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**FEDERAL ASSISTANCE PROGRAM
QUARTERLY PROJECT PROGRESS REPORT**

GEOTHERMAL DIRECT-HEAT UTILIZATION ASSISTANCE

GRANT NO. DE-FG07-90ID 13040

REPORTING PERIOD: APRIL 1 - JUNE 30, 1998

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ABSTRACT

This report summarizes geothermal technical assistance, R&D and technology transfer activities of the Geo-Heat Center at Oregon Institute of Technology for the third quarter of FY98 (April-June, 1998). It describes 231 contacts with parties during this period related to technical assistance with geothermal direct heat projects. Areas dealt with included requests for general information including material for high school and university students, and material on geothermal heat pumps, resource and well data, space heating and cooling, greenhouses, aquaculture, equipment, district heating, resorts and spas, industrial applications, snow melting and electric power. Research activities include work on model construction specifications for line shaft submersible pumps and plate heat exchangers, and a comprehensive aquaculture developers package. A brochure on Geothermal Energy in Klamath County was developed for state and local tourism use. Outreach activities include the publication of the Quarterly Bulletin (Vol. 19, No. 2) with articles on research at the Geo-Heat Center, sustainability of geothermal resources, injection well drilling in Boise, ID and a greenhouse project in the Azores. Other outreach activities include dissemination of information mainly through mailings of publications, tours of local geothermal uses, geothermal library acquisitions and use, participation in workshops, short courses and technical meetings by the staff, and progress monitor reports on geothermal activities.

1.0 PROJECT SUMMARY: APRIL 1 - JUNE 30, 1998

1.1 Technical Assistance. GHC staff provided responses to 231 request during the reporting period from 32 states and the District of Columbia, and 62 international contacts from the following countries: Australia, Belgium, Brazil, Canada, Columbia, Egypt, France, Germany, Iceland, Japan, Mexico, Netherlands, New Zealand, Peru, Philippines, Poland, Russia, Singapore, Slovakia, Spain and Turkey. A total of 152 requests/responses were by e-mail of which 49 could not be identified as to location. A breakdown of requests relative to applications are: GHP (56), General (50), Resource/Wells (34), Resort/Spa (16), Electric Power (12), District Heating (12), Equipment (20), Space Heating/Cooling (8), Aquaculture (10), Greenhouses (1), Snow Melting (3) and Industrial (9).

The number of requests/responses has increase by 47% over the same period from last year (157 requests/responses). With increased e-mail and web site use, we have had numerous inquiries for general information on geothermal energy from university, high school and junior high students.

1.2 R & D Activity. The Model specifications for wells, line-shaft submersible pumps and plate heat exchangers are approximately 75% completed, and the Comprehensive Aquaculture Developer Package is about 90% complete.

1.3 Technology Transfer. GHC Quarterly Bulletin, Vol. 19, No. 2, featuring articles on the Geo-Heat Center, sustainability, the City of Boise injection well and a greenhouse project in the Azores, was mailed to 1652 U.S. and 392 international subscribers; Vol. 19, No. 3 is in preparation and should be published by September 1998. This next issue will be devoted to direct use in New Zealand and the 40th anniversary of the start of power generation from the Wairakei geothermal field. Seven presentations were made, the DOE Program Review, the DOE Show Case and the semi-annual ASHRAE meetings were attended, and four tours conducted of the OIT and Klamath Falls geothermal heating systems. The director also attended two GRC board of directors meetings and participated in the technical paper review session for the GRC Annual Meeting which will be held in San Diego in September. Arni Ragnarsson from the National Energy Authority (Orkustofnun) of Iceland is spending six months at the Geo-Heat Center on a Fullbright Foundation scholarship. A total of 601 publications were distributed on direct use and 5 volumes were added to the geothermal library. Geothermal Progress Monitor reports include: (1) Meetings, (2) California - California Energy Commission Seeks Input on Uses for \$2.5 Million Annual Geothermal Funding, (3) Washington - Mount St. Helens Quakes on the Increase Under Dome, (4) Germany - Use of Earth Heat in Germany, and (5) Japan - Efficient Use of Geothermal Hot Water.

1.4 GHC staff that worked on the project include: J. Lund (76%), K. Rafferty (86%), T. Boyd (96%) and D. Gibson (86%).

2.0 TECHNICAL ASSISTANCE

The Geo-Heat Center provides technical assistance on geothermal direct heat applications to developers, consultants and the public. This assistance includes information on low-temperature (<150°C) resources and wells, space and district heating (and cooling), geothermal heat pumps, greenhouses, aquaculture, industrial processes, equipment, resorts and spa development, electric power (small scale), and general material on geothermal energy. The nature of the assistance includes preliminary engineering feasibility studies, review of direct-use project plans, assistance in project material and equipment selection, analysis and solutions of project operating problems, information on resources and utilization, and general information of geothermal energy. We also provide assistance in the preparation of technical papers and reports, and participation in technical meetings. The following are brief descriptions of technical assistance provided during the second quarter of the 1998 program.

DISCLAIMER

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<u>Name</u>	<u>Nature</u>
04/01/98 Pascal, M. TAN - 14 Boulevard de Vincennes Fontenay sous Bois, France 94120 YOU1062072@aol.com	Re: Aquaculture Interested in your prawn project and would like to know more about how much it cost to install, are you interested to make it in France. Can you introduce me to an investor. Sent a reply informing him we no longer have the project going, mentioned our aquaculture publications and also Pierre Ungemach contact information who might be able to help. E-mail you1062072@aol.com
04/27/98 joe@kottler.com Nevada	Re: Aquaculture email response to a request for info on a NV resource. He is looking into Australian Red Claw aquaculture. Gave him info and contact for Stewart site. Also provided information on the other two Red Claw developers that we have worked with.
05/05/98 Discher, Tim enviro2@usinternet.com MN 612-593-9657	Re: Aquaculture Have an enclosed recirculating fish farm. Am interested in information concerning absorption power generator using low-grade geothermal. Sent a reply letting him know to contact Ken Nichols (provided email). He would be able to answer your questions.
05/26/98 Lipton, Doug Department of Agricultural and Resource Economics Maryland Sea Grant Extension Program Maryland dlipton@arec.umd.edu	Re: Aquaculture Asked if he knew who to contact for permission to use the State/Territory Permits and Regulations publications for the Aquaculture package. Received a reply - never heard of the publication.
05/27/98 Nider, William xplores13@earthlink.net	Re: Aquaculture Interested in any information on the production of freshwater prawns. Would aid me in researching the feasibility of starting a business in this area. Informed him of the publications we had, and also mentioned the AquaNIC website, which has lots of good information. Would need mailing address to send publication. E-mail xplores13@earthlink.net
06/04/98 Maryland Sea Grant mdsg@umbi.umd.edu Maryland	Re: Aquaculture Inquired if they had any information concerning who to contact for permission to use the publication "State/Territory Permits and Regulations Impacting the Aquaculture Industry, 1995". We would like to use part of it for our aquaculture package. Have not heard back yet.
06/04/98 Northeastern Regional Aquaculture Center (NRAC) nrac@umassd.edu MA	Re: Aquaculture Inquired if they had any information concerning who to contact for permission to use the publication "State/Territory Permits and Regulations Impacting the Aquaculture Industry, 1995". We would like to use part of it for our aquaculture package. Have not heard back yet.
06/12/98 California Aquaculture Assoc. CA 359-3474	Re: Aquaculture Called asking if they had contact information for Jeff Swan. Wanted to contact him concerning the business development he is starting in Desert Hot Springs (geothermal). Left name and number to call me back. No response.
06/12/98 Martin, Jerry m1699@mica.com	Re: Aquaculture Wanted to know if we knew anything about monster shrimp (Macrobrachium Carcinus). Sent a reply letting him know we have nothing on monster shrimp, but to check out the AquaNIC (Aquaculture Network Information Center) website, they might have some information and provided web link.
06/12/98 Menna, Carol cmenna@aol.com	Re: Aquaculture Studying aquaculture and are interested in learning how to raise dolphinfish. Any help you could offer would be appreciated. Replied that we don't have any information, but should check out the AquaNIC website.

04/01/98 Sommer, Curt 2416 E. Laird St. Tempe, AZ 85281	Re: District Heating Met with him at USDOE meeting to discuss his PhD thesis topic on geothermal district heating. Gave him several copies of the GHC Bulletin with articles on district heating
04/06/98 Garcia, Mark City of Pagosa Springs, CO email: trops@pagosasprings.net	Re: District Heating Email request for suggested topic on district heating for the GRC annual meeting. Suggested "lessons learned" and current problems with some background history.
04/08/98 Sadler Cadmus Group 1531 Pontius Ave. Suite 500 Los Angeles, CA 90025	Re: District Heating Wanted to know if we had any information on water quality for the various district heating systems. Provided him with fluid chemistry for the district heating systems and the quarterly bulletin vol 18, no. 3.
04/12/98 Armistead, Tom Engineering News Record New York City, NY 212-512-3388	Re: District Heating He called to check on some data on geothermal in the US. 500 MW th, 2271 sites, Boise 31.15 MW, San Bernardino 12.83 MW. Advised that all the numbers we publish are based on confirmed systems. There is no allowance for systems that we are unaware of.
04/14/98 Armistead, Tom ENR, NY email: tom_armistead@mcgraw-hill.com	Re: District Heating Email request: Needed verification of material for Engineering News Record (ENR) article on the Reno District Heating Project. All his numbers were reported correctly.
04/28/98 Phetteplace, Gary US Army Cold Regions Lab Lyme NH 603-646-4248	Re: District Heating Several days editing the district heating chapter for the ASHRAE handbook - Ch 11 for the 2000 ASHRAE Handbook of Systems
04/29/98 Phetteplace, Gary Hanover, NH gephet@hanover-crrel.army.mil	Re: District Heating email to Gary containing the attached text for the Central Plants section of the District Heating chapter that I updated.
04/30/98 Flynn, Tom Mankato Enterprises Reno NV 702-853-0501	Re: District Heating Tom called to ask about the flat rate potential for the Warren Estates. Told him that it was probably the best way to go for residential. Discussed the experience of other systems.
05/01/98 Sommer, Curtis 2416 E. Laird Tempe, AZ 85281 curtis@imap1@asu.edu	Re: District Heating Working on my thesis project of an assessment of the environmental impacts of geothermal district heating. Talked to Gordon B. and he mentioned the 3rd. edition of the guidebook especially chap. 13. How much will it cost to get. Sent a reply that I could send him a copy of chap. 19, but will need him mailing address. Also mentioned the University of Auckland website which is offering an environmental course now.
06/04/98 Nemec, Jerry Mayor Midland, SD	Re: District Heating Request to help format and review a paper on the Midland, SD district heating system. Completed and mailed to GRC for their annual meeting
06/12/98 Potter, Chris City Council City Of Ketchum, ID	Re: District Heating Visit to the Geo-Heat Center by a member of the City Council of Ketchum, ID. Interested in constructing a 2-1/2 mile pipeline for district heating and to heat a new swimming pool. Went over the economics - doesn't look good since they have natural gas. She will send more detailed information so we can do a better preliminary economic analysis.

06/17/98 McGoff, Steve NV PUC 702-687-6040	Re: District Heating Steve is with the NV PUC and he was calling about the plan to change the Warren Property system over to flat rate from btu meters. Some of the customers are complaining. He asked about what they are doing in Susanville and Boise. They are planning on allowing the flat rate but putting meters in the homes for those unhappy.
04/07/98 Igsie, Bonita CVPC, Main Campus Dumaguete City, Philippines 6200 bonitaigsie@yahoo.com	Re: Electric Power Am an geothermal engineering student who would like an in depth knowledge of the following topics 1) single flash cycle, 2) double flash cycle, and 3) multiple flash cycle. Do you have any information or data on said topic. Sent her some titles of books which would help in her research, which might be in her library. Also mentioned the GRC library database. Received a reply, they don't have those volumes, could you send me copies of relevant information. Sent a reply that the books I mentioned are quite large and I might send the wrong info. Recommended she contact Ronald DiPippo who was an author and editor for several of the books he might have a simplified version.
04/16/98 Lyall, Alison Alison.lyall@AF-Group.com	Re: Electric Power Recently heard that a new power plant opened in Otay Mesa, CA. Could you give me some information regarding this new plant and a phone number I could call to receive an application for employment. Sent a reply informing her we haven't heard of a new power plant, but contact the GRC, they might have the information you are looking for. Provided a link to their website.
04/27/98 Stahl, Keith New Bio Moscow ID	Re: Electric Power He was looking for information on ORC (binary) for waste heat from a water treatment process. Has a flow of 100 gpm @ 200 F and needs to cool it to 100 F. Told him that he could not do it with an ORC - too big of a temp drop, also temp is pretty low, flow low for the machine sizes available. Gave him phone numbers for ORMAT and Barber Nichols.
04/29/98 Gloor, Jina D. NPBN12E@prodigy.com	Re: Electric Power Can you give me info. on fossil fuels and geothermal in Nuclear power plants. Sent a reply informing her that geothermal is not present in Nuclear power plants
04/29/98 Forseth, Mallory forseth@pjs.mntm.org Pipestone, Minnesota	Re: Electric Power Comment - more information on percentages of electricity used that comes from geothermal energy. Sent a reply with a table showing capacity and gross electricity for geothermal, fossil fuel, hydro, and total. With geothermal being about 0.42% in capacity and 0.48% in Gross of the total. Provided him with EIA's website address for more updated info.
05/19/98 Bernal, Nelson Ingeominas Diagonal 53 N 34-53 Bogota, Cundinamarca, Colombia 57 1 222 18 11	Re: Electric Power Comment - I would like to know about the cost for KW electric generated in USA and other countries with electric geothermal power. Thanks. Sent a reply with what information we had also suggested the Geothermal Energy Association. Received a reply - thanks
05/27/98 Thomas, Dan Newcastle, UT	Re: Electric Power Phone request for information on how to use a working fluid (low boiling point) to produce electricity on a small scale. Referred him to Barber Nichols, Inc. of Arvada, CO - manufacturer of small units.
06/02/98 Pasteris, Ray Strategic Energy Services PA 215-736-8170	Re: Electric Power He is looking into using waste heat from a steel mill to run a small power plant. Waste stream is 250 - 300 F. Gave him Barber Nichols and Ormat numbers.
06/07/98 Whalen, Ron whalen@rockisland.com	Re: Electric Power Wanted to know what became of the CalEnergy project at Newberry. Sent a reply telling him that the leases have been transferred to the Medicine Lake area in Northern CA. Also mentioned he could contact Dave McClain for more information.

06/15/98 Duscher, Tim Granite Falls, MN	Re: Electric Power Phone request to ask if 159 F water could be used for power generation at a fish farm in SD. Recommended against it - as the parasitic load would be too high, and the efficiency would be too low. Referred him to Ken Nichols for further information.
06/18/98 Lando, Mauro Self employed translator/interpreter r. Mascarenhas de Morais 191 / 203 Rio de Janeiro, RJ, Brazil 22030-040 +5521 547 7667	Re: Electric Power Would love to received more information on percent of geothermal in the overall energy production in the US and World. Also depths at which the three mentioned levels of heat are usually found. Sent him some information concerning present and planned production of electricity for the US in 1995 (EIA). Also provided them with some websites to check out for more information (EIA, IGA, and SMU). email: roman@uninet.com.br
06/28/98 Carletti, Diogenes Brazil	Re: Electric Power Wanted more information on the Rankine cycle at Lakeview Oregon. Is it still operating, what is the organic fluid, low and high temp and the addresses of the two suppliers (ISRAELI ORMAT ana SPS). Provided them with Dan Schochet's contact information.
04/08/98 Toralde, Julmar Shaun S. Back of YMCA piapi Dumaguete City, Negros Oriental, PI 6200 js2ralde@cvpc.edu.ph	Re: Equipment This message was forwarded from the GEA office. Am a Geothermal Student of CVPC in the Philippines. For my project study I am tackling downhole heat exchangers which is related to Hot Dry Rock. Was wondering if you could send me data or reading materials related to this subject. Sent him several publications of DHEs also provided him with a link for Hot Dry Rock in Los Alamos. Received a thank you from him on 04/15/98.
04/16/98 Ho, Polycarp DreAmeroid Singapore 27 Tanjong Penjuru Rd Jurong, Singapore 609025 65-2616544	Re: Equipment Downhole injection system for calcite inhibition. Any info on using carbon steel metallurgy tubing/rods. Heard of such things called a sucker rod? Sent a reply informing them we did not have any info, but recommend they contact the GRC, and they would know who to contact. Received error msg. the e-mail given wouldn't go through. E-mail drewin@mbox3.singnet.com.sg
04/17/98 Mansoor, Judge Solar Dynamic Inc. 1395 Lawrence Ave., W. Toronto, ON Canada M6L 3C8 416-226-3007	Re: Equipment He requested 5 bulletin articles concerning absorption. Also said he misplaced the name I gave him for the manufacturer of turbine for Rankine Cycle applications. Sent him contact information for ORMAT international who helped with the Rankin cycle system he mentioned in earlier e-mail. Received a reply back on 04/22/98 thanking us for the information.
04/21/98 Riveness, Roger South Suburban Sanitary District Klamath Falls OR 541-884-2394	Re: Equipment Roger called to ask about pipe options for their system. They had another leak recently. Pipe is 1.5 to 2" in most cases, uninsulated steel. Fails due to external corrosion. Suggested that we look into the Dritherm type product to protect from moisture. Turns out that the cost of small quantities of that stuff exceeds the cost of insulated pipe. Best option is to keep using steel but go to Sch 80.
04/21/98 Kavanaugh, Steve University of Alabama Skavanaugh@cor.eng.ua.edu	Re: Equipment email to Steve with comments on his motor efficiency program. Gave him similar data from the Motor Master program. Suggested that his efficiency numbers were a little low.
04/22/98 Hamilton, Robert Metal Masters Inc Klamath Falls OR 541-883-3237	Re: Equipment Bob called to get manufacturer info for HW baseboard element. Gave him Dunham Bush, Edwards Engineering, SlantFin and Modine w/ phone numbers.
04/27/98 Riveness, Roger South Suburban Sanitary District Klamath Falls OR 541-884-2394	Re: Equipment Roger called to ask about the difference between domestic and import pipe for their system. Advised that if I was him I would go for the domestic.

04/28/98 Douglas, Mark Paisley OR	Re: Equipment He called about doing a lumber mill dry kiln w/ geothermal. Would be using the Colahan well in Paisley. Wanted to know what insulated pipe would cost - water is about 230 F. Told him that it would be about \$12-14 per foot for the material in the 3" size
05/02/98 Brown, Brian Mechanical Engr. Ft Klamath OR 541-783-3347	Re: Equipment Brian called to ask about setting for the back pressure valve at the city central plant. He calcs that it should be set for 35 psi to prevent flashing at the wellhead. Current setting is 10. No known damage from the past low pressure operation, should he design for the 35 and take the higher pump energy or stay with 10?. Advised that if his stamp is on it he should go with good design - 35psi.
05/02/98 Kavanaugh, Steve Univ. of Alabama 205-348-1649	Re: Equipment Steve called to discuss the article on expansion tanks for the next issue of the OTL. Said that his calcs indicated that the pipe expands faster than the water so the pressure actually can go down at higher temps. Asked about the quantity that is buried - soil restraint.
05/11/98 Lippmann, Marcelo LBL Berkeley, CA email: MLippmann@lbl.gov	Re: Equipment Email request for information on the Arkranes 60-km long pipeline in Iceland. Information would be of assistance to a group of Tibetan engineers now in the country. Sent a GRC Vol 5 transactions, reference form 1981 - the latest information.
05/15/98 Magalay, Eva university student Philippines email: vea3@hotmail.com	Re: Equipment email request for information on heat exchanger design. Referred her to text books on the subject and that she should contact a suppliers such as Alfa-Laval.
05/18/98 Brown, Brian Mechanical Engr. Ft Klamath OR 541-783-3347	Re: Equipment Brian called to ask about elastomers for the inside of butterfly valves for the city system. Said the old valve lining (which was EPDM) had softened and had to be replaced. Advised that we had no similar problem that I was aware of here at OIT. He was going to go to Fluoroelastomer. Softening must be from lube oil, temperature should be OK for both EPDM and Buna N.
05/20/98 Thomas, Festus Protective Environmental Controls Pte Ltd 35 Tannery Road, #10-01A Tannery Park, Ruby Industrial Complex Singapore 347740 (65) 846 0620	Re: Equipment One of our clients is interested in installing a 50RT capacity Absorption Chiller. We are looking for a suitable manufacturer to supply such an equipment. Sent him to our Vendor listing page and provided a link to it.
05/26/98 Ertoz, A. Ozden Vansan A.O.S.B 10035 Sokak 10 Cygly Yzmyr, Turkey 35620 vansan@superonline.com	Re: Equipment I am very interested in failures of geothermal direct-use well pumps. Would be very grateful if you mailed me a complete report. Wanted tp2 - sent it out to him.
05/27/98 Phetteplace, Gary Hanover, NH gephet@hanover-crrel.army.mil	Re: Equipment email to Gary about his response to a question on the Holly district heating listserv. Asked if he had ever actually used that insulation material. Suggested that the few times that we had looked into it that it was more expensive than preinsulated pipe.
05/28/98 Fjallman, Rolf rolf@trustpower.co.nz New Zealand Fax 0064 7 5744825	Re: Equipment Working for an energy company in New Zealand and understand you have information about DHE in Switzerland and maybe Italy. Do you have names and addresses of companies manufacturing and installing DHEs in these countries. Provided him with the names of several people (Dunstall and Rybach) who have knowledge about DHEs in New Zealand and Switzerland

06/16/98 Ostaficzuk, Stanislaw University of Silicia Poland email: ostaficz@us.edu.pl	Re: Equipment email request for information on gas fired refrigeration units. Gave him name and addresses of two suppliers: Trane and Carrier.
06/30/98 Kush, Ed edkush@hamptons.com	Re: Equipment email to Ed Kush about the relationship of the proposed SCW ASHRAE Work statement and the DHE work of Culver and Reistad. Suggested that it be referenced in the work statement as foundation material. Advised that I have put copies of the material in the mail to him today.
06/30/98 Phetteplace, Gary Hanover, NH gephet@hanover-crrel.army.mil	Re: Equipment email response to Gary on the well specs that I am working on. Told him that I would be done with them about the end of September. Will cover production and injection wells, well pumps and HTX.
04/03/98 Castle, Ron American Geothermal Inc. 1037 Old Salem Road Murfreesboro, TN 37129 615 890-6985	Re: General We are manufacturers of geothermal heat pumps for residential and industrial/commercial applications and would like to be added to your vendors listing. Talk to Kevin he said to add them. They offer are Direct Expansion units.
04/03/98 Ottoum, Margaret Professor, Dept. of Environ. & Health Sciences Johnson State College Johnson, VT 05656 802-635-1335	Re: General Gave tour of OIT geothermal system. Toni gave tour of downtown area.
04/06/98 Ward, Ray wardend@hpmfas1.cup.hp.com	Re: General Looking for information concerning degree days, monthly and annual, winter design temp, and Percent sunshine for Bonanza, OR. Sent a reply containing the information for Medford for solar and Klamath Falls for all else which would be close to Bonanza weather.
04/07/98 Adams, Steve Sadams@lopez.wednet.edu	Re: General Doing a school report on geothermal energy for a science project. Could you send me any general info. Sent a reply asking what kind of information they were looking for (greenhouses, power, aquaculture, etc.). Also provided a link to the Geothermal Education Office website.
04/07/98 Clutter, Ted GRC Davis, CA	Re: General Sent an e-mail letting them know that we no longer loan out any volumes from our library. It is for in-house use only. Would they please change it on their website. Received a call from Estella on what to put on the website for publication requests
04/08/98 Dorr, Perle GEA Washington, DC email: pdorr@geotherm.org	Re: General email request for information on the 33rd IECEC to be held in Colorado Springs, August 2-6, 1998.
04/10/98 mnemzer@aol.com Geothermal Education Office Tiburon, CA	Re: General email to Geo Ed office with comments on their pub draft. Suggested that wording be changed in the power plant section on Binary. Offered explanations on the operation of GHP in the heating cooling and DHW modes.
04/14/98 Semiz, Tuncay 30 Middle Road Levittown, PA 19056 (215) 547-1119	Re: General Wanted to know about geothermal in Turkey. What can he do? and maybe a contact person. Provided him with some information on Turkey and also provided Rosita's contact information.

04/16/98 ASHRAE Atlanta, GA jmoses@ashrae.org	Re: General email to ASHRAE handbook staff on questions posed in their message. Advised that there are no new index terms, no old notes at top be deleted, and to send the galley's to me.
04/16/98 Geothermal Education Office Tiburon, CA geo@marin.org	Re: General email to Geo Ed office with comments on their publication draft. Made several comments reading environmental emissions compared to conventional plants, direct use map, removal of GHP from the document, cooling tower diagram etc.
04/17/98 Nemzer, Marilyn Geothermal Education Office Tiburon, CA email: geo@marin.org	Re: General Send e-mail to respond to request to review the "little red book" - made 7 suggestions.
04/20/09 Jacobson, Emily Old Bridge Elementary School 12530 Oakwood Dr. Woodbridge, VA 22192 email??	Re: General email request for general information on geothermal energy.
04/21/98 Fortuna, Ray USDOE Washington, DC	Re: General Regarding a booth at the IDEA conference in San Antonio June 13-16. Asked if we had a booth setup. Let him know we did not. He also mentioned Gordon will be working with us for the graphics and legends for the booth setup.
04/22/98 Twine, Jess Synergy PO Box 1854 Cathedral Station NY 10025	Re: General He called for info on the Heat Center for a directory of Renewable energy organizations.
04/23/98 MacLeod Gardens Point Campus Queensland University of Technology 2 George St. Brisbane, Queensland Australia 4000 6178645125	Re: General Librarian with the Document Delivery Unit of Queensland University of Technology in Australia. We have somebody eager to borrow a copy of the item "Reference Book on Geothermal Direct Use", 1994. Was wondering if you could assist us in this matter. Found an extra copy in the library and sent it.
04/23/98 Palmer, Lisa Growth Capital Holdings 3100 Arapahoe, Suite 503 Boulder, CO 80303	Re: General Phone request for 20 copies of the direct use brochure to be used for investors for a project on the island of St. Vincent. Referred to us by USDOE.
04/29/98 Rosengart, Oliver ollie@panix.com	Re: General Doing a report on geothermal energy for a college report. Was wondering where to find a good source, or if you had any information to send me. Suggested a couple of websites to check out to get him started.
04/30/98 Haller, Pablo Spain phaller@teleline.es	Re: General Studying power engineering in Germany and interested in renewable energies. Please tell me how I can get work experience in projects related with renewables. Provided him with Pierre Ungemach's contact information, plus the Geothermal Institute in Auckland's contact person.

05/01/98 Ross, Howard Univ of Utah SLC, UT 801-581-5184	Re: General Howard called about info for the brochure that Mike is updating for the DOE. Wanted to know the number of each type of use in the US. Verified the numbers for him but commented that those are only the ones we have worked with. need to allow for the others that we don't know about.
05/05/98 Weber, Jarod Bob backyard-bob@mailexcite.com	Re: General Doing a project on alternative sources of energy. My project is due in a couple of days and I'm running low on info. Could you send me any info on energy. Since his project was due soon, sent him to look around our website and also the Geothermal Education Office and Geothermal Technologies websites and provided links for him.
05/08/98 Albert, Mark OR Fax 541 317-2879	Re: General Wanted to know if we had information for renewable energy regulations. Mentioned the Guidebook chapter 18 which has some state regulations for geothermal. Asked if I could fax him the information
05/11/98 Gordon shorts@pacbell.net	Re: General Looking around the Internet for information on Beppu. Will be there in June. Any ideas on what to do, where to stay, or interesting stuff. Provided him with Mitsuru Sekioka's e-mail address, he might be able to provide info.
05/11/98 Van Huizen, Alan atvan@worldnet.att.net	Re: General Heard that the Salton Sea field was discovered during an oil&gas drilling during 1957-58. County records say Allen T. Van Huisen, Sr. was the principal owner. Could you verify this info. Provided him with some people to contact who might know (UNOCAL and Susan Hodgson).
05/12/98 Billock, Dave DBillix316@aol.com Springfield, OH spri0306db@ACCESS-K12.org	Re: General Eighth grade student in Springfield, OH. One of our tasks for our science class is to interview a geothermal expert. Let me know if you can help out. Sent a reply back that we would be happy to help and if we don't have the answers we would find somebody who could. Passed message to John. Asked general questions about geothermal energy
05/14/98 Lawrence, Bob 424 N. Washington St. Alexandria, VA 22314	Re: General Email request for information of the breakdown of direct use applications and energy numbers for the US and World. Sent a paper with the information.
05/15/98 Noppenberger, Mark Marsulex Environmental Technologies mnoppenberger@marsulex.com	Re: General Informed us the address for Voith Transmission has changed. Made changes to the website entry.
05/16/98 Dave, Keaton and Jim email: spri0306db@ACCESS-K12.org	Re: General Email inquiry asking several general questions about geothermal energy - dangers, life, cost, maintenance, advantages, disadvantages, and peaking plants. Gave responses and gave advice on building a geothermal "machine".
05/20/98 Hare Bob California Energy Commission Sacramento, CA 916-653-8685	Re: General He is with the CEC and called to see if we can participate in a meeting in Aug on the "reassignment" of the GRDA funds which come from royalties on the geot power plants in the state. Told him that we both have commitments in Aug but we would try to attend.
05/22/98 Dan Shawhan GEA Washington, DC	Re: General Looking for a world map showing resource distribution. Told him about our US map and the world maps used on some GHC bulletin covers

05/28/98 Dan Shawhan GEA Washington, DC (202) 383-2626	Re: General Looking for a photo representing direct use for a brochure they are making to distribute in South America. Looking for S.A. pictures mainly. Told him John would know if we had any. John referred him to Tom Flynn, Sue Goff and Gerry Hutter.
05/28/98 Papworth, Frank Scancem Materials Australia frank@scancem.com.au	Re: General Our company is a leading producer and seller of silica fume. We understand that geothermal silica has similar properties, would appreciate any information you have concerning silica. Replied and asked if he had access to the GRC Transactions and listed the publications he might like to look up concerning geothermal silica.
05/30/98 Srodnin, Larissa Liberty Science Center 251 Phillip Street Jersey City, NJ 07305-4699 201 451 0006	Re: General Have an exhibit on geothermal energy would like to have information sent to us. Sent him a couple of brochures and some publications.
06/01/98 Lippmann, Marcelo LBL Berkeley, CA email: mlippmann@lbl.gov	Re: General email request to review a translated paper from Argentina to be presented at the GRC meeting in September. Reviewed the paper and made comments.
06/04/98 Lippmann, Marcelo LBL, Berkeley California email: mlippmann@lbl.gov	Re: General Email request to review a translated direct-use paper from Argentina by Able Pesce. Downloaded a copy and made several suggestions which were emailed back.
06/04/98 Agaoglu, Sahabettin Merter Evleri Sitesi, B Blok, Kat 2, D 11 Tozkoparan-Istanbul, Turkey 90-212 481 49 48	Re: General Requesting information about geothermal courses with your application forms. Sent a reply informing him we don't offer geothermal courses here, but provided him with webpage sites for Auckland, Iceland and Stanford. Received an e-mail warning that it was having trouble connecting.
06/09/98 Mizen, Michael Mizen & Associates, Inc. River Forest, IL 708 366 2060	Re: General An independent developer of technology based training programs and updating an exhibit on sources and forms of energy. Would like to obtain photos demonstrating geothermal applications and have permission to use them from your site. Sent a reply that the pictures on the website can be used and also told him about the EREN/DOE photo library that is online. Received a reply - thank you
06/14/98 Boguslavsky, Emil St. Petersberg Mining Institute St. Peterberg Russia email: emil@erb.usr.spmi.spb.ru	Re: General Email request to review paper for GRC Annual Meeting. Forwarded on to Jim Lovekin for review and to GRC for publication
06/15/98 Phetteplace, Gary Hanover, NH gephet@hanover-crrel.army.mil	Re: General email message to Gary regarding the edit of the District Heating chapter for the ASHRAE handbook. Gave him the latest changes to the first draft that I sent him. Told him that I could make the Wed meeting in Toronto.
06/15/98 Fortune, Ray Office of Geothermal Technologies USDOE Washington, DC	Re: General Email request to review a paper on "Geothermal Power" to be published in the Standard Handbook for Electrical Engineers. Sent comments back. Good paper.

06/19/98	Re: General Sent the Russian paper (7 files) for the GRC meeting to Grace Mata
Grace Mata Geothermal Resources Council Davis, CA	
06/19/98	Re: General Sent the Russian paper (7 files) for the GRC meeting to Jim Lovekin
Jim Lovekin GeothermEx Richmond, CA	
06/20/98	Re: General Thought you might want to list us under "Consultants" we conduct assessments and hydrogeologic evaluations. Kevin said to find out what properties they evaluate. Sent a reply asking for a short summary for the vendors listing. Received a reply on the 30th and let's us know what he does. Deals with low and high temp resources.
Campbell, Michael Campbell and Associates 17419 Sandy Cliff Drive Houston, Texas 77090 281-440-7665	
06/22/98	Re: General Is it possible to email the article Pond Heat Loss? Sent a reply that it is not setup for electronic transmission, but if they send me their mailing address I will get it sent off to them. Received a reply, they sent me the mailing address for one of their people in Colorado (Doug Grauel) and also wanted Heatools paper also. Replied that the publications have been mailed to the address he provided.
Dubrovsky, Michael dubr@kzsit01.tengizchevroil.com	
06/22/98	Re: General Received the files HMLIBE.zip, HM6JN8.zip, and KFALLS.zip to update the heatmap program they installed on my computer. It should include heat exchangers in the central plant. Downloaded the files but have not installed them yet.
O'Brien, Bob WSU- Energy Program WA ObreinR@energy.wsu.edu	
06/23/98	Re: General Currently studying geothermal energy and in particular its viability within residential areas. Any information would be appreciated. Sent a reply asking if they were interested in GHPs or direct use. Provided links to the survival kit if they wanted info on GHPs. He is interested in both ghp and direct use. Could we send info on direct use applications. Sent him a couple of publications.
Newman, Adam Saunders Gorge Sanctuary RSD 72 Palmer, South Australia 5237 hackemfro@hotmail.com	
06/24/98	Re: General Informed us of the incorrect spelling for the authors of the bulletin article bci246. Sent a reply thanking them and corrected the information.
Malolepszy, Zbigniew UNU Geothermal Training Programme zbma@os.is Iceland	
06/25/98	Re: General Wanted to know if we knew of any job prospects in the fitness / health spa area in Hawaii. Ran across our bulletin abstract concerning fitness industry in Hawaii. Sent a reply that we didn't have any info.
Mandel, Olivia oliviabuckwheat@yahoo.com	
06/25/98	Re: General John forwarded a message concerning a Texas Representative who was interested in knowing if the DOE was involved in any projects in his district. Did some research and found out that the T-H-S hospital in Marlin, which our records indicated it closed in the 1980s, was just renovated and changed its name to Falls Community Hospital and Clinic. They have been using the geothermal since they opened. They have a heat exchanger and pump and dump. They have some scaling and have lowered the pump twice since operating. Called Ray and let him know what I have found out.
Fortuna, Ray USDOE Washington, DC	
06/26/98	Re: General Sent the Russian's author submission form for the GRC meeting to Grace Mata.
Grace Mata Geothermal Resources Council Davis, CA	

06/28/98 Bayking, Elias Jr. 2nd Floor, #1 Taft St. Dumaguete City, Philippines 6200 ebayks@technologist.com	Re: General Working on a feasibility study on the use of downhole heat exchangers to extract heat of non-discharging hot wells. Would appreciate any information you might have. Sent him several publications on DHEs.
03/16/98 Kavanaugh, Steve University of Alabama skavanaugh@coe.eng.ua.edu	Re: GHP email response to Steve on the OA (outside air) furor in ASHRAE. I suggested that we have gotten too far from the goal of supplying OA. Should base it on CO ₂ plus some allowance and go back to a simple people/sqft x cfm/person approach. The health considerations are beyond our scope as professionals.
04/06/98 carlene@erols.com	Re: GHP email response to a message passed on to us from DOE HQ regarding "geothermal wells". Advised that if they were interested in GHP "wells" that the term borehole was more commonly used. For standards they should contact the NGWA for a copy of the Vertical Borehole Construction Guideline. Avoid the term well because this results in over regulation.
04/06/98 Simpson, Stu Washington State Dept of Gen Admin Olympia WA 360-902-7199	Re: GHP Returned Stu's call about a GHP for a school in WA. Message said he would be out til 4/13.
04/07/98 Henry, Dennis lotus@a1pro.net	Re: GHP Is there any info available for simple conversion, air conditioners, etc. to geo heat pumps? Any info on do it yourself engineering plans would be helpful. Sent reply informing him the systems are not do it yourself installations, heat pumps operate over a more extreme temp range than conventional heat pumps and air conditioners, also mentioned our survival kit on-line.
04/08/98 Overbury, Mike Geothermal Interface Assoc 76 Baby Point Cres Toronto, ON Canada M6S 2C1 416-762-6834	Re: GHP Mike called to get my opinion on GS4 (antifreeze). Told him that I am mostly an open loop guy so we don't have any direct experience with it. Opinions from contractors that I have spoken to are "It leaks out of everything but the container it comes in"
04/08/98 Kavanaugh, Steve Univ of Alabama 205-348-1649	Re: GHP Called Steve to give him the final changes to the OTL (Outside the Loop) GHP newsletter draft for Vol 1 No2. Should be out in the mail next week
04/09/98 Cressman, Steinar Tres West Engineers Seattle WA 253-472-3300	Re: GHP He called about a vertical closed loop GHP system that they put in a Elem school in Richland WA. Has a 4000 gal tank in the loop that is open to the atmosphere. They are having problems and high water treatment costs. Told him about "blanketing" the water surface with an inert gas like nitrogen. That way the tank can still operate at low pressure.
04/09/98 Oxboro, Mike USFS Portland OR	Re: GHP Faxed comments on the design of the Forest Service bldg to Oxboro. Advised that the boiler/tower were probably not necessary, should variable speed the loop pump, and well pump control should be changed to run only when needed etc
04/10/98 crabeyeVII@aol.com	Re: GHP email response to a request for help in finding a lower bid on a resid GHP system. Advised that the numbers in our website are national averages and some areas are much higher. Suggested the open loop option to reduce cost. Mentioned the IGSHPA site contractor list. Advised that in some areas it just doesn't pencil out.

04/10/98 Fore, Robert Eastern Sierra Unified School Dist Lee Vining, CA 760-932-7443	Re: GHP He called to ask about the possibility of using a GHP system for a school in his (he is the superintendant0 district. Now on oil furnaces. Have 72 F well. 100 students, 5 classrooms and a gym, office. Discussed system design, outside air, costs and savings. Gave him heating costs in \$/million Btu.
04/13/98 RonErgoMan2aol.com	Re: GHP email response to a manufacturer of GHP DX equipment about listing in our directory of suppliers.
04/14/98 Phetteplace, Gary Hanover, NH gephet2hanover-crrel.army.mil	Re: GHP email to Gary on the additions/edits/deletions to the chapter on DHC for the 2000 handbook. Suggested that we add cool storage and drop some of the customer connection stuff from the central plants section that I am responsible for.
04/22/98 Guest, Paul 541-884-3758 (local) 415-563-5525 (SF) San Francisco, CA	Re: GHP Visited the GHC and asked about geothermal resources on a piece of property north of Klamath Falls. Indicated that there was no known geothermal resources there, but that a heat pump would probably work. The local well water is 64 F. Gave him the homeowners guide and several other papers.
04/24/98 Bradshaw, Greg Pompei AD NY NY 212-431-1261	Re: GHP He is an architect w/firm in NYC working on a project in western WA state. Wanted to "green up" their proposal. Advised him that there are no hot geo resources in that area but that GHP might be a good idea. Discussed GHP for retail portion of the project.
04/28/98 Nies, Richard 2216 Falsburg Pk. Rd Lowell, Michigan 49331 fandmservice@triton.net	Re: GHP Could you send information on geothermal heating for the home usage. Sent a reply informing him of the survival kit we have on line and provided a link.
04/29/98 Brown, Bob Climate Master Indiana 219-543-2302	Re: GHP Bob called to ask about guidelines for their installers handbook for GHP open loop. Discussed limits for H2S and NH3 and sulphur. Faxed him a copy of the material that I put in the last issue of the OTL newsletter.
05/01/98 Vallencourt, Rich Canterbury Engineering Assoc Canterbury CT 860-546-1124	Re: GHP He called about a project that he is working on in the NE. 1,000,000 sqft office conversion of an old mill. Has a big pond. Chillers 2500 tons. Discussed surface water system and limit on heat rejection. Gave him number from the OTL newsletter. Told him it would result in very small impact.
05/02/98 McCrea, Kevin National Ground Water Asoc. Westerville OH	Re: GHP Faxed comments to Devin McCrea @ NGWA on the changes to the vertical loop installation guidelines. Changes to the antifreeze data to allow all the major types to be used.
05/04/98 Miller, Kevin 32 Al Harvey Road kem3@uconect.net Stonington, CT 06378 (860) 535-1172	Re: GHP Comment - thinking about geothermal for new house. Please send as much information as possible on systems and price comparisons. Referred them to the survival kit on-line.
05/06/98 rsalm@jetstream.net Canada	Re: GHP email response to a request from a contractor to use material from the Survival kit in his marketing of GHP in BC Canada. Advised that it was OK as long as it was properly credited and info not used out of context.

05/06/98 Pape, Dr. Joachim T. Busch 10 Bonn, NRW Germany 53113 +49-228-2422430	Re: GHP Working on computer supported calculations of dynamic heat transfer in soils. Would like new business contacts. Do you know any. Sent him to the IGSHPA and the GHP Consortium webpages. They might be able to help.
05/08/98 Terry.Murphy@email.msn.com	Re: GHP email response to a request for info about DX systems. Advised that I do not consider them to "Mainstream" as he puts it. Cautioned about lack of ratings, performance data and few installations. Suggested that there is the potential for better performance but unproven. Discussed the reliability issue and the extensive piping for DX.
05/10/98 Dal Bello, Joao Rua Andrade Neves 1.034 Bairro Exposicao Caxias do Sul, Brazil 95084-200 dalbello@visao.com.br	Re: GHP Is it possible to send me the article A Capital Cost Comparison of Ground-Source Heat Pumps. Sent a reply informing him that we can, but need mailing address.
05/11/98 Thain, Ian Taupo New Zealand email: i.a.thain@xtra.co.nz	Re: GHP email request for reference on geothermal heat pumps to be used in a seminar in Auckland in July. Sent copies of reference.
05/12/98 jjames@Wyoming.com WY	Re: GHP email response to a request for assistance with a resid GHP. Advised that contractor availability is a hurdle in some areas like theirs (WY) and that they may have to bring in a contractor from out of the area. Suggested that the open loop option sometimes can play a role. Don't need a cert contractor and it's a lot cheaper. Cautioned about water quality, disposal and flow. Discussed radiant floor considerations - cooling, SWT.
05/13/98 Goranson, Colin 1498 Aqua Vista Rd.. Richmond, CA 94805	Re: GHP Phone request for general information on GHP. Sent a package of GHP articles.
05/18/98 Ooms, Jurgen and Xander Schoolen Chemical Technology Twente University of Technology Netherlands email: j.ooms@student.utwente.nl & a.schoolen@	Re: GHP email request for information on geothermal heat pumps, environmental concerns and industrial examples. Answered some questions and asked for more details.
05/18/98 Hitchcock Jerry GTE Government Systems SD 605-966-2465	Re: GHP He called about using a ground loop to cool a remote electronics site. Told him it could be done but that a constant cooling load w/ no heating load would result in very long loop lengths. He had already done the calcs and didn't believe the answer. Verified his numbers.
05/19/98 Zeeuwen, Maarten Dr Ottestraat 8 Vlissingen, The Netherlands 4382 LV hzeeuw@mail.HZeeland.nl	Re: GHP Working on a project for school about heat pumps. Need to write about the influence of the climate on the performance of heat pumps. Informed him about the survival kit online and the ARI website and how to estimate annual operating cost of a heat pump. Received a thank you and wanted to confirm an e-mail address for Rybach. Sent the e-mail address for Rybach.

05/19/98 Zeeuwen, Maarten Vissingen Netherlands email: hzeeuw@mail.HZeeland.nl	Re: GHP email request for climate conditions vs GHP operations for both air and ground source units. Gave address and email contacts of Rybach (Switzerland), Sanner (Germany) and Walter (Netherlands) for information on Europe.
05/19/98 Ooms, Jurgen Witbreuksweg 379-117 7522 ZA Enschede The Netherlands email: j.ooms@student.utwente.nl	Re: GHP email request for additional information on heat pumps - especially for industrial process heat. Described a vapor compression unit and suggested he contact a turbo machinery company in Europe. Also gave him the address of Frans Walter at the Univ. of Delft - who wrote the WGC'95 country update paper for The Netherlands.
05/22/98 mhoran@lefton.com	Re: GHP email response to a request for information on the geographic distribution of GHP. Responded that we don't have any info like that. Suggested that most of the requests that we get come from east coast and upper midwest. Very little activity here in the NW
05/26/98 Barnard Pat DGI Sacramento CA	Re: GHP She is an architect in Sacramento. Working on a large office building - 10 floors apts 2 floors comm'l space. Has a pump under the building running 24 hrs/day to keep water out of the basement. She wants to use it for a heat pump system. Discharges to storm drain. Told her that a first guess would be 1 gpm/ton if the temperature isn't to high.
05/26/98 jandedie@mindspring.com	Re: GHP email response to a request for info an operating a solar photovoltaic GHP. Advised that I was not aware of any GHP's designed for this. Suggested that it would be better to invest in a more effective envelope for the house than in up sizing the array to serve the heat pump. Provided some data on the power requirements of heat pumps.
05/26/98 Ostaficzuk, Stanislaw University of Silesia Poland email: ostaficz@us.edu.pl	Re: GHP Email reply for information on heat pipes and heat pumps based on an article in the CADDET magazine about pavement snow melting in Japan
05/27/98 Ostaficzuk, Stanislaw University of Silesia Poland email: ostaficz@us.edu.pl	Re: GHP Email request for information of using warm water from coal mines. Send information on Springhill, Nova Scotia, Canada project and papers by Alan Jessop.
05/29/98 Dougherty, Richard Tashkent, WA email: moosemeat@hotmail.com	Re: GHP email request for information on GHP for a log house in Washington. Answered some of his questions and then referred him to our website for additional information of GHP.
06/01/98 bmnevilles@belmont.campus.mc i.net	Re: GHP email response to request for info on hospital GHP. He asked if the central plant could be converted to GHP and the distribution remain conventional. Advised that it could be done but that in large buildings, much of the savings from using GHP is on the fan side. To achieve any savings, a heat recovery chiller arrangement would be the way to go. Are heating coils comparable?
06/01/98 bmnevilles@belmont.campus.mc i.net	Re: GHP email response to a request for information on applications of GHP in acute care hospitals. Advised that there are many applications in long term care, med office etc but that all the acute care applications I am aware of are open loop/central plant type. This is due the fan side primarily. The need for relative pressurization, high efficiency filters and high OA tends to eliminate unitary equipment. Also critical nature of facility results in very conservative engineering practice.

06/03/98 McCrea, Kevin Nat Ground Water Assoc OH h2o@h2o-ngwa.org	Re: GHP email to Kevin McCrea about the antifreeze language in the vertical borehole completion guideline. I suggested that we broaden the range on the flammability, toxicity and BOD to include all the fluids identified in the ASHRAE work as acceptable. Provided the appropriate values.
06/04/98 dmoser@usa.net	Re: GHP email response to a request for help with a GHP system. Advised that we do not maintain a list of contractors but that the IGSHPA does. Gave them the location on the IGSHPA site
06/05/98 Brewer, George 35 E. Jacaranda St. Mesa, AZ 85201	Re: GHP Phone request for information on GHP for an installation at a home in the desert. Concerned about heat sink. Sent him some literature and referred him to our web page, IGSHPA and the Consortium.
06/08/98 Lord, Roger Las Cruces, NM phone: 505/521-1840 (w) or 522-6896 (h) email: Rlord@imr.rjf.com	Re: GHP email request for GHP information for a desert climate. Has a 104 F well to use. Informed him that this is too hot and suggested he look into a closed system (ground-coupled) instead. Referred him to our web page and the "Survival Kit". Also, offered to send additional information upon receipt of his address.
06/09/98 cbishopp@sprintmail.com	Re: GHP email response to a request for information on GHP DX. Forwarded the message that I had sent out on a similar request a couple of weeks earlier. Questions were about how the DX compares to standard GHP and about efficiency gain, type of piping.
06/09/98 Knight, Denys 4600 Lisa Road Harrison, ID 83833 KNIGHD@dshs.wa.gov	Re: GHP Would like more information regarding geothermal heating and cooling. Referred them to the Survival Kit we have on line. If they had other questions to contact us.
06/10/98 John_Hazen@msn.com AZ	Re: GHP email response to a request for information on GHP installations in the Arizona area. Advised that the largest savings are usually in the heating mode in the residential installations but that the high cooling operating hours in his area could compensate for that. Loop lengths in hot climates are long and that drives up first cost.
06/11/98 Kush, Ed Water Mill NY 516-726-4658	Re: GHP Ed is working on something for the Consortium about Standing Column wells. He called to see what I knew about them. Told him that Carl Orio is the real expert on those. My concern is that they typically don't use an isolation heat exchanger. This may be a problem if they are installed in areas other than the NE part of the country.
06/12/98 Maxwell, John Aspen Systems Corp. 1600 Research Blvd. Rockville, Maryland 20850 (301) 251-5000	Re: GHP Wants to set up a computer simulation using GHPs. Wanted to know if the pumps run all the time. Kevin was out of the office. Mentioned the survival kit we have on-line and also referred him to Steve Kavanaugh.
06/14/98 Anderson Dave Geothermal Energy Association Davis, CA	Re: GHP Dave called to see if he could use some of the material in the Survival Kit for something that he was developing. Told him it would be better if he created something from scratch for CA since the Survival Kit was intended for a national audience. Asked that he not take items and use them out of context - all or nothing.
06/14/98 Smith, Will wsmith@sunlink.net Pennsylvania	Re: GHP Can you supply any info about vendors who manufacture water-to-water GSHP for heating and cooling. This is for an existing open loop system. It has 6 units with 5 tons of capacity each. Sent him a list containing manufacturers of water-to-water heat pumps and contact information for each.

06/17/98 Krisnart@aol.com	Re: GHP email response to a request for help with an office building design. Advised that 45,000 sqft is large enough that residential rules of thumb should not be used - could result in a short loop for the load. Advised that he should get a copy of one of the commercial design software packages.
06/17/98 Oxboro, Mike USFS Portland OR	Re: GHP Mike called about the potential main on the system at the FS building in Lakeview. The contractor wants \$10,000 per year for the main and that doesn't include the wells. Told him that the equipment should still be under warranty for the first year. the item that could require main are the control valves and the htx. Advised that he check out the info on the consortium's web site about main on GHP systems.
06/18/98 Lord, Roger email: rlord@imr.rjf.com	Re: GHP email request for additional information of GHP - especially how to heat the domestic hot water. Gave him an answer and referred him the GHP Survival Kit on our web site.
06/30/98 rkkelog@francecomp.com	Re: GHP email response to a request for GHC spreadsheets. Advised that the referenced spreadsheets would not assist him in determining the feasibility of a GHP for his home.. Suggested the Survival Kit portion of our website. Said we would be happy to answer any question s that he had.
06/30/98 kfmp@infonet.com	Re: GHP email response to a request for information on DX GHP. He had heard that they were more efficient than standard GHP's. Advised that there was the potential for better performance but that the units were not independently rated so there was no real way to tell. Very few systems and no data. Also suggested that the many refrigerant piping connections are potential leaks and could lead to poor reliability.
06/30/98 Leaman, Ken CA (209) 486-1700	Re: GHP Wanted information for heating and cooling a home. Referred him to our survival kit that is on-line.
04/04/98 El naggar, Atwa 55 Fesel St. Bourg Al Attebaa Arp 5 Cairo, Eqypt 5688664	Re: Greenhouse We are El ansar company for development and commerce in agricultural field in Cairo. Please let us know what is new in Greenhouses and accessories. Sent him a quarterly bulletin on greenhouses and the Greenhouse Information Package
04/06/98 Oracion, Joseph B. #03 Locsin St.6200, Dumaguete City Philippines email: meph_98@yahoo.com	Re: Industrial email request for information on our silica study in Mexico. Gave reference in GRC Transaction.
04/13/98 Knox, Laurie Denver, CO 303-273-9508	Re: Industrial She called about obtaining the phone numbers and contacts at the two geothermal onion dehydration plants in Nevada. She want to take a client to see the facilities. Gave her the numbers and contacts that we had.
04/14/98 Knight, John Gross Capital Holdings 3100 Araphoe Ave. Boulder, CO 80303	Re: Industrial Call requesting information on vegetable dehydration and general direct use. This is for developers for a project in St. Vincent and the Grenadines. Will drill a well in 90 days. Send Bulletin on the onion dehydration and some general literature.
04/30/98 Lennertz, Pascal ECOPRO S.P.R.L. Rue de Hottleux 101 Waimes, Belgium B-4950 +32 80 67 21 31	Re: Industrial Are seeking information about the wood-ethanol plant in Rotorua. We would be thankful to you if you can provide us with some of these in formations. Provided them with two people to contact who would have information on the plant in Rotorua. Also the website for the Geothermal Institute in Auckland.

05/13/98 Pinea, Yvette NOAC, Kabankalan City Negros Occidental, Philippines 6111 ettevy@hotmail.com	Re: Industrial I've planned my project study on "Philippine Mushroom Production Using Geothermal Heat", but I don't have enough sources. I am asking your assistance. Provided information on the Mushroom place in Vale Oregon and what information I had for Fludir, Iceland. Also provided contact information for Oregon Trail Mushrooms in Vale. Received a reply back on 5/14, - thank you.
05/15/98 Oracion, Joseph B. #03 Locsin St 6200, Dumaguete City Philippines	Re: Industrial email request for article on waste silica use that was written on our research work at Cerro Prieto. Will send article from GRC transactions
06/02/98 Green, Larry Geothermal Development Assoc. 251 Ralston Reno, NV 89503	Re: Industrial Phone request for paper on fruit dehydrator developed for Mexico. He is making a presentation in Central America on direct use. Will send him a copy.
06/02/98 Jackson, Doug Klamath County Public Works Klamath Falls, OR 97601	Re: Industrial Phone request for information on the local diatomaceous earth and cinders. Explained what each were and their physical and engineering characteristics.
06/07/98 Thompson, Chris Rainbird cthompson@rainbird.com	Re: Industrial Would like to know more about heap leaching. I am curious to know if our product applicable to the mining industry. Referred him to Tom Flynn who has knowledge on heap leaching.
04/06/98 Davidson, Charlie Australian Embassy Tokyo, Japan email: charlie.davidson@austrade.gov. au	Re: Resort/Spa E-mail request for information on spas and contacts at the Greenbrier, WV, in Egypt and Palm Springs. Provided addresses and phone numbers
04/07/98 Wertenberger, Tracy garfield@lemoorennet.com	Re: Resort/Spa Looking for number and directions to go to California Hot Springs. Would appreciate it if you could give me their phone number. Informed her we don't have any more information for California Hot Springs, they are not listed in our Hot Spring books.
04/16/98 Birnbaum, Nate Toronto, Canada nbremax@pathcom.com	Re: Resort/spa Please provide me with as much info about Soap Lake's spas for treatment of psoriasis patients. How far is it from Vancouver or Seattle airports. Provide him with information from the book entitled "Great Hot Springs of the West", by Bill Kaysing and also gave him an idea of where Soap Lake was located.
04/22/98 Mussetti, Jack Anniston CO	Re: Resort/Spa Has a geothermal motel in CO. Wants to add a pool to be maintained at 98 F. geo temp is 100 F. Told him the only way to do it would be with a flow through and it would take a bunch of flow. Academic though, because the state health dept would not allow it.
04/23/98 Potters, Christina Box 416 Ketchum, ID 83340 208-726-9549	Re: Resort/Spa Phone request for assistance developing a swimming pool in Ketchum, ID - using the spring that feeds the district heating system. Asked that she provide us more information on the resource and locations. Sent her some general direct use information. The original district heating system heated 150 homes thru a 2.7 mile long wooden pipeline. Now only about 7 homes and the pipeline needs repairs. Also, concerned about the fluoride content of the water.

04/24/98	Re: Resort/Spa
DeVierville, Jonathan Paul 204 Alamo Plaza San Antonio, TX 78205 210-223-5772	Wrote letter in support of spa development at the historic Hot Wells Bath House and Lodges, San Antonio, TX. This had been requested earlier, but did not have sufficient information to evaluate the proposal. The resource is about 104 F.
05/04/98	Re: Resort/Spa
Potter, Chris Ketchum, ID 208-726-9549	Phone call to discuss our proposed technical assistance for the design of a swimming pool and heating several homes. Discussed what data is necessary. She will gather and send to us.
05/15/98	Re: Resort/Spa
Anderson, Jeannie 10620 SE Holgate #7 Portland, OR 97266 (503) 760-9347	Please send me information (or where I can get information) on the Lolo Hot Springs and if there is cabin lodging close by. Replied with contact information for Lolo, plus provided a description of the hot springs from the book "Great Hot Springs of the West" by Bill Kaysing. Received a thank you on 5/20.
05/26/98	Re: Resort/spa
Sutton, Scott 5508 E Roanoke Phoenix, AZ 85008 602 840 9299	Thought this email was for Castle Hot Springs and complained about trash dumping on his property. Sent a reply informing him this is not their e-mail and they will need to contact them directly. Provided contact info. email - obug@neta.com
05/28/98	Re: Resort/Spa
Alia	Heard that Tecopia Hot Springs might be going to privatization and did we know anything about it. Informed her of the e-mail message I received on Jan 1, 1998 and the webpage link they had set up
06/08/98	Re: Resort/Spa
Wentworth, Gayle 131 Yachtclub Way Apt. #206 Hypoluxo, FL 33462 TIMESPA@aol.com	Interested in the full article entitled "Business Opportunity in Hawaii". How do I get it? Checked the bulletin index and found it in Vol 14, No. 4. Sent reply informing them I need the mailing address to send the article. Received a reply on 6/15 with the mailing address. Sent out publication.
06/09/98	Re: Resort/Spa
Timespa@aol.com	email responses to a request for assistance with a spa. Advised that we are engineers and our contribution is primarily in the area of space heating and piping, pumps etc rather than the business side. Suggested that we send a copy of the issue of the bulletin that focused on resorts and that they contact some of them for additional info.
06/11/98	Re: Resort/Spa
Timespa@aol.com Hawaii	email response to a request for assistance on a resort. They questioned whether I was aware of any "hot spring" resorts that used a well instead of a spring. Told them I didn't know of any but that Lund might. Suggested that there was no practical reason why it wouldn't work - could be a marketing issue though. They are interested in HI location.
06/15/98	Re: Resort/Spa
Wentworth, Gayle Florida email: timespa@aol.com	email request passed on requesting information on spas that use well water as she is interested in developing a spa in Hawaii. Listed two spas - TX and WA that use well water and gave her additional references and article in GRC Transactions on spa potential in Hawaii.
06/19/98	Re: Resort/spa
Maggie magb@pacifier.com	Looking for hiking trails near Carson Hot Springs. Do you know who to contact. Looked in the Direct Use database and found two Carson Hot Springs. Sent a reply providing the contact info for both of them and said they might have info on hiking near them.
06/21/98	Re: Resort/Spa
Claflin, Christopher Claflin_61@aol.com	Going to Germany soon and would like to visit a spa. Efforts to search the Internet for that region have not been productive. Any assistance you can provide would be appreciated. Let them know we don't have info, but provided contact information for Jonathan Paul DeVierville. Also provided a link to SpaMagazine.

04/01/98	Re: Resource/Wells She called to ask about the minerals in the geothermal water in K Falls. Gave her the typical water chemistry and advised that most wells are similar but depends on temperature and location.
04/01/98	Re: Resource/Wells Are there any sites in North East that use geothermal resources? I have always been interested in working in this field. I find it fascinating. Sent a reply informing him of the places we know of and also mentioned the Virginia Tech Website which has more info concerning the eastern states. Received a reply - thank you, decided to do a research paper on the advances in the Geothermal Field.
04/07/98	Re: Resource/Wells Mike called about the wells for the Forest Service Building in Lakeview. 2nd well is 290 gpm, 72F, 64 ft drawdown after 4 hrs. Inj well is 400 ft cased to 320. Discussed well performance. Doesn't sound like they did much of a test.
04/22/98	Re: Resource/Wells Jim called to ask about hot water wells in the area slightly north of their present location T38s R20E S33. Told him that I would check to see what we have.
04/23/98	Re: Resource/Wells Called Jim back to give him the info on the wells in the area he asked about. Told him that there was some hot wells in that section but that it was pretty spotty - only one hot one in the NE portion of the section and nothing in the NW.
04/24/98	Re: Resource/Wells Phone request for information on the ground water regime near the stockyards on Lavern Ave. in southwest Klamath Falls near the BN railroad yards. Referred to us by DOGAMI. Provided faxes of well data and groundwater hydrology reports that we have in our library.
04/28/98	Re: Resource/Wells Phone request for information on exploration techniques for geothermal. Sent him some general information and gave him Dennis Nielson's phone at EGI. Also, wanted Paul Lienau's phone - to ask him to guest lecture at Western Washington Univ. in Bellingham.
04/29/98	Re: Resource/Wells Bob called back about the maps that I faxed him. Told him about the groundwater atlas that was published by the NGWA years ago. Told him that I would be doing some work to expand on it next year for our DOE contract.
04/29/98	Re: Resource/Wells Phone request for information on geothermal resources just west of Snoqualmie Pass, WA. Found four low temperature resources in King County - but recommended that GHP would probably be better. Sent information on GHP.
05/04/98	Re: Resource/Wells Email requesting review of proposed solicitation for matching (75/25) funds for drilling geothermal wells and proving the resource at one of the co-located resource sites ("risk reduction grants"). Reviewed the proposal and made several suggestions for corrections or additions.

05/05/98	Re: Resource/Wells Phone request for information on geothermal energy in Macedonia. Sent copy of recent publication that Kiril Popovski and John Lund put together on the geothermal resource. They are doing a national energy plan for the country
05/05/98	Re: Resource/Wells Request for information on local groundwater chemistry in the southern Klamath Falls area. Provided him with maps and copies of groundwater studies.
05/18/98	Re: Resource/Wells email request for temperature gradient information on Alaska and the world. Referred him to Dave Blackwell at SMU.
05/20/98	Re: Resource/Wells Request for information on well at 1120 Eldorado in Klamath Falls. Found well log and faxed it to him.
05/21/98	Re: Resource/Wells Would it be possible to get by e-mail a copy of the report by Schuster and Bloomquist "Open-File Report 94-11". Sent a reply informing him we don't have an electronic version of it and provided the contact information for Gordon Bloomquist.
05/28/98	Re: Resource/Wells email request for information of property with geothermal spring or resource in OR or WA. Asked about potential use and then would mail him a list.
05/28/98	Re: Resource/Wells Gordon wants 6 copies of the Final Report on the Low Temperature Resource Assessment which has the collocated resource information database.
05/29/98	Re: Resource/Wells Trying to locate a technical report entitled "California Low-Temperature Geothermal Resources Update - 1993" by L. G. Youngs. Sent him the contact information for Youngs to request the report from him.
05/29/98	Re: Resource/Wells email response to request for location of hot springs in WA and OR that could be purchased for a greenhouse development. Sent a short list, and referred him to a co-located resource information on our web site. Also, listed several hot spring books that cover those in the NW.
06/02/98	Re: Resource/Wells She was calling on behalf of a client who is buying a home with a hot well. What does he need to look out for? Advised that the DHE will need service occasionally and when was the last service, agreement among owners for service costs, buried pipe corrosion, type of dhw heating.
06/02/98	Re: Resource/Wells Was looking at the Arkansas map and saw the two shaded areas. What is the significance? Sent a reply telling him those areas have a potential of have geothermal at a temperature below 212 F.

06/02/98	Re: Resource/Wells Received an e-mail concerning the GRID program from Water Resources department. They are now selling CD-ROMs containing well log information. There are 26 CDs all together. Talked to Kevin he said to order for Klamath County, Lake County, etc. Gave all the information to Donna to request the CDs.
06/04/98	Re: Resource/Wells Sheppard, Dave OIT student Klamath Falls, OR Wanted information on drilling rig costs, weights, operation etc. Found some information on the Internet for him.
06/09/98	Re: Resource/Wells Miller, Mark Klamath Falls, OR phone: 885-6659 Phone request for information on well at 1217 Pacific Terrace in Klamath Falls. Found that well had caved in and there were no data. Found data on adjacent homes and gave him 300 feet at a minimum of 160 F.
06/09/98	Re: Resource/Wells Weigandt, Ben 420 Douglas Fir Goldendale, WA 98620 509-773-3681 Visit to obtain general information on geothermal and to look a property down near the OR/CA line west of Merrill. Gave him several publications and the Oregon geothermal map.
06/10/98	Re: Resource/Wells Colahan, Kent South Suburban Sanitary District Klamath Falls OR Kent called to ask about the resource in the area east of the jail. May be a sports complex developed there. I suggested that it would be a lot cheaper to connect to the existing jail well for water. Discussions with the county should come before looking at drilling a new well.
06/10/98	Re: Resource/Wells Koldjeski, John 14000 String Bean Alley Sutter Creek, CA 95685-9719 Letter request for references and information on SP exploration. Referred him to Mike Wright at EGI and John Pritchett at Maxwell.
06/13/98	Re: Resource/Wells Melanson, Paul 3320 Dover Dr. Boulder, CO 80303 303 499 3294 Requested technical papers hg1, tp58, and tp55. Comment - Do you have revised GEOTHERM data (digital format)? Sent a reply informing him of the Colorado low-temperature assessment report. Giving James Cappa contact information. E-mail twistyman@aol.com
06/16/98	Re: Resource/Wells Zimova, Eva SPP-VVNP Research Oil Co. Votrubova 11/A Bratislava, Slovak Republic 825 05 Fax: 00421-7-521 12 42 Would like to receive a copy of the bulletin article "Improved Utilisation of Low-Temperature Thermal Water Rich in Hydrocarbon Gases", Vol 12, No. 4. Seems to be of great value to us, we are a Research Oil Company based in Bratislava which deals mainly with oil and gas exploration and then with well testing, underground gas storage and reservoir simulations. Sent a reply that I will need a mailing address to send the publication. Asked if we could fax to them and provided the number. Fax the article to her. Received a thank you for the article.
06/25/98	Re: Resource/Wells Brewer, George environmental consultant Arizona phone: 602-668-5636 phone request for information on the effects of heat rejection into the ground. Would we be interested in a study? Referred him to Dave Blackwell at SMU.
06/26/98	Re: Resource/Wells Fortuna, Ray USDOE, Geothermal Washington, DC email: Fortuna.Ray@ee.doe.gov email request for information on geothermal in Texas near Waco. The information is for a congressman from that district. Found several projects and that is located on the Balcones Fault Zone. Sent some preliminary information and Toni and Kevin will follow up with more information.

06/26/98 Culver, Gene 7820 Reeder Rd Klamath Falls, OR phone: 884-1273	Re: Resource/Wells phone request for information on local wells near Stukel Mountain just south of Klamath Falls. Found several sites in our data base and on a USGS report from 1980. He will visit the center next week to study the data in detail.
04/24/98 Pepper, William	Re: Resources/Wells Looked at the Collocated Resources page. Is there any information on undeveloped or unused geothermal sites in Jackson County? Searched the database and it showed 30 wells and springs in Jackson county. Also mentioned the state team report and who to contact for the info. Received a reply, he would like the info on the Jackson county wells. Sent him the information.
04/28/98 Fortuna, Ray US Department of Energy, Geothermal Technologies Washington, DC. email: Raymond.Fortuna@oee.doe.gov	Re: Resource/Wells Email request for assistance in preparing the solicitation for direct use projects in the US. Specifically, 75-25 matching funds for risk reduction in the development of a geothermal resource for district heating, industrial use, aquaculture, greenhouses, etc. Provided a check list of items to be evaluated along with the relative weighting.
04/01/98 Bomar, Dave Balzhiser Hubbard and Assoc Eugene OR 541-686-8478	Re: Snow Melt Dave called about the design of a snow melt system for the Ross Ragland Theatre addition. Does the city have a spec for it? Told him that they are going to develop one but it isn't in place yet. Told him that Brian has been doing most of the work for the city.
04/10/98 Brown, Brian Mechanical Engr. Ft Klamath OR 541-783-3347	Re: Snow Melt Brian called to discuss the design of the controls for the snow melt system for the state road section on Esplanade. Discussed the need for sophisticated controls. Advised that my opinion is that it should be as simple as possible since they have their own well.
04/17/98 Hart, Bud City of Klamath Falls, OR	Re: Snow Melt Bud called to see if we have a copy of the State's report on the work that was done on the road snow melt system a few years ago. Told him I would put a copy in his mail box. City may be taking over the system.
04/14/98 Adams, Tom Colorado 800-241-4119	Re: Space Heating/Cooling He is buying a geothermal property in SW CO and wanted to order a copy of the guidebook.. Discussed space heating for buildings at a resort type facility.
04/20/98 David_george@msn.com	Re: Space Heating/Cooling email response regarding our spreadsheets HEATOOLS and COST. Suggested that the Heatools spreadsheet was not designed for the high temperatures that he was interested in evaluating. Suggested that the POND Manual by the Fermilab would be a better tool. Explained that the COST spreadsheet was not designed for GHP but Direct Use.
04/24/98 Fujihara Fujinaki, Bachiller . Carlos Peru cpil2@mail.edep.edu.pe	Re: Space Heating/Cooling Am a student of mechanical engineering in University of Piura (PERU) and I'd want to know information or books about absorption refrigeration. Please could you give me that information. Provided him with a list of publications we have absorption and told him about the Geothermal Resources Council (GRC) website and their searchable library database. Received a reply letting me know which ones he wants, thank you.
05/07/98 Holtzgang, Larry OR Dept of Economic Development Salem, OR 541-891-8525	Re: Space Heating/Cooling SMC corp is on line at their factory in Burns. They are using the geot for ventilation make up air heating for a 172,000 sqft manufacturing plant. Larry also asked about the potential at the site between West One dealership and the railroad. Told him I would see what we have on it

05/13/98 Flynn, Tom Mankato Enterprises 90 Mankato Dr. Reno NV 89511	Re: Space Heating/Cooling Tom called to discuss potential for floor heating in a horse arena south of the Moana area. 63,000 sqft bldg, dirt floor w/ straw. Well doesn't look too good. 70 F w/ very little gradient. Suggested that he could do something with 85 F water or so but only partial heating
05/27/98 Fujihara, Bach. Carlos Urb. San Isidro W3-35 Piura-Peru jcuff@hotmail.com	Re: Space Heating/Cooling Wanted the publications concerning absorption refrigeration. Also wanted me to write before sending the publications. Sent a reply - they are being sent out today.
06/09/98 padrinc@aol.com CO	Re: Space Heating/Cooling email response to a request for assistance with a direct use space heating application. Advised that we could give them some help with the design of a system to heat their house in CO from the spring that they have. Asked for more information about the application.
06/16/98 padrinc@aol.com	Re: Space Heating/Cooling email response to a request for help with the design of a direct use space heating application. They are considering drilling a well near a spring for the resource. there is another user across the road. Advised that a cable tool is the safest type of rig (no mud) but suggested that they should try to us the natural discharge first instead of drilling. explained how a DHE works. Discussed radiant floor design and the advantages and cautions for geot.

3.0 R & D ACTIVITIES

The direct use research development objectives are to aid industry in resource and technical development problems, to investigate and analyze method or approaches to reducing the cost of designing, developing and operating low- and moderate-temperature geothermal projects. The following is a summary of work recently completed by Kevin Rafferty, our staff mechanical engineer and Toni Boyd, our staff civil engineer (EIT) and computer programmer.

- 3.1 **Model Construction Specifications - Sub-Task 2.1.** The project is approximately 75% completed, with the first draft of the material on wells, line-shaft submersible pumps and plate heat exchangers completed. This project should be finished in about one month at which time it will be available to the public.
- 3.2 **Comprehensive Aquaculture Developer Package - Sub-Task 2.2.** The project is approximately 90% complete, and all material for the report has been obtained and is being put into the final format. The report should be completed and available for the public in approximately one month.

4.0 GEOTHERMAL ENERGY IN KLAMATH COUNTY BROCHURE

A brochure, *Geothermal Energy in Klamath County, Oregon*, was revised for use by the state and local tourism bureaus. The brochure outlines the use of geothermal energy in Klamath County and has several maps and figures detailing the location of the resource, the district heating system and the downhole heat exchanger. It lists the Geo-Heat Center for further information and for tours.

5.0 TECHNOLOGY TRANSFER

The Geo-Heat Center staff prepares and publishes information and educational materials on direct-heat applications of geothermal energy that include: the Quarterly Bulletin, technical papers, computer programs, website information, and progress monitor activities. In addition, a geothermal technical library, and tours of geothermal facilities in the Klamath Falls area are made available to the public.

5.1 **Geo-Heat Center Quarterly Bulletin.** Bulletin Vol. 19, No. 2, featuring articles on the Geo-Heat Center, sustainability, the City of Boise injection well and a greenhouse project in the Azores, was distributed in June to 1652 domestic and 392 foreign subscribers. Bulletin Vol. 19, No. 3 is in preparation and will be published in September, Articles will include:

1. Overview of Geothermal Development in New Zealand by Derek Freeston and Ian Thain.
2. Wairakei Prawn Park by Richard Klein and John Lund
3. Miranda Hot Springs by Derek Freeston
4. Geothermal Greenhouses by Brian Foster and Mike Dunstall
5. Rotorua Geothermal System by Ross Anderson
6. Taupo Lucerne Plant by Neil Pirrit and Mike Dunstall
7. Orchid Raising by Alistair McLachlan
8. Timber Drying at Kawerau by John Scott

5.2 **GHC Web Page Updates.** The Geo-Heat Center provides a webpage maintained by Tonya Boyd: <http://www.oit.edu/~geoheat> consisting of over 2000 files, including all the articles from the Quarterly Bulletin since Vol. 16, No. 4. Links are provided to other geothermal web sites. The following information is on usage for the period 5/6/98 to 6/30/98. Unfortunately usage for April was lost.

Total Users:	16,755	Average users per day:	299
Total Hits:	178,016	Average hits per day:	3,178

Average time user spends with our website: 12:18 minutes

User sessions from the US: 11,742 (70%)

Users from international: 1,983 (12%)

Unknown users: 3,030 (18%)

Total users during the weekday: 13,383 (80%)

Total users during the weekend: 3,372 (20%)

Users by countries (top 10)

USA	11,742	70%	Singapore	98	0.6%
Canada	242	1.4	Sweden	94	0.6
Australia	199	1.2	Netherlands	82	0.5
Germany	141	0.8	Italy	63	0.3
UK	140	0.8	New Zealand	57	0.3

For 6/1 to 6/30

Users during work hours: 4,552 (51%)

Users after work hours: 3,978 (49%)

The web page use has increased significantly over the use reported from the previous quarter. Other activities concerning updating of our web page include (1) removed the DOE Program Review announcement (2) added an order form for the 3rd edition of the Guidebook, (3) updated several direct use pages to reflect new phone numbers and other information, and (4) added the vendor listing for American Geothermal.

5.3 **Technical Papers, Presentations and Tours**

1. Kevin Rafferty attended the Annual ASHRAE meeting in Toronto, Canada and made a presentation in a seminar on "Variable-Flow Pumping Issues with Ground Source Heat Pump System." His topic was "Well Pump Control for Open Loop Systems."
2. Kevin Rafferty, along with co-author Steven Kavanaugh of the University of Alabama completed the second issue of the geothermal heat pump newsletter "Outside the Loop" and it was mailed free of charge to approximately 500 engineers and designers of GHP systems. They are presently compiling the third issue of the newsletter. It is funded in part by the GEOEXCHANGE and supported by the Geo-Heat Center and the University of Alabama.

3. Toni Boyd made presentations on geothermal energy and conducted field trips of the OIT geothermal heating system for two sessions of 9 high school girls each in a "Teen Women In Science and Technology" (TWIST) program held annually on the OIT campus. She also assisted with an AutoCad lab and a surveying project of 58 girls in the same program.
4. John Lund attended two Geothermal Resources Council (GRC) Board of Directors meetings in Berkeley and Sacramento, CA. He is the 1st VP and chair of the Education Committee.
5. John Lund and Toni Boyd attended the DOE Program Review meeting in Berkeley, CA. John Lund made a presentation on "Direct Utilization at the Geo-Heat Center" and participated in the panel discussion on "A Strategic Plan for Geothermal Research". He discussed the plan for Direct Use Applications in the session.
6. John Lund made a presentation of "Direct Utilization of Geothermal Energy" at the DOE Show Case presentation in Washington, D.C. He also prepared a poster display of direct uses of geothermal energy and information on the Geo-Heat Center. This meeting was attended by US government representatives, embassy personnel, and members of the World Bank.
7. John Lund and Toni Boyd are working with co-editors Susan Hodgson and Raffaele Cataldi on papers for the geothermal historical book: "Stories from a Heated Earth, Our Geothermal Heritage." This volume is being funded by GRC and IGA and includes 35 international papers. The volume, an outgrowth of the Historical Session at WGC'95, will be available late this fall.
8. Four tours were conducted of the OIT geothermal heating system, private home heating systems, and the Klamath Falls district heating system for (1) a member of the Ketchum, ID city council and Arni Ragnarsson of Iceland, (2) two visitors from a university in Vermont that has an alternative energy program (Johnson College), and (3) two tours for each of 9 girls from the campus TWIST program.
9. John Lund and Toni Boyd gave a presentation of the Geo-Heat Center to 15 Oregon community and legislative representatives. He discuss the Vale, OR geothermal resource with one of the representatives - he and his brother own part of the geothermal resource situated in this community. Toni demonstrated the use of our web page.
10. Arni Ragnarsson from the Icelandic National Energy Authority (Orkustofnun), who is working at the Geo-Heat Center for six months on a Fullbright Fellowship grant, is working on a summary of Geothermal Heat Pump data for the Center. He attended the International Ground Source Heat Pump Association (IGSHPA) training program in Stillwater, OK and also talked to DOE, Consortium and EIA personnel in Washington, DC. Arni will be working at the Center until October, investigating district heating systems in the US.
11. John Lund worked with Gordon Bloomquist of the Washington State University Energy Office in developing a geothermal district energy display for the International District Energy Association (IDEA) meeting in San Antonio, TX. The emphasis of the display was on US geothermal district heating and cooling and a presentation of what is geothermal energy and the resource distribution. Gordon then set up the display at the meeting and made a presentation on geothermal district heating. The GHC supplied photos and text for the display and copies of slides for the presentation.

5.4 Geothermal Library. During the period of January 1 to March 31, 1998, 5 new volumes were added to the library. The library now has a total of 5318 volumes cataloged.

5.5 Information Dissemination. The GHC provided publications to individuals according to the following topics:

<u>Topics</u>	<u>No. Publications</u>
Geothermal Heat Pumps	237
Space Heating/Cooling	19
District Heating	30
Greenhouses	60
Aquaculture	22
Equipment	55
Resources/Wells	58
General	<u>120</u>
	601

In addition we mailed a large package of publications to the library of Central Visayas Polytechnic College, Dumaguete City, Philippines. They evidently have a new geothermal training program, but very few references on geothermal energy. We became aware of their need thru numerous email requests for information.

6.0 GEOTHERMAL PROGRESS MONITOR

6.1 Meetings

Geothermal Resources Council 1998 Annual Meeting, San Diego, CA, September 20-23, 1998.

Theme: "Geothermal: The Clean and Green Energy Choice for the World." The meeting will be held from September 20-23 at the Town & Country Hotel in San Diego, California. Distinguished keynote speakers during the meeting's opening session will highlight the role that geothermal can play in the world energy mix, with a focus on global warming, the advantages of geothermal energy over fossil fuels for power generation, and the future of geothermal development.

Special sessions will be held on Sustainability of Geothermal Resources, Pacific Rim, Mexico and Latin America, Direct Heat Utilization, Drilling, Well Completion and Logging, Geology and Geochemistry, Geothermal Exploration, Production Technology, Reservoir Engineering, Environmental Issues, and Geothermal Heat Pumps. Two short courses will be held prior to the meeting: on September 17th and 18th a course on Geothermal Drilling, A New Mindset, and on September 19th a course on Borehole Imaging. Two pre-meeting field trips will be taken to the Cerro Prieto Geothermal Field in Mexico and the Coso Geothermal Field in eastern California, and a post meeting field trip to the Imperial Valley Geothermal Field and Mineral Recovery Site. The Geothermal Energy Association will holds a trade show.

Further information and registration material can be obtained from the Geothermal Resources Council, PO Box 1350, Davis, CA 95617-1350, phone: 530-758-2360, email: grc@geothermal.org.

20th Geothermal Workshop, Auckland, New Zealand, November 11-13, 1998

The Geothermal Institute and the New Zealand Geothermal Association will host the 20th NZ Geothermal Workshop at the University of Auckland on 11, 12 and 13 November, 1998. The meeting will be a forum to exchange information on all aspects of the exploration, development and use of geothermal resources worldwide. Intending authors should submit a title to the convenors by 15 June 1998. All accepted papers will be published in the Proceedings of the Workshop which are widely distributed.

The Workshop is open to papers on all aspects of geothermal technology including, Exploration, Field Development, Utilization, Applications and Case Studies.

Intending authors can submit their title to the convenors by e-mail: geo.wshop@auckland.ac.nz. Further information can be obtained by email: <http://www.auckland.ac.nz/gei/>, or by writing:

Mike Dunstall, co-convenor
Geothermal Institute
The University of Auckland
Private Bag 92019,
Auckland, New Zealand

International Geothermal Days, Azores 1998 - September 13-20, 1998

The International Summer School has scheduled three workshops at Ponta Delgada, Azores (Portugal). The first is an International Workshop on Heating Greenhouses with Geothermal Energy on September 14th covering: 1) Technical, Technological and Economic Feasibility of Geothermally-Heated Greenhouses in Europe and the World; 2) State of the Art in EC, Mediterranean and Central/East European Countries; 3) EC "Thermie" Project Ribeira Grande (see article in this issue of the Bulletin), and 4) Problems and Activities for Development of Geothermal Energy Application for Heating Greenhouses.

The second is an International Seminar of Electricity Production from Geothermal Energy on the 15th, and the last is an International Course on Economy of Integrated Geothermal Projects from the 16th through the 18th covering: 1) Nature and Distribution of Geothermal Energy in the World; 2) Technology of Integrated Geothermal Projects; 3) Economy of Integrated Geothermal Projects, and 4) General Problems Related to Development of Integrated Geothermal Projects.

The program is being organized locally by the Institute of Innovative Technologies of Azores (INOVA). A field trip is scheduled after the workshop on Saturday the 19th. Further information can be obtained from John Lund at the Geo-Heat Center, Professor Dr. Kiril Popovski in Skopje, Macedonia (Tel/Fax: 389-91-119-686), or Professor Dr. Jorge Rosa de Medeiros in Ponta Delgada, Azores (Fax: 351-96-65 33 24 or email: Inova@mail.telepac-pt). Registration can be made to:

International Summer School on Direct Application of Geothermal Energy
ul. Dame Gruev br. I-III/16
91000 Skopje, Macedonia.

20th Annual PNOC EDC Geothermal Conference, New World Hotel, Manila, March 4-5, 1999

The Philippine National Oil Company Energy Development Corporation (PNOC EDC) cordially invites scientists and engineers in the geothermal industry to attend and participate in the Twentieth Annual PNOC EDC Geothermal Conference in Manila. The technical program promises to be of great interest to all involved in the exploration, development, utilization, and regulation of geothermal resources worldwide. The technical program will consist of the following sessions (but not necessarily limited to): Exploration, Development, Utilization and Environmental Issues. Post-conference field excursions are being offered to geothermal fields in Leyte, Dumaguete, Bacon-Manito, and Mt. Apo in Mindanao.

Titles of papers are due by July 30, 1998, abstracts by September 30, 1998 and manuscripts by December 15, 1998. Further information and registration forms can be obtained from: John Patrick L. Catane, Convener, Geoscientific Department, PNOC EDC, Merritt Road, Fort Bonifacio, Makati, Metro Manila, Philippines 1201, tel: 632- 893-6001, loc. 4242, fax: 632-815-2747 or 844-6207, and email: layugan@edc.energy.com.ph.

European Geothermal Conference, Basel, Switzerland, September 28-30, 1999.

For information: Schweizerische Geothermische Vereinigung (SVG/SSG), % Büro Inter-Prax, Richenbacher + Partner, Dufourstrasse 87, CH-Biel/Bienne, Tel./Fax: +41 32 341 4565.

World Geothermal Congress 2000, Kyushu - Tohoku, Japan, May 28 - June 10, 2000

The World Geothermal Congress 2000 will be co-convened in Japan by the International Geothermal Association (IGA) and the Japanese Organizing Committee for WGC2000 (JOC). The main purpose of WGC2000 is to provide a forum for exchange of scientific, technical and economic information on geothermal development. The Congress will offer opportunities to learn about recent scientific results and state-of-the-art technologies for geothermal energy development and

for exchanges of information with worldwide experts in the field. The IGA and JOC invite the participation of all persons with an interest in geothermal resource development; countries, organizations and enterprises of countries engaged in the research, development and use of geothermal energy; and the manufacturers of geothermal-related equipment.

The technical sessions will be held in two separate locations: Beppu City on Kyushu from May 31 to June 2 and in Morioka City, Tohoku on Honshu from June 5 to 7. Transportation will be provided between the two sites by JOC. The call for papers has been issued and the receipt of abstracts is by December 31, 1998. Draft papers will be received by July 31, 1999 and receipt of the final papers is January 31, 2000. The abstract form can be obtained from the WGC2000 official web site: <http://www.wgc.or.jp>. For further information, contact the Secretariat of the WGC2000, % New Energy and Industrial Technology Development Organization (NEDO), 3-1-1 Higashi-Ikebukuro, Toshima-ku, Tokyo 170-6028, Japan, phone: 81-3-3987-5793, fax: 81-3-3987-5796 and email: info@wgc.or.jp.

6.2 California

California Energy Commission Seeks Input on Uses for \$2.5 Million Annual Geothermal Funding.

The California Energy Commission wants your suggestions for uses of its Geothermal Resources Development Account (GRDA). This account has about \$2.5 million available each year for geothermal applications. The Commission is seeking input to define the geothermal community's most critical problems and how this funding can best address them. You can help develop the GRDA use recommendations which the Commission's Research, Development and Demonstration Committee will consider in a public workshop this fall. This process includes an initial input period (now through August 14, 1998), and August 25 workshop at the Clarion Hotel near the San Francisco Airport to develop recommendations, and an RD&D Committee workshop this fall.

There are several ways to get involved: (1) visit the web page: www.energy.ca.gov/development/geothermal/index.html and review the "Discussion Outline of California Geothermal Problems and Resolution Strategies." Tell them your priority geothermal problems and strategies as they may be represented in this outline and suggest outline changes if they are not, (2) subscribe to the Commission's List Server Discussion Group for the GRDA Use Recommendation Process. You can subscribe to this list server by the following information on line: http://www.energy.ca.gov/development/geothermal/geothermal_listserver.html, or (3) contacting Bob Hare: California Energy Commission, 1516 9th Street, MS-43, Sacramento, CA 95814-5512, telephone: 916-653-8685, fax: 916-653-6010, email: bhare@energy.state.ca.us, and (4) participate in the August 25th workshop to develop GRDA use recommendations. The workshop is being held by the Geothermal Energy Association, the Geothermal Resources Council and the Commission from 9:00 AM to 3:00 PM. Meeting details and optional hotel registration information will be posted at our web site and mailed to those on the contact list.

6.3 Washington

Mount St. Helens Quakes on the Increase Under Dome

Mount St. Helens is twitching again. Earthquake activity below the mountain gradually has increased in recent months, with the pace accelerating in May. Seismic activity has increased from about 60 quakes a month last winter to 165 in May, scientists at the Cascades Volcano Observatory in Vancouver, WA report. The earthquakes are small and unfelt, with only three of them greater than magnitude 2, according to William E. Scott, acting scientist in charge of the observatory. He stressed that no evidence indicates the closely monitored volcano is heading for a return to large explosive eruptions. None of the quakes is typical of the large number of shallow quakes that typically occur before an eruption.

The quakes are occurring in two clusters below the 920-foot-high lava dome in the volcano's crater. One cluster is about 1.25 to 3 miles below the dome, and the other is about 4.75 to 5.5 miles beneath the surface. Scott said the most recent quakes might indicate that new magma is entering the volcano or that cooling magma from a series of eruptions in the 1980s is releasing gas and building up pressure. The last steam and ash plume from the lava dome occurred in February 1991. The last dome-building eruption, in which magma reached the surface and added to the huge mound of lava on the crater floor, was in October 1986. (Richard L. Hill - Oregonian, 3 June 1998).

6.4 Germany

Use of Earth Heat in Germany (Erdwärmemenutzung in Deutschland)

By the end of 1995 direct thermal use of geothermal energy in Germany amounted to an installed thermal power of roughly 323 MWt. Of this sum, approximately 48 MWt are generated in 24 major centralized installations. Small, decentralized earth-coupled heat pumps and groundwater heat pumps are estimated to contribute an additional 285 MWt. By the year 2000 an increase in total installed power of about 144 MWt is expected: 115 MWt from major central and 29 MWt from small, decentralized installations. This would bring direct thermal use in Germany close to an installed thermal power of 467 MWt. At present no electric power is produced from geothermal resources in Germany, who annual final energy consumption at present amounts to about 9,200 PJ (8.73 quads). Final energy is defined as the fraction of primary energy which is supplied to the final consumer. It is less than the corresponding primary energy because of losses, mainly due to conversion and distribution. Related to one year this is equivalent to a total consumed power of approximately 290,000 MW. Almost 60% of this energy is required as heat.

The maximum technical potential for direct thermal use of geothermal energy in Germany is estimated to be 2,580 PJ/yr (2.45 quad/yr) from hydrothermal applications and shallow heat exchanger systems; this is equivalent to a maximum thermal power generation of about 81,800 MWt. This corresponds to about 29% of the country's annual final energy consumption, or roughly 49 % of it demand for heat. However, at present only about 0.4% of the existing maximum technical potential for direct thermal use of the geothermal energy meets the demand for heat. If the vast potential of geothermal energy for direct thermal use was utilized to substitute fossil fuels, roughly 110 million tonnes less of CO₂ would be released to the atmosphere annually, equivalent to about 12% of Germany's CO₂ output in 1994. (Christoph Clauser - Geothermische Energie, nr. 21, May 1998).

6.5 Japan

Efficient Use of Geothermal Hot Water

Kokonoe Town in Oita Prefecture, Kyushu, is the largest geothermal power generation area in Japan. It hosts three commercial geothermal power stations, totaling 147.5 MW, belonging to the Kyushu Electric Power Co: the 12.5 MW Otake station, operational since 1967; the 110 MW Hatchobaru station (the biggest geothermal power station in Japan); and the 25 MW Takigami station which began operation in 1996. In addition, there are two small-to-medium-sized demonstration test plants operated by the New Energy and Industrial Technology Development Organization (NEDO) for binary cycle power generation. The town government of Kokonoe intends to exploit as far as possible the geothermal hot water from these power stations, together with thermal energy from the many hot springs existing in the town, to develop agriculture and tourism, and to improve the living environment.

The use of geothermal hot water associated with geothermal power generation started in 1965 when, in response to a request from a local farmer, Kyushu Electric Power Co made hot water from exploration wells available in the Yutsubo area of the town to heat greenhouses. In the beginning, raw geothermal hot water was supplied to users but, because the geothermal hot water contains arsenic, regulations were introduced which stated that all raw geothermal hot water must be reinjected deep into the ground. As a result, since 1974, river water heated by heat exchange from the geothermal fluid is supplied to a large number of users for horticulture, domestic heating and hotel and leisure facilities. Since 1988, the Kokonoe Bio Center has been using hot water supplied at a flow rate of 20 tonnes/hour from the Otake Station about 5 km away to produce inexpensive, virus-free seed and saplings for farmers in the town.

A floriculture partnership organized by five farmers invested JPY 153 million (approximately US\$1.2 million) in constructing an energy-saving rose farm consisting of 10 greenhouses with a total floor area of 5,723 m² (1.4 acres). The farm grows roses all year round, and started shipments of flowers in 1984. The rose farm is provided with hot water (inlet temperature at 73 °C - 163 °F), exchanging heat with geothermal hot water at a flow rate of 16 tonnes/hour. The partnership now enjoys sales of roses exceeding the planned sum of JPY 38 million/year (approx. US\$0.3 million/year) and completed the repayment of investment in 12 years.

In 1994, a new floriculture partnership organized by 10 farmers began to grow roses in 20 newly-built greenhouses with a total floor area of 19,278 m² (4.8 acres) using geothermal hot water. JPY 678 million (approx. US\$5.2 million) was invested in this new farm, which is expected to sell roses worth JPY 180 million (approx. US\$1.4 million) annually. Because the

supply of geothermal hot water to the new farm is limited to 6 tonnes/hour, the farm receives hot water in a storage tank and then circulates the water repeatedly through heating circuits (finned tubed radiators), thereby making hot water at 50°C (122°F) flow through the greenhouses at a rate of 37 tonnes/hour.

The changes in outdoor temperature at the site of the rose farms are similar to those in colder, more northerly regions. Thus, when the temperature inside the greenhouses is kept at 18°C (64°F) throughout a year, the degree-hours of heating are 60,210°C-hours (4,516°F-days). Each year, in total, geothermal energy saves 884 kL (5,560 bbl) of fuel oil and JPY 41.5 million (approx. US\$0.32 million) of fuel cost (fuel oil price at JPY 47/ L - US\$1.37/gal).

Geothermal energy is also supplied to a municipal community center (75°C - 167°F at 3 tonnes/hour) and the prefectural recreational lodge for boys and girls (80°C - 176°F at 7 tonnes/hour). Waste water from all the uses is discharged at 28°C (82°F) when the outside temperature is 8°C (46°F). (CADDET - Renewable Energy Newsletter, May, 1998).