INTERNATIONAL GEOTHERMAL DAYS OREGON 1999

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For the first time, the International Summer School on Direct Application of Geothermal Energy (ISS), "International Geothermal Days - Oregon 1999", was held outside of Europe. A total of 114 participants from 30 countries attended the conference on the Oregon Institute of Technology campus from October 9 to 16, 1999, including a large delegation of city mayors and provincial governors from Turkey. The conference, hosted by the Geo-Heat Center, was supported by funds from the U.S. Department of Energy and donations from Fuji Electric Corporation of America, Calpine Corporation, Ormat International, Inc. and the Shaw Historical Library Foundation.

The Conference was composed of the following sessions:

- International Workshop on Small-Scale Power Projects
- International Workshop on Geothermal Heat Pumps
- International Course on Direct Utilization of Geothermal Energy
- Evening Seminar on Computer Software for Geothermal Heat Pumps
- Evening Seminar on HEATMAP© Computer Software Utilization

Four field trips were also undertaken to nearby geothermal projects and geologic sites:

- Crater Lake National Park (for early arrivals)
- Medicine Lake, CA to visit the potential sites of two 50-MWe geothermal power plants (Fourmile Hill by Calpine Corporation and Telephone Flats by CalEnergy Company geothermal projects). This field trip also included a visit to Lava Beds National Monument.
- Direct-use projects in the Klamath Basin, including the Oregon Institute of Technology mini-heating district, the Klamath Falls district heating system, a local residential heating system using a downhole heat exchanger, and a combined greenhouse and aquaculture heating project.
- A final field trip from Klamath Falls to Reno, NV visiting along the way two potential geothermal projects at Canby, CA, and a hybrid plant (wood waste and geothermal) and binary geothermal plant (Wineagle) near Litchfield, CA.

This conference was also the 10th anniversary of the International Summer School founded by Dr. Kiril Popovski of St. Clement Ohridski University, Bitola, Macedonia , and the 25th anniversary of the International Geothermal Conference on "Multipurpose Use of Geothermal Energy" held on the Oregon Institute of Technology campus - and was the start of the then Geo-Heat Utilization Center. The founders of the Center, Gene Culver, Paul Lienau and John Lund all made presentations at both conferences..

The first official function of the conference was the Medicine Lake field trip lead by David McClain, a consultant from Portland, OR. His detailed knowledge of the environmental work and local geologic setting for the two power project provided interesting discussion for all, especially during our stop for lunch at Medicine Lake under beautiful fall weather. Subjects from the impact of noise from the power plants and the visual impact of the power line, to addressing local Indian and summer resident's concerns were presented and explained how they would be mitigated. We ended the day by visiting several geologic structures in Lava Beds National Monument, including a chance to cool off in Skull Cave - a large collapsed lava tube. A reception was held that evening on the OIT campus, hosted by the Shaw Historical Library Foundation.

The conference was officially opened on Monday by welcome talks from the President of Oregon Institute of Technology, Dr. Martha Anne Dow, the Mayor of the City of Klamath Falls, Todd Kellstom, and the chairman of the Klamath County Commissioners, Steve West. Dr. Kiril Popovski, representing the International Summer School and Dr. John W. Lund, representing the Geo-Heat Center, also welcomed the attendees and presented some of the background history on the conference.

The one and a half day session on Small-Scale Electric Power Generation was introduced with an excellent summary paper by Ron DiPippo (see Vol. 20, No. 2). His paper was followed by the topic of slim hole drilling presented by Jim Combs and John Pritchett. Liz Battocletti presented material on financing, and then Gordon Bloomquist and David McClain discussed legal, institutional and environmental issues. That evening, a dinner, complete with local Native American, Wocus Bay Singers, dancers and drummers, was hosted by Calpine Corporation. The audience participated in one of the ring dances and drumming - to the delight of all. For many, this was their first exposure to Indian culture and traditions.

The next day, power plant case histories were presented by Dan Schochet of Ormat, Ken Nichols of Barber-Nichols , Richard Campbell on the Mammoth, CA project developed by Ben Holt Company, Gerardo Hiriart on CFE projects in Mexico, Yuri Esaki on projects in Japan, Mike

Dunstall on New Zealand experience (inculed in this issue) and Josefino Adajar on projects in the Philippines.

This was followed by a half-day session on geothermal heat pumps. Kevin Rafferty of the Geo-Heat Center started off by presenting US experiences with commercial applications. This was followed by an overview paper of European experience present by Ladsi Rybach of Switzerland, Burkhard Sanner of Germany and Goran Hellstrom of Sweden. Gordon Bloomquist presented material on case studies of commercial/institutional installations in the U.S. (included in this issue). Computer applications were then presented by Gary Phetteplace of the U.S. and Burkhard Sanner of Germany, followed by an evening workshop on computer applications. There was lively discussion during all of these presentations, as this was the first time the subject had been presented at an International Summer School conference.

To break up the indoor presentations, a local field trip of direct-use sites in the Klamath Basin was held at midweek. In additional to John Lund, Toni Boyd and Kevin Rafferty of the Geo-Heat Center, the field trip was enhanced by commentary from Gene Culver, retired from the Geo-Heat Center, Brian Brown, a local consulting mechanical engineer, Bruce Masl and Ray Gibson (retired) from the OIT Physical Plant, and Manny Molina of the city of Klamath Falls. The participants were divided into two groups and visited the OIT wells and heating systems, an individual home downhole heat exchanger system (Dick and Doris Pope), the city of Klamath Falls district heating system, including the newly completed Klamath County Courthouse, and downtown sidewalk snow melt system. Lunch was arranged by the city at a local park, and then we drove south of town to visit the Liskey Ranch where geothermal water is used to heat a greenhouse complex (Vicky Azcuenaga) and topical fish rasing ponds (Ron Barnes - who can be reached at <gotfish@aol.com>). That evening a dinner was hosted at the local country club by Fuji Electric Company and Ormat International. Our English/Spanish interpreter, Paul (Pablo) Lewis, provided the entertainment by singing Mexican songs of his own composition.

The last two days of the formal part of the conference were presentations on the direct utilization of geothermal energy. The first set of presentations were on general aspects of direct utilizations, including an overview of the technology by John Lund, downhole heat exchangers experience by Gene Culver, district heating design by Orhan Mertoglu, greenhouse design by Kiril Popovski, aquaculture pond design and refrigeration by Kevin Rafferty, industrial applications by Paul Lienau, timber drying by John Lund, pavement snow melting design by Brian Brown, an innovative concrete block and fruit drying facility in Guatemala by Luis Merida (included in this issue), and an introduction to HEATMAP© district heating design program by Gordon Bloomquist. This was followed by a computer workshop on the use of HEATMAP© presented by Bob O'Brien of the Washington State University Energy Program. That evening, the Mayor of the City of Klamath Falls, Todd Kellstrom, hosted a reception at the Ross Ragland Community Theater in downtown area - a building that is also geothermally heated.

These general presentations were then followed by specific examples of district heating design in Iceland (E. Gunnlaugsson), USA (T. Boyd and B. Brown), France (C. Boissavy), Romania (M. Rosca and C. Bendea), Slovakia (O. Vana and O. Halas), Hungary (M. Arpasi), Lithuania (V. Rasteniene and F. Zinevicius), Italy (R. Carella–included in this issue), China (Zhu Jialing) and Japan (Y. Yusa). General and greenhouse system potential and design were presented by representatives from Albania (A. Frasheri), France (C. Boissavy), Argentina (A. Pesce), Bulgaria (S. Fournadzieva and K. Bojadzieva), Macedonia (S. Popovska), Portugal (A. M. Rodrigues), India (D. Chandrasekharam), USA (B. Gordon) and Italy (C. Campiotti).

The final evening, a western style dinner complete with cowboy hats, bandanas and sheriff badges, was hosted by OIT. Entertainment was provided by Belles and Beaus line dancers, again with audience participation. Certificates were presented to participants and lecturers.

The final field trip was from Klamath Falls to Reno, set to arrive in time for the start of the Geothermal Resources Council Annual meeting. The all-day bus tour with nine cars following, toured a potential district heating project in Canby, CA (Dale Merrick) and Kelly Hot Springs flowing at 400 gpm (25 L/s) at 187ºF (86ºC) (Sal Pantano). A lunch stop was held in Alturas, CA where several schools are heated with geothermal energy. The park for lunch was reserved by the Alturas Chamber of Commerce. After lunch and a 1.5-hour drive, we toured the Operation Energy Corporation/Honey Lake Power Company biomass/hybrid power plant near Litchfield/Wendel, CA. This plant built in 1989, uses geothermal water for the condensate preheater (1.5 MW) and then wood chip waste as the main fuel to produce 35.5 MWe of power. The massive plant was down for maintenance, but we were still impressed with its unique type of operation. Afterwards we toured the Wineagle Developers binary power plant which uses 1,000 gpm (63 L/s) of 230ºF (110ºC) geothermal water to produce a net output of 600 kWe. The plant was design by Barber-Nichols Engineering Co.

From there, the nine trailing cars descended on the lone gas station at Litchfield, and almost overwhelmed the facility. All finally arrived in Reno safely and scattered to the various motels. Some participants left the next day, and other stayed for the GRC meeting.

Two volumes of the proceeding are available:

- Small-Scale Electric Power Generation & Geothermal Heat Pumps - 19 papers of 192 pages.
- Direct Utilization of Geothermal Energy - 36 papers of 226 pages.

Each can be ordered from the Geo-Heat Center for $15.00 or $25.00 for both plus postage. Copies of the three field trip guides are also available free of charge. The four papers in this issue of the Quarterly Bulletin, were presented at the conference, but arrived too late to be included in the Proceedings.

Many thanks to all the participants - a few photographs are included for your enjoyment.