Minutes of the DOE – Industry Geothermal Program Briefing
Lawrence Berkeley National Laboratory
March 20, 2003
Berkeley, CA

Disclaimer Preface

These minutes have been developed from handwritten notes taken throughout the day-long geothermal meeting at Berkeley. An attempt was made to capture the thoughts and words of those involved in the discussions during and after each presentation. However, responsibility for any mistakes, misattributions, omissions and other irregularities are mine alone. The notes are keyed to the presentations and should be read in that context.

- Clifton Carwile
Rockville, Maryland
April 11, 2003

DOE – Industry
Geothermal Program Briefing

March 20, 2003

Room 100, Building 2
Lawrence Berkeley National Laboratory
Berkeley, CA

Attendees

Name	Affiliation	Name	Affiliation
Roy Mink	DOE Headquarters	Stu Johnson	GRC-Caithness
Jay Nathwani	DOE Idaho	Jim Combs	GRC - Geo Hills Assoc.
Joel Renner	INEEL	Paul Brophy	GRC - EGS Inc.
Greg Mines	INEEL	Paul Hirtz	GRC – Thermochem
Clifton Carwile	NREL guest	Karl Gawell	GEA
Ed Hoover	Sandia	Bob Lawrence	GEA-Lawrence & Assoc.
Roger Hill	Sandia	Jeff Hulen	GEA - EGI
Paul Kasameyer	LLNL	Ann Robertson-Tait	GEA - Geothermex
Carol Bruton	LLNL	Tom Box	GEA - Calpine
Mike Hoverstern	LBNL	Daniel Schochet	GEA - Ormat
Marita Berndt	BNL	Lou Capuano	GEA - Thermasource
Tom Butcher	BNL	F. Mack Shelor	Advanced Thermal Systems
Doug Jung	Two-Phase Eng. Res.	B. Mack Kennedy	LBNL
Ted Clutter	GRC		
John Lund	GRC		

Meeting Kickoff

Welcome, Introductions and Announcements – B. Mack Kennedy

Purpose of Meeting

Roy Mink: In third week as the new head of the Geothermal Technologies Program. This was a briefing (for him especially) and not a program review. Wants to establish a dialogue at this meeting with the national labs and industry.

Timing is good, can make modifications to the (Federal geothermal) program now (especially the FY 2005 budget). The internal EERE budget summit is April 10. (Next Friday, March 28, Roy has to go before a 'murder board' to make his pitch on the FY 2005 budget). The FY 2003 budget is $30M with two Congressional mandates. (There were indications from Roy that the planned FY03 allocations may not be final. The $30M was the result of a Congressional Resolution several months into Fiscal Year). FY 2004 is before the Congress and is pretty much locked in. Roy wanted recommendations where and how it made sense to increase the budget. He was optimistic that there is an opportunity to increase the budget. David Garman emphasizes 'more power on line' and the budget needs industry's blessing. Roy wanted feedback at this meeting and later (as the attendees saw fit).

Laboratory Programs – Lead Laboratories

Idaho National Engineering and Environmental Laboratory: Joel Renner

DISCUSSION
DOE Budget Allocations
Tom Box and Al Capuano: What percentage of DOE's geothermal budget goes to the 3 labs? (INEEL, NREL, and Sandia).
Jay Nathwani: In Drilling, all goes to Sandia National Laboratories.
Joel Renner: In ESR&T, all goes to labs except for a small amount.
Jay Nathwani: In Geosciences, the labs get $2.48M (without Sandia).
There are two earmarks of $1M each (one goes to UNR). INEEL gets $1.1M out of the $2.48M.

Working With Industry
Karl Gawell: What do you (DOE) see you get out of working with industry, at Dixie Valley, etc.?
Joel Renner: Real data and a tie to industry.
Roy Mink: Is industry cooperating (on providing data)?
Joel Renner: Getting better.
Stu Johnson: Industry has been great.

Idaho National Engineering and Environmental Laboratory: Greg Mines

National Renewable Energy Laboratory: Gerry Nix*
*Greg Mines of INEEL gave Gerry Nix's presentation because Gerry was snowbound in Denver

Key Points: Goal is to reduce cost of geothermal electricity by at least 1 cent/KWH. (This was the exact phrasing, which became important later during the discussion). Should be able to attain this goal in 5-7 years. NREL, INEEL, BNL, and LLNL are working in various areas.

Low-moderate temperature resources:
Low temperature resources are the most common type (from USGS 1978). 83% of sites (are less than 170 degrees C and)require binary technology. EGS/HDR very likely will also be binary cycle. 50% of available heat energy is at less than 170 degrees C.

Heat rejection: Why work in this area?
In geothermal, 90% of the heat in the geothermal fluid is rejected (to the environment). Performance is highly sensitive to condenser outlet temperature. In summer operation, power reduction up to 50% is possible. Evaporative cooling consumes water, which is scarce in most locations. Western states face water shortages. Therefore air-cooled condensers may be necessary.
- Air-cooled condenser, transpired and tabbed fins. Have a CRADA with SRC. There is the potential to increase performance by 30% and thereby reduce the cost of electricity by 0.5 cents.
NREL ESR&T Summary:
- Possible to reduce cost of power by 1 cent/KWH, particularly applicable to binary cycle. Quick returns possible. Partnership with industry.

DISCUSSION
Status of Exergy/licenses/patents
Bob Lawrence interjected that Exergy had closed its doors and Mack Shelor stated this occurred 'a month ago'. (Greg had mentioned in the presentation that NREL was cooperating with Exergy)
Mack Shelor: The Exergy licenses and patents are now in the hands of Recurrent and ATS.

Low Temperature Energy Production
Tom Box: It is important to use lower resource temperatures for electricity production. What is the minimum (temperature that can be used) for binary?
Unidentified: If the power is worth a lot, then can use lower and lower temperatures.
Dan Shochet: Depends on what you can sell it for.

John Lund: Parasitics and pumping costs are critical. In Austria, there is an installation that cascades to direct use.
Unidentified: In Alaska, even lower resource temperatures can be used (because lower heat rejection temperatures are available)

Linking Research Goals to Cost of Power
Karl Gawell: Linking research to cost of power is (potentially) a credibility issue for DOE.
Dan Shochet: Be careful with quoting cost of power – so many variables.
Greg Mines: Probably doing this because they are DOE's stated goals.
(It was felt that Gerry could have more fully explained the link if he had been able to be present. The group moved on, but linking university/lab research to reducing the cost of power may be a major point that needs to be looked into further).
Lou Capuano: Perhaps adopt cost of generation, rather than cost of power?
Dan Shochet: Rule of thumb, if typical production cost is 5-6 cents; 60% is capital costs and 40% is variable, O&M, taxes, etc. This implies you have to make greater percentage costs in capital costs (from your research) to make the cost of power goal.

Sandia National Laboratories: Ed Hoover

Key Points: The R&D goal is a 25% cost reduction in 'drilling'. Previous goal was 50%, but that raises a credibility issue at the current level of funding for this program area. Basic approach to achieving the 25% goal is to go at it in small chunks.
In Hard Rock Bit Technology have a CRADA with 4 bit manufacturers on PDC bits. They are to use their best design, and they bear their own costs.

DISCUSSION
Cooperation With Industry
Bob Lawrence: Back in the early 90's, Sandia overall was 50-50 with industry primarily in field work. For example, Unocal in Philippines would send back core, etc. How and why has the emphasis changed? What is the industry cost share?
Ed Hoover: In electronics there is a healthy cost share, maybe $200K-300K. In batteries, Eagle Prichard (sp?) is cost sharing. In wellbore integrity, it is about $150K with a couple of manufacturers involved. In polyurethane grout, Halliburton is cementing wells. Under the CRADA, (a guess) but the bit manufacturers are bearing their own costs at $200K-300K.
Bob Lawrence: An observation, CalEnergy and Caithness appear in the list of companies, but Calpine is missing. Ten to twelve years ago, Unocal was cooperating on field work. The quality of the research is high, but I am concerned as to why developers/generators are not as involved (as previously).
Ed Hoover: Both sides are to blame. We want geothermal industry involvement, and we do have more in petroleum. Calpine is a good example where we could do more. Unocal is still on our list and serves on the DWD Technical Advisory Committee. We have a continuing dialogue, but no collaboration in the field.
Jim Combs: The industry has millions of dollars at risk when they allow you to participate in their field work, so that's a significant contribution by the industry.
Bob Lawrence: Your advances should be in cooperation with industry.
Ed Hoover: An example of cooperation is at Coso where we have a combination high-temperature and pressure tool downhole long term obtaining real-time data from the well. An example of why field data is important is the unanticipated migration of hydrogen (into the tool) at Fenton Hill.
Bob Lawrence: With the current state of the industry now, the lab research is becoming more and more important. Technology development is important to recovery of the industry. ******

Laboratory Programs – Support Laboratories
Brookhaven National Laboratory: Marita Berndt

DISCUSSION
Moderate Temperature Brine
Bob Lawrence: Are you working with Calpine at the Salton Sea?

Marita Berndt: Yes
Paul Hirtz: Do you plan to expand to moderate temperature brine?
Marita Berndt: Possibly.

Geothermal Heat Pumps
John Lund: In the future, do you plan to do more work on heat pumps?
Marita Berndt: Would like to. Still get calls for assistance. Work is on hold now, but there are plenty of things to do to reduce cost.

Byproduct Recovery Work
Roy Mink: Is there any other recovery work going on?
Marita Berndt: No
Tom Butcher: Lithium is of interest
Karl Gawell: Any publication on the potential for recovery of other materials?
Carol Bruton: There was a DOE study by Dan Entingh of PERI, which has not been published yet.
Stu Johnson: Mexico has some work in rubidium and lithium

Lawrence Livermore National Laboratory: Paul Kasameyer

Key Points: Working in the goal areas particularly on the hidden geothermal resource problem. In the mid-70s, the USGS estimated the geothermal resource, known and undiscovered. The total was big, but much of that was the undiscovered resource. Since then there have been a number of hits, but nowhere near what the USGS estimated. The Program decided to look for the hidden resource. Are there ways to look for that resource? Why are they where they are? In the Basin and Range, geothermal systems greater than 150 degrees C are spaced at about 700 km. We have no good understanding why this is so. An InSAR interferogram shows a Dixie Valley lineament, but its significance is not known. Also have hyperspectral data from airplanes for Dixie Meadows.

In EGS we are looking to create or engineer geothermal reservoirs. There is the problem of parasitic pumping losses and we are looking at near-wellbore issues. Cooperating with John Schatz using a commercial code, PulsFrac. This code is used by people who use Halliburton services for work near the wellbore. Also looking at geothermal rock properties. They are hard certainly, but their properties are different from pure granite or sandstone. Studying the detection of fractures and their properties. An issue is can we predict resistivity in the field?

(Carol Bruton then took over the presentation on ESR&T work.)
Want to manipulate chemistry/physics. Have a project on silica and metals extraction at Mammoth Lakes. This has an air cooled condenser with evaporative assist. Mammoth wants to use the geothermal fluid for the evaporative stage but problem of silica scale. Have to take the silica out first chemically, then metals extraction is easy. There is potential for big dollar value in the extracted metals. Now in process development.

DISCUSSION
Dixie Meadows
Unidentified: Will Caithness drill at Dixie Meadows in the future?
Stu Johnson: Send money! Would be a great area to study.

Relevance of Oil Patch Experience
Ann Robertson-Tait: May be overlooking the relevance of oil patch fracturing experience. I like the multi-scale approach (that LLNL is pursuing): near wellbore, GeoBilt, 15-20 meters out, cores, fieldwide scale. Keen to look at oil field stimulation work; there is a tendency to not take advantage of that experience and reinvent the wheel.

Modeling
Paul Hirtz: Are you using already developed models?
Carol Bruton: Starting with basics, our own work but also working with Fleming. Certainly are considering past work.

Paul Hirtz: Is this applicable to flash plants and are there any experiments?
Carol Bruton: There has been some work sponsored by the CEC.

Finding Hidden Geothermal Resources
Paul Brophy: Hidden resources are the key in the next 5-10 years. Basin and Range first, applicable to others. Need to design a program. Also need to take existing technology a step further
Ann Robertson-Tait: Regarding fault-controlled permeability, Dixie Valleys may be rare. The near surface is fault-controlled; but deeper, who knows?
Jim Combs: From east side of Nevada to the west, is there any imagery available east of Dixie Valley? There may be hidden resources in eastern Nevada. The old Imax prospects are there. Lineament extension?
Paul Kasameyer: We are looking for a place to do the next phase.
Mack Kennedy: The problem is we don't know yet what to look for in hidden resources. Proceed by applying InSAR to known systems. The questions are, can you use InSAR and what signatures are you looking for in finding hidden resources?

Lawrence Berkeley National Laboratory: Mack Kennedy

Key Points: InSAR uses high resolution satellite observations. From satellite, take a series of side angle radar pictures, then next time around take another set of pictures with a slight offset. Can conduct deformation studies at less than cm scale. For example, can see deformation from production at Dixie Valley.

Innovative Exploration Techniques: from satellite observations can get soil gas signatures of hidden systems. Multi-spectral analyses of plants, which have been affected by gas seepages.

Kilauea 3D MT Imaging Experiment (Mike Hoverstern)
Detailed MT survey at the Kilauea crater was a first. Full 3D modeling with full 3D data in coverage. Combining seismic and resistivity data to define the fracture system. Could be a powerful tool for geothermal exploration.

DISCUSSION
Carbon Dioxide Effects
Bob Lawrence: you said that the high CO2 content killed plants. I thought higher CO2 concentrations encouraged plant growth.
Mike Hoverstern: These were extremely high concentrations, 90%. The plants choked themselves, couldn't exhaust their own CO2.

Leveraging Lab Resources
Mack Kennedy: This CO2 work for geothermal benefits from the DOE CO2 sequestration project. No way we could support this type of geothermal work with just Geothermal Program funding. The geothermal program at $900K for LBNL supports the equivalent of 4.5 FTEs.

Kilauea Imaging
Jim Combs: Please explain the partial melt situation at Kilauea.
Mike Hoverstern: Most of the core is solidified
Mack Kennedy: The deep primary chamber feeds the rift zone. Don't know the feed mechanisms.
Mike Hoverstern: Imaged main conduit to ocean. Can't image deeper than __ km because of ocean effect.
Mack Kennedy: What we are trying to do is image fluid in fractures, not define the magma. Need a simple remote way of doing that. ******
Mike Hoverstern: Image both fresh water and salt water, which is more conductive.

InSAR in the Imperial Valley
Jim Combs: Has InSAR been tried in the Imperial Valley?
Paul Kasameyer: Yes. Image of East Mesa (where there are no crops).

DOE Financial Assistance Programs

(1)University Research: Jay Nathwani

DISCUSSION
University Research Directive
Roy Mink: We are scaling back to accommodate two Congressional earmarks. Also have to accommodate a $10M prior year hit for a total of $13M.
Karl Gawell: To ensure that universities get enough money, Congress required a breakout of university research. (Not just a geothermal issue).
Jay Nathwani: The requirement is $2.6M for university research.
But the total for universities is actually $5M when everything is included. Newcomer is the University of Nevada at $2M. But we are not just funding science at the universities. Jay stated that he was managing 27 university projects; 15 are ending and 12 will be transferred to the Golden Field Office.)
Bob Lawrence: Why are 15 being closed out?
Jay Nathwani: Those particular projects are over, but the universities may repropose and there will be new projects, but all through the Golden Field Office.

Industry/university Linkage
Roy Mink: What about industry/university links?
Jay Nathwani: Good. (Gave example of EGI and Ormat)

(2) Enhanced Geothermal Systems: Jay Nathwani
Key Points: PERI contract started in 1997. Held workshops, etc. and during that process the term "Enhanced Geothermal Systems" was adopted.
Discussed solicitations for Phases I, II and the possibility of III in FY 2005.
Projects:
- Calpine; DOE share 40% at $425K; 49MWe, permitting issue
- Ormat; 80% DOE cost share
- COSO; 20MWe from EGS
- Injection projects, Geysers

COSO EGS study area, EGS study wells. The COSO EGS concept is to look at everything to improve permeability
Ormat Concept, attempting to create reservoirs of 3-5 MWe
Calpine concept, acid stimulation/hydrofrac
Lake County Basin Geothermal Project
Santa Rosa Geysers Project (last year's dollars)

DISCUSSION
Scope of Enhanced Geothermal Systems
(Jay's presentation kicked off a discussion of the meaning of Enhanced Geothermal Systems)
Lou Capuano: When we were on the panel, organized by PERI, the term applied to existing reservoirs, not the creation of new ones.
Ann Robertson-Tait: EGS refers to both the spectrum of resource (from hydrothermal to HDR) and also the process for enhancing reservoirs. Because injection is done at The Geysers, that qualifies as EGS.
Karl Gawell: (referred back to a panel discussion some years ago where the President's Advisory Committee with Mike Wright and Tom Sparks and LANL were represented.) The LANL HDR approach is like saying, 'if you can grow wheat on Mars, then you can grow wheat anywhere'.

GRED Funding
Bob Lawrence: There must be lots of carryover available (because of delays in getting FY 2003 funding) to fund GRED III.
Jay Nathwani: Having lots of carryover is not good, because we get penalized by OMB for prior year carryover.
Jay Nathwani: DOE has bought into EGS; anticipate big money in FY06 and 07 for EGS.

Importance of Industry Cost-Share

Bob Lawrence: I would like to go back to the table which shows the proposed 2003 budget allocations. An important driver is industry interest, and success is measured by growth in generation, so it is important to show industry share. Your allocation for university research showed little outside input and that's OK. However, for drilling and ESR&T, it is important to have something in the industry share column (add such a column). As presented, it leaves the impression that it is just the labs.
Dan Shochet: More important, what is the total industry value that the government program is supporting? Example, DOE's $12M – is that supporting $5M or $50M worth of drilling by industry? Leverage, is it 4 to 1, 5 to 1, whatever?
Jay Nathwani: For the first solicitation, it was Caithness at $12M and $4.5M (DOE) share.
Lou Capuano: There are some industry gains from all of the dollars spent by DOE on research. Certainly more than just 12 publications, for example. There needs to be some measure that indicates industry wants the work; leverage/at risk – your money/our money, etc.
Jim Combs: Industry is coming back and there is lots of drilling this year. Can now come up with the numbers. It's important to sell Congress on the value of the geothermal program to industry.
Roy Mink: Caution! The Water Resources Board came before the OMB with an $8M program that leveraged $50M. OMB zeroed the budget as obviously 'not needed'. How you package and present is important.

New Lake County Pipeline
Karl Gawell: The earmark for a Lake County pipeline, is that a new pipeline?
Jay Nathwani: Yes, north or northwest
Lou Capuano: This is a third segment and is in the study phase

(3) Geothermal Resource Exploration and Definition: Dan Sanchez*
*Dan's presentation was given by Ed Hoover

DISCUSSION
GRED III
Paul Brophy: Will there be a GRED III?
Ed Hoover: Uncertain at this time. There is some concern about whether it's corporate welfare; why are we doing it?, etc.

(4) Geopowering the West: Roger Hill
Key Points: Pushes market pull
Budget: FY03= $3.2M

DISCUSSION
Support Geothermal as Renewable
Unidentified: Geothermal is often omitted from the list of renewable energy technologies.
Roger Hill: Even internal to Sandia that sometimes occurs.
Jim Combs: Reuters doesn't list geothermal as renewable.
(There were obviously quite a number of concerns about the fact that not everyone considers geothermal to be a renewable resource. Is it because geothermal needs that designation to be included in RPS and to get preferential treatment vis-à-vis fossil? Whatever the reason, this may be something to follow up on.)

San Francisco Mountains
Bob Lawrence: Excellent presentation and program, heartwarming to see what is happening. 7-8 years ago when I met with Dan Reicher there were just 4 states with potential for electricity. Now real potential for 8 states. Is there potential in the San Francisco Mountains?
Roger Hill: John Sass is looking at the potential there.

Ormat Binary
John Lund: The Ormat binary is down now.
Roger Hill: We didn't count that.

GPW Publicity

Karl Gawell: Be careful that all states are being kept up to date on meetings, etc.
Roger Hill: Vulcan was doing their own thing.
John Lund: Is there a GPW website?
Roger Hill: Already getting criticism on the number of newsletters!
Dan Shochet: You're doing a good job raising consciousness in the state regarding potential resources. Need new faces in finance and development. Seeing some starting up – a change. When we say we have a new contract, we get calls back.

Renewables Portfolio Standard (RPS)
Roger Hill: Utah doesn't have an RPS. Working on Handbook for States regarding RPS.
Karl Gawell: Market development is so close to project that you have to lean over backward to be perceived as fair.
Dan Shochet: PTC would be good.
Roger Hill: Americulture in New Mexico is small; maybe Sandia could buy the power.
Jim Combs: Colorado voted down RPS last week.
Bob Lawrence: By one vote, 4-3.

Program Goal
Jay Nathwani: Communication/outreach alone (GPW) alone doesn't double the number of states. That is the geothermal program goal. GPW is the catalyst.
Roger Hill: We build on the R&D program.

New Mexico Power Plant
Jay Nathwani: What about the New Mexico electric powerplant?
John Lund: Not operating, he doesn't have a cooling tower. It's less than 1 MWe and would be for internal use.
Karl Gawell: What do we count then? Count all? Therefore, do we include the New Mexico plant?
Jim Combs: Include it and declare victory in New Mexico.

Program Discussion by Stakeholders

Geothermal Energy Association Perspective: Karl Gawell
Key Points: Geothermal Energy R&D: Industry Prioritization Study
This was last done by Mike Wright in 1995. This is a new study. The R&D questionnaire went to GEA members and affiliates. This is new data on Excel sheets; became available just this week!

DISCUSSION
Survey Response
Bob Lawrence: What was the ratio of electricity responders to direct use responders?
Karl Gawell: Went out to all GEA and GRC members. There were 30 responders out of 300.
Jim Combs: I didn't respond (because it fell between the cracks)
Karl Gawell: That was your choice since we sent you a followup email.
Doug Jung: My group, operations and power engineering, weren't polled. They might have had a different response.
Karl Gawell: I will give you the coded Excel sheets. The variations between groups weren't overwhelming.

Industry Need Summary
Karl Gawell: To summarize; help us find, help us develop; get the industry moving; success builds on success.
Jay Nathwani: Industry seems to be in sync with the DOE program.

Coordination of Questionnaires
Dan Shochet: Coordination of GEA and GRC questionnaires?
Karl Gawell: Unfortunately they were concurrent and independent. But general agreement in responses.
Ted Clutter: GRC somewhat more quantitative. Top categories similar.

Geothermal Resources Council Perspective: Stu Johnson
Key Points: We were asked by DOE to poll our constituency for this meeting
Summary of recommendations
- From side discussions
    Deployment is key; 1-3 year window to get real deployment
    Drilling targeting, fracture definition
    Cost-shared drilling
- Expand GRED; yesterday I called NV folks, and they emphasized cost-shared drilling, fund initial well for small companies
- Reactivate Geothermal Drilling Organization (GDO)!
- EGS, near term deployment
- Downhole Pump, temperature limit
- H2S abatement
- Combination tools
- Conversion technology for 212-300 degrees F and also lower temperatures. Interested in Kalina work.
- Distributed Power and non-electric applications. Perhaps a low-cost skid mounted unit for off-grid?
- Information dissemination/education/outreach

Barriers to Short Term Deployment
- Lack of power sales contracts (even in Nevada)
- Capital front end loading of geothermal projects
- Limited inventory of proven resources
- Attracting capital investment

DISCUSSION
Downhole Pumps
Dan Shochet: Downhole pumps can pump 2000 gpm, surface pumps 1200 gpm, (so downhole pumps are important)
Greg Mines: Government has 2? projects with CentriLift operating for longevity in the field.
Mack Shelor: These are really downhole 'motors'. Can increase well output by 30% and thus have a huge impact. Steamboat using CentriLift pumps and they are working well. Present pump design has been under test for 18 months.
Ann Robertson-Tait: Can lower it further into the reservoir as the reservoir level declines. Noise is reduced if located downhole. Important if there are people nearby.
Mack Shelor: Line shaft pumps put oil into the ground (from leakage).
Jim Combs: Temperature limitation with present pumps, need greater than 365 degrees F. CentriLift is tapped out, no sales right now and top management is reluctant. The GDO did those kinds of things.
Doug Jung: GDO was good. ******
Kalina Cycle
Jay Nathwani: Kalina started back in 1994-95, we now have 2 proposals to get into place.
Mack Shelor: We have one of them.

Exergy
Ted Clutter: What about Exergy?
Mack Shelor: Exergy exists, but …
Jay Nathwani: The contract is with Exergy. This will be an issue with the contracts people, if Exergy isn't the entity to carry out the work.
Mack Shelor: I understand that, but that is beyond me.

Moderate Temperature/Direct Use
Dan Shochet: We have a 200 kWe unit operating in Austria.
John Lund: No major R&D needed in direct use. We just incorporate small R&D into our DOE work.

BLM Royalty Policy
Dan Shochet: Is the BLM royalty policy an issue?

John Lund: There are very few direct use projects on BLM land. Royalty structure definitely has an adverse impact.

DOE Support for GEA and GRC
Dan Shochet: Include the need for DOE support of GEA and GRC contracts in this category. GRC has had lean years and GEA is even more precarious. Portion of DOE budget really belongs with GRC/GEA.

United States/Mexico Cooperation
Stu Johnson: Encourage US and Mexico cooperative work. How to promote and expand? There is potential for a meeting between Secretary Martens and Secretary Abraham. Martens will discuss with Abraham; may already have happened.
Lou Capuano: We haven't even met with Abrahams!
Bob Lawrence: Don't move too fast on pushing cooperation.
Ted Clutter: Martens is the keynote speaker at the GRC meeting which should help leverage a high-level DOE speaker.

Possible Objective for GRED III
Stu Johnson: Perhaps GRED III could incorporate all the great R&D stuff at a Federal project site? Demonstrate efficient well development.
There are good prospects not being pursued. We don't always pick the best.

True Cost of Geothermal Energy
Dan Shochet: It would help with barriers if GPW included the concept of the true value of geothermal energy. Maybe a research project for GPW would be to define the true cost of geothermal energy.
Roger Hill: Yes, aggregate everything; lack of risk, etc. with geothermal.
Bob Lawrence: We went with Sierra Power to the NV PUC on an avoided cost basis. The PUC has sat on it since May 2002 – even with 'harassment'. Give us a cost number. With gas dependency and avoided cost, we might make it. Can't get NV to move even if it is a Federal law. Consider avoided cost, employment, environmental impact.
Dan Shochet: Long term, geothermal is a technology that can play.
Roger Hill: Idaho has a 10MWe limit, which is OK for wind, but geothermal needs it higher.

Summation: Roy Mink
I was impressed with the surveys and the extent to which they agree. Program design – industry/DOE – is similar. We have to determine how to put these priorities into the budget. The counter to level budget guidance is to put the industry priorities and agreement on the table. We are in sync with the higher priority things in your lists. We can move in the right direction. GPW has done well in working with the GRC and GEA. GPW in Idaho has been effective with legislators. Has broad-based support.

DISCUSSION
Budget Flexibility
Jay Nathwani: But it will be two years (FY 2005 budget) before these priorities show up.
Jim Combs: Is it possible to redirect earlier?
Roy Mink: To a degree, but limited
Roy Mink: This meeting and its results allows us to start. Mr. Garman is interested in a 10 year plan.

The Role of Politics
Karl Gawell: I want to thank DOE and the labs for great presentations. DOE has been a wasteland. The Congress is getting a little better. The key is, do we know people? It's Politics 101. I compare the budget to member interests. In Nevada, its Reid and Gibbons. You have the core of a good program. Continue to work with people in the West.
Jim Combs: Mack Kennedy did a great job of organizing this meeting. Move fast, some of us may not be around in two years.

DOE Participation in the Annual GRC Meeting

Dan Shochet: A plug for the annual GRC meeting. There have been constraints on the number of lab and university people that can attend our meetings. Somewhere we need to find the dollars to allow this. I realize the next meeting being in Mexico may be an issue.
Ann Robertson-Tait: Pitch the GRC meeting as outreach!
Roy Mink: What about the Martens/Abraham connection?
Jim Combs: Have to make decision soon. I won't write a paper if I can't go.

USGS Resource Assessment
Karl Gawell: Regarding new resource assessment by the USGS. I need one-half page of material that defines what we want done (by the USGS) – multi-year, comprehensive plan. Timing for this is soon.

END OF MEETING