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A SUMMARY REPORT REGARDING THE PROCEEDINGS AT THE STATES OF NEVADA AND ALASKA GEOTHERMAL TRADE MISSION

**Peppermill Hotel, Reno, Nevada
June 10-11, 2004**

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Introduction

On Thursday, 10 June 2004, the States of Alaska and Nevada Geothermal Trade Mission was begun at the Peppermill Hotel in Reno, Nevada. There were 49 people involved with the Mission and 39 of them attended the opening session. Delegates were from Alaska, Nevada, Colorado, Texas, Washington, DC, California and Washington. The group included Federal and State officials, geothermal industry representatives (consultants, developers, and equipment manufacturers), entrepreneurs, Native Tribal representatives, lawyers and economists.

10 June 2004 Morning Session Proceedings

At 0810 hours, Alan Coyner (NDM) and Bernie Smith (AIDEA/AEA) opened the meeting with welcoming remarks and introductions by each attendee. Thereafter, Gerry Nix (NREL), speaking on behalf of Roy Mink (DOE), welcomed visitors and apologized for Dr. Mink's absence.

Dick Burdette (NSOE) briefly noted the similarities between Nevada and Alaska, specifically "Wilderness Areas" and "self-sufficiency". He also observed that geothermal in Nevada has become a respected business rather than a "politically correct" activity.

Curtis Framel (DOE) next described the DOE GeoPowering the West (GPW) program including its budget levels and the domestic and global benefits of the programs. He showed maps of geothermal areas in the USA and cited increased power generation, direct use and mineral recovery as primary GPW objectives. Illustrative materials included photos of flash and binary power plants, direct use sites in Reno, Elko, and Boise, plus some pictures of light industrial geothermal applications. Mr. Framel concluded by describing the National Laboratory missions and capabilities and he advertised the high ratings recently given the DOE program during a Washington, DC peer review session.

Co-speaking with Mr. Framel was Gerry Nix (NREL) who further discussed the GPW program, its structure, goals, and objectives. He emphasized the GPW work aimed at achieving improved power cycles, lowered drilling costs, improving methods of reservoir stimulation, and invention of more accurate exploration techniques.

Mark Coolbaugh (UNR/GBCGE) next presented an overview of Nevada's geothermal resources. He first showed global geothermal zones, and then focused on the Great Basin and Nevada. He explained the basic reasons for the existence of geothermal resources, and broke them into two types: magmatic and extensional. Of special interest were: 1) slides showing the typical thermal gradient curves exhibited by each of these resource types, 2) the locations in Nevada of regional hot spots and high strain rates, and 3) the most geothermally prospective areas in Nevada.

John Snow (NDM) then reviewed the geothermal industry in Nevada. He listed all of the geothermal powerplants in Nevada and showed their locations. He then summarily described ten producing geothermal areas: Beowawe, Brady, Desert Peak, Dixie Valley, Empire, Soda lakes, Steamboat, Stillwater, and Wabuska. As "Green Fields" he named Blue Mt., Salt Wells, Tuscarora, Rye Patch, and Fish Lake Valley. Finally, he listed all the Nevada direct use sites.

Gerry Hutterer (GMC) gave an overview of Alaska geothermal resources. His talk included a brief description of the planetary forces responsible for geothermal resource concentrations and examples of highly prospective high and medium temperature geothermal sites in Alaska. Mr. Hutterer concluded by outlining common exploration and development program activities and presenting typical costs and schedules for 5, 10, and 20 MW projects both in the "Lower 48" and in Alaska. The latter costs included a 100% "Alaska Cost Multiplier" (ACM).

Jack Woods (Wood Family Trust) opened his presentation with comments concerning and photos of Pilgrim Springs, AK, Mt. Makushin, AK and the Clear Lake, CA prospects controlled by his group. He then showed scenes from Iceland including a drilling project targeting penetration of 5 kilometers and several direct use sites. Mr. Wood then switched to "thinking outside the box" project proposals. Among these were one focused on the generation of hydrogen using geothermal heat and another advocating the drilling of ultradeep wells in Alaska for the purpose of producing super-critical fluids (like those emanating from sub-sea "Black Smokers" at 1000°C). Mr. Woods favors the development of innovative projects for the future, however he insists that such projects must be developed at cost levels that will allow them to be sustainable over the long run.

The final speaker for the day was Stuart Johnson (ORMAT) who spoke representing the Geothermal Resources Council (GRC), of which he is the President. He gave the history, goals and objectives of the GRC, listed their products including educational workshops, publications, and an on-line library. He named a few associated entities like the Geothermal Education Office, Geothermal Energy Association, the International Geothermal Association and the National Laboratories. He finished by advertising this year's Annual Meeting and Industrial Exposition as well as the 2005 World Geothermal Conference in Antalya, Turkey.

10 June 2004 Afternoon Field Trip

The afternoon of 10 June was spent traveling by bus from Reno to Brady Hot Springs, the adjacent Con-Agra onion dehydration plant, a geothermal well-drilling site, and the Steamboat geothermal area south of Reno. At Brady, Norm Frey (Churchill County) expounded on the relationship between Churchill County and the geothermal developers with emphasis on the abundant benefits to both parties. His talk was followed by one by Dan Schochet (ORMAT), in which he summarily described the double flash and binary power plants in operation. The group then toured both plants, taking photos, asking questions and receiving further information.

From the power plant, the bus went next to the Con-Agra onion dehydration plant. An overview of operations, given by the Plant Manager, was followed by a thorough tour of the facilities and the distribution of dried onion samples.

Finally, the group was driven to the site of a production well being drilled. The rig was of the large “triples” style with two 400 horsepower motors capable of penetrating to more than 12,000 feet. Of primary interest were the 13³/₈ inch casing stockpiles, a large blow-out preventer, and the reserve pit. A brief explanation of the local surface and subsurface lithology and of the drilling objectives was given by the on-site geologist.

Upon arrival in Reno, the bus headed south to the Steamboat Springs geothermal area. At slow speeds, views were obtained of the Ormat binary plants 1, 1A, 2 and 3 together with glimpses of the Ormat (ex-Caithness) flash plant on top of the hill to the south.

June 10 events culminated with a cocktail party and a diner during both of which there were opportunities for many interesting geothermally-related conversations that helped in “bonding” the Mission attendees.

11 June 2004 Morning Session Proceedings

At 0830 the meeting attendees reassembled to hear a full four hours of presentations. Before beginning, the group observed a moment of silence in respect for recently deceased President Ronald Reagan. This was followed by a round of introductions inasmuch as several “new” participants were present.

The day’s first speaker was Kevin Rafferty (Engineering consultant) specializing in direct use geothermal applications). Mr. Rafferty acknowledged that direct use projects are “unglamorous” but he insisted that they are highly successful when properly designed, applied and operated. Of great importance is the fact that a direct use geothermal project must be economically viable without geothermal before it can realize the benefits of using the thermal fluids.

Mr. Rafferty showed several types of typical direct use installations featuring production wells, heat exchangers and injection wells. Approach temperatures were about 100°F. He said that the main project risks are related to the well drilling as most hardware is “off-the-shelf”. Photos were showed of district heating locales in Boise, ID, Klamath Falls, OR, and in Iceland. He also showed greenhouses, aquaculture (Tilapia and alligators) and snow-melt geothermal

applications. Mr. Rafferty finished by saying that the greatest obstacle to the proliferation of direct use is awareness of its potential.

The morning's second speaker was Dan Schochet (ORMAT). He began with a brief history of the company and by showing pictures of Ormat plants in Thailand, the Philippines, Guatemala and Kenya as well as at Brady, NV, Mammoth, CA, and East Mesa, CA. He described the many benefits of geothermal including its typical 98% availability, small plant foot-print, easy installation, and low operation and maintenance costs. Mr. Schochet also reviewed power cycle details, typical resource temperature-power cycle applications and he emphasized the advantages of binary cycle modularity.

Switching topics, Mr. Schochet next cited the requirements for acquisition of financing:

- Proven resources and a bankable report
- A creditworthy power purchaser
- A financeable take-or-pay Power Purchase Agreement (PPA)
- A credible developer with a proven track record.
- Site control and the rights to use the geothermal resources

He presented some typical exploration, development and power plant-related costs that together totaled about \$2,500 per kilowatt installed (in the Lower 48 states) and he concluded his talk by listing project risks and options for risk mitigation.

Shuman Moore (High Desert GeoCulture) next spoke about renewable energy development on Tribal lands. He described the renewable energy resources and Tribal attributes on the Pyramid Lake Paiute Reservation and noted that the planned project there will include geothermal, wind, biomass, and solar thermal technologies. Citing the many tax benefits available to the Tribe, he noted that renewable energy power could be sold to at least seven entities in the region. Funding for the work conducted to date came from a \$1 million earmarked Federal grant and at least one potential project partner has been identified.

Following a brief coffee break, Lisa Shevenell (NBMG) described the Great Basin Center for Geothermal Research's organization, its history, funding sources, relationships to the GPW project and the projects completed, in progress, and proposed. She noted that the Center has received great praise for its work and that continued funding is anticipated.

The Renewable Portfolio Standard (RPS) was the subject addressed next by John Wellinghoff (Becky, Singleton Attorneys at Law). He began by noting that Nevada has been graded "A" by the Union of Concerned Scientists (UCS) for their early implementation of a 20% RPS. The UCS expects the use of renewable energy to more than double by 2012, but also sees that 34 states are doing little or nothing in the field.

Mr. Wellinghoff denies that the RPS subsidizes renewable energies and he says that the basis for the RPS is the economic benefit brought to the State and the rural communities. His brief talk concluded with the presentation of a website at which more RPS information can be obtained: <http://www.LEG.STATENV.US/NRS/NRS-704.http>

Dick Burdette (NSOE) spoke next regarding regulations and oversight of energy-related matters in Nevada. He reviewed the process through which regulations are created, noted a 6-8 month time frame for their ratification and he addressed issues related to compliance with regulations. The latter included scheduling, capacity versus energy, allocations among renewable energy technologies, valuation of the controlled renewable energies, penalties for non-compliance, and on-grid versus off-grid decisions.

Mr. Burdette then noted that Sierra Pacific/Nevada Power are not now in compliance with their 2003 RPS obligations to get 5% of their power from renewable energy sources. He spent considerable time reviewing the reasons for this and stated his confidence that the situation would be corrected.

Representing the Sierra Pacific/Nevada Power utility, Colin Duncan next described the status of his company's renewable energy long term and short term contracts and showed where these contracted facilities are located. He then summarized the history of RPS implementation, noted changes in the regulations and listed his utility's plans to get into compliance. He suggested that the current RPS schedules for integrating renewable energy into his firm's power mix are somewhat unrealistic and he listed the times needed to accomplish the many activities required to put a new renewable energy project on line. He ended his talk by noting that due to common project hurdles, there is a 40% failure rate in getting on-line those projects for which contracts have been signed.

The presentations completed, about ½ hour was devoted to a Round Table Discussion with Messieurs Wellinghoff, Burdette and Duncan answering questions posed by attendees. In this scenario: 1) advice was given to the Alaskans with regard to the promotion of renewable energy use in small rural population centers, 2) thought was given to methods that Nevada can use to "protect" its renewable energy resources if "raided" by developers planning to sell power in California, and 3) the topic of "self-building" of renewable energy facilities by the Nevada utilities was given consideration.

Summary Comment

This Trade Mission was very well conceived, organized and conducted. The Alaskan attendees had ample opportunities to learn about many aspects of the geothermal business in an informal and open environment. The Mission implementers are to be commended.

NOTE: A copy of the powerpoint presentations given by the presenters at the Nevada/Alaska Geothermal Trade Mission is available in portable document format (pdf) from the Nevada Division of Minerals. Please send your request for a CD-ROM copy to:

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