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NEVADA GEOTHERMAL UPDATE

April 2003

NOTE - UPDATES AND NEW ITEMS ARE HIGHLIGHTED IN YELLOW

CURRENT POWER OPERATIONS

<u>Plant/Operator (year on-line)</u>	<u>Nameplate Capacity *</u>	<u>Location</u>
Beowawe Power Plant (1985) Beowawe Power LLC/Caithness Operating	16.6 MW	S13, T31N R47E

Bradys Power Plant (1992) Brady Power Partners/ORMAT	21.1 MW	S12, T22N R26E
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Desert Peak Power Plant (1985) Brady Power Partners/ORMAT	12.5 MW	S21, T22N R27E
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- ◆ Power purchase contracts were recently awarded by Sierra Pacific for flash-steam and binary geothermal plant expansions, Desert Peak 2 for 25 MW and Desert Peak 3 for 13 MW. PUC approval 3/6/2003: <http://www.puc.state.nv.us/news/2003/REPS%20303.pdf>
- ◆ ORMAT Nevada Inc.; Permit #517, API # 27-001-90295 for Thermal Gradient Well "ST 11c" issued January 29, 2003; NE/4 SW/4, Section 15, T22N R27E; Churchill Co., PTD 2000 ft.; Spud Feb 15, 2003, Caza Rig #505; Drilled to their projected TD, completed as an observation well, Feb 27, 2003.
- ◆ ORMAT Nevada Inc.; Permit #518, API #27-001-90296 for Thermal Gradient Well "ST 12a" issued January 29, 2003; SE/4 NW/4, Section 21, T22N R27E; Churchill Co.; PTD 2000 ft.; Spud Mar 1, 2003, Caza Rig #505; Drilled to their projected TD, completed as an observation well, Mar 8, 2003.
- ◆ ORMAT Nevada Inc. (ORNI 3, LLC); Permit #519PA for a geothermal project area issued March 7, 2003; Includes 8 production wells, 3 injection wells, and 2 observation wells; Project area includes sections 13-16 and 21-29, T22N R27E, Churchill County.

Dixie Valley Power Plant (1988) Caithness Dixie Valley/Caithness Operating	62.0 MW	S7, T24N R37E S33, T25N R37E
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Empire Power Plant (1987) Empire Energy LLC	4.8 MW	S21, T29N R23E
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- ◆ Empire Energy LLC; Permit 507, API #27-031-90211 for Production Well "EEP-02" issued August 5, 2002; NW/4 NE/4 Section 16, T29N R23E, Washoe Co.; PTD 2500 ft.

Soda Lake No. 1 (1987) Soda Lake No. 2 (1991) Constellation Operating Services	26.1 MW	S33, T20N R28E
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Steamboat I, IA (1986)	10.8 MW	S29, T18N R20E
Steamboat II, III (1992)	47.8 MW	
S B Geo, Inc./Far West Capital		
♦ Advanced Thermal Systems (ATS) was recently awarded a power purchase contract from Sierra Pacific for a Kalina Cycle 44-MW binary plant, Steamboat IV. PUC approval 3/6/2003: http://www.puc.state.nv.us/news/2003/REPS%20303.pdf		
Steamboat Geothermal Power Plant/Caithness Power Plant (1988)	14.41 MW	S5, 6, T17N R20E
Yankee-Caithness JVLP		
Stillwater (1989)	21.0 MW	S1, T19N R30E
Stillwater Holdings, LLC		
Wabuska (1984)	2.2 MW	S15, 16, T15N R25E
Homestretch Geothermal LLC		

* Nameplate Capacity as reported to the Division of Minerals for 2002.

DIRECT USE OPERATIONS

Empire Group LLC; Empire, Washoe County, Nevada

<http://www.empirellc.com>

Gilroy Foods; Onion Dehydration Plant; Fernley, Nevada

<http://www.gilroyfoods.com/aboutus.html>

♦ Currently idle, production anticipated to resume in May, 2003.

OTHER ACTIVE AREAS

Hot Sulphur Springs (Tuscarora), Elko County

♦ Earth Power Resources was recently awarded a power purchase contract from Sierra Pacific for a 25 MW binary plant. PUC approval 3/6/2003: <http://www.puc.state.nv.us/news/2003/REPS%20303.pdf>

Rye Patch/Humboldt House KGRA, Pershing County (Rye Patch Power Plant, 12 MW, 90% complete)

♦ Presco Energy/Department of Energy (DOE) National Renewable Energy Laboratory funded Thermal Gradient Wells; "Renewable Energy Advancement in Nevada"; contact Gina Tempel
gina@mines.unr.edu.

Presco Energy plans to begin their drilling program in the Humboldt House KGRA (Known Geothermal Resource Area) southwest of Winnemucca, Nevada, in early May 2003. This program has been funded for the purpose of evaluating the lifetime and current potential of the Humboldt House geothermal system.

- Presco Energy LLC.; Permit 511, API #27-027-90061 for Thermal Gradient Well "P 3-1" issued January 22, 2003; NE/4 NW/4 S3, T31N R33E; PTD 1000 ft.
- Presco Energy LLC.; Permit 512, API #27-027-90062 for Thermal Gradient Well "P 5-1" issued January 22, 2003; SW/4 NE/4 S5, T31N R33E; PTD 1000 ft.
- Presco Energy LLC.; Permit 513, API #27-027-90063 for Thermal Gradient Well "P 10-1" issued January 22, 2003; SW/4 NE/4 S10, T31N R33E; PTD 1500 ft.
- Presco Energy LLC.; Permit 514, API #27-027-90064 for Thermal Gradient Well "P 32-1" issued January 22, 2003; SW/4 NE/4 S32, T32N R33E; PTD 1000 ft.
- Presco Energy LLC.; Permit 515, API #27-027-90065 for Thermal Gradient Well "P 32-2" issued January 22, 2003; NE/4 SW/4 S32, T32N R33E; PTD 500 ft.

Fly Ranch Geothermal Prospect Area; West Black Rock Desert, Washoe County

- ◆ SB Geo, Inc.; Permit #516, API #27-031-90214 for Thermal Gradient Well "72-02-TG" issued January 27, 2003; NE/4 NE/4 Section 2, T34N R23E, Washoe Co.; Re-Entry, PTD 1456 ft.; **Cleaned out existing well (1-2FR) to 1456 ft.; Ran temperature logs; Completed Feb, 2003.**

Blue Mountain Geothermal Prospect Area, Humboldt County

- ◆ NORAMEX Corporation; Permit #500, API #27-013-90014 for Observation Well "Deep Blue #1" issued March 20, 2002; SE/4 SW/4, S14 T36N R34E, Humboldt Co.; PTD 2000 ft.; Drilled in May, 2002. <http://www.continentalridge.com/geothermal-energy.htm>

Joy Lake Geothermal Prospect Area, Washoe County

- ◆ Evergreen Energy LLC; Permit #496, API #27-031-90208 for Observation Well "Joy Lake 45-22" issued January 29, 2002; SE/4 NW/4 Section 22, T17N R19E, Washoe Co.; PTD 3000 ft.
- ◆ Evergreen Energy LLC; Permit #497, API #27-031-90209 for Observation Well "Joy Lake 78-22" issued January 29, 2002; SE/4 NE/4, Section 22, T17N R19E, Washoe Co.; PTD 3000 ft.

OTHER NEWS

Geothermal Energy Report Released

- ◆ The DOE Energy Efficiency and Renewable Energy and Department of Interior Bureau of Land Management (BLM) have released a geothermal energy report entitled "*Opportunities for Near-Term Geothermal Development on Public Lands in the Western United States.*" <http://www.nrel.gov/docs/fy03osti/33105.pdf>

The report identifies 35 sites in the Western U. S. as having the greatest potential for short-term development of geothermal power. Ten of these sites are in Nevada: Fish Lake, Beowawe, Salt Wells, Soda Lake, Steamboat, Stillwater, Dixie Valley, Brady, Rye Patch, and San Emidio.

- ◆ Reno Gazette-Journal 4/15/03: *The study is the result of an increased emphasis on geothermal potential on federal lands — primarily Western lands managed by the Bureau of Land Management. It's part of a broader effort to reduce U.S. dependency on foreign energy, said Rebecca Watson, Assistant Interior Secretary for Land and Minerals Management.* <http://www.rgj.com/news/stories/html/2003/04/14/39476.php>

U. S. Senator Harry Reid Speaks on Renewable Power in Nevada

- ◆ Senator Harry Reid spoke at a meeting in Kings Beach, North Lake Tahoe, California, on April 18, 2003. <http://www.sierrahightech.com/agenda.html>. Reid spoke of the potential and the challenges facing the future development of domestic renewable energy projects. Reid has introduced legislation this session for a production tax credit to help reduce the risk of investing in renewable power. His plan would provide renewable power producers a tax credit of 1.8 cents per kilowatt-hour. <http://www.nevadaappeal.com/apps/pbcs.dll/article?Site=NA&Date=20030414&Category=NEWS&ArtNo=304140105&Ref=AR>

NBMG Bulletin 91 Now Available Online

- ◆ Nevada Bureau of Mines and Geology, Bulletin 91, "Thermal Waters of Nevada" is available online at <http://www.nbmgs.unr.edu/dox/b91/>

Great Basin Center for Geothermal Energy

- ◆ Progress Meeting held on March 27, 2003

On March 27, 2003, a one-half day meeting was held with participation from all currently funded investigators and two of the student contributors. Current progress and accomplishments were discussed, and collaboration among researchers was enhanced. Some significant achievements thus far include:

- Four independent, regional projects identified anomalies in the same location (Buffalo Valley), warranting more detailed evaluation at the valley scale.
 - GPS studies show elevated, maximum extensional strain.

- Seismic velocity modeling shows thin (<25 km) Earth crust.
 - GIS weights of evidence model indicates high likelihood of elevated temperatures, due in part to the presence of Quaternary northeast-trending fault scarps and cinder cones.
 - Moderate temperatures are indicated with chemical geothermometry.
 - GPS strain mapping and GIS modeling have highlighted at least two additional areas of exploration interest. These include the Fairview Peak area in southwestern Nevada, and the northeastern portion of the Great Basin in southeastern Idaho.
 - A correlation between high-temperature geothermal systems and areas of shallow groundwater in Nevada was confirmed with a new, more accurate map of groundwater depths created by the Desert Research Institute. This suggests that additional undiscovered geothermal resources may occur in areas where groundwater levels are deeper.
 - Geochemical evidence indicates that the geothermal system at Steamboat Hot Springs is magmatically driven. This increases the exploration attractiveness of the area, because magmatic systems have the potential to produce more electric power than extensional systems. Steamboat Springs already generates more power than any other geothermal system in the state of Nevada, and there are plans to increase production by up to 60% in the next few years. Skalbeck, et al. (2002), recently presented gravity and magnetic geophysical evidence of additional zones of upwelling fluids that remain untested.
 - The surface pattern of fumaroles and warm ground at Brady's Hot Springs has been mapped in detail using GPS-units and satellite-based thermal imaging. This map reveals the Brady's fault system to be more complex than shown in previously published maps, with multiple intersecting northeast and north-trending structures. This information is being integrated into a detailed structural and kinematic analysis by Faulds, et al. (2002), which will identify controls on geothermal fluid flow and point to areas of exploration potential.
- ◆ **List of Research Projects**

Project reports for the Center are available on their website <http://www.unr.edu/geothermal/projects.html>

 - Geochemical Characterization of Magmatic-related vs. Extension-related Geothermal Systems in the Great Basin: Implications for Exploration, Exploitation, and Environmental Issues
 - Targeting potential geothermal resources in the Great Basin from regional relationships between geodetic strain and geological structures
 - Testing unique surface identifiers for geothermal site characterization from remote sensing imagery
 - Structural and geophysical analysis and characterization of the Desert Peak-Brady Geothermal Field: Implications for understanding linkages between northeast-trending structures and geothermal anomalies
 - Assembly of a crustal seismic velocity and density database for the western Great Basin
 - Geochemical sampling of thermal and nonthermal waters in Nevada: Evaluation of geothermal resources for electrical power generation and direct-use applications
 - Regional Assessment of Exploration Potential for Geothermal Systems in Nevada using a Geographic Information System (GIS)
 - Nevada Geothermal Resources Database and Web Site
 - Construction of an Electronic Database of Geothermal and Mineral Water and Gas Samples Collected by the USGS in the Western U.S.

Nevada Assembly Bill 372 would require Permit Fee on Renewable Energy Projects

- ◆ This Bill would require a person who develops or operates a renewable energy generation project to obtain permit from Division of Wildlife. Referred to the Committee on Natural Resources, Agriculture and Mining. <http://www.leg.state.nv.us>

Public Utilities Commission Approves Renewable Energy Contracts

- ◆ March 6, 2003: The Public Utilities Commission approved six contracts between Nevada Power/Sierra Pacific and renewable energy power plants under development. These plants will provide enough electricity in 2005 and 2006 for Nevada Power to comply with the non-solar portion of Nevada's Renewable Energy Portfolio Standard.
<http://www.puc.state.nv.us/news/2003/REPS%20303.pdf>
<http://www.leg.state.nv.us/NRS/NRS-704.html#NRS704Sec7801> SB 372 (2001).

Redfield Campus, Reno, NV

- ◆ February 24, 2003: Nevada will soon have the only college campus in the world completely powered by renewable energy. A new 30-year agreement between ATS of Reno and the University of Nevada, Reno will bring advanced geothermal technology to provide heat and power for the collaborative new Redfield Campus and provide a new source of clean, affordable power for Northern Nevada. Under the agreement, ATS will build and operate an 11 MW Kalina Cycle geothermal power plant adjacent to the new campus. The plant will provide electricity, hot and chilled water. It will also supply hot water to support university research in areas such as hydroponics and aquaculture. ATS hopes to sell excess electricity generated to Sierra Pacific to help the local utility meet growing regional energy needs.
<http://www.advancedthermalsystems.com/>
<http://www.solaraccess.com/news/story?storyid=3727>
http://www.unr.edu/content/text/news.asp?sto_id=481

Carson City Looks to Renewable Energy Opportunities

- ◆ "Our goal is to make Carson City known as a manufacturing and research center for renewable energy," said Charlie Long, a consultant to the city and coordinator of the work group. "Nevada itself has huge potential for renewable energy." The city began soliciting nationally January 30th to find companies interested in producing energy from solar, wind, geothermal, hydro, bioenergy, and landfill gas as potential renewable energy sources in the city.
<http://www.nevadaappeal.com/apps/pbcs.dll/article?Date=20030211&Category=NEWS&ArtNo=302110102&SectionCat>

BLM Geothermal Leases Filed 2003 To Date

- ◆ During the calendar year of 2003 to date, the Nevada BLM has received applications for 9 new geothermal leases encompassing 18,272 acres. For more information on BLM leases in Nevada, see the website: <http://www.blm.gov/lr2000>

Katz, L.	480 acres	T41N R52E	Tuscarora, Elko County
Henkle & Assoc.	1420 acres	T23N R43E	Reese River, Lander County
Ormat Nevada Inc.	16,372 acres	T12-13N R33-34E	Gabbs Valley, Mineral/Nye Counties

Public Renewables Partnership looking for more Geothermal Power

- ◆ Geothermal developers and others with resource data are being asked to contact GeothermEx, Inc. to allow creation of a portfolio of geothermal resources that municipal utilities can look to in their planning for electrical generation. Respond to Request for Nevada Prospects at http://www.resource-solutions.org/PIER/emphasis1project3/PRP%20Geothermal%20Questionnaire_intro.pdf

LINKS: USEFUL DATABASES AND GEOTHERMAL INFORMATION

- ◆ Bureau of Land Management – Nevada Geothermal Program - <http://www.nv.blm.gov/minerals/geothermal/index.htm>
- ◆ Geo-Heat Center, Oregon Institute of Technology, Klamath Falls, Oregon - <http://geoheat.oit.edu/>
- ◆ GeoPowering the West - <http://www.eere.energy.gov/geothermal/>

- ◆ **Geothermal Biz.com** - <http://www.geothermal-biz.com/>
Geothermal biz.com was created to help the geothermal entrepreneur—companies, small businesses, Native American tribes, homeowners, and individuals—develop geothermal direct use and small power generation projects.
- ◆ **Geothermal Education Office** - <http://www.geothermal.marin.org/>
- ◆ **Geothermal Energy Association** - <http://www.geo-energy.org/>
- ◆ **Geothermal Resources Council** - <http://www.geothermal.org>
- ◆ **Great Basin Center for Geothermal Energy at the University of Nevada, Reno** - <http://www.unr.edu/geothermal/>
- ◆ **Idaho National Engineering and Environmental Laboratory (INEEL)** - <http://geothermal.inel.gov/>
- ◆ **Nevada Bureau of Mines and Geology, MI-2001, “The Nevada Mineral Industry 2001”** - <http://www.nbmjg.unr.edu/hits.php?p=dox/mi/01.pdf>
- ◆ **Nevada Bureau of Mines and Geology, Geothermal Energy** - <http://www.nbmjg.unr.edu/geothermal/index.html>
- ◆ **Nevada Commission on Mineral Resources, Division of Minerals** - <http://minerals.state.nv.us/programs/ogg.htm>
- ◆ **Nevada Public Utilities Commission** - <http://www.puc.state.nv.us/>
- ◆ **Renewable Energy Policy Project & CREST (Center for Renewable Energy & Sustainable Technology)** - <http://www.repp.org/>
- ◆ **Sandia National Laboratories Geothermal Research Dept.** - <http://www.sandia.gov/geothermal>
- ◆ **Sierra Pacific Power, Renewables RFT** - <http://www.sierrapacific.com/company/renewables/>
- ◆ **Southern Methodist University Geothermal Laboratory** - <http://www.smu.edu/geothermal/>
- ◆ **Stanford Geothermal Program** - <http://ekofisk.stanford.edu/geotherm.html>
- ◆ **U.S. Geological Survey, USGS Open-file Report 99-425 online version 1.0, “Geothermal Industry Temperature Profiles from the Great Basin”** - <http://geopubs.wr.usgs.gov/open-file/of99-425/webmaps/home.html>

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Under USDOE Cooperative Agreement: SEP/CA/03/006 supporting GeoPowering the West.

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