- **Policy Recommendation #27:** Incorporate DU and heat pump technologies into building codes
- **Policy Recommendation #28:** Promote the “Green G” branding of businesses employing geothermal technologies
- **Policy Recommendation #29:** Solicit DOE-CEC engineering support for public buildings
- **Policy Recommendation #30:** Develop a web based database of DU and heat pump projects
- **Policy Recommendation #31:** Include all geothermal technologies in the PEIS
- **Policy Recommendation #32:** Develop a standard negative declaration for CEQA for DU projects
- **Policy Recommendation #33:** Provide DU and Heat pump technologies with renewable attributes that can be traded or monetized (thermal RECs/green tags)
- **Policy Recommendation #34:** Fund and develop demonstration centers highlighting DU and heat pump technologies

Mr. Gawell concluded his formal presentation with the comment that “education is the key” to our future success as an industry, and that we need to educate people about the existing and potential contribution that geothermal resources can make, and what future development of geothermal can mean compared to the alternatives – particularly nuclear and coal – for the environment, public health, public safety and the consumer. We need to understand and educate the public that coal and nuclear are our competition and our reference point in terms of societal impacts. He concluded his remarks by commenting that if we want more ideas on what we can do and what strategies are available to promote geothermal, then one just needs to search on the word “solar” in the state’s energy planning documents to see what’s available and possible.

Next, Mr. Gawell led a brief session soliciting comments from the audience on the topic of governmental policies and market approaches. Comments received included:

- As we promote the geothermal industry, we all need to speak with one voice, and we need to send a consistent message to the public and the legislators. In doing so, we need to work off of a consistent set of numbers that are defensible,
- We need to assert the positives of geothermal and make them widely known,
- The resource identification and characterization work is key to the industry’s success; responding to the RPS is extremely difficult without better information on the available resource.
- Competition on base load power is something that needs to be looked at in terms of the role of geothermal in the state; it’s where the Commission is heading with regard to nuclear power.
- We should put on an “ACORE” type conference for state legislators. Term limits have certainly changed the landscape and legislators and staff need to be educated more frequently.
- Maybe putting on a “Geothermal Day” vis-à-vis the old Clean Power Days previously conducted by CEERT for the legislators is in order and should be explored.

Following this comment period, Mr. Larry Grogan addressed the group and provided his perspective on the problems and solutions regarding geothermal development in California. Mr. Grogan is the Chairman of the Imperial County Board of Supervisors. Mr. Grogan began his comments by stating that he heard the same thing here today that he heard back in 1978, and asked, “What have we done since then ?” He asserted that the biggest impediment to geothermal production in California is the CEC. For example, he asked, “Why are all the geothermal power plant proposals all coming at 49.9 MWs?” and answered that it’s because a whole new set of red tape and bureaucratic permitting rules come into play at 50 MWs which preclude them from being proposed by the developers. He also stated if they were allowed to develop 100 MW projects that there would be no transmission issues associated with geothermal in the Imperial Valley. He also stated that the Board of Supervisors in Imperial Valley is opposed to the proposed GreenPath transmission line because of who is building it – San Diego Gas & Electric and Sempra; and they believe that the developer’s true interest in the line is to import cheap power from Mexican power plants with no emissions controls on them. So, with that dilemma, how do we get enough commitment to fill the GreenPath to capacity? A simple solution is to

streamline permitting of 100 MW geothermal power plants. However, it's hard to understand why the CEC won't approve 100 MW geothermal power plants since we have proven for over 25 years that we can handle it; we have 2500 MW that we can bring on line, and there's nothing that we can do about it to make it happen.

Another issue that Mr. Grogan addressed was the fact much of the geothermal resources are owned by companies like Cal Energy who have to measure the economic performance of geothermal projects against all other development opportunities to determine which project has the highest ROI in the shortest timeframe. Meanwhile, there is a lot going on in the Imperial Valley related to energy development, including a proposed 300-900 MW Sterling Solar System, but things are moving slow on geothermal development. He concluded his remarks by stating that he would like to see carbon credits allocated to geothermal power projects, and that a Renewable Energy Commission should be established in the Imperial Valley to facilitate geothermal project development.

Following Mr. Grogan's comments, Mr. Gawell suggested that we should bring in county representatives to the Commission for a day of presentations and discussion to educate the Commissioners, and to facilitate change and streamline geothermal development in the state. Another audience member commented that we need a buyer for the power and that this is a key issue that needs to be addressed, adding that we are not going to meet the RPS requirements unless we work on the whole renewable procurement process.

Following lunch, Jack Peterson of the BLM and Rich Ferguson of the Center for Energy Efficiency and Renewable Technologies (CEERT) addressed the group with some announcements and remarks. Mr. Peterson was the first to speak, and commented that there is one word to describe today's discussions and that's "huge", and added that the timing of these discussions is perfect. He noted that the language is now out on the Programmatic EIS, and that the need for a clearinghouse of geothermal data is imperative. And, California is the epicenter of geothermal data, information, and experience with the GRC, USGS, CEC, LBNL, LLNL, GEO, CGEC and others all located within the state. Mr. Peterson then focused on the USDA/US DOI joint effort to streamline the BLM leasing process. Included in these efforts is the Programmatic EIS under development. The PEIS is being done at the "50,000 foot level" and the BLM is looking at policies for state and private lands as well, and while this is being done at a high level it should add value to the process. It is also the goal of the BLM to eliminate the backlog of pending lease applications by 2010, and the process is underway now and applications are being culled to a short list. Mr. Peterson then discussed the PEIS in more detail and commented that they are working with states, the USGS, DOE, national labs, and others in the process. He strongly encouraged all the audience members to participate in the PEIS Scoping Meetings being held over the next couple of months and to provide input into the process. He also highlighted the fact that the Western Electric Coordinating Council was holding a meeting to discuss transmission issues and also encouraged participation by the group in that meeting.

The second speaker to address the workshop attendees after lunch was Mr. Rich Ferguson of CEERT. He provided an overview of the transmission planning project that CEERT is working on for the CEC, by outlining the need for 4500 MW of transmission capacity at Tehachapi. The problem is that it takes about ten years lead time to build a transmission project. As a result, these projects need to be on the table by 2010 to meet the 2020 RPS targets. CEERT is working on a plan for transmission requirements for renewables and needs help from all renewable energy technology representatives to determine which major transmission projects will be built in the future. There is a need for 25,000 MW of transmission in California by 2020 (estimated to cost about \$10B) and CEERT is forming a stakeholder group to provide input, data, and insight into the decision-making process. The group needs a representative from the geothermal community, so if anyone is interested contact Rich Ferguson or Judy Fischette from CGEC.

3 CLOSING SESSION -- WORKSHOP WRAP UP AND KEY RECOMMENDATIONS

The final session of the day was designed to wrap up the three discussion sessions held earlier, and for the moderator of each session to present the top three or four recommendations for inclusion in the California

Geothermal Development Plan. This was followed by a brief final comment period to gather any additional suggestions or recommendations from the audience.

Karl Gawell was the first moderator to offer his recommendations from the governmental policy session, which included:

1. We need to proceed with the more detailed California geothermal resource assessment to supplement the USGS assessment, and we need to do it immediately. The group should write a collective letter to the CEC and request that GRDA funds be directed to this new assessment now. Completion of this assessment will not only support the conventional geothermal power plant opportunities, but also support development of geothermal distributed generation, smaller power plants, low temperature power plants, and direct use projects.
2. We need to support and expand the efforts on the Programmatic EIS. The coordination of various Federal and state agencies to provide short cuts to the permitting process will provide huge benefits down the road.

Next, Laurie McClenahan Hietter offered her top three recommendations from the leasing and permitting session, which included:

1. Re-branding of the geothermal product: we need to develop the “sound bite” to build the geothermal ballot proposition.
2. Education: many of the recommendations from the permitting session fall under the category of education, and a particular focus should be placed on educating the media, legislators, and the Governor’s office.
3. There needs to be more accessible information on educational resources (i.e., web-based education resources with cross references).

Lastly, Paul Brophy provided his top three recommendations from the geothermal resources session, which included:

1. There needs to be a “next step” of geothermal resource characterization in California. This supplemental resource assessment should build off of the GeothermEx report and develop additional detail on resources (in conjunction with the USGS national assessment efforts).
2. In the longer term, we need to look at identifying hidden resources which will require the development of advanced tools for their exploration. We will need to be able to look at larger areas of land (~100-150 square mile areas) and then target areas down to the square acreage scale.
3. We need to set up funding mechanisms for cost-shared drilling activities. The Canby project in northern California is a good example of how to do that.

After the key recommendations were presented, Bill Glassley asked the attendees if there were any additional issues or recommendations that should be brought to the table before the meeting was adjourned. The following bullets highlight the comments during this final session:

- We need to acknowledge the cross-spectrum of technologies represented in the geothermal community;
- “Earth Power”, or something like it, is the “brand” of geothermal power, but the key is the “tag line” to the brand – it’s important to recognize the importance of the “tag line” and develop it;
- We need to collaborate with other groups who are looking at renewable energy ballot initiatives and coordinate our efforts. We will need ~500,000 signatures to get an initiative on the ballot;
- We need to put together a list of web sites and links to geothermal information. We have been pretty successful with putting geothermal information on CD’s, but we need to be web-based. In addition, we should look at putting web cams on drill rigs;
- We should discuss, within our group, the recommendation of allocating GRDA funds to for a supplemental resource assessment before we finalize the recommendation. We should also be careful in targeting existing sources of funds because there probably aren’t enough to do everything that needs to be done;

- Completing a good resource assessment is a key requirement for asking the legislature for additional funds to do all the other things we are discussing here today. So, the question is, “Where does the money come from to do the supplemental resource assessment?” DOE has a continuous fund for all the other renewable resources, but not for geothermal.
- The national assessment developed at the NREL workshop last year has come in handy time and time again. A more detailed assessment of California will be even more important to have. Jim Lovekin’s work was a revolutionary product and we need to take the next step in building on that assessment. In pursuing this supplemental assessment, it will be important to determine exactly what we need since there are different levels of resource assessment for different needs and audiences. We really need to come to a consensus on the intended audience and desired outcomes from a supplemental detailed geothermal resource assessment for the state.

Following this final comment period, Bill Glassley thanked all the attendees for coming, and for all of their valuable input into this process. He adjourned the meeting at 2:30 PM.

Appendix A: Meeting Agenda

California Geothermal Development Plan *Workshop Agenda*

8:00 – 9:00 a.m. **Check-in**

9:00 – 9:15 a.m. Welcome

A summary of the California Geothermal Development Plan will be presented including its relationship to the new CEC Renewables Road Map.

William Glassley, California Energy Commission (moderator)

The following three sessions will begin with a short presentation on the challenges and issues facing the geothermal community. After each presentation, attendees will participate in a general discussion to provide additional recommendations offering the best solutions for increasing geothermal development in California.

9:15 –10:15 a.m. Geothermal Resources Subcommittee Presentation

The session will concentrate on Geothermal Resources by identifying which areas or lands hold the greatest promise for potential geothermal leasing and development over the next ten years. Focus will be on geothermal development for all types of power producing technologies, EGS projects, and low-temp binary projects. The current efforts of the USGS will play a major role.

Co-Chairs: Paul Brophy, EGS, Inc. and Mack Kennedy, Lawrence Berkeley National Labs

10:15 –10:30 a.m. **BREAK**

10:30 –11:30 a.m. Leasing and Permitting Subcommittee Presentation

The session will focus on Leasing and Permitting concerns as they impact water, air, cultural issues, etc. The intent is to develop a “best practices” approach that could be utilized throughout the State to streamline consideration and review of lease applications by governing agencies. The BLM Western EIS program will be included in the process.

Co-Chairs: Charlene Wardlow, Ormat Nevada Inc. and Laurie McClenahan Hietter, MHA/RMT Inc.

11:30 –12:30 p.m. Governmental Policies & Marketplace Approaches Subcommittee Presentation

The session will review the impact of state and federal governmental policies, practices and incentives on California geothermal development. It will also look at general marketplace approaches to expanding geothermal regarding how best to encourage consumer interest, financing and investor backing.

Co-Chairs: Karl Gawell, Geothermal Energy Association and Jonathan Weisgall, MidAmerican Energy Holdings Co.

12:30 – 1:30 p.m. **LUNCH (included with registration)**

1:30 – 2:30 p.m. Panel Question and Answers and Wrap-up Session

The goal of the wrap-up session will be to create a list of the key development options in each of the areas of geothermal resources, leasing and permitting, governmental policies and marketplace outreach that will have the greatest impact on geothermal development in California.

William Glassley- moderator

2:30 p.m. **Adjourn**

Appendix B: Attendee List Phone/Email

Geothermal Development Plan Workshop						
California Geothermal Energy Collaborative			Attendees List		Woodland, California - June 20, 2007	
Last Name	First name	Organization	City	State	E-mail Address	Phone Number
Arnold	Shaune	Dongell, Lawrence and Finney	Los Angeles	CA	sarnold@dflawyers.com	213-943-6100
Bate	Kevin	RMT, Inc.	Los Angeles	CA	kevin.bate@rmtinc.com	310-488-2281
Beyer	John Henry	California Energy Commission	Sacramento	CA	jbeyer@energy.state.ca.us	916-654-4609
Blaydes	Paula	Blaydes & Associates	Santa Rosa	CA	peblaydes@comcast.net	707-537-8727
Bourg	Joe	Millennium Energy LLC	Golden	CO	millnrg@earthlink.net	303-526-2972
Braun	Gerald W.	California Energy Commission	Sacramento	CA	gbraun@energy.state.ca.us	916-653-8906
Brophy	Paul	EGS Inc.	Santa Rosa	CA	pbrophy@envgeo.com	707-544-0955
Bruton	Carol J.	LLNL	Livermore	CA	bruton1@llnl.gov	925-423-1936
Campbell	Don	Ormat	Reno	NV	dcampbell@ormat.com	775-356-9029
Carter	Anna	Geothermal Support Services	Rohnert Park	CA	annacartr@aol.com	707-585-2111
D'Olier	William L.		Bakersfield	CA	gepca@sbcglobal.net	661-832-9592
Dudak	Daniel	California State Lands Commission	Long Beach	CA	dudakd@slc.ca.gov	562-590-3132
Eddy	Shannon	Conscious Ventures Group	Sacramento	CA	shannon@consciousventuresgroup.com	916-731-8371
Ferguson	Rich	CEERT	Boonville	CA	rich@ceert.org	707-895-9121
Fisch	Edward					
Fischette	Judy	CGEC	Davis	CA	fischette@sbcglobal.net	530-848-8043
Gawell	Karl	Geothermal Energy Association	Washington	DC	karl@geo-energy.org	202-454-5264
Geyer	John	John Geyer & Associates	Vancouver	WA	jgeyer@jgainc.com	360-882-5050
Glassley	Bill	CEC- Geothermal Programs	Sacramento	CA	wglassle@energy.state.ca.us	916-654-4838
Grogan	Larry	County of Imperial	El Centro	CA	larrygrogan@co.imperial.ca.us	760-482-4290
Gutierrez	Pablo	California Energy Commission	Sacramento	CA	pgutierr@energy.state.ca.us	916-654-4663
Hill	Roger	Sandia National Laboratories	Albuquerque	NM	rrhill@sandia.gov	505-844-6111
Hodgson	Susan		Davis	CA		530-756-9534
Hoops	Rich	BLM, Nevada State Office	Reno	NV	rhoods@nv.blm.gov	775-861-6568
Johnson	Elizabeth	California Division of Oil, Gas, & Geothermal Resources	Sacramento	CA	ljohnson@consrv.ca.gov	916-323-1786
Kennedy	Mack	Lawrence Berkeley National Laboratory	Berkeley	CA	bmkenedy@lbl.gov	510-486-6451
King	John	EMPS, Inc.	San Francisco	CA	john.king@empci.com	415-544-0440
Knox	Bill	CEC Renewables Office	Sacramento	CA	bknox@energy.state.ca.gov	916-654-4417
Lovekin	James	GeothermEx, Inc.	Richmond	CA	jwl@geothermex.com	510-527-9876
Hietter McClenahan	Laurie	MHA/RMT, Inc.	San Mateo	CA	laurie.hietter@rmtinc.com	650-373-1200
Merrick	Dale	Merrick Consulting	Canby	CA	dale@isotinc.org	530-640-1477
Nemzer	Marilyn	Geothermal Education Office	Tiburon	CA	mnemzer@aol.com	415-435-4574
Peterson	Jack	Bureau of Land Management, Idaho	Boise	ID	Jack_G_Peterson@blm.gov	202-484-5366
Robinson	Curt	Geothermal Resources Council	Davis	CA	crobenson@geothermal.org	530-758-2360
Russell	Stu	Point Environmental Services	Palo Alto	CA	srussell@pointenvsc.com	650-856-2800
Signorotti	Vince	CalEnergy Operating Corporation	Brawley	CA	vincent.signorotti@calenergy.com	760-351-3050
Sison-Lebrilla	Elaine	Sacramento Municipal Utility District	Sacramento	CA	esison@smud.org	916-732-7017
Switzer	Lawrence	ANF, Inc.	Santa Rosa	CA	lawrencewizter@earthlink.net	707-578-1567
Tiango	Val	California Energy Commission	Sacramento	CA	vtiangco@energy.state.ca.gov	916-654-4664
Timlin	Mike	TerraThermal	Redwood City	CA	mtimlin@terrathermal.com	408-499-1846
Truschel	John (Jack)	California Division of Oil, Gas, & Geothermal Resources	Sacramento	CA	jtruschel@consrv.ca.gov	916-323-1787
Wardlow	Charlene	Ormat Nevada Inc.	Reno	NV	cwardlow@ormat.com	775-336-0155
Whittome	Andrew	Calpine Corp.	Pleasanton	CA	ajwhittome@hotmail.com	925-479-7303
Wiggett	Gail	California Energy Commission	Sacramento	CA	gwiggett@energy.state.ca.us	916-653-7551
Williams	Colin	USGS	Menlo Park	CA	colin@usgs.gov	650-329-4881

Appendix B: Attendee List Addresses

Geothermal Development Plan Workshop California Geothermal Energy Collaborative			Attendees List	Woodland, California - June 20, 2007			
Last Name	First name	Title	Organization	Address	City	State	Zip
Arnold	Shaune	Attorney	Dongell, Lawrence and Finney	707 Wilshire Blvd.	Los Angeles	CA	90017
Bate	Kevin	California Business Manager	RMT, Inc.	700 South Flower Street, Suite 1100	Los Angeles	CA	90017
Beyer	John Henry	PIER Project Manager	California Energy Commission	1516 Ninth Street, MS-43	Sacramento	CA	95814
Blaydes	Paula	Principal	Blaydes & Associates	1275 Fourth St. #214	Santa Rosa	CA	95404
Bourg	Joe	President	Millennium Energy LLC	PO Box 16073	Golden	CO	80402
Braun	Gerald W.	Renewables Team Lead	California Energy Commission	1516 Ninth Street	Sacramento	CA	95814
Brophy	Paul		EGS Inc.	725 Farmers Lane, Suite 8	Santa Rosa	CA	95405
Bruton	Carol J.		LLNL	L-221 P.O. Box 808	Livermore	CA	94550
Campbell	Don	Exploration Manager	Omat	6225 Neil Rd.	Reno	NV	89511
Carter	Anna		Geothermal Support Services	87 Verde Circle	Rohnert Park	CA	94928
D'Olier	William L.	Consultant & Geologist		310 Hume Lane	Bakersfield	CA	93309
Dudak	Daniel	Assoc. Mineral Resources Engineer	California State Lands Commission	200 Oceangate, 12th Floor	Long Beach	CA	90802
Eddy	Shannon	Principal	Conscious Ventures Group	2501 Portola Way	Sacramento	CA	95818
Ferguson	Rich	Research Director	CEERT	PO Box 1045	Boonville	CA	95415
Fisch	Edward						
Fischette	Judy	Administrative Manager	CGEC	P.O. Box 1677	Davis	CA	95617
Gawell	Karl	Exec. Director	Geothermal Energy Association	209 Pennsylvania Ave., SE	Washington	DC	20003
Geyer	John	Principal	John Geyer & Associates	5910 NE 82nd Ave.	Vancouver	WA	98662
Glassley	Bill		CEC- Geothermal Programs	1516 9th Street, MS 43	Sacramento	CA	95814
Grogan	Larry	Board Member District 2	County of Imperial	940 W. Main Street, Suite 208	El Centro	CA	92243
Gutierrez	Pablo	Assoc. Mechanical Engineer	California Energy Commission	1516 Ninth Street	Sacramento	CA	95814
Hill	Roger	Program Manager	Sandia National Laboratories	P.O. Box 5800 MS 1124	Albuquerque	NM	87185
Hodgson	Susan			P.O. Box 644	Davis	CA	95617
Hoops	Rich		BLM, Nevada State Office	1340 Financial Blvd.	Reno	NV	89502
Johnson	Elizabeth	Geothermal Officer	California Division of Oil, Gas, & Geothermal Resources	801 K Street, MS 20-21	Sacramento	CA	95814
Kennedy	Mack	Staff Scientist	Lawrence Berkeley National Laboratory	One Cyclotron Rd. MS 70A-4418	Berkeley	CA	94720
King	John	Principal	EMPS, Inc.	944 Market Street, Suite 509	San Francisco	CA	94102
Knox	Bill		CEC Renewables Office	1516 Ninth Street	Sacramento	CA	95814
Lovekin	James	Manager of Field Operations	GeothermEx, Inc.	5221 Central Avenue, Suite 201	Richmond	CA	94804
Hietter McClenahan	Laurie	Senior Client Executive	MHA/RMT, Inc.	4 W. Fourth Ave. Suite 303	San Mateo	CA	94402
Merrick	Dale	Project Manager/Consultant	Merrick Consulting	P.O. Box 125	Canby	CA	96015
Nemzer	Marilyn	Executive Director	Geothermal Education Office	664 Hilary Drive	Tiburon	CA	94920
Peterson	Jack		Bureau of Land Management, Idaho	1387 South Vinnell Way	Boise	ID	83709
Robinson	Curt	Executive Director	Geothermal Resources Council	2001 2nd St., Suite 5	Davis	CA	95617
Russell	Stu	Principal	Point Environmental Services	2390 El Camino Real	Palo Alto	CA	94306
Signorotti	Vince	Vice President, Real Estate Assets	CalEnergy Operating Corporation	551 W. Main Street, Suite 1	Brawley	CA	92227
Sison-Lebrilla	Elaine	Senior Project Manager	Sacramento Municipal Utility District	6201 S Street	Sacramento	CA	95817
Switzer	Lawrence	President	ANF, Inc.	3560 Lake Park Dr.	Santa Rosa	CA	95403
Tiango	Val	Senior Technical Lead	California Energy Commission	1516 Ninth Street	Sacramento	CA	95814
Timlin	Mike	CEO	TerraThermal	80 Pelican Lane	Redwood City	CA	94065
Truschel	John (Jack)	Geothermal District Engineer	California Division of Oil, Gas, & Geothermal Resources	801 K Street, MS 20-21	Sacramento	CA	95814
Wardlow	Charlene	Environmental/Regulatory Affairs Ad	Omat Nevada Inc.	6225 Neil Road, Suite 300	Reno	NV	89511
Whittome	Andrew	Director, Project Development	Calpine Corp.	3875 Hopyard Rd., Suite 345	Pleasanton	CA	96588
Wiggett	Gail	Geologist	California Energy Commission	1516 Ninth St., MS-43	Sacramento	CA	95814
Williams	Colin		USGS	345 Middlefield Rd.-Mail Stop 977	Menlo Park	CA	94025