Geothermal R&D Program Technology Transfer Outlook FY-85 Through FY-1989

MARCH 1986

Prepared for

THE U.S. DEPARTMENT OF ENERGY
GEOTHERMAL TECHNOLOGY DIVISION

Prepared By

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Under Subcontract #R54PJZ85352033
(Meridian Project No. 195) to:

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GEOTHERMAL R&D PROGRAM
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1.0 INTRODUCTION

1.1 Purpose of the Federal Geothermal R&D and Technology Transfer Program

This is the USDOE Geothermal Technology Division (GTD) Technology Transfer Outlook document for the five years FY1985-FY1989. It is a companion volume to "U.S. Geothermal Energy Program Multiyear Research Plan: 1985-1989." In its simplest terms, this document describes how those technologies which are currently the focus of R&D efforts will be transferred to industry and the public.

The R&D Plan mentioned above describes concisely and accurately the role of GTD R&D efforts, both historically and in the coming years, within the context of legislative and adminstrative mandates. In brief, it is the stated policy of the Federal government to[1]

- o encourage the development of a wide range of energy sources,
- o concentrate its efforts on those sources which have a potential to contribute significantly to the nation's energy base,
- o focus on those technologies which, for technical, economic, or other reasons, would probably not be developed by industry alone, and
- o foster the aggressive transfer of Federally-sponsored technologies directly to those industries which could use them to develop new energy sources.

To these ends, GTD has put in place an R&D effort of significant dimensions. It encompasses all eight major forms of geothermal energy[2] and is being conducted

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[1] See Appendix A.

[2] The eight forms are: hydrothermal/flash-steam, hydrothermal/binary-cycle, hydrothermal/direct-heat, geopressured/methane, geopressured/hot-water, geopressured/hydralic, hot-dry-rock, and magma.

by scientists and engineers at the DOE national laboratories, universities, and private sector firms. The record of their accomplishments is seen clearly in the recently released "GTD/DOE Geothermal Technology Catalog."

In general, the purpose of the GTD Technology Transfer program is to ensure that U.S. industry is aware of technology that results from Federal geothermal R&D, and that technology is successfully adapted to industry needs.

1.2 Purpose and Scope of This Document

This document is a description of and justification for the Technology Transfer activities of the GTD R&D Program, but not either:

1. A detailed Technology Transfer status or activities report,[3] or
2. A methodology for developing a Technology Transfer Plan.[4]

This document:

- Is a description of the Program Technology Transfer Strategy General System, and Major Activities;
- Emphasizes activities for FY 1985 that are intended to assist industry in adopting Federally-developed technology and to stimulate intra-industry transfer of industry-developed technology; and
- Describes what the GTD program is doing to improve the effectiveness of its Technology Transfer activities.

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[3] See "GTD/DOE Geothermal Innovative Technologies Catalog," [MCR-002-86-TA]

[4] See "Guidebook for Technology Transfer Managers," [MCR-001-86-TA]

2.0 Technology Transfer Strategy and Goals

2.1 Needs for R&D and Technology Transfer

The United States is not an energy poor nation. Our energy is abundant and for the most part readily available. And by almost any measure, energy in America in relatively inexpensive, calculated either as a percentage of GNP, of personal income, or even on a straight price per Btu basis. Still, it is advantageous to us as a nation to exploit more fully our domestic renewable resources. The reasons why are fairly obvious; energy indepenence, national security, and economic expansion. Given this, it is important to determine if geothermal resources can or should be tapped as a contribution to the nation's energy base.

Geothermal energy is:

- o A tremendous resource base
  - Hydrothermal, 116, 000 quads
  - Geopressured, 113,000 quads thermal energy; 67,000 quads methane
  - Hot dry rock, 530,000 quads
- o A clean, safe resource
  - No combustion required
  - No coal storage piles, tanks of oil, or transportation of these fuels
  - No public fear of nuclear accident
  - Low environmental impact
- o A base-load resource
  - Available 24 hours a day
  - Not affected by variables such as sun and wind
- o A reliable resource
  - Availability factors of over 90% achieved
  - Average for nuclear plants, 71%, 78% for fossil plants
- o A competitive resource
  - Geysers plants produce power at lowest cost of any of PG&E's mix of plants types
  - Costs of flash steam plants coming on-line competitive with conventional plants
  - Costs of small binary units competitive and short lead times bring early profits

All of these advantages argue strongly for a greater exploitation of our

nation's geothermal resources. There are, however, significant obstacles to doing so. Among them:

- Significant technical and economic obstacles must be overcome before the majority of U.S. geothermal resources may be exploited by industry, especially of moderate temperatures (150° - 200°C)
- Current technology is only economic when applied to high grade reservoirs
- The market for geothermal equipment is too small for significant commitment to R&D by private suppliers - only 1 deep well in 1000 is geothermal
- Geothermal drilling costs are up to 4 times that of oil or gas wells
- The geothermal industrial infrastructure is small, and depends to a large extent on interaction with the oil and gas industry
- The typically small size of most geothermal companies minimizes R&D initiated by industry
- Companies dedicated to geothermal development have little profit to spend on R&D

These are obstacles which are not likely to be overcome to any significant degree unless some institution acts as an integrator; someone able to identify and evaluate all of the potential benefits, problems, synergies, and needs. This is a role uniquely appropriate for the Federal government, and is strictly in line with its stated objectives and responsibilities.

Those very same obstacles to development are also obstacles to the transfer of the developed technology. Here, too, the Federal government can play an essential role. It is the Division's firm conviction that Technology Transfer and R&D are best understood and practiced as complementary activities, acting to reinforce and increase the value of each other. Technology development without Technology Transfer is simply a waste. Technology Transfer without technology development is an impossibility. Together, these two activities can bring into place a rather fragile industry, but one whose potential contributions can ripple throughout our economy and bring us one step closer to energy independence.

2.2 Goals and Objectives of the R&D Program

The five-year goals of the GTD R&D program are fully described in the "U.S. Geothermal Energy Program, Multiyear Research Plan: 1985-1989", from which Exhibit 2.1 is taken. These are generalizations of extremely detailed plans developed using the evaluation and planning process outlined in the Renewable Energy Research and Development Outlook, February 1985. An example of the more detailed goals would be "For Hot Dry Rock: Connect wells up to 15 separate fracture zones."

The technology being developed today will need to be transferred for tomorrow's use. And as the Division attempts to include transfer activities in the earlier stages of R&D, there will exist an even greater overlap between R&D plans and Technology Transfer plans.

EXHIBIT 2.1

RESEARCH STATUS AND OBJECTIVES

A. GEOTHERMAL GEOSCIENCES RESEARCH

Research Area	Current Status	Five-Year R&D Objectives
Hard Rock Penetration Research	Oil & gas drilling technology has been adapted to geothermal use, but high temperatures, harder rocks and corrosive fluids make geothermal wells two to four times more expensive than oil or gas wells.	Complete the development of components and prepare for field testing of an advanced drilling system that incorporates a downhole motor, capable of directional drilling, casing while drilling, and high penetration rates to reduce well costs by 50%.
Hydrothermal Reservoir Research	Reservoir understanding, modeling and behavior prediction, including behavior of injected and recharge fluids, has been developed and is used by industry, but is uncertain.	Develop improved reservoir understanding and prediction methods to provide advanced reservoir management tools and reduce uncertainty in behavior prediction by a factor of five.
Geopressured Production Research	Geopressured reservoirs shown to be saturated with natural gas. Modified logging techniques are available for predicting salinity and gas content. Existence of very large reservoirs proven. Scale control in early stage of development. Reservoir drive mechanisms poorly understood.	Complete the development of predictive model for geopressured reservoir performance based on long term flow testing. Develop scale-control technology. Complete economic analysis of total energy recovery system, including natural gas, electricity and direct heat applications.
Hot Dry Rock Reservoir Research	Scientific feasibility established. Hydrofracturing of deep, hot crystalline rock shown to be volumetric rather than planer. Microseismic monitoring and delineation in early stage of development.	Complete the development of microseismic technology for locating and characterizing deep hydraulic fractures in stressed crystalline rock. Establish methodology for creation of high surface area heat exchanger system in deep hot rock geosystems.
Magma Energy Extraction Research	Scientific feasibility has been shown for extracting energy from shallow magma bodies. Technology improvements and extrapolations show at least 1000 MWe may be exploitable economically.	Study target site for magma loop experiment, initiate technology for drilling and heat extraction, test all equipment at interim site and prepare for major drilling program to start in 1991.

RESEARCH STATUS AND OBJECTIVES (continued)

B. GEOTHERMAL CONVERSION RESEARCH

Research Area	Current Status	Five-Year R&D Objectives
Binary Conversion Technology Verification	Heber binary plant, being built in California's Imperial Valley under a DOE/industry cooperative program, is on schedule and under budget.	Complete start-up of Heber binary and carry out two year experimental operation. Test several advanced concepts for in-line control instrumentation. Complete economic evaluation of Heber plant and follow-on improved designs.
Heat Cycle Research and Second Generation Binary Technology	Advanced heat cycles are under research or pilot scale. Materials, heat exchangers, condensers, pumps are under test and development.	Complete the design and development of components, materials and systems concepts for second generation binary system capable of reducing binary plant costs by 30%.
Hybrid Geothermal Electric Systems	Honey Lake hybrid plant conceptual design complete; the desirability and basis for continuing preconstruction activities is under review.	Complete preconstruction activities of Honey Lake hybrid plant, if appropriate cooperative arrangements can be set up.
Low-Enthalpy Systems	Twenty-three field projects were initiated, of which seven were terminated due to technical problems. Fifteen are in operation and one is under construction. Thirteen final reports of the operating projects have been issued.	Completion of all direct heat projects. Publication of all final reports, and economic analyses of direct heat applications of geothermal energy.
Geopressured Conversion Research	Wells are ready for tests of electric production from combined methane, thermal, and hydraulic energy. No direct heat use to date.	Complete EPRI experiments on gas-engine plus binary electric system. Allow industry access to wells for direct heat tests.
Hot Dry Rock Conversion Research	Reservoir not ready for power generation tests.	Conduct small-scale tests. Make site accessible to industry for larger-scale electric plant.

3.0 TECHNOLOGY AND AUDIENCES

3.1 The Technology Delivery System

In order for a new technology to enter the market place, a number of different institutions and individuals must interact in a variety of ways. The institutions might be universities, equipment manufacturers, service providers, financiers, and government regulators. Each technology has its own real "delivery system" that exchanges information, devices, money, services, etc.

The concept of a Technology Delivery System (TDS) is a way to represent these complex processes, as a sort of map to guide the means by which the Federal government stimulates technology improvements and adoption. While the TDS is an abstraction of the real-world mix of actors and exchanges, developing and analyzing this map is especially valuable for clarifying which institutions can be worked with to facilitate transfers of specific technologies.

The concept of the TDS was developed by the National Academy of Engineering in 1973, and continues to be expounded as an important tool by Dr. Arthur A. Ezra of the National Science Foundation. In a paper explaining how to develop and analyze a TDS ("Technology Utilization: Incentives and the Federal Role" in "A Synthesis of Technology Transfer Methodologies," U.S. Department of Energy, December 1984), Ezra provided examples of part of the U.S. geothermal energy TDS.

Two figures from Ezra's paper show the geothermal TDS, emphasizing the role of public utilities in the adoption of geothermal conversion technologies. Exhibit 3.1 shows the TDS without government assistance. Exhibit 3.2 shows ways in which government assistance can come into play.

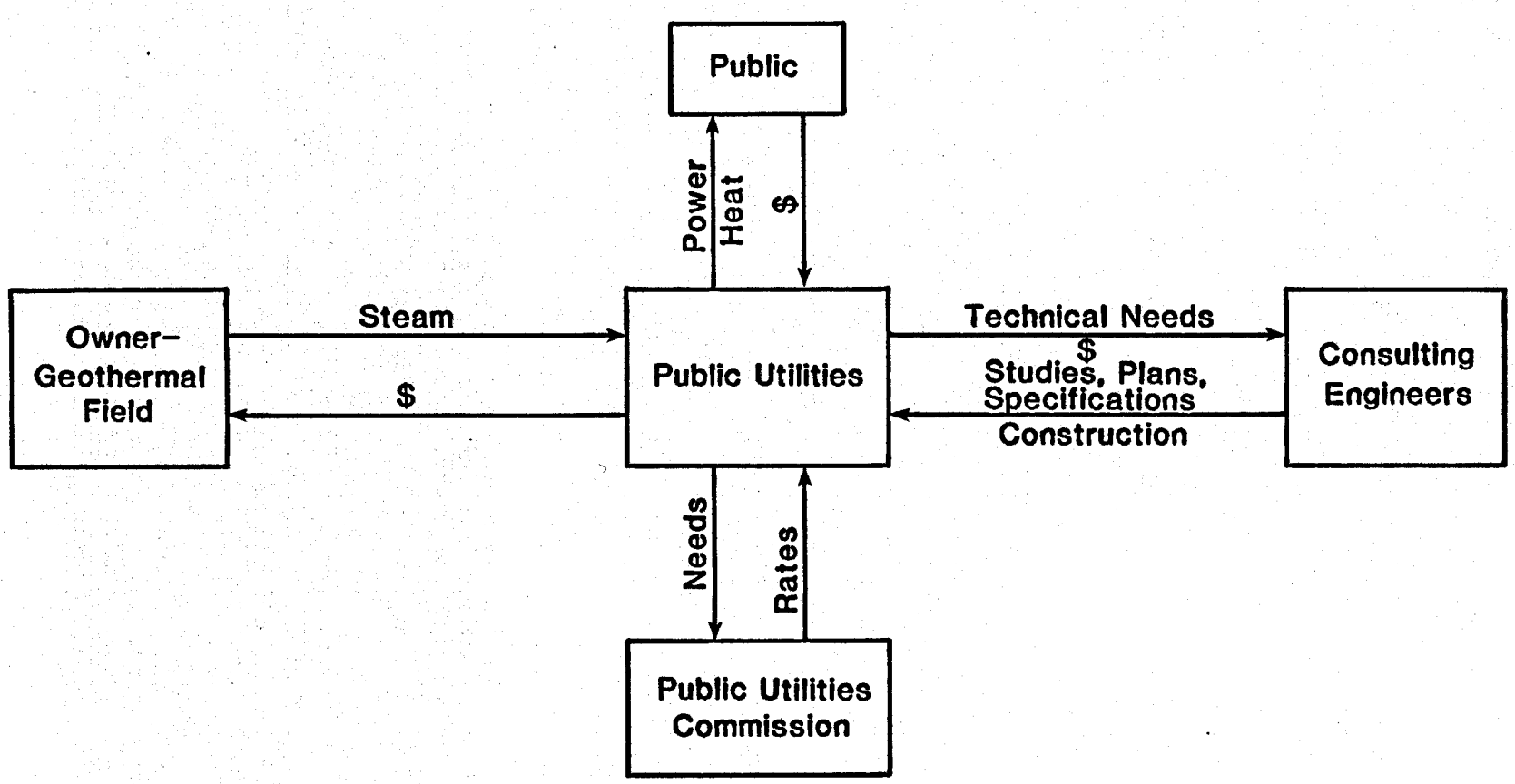


Exhibit 3.1
Geothermal Energy Technology Delivery System without Government Assistance

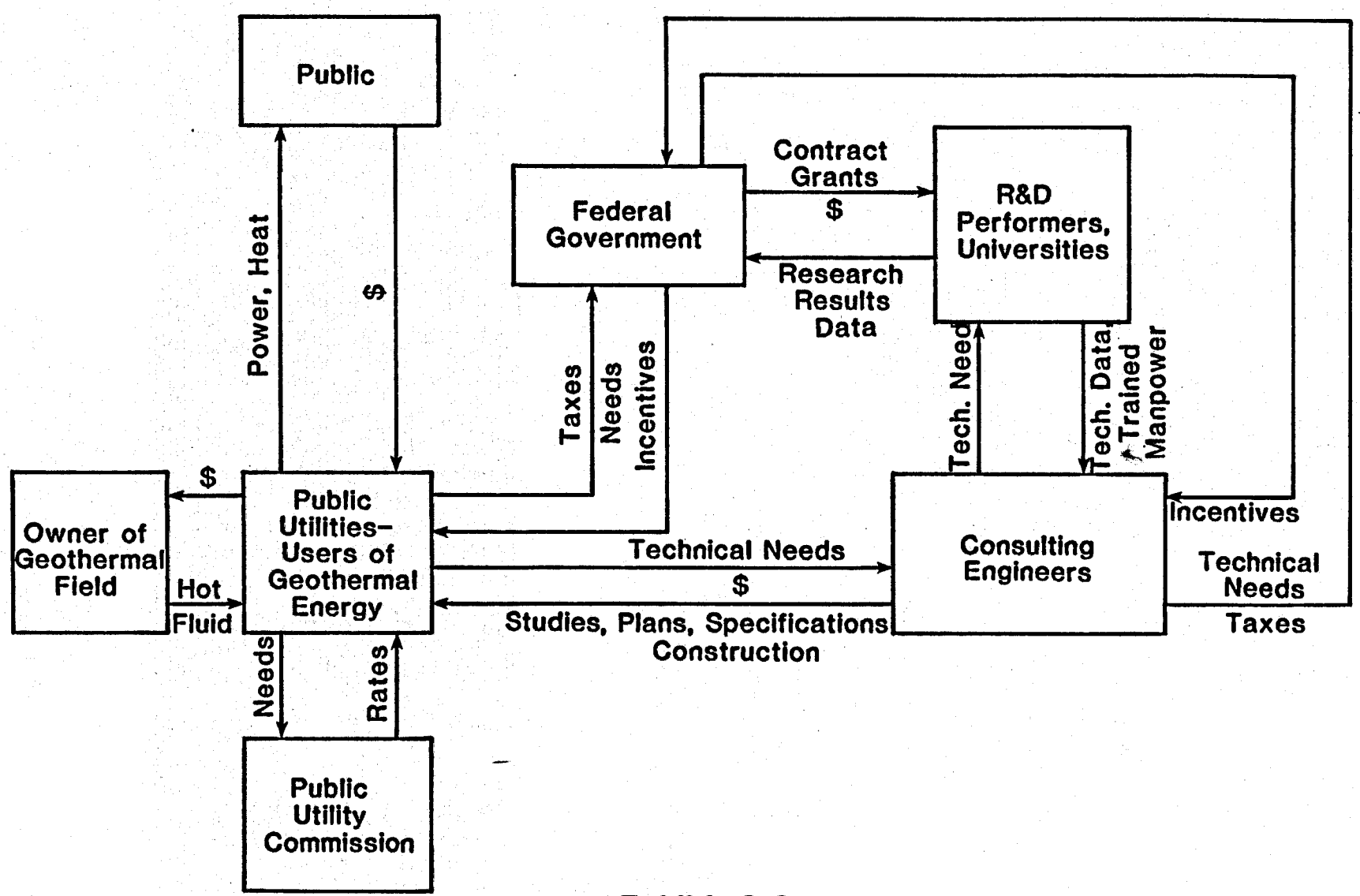
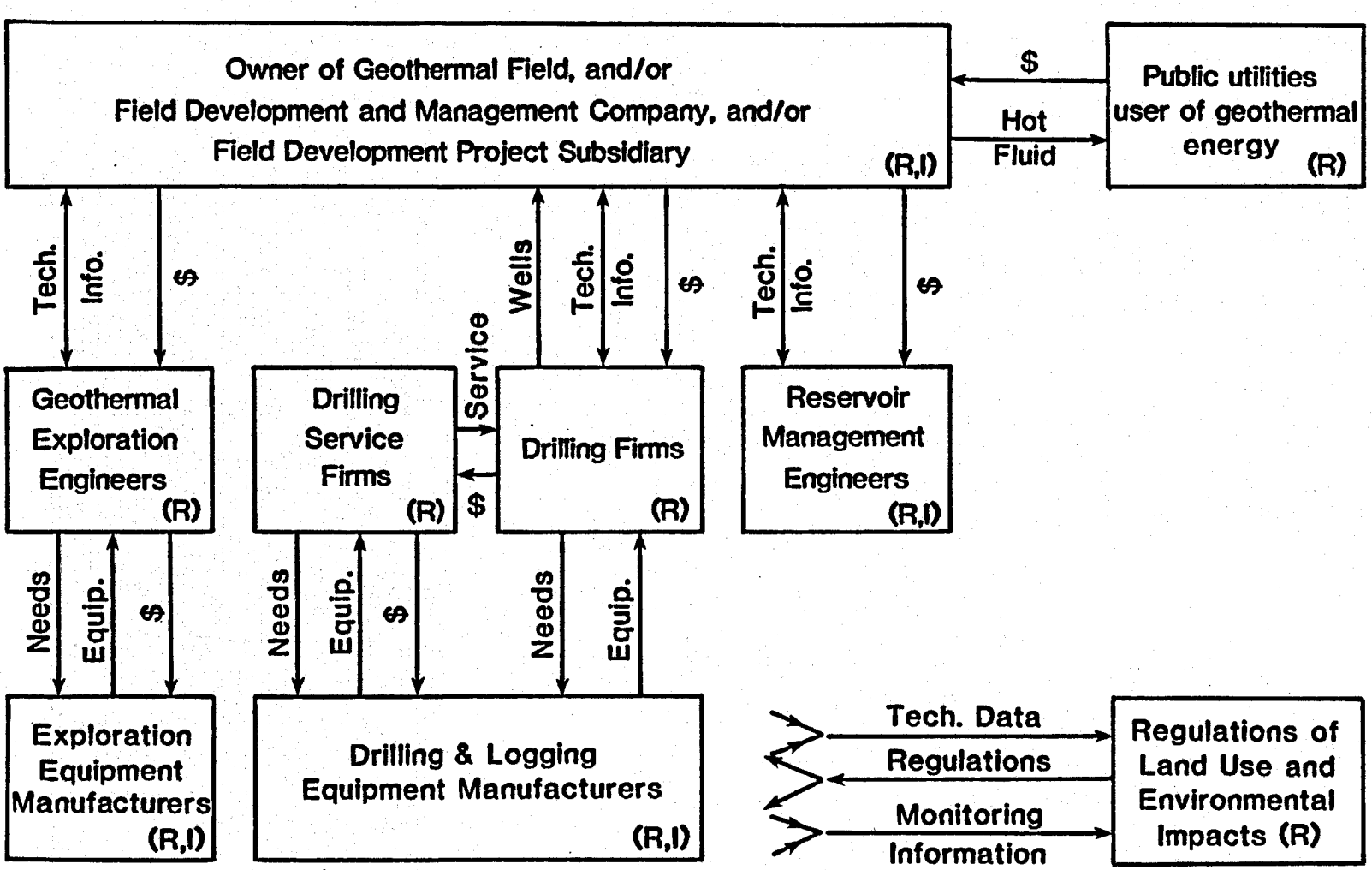


Exhibit 3.2

Geothermal Energy Technology Delivery System with Government Assistance



Notes: (R,I) indicate applicability of government involvement in Research or various Incentives

Exhibit 3.3

Geothermal Energy Field Development Technology Delivery System

Comparing these two figures reveals a number of important points:

(1) A fundamental role of government-sponsored R&D is to improve the technical database from which consulting engineers develop designs and plans for power plants.

(2) Communication of technical needs is a fundamental process among many of the actors.

(3) Tax receipts and (financial) incentives can be traded off among each other through the system as a whole.

(4) A most important flow link is the transfer of new technical data, and personal skill directly from R&D labs (e.g., universities) to consulting engineers.

(5) The energy-consuming public is insulated from most of the technology development and transfer interactions.

(6) If financial (e.g., tax or subsidy) incentives are required to accomplish technology adoption, the R&D program (e.g., GTD) often must act as the "incentives system integrator" among a number of Federal institutions (e.g., Congress, OMB, Treasury).

Ezra's geothermal energy TDS (Exhibit 3.2) omits one important group of actors, commercial financiers, who play a crucial role of investing and lending funds for field and conversion plant development. Financiers, in their needs to assess the financial risks associated with proposed projects, usually require much technical and cost information. The level of detail of that information often approaches that required by design engineers. It is also important to recognize that Exhibit 3.2 does not attempt to portray the complexity of the

geothermal TDS from the point of view of the owner of the geothermal field. The field development aspects of the TDS are shown in Exhibit 3.3 (which is not from Ezra's paper). The roles of researchers, research support, and other government incentives are shown there only by the codes (R) or (R,I), to keep the figure simple.

It can be seen that all of the actors in Exhibit 3.3 are impacted by government involvement in research or various incentives. Each actor has different specific R&D/incentives needs requiring federal government involvement.

It is important to note that the Federal government's role in receiving inputs must be an active one. For example, in the field of taxes, the Federal government has more than simple collection responsibilities. It must also be assured that its tax policy is, at a minimum, not antagonistic to the goals of the other players, and, at its best, is actively sympathetic to those goals. Similarly the Federal government should not simply receive data from sponsored research. It must analyze this data as well. What do these data actually represent and what are their implications for R&D policy and emphasis?

In receiving "needs" information the government has the responsibility to be a good listener. A good parallel to this is the case of medical diagnosticians, who believe that if they are able to listen closely and well enough, their patients will usually tell them precisely what their problem is. Indications (e.g., pulse, temperature, etc.) are therefore used best as confirmatory evidence to the patient-described need. Like the practiced diagnostician, GTD listens to the industry, to the industry's own expression of its needs (whether in drilling technology or loan guarantees), as the first step in selecting technologies for active transfer. Frequent GTD workshops and program reivews serve this listening function.

Once GTD has detected specific needs for R&D or transfer actions, it then looks for opportunities to intervene and assist the other players in making their activities and their interactions as strong as possible. For example, GTD (or some other arm of the Federal government) may beneficially assist the universities in training the engineers which the industry will need, or develop a way to help geothermal drilling firms get improved drill bits from manufacturers.

Using a final metaphor, GTD recognizes that a Technology Delivery System resembles a circuit board, with each player or institution in the role of transistors, etc., amplifying some needs, modulating others. But only when all circuit lines are properly laid down, when all components are functioning properly, does the circuit as a whole perform its functions, and will the U.S. recognize the highest practical exploitation of its geothermal energy resources.

As a conceptual device, the TDS in Exhibits 3.2 and 3.3 are helpful in understanding the intricate interactions of the geothermal energy industry. GTD has begun the process of developing a consolidated and detailed picture of the major individual players involved. For example, information on public financing sources is scattered among the Operations Offices staff. It is nowhere consolidated into one, unified database, there is no check to be certain that all key players are included, and there is no means of making that information generally available.

The concept of the loyal proponent, or "technology champion" is central to GTD's approach to Technology Transfer. The absolutely essential Technology Transfer role performed by this "technology champion" can not be stressed too strongly. Such champions may arise within any of the blocks shown in Exhibits 3.2 and 3.3, from within the Federal government, from an R&D firm, a public utility executive, or elsewhere. A champion's role however is not circumscribed by his or her "location" within the TDS. For example, a "Public" champion would need to have an intimate

understanding of all players, not just of the Public Utilities to which she/he is shown connected in the TDS. Where would such a champion turn in order to find a consolidated, centralized source of information on precisely who the key engineers, R&D developers, etc. are? To date, such information has been gathered individual on an ad hoc basis, thereby slowing the pace and limiting the effectiveness of the champion's efforts.

The Division has stressed the central importance of champions and has an appropriate predisposition to find them outside of the Federal government. It must now make it easier for such champions to arise and flourish. One way of doing that is to make available the information necessary for the champion to do his or her job.

3.2 The Transferable R&D Products

GTD has identified over 200 R&D products developed either at the DOE National Labs or under direct DOE sponsorship, which are now at various stages of transfer readiness. These have been collected, cross-indexed, and annotated in the "GTD/DOE Geothermal Technology Catalog." A summary of those products is provided in Appendix B.

3.2.1 Method for Selecting Transferable Products

The first step in implementing a Technology Transfer program and thereafter selecting specific technologies for transfer is to assess the R&D stage and the current transfer status of all DOE-sponsored R&D products. Exhibit 3.4 shows a summary of geothermal R&D products grouped by their R&D and transfer status. The numbers are derived from a preliminary survey of products conducted during the preparation of the GTD/DOE Geothermal Technology Catalog.

EXHIBIT 3.4
GEOTHERMAL R&D PRODUCTS
GROUPED BY TRANSFER STATUS

TRANSFER STATUS	NUMBER OF PRODUCTS
Conceptual	4
Design	13
Innovation	16
Field Testing	15
Diffusion	93
Status Not Available	85
TOTAL	226

To date there has not been a systematic process or mechanism for selecting specific technologies for transfer emphasis. Technologies or products have

tended to be somewhat self-selecting. Some (like publications) are easier to transfer, simply putting them into the public domain and allowing passive transfer to occur. Others (like many of those developed at Sandia) have been transferred successfully because manufacturing industry representatives have been brought in and involved since the earliest stages of R&D.

In one sense there should be no "selection" of products to transfer; every successful item under R&D should eventually be transferred. Ideally the Division would produce an active transfer plan for each and every technology now under development. Budget constraints, however, make such a strategy impractical. A selection must be made, an emphasis must be placed, priorities assigned.

To avoid forever playing catch-up, the Division should select a number of transfer items at the early stages of the R&D transfer stream. To create a self-sustaining and ever-increasing interest within the full geothermal energy community, the Division should select a number of transfer items capable of immediate and wide-spread adoption by the industry. A programatic balance between these two objectives must be sought and maintained. In short, it is necessary to plan prudently for the future while at the same time capturing the attention of the present.

We propose here a number of tactics and processes to do this. These are described in more detail in Section 5.0. These are:

1. Incorporate Technology Transfer into the MBO selection process.
2. Incorporate Technology Transfer plans into the R&D plans.
3. Establish a policy on the use of Technology Transfer budget funds.
4. Establish an objective Technology Transfer proposal scoring system.
5. Create reports from the GTD Technology Transfer proposals database for evaluating Technology Transfer proposals.
6. Establish a policy to handle Technology Transfer management for technologies that arise from non-lab contractors.
7. Hold a field-manager Technology Transfer strategy workshop.

8. Set Technology Transfer objectives for GTD field managers and/or contractors.

9. Establish partially-distributed control of GTD Technology Transfer funds.

10. Set yearly objectives for the Division's Technology Transfer program.

11. Realign certain activities along "technology" lines.

12. Create and maintain a list of coming "critical events".

13. Make a traveling display to emphasize GTD R&D results.

14. Have GRC distribute Energy-Grams.

15. Establish a program of industry fellows at the labs.

16. Analyze the GTD Technology Delivery System.

17. Map the current GTD Technology Transfer Operational Network.

18. Develop a handbook on "Model Technology Transfer Operations".

3.2.2 The R&D Products

As mentioned earlier, the Division has identified over 200 R&D products relating to geothermal energy exploration and exploitation. A listing of these products is contained in Appendix B.

Exhibit 3.5 shows the wide variety of products whose development has been sponsored by the Department. As was mentioned previously, Exhibit 3.4 shows these same products grouped by their "transfer readiness".

3.3 The Target Audiences

3.3.1 Methodology for Audience Selection

Audiences for the transfer of any particular technology might usefully be grouped into two classes; ultimate audiences and intermediate audiences. The ultimate audiences are the easiest and most obvious to identify. The ultimate audience for a novel piece of drilling equipment is, of course, the drillers themselves. The intermediate audiences are those other persons or institutions who must also be involved to effectuate the transfer to the ultimate audience. In the case of the drilling equipment, intermediate audiences might include a firm to manufacture the equipment, design engineers to adapt it, and even financial institutions to fund the manufacturer's tooling, distribution, and other start-up costs.

Intermediate audiences can best be identified by analysis of the Technology Delivery System (TDS). Such a system maps out all of the transfer players and the needs-incentives flows that move between them. Beginning with the person or institution who conducts the R&D and ending with the ultimate audiences, the construction of the TDS is essentially a question of: "How do I get from here

EXHIBIT 3.5

R&D PRODUCTS BY TYPE

Hardware	92
Software	44
Processes	34
Reports	5
Handbooks	15
Test Facilities	12
Databases	10
Technical Assistance	2
Designs	3
Advisories	2
Libraries	2
Workshops	2
Periodicals	1
Conference	1
Education	1
TOTAL	226

to there?" "Who or what is needed along the way?" Of course, a TDS is not a static construction; it represents elements of a dynamic society and market-place, and so it, too, must bear somthing of that dynamic quality. In fact, it is rare that a TDS can be configured at the beginnings of an R&D effort and remain unchanged through to transfer to users. Problems or complexities are likely to arise. For example, a product concept may be sound but the pieces can not be milled precisely enough, or the product may perform excellently but be too expensive for limited production. It is when such problems are noted that new elements are added to the TDS, usually meaning new intermediate audiences.

Another useful way of viewing Technology Transfer audiences is either as systems (or organizations) or as actors (or individuals). Exhibits 3.1 , 3.2, and 3.3 showed TDSs for the geothermal energy industry. The players identified, however, are generic organizations, such as "universities" or "Federal government". Even if these players were specifically identified (e.g., Stanford University and GTD/DOE) they remain audiences as systems. In the end it is individual persons who make decisions, approve loans, evaluate technologies, etc. Every one of these persons is constrained and predisposed to act in certain ways, which can be either beneficial or antagonistic to the interests of any particular transfer. Such players as actors are influenced by a host of factors:

- their education
- their previous jobs
- their career/job goals
- their interests
- their sources of information
- their judgements and prejudices

and many more. In working a technology through the transfer process --through a TDS-- one always has to keep in mind that it is these individual actors who will determine the ease or difficulty (and perhaps even the feasibility) of transferring a new technology. This characteristic of audiences is explored in

the "GTD Technology Transfer Management Guidebook" (Chapter 4).

A distinction should be made however between audience identification and audience selection. In the first case, it may be relatively simple to identify the need of a particular audience (e.g., market research or engineering firms), however selecting particular audiences (e.g., a market research or engineering firm) is quite a bit more difficult. The problem is that the geothermal industry is horizontally, but not vertically, integrated. There are associations for various of the TDS players (bankers, drillers, engineers, market researchers, etc.) but none that brings these all together. As a consequence, when the need for a new player is identified, that player in is too often selected by fairly hap-hazard methods of word-of-mouth referral, etc.

There is a need to maintain and strengthen vertical association and information exchange mechanisms in the industry, an ancillary benefit of which will be the likely increase in the number of specific players. Vertical integration is currently fostered by the Geothermal Resources Council, an educational association of about 1000 members, and the ASTM (American Society for Testing and Materials) panel on Geothermal Chemistry and Materials. A recently formed consortium of geothermal field developers and drillers, the Geothermal Drilling Organization, has began to address vertical needs for technology transfer among R&D labs, drillers, drilling equipment manufacturers, and drilling service firms.

3.3.2 Audiences and Their Information Needs

Each player in the Technology Delivery System constitutes a discrete audience, each with needs and contributions of its own. The players depicted in Figure 3.2 are the essential players in just about any geothermal Technology Transfer.

While there may easily be many more players involved in any specific transfer effort, it is unlikely that there are any fewer in any instance. Some of these must participate in order to bring the transfer about; others, as potential opposers, must be persuaded not to participate negatively. Some, then, are necessary but not sufficient (e.g., the drillers), while others are probable but not always positive.

Here are brief descriptions of the key players in the geothermal TDS, with mention of their principal needs and contributions.

The Public: No other player holds quite so powerful a role as the general public. While they are not concerned about the transfer of an intricate piece of geothermal-related technology they make it possible for transfer to take place by creating the environment within which any such transfer would have to take place. Public opposition to geothermal exploitation --whether on the grounds of destroying natural beauty, excessive noise, noxious sulpuric odors, surface pollution from brine and/or mud, disturbances to to the water table-- is enough to make the transfer of enhancing technology a fruitless exercise. In this sense, the primary need of the public is assurance/reassurance of the community-compatibility of geothermal energy production. This need can be met both with education/information and with attention paid to the actual process of introducing geothermal into a community. The Imperial Valley Environmental Project is an excellent example of the benefits to be derived from not only seeking community involvement but doing so in a positive way and allowing it to drive the transfer/introduction process.

The public holds what is perhaps a more fundamental veto power (--again not directly but in terms of obviating its need--) in relation to its demand for energy (power and heat) and the price elasticity of that demand. How much energy

is required and what price will be tolerated for it? If the public's price elasticity is very low, perhaps no amount of Technology Transfer can make it worthwile to tap into an expensive geothermal resource. On the other hand, if the elasticity is high, this may act to determine the nature of what technology is targetted for transfer. Trade-offs between other forms of energy may enter the public equation. For example, a public strongly predisposed against nuclear power generation may tolerate environmental degredation and high prices attendent with geothermal production as a preferable alternative.

R&D Performers

R&D performers have one overriding need; the need to listen to the producers -- the explorers, the drillers, and the power plant operators. Once again, "market pull" is far and away a more certain and more relaible generator and director of R&D than is "technology push". That is, it is not enough to know what can be done, they must know what needs to be done. It may be possible to develop a sophisticated down-hole intelligence probe, but if the producer lacks casings with a resistance to corrosion, the probe will be of little use and it is unlikely that it will be transferred/adopted. The original impetus for the involvement of the national labs began with the recognition that certain materials and techniques they had already developed might be adopted to use in the geothermal industry. Since then the government has acted to bring a higher level of "field intelligence" to bear upon the R&D project selection process at the labs. It would behoove all involved if the R&D producers could develop a more direct appreciation for the producers' needs, not withstanding the government's role. To this end, some of the recommendations in Section 5.2 aim at closing that gap. See, for example, the Industry Fellow program.

Geothermal Field Developers

The geothermal field developers (fluid producers) may comprise the single most important audience in terms of the complexity and demands of their needs. Their needs also span the widest range in terms of type and kind. Among these needs are:

- o Financing for exploration, production, equipment, plant, etc.
- o Financial guarantees in the form of "power contracts" from utilities
- o Geophysical data on the capacity and characteristics of a field
- o Advanced technologies for drilling equipment, down-hole intelligence, power/conversion plants
- o Mineral rights, if they are not also the owner
- o Public "approval", or the absence of active opposition
- o Environmental and land-use permits

Exploration Geologists

The exploration and resource assessment stages of geothermal resource development often involve significant capital expenditures with no guarantees of successful future development. In order to make exploration less of a financial risk, and thereby improve the overall economics of geothermal resource exploitation, exploration geologists need access to the best information and tools that exist. Their specific needs include:

- o Easy access to existing resource assessments/mappings.
- o Easy access to current data streams, including remote sensing and exploration by the petroleum and other extractive industries.
- o Improved computerized modeling tools to upgrade the depth of analysis that can be done.

The Drilling Industry

Drilling is an exploration and development cost that significantly impacts the overall economic viability of geothermal resource development projects. Drilling

firms, drilling service firms, and drilling and logging equipment manufacturers all derive substantial benefits from improvements in drilling technology resulting from research sponsored by the federal government. The adoption by them of improvements resulting in lower overall drilling costs in turn benefit the other actors in the geothermal industry. R&D work that specifically benefits drillers focuses on technology improvements such as new O-rings and drill bits.

Power Plant Designers/Constructors

The design and construction of power plants are well established disciplines. Most aspects of power plant design follow standardized components and materials specifications. Most of the components used in construction are off-the-shelf items. However, there remains a great need for research and development work on geothermal-specific power plant design and construction problems. For example, it is desirable to improve the longevity of the power plant materials coming into contact with geothermal fluids. Many existing heat exchanger, piping and gasketing materials function poorly in the mineral-rich, corrosive geothermal fluid environment.

Public Utilities

The economics of geothermal energy production, the substantial capital investments usually required, dictate that geothermal energy will find its principal use as a power generation source for utilities. Exceptions, like Klamath Fall (OR) and Boise (IA), are rare.

Utilities are affected by the public's electricity price elasticity is as well as its tolerance for environmental degredation. Beyond that, however, utilities require favorable rate structures from the associated utility commissions and an equally favorable steam contract, in those instances where the utility is not also the producer. Often, utilities will include estimations of such

difficult-to-quantify concepts as "avoided cost" in choosing between geothermal energy or some other form, such as nuclear. Clearly, utilities require sophisticated models whose results are defensible before comissions to make such trade-off analyses. By and large, electric utilities have such models in place, though there is room for improvement and upgrading.

In those instances where the utility seeks to undertake the actual production as well, it inherits the special needs of producers, too.

Financiers

Geothermal project financiers have a great need for tools to help them quantify the financial risks associated with specific projects. They need almost the same level of technical detail for their analyses as do design engineers. Access to geothermal resource data, computerized modeling tools, and reliable cost information are all vital components of the technology transfer needs of project financiers.

Local Government

Local government plays several roles in the development of geothermal projects. It represents the interests of the local population regarding environmental protection, it encourages local job formation, it accesses local markets for geothermal resources (especially in district heating applications), and it may take a hand in project financing, especially in the case of geothermal resource exploitation by municipal utilities. It assumes the needs of a variety of actors depending on the local government's specific role in a project.

Federal Government

The Federal government has assumed the role of system (TDS) integrator. As such, it must know (1) the activities of most other players and (2) the technology and regulatory needs of those players. In addition, the government, represented

chiefly by GTD, must know the legislative intent of the Congress and the policy goals of the Administration. These last will dictate how and to what extent GTD or other agencies intervene into the incentives/information/money flows thoughout the TDS. For example, the Division no longer sponsors new loan-guarantees. On the other hand, it has increased its role in institutionalizing Technology Transfer considerations into the R&D efforts at the national laboratories. The Federal role must remain a flexible one, responding to the priorities of presidents and Congresses, yet always preserving and fostering the essential flows of information between and among the other players.

3.3.3 Spin-Off Potential

The generic form of Technology Transfer with which most persons are familiar is the so-called technology "spin-off". A product or process developed for a specific need, targetted to a specific audience, is considered spun-off when it is adopted by a new audience. Simple matching of needs and uses can often accomplish this form of Technology Transfer, perhaps best illustrated and practiced by NASA. Teflon cooking surfaces and self-contained breathing units for firemen typify NASA's success at spinning-off the technology it developed for the nations's space program.

In NASA's case, adoption of its technology by private industry helps to justify its programs by emphasizing a collateral public benefit derived from its own operations. However, private sector use of NASA-developed technology is so different from NASA's own use, that NASA is usually unable to reap any subsequent cost savings from mass private sector production.

For the geothermal industry, however, the principal reason for pursuing spin-offs is precisely to lower costs. The task is to find other industries (1) which would benefit from the very same products, materials, and processes that the

geothermal industry would, and (2) which are sufficiently larger than the geothermal industry to cause a cost reduction because of greatly increased production runs.

One such spin-off partner industry does exist for geothermal: the oil and gas exploration/production industry. Both industries face essentially similar drilling and down-hole intelligence problems. An improved high-temperature bearing seal developed for geothermal drilling, for example, was rapidly adopted by the natural gas drilling industry. However, without its adoption by the gas drillers, simple economics would have made the o-ring seal too expensive for the geothermal industry to manufacture itself.

While the high-temperature O-ring seal is a spin-off success story, the geothermal industry can not rely on such after-the-fact collateral industry adoptions. Instead, the geothermal industry and GTD must plan for spin-off from the start of its R&D program. By monitoring the needs and understanding the problems of the oil and gas drillers, geothermal research can seek to develop, from the first, a product that will clearly benefit both industries. That is, the products should be designed to meet both the highly specialized needs of geothermal exploration but also the more basic needs of the partner spin-off industry. The high-temperature capabilities of the o-ring, for example, were absolutely essential for geothermal well use, but not for the gas wells. What caused it to be adopted by the gas drillers was the fact that it was (high-temperature capabilities aside) simply a superior seal.

As the only secondary market of any consequence to geothermal R&D, the industry needs to maintain its close working relationship with the oil and gas drillers. It is conceivable that if presented with enough mutual benefit readily apparent, the oil and gas drilling equipment manufacturers could be induced to support

more fully some of the geothermal research currently sponsored by DOE. Opportunities for such "reverse spin-offs" should be actively sought, especially in the research areas of drilling automation and downhole drilling motors.

Finally, the GHTD and industry should identify a number of trigger events which will make additional spin-offs possible. For example, in the process of bringing out the deep and ultra-deep methane trapped beneath the Anadarko Basin in Oklahoma, gas drillers are faced with some of the very same problems of erratic pressures and extremely high temperatures which are the common fare of geothermal drillers. Pressures of 27,000 psi and temperatures of nearly 500°F have been reported. Sulphuric acid corrosion of drilling pipe has also been experienced. To date, Anadarko gas has not been discovered in sufficient quantities to offset the enormous expenses of drilling to such depths (in some cases, nearly 6 miles deep). The trigger event --the signal for geothermal drillers to demonstrate the benefits of joint R&D and production of high-pressure, high-temperature, corrosion-resistent drilling equipment-- will be the discovery of Anadarko gas in economical quantities. The industry should identify as many of these trigger events as possible and carefully monitor events in the partner industries to know when approaches for joint R&D of spin-off production will be most readily received.

A similar set of trigger conditions exists for increased automation of drilling rigs, and probably the widespread adoption of down-hole drilling motors. Those conditions are the high cost (especially in terms of rig rental rates) for deep offshore and arctic drilling. Those costs, on the order of five to eight times those of equivalent land rigs, greatly amplify the net economic benefits of even high cost methods and equipment for more rapid and more continuous hole making and casing. Industrial research in this area (e.g., down-hole motors, and down-hole measurement and control of rock/bit interactions) is being monitored by GTD for opportunities for collaborative research.

4.0 TECHNOLOGY TRANSFER MECHANISMS AND ACTIVITIES

4.1 Program's Generic Approach to Technology Transfer

To achieve the necessary level and quality of Technology Transfer required by the Program, GTD emphasizes a number of generic approaches to its Technology Transfer activities. These can be thought of as both abstractions or generalizations from the specific activities as well as guidelines to the expected emphases of those activities. These comprise, in effect, the Division's Technology Transfer credo.

- First and foremost, GTD believes that geothermal Technology Transfer activities should be predominantly active in nature. The goethermal industry is, generally speaking, not comprised of exploration firms or utilities large enough to support serious, aggressive literature searches, etc. in order to understand what technologies or technology improvements exist. Information can not simply be produced and made available to those who might wish to review it, as the "passive" transfer methodology suggests. Instead, GTD and others must make the information-needs connections and bring that information directly to those who will benefit by it most greatly.

- Second, GTD is convinced that "market pull" rather than "technology push" is central to transfer success. The geothermal industry has a fairly short-term, applications/production orientation, and generally can not afford the luxury of experimenting with new technology which does not meet an immediate need. For those reasons, the Division must allow the industry to dictate its own needs, and must direct its transfer activities to meet those needs.

- Research and Development and Technology Transfer are not wholly independent, separable activities. They are, instead, complementary, interdependent aspects of one integrated process. Considerations of "transferability" should be introduced into the earliest stages of R&D to ensure that the result is a technology for which there is a genuine need and one which will be readily adopted.

- The necessity of engaging an equipment manufacturer or ancillary service firm to "produce" a technology for its potential users is absolute. This consideration impels GTD, wherever possible, to contract the fabrication of R&D devices and prototypes out to a private sector firm who could produce, and market the technology when it reaches the practical stage. This is usually done through cost-shared projects, and fosters the technology producer's familiarity with an innovation, as well as a desire to recoup its cost-shared investment.

- The concept of the Technology Delivery System (TDS) is both sound and valid. If Technology Transfer is to be anything other than almost accidential activity, then all of the required "players" must be involved and all of the information-capital-incentive flows be identified and enhanced. For example, technology may be developed, even one for which the industry has expressed on explicit need, but unless the requisite financing can be arranged for production, the technology may languish and never be of practical use.

- Each technology requires a separate "game plan" to ensure that its unique characteristics and needs are taken into account. The transfer of a computer model to consulting engineers and an elastomer to drillers may both be described within the context of the same TDS, yet nontheless require a radically different collection of players, information flows, and even timing.

- The proper Federal role in Technology Transfer should be that of a facilitator or catalyst, but not as a substitite to either the industry or its associated partners. For that reason, it is not deemed proper for the Federal Government to guarantee loans, and though it may sometimes be necessary it is less than desirable to fund demonstration projects or cost-sharing ventures.

4.2 Technology Transfer Mechanism

In transferring any technology one must choose a mode (active, semi-active, passive), a target audience, a pathway (TDS), and at least one mechanism or means of effectuating the transfer.

The choice of a specific mechanism will depend on a number of different factors, among them:

- the nature and status of the technology
- the nature of the audience
- the nature and status of the industry
- external economic factors
- national priorities and goals
- budgetary contraints

All of these are discussed in some detail in the "Technology Transfer Management Guidebook".

Among the possible mechanisms, GTD has employed all of the following at one time or another.

- o Intergovernment agency agreements
- o Personnel transfer to and from industry
- o Joint government-industry development and test
- o Government development/joint test & verification
- o International agreements
- o Agreements with R&D arm of public utility/industry
- o Technical assistance/education/training
- o Industry technical committees
- o Workshops/conferences/seminars
- o Technical meetings/exchanges
- o Formal visits
- o Information interactions
- o Liason with industry associations
- o Publications
- o Information dissemination centers
- o Data banks
- o Direct mailing
- o Media announcements
- o Patents
- o Licensing
- o Industrial shows, exhibits, and trade fairs

Exhibit 4.1 shows the specific mechanism which predominates in each of the FY '85 activities.

As an example, a mechanism which has been used with success is field verification projects.

For <u>verification projects</u>, some of the key objectives have been:

- o To use available technology to demonstrate the economic viability of geothermal energy system
- o To identify engineering, economic, environmental and institutional issues associated with geothermal development
- o To disseminate data on the construction and maintenance of these facilities

. . . and the associated accomplishments are:

- o projects underway
- o projects operational
- o Construction cost, and operating and maintenance experience being transferred to industry.

Obviously, Technology Transfer does not take place in a vaccuum; there must exist an environment that is conducive to transfer. In establishing that environment, information is transferred, often without the goal of effectuating the transfer of a specific technology but of the field generally. The transfer mechanism used for these generalized transfers are fairly common but also very effective.

The necessary counterpart to any R&D program is an equally effective Technology Transfer effort. The Division's role in Technology Transfer varies from transfer item to transfer item. However, certain generalized roles can be identified:

- o FOSTER AWARENESS. GTD will foster a more general awareness of the availability and potential of geothermal resources and geothermal technology to supplement the nation's energy base.

- o LISTEN. To manage the R&D and Technology Transfer cycle, the Division will listen carefully to the needs and concerns of the geothermal industry and utilities to ensure that useful and practical technologies are being developed and transferred.

- o COOPERATE. Research and development will be undertaken jointly by industry and government, ensuring Technology Transfer is more rapid and efficient.

- o PROVIDE INFORMATION. Once a new technology for geothermal energy extraction has been developed, industry will be informed and encouraged to adopt it.

- o VERIFY. When necessary, the Federal government will verify through field tests the utility and feasibility of new techniques and technologies.

EXHIBIT 4.1

FY-1985 Geothermal Technology Transfer Activities

Activity #	DOE Cost ($000)	Transfer Mode	Transfer Mechanism	Transfer Partner	Transfer Model	Duration
1	75	Semi-Active	Research	University	Inventing	MY
2	119	Active	Demonstration	University	Innovating	SY
3	50	Active	Assessment	US Air Force	Inventing	SY
4	54	Passive	Publication/ Symposium	GRC	Informing	SY
5	250	Semi-Active	Research	National Laboratory	Inventing	MY
6	163	*	*	Foreign Governments	*	MY
7	15	Passive	Database	IPA	Informing	SY
8	13	Passive	Publication	DOE	Informing	SY
9	55	Semi-Active	Cooperative Research	Other Federal Agencies	Informing	SY
10	10	Active	Symposium	Various	Informing	MY
11	10	Semi-Active	Cooperative Research	University Foreign Government	Informing	SY
12	50	Semi-Active	Cooperative Research	Various	Informing	SY

* To be determined

- o PROTECT RIGHTS. Patent rights and licensing agreements will be structured to encourage technology adoption and adaptation by industry.

Effective Technology Transfer is a demanding and complex undertaking, involving far more than the above generalized roles. There are additional roles (and players) and their performance rarely admits to a discrete step-by-step approach. Successful Technology Transfer is not simply executing pre-determined steps in sequential order. It is, instead, in each instance, the selection and melding of a unique set of transfer activities matched to the peculiar demands of the technology involved.

What is more, as a transfer attitude and transfer activities are introduced earlier and earlier in the R&D process, as they properly should, the clear distinctions between R&D and Technology Transfer become progressively blurred. There is no longer a "hand-off" from an independent R&D effort to an equally independent Technology Transfer effort. Instead, both R&D and Technology Transfer become simultaneous and inter-dependent aspects of a unified process that molds advanced technology to users' needs.

To achieve this intermix of R&D and Technology Transfer will not be easy. Inaugurating a formalized Technology Transfer program in the midst of an earlier-started and on-going R&D stream presents a number of challenges, requiring a like number of different transfer mechanisms and approaches. Some R&D products are now ready for active transfer, others are in the research pipeline and will be ready in a few years, while still others are in early phases of R&D phases. Each will reqire a distinct transfer approach.

In general terms, however, the Technology Transfer process centers on the following:

- The primary emphasis will be on transferring devices and procedures to equipment manufacturers and consulting engineers who have shown a history of commitments to servicing the geothermal industry.

- By working closely with industry associations, particularly the Geothermal Resources Council and the Electric Power Research Institute, GTD will ensure its R&D and Technology Transfer objectives match the needs of industry.

- By ensuring that the "resource development" products of geothermal R&D have a high enough value to the oil and gas resource industry to induce manufacturers of oil and gas equipment to produce these products for the relatively small geothermal market, GHTD will achieve a collateral and relatively inexpensive transfer.

- By using established DOE Technology Transfer channels (e.g., TIC, CAREIRS) GTD will promote adoption of products of geothermal R&D by non-geothermal industries.

The Program transfers technology to industry through mechanisms targetted at both technology producers (manufacturers and service firms) and technology consumers (geothermal field developers, drillers, electric utilities, etc.).

The Program emphasizes approaches that provide technical information and data, to allow market forces to work in the private sector's production and use of energy systems and subsystems. Earlier activities that used direct financial incentives to promote the adoption of specific technologies have been discontinued.

However, the geothermal market for selected goods and services is quite small compared to other markets that technology producers serve. Because of this, the Program sometimes cost-shares industry's initial investment to understand

and tool up production of new technology of great utility to the geothermal industry.

Two major methods are used to transfer technology to producing firms:

(1) Whenever possible, technology R&D is conducted on a cost-shared basis with a private sector manufacturing or service firm, often starting very early in the development of a new concept. This mechanism provides incentives to these firms to invest in new technology, and to manufacture and market improved technologies.

(2) When relatively high-development-risk technologies have been brought to initial feasibility entirely within a National Laboratory or university context, direct actions are often needed to entrain a private sector producer and marketer for the technology. In such cases the Program sometimes funds activities to induce a technology producer to understand, license, produce, and market the technology.

Technology consumers, those who purchase improved goods and services from producers, are informed about and stimulated to adopt improved technology through: (1) general awareness programs, e.g., technical conferences and publications, (2) topical seminars about selected improvements in technology, (3) participation in or observation of field experiments with prototype technologies, and (4) technical assistance to new users of geothermal technologies.

Wherever possible, and especially with respect to promoting general awareness of geothermal resources and technology, the Program works cooperatively with major private sector associations and established Federal mechanisms for Technology Transfer. These include:

- The monthly Bulletin, the annual conference, and topical workshops of the Geothermal Resource Council, the major U.S. geothermal energy development association. These technical programs cover the gamut of technical and organizational concerns of the geothermal industry.

- Special programs and projects conducted by the geothermal technology program of the Electric Power Research Insititute, the R&D association of U.S. public electric utilities. These programs emphasize electric conversion technology.

- Projects and reports of the Geothermal Drillers Organization, an R&D consortium of major U.S. geothermal field developers. These projects induce manufacturers to produce DOE geothermal R&D products that are especially useful in geothermal drilling.

- Dissemination of Program plans, bulletins, summaries, and high-value technical reports through the DOE Technical Information Center, the CARIERS program of the Solar Energy Research Institute, and the National Technical Information Center, Department of Commerce.

The Program also funds industry-oriented technical workshops and provides technical assistance to new users of geothermal technology through:

- Geoheat Center, Oregon Institute of Technology: Geothermal direct heat system technology

- Idaho National Engineering Laboratory: Electric and direct heat conversion systems technologies

- Sandia National Laboratory: Drilling and well-logging technology

- University of Texas at Austin, Center of Energy Studies: Geopressured resources technology

- University of Utah Research Institute: Geophysics and geothermal well-log interpretation

To illustrate this, GTD has undertaken to:

- Initiate open dialogue with industry
  - Annual program reviews, semiannual topical reviews
  - Continuing participation in Geothermal Resources Council (GRC) meetings
  - Establishment of DOE laboratory/industry technical committees
- Collect, analyze, disseminate results of R&D
  - Technical reports and handbooks
  - Technology Transfer section in DOE's geothermal progress monitor
  - Technology Transfer articles in the GRC bulletin
- Establish EPRI/DOE coorperative activities (preliminary electric applications)
- Institute DOE geothermal Technology Transfer seminar series
- Demonstrate Heber technology transfer project
- Engage in international programs with IEA, Mexico, and Italy
- Participate in interagency geothermal coordinating council activities
- Create "A Synthesis of Technology Transfer Methodologies - Proceedings: U.S. DOE Technology Transfer Workshop"

4.3 FY-1985 Technology Transfer Activity Descriptions

The FY-1985 Geothermal Technology Transfer Program encompasses nine major activities, covering a range of transfer modes and mechanisms. They are:

1. Three tasks will be undertaken to adapt the technology used at the Puna, Hawaii 3 MWe electric demonstration plant for exploitation on a wider basis. They are: reservoir analysis, sulphur abatement and recovery, and reduction of hydrogen sulfide impact on plants.

2. The University of Nevada will demonstrate to the mining industry the value of colocated geothermal resources in the solution leaching of metals from ores. The heat in the geothermal water speeds the chemical reactions of leaching and allows operation during freezing conditions. The transfer of this technology would benefit the mining industry of the Western U.S. where mining operations are near geothermal resources.

3. Support of U.S. Air Force geothermal assessment at Ascension Island, as a case study of the use of geothermal energy at remote sites. Resistivity measurements have been completed. GTD will continue to monitor the project.

4. The Geothermal Resources Council (GRC) will develop an "International Volume" on Geothermal Energy, in connection with the August 1985 International Symposium on Geothermal Energy. The volume will contain invited papers, country updates and development plans for the next 5 years. GRC will also conduct a poster session in conjunction with the symposium. The poster session will be entitled, "Technology Transfer Opportunities." This session will expose and explain to potential

users and others specific research findings by DOE.

5. Idaho National Engineering Laboratory will evaluate condensation behavior in hydrocarbon turbine expansion processes. R&D will be conducted on hydrocarbon working fluid properties that are critical for improving efficiency (and thereby industry acceptability) of geothermal binary electric plants. INEL will also conduct joint DOE-industry injection back flow investigations. This advanced R&D on data collection methods for measuring and predicting the production behavior of wells is expected to reduce industry uncertainty with respect to the useful economic lifetimes of geothermal fields.

6. Mexico/Italy Agreements

   Activities to be determined.

7. Institute for Public Administration, Sandia National Laboratory, will develop a "Tele-Technology Transfer System", utilizing computers and a telecommunications system. Final hook-up will be between Sandia and GTD headquarters.

8. Printing proceedings from the May 1984 GTD/DOE Technology Transfer workshop, "A Synthesis of Technology Transfer Methodologies." The proceedings were published in December 1984 and have been widely distributed to geothermal and other DOE Technology Transfer managers and agents.

9. GTD is initiating a study of geothermal resources and development opportunities in less-developed countries. GTD is working to enlist collaboration and support in this broad area from AID, the Trade Development Program, and the Department of Commerce.

10. El Centro cost Overrun

11. Stanford Mexican Agreement

12. GTF Outside Experiments

Figure 4.1 compares these activities across several key dimensions; transfer mode, mechanism, model, partner, cost, and duration. As the table shows, the Division has selected, with Congressional guidance, a variety of activities meant to demonstrate the full range of possible transfer activities.

4.4 Other On-Going Technology Transfer Efforts

A number of other GTD activities, supported as part of R&D contracts, or by other means, make important contributions to geothermal Technology Transfer. These include some well-established DOE-wide information-dissemination channels, and certain legislated incentive programs. These are described below.

The program seeks to keep industry fully informed of the results of its conversion technology research. Some of the special technology transfer efforts in this regard include:

o the monthly Bulletin, the annual conference, and topical workshops of the Geothermal Resources Council, the major U.S. geothermal energy development association. These technical programs cover the gamut of technical and organizational concerns of the geothermal industry.

o Projects and reports of the Geothermal Drilling Organization, an R&D consortium of major U.S. geothermal field developers and service companies. These projects induce manufacturers to utilize the results of drilling R&D programs that are especially useful to the geothermal drilling industry.

o Special programs and projects conducted by the geothermal technology program of the Electric Power Research Institute, the R&D association of U.S. public electric utilities. These programs emphasize electric conversion technology.

o Special technical reports on the economics of the Heber binary conversion system verification experiment. These indicate what the costs of a follow-on plant, stripped of its special research and testing features, would be if industry were to construct it without Federal involvement.

o Dissemination of Program plans, bulletins, summaries, and high-value technical reports through the DOE Technical Information Center, the DOE CAREIRS program, and the National Technical Information Center, Department of Commerce.

o The Program also funds industry-oriented technical workshops and provides technical information to new users of geothermal conversion systems technology through:

- Geo-Heat Center, Oregon Institute of Technology: geothermal direct heat conversion technology
- Idaho National Engineering Laboratory: electric and direct heat conversion systems technologies
- Brookhaven National Laboratory: materials for geothermal application
- Sandia National Laboratories: well drilling, completion, and logging technology.

o Dissemination of computer codes through the National Energy Software Center at Argonne National Laboratory.

o The Program also supports industry-oriented technical workshops and provides technical information to new users of geosciences technology through:

- Idaho National Engineering Laboratory: heat cycle research and geopressured geothermal resources
- Lawrence Berkeley Laboratory: reservoir technology and brine injection
- Pacific Northwest Laboratory: brine/chemistry treatment and chemical instrumentation
- Stanford University: geothermal reservoir engineering
- University of Texas at Austin, Center of Energy Studies: geopressured resources technology
- University of Utah Research Institute: geophysics and geothermal well-log interpretation

4.5 Technology Transfer Activities, Post-FY 1985

The GTD Five-Year Research Plan indicates that some major R&D milestones are likely to be met in the next few years. These anticipated milestones have Technology Transfer implications, which are discussed here.

Completion of the R&D phase of a project does not mean that federal support for the project should be immediately withdrawn. Rather, it indicates that the

emphasis of the support should shift from R&D to technology transfer. After completion of technology transfer efforts, then an end to federal involvement may be appropriate for the project.

As the GTD Five-Year Research Plan shows, each year a number of projects will reach the end of their R&D phase. It is important to ensure that adequate resources for technology transfer purposes are available to accommodate each year's needs. Since the number and significance of R&D milestones occurring each year fluctuates, the budget for technology transfer purposes should also vary from year to year to match current needs.

5.0 IMPROVEMENT OF TECHNOLOGY TRANSFER PROGRAM

5.1 Program Monitoring Mechanisms

The difficulty of measuring Technology Transfer effectiveness, especially with respect to the dissemination of information on paper, has been noted by GTD staff. This is one area where an intense and rapid effort could have big payoffs in Technology Transfer program effectiveness.

A. Incorporate Technology Transfer into the MBO selection process.
Technologies under consideration for R&D are screened, ranked, and evaluated by a comprehensive process, using the DOE-Renewable Energy Management By Objectives (MBO) methodology. This ensures that the items selected for research and development are consistent with long-range development goals and short-range allocation policies. The process is keyed to focus on those technologies which will show the most immediate pay-off, for the least amount of Federal funding, consistent with all program direction guidelines and emphases. The one element lacking from this MBO evaluation process is the "transferability" of the technology. The ease of transfering the technology and the impact of having done so are legitimate concerns for selecting and ranking research and devleopment priorities. By including subjective measures of how easy and how effective transfer of a particular technology under consideration will be, the Division can anticipate that those technologies selected for R&D funding will have an inherent transferability.

B. Incorporate Technology Transfer plans into the R&D plans.
One approach to achieving better effectiveness measurement is to obviate the need for measurement at all. If an active and effective Technology Transfer mechanism were built directly into every R&D effort, and if that R&D were not to be considered completed until the transfer had successfully taken place,

there would be little need of measuring transfer effectiveness separately. To achieve this, each R&D plan should contain a detailed and comprehensive transfer plan. Just as an R&D project will not be initiated without a complete budget, so too, R&D should not commence until a comprehensive transfer plan had been developed, specific to each R&D item. In this way, potential audiences of users, manufacturers, spin-off adopters, and others would be identified, informed, and engaged from the very first steps of research and development. At the same time that, say, experiments are being designed, eventual adopters could be lined up and involved in the program. This is the ultimate goal of all transfer activities; to make R&D and transfer simply different elements of one integrated process.

C. Establish a policy on the use of Technology Transfer budget funds. Though the processes of research and development and technology transfer will, it is hoped, become ever more intermixed, the budgeting for these two activities must still be separated by account. Even now, with Technology Transfer sometimes being a hand-off activity following R&D, there is not a clear and distinct cut off point, where the budget for one ends and the other begins. As this merger of the processes procedes and takes hold, this budget point will become progressively blurred. The Division must therefore set a working policy for when "R&D" funding ends and "Technology Transfer" funding begins. Perhaps R&D funds should be used for component or system development until essentially all technical risk is removed from the research concept, from the point of view of the R&D Program Manager and the R&D workers. Then Technology Transfer funds should be used (if available) to transfer the product, by reducing the "perceived" risk or uncertainty on the part of the potential adopters.

The greyest area between "R&D" and "Technology Transfer" is probably in the stage where the R&D Program is helping a manufacturer (or other "technology-supplying

adopter") to adopt/modify the technology into a form that is workable in the commercial melieu. This work can be viewed as "applied R&D" (advanced development) by the adopter, but as "transfer" by the R&D and Technology Transfer Program managers.

D. Establish an Objective Technology Transfer Activity Evaluation System

A possible technology transfer activity scoring scheme that is based on three main considerations that are reasonably objective might include:

1. The "value" of the subject technology to the overall goals of the GTD program.
2. The "readiness" of the subject technology for being transferred.
3. The "appropriateness" of the Technology Transfer mechanism proposed for the subject technology.

Each of these three considerations could be further broken down into components that are scorable or rateable by GTD Technology Transfer and R&D managers. One great advantage of such an approach and scheme is that nothing is "locked in cement": policy/funding decisions would remain entirely in the hands of GTD managers. The use of such a scheme would be very efficient if it were automated, working from numbers and factors that are already in a computerized database of attributes of GTD 1984 Technology Transfer activities.

E. Create Reports from the GTD Technology Transfer Proposals Computerized Database, for Evaluating Technology Transfer Proposals

In the process of conducting preliminary evaluations of the 1984 Technology Transfer proposals a computerized database on many salient characteristics of the Technology Transfer proposals received by GTD was created. It would be relatively easy to generate a variety of reports from this database.

Information that could be included in reports includes:

* Proposal Title: Short and long versions
* Offeror: Institution, division, person

* Proposed Costs: Fiscal year(s), cost shared?

* Duration: Months

* Technology:
  - Geothermal resource orientation
  - End use, system, subsystem
  - Phase of engineering development
  - Value program objectives

* Audience:
  - Name, relationship to technology
  - Decision orientation
  - Potential size
  - Number to be contacted in proposed effort

* Technology Transfer Approach:
  - Mode, mechanism
  - Level of detail of information

* Proposal Evaluation Items:
  - Advantages of proposed Technology Transfer mechanism
  - Disadvantages of proposed mechanism
  - Overall value to GTD program
  - Priority score
  - General recommendation

Reports can be generated over all the proposals, or for any definable subset of the proposals. Some possible subsets are:

1. Total budget (FY85 + FY86) is less than $100 K.
2. Recommendation is to consult with R&D technical manager before further consideration.
3. The end use is Direct Heat.
4. The use is Direct Heat from Hydrothermal Resources.
5. The offeror is not a DOE Lab or HQ.
6. The audience is executives or managers of adopting firms.
7. The audience is engineers in adopting firms.
8. The primary impact of the proposal would be on policy.

More complex reports could also be generated; e.g., titles and budgets of all proposals for direct heat technology transfer, in order of assigned priority scores.

5.2 How Technology Transfer Methods are Being Refined

The Division is undertaking a number of steps, outlined here, in order to refine and improve upon the existing methods of actual Technology Transfer.

A. Establish a Policy to handle Technology Transfer management for technologies that arise from non-lab contractors.

It has long been evident that the DOE National Laboratories have operational Technology Transfer programs and that these labs think in Technology Transfer terms. There is not yet, however, a similar commitment ingrained within all of the non-lab GTD R&D contractors. To achieve this Technology Transfer awareness, the Division must (1) embark on a contractor education program in the necessity for and methodology of effective Technology Transfer, and (2) incorporate Technology Transfer activities directly into the contractor work statements (see C below).

B. Hold a Field-Manager Technology Transfer Strategy Workshop.

It would be valuable to bring together about three HQ personnel, most of the high-level field R&D program managers and ORTA people, and other field technology transfer managers (e.g., from OIT, UURI, etc.) for a two- or three-day workshop to hammer out a consistent strategy for Technology Transfer <u>across</u> GTD programs.

The strategies and methods currently employed and proposed by GTD-supported programs give, in part, an impression that many of the approaches are "home-grown" and at times overlapping with respect to technology and audience focuses.

Managers could share successful and failed efforts of Transfer Technology. Individual gaps in awareness or understanding of the available methods would surface and could be resolved. It might be useful to include a consultant-facilitator, versed in Technology Transfer methods. Participation of HQ staff would provide the necessary policy and integrating inputs.

Creation of a somewhat common strategy at the working management level would increase the perception of "ownership" of GTD Technology Transfer strategy at the field level. That should improve participation in a more common and consistent set of strategy at the field level. That, in turn, should improve participation in a more common and consistent set of strategies and approaches.

C. Set Technology Transfer Objectives for GTD Field Managers and/or Contractors

GTD could get considerable additional Technology Transfer "mileage" out of its field managers and contractors by promulgating some of the following objectives. The objectives could be written into R&D contracts and/or Field Task Proposal/Agreements.

* Annual and Final R&D Reports are to be completed by the contract completion date.

* Annual and Final R&D Reports are to be submitted to TIC within two months of contract completion date.

* A submission of a four-page paper to the GRC Conference or EPRI Workshop (if cost-shared by EPRI) is required as a contracted deliverable of (almost) every GTD project.

* A "one pager" (two sides, camera-ready) is required for each "product" (there could be multiple products per project) as part of every contract. Submitted to contract technical manager 2 months prior to end of contract, and revised and completed by end of contract.

* Each DOE Operations Office funded by GTD should submit a "progress" paper to GRC Conference every year. This should include a "catalog or portfolio" of available new technology. GRC could be funded lightly to print same in a special section of "Proceedings" or in appropriate technical sections.

* Each DOE Operations Office funded by GTD should prepare and submit to GHTD-HQ an annual Technology Transfer Report and Plan, covering the past and coming year. These should be formatted to make preparation of GTD Reports and Plans easier. GTD would have to provide detailed specifications and examples of what is desired.

* Each DOE Operations Office funded by GTD should establish a Laboratory/ Industry Technology Review Panel. The Panel would assess needs for improved technology, and readiness of technology for transfer.

* Each DOE Operations Office funded by GTD should nominate staff members, contract researchers, or adopter industries for one of a limited number of GTD annual "Geothermal Technology Development and Transfer Awards".

Might carry cash prizes (put up by GRC or EPRI?). Award at GRC Convention.

D. Establish Partially-Distributed Control of GTD Technology Transfer Funds. One possibly useful approach is to devote a fraction of GTD Technology Transfer funds to discretionary Technology Transfer funds for Field R&D/Technology Transfer managers. Two values to this are: 1) Managers could target the funds as needed without having to do extensive reprogramming, and 2) Such funds could be used as rewards for Technology Transfer effectiveness in prior years.

In the first instance, distributed control of budget obviates HQ needs to micro-manage the Technology Transfer program, and can allow the field manager to apply funds as immediate needs arise. The management science literature contains many references to the allocative efficiency of giving such discretion to lower level managers who have demonstrated competence.

The Technology Transfer management literature suggests it is important to establish suitable personal "rewards" for effective Technology Transfer work. A "Discretionary" Technology Transfer fund award to a field program manager could be one such reward. One to three such rewards could be made each year, with the only stipulations being that the funds be used for Technology Transfer work and that the use of the funds be reported at the end of the fiscal year.

E. Set Yearly Objectives for GTD Technology Transfer Program. "Technology Transfer" is a fairly broad concept. This makes it important to set objectives that clarify what the Program hopes to achieve in the near term. Doing so will both (1) define to others what the Program is about, and (2) protect the Program from late criticism about its directions.

Suitable near-term objectives for the GTD Technology Transfer Program one:

1. Complete a descriptive catalog of GTD technologies (underway).

2. Assess information flow in existing channels.

3. Publish recent assessments of the apparent size of current and mid-term markets for geothermal technology, to help manufacturers size their efforts.

4. Establish a GTD HQ process for annual review of (a) overall technology value, and (b) technology readiness for transfer. This will provide quantitative guidance to the Technology Transfer program on how to "push" specific technologies.

5. Entrain new manufacturers for specific technologies.

6. Publish a GTD "Geothermal Technology Transfer Directory" that reminds industry user/adopters of which technologies are being developed, and of commercial sources of useful hardware (Federally developed, or otherwise) for geothermal technology and potential spinoffs.

F. Realign Certain Activities Along "Technology" Lines.

In GTD staff reviews of the draft FY-1984 GTD Technology Transfer Plan, comments arose that indicated value to organizing certain current Technology Transfer activities around "technology" topical areas. The two instances mentioned were (a) initiatives at the GRC Annual Conference and (b) seminars currently conducted by the DOE National Labs.

At the GRC annual meetings, the suggestion was: Instead of having a "Technology Transfer" session, set up separate sessions on "Drilling Technology R&D Developments", "Electric Conversion R&D Developments", etc. This would seem to have great value in matching audience interest to technical content. Moreover, industry technology developers might be more willing to present in "technology-oriented" sessions, compared to a general session that might be perceived as highly-DOE-R&D oriented.

For the ongoing seminars presented by the National Labs, the comment was: "Sandia and LANL fund their own workshops, almost no technology development work is done at ORNAL or LLNL, so that leaves PNL and INEL needing (separate) funding." It appears that a "technology-specific" approach to these seminars

helps industry adopters to get the "big picture" of technology current status and future promise in a "one-stop shopping mode". This approach might foster cooperation between the Labs, at least with respect to presentations. Something like this happens at the annual EPRI Geothermal Conference, with respect to electric conversion technology, and at the recurring seminars that Stanford University conducts on its geothermal reservoir engineering research.

There is no special danger of disciplinary segregation, so long as the GRC Conference and Bulletin continue to cut across all topics.

G. Create and Maintain a List of Coming "Critical Events".

Review at top of GTD and RE the possibility and probability of specific coming events and policies that might influence the conduct of Programmatic Technology Transfer activities. Also, report upwards on how DOE outlooks and policies should be influenced or altered by the industry realities that are being learned about during ongoing Technology Transfer actions.

H. Make a Traveling Display to Emphasize GTD R&D Results.

This is a take-off on various "road-show" and "display" ideas. The emphasis would be on recent technical advances, with lots of one to four page brochures available.

I. Have GRC Distribute Energy-Grams.

TIC now writes the Energy-grams (1 to 2 page topical brochures), and distributes them to the UC-66 name lists (about 600 names). These could have a much broader impact if distributed through GRC channels.

J. Establish a Program of Industry Fellows at the Labs.

This has been tried and industry failed to pick up on it. It is time to try again. It appears that the Hard Rock Penetration program might be a good place to

attempt this, especially now that the program is beginning to investigate a total advanced system approach. Intense interactions with either a major drill rig design firm, or a downhole mechanics engineering firm might be especially valuable in the early phases of specifying the configuration of such an advanced drilling system.

5.3 Specific Strategic Activities

The following activities are designed to develop a better understanding of the efficacy of the GTD Technology Transfer system, with an eye toward the development of longer-range improvements in the system.

A. Analyze the GTD Technology Delivery System

GTD's current understanding of the U.S. geothermal energy Technology Delivery System (TDS) now is comprised primarily of GTD and field managers' individual personal perceptions of who in industry is interested in specific technology types.

Long-range streamlining of GHTD's Technology Transfer activities could be done most effectively if the U.S. geothermal TDS were better understood, both qualitatively and quantitatively. It is important to know both the "types" of industry participants who talk to each other about different aspects of geothermal technology, and how many such persons there are.

Moreover, it would appear to be especially important to enlist the aid of many industry actors in assessing the value of current GTD Technology Transfer activities with respect to decisions that these actors make in their businesses.

Some of this information can be gleaned from statistics on TIC, GRC, EPRI, etc. distribution and membership lists. A "skeleton" TDS could be developed in this way.

B. Map the Current GTD Technology Transfer Operational Network

The contradistinction to "A" above, and in support of it, a diagram needs to be sketched out of how GTD Technology Transfer information flows from developers to adopters, in "real" rather than conceptual terms. For example, does all GTD-sponsored work on drilling technology originate via Sandia? Does Sandia attempt to transfer drilling devices developed at Los Alamos? Does Sandia communicate directly with geothermal well-design and drilling engineers? If not, who does?

It is possible that the current network has some gaps or inefficient overlaps in it. It is often described in GTD reports in a "conceptual" form -- e.g., "the Program communicates with the drilling industry". A mapping such as proposed here would also be of value in achieving a better publishable GTD description of the geothermal energy Technology Delivery System.

The mapping process might include the following steps:

1. Interview GTD HQ managers r.e. their understanding of who, in HQ and in the field, is responsible for information flow about specific technologies to specific audiences, and what channels (e.g., TIC, GRC, EPRI, ASTM) are used.

2. Check those impressions with the field managers, by phone, or by circulating a brief report from step 1.

3. Do telephone interviews of 20 to 30 important actors in the geothermal industry -- asking, from where or whom do you get information about Technology X? It might be very valuable to expand this part to ask industries "What information about what types of technology is valuable to you? How do you go about acquiring such information?"

4. Analyze results of above to identify overlaps and gaps. The analysis would include:

   * Definitions of operational responsibility (e.g., who finds information, who submits it to whom)
   * Approximate annual cost per channel
   * Apparent effectiveness of the channels (especially in terms of whether there are GTD-developed technologies that just don't seem to have been adopted).

C. Develop a Handbook on "Model Technology Transfer Operations".

Working from the results of the Field Technology Transfer Workshop and the Field Manager Technology Transfer Goals to produce a written description of what the "ideal" GTD managers and field operatives do, and how they conduct their day-to-day interactions with industry and GTD would be of significant value.

Another useful basic for this would be to request the field technology transfer personnel (OIT, INEL, UURI, CEC, NMEI, CEC, State Teams) to write 4 to 6 page descriptions of what they do, including some evaluation of what seems effective and what seems not --and a one one-page case study of an effective action. These could be distributed among all of the contributors.

6.0 PROGRAM MANAGEMENT

6.1 Management

Management of the GTD Technology Transfer programs is overseen directly by the Division Director. It is carried out by the Program Manager. Exhibit 6.1 shows the full Headquarters organization.

The other principal Federal players in both GTD Technology Transfer and R&D are the three Operations Offices (i.e., Albuquerque, Idaho, and San Francisco), and the six National Laboratories:

Battelle Pacific Northwest Laboratories

Brookhaven National Laboratory

Idaho National Engineering Laboratory

Lawrence Berkeley Laboratory

Los Alamos National Laboratory

Sandia National Laboratory

6.2 Major Milestones

Major milestones for the GTD Technology Transfer programs follow those for the Divisions R&D plan for the years 1986-1989. These are presented in Exhibit 6.2.

6.3 Resource Requirements

The FY'85 budget for geothermal Technology Transfer is $864,000. Activities covered under this budget are described in detail in section 4.3 of this Plan. For each of Fiscal Years 1986-1989, the Technology Transfer budget is estimated to be $1 million in constant dollars, or somewhat more than that in real dollars adjusted for inflation. The five-year total then is $4.84 million (constant dollars) or $5.177 million (assuming a compound annual inflation rate of 3%).

For FY'85, the following activities are undertaken:

	Activity	DOE Cost ($000)
1.	Community Geothermal Technology Program (University of Hawaii at Manoa)	75
2.	Solution Leaching of Metals from Ores (University of Nevada)	119
3.	Ascension Island Geothermal Assessment (U.S. Air Force)	50
4.	GRC "International Volume"	54
5.	Condensation Behavior and Injection Back Flow Investigations (Idaho National Engineering Laboratory)	250
6.	Mexico/Italy Agreements	163
7.	Tele-Technology Transfer System	15
8.	Technology Transfer Workshop Printing	13
9.	LDC Study	55
10.	El Centre Cost Overrun	10
11.	Stanford Mexican Agreement	10
12.	GTF Outside Experiments	50
	TOTAL	$864

Exhibit 6.1

Geothermal Technology Division

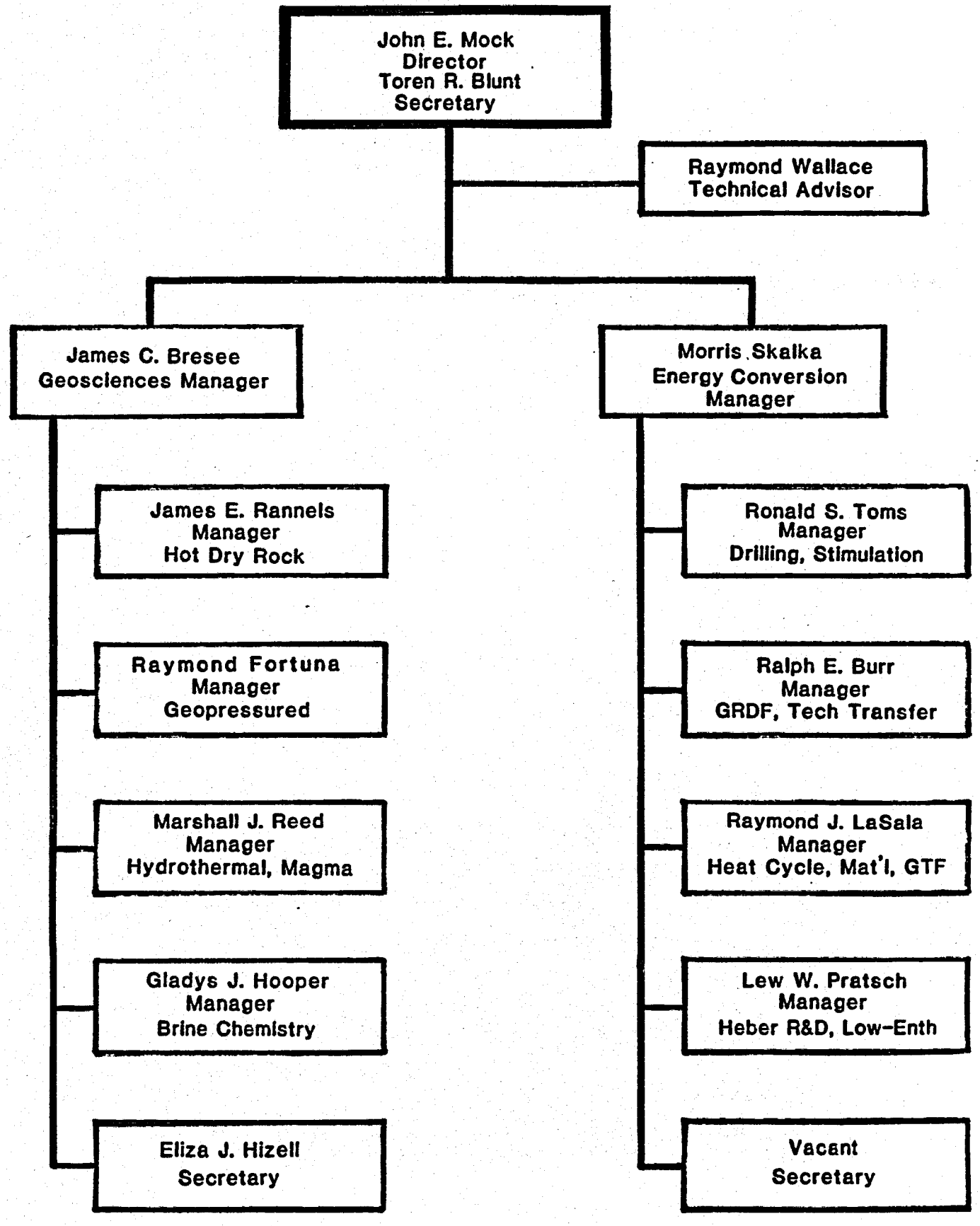


EXHIBIT 6.2

Geothermal Geosciences Subprogram
Outyear Key and Control Milestone Schedule

ACTIVITY	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990
HYDROTHERMAL RESERVOIR RESEARCH					
o Reservoir Technology	C1	K2 C3	C4		C5
o Brine Injection	C1-5	K6	K7-8	K9	
o Brine Treatment/Chemical Instrumentation/ Advanced Brine Chemistry	K1-3	K4-5	K6		
o Salton Sea Scientific Drilling Project	K1				
o Cascades Investigations	C1 K2	K3 C4	C5		
GEOPRESSURED PRODUCTION RESEARCH	K1-2			K3-5	K6
HOT DRY ROCK RESERVOIR RESEARCH	K1-2	K3	K4-5	K6	
MAGMA ENERGY EXTRACTION	C1 K2	K3 C4-5	K6	K7 C8	K9

EXHIBIT 6.2 (Continued)

Milestone Number and Description

'K' = Key Milestone
'C' = Control Milestone

HYDROTHERMAL RESERVOIR RESEARCH

Reservoir Technology

1. Input of fundamental data (especially fluid chemistry) into numerical codes
2. Testing and verification of well test analysis techniques with Broadlands, New Zealand, Krafla, Iceland, and Los Azufres, Mexico, data
3. Integrated interpretation and modeling of low-temperature geothermal reservoirs
4. Monitoring of field production, trends, and changes at several systems
5. Integration of practical and effective methods for detailed, quantitative prediction of reservoir performance, under different production and injection schedules

Injection

1. Complete journal article on transport in fractured systems
2. Complete dual permeability model tests
3. Complete and issue analytical report on Mammoth Lakes site data
4. Complete tracer interpretation computer program
5. Integrate the results of tracer stability experiments and analytic determinations
6. Complete the development and characterization of geothermal tracers
7. Complete the development and evaluation of geophysical techniques for tracking fluid migration
8. Complete the investigation of fluid-rock interactions which impact injectivity
9. Complete the development of integrated models to analyze fluid migration, to predict thermal and chemical effects, and to optimize injection well placement for pressure maintenance

Brine Treatment/Chemical Instrumentation/Advanced Brine Chemistry

1. Receive laser particle meter from vendor
2. Award contract to modify existing low-temperature, experimental pH/CO_2 instrument
3. Complete CO_2 carbonate ions equilibrium model and amorphous silica solubility model
4. Complete tests of particle sizing instruments
5. Complete calcite solubility model, test, adjust as necessary, and deliver to DOE
6. Complete industry cooperative testing of particle meters

Salton Sea Scientific Drilling Project

1. Complete SSSDP

EXHIBIT 6.2 (Continued)

Milestone Number and Description

Cascades Investigations

1. Conduct cost-shared research procurement
2. Complete 1985 cost-shared research
3. Complete 1986 cost-shared research
4. Conduct workshop for discussion of results
5. Publish final report

GEOPRESSURED PRODUCTION

1. Make decision to rework Pleasant Bayou wells and install EPRI system
2. Make decision to continue operation of Gladys McCall site
3. Plug and abandon Gladys McCall well
4. Plug and abandon Pleasant Bayou well
5. Plug and abandon Hulin well
6. Publish final well reports

HOT DRY ROCK RESERVOIR RESEARCH

1. Conduct the Initial Closed Loop Flow Test (ICF)
2. Complete development and testing of the Borehole Acoustic Televiewer
3. Complete surface system; start Long Term Flow Test (LTFT)
4. Complete LTFT
5. Complete instrument development
6. Shutdown and restore site

MAGMA ENERGY EXTRACTION

1. Complete preliminary design of drilling system for entry into magma
2. Select drill site in Long Vally Caldera for deep geophysical observation hole
3. Drill and complete first phase of deep geophysical hole in Long Valley
4. Complete long-term compatibility experiments
5. Obtain downhole geophysical data in observation hole
6. Drill and complete second phase of deep geophysical hole in Long Valley
7. Drill and complete final phase of deep geophysical hole in Long Valley
8. Design hardware for magma energy extraction field experiment
9. Determine drill site for magma energy extraction experimental well

EXHIBIT 6.2 (Continued)

Geothermal Conversion Subprogram
Outyear Key and Control Milestone Schedule

ACTIVITY	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990
HARD ROCK PENETRATION					
o Rock Penetration, Mechanics	C1-7	C8-9 K10-12 C13	C14 K15-16	K17-18	K19
o Fluid Technology	C1 K2	K3-4			
o Borehole Mechanics	C1-3	C4-5 K6	C7-8 K9	K10 C11 K12	K13-15
o Diagnostic Technology	K1-4	C5	C6	C7	
o Geothermal Drilling Organization	Developed as funding and industry interest incicate.				
PERMEABILITY ENHANCEMENT	C1-2 K3	C4			
HYDROTHERMAL CONVERSION					
o Heat Cycle	K1		K2-3	K4-5	K6
o Heber 45 MWe Binary Plant	C1	K2 C3 K4-5 C6-7	C7 K8		
o Honey Lake Hybrid Binary Plant					
o Pump Development	K1	C2	C3-4	C4-5	

EXHIBIT 6.2 (Continued)

Geothermal Conversion Subprogram
Outyear Key and Control Milestone Schedule, Continued

ACTIVITY	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990
o Geothermal Test Facility	K1				
o Materials	K1-3	K4-6	K7		
GEOPRESSURED CONVERSION RESEARCH	K1	K2			
HOT DRY ROCK CONVERSION RESEARCH			K1		
MAGMA CONVERSION RESEARCH	C1	K2	K3 C4		

EXHIBIT 6.2 (Continued)

Milestone Number and Description

'K' = Key Milestone
'C' = Control Milestone

HARD ROCK PENETRATION

Rock Penetration Mechanics

1. Drilling cost model - receive code from contractor
2. Complete Phase II of drill string dynamics code
3. Seal development - complete testing; publish final report
4. Cavijet research - receive nozzles at Sandia
5. Single point cutter tests - complete testing
6. Niobium carbide research - fabricate/test samples
7. Begin cutter/jet tests
8. Drilling cost model - complete coring vs. drilling tradeoff studies
9. Drill string dynamics - verify/qualify code
10. Cavijet research - publish final project report
11. Single point cutter tests - complete project report
12. Niobium carbide - complete final project report
13. Complete cutter/jet tests
14. Drilling cost model - evaluate operational costs of advanced drilling system
15. Drill string dynamics - complete Phase III of code; publish final report
16. Cutter/jet tests - design/test full scale bit
17. Drill string dynamics - complete tests; publish report
18. Cutter jet tests - complete full scale bit lab tests; analyze data
19. Cutter jet tests - field test bit; publish final report

Fluid Technology

1. Mud research - complete polymer additive studies
2. Foam hydraulics - complete testing; publish final report
3. Mud research - publish final project report
4. Foam hydraulics - complete testing

EXHIBIT 6.2 (Continued)

Milestone Number and Description

Borehole Mechanics

1. Lost circulation analysis - develop numerical model
2. Lost circulation expert system - complete demonstration system
3. Lost circulation material tests - complete single particulate materials tests
4. Lost circulation analysis - complete flow visualization experiments
5. Lost circulation material tests - complete multiple constituent tests
6. Lost circulation expert system - complete geothermal prototype system
7. Lost circulation analysis - define second phase experiments
8. Lost circulation expert system - begin industry tests
9. Lost circulation material tests - design/test geothermal LCM
10. Lost circulation analysis - complete plugging model experiments
11. Lost circulation expert system - complete system modification (industry input)
12. Lost circulation material tests - design/field test geothermal LCM
13. Lost circulation analysis - correlate analysis and experiments
14. Lost circulation expert system - make final system available to industry
15. Lost circulation materials tests - publish final report on LCM testing

Diagnostics Technology

1. Radar fracture mapping tool - deliver prototype tool
2. Dewared battery pack - design/fabricate/test/deliver tools to USGS
3. High-temperature Kuster tools - design/fabricate/test/deliver tools to USGS
4. Electric temperature tool - design/fabricate/test/deliver tools to USGS
5. Radar fracture mapping tool - complete lab testing
6. Radar fracture mapping tool - complete field testing
7. Radar fracture mapping tool - field test second generation device

EXHIBIT 6.2 (Continued)

Milestone Number and Description

PERMEABILITY ENHANCEMENT

1. Complete analysis of FY 1985 high energy gas fracturing (HEGF) experiments conducted in G-tunnel at Nevada Test Site
2. Complete numerical modeling of the effects of artificial fracture geometry on geothermal well production
3. Conduct one series of HEGF experiments at the Nevada Test Site to evaluate fracture interaction and the flow characteristics of created fractures
4. Complete final report

HYDROTHERMAL CONVERSION

Heat Cycle

1. Complete report on supercritical cycle experiments with the condenser in the vertical attitude
2. Complete supercritical cycle testing with impluse turbine and prepare report
3. Complete conceptual design and analysis of combined direct-contact heat exchanger and crystallizer (Pa. State U. Project)
4. Complete research and prepare report for Supersaturated-Vapor Condensation-Behavior Technology-Application Project
5. Initiate move of Heat Cycle Research Facility to a highly-scaling resource
6. Complete research and prepare report on the advanced heat-rejection system

Heber 45 MWe Binary Plant

1. Achieve 50% brine supply
2. Achieve 100% brine supply
3. Turbine Performance Guarantee Test
4. DOE plant acceptance
5. Start demonstration period
6. Complete 3-month capacity run
7. Complete demonstration period
8. Complete Cooperative Agreement (except for data recovery from commercial operating plant)

Pump Development

1. Cost-share design and fabrication of high-risk, critical submersible pump components
2. Cost-share long-term testing
3. Assemble prototype pump
4. Conduct long-term testing of prototype
5. Complete the East Mesa Pump Test Facility

Geothermal Test Facility

1. Decommission GTF

Materials

1. Initial test of advanced loss control material (contingent upon funding)
2. Laboratory test of elastomeric seal performance
3. Fabrication of elastomeric well liner for testing
4. Performance test of waste encapsulation technique
5. Fabrication and test of polymer concrete heat exchanger tubes
6. Formulation and test of advanced high temperature cement
7. Demonstration of microorganism concentration of toxic metals from geothermal wastes

GEOPRESSURED CONVERSION

1. Make decision to rework Pleasant Bayou wells and install EPRI system
2. EPRI system provides power generation data for use in engineering economic analysis

HOT DRY ROCK CONVERSION

1. Conduct electric power generation experiments

MAGMA CONVERSION

1. Develop experimental facility to study magma heat exchange
2. Complete performance evaluation of magma heat exchange
3. Select engineering materials for magma heat exchange
4. Test magma heat exchange in a large melt facility

APPENDICES

A. The Legislative and Administrative Mandate

B. The Technology Transfer Database

APPENDIX A

The GTD mandate for both its R&D and its Technology Transfer programs derives from a number of sources, among them:

- The Geothermal Energy Research, Development, and Demonstration Act of 1974 (PL 93-410)
- The Energy Recognization Act of 1974 (PL 93-438)
- The Department of Energy Act of 1978 (PL 95-238)
- The Stevenson-Wydler Technology Transaction Act of 1980 (PL 96-480)
- DOE Order Number 5800.1
- The National Energy Policy Plan (NEPP - IV) (October 1983)

APPENDIX B

The Technology Transfer Database Summary Listing

***** GEOTHERMAL TECHNOLOGIES DATABASE ********* DATE: 03/19/86

DB# 1 ACCESS# 1601 High-Temperature Elastomer TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1001 IN USE? : Y BEST INFO FROM: DOE/SF/11537-1 (DE8500323)
ITEM NAME : High-Temperature Elastomer, Y267 EDPM
TECHNOL. TYPE : HARDWARE FUNCTION: Elastomers for use in static seals at temps. up to 260C
SYSTEM LEVEL : MATERIAL XFER STATUS: DIFFUSED YR LAST R&D: 83 YR READY: 83 YR FIRST USED: 81
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : Brookhaven LAB DIRECTOR : N. Samios
LAB TECH MNGER: L. Kukacka LAB CONTACT : W. Marcuse
R&D FIRM : L'Garde, Inc. R&D FIRM CONTACT: A. Hirasuna
PRODUCING FIRM: Parker Seal (CA) PRODUCER CONTACT: (213)726-4090
USED BY : Otis Engineering Cor USER CONTACT :
COMMENT : Other manuf's: BJ-Hughes Rubber Products, Precision Rubber

DB# 2 ACCESS# 1302 High-Temp Electro. Components TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1002 IN USE? : Y BEST INFO FROM: Sandia Tech. Transfer Report, 1983
ITEM NAME : High-Temperature Active & Passive Electronic Components
TECHNOL. TYPE : HARDWARE FUNCTION: Components of logging & measurement while drilling tools.
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSED YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: Schlumberger PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Also, produced by Gearhart, another logging company.

DB# 3 ACCESS# 1303 High-Temp Temperature Sensor TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1003 IN USE? : BEST INFO FROM: Mock, Kenkeremath Paper, 1984
ITEM NAME : High-Temperature Temperature Sensor
TECHNOL. TYPE : HARDWARE FUNCTION: Measure temperature, in logging tools.
SYSTEM LEVEL : COMPONENT XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 4 ACCESS# 1304 High-Temp Pressure Sensor TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1004 IN USE? : BEST INFO FROM: Sandia Tech. Transfer Report, 1983
ITEM NAME : High-Temperature Pressure Sensor Element, Quartz Crystal
TECHNOL. TYPE : HARDWARE FUNCTION: Measure pressure, in GT wells or fluid streams.
SYSTEM LEVEL : COMPONENT XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

***** GEOTHERMAL TECHNOLOGIES DATABASE ********* DATE: 03/19/86

DB# 1 ACCESS# 1601 High-Temperature Elastomer TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1001 IN USE? : Y BEST INFO FROM: DOE/SF/11537-1 (DE8500323)
ITEM NAME : High-Temperature Elastomer, Y267 EDPM
TECHNOL. TYPE : HARDWARE FUNCTION: Elastomers for use in static seals at temps. up to 260C
SYSTEM LEVEL : MATERIAL XFER STATUS: DIFFUSED YR LAST R&D: 83 YR READY: 83 YR FIRST USED: 81
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : Brookhaven LAB DIRECTOR : N. Samios
LAB TECH MNGER: L. Kukacka LAB CONTACT : W. Marcuse
R&D FIRM : L'Garde, Inc. R&D FIRM CONTACT: A. Hirasuna
PRODUCING FIRM: Parker Seal (CA) PRODUCER CONTACT: (213)726-4090
USED BY : Otis Engineering Cor USER CONTACT :
COMMENT : Other manuf's: BJ-Hughes Rubber Products, Precision Rubber

DB# 2 ACCESS# 1302 High-Temp Electro. Components TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1002 IN USE? : Y BEST INFO FROM: Sandia Tech. Transfer Report, 1983
ITEM NAME : High-Temperature Active & Passive Electronic Components
TECHNOL. TYPE : HARDWARE FUNCTION: Components of logging & measurement while drilling tools.
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSED YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: Schlumberger PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Also, produced by Gearhart, another logging company.

DB# 3 ACCESS# 1303 High-Temp Temperature Sensor TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1003 IN USE? : BEST INFO FROM: Mock, Kenkeremath Paper, 1984
ITEM NAME : High-Temperature Temperature Sensor
TECHNOL. TYPE : HARDWARE FUNCTION: Measure temperature, in logging tools.
SYSTEM LEVEL : COMPONENT XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 4 ACCESS# 1304 High-Temp Pressure Sensor TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1004 IN USE? : BEST INFO FROM: Sandia Tech. Transfer Report, 1983
ITEM NAME : High-Temperature Pressure Sensor Element, Quartz Crystal
TECHNOL. TYPE : HARDWARE FUNCTION: Measure pressure, in GT wells or fluid streams.
SYSTEM LEVEL : COMPONENT XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 5 ACCESS# 1305 High-Temp Sound Sensor TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1005 IN USE? : Y BEST INFO FROM: Sandia Tech Trans Report, 1983
ITEM NAME : High-Temperature Sound (Acoustic) Sensor
TECHNOL. TYPE : HARDWARE FUNCTION: Sensor in borehole televiewer, acoustic scanning device.
SYSTEM LEVEL : COMPONENT XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 6 ACCESS# 1606 Polymer Concrete Pipe TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1006 IN USE? : Y BEST INFO FROM: BNL 50777, BNL 33019, BNL 33130,BNL50777
ITEM NAME : Polymer Concrete Pipe
TECHNOL. TYPE : HARDWARE FUNCTION: High-Temperature Fluid Distribution Pipe
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSION YR LAST R&D: 81 YR READY: 81 YR FIRST USED: 82
GHTD CONTACT : R. LaSala USED AT PLANT : Larderello, Italy, Marlin, TX
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : Brookhaven LAB DIRECTOR : N. Samios
LAB TECH MNGER: L. Kukacka LAB CONTACT : W. Marcuse
R&D FIRM : Lindsey Industries R&D FIRM CONTACT: K. Lindsey
PRODUCING FIRM: Quazite Corp. PRODUCER CONTACT: K. Vallentine
USED BY : USER CONTACT :
COMMENT : Tested by U.S. Industry and Italy.

DB# 7 ACCESS# 1607 Bearing Lubricant, High-Temp TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1007 IN USE? : Y BEST INFO FROM: Sandia Tech Transfer Report, 1983
ITEM NAME :
TECHNOL. TYPE : HARDWARE FUNCTION: Lubricate geothermal drill bit bearings.
SYSTEM LEVEL : MATERIAL XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: Pacer Industries PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 8 ACCESS# 1308 Downhole Flow Meter TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1008 IN USE? : Y BEST INFO FROM: LBL-16672
ITEM NAME : High temperature downhill flowmeter
TECHNOL. TYPE : HARDWARE FUNCTION: Used at 520 F and 6000 psi.-measure downhill flow rates
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 83 YR READY: 82 YR FIRST USED: 81
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :M. Molloy
R&D LAB : Lawrence Berkeley LAB DIRECTOR : M. Lippmann
LAB TECH MNGER: M. Lippmann LAB CONTACT : S. Benson
R&D FIRM : BGI R&D FIRM CONTACT: R. Schroeder
PRODUCING FIRM: BGI PRODUCER CONTACT: R. Schroeder
USED BY : USER CONTACT :
COMMENT : A corrosion resistant stainless steel and titanium device.

DB# 9 ACCESS# 1201 Foam Stabilizing Agents TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1009 IN USE? : Y BEST INFO FROM: Mock Report, October '84
ITEM NAME : Aqueous Foam Stabilizing Agents
TECHNOL. TYPE : HARDWARE FUNCTION: Used for foam drilling and enhanced oil recovery.
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : Foamair/Chevron USER CONTACT :
COMMENT : Make aqueous foams stable at high temperatures.

DB# 10 ACCESS# 1202 Diesel Exhaust Cleaner TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1010 IN USE? : Y BEST INFO FROM: Mock Report, October '84
ITEM NAME : Diesel Exhaust Cleaner
TECHNOL. TYPE : HARDWARE FUNCTION: To reduce drill pipe corrosion by substituting for air.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : Foster-Miller R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : An inert gas generator that cleans diesel exhaust.

DB# 11 ACCESS# 1611 Water-Jet Descaling System TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1011 IN USE? : Y BEST INFO FROM: Mock Report, October '84
ITEM NAME : Cavitating Water-Jet Descaling System
TECHNOL. TYPE : HARDWARE FUNCTION: Removes dense scale from pipes and heat exchanger tubes.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Cavitating jet nozzles have been found extremely efficient.

DB# 12 ACCESS# 3112 Magnetotelluric Surveys TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1012 IN USE? : BEST INFO FROM: 84 TT Plan
ITEM NAME : Magnetotelluric Surveys
TECHNOL. TYPE : PROCESS FUNCTION:
SYSTEM LEVEL : PROCESS XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetten
LAB TECH MNGER: LAB CONTACT : M. Andier
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 13 ACCESS# 8513 Heating Systems Designs Info. TASK STEP: F/LISTG TASK STATUS: AAC
CONTROL# 1013 IN USE? : Y BEST INFO FROM: Mock Report, October '84
ITEM NAME : District Heating Systems Designs, clearing house for info.
TECHNOL. TYPE : LIBRARY FUNCTION: Provides information on heating systems.
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : L. Pratsch USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :P. Brookshier
R&D LAB : GeoHeat Center, OIT LAB DIRECTOR : P. Lienau
LAB TECH MNGER: P. Lienau LAB CONTACT :
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : The GeoHeat Center is in Klamath Falls at the U. of Oregon.

DB# 14 ACCESS# 2514 Heating Systems Design Models TASK STEP: F/LIST TASK STATUS: AAC
CONTROL# 1014 IN USE? : Y BEST INFO FROM: Mock Report, October '84
ITEM NAME : District Heating Systems Feasibility Studies
TECHNOL. TYPE : DESIGN FUNCTION: Space heating of institutional and commercial buildings
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 85 YR READY: YR FIRST USED:
GHTD CONTACT : L. Pratsch USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :P. Brookshier
R&D LAB : GeoHeat Center, OIT LAB DIRECTOR : P. Lienau
LAB TECH MNGER: P. Lienau LAB CONTACT : G. Calver
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : College of Idaho USER CONTACT :
COMMENT : Seventeen project reports available

DB# 15 ACCESS# 1310 Acoustic Borehole Televiewer TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1015 IN USE? : Y BEST INFO FROM: Mock Report, October '84
ITEM NAME : Acoustic Borehole Televiewer, with internal cooling system.
TECHNOL. TYPE : HARDWARE FUNCTION: Examines internals of hot process piping.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Operates at 500 degrees F. for 4 hours.

DB# 16 ACCESS# 9516 GeoHeat Quarterly Bulletin TASK STEP: F/LIST TASK STATUS: AAC
CONTROL# 1016 IN USE? : Y BEST INFO FROM: Mock Report, October '84
ITEM NAME : District Heating System Designs, Quarterly Bulletin.
TECHNOL. TYPE : REPORT FUNCTION: For distributed space conditioning system designers/marketer
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 85 YR READY: 75 YR FIRST USED: 75
GHTD CONTACT : L. Pratsch USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :P. Brookshier
R&D LAB : GeoHeat Center, OIT LAB DIRECTOR : P. Lienau
LAB TECH MNGER: P. Lienau LAB CONTACT :
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : 1600 subscribers USER CONTACT : U.S.& 29 others
COMMENT : Progress and development report on the direct use of GT

DB# 17 ACCESS# 1203 Measurements While Drilling TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1017 IN USE? : Y BEST INFO FROM: Mock Report, October '84
ITEM NAME : Directional and Dynamic Parameter Measurement while Drilling
TECHNOL. TYPE : HARDWARE FUNCTION: Increase accuracy in measurements.
SYSTEM LEVEL : COMPONENT XFER STATUS: INNOVATION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: Teleco Oilfield Serv PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Christenson Diamond, Eastman Whip. Gearhart, Schlumberger.

DB# 18 ACCESS# 3318 Automated Seismic Processor TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1018 IN USE? : Y BEST INFO FROM: Mock Report, October '84
ITEM NAME :
TECHNOL. TYPE : PROCESS FUNCTION: Microearthquake-induced seismicity-waste injection studies.
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :M. Malloy
R&D LAB : Lawrence Berkeley LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: Sprengnether Instr. PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Monitors a seismic array, detects events, provides calcs.

DB# 19 ACCESS# 1311 Logging Tool Designs TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1019 IN USE? : Y BEST INFO FROM: 84 TT Plan
ITEM NAME : Logging Tool Design Changes
TECHNOL. TYPE : DESIGN FUNCTION: Well logging
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: INNOVATION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: Kuster Tool PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Other Producers: Geophysical Research, Thermodurics

DB# 20 ACCESS# 2120 Heat & Fluid Trans. Analysis TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1020 IN USE? : Y BEST INFO FROM: Mock Report, October '84
ITEM NAME : Heat and Fluid Transfer Analysis System
TECHNOL. TYPE : SOFTSARE FUNCTION: For 2 phase non-isothermal flow in porous medium.
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :M. Malloy
R&D LAB : Lawrence Berkeley LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Studies nucl. waste, pressure/phase trans., & more oil recov

DB# 21 ACCESS# 2222 Wellbore Temperature Model TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1021 IN USE? : Y BEST INFO FROM: Mock Report, October '84
ITEM NAME :
TECHNOL. TYPE : SOFTWARE FUNCTION: Analyzes heat and mass transfer for fluids and formations
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: ENERTECH PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Could have many other uses.

DB# 22 ACCESS# 1204 Cavitating Drill-Bit Nozzles TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1022 IN USE? : Y BEST INFO FROM: Mock Report, October '84
ITEM NAME : Cavitating bi-cone and tri-cone drill bit nozzles.
TECHNOL. TYPE : HARDWARE FUNCTION: Enhance cutting and cleaning ability of drilling bits.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Available in Smith A-1 bits. Also for other material removal

DB# 23 ACCESS# 1205 High-Temp. Drilling Muds TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1023 IN USE? : Y BEST INFO FROM: Mock Report, October '84
ITEM NAME : High-Temperature Sepiolite Clay Based Drilling Muds.
TECHNOL. TYPE : HARDWARE FUNCTION: Retain lifting and sealing power at high temperatures.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: NL Baroid PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Consist of sepiolite clay based muds.

DB# 24 ACCESS# 1206 PDC Drill Bits TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1024 IN USE? : Y BEST INFO FROM: Mock Report, October '84
ITEM NAME : PDC Drill Bits (sintered diamond cutter elements)
TECHNOL. TYPE : HARDWARE FUNCTION: Fabricated into high efficiency bits by all US manufacturers
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: Intro. by Gen. Elec. PRODUCER CONTACT:
USED BY : All US manufacturers USER CONTACT :
COMMENT : Eg: Coal roof bolt bit w/100X lifetime, 20-30% oil bits.

DB# 25 ACCESS# 4225 Lost Circulation Test Facility TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1025 IN USE? : Y BEST INFO FROM: Mock Report, October '84
ITEM NAME : Lost Circulation Test Facility
TECHNOL. TYPE : WORKSHOP FUNCTION: For exper on mater that seal mud leaks in bores of deep well
SYSTEM LEVEL : SYSTEM XFER STATUS: INNOVATION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : SANDIA USER CONTACT :
COMMENT : Also for studying dynamic sealing systems for process tubing

DB# 30 ACCESS# 1130 Remote Underwater Seismic Eqpt TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1030 IN USE? : Y BEST INFO FROM: Mock Report, October '84
ITEM NAME : Remote Underwater Seismic Equipment
TECHNOL. TYPE : HARDWARE FUNCTION: Links communications without using cables.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: INNOVATION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Uses acoustic communications link.

DB# 31 ACCESS# 1131 In Situ Monitoring TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1031 IN USE? : Y BEST INFO FROM: 84 TT Plan
ITEM NAME : In situ process monitoring instrumentation techniques.
TECHNOL. TYPE : HARDWARE FUNCTION: Monitor fracture development?
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: INNOVATION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: Fracture Technology PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 32 ACCESS# 1230 High-Temp. Packer Design TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1032 IN USE? : Y BEST INFO FROM: 84 TT Plan
ITEM NAME : Advanced packer designs for high temperatures.
TECHNOL. TYPE : HARDWARE FUNCTION: Well packers for fracturing or production
SYSTEM LEVEL : COMPONENT XFER STATUS: INNOVATION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT : Oil Recovery
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : L'Garde R&D FIRM CONTACT:
PRODUCING FIRM: Baker PRODUCER CONTACT:
USED BY : Union Oil USER CONTACT :
COMMENT : Other producers: Foster-Miller

DB# 33 ACCESS# 3133 High Energy Gas Fracture TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1033 IN USE? : Y BEST INFO FROM: 84 TT Plan
ITEM NAME : High Energy Gas Fracture
TECHNOL. TYPE : PROCESS FUNCTION: Well Testing
SYSTEM LEVEL : PROCESS XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Dunn LAB CONTACT : J. Dunn
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 34 ACCESS# 1207 Injection String Insulation TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1034 IN USE? : Y BEST INFO FROM: 84 TT Plan
ITEM NAME : Injection String Insulation System
TECHNOL. TYPE : HARDWARE FUNCTION: Insulate geothermal injection well strings.
SYSTEM LEVEL : COMPONENT XFER STATUS: INNOVATION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: General Electric PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 35 ACCESS# 1240 Improved Drill Pipe TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1035 IN USE? : Y BEST INFO FROM: 84 TT Plan
ITEM NAME : High-Temperature Drill Pipe
TECHNOL. TYPE : HARDWARE FUNCTION:
SYSTEM LEVEL : COMPONENT XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : Brookhaven LAB DIRECTOR : L. Kukacka
LAB TECH MNGER: L. Kukacka LAB CONTACT : L. Kukacka
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : "Used by U.S. Industry, Mexico, and Italy"

DB# 36 ACCESS# 1241 Improved Well Casings TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1036 IN USE? : N BEST INFO FROM: Corrosion-NACE, Vol 41, No. 4, 4/85
ITEM NAME : Nitrogen-containing stainless alloys for resistance-pitting
TECHNOL. TYPE : HARDWARE FUNCTION: Extend casing strength and life.
SYSTEM LEVEL : COMPONENT XFER STATUS: ENGINEER DEVEL. YR LAST R&D: 85 YR READY: 88 YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : Brookhaven LAB DIRECTOR : N. Samios
LAB TECH MNGER: D. Van Rooyen LAB CONTACT : W. Marcuse
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : "Used by U.S. Industry, Mexico, and Italy"

DB# 37 ACCESS# 1242 Cements For Geothermal Wells TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1037 IN USE? : Y BEST INFO FROM: DOE/TIC/81/14, Oil and Gas Jrnl. 93,2/85
ITEM NAME : High-Temperature Well Cements
TECHNOL. TYPE : HARDWARE FUNCTION: better setting properties, improved lifetime, Well comp. mat
SYSTEM LEVEL : MATERIAL XFER STATUS: DIFFUSION YR LAST R&D: 83 YR READY: 83 YR FIRST USED: 83
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : Brookhaven LAB DIRECTOR : N. Samios
LAB TECH MNGER: L. Kukacka LAB CONTACT : W.Marcuse
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : "Used by U.S. Industry, Mexico and Italy"

DB# 38 ACCESS# 9870 Magma Project Summary TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1038 IN USE? : N BEST INFO FROM: 84 TT Plan
ITEM NAME : "Utilization of Magma Energy - A Project Summary"
TECHNOL. TYPE : REPORT FUNCTION: Extract energy from magma.
SYSTEM LEVEL : SYSTEM XFER STATUS: CONCEPTUAL YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Dunn LAB CONTACT : J. Dunn
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 39 ACCESS# 9871 Magma Workshop TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1039 IN USE? : BEST INFO FROM: 84 TT Plan
ITEM NAME : Workshop on Magma Energy Research, 1975
TECHNOL. TYPE : WORKSHOP FUNCTION: Info. Dissem. to 30 U.S. and Japanese Scientists.
SYSTEM LEVEL : SYSTEM XFER STATUS: CONCEPTUAL YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Dunn LAB CONTACT : J. Dunn
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 40 ACCESS# 3240 Drilling Techniques TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1040 IN USE? : BEST INFO FROM: LANL
ITEM NAME : Drilling Techniques/Technology
TECHNOL. TYPE : PROCESS FUNCTION: Drilling in hard, hot, crystalline rock
SYSTEM LEVEL : PROCESS XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT : Fenton Hill, NM
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetten
LAB TECH MNGER: D. Brown LAB CONTACT : P. Franke
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 41 ACCESS# 7841 Magma Advisory Panel TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1041 IN USE? : BEST INFO FROM: 84 TT Plan
ITEM NAME : Magma Energy Research Scientific Advisory Panel
TECHNOL. TYPE : ADVISORY FUNCTION: Technical inputs to magma energy R & D
SYSTEM LEVEL : SYSTEM XFER STATUS: CONCEPTUAL YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Dunn LAB CONTACT : J. Dunn
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Panel was organized in 19 ?

DB# 42 ACCESS# 9442 EPRI Geothermal Conference TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1042 IN USE? : BEST INFO FROM: 84 T.T.Plan
ITEM NAME : EPRI Annual Geothermal Conference and Workshop
TECHNOL. TYPE : CONFERENCE FUNCTION: Technology information for utilities.
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 85 YR READY: 77 YR FIRST USED: 77
GHTD CONTACT : R.Toms USED AT PLANT :
DOE OPS OFFICE: OPS CONTACT :
R&D LAB : LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : EPRI R&D FIRM CONTACT: V.Roberts
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Some EPRI R & D is cost-shared with GHTD.

DB# 43 ACCESS# 9443 Conversion Technol. Newsletter TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1043 IN USE? : BEST INFO FROM: 84 T.T.Plan
ITEM NAME : Newsletter of Geothermal Energy Conversion Technology
TECHNOL. TYPE : PERIODICAL FUNCTION: Keep conversion engineers abreast of developments.
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :M. Malloy
R&D LAB : Lawrence Berkeley LAB DIRECTOR : M. Lippmann
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : None R&D FIRM CONTACT:
PRODUCING FIRM: None PRODUCER CONTACT:
USED BY : _____Subscribers USER CONTACT :
COMMENT : Begun 19??. Ended 19?? or still quarterly ?

DB# 45 ACCESS# 8103 U.S.G.S. Geothermal Database TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1045 IN USE? : BEST INFO FROM: 84 TT Plan
ITEM NAME : U.S. Geologic Survey Geothermal Database
TECHNOL. TYPE : DATABASE FUNCTION: General assessment of U.S. geothermal resources.
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. Wallace USED AT PLANT : Many exploration sites.
DOE OPS OFFICE: NONE OPS CONTACT :
R&D LAB : LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : DOE, Industry USER CONTACT :
COMMENT : Has international uses also.

DB# 48 ACCESS# 3501 OIT Technical Assistance TASK STEP: F/LIST TASK STATUS: AAC
CONTROL# 1048 IN USE? : Y BEST INFO FROM: 84 TT Plan
ITEM NAME : OIT Direct Heat Systems Technical Assistance
TECHNOL. TYPE : TECH ASSIST FUNCTION: Helps new developers scope GT projects.
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 85 YR READY: 78 YR FIRST USED: 78
GHTD CONTACT : L. Pratsch USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :P. Brookshier
R&D LAB : GeoHeat Center, OIT LAB DIRECTOR : P. Lienau
LAB TECH MNGER: P. Lienau LAB CONTACT : G. Culver
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : Over two hundred USER CONTACT :
COMMENT : Example: Haystack Resources Co., Boulder, CO

DB# 50 ACCESS# 9450 Sourcebook - Companion TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1050 IN USE? : BEST INFO FROM: We have it.
ITEM NAME : Geothermal Energy as a Source of Electricity
TECHNOL. TYPE : HANDBOOK FUNCTION: Descriptions of many GT power plants.
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 79 YR READY: 80 YR FIRST USED: 80
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : Brown University LAB DIRECTOR : R. DiPippo
LAB TECH MNGER: R. DiPippo LAB CONTACT : R. DiPippo
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Published.

DB# 51 ACCESS# 9451 Geothermal Sourcebook TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1-51 IN USE? : BEST INFO FROM: Sourcebook itself
ITEM NAME : Sourcebook on the Production of Electricity from GT Energy
TECHNOL. TYPE : HANDBOOK FUNCTION: Handbook on GT electric technology.
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 80 YR READY: 80 YR FIRST USED: 80
GHTD CONTACT : R. LaSala USED AT PLANT : Many
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : Brown University LAB DIRECTOR : J. Kestin
LAB TECH MNGER: J. Kestin LAB CONTACT : J. Kestin
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : 3000 persons USER CONTACT :
COMMENT : Published March 1980, about 1000 pages.

DB# 53 ACCESS# 9553 State Fact Books TASK STEP: F/LIST TASK STATUS: AAC
CONTROL# 1053 IN USE? : Y BEST INFO FROM: INEL
ITEM NAME : Hydrothermal Commercialization Baselines for AZ,CO,ID,MT,etc
TECHNOL. TYPE : HANDBOOK FUNCTION: also NV,NM,ND,SD,TX,UT & Wyoming
SYSTEM LEVEL : XFER STATUS: YR LAST R&D: YR READY: 79 YR FIRST USED: 79
GHTD CONTACT : L. Pratsch USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :P. Brookshire
R&D LAB : INEL LAB DIRECTOR : G. Sommers
LAB TECH MNGER: B. Lunis LAB CONTACT : B. Lunis
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Make a list of states for which F.B.'s are done.

DB# 57 ACCESS# 3503 INEL Technical Assistance TASK STEP: F/LIST TASK STATUS: AAC
CONTROL# 1057 IN USE? : BEST INFO FROM: INEL
ITEM NAME : Selected Geothermal Technical Assistance Efforts at EG&G Ida
TECHNOL. TYPE : HANDBOOK FUNCTION: Direct Heat
SYSTEM LEVEL : XFER STATUS: YR LAST R&D: YR READY: 82 YR FIRST USED: 82
GHTD CONTACT : L. Pratsch USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :P. Brookshire
R&D LAB : INEL LAB DIRECTOR : G. Sommers
LAB TECH MNGER: B. Lunis LAB CONTACT : B. Lunis
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 58 ACCESS# 3504 NEMI Technical Assistance TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1058 IN USE? : BEST INFO FROM: 84 TT Plan
ITEM NAME : NEMI GT Technical Assistance
TECHNOL. TYPE : TECH ASSIST FUNCTION: Direct Heat
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : L. Pratsch USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :E. Bray
R&D LAB : NEMI LAB DIRECTOR : R. Cunniff
LAB TECH MNGER: R. Cunniff LAB CONTACT : R. Cunniff
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : NEMI = New Mexico Energy Institute, Las Cruces, NM.

DB# 60 ACCESS# 1060 DOD Geothermal Projects TASK STEP: F/LIST/ITEMITES TASK STATUS: AAAFA
CONTROL# 1060 IN USE? : Y BEST INFO FROM: 84 TT Plan, P.M. Wright
ITEM NAME : D. Defense Geothermal Projects
TECHNOL. TYPE : TEST FACILITY FUNCTION: Resource Assessment, Electric, Direct Heat.
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED: 80
GHTD CONTACT : R. Toms USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : UURI/ESL LAB DIRECTOR : P.M. Wright
LAB TECH MNGER: P.M.Wright LAB CONTACT : D.L.Nielson
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Need titles, status, contact for each of the 15 projects.

DB# 61 ACCESS# 3000 Stanford U. GT Program TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1061 IN USE? : Y BEST INFO FROM: 84 TT Plan
ITEM NAME : Stanford U. Geothermal Energy Graduate Program
TECHNOL. TYPE : EDUCATION FUNCTION: Resource development is principal focus.
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 85 YR READY: YR FIRST USED:
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :M. Malloy
R&D LAB : Stanford Univ, CA LAB DIRECTOR : J. Gudmundson
LAB TECH MNGER: J. Gudmundson LAB CONTACT : J. Gudmundson
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Trained current industry leaders, Geosciences R & D.

DB# 62 ACCESS# 4662 GT Test Facility TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1062 IN USE? : BEST INFO FROM: 84 TT Plan
ITEM NAME : DOE Geothermal Test Facility
TECHNOL. TYPE : HARDWARE FUNCTION: Materials Testing, DCHX Test Facility.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: FIELD TESTED YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : WESTEC R&D FIRM CONTACT: W. Johnson
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Brochure is available.

DB# 63 ACCESS# 4663 GT Loop Exper. Facility TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1063 IN USE? : BEST INFO FROM: Report DOE/ET/28443-T1(1980)
ITEM NAME : DOE GT Loop Experimental Facility
TECHNOL. TYPE : HARDWARE FUNCTION: Brine, Materials, Valves, Monitoring, Crystallization.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DISMANTLED YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT : Magma Binary Plant
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : WESTEC R&D FIRM CONTACT: W. Johnson
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : Magma Power USER CONTACT :
COMMENT : Also used at:SCE and Union at Salton Sea Plants.Cite report.

DB# 64 ACCESS# 4464 Raft River Thermal Loop TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1064 IN USE? : N BEST INFO FROM: 84 TT Plan
ITEM NAME : DOE Raft River Thermal Loop Test Facility
TECHNOL. TYPE : HARDWARE FUNCTION: Test hydrothermal reservoir & conversion equipment.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : INEL LAB DIRECTOR : G. Sommers
LAB TECH MNGER: J. Whitbeck LAB CONTACT : J. Whitbeck
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 65 ACCESS# 2201 PDC Cutter Placement Code TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1065 IN USE? : Y BEST INFO FROM: 84 TT Plan
ITEM NAME : Computer Code for PDC Cutter Placement
TECHNOL. TYPE : SOFTWARE FUNCTION: Design of PDC drilling bits.
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSED YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT : ?
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : Reed USER CONTACT :
COMMENT : Other Users: PCI, Smith, Security (Bit Companies).

DB# 66 ACCESS# 3216 PDC Cutter Bonding TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1066 IN USE? : BEST INFO FROM: 84 TT Plan
ITEM NAME : PDC Cutter Diffusion Bonding Process
TECHNOL. TYPE : PROCESS FUNCTION: Bond PDC cutters to drill bit structures.
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSED YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : Pressure Coring, Inc USER CONTACT :
COMMENT :

DB# 67 ACCESS# 1208 Cavitating Jets for Bits TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1022 IN USE? : BEST INFO FROM: 84 TT Plan
ITEM NAME : Cavitating Jets for Geothermal Drill Bits
TECHNOL. TYPE : HARDWARE FUNCTION: Increase ROP for rollercone bits.
SYSTEM LEVEL : COMPONENT XFER STATUS: INNOVATION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: Smith Tool PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Same as # 1022

DB# 68 ACCESS# 1602 EDPM O-Rings TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1068 IN USE? : BEST INFO FROM: 84 TT Plan
ITEM NAME : EDPM High-Temp. O-Rings
TECHNOL. TYPE : HARDWARE FUNCTION: High-Temp. elastomeric seals. Bits & other equipment.
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : Parker Seal R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Producers: Precision Rubber. Uses material of CTRL #1001.

DB# 69 ACCESS# 1209 Sepiolite Clay Drill Mud TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1023 IN USE? : BEST INFO FROM: 84 TT Plan
ITEM NAME : Sepiolite Clay High-Temp. Drilling Fluid
TECHNOL. TYPE : HARDWARE FUNCTION: Used in drilling hydrothermal wells.
SYSTEM LEVEL : MATERIAL XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: NL BARIOD PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 70 ACCESS# 1210 Low Invasion Coring Fluids TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1070 IN USE? : BEST INFO FROM: 84 TT Plan
ITEM NAME : Low Invasion Well Coring Fluids
TECHNOL. TYPE : HARDWARE FUNCTION: Reduces core sample contamination by mud???
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: Pressure Coring,Inc. PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Other Producers(?): Christensen (manuf's coring bits).

DB# 71 ACCESS# 1211 Tri-Cone Bit Seals TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1071 IN USE? : Y BEST INFO FROM: 84 TT Plan
ITEM NAME : Tri-Cone Bit Seals (Metallic??)
TECHNOL. TYPE : HARDWARE FUNCTION: High-temp. seals for drill bit bearings.
SYSTEM LEVEL : COMPONENT XFER STATUS: INNOVATION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT : ?? The Geysers
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: Reed Tool Co. PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 72 ACCESS# 1212 High-Pressure Coring TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1072 IN USE? : BEST INFO FROM: 84 TT Plan
ITEM NAME : Adapted a pressure coring system for higher pressure.
TECHNOL. TYPE : HARDWARE FUNCTION: Take cores from wells.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: INNOVATION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: Pressure Coring,Inc PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 73 ACCESS# 2204 Casing Plan Software TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1073 IN USE? : Y BEST INFO FROM: 84 TT Plan
ITEM NAME : Adapted Well Casing Design/Plan Software
TECHNOL. TYPE : SOFTWARE FUNCTION: Design casing strings for GT wells.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: Sandia PRODUCER CONTACT:
USED BY : Union USER CONTACT :
COMMENT : Other users: Aminoil.

DB# 74 ACCESS# 1313 Op-Amp and Multiplexer TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1074 IN USE? : Y BEST INFO FROM: 84 TT Plan
ITEM NAME : High-Temp Operation Amplifiers and Multiplexers
TECHNOL. TYPE : HARDWARE FUNCTION: Active electronics for logging tools.
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: GE PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Reference CTRL #1002. Other Producer: Harris

DB# 75 ACCESS# 1314 WINS- Wellbore Navigation TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1075 IN USE? : BEST INFO FROM: 84 TT Plan
ITEM NAME : WINS - Wellbore Inertial Navigation System
TECHNOL. TYPE : HARDWARE FUNCTION: Measure wellbore location and directions.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 76 ACCESS# 1253 Open Hole Packers TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1076 IN USE? : Y BEST INFO FROM: LANL - Late 1984
ITEM NAME : High-Temp. Open Hole Packers
TECHNOL. TYPE : HARDWARE FUNCTION: Seal drillstring or prod. tube to borehole wall.
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSION/INOVA YR LAST R&D: 85 YR READY: 81 YR FIRST USED: 85
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : J. Miller
R&D FIRM : Baker Prod. Tech.,TX R&D FIRM CONTACT: Colin MacRae
PRODUCING FIRM: Guiberson/Dresser PRODUCER CONTACT:
USED BY : LALN, HDR USER CONTACT : J. Miller
COMMENT : Other R & D Firm: Lynes, Inc., Guibesson/Dresser

DB# 77 ACCESS# 1370 Gyroscopic Hole-Survey Tools TASK STEP: F/LIST TASK STATUS: AAC
CONTROL# 1077 IN USE? : BEST INFO FROM: 84 TT Plan
ITEM NAME : Gyroscopic Hole-Survey Tools
TECHNOL. TYPE : HARDWARE FUNCTION: Measure wellbore location and direction at high temperatures
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT : Oil-field use.
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : B. Dennis
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : Sperry-Sun, Inc. USER CONTACT :
COMMENT : Other User: Eastman Whipstock. See also CTRL# 1075,Sandia.

DB# 78 ACCESS# 1372 Downhole Geophone TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1078 IN USE? : BEST INFO FROM: LANL - Late 1984
ITEM NAME : Downhole Geophone Sonde System
TECHNOL. TYPE : HARDWARE FUNCTION: Locate fractures and microseismic events.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT : Baca, NM Location
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : B. Dennis
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : Union Geothermal USER CONTACT :
COMMENT :

DB# 79 ACCESS# 1374 Crosswell Acoustic Transceiver TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1079 IN USE? : BEST INFO FROM: LANL - Late 1984
ITEM NAME : Separated Acoustic Source and Acoustic Reciever
TECHNOL. TYPE : HARDWARE FUNCTION: For mapping rock structure between wellbores.
SYSTEM LEVEL : COMPONENT XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT : CO Tight Gas Sands
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : B. Dennis
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: Simplex Manuf. Co. PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 80 ACCESS# 1376 "EYE" Steering Tool TASK STEP: F/LIST TASK STATUS: AAC
CONTROL# 1080 IN USE? : BEST INFO FROM: 84 TT Plan
ITEM NAME : "EYE" Steering Tool Adapted for High Temperature
TECHNOL. TYPE : HARDWARE FUNCTION:
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: INNOVATION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : B. Dennis
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: Scientific Drilling* PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : *Scientific Drilling International

DB# 81 ACCESS# 1378 Triaxial Magnetometer TASK STEP: F/LIST TASK STATUS: AAC
CONTROL# 1081 IN USE? : BEST INFO FROM: LANL - Late 1984
ITEM NAME : Triaxial Magnetometer around a Fluxgate Magnetometer
TECHNOL. TYPE : HARDWARE FUNCTION: Used for well surveys
SYSTEM LEVEL : COMPONENT XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT : Well Surveys at NV Test Site
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : B.Dennis
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : Humphrey, Inc. USER CONTACT :
COMMENT :

DB# 82 ACCESS# 1381 Fluid Velocity-Spinner Tool TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1082 IN USE? : BEST INFO FROM: LANL - Late 1984
ITEM NAME : Modification of Worth Well Spinner Tool
TECHNOL. TYPE : HARDWARE FUNCTION: For measuring low fluid velocities.
SYSTEM LEVEL : COMPONENT XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : B. Dennis
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : British HDR Program USER CONTACT :
COMMENT :

DB# 83 ACCESS# 1383 Armored Instrument Cable TASK STEP: F/LIST TASK STATUS: AAC
CONTROL# 1083 IN USE? : Y BEST INFO FROM: LANL - Late 1985
ITEM NAME : Seven-Conductor TFE-Teflon Instrument Cable
TECHNOL. TYPE : HARDWARE FUNCTION: Useable at above 570 degrees centigrade.
SYSTEM LEVEL : COMPONENT XFER STATUS: YR LAST R&D: 81 YR READY: 81 YR FIRST USED: 81
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : B. DENNIS
R&D FIRM : Vector Cable * R&D FIRM CONTACT:
PRODUCING FIRM: Vector Cable * PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : *Also Rochester Corporation.

DB# 84 ACCESS# 1384 High-T, High-P Cablehead TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1084 IN USE? : BEST INFO FROM: LANL - Late 1984
ITEM NAME : High-Temp., High Pressure Cablehead
TECHNOL. TYPE : HARDWARE FUNCTION: Electrical connector for logging tools.
SYSTEM LEVEL : XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : B. Dennis
R&D FIRM : Gearhardt-Owens * R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : British HDR Program USER CONTACT :
COMMENT : *Also Scientific Drilling International.

DB# 85 ACCESS# 1385 DC Motors for Logging Tools TASK STEP: F/LIST TASK STATUS: AAC
CONTROL# 1085 IN USE? : BEST INFO FROM: LANL - Late 1984
ITEM NAME : Direct Current Motors for Downhole Instruments
TECHNOL. TYPE : HARDWARE FUNCTION:
SYSTEM LEVEL : COMPONENT XFER STATUS: YR LAST R&D: 78 YR READY: 78 YR FIRST USED: 78
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : B. Dennis
R&D FIRM : Amer. Electronics * R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : *American Electronics.

DB# 86 ACCESS# 1386 Slim Metal Dewars TASK STEP: F/LIST TASK STATUS: AAC
CONTROL# 1086 IN USE? : BEST INFO FROM: LANL - Late 1984
ITEM NAME : Slim Metal Dewar Flasks
TECHNOL. TYPE : HARDWARE FUNCTION: Cool and protect down-hole instruments.
SYSTEM LEVEL : COMPONENT XFER STATUS: YR LAST R&D: 77 YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : G. BENNETT
R&D FIRM : Vacuum Barriers Corp R&D FIRM CONTACT:
PRODUCING FIRM: Vacuum Barriers Corp PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : First tested at Fenton Hill.

DB# 87 ACCESS# 1254 Detonators & Firing Units TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1087 IN USE? : BEST INFO FROM: LANL - Late 1984
ITEM NAME : Detonators and Firing Units
TECHNOL. TYPE : HARDWARE FUNCTION: Deep drilling and downhole explosion devices.
SYSTEM LEVEL : COMPONENT XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : Reynolds Industries R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : British HDR Program USER CONTACT :
COMMENT :

DB# 88 ACCESS# 3288 Hydraulic Fracturing TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1088 IN USE? : BEST INFO FROM: 84 TT Plan
ITEM NAME : Hydraulic Fracturing Techniques
TECHNOL. TYPE : PROCESS FUNCTION:
SYSTEM LEVEL : PROCESS XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetten
LAB TECH MNGER: LAB CONTACT : M. Murphy
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 89 ACCESS# 3389 Borehole Mapping TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1089 IN USE? : Y BEST INFO FROM: 84 TT Plan
ITEM NAME : Acoustic Borehole Mapping of Seismicity Accomp. Hydro. Frac.
TECHNOL. TYPE : PROCESS FUNCTION: Determine location of hydrolic fracture
SYSTEM LEVEL : PROCESS XFER STATUS: ADVANCED DEVEL. YR LAST R&D: 85 YR READY: 10 YR FIRST USED: 75
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : R. Benson
LAB TECH MNGER: M. Fehler LAB CONTACT : M. Fehler
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 90 ACCESS# 9510 Direct Use Handbook TASK STEP: F/LIST TASK STATUS: AAC
CONTROL# 1090 IN USE? : Y BEST INFO FROM: 84 TT Plan, GRC
ITEM NAME : Direct Utilization of Geothermal Energy: A Tech. Handbook
TECHNOL. TYPE : HANDBOOK FUNCTION: Helps developers design GT projects
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 79 YR READY: 80 YR FIRST USED: 80
GHTD CONTACT : L. Pratsch USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :P. Brookshier
R&D LAB : Geo-Heat Centers,OIT LAB DIRECTOR : P. Lieniau
LAB TECH MNGER: B. Lunis LAB CONTACT : B. Lunis
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: GRC PRODUCER CONTACT: D. Anderson
USED BY : Many USER CONTACT :
COMMENT : Provides nature & occ. of resources, its dev., util.econ.ect

DB# 91 ACCESS# 9511 District Heating TASK STEP: F/LIST TASK STATUS: AAC
CONTROL# 1091 IN USE? : BEST INFO FROM: INEL
ITEM NAME : District Heating Feasibility Studies
TECHNOL. TYPE : HANDBOOK FUNCTION:
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : L. Pratsch USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :E. Bray
R&D LAB : INEL LAB DIRECTOR : G. Sommers
LAB TECH MNGER: B. Lunis LAB CONTACT : B. Lunis
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Cosponsored by DOE and HUD.

DB# 93 ACCESS# 7193 Resource Assessment TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1093 IN USE? : BEST INFO FROM: 84 TT Plan
ITEM NAME : Resource Assessment and Problem Identification
TECHNOL. TYPE : ADVISORY FUNCTION:
SYSTEM LEVEL : PROCESS XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :M. Malloy
R&D LAB : Lawrence Berkeley LAB DIRECTOR : M. Lippmann
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 94 ACCESS# 3801 Geopressured Wells TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1094 IN USE? : BEST INFO FROM: 84 TT Plan
ITEM NAME : Reworked Geopressured Wells
TECHNOL. TYPE : PROCESS FUNCTION:
SYSTEM LEVEL : PROCESS XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : D. Lombard USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : INEL* LAB DIRECTOR : G. Sommers
LAB TECH MNGER: J. Ramsthaler LAB CONTACT : J. Ramsthaler
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : Exxon ** USER CONTACT :
COMMENT : * Also Industry. ** El Paso Natural Gas

DB# 95 ACCESS# 3802 Geopressured Wells TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1095 IN USE? : BEST INFO FROM: 84 TT Plan
ITEM NAME : Geopressured Design Wells
TECHNOL. TYPE : PROCESS FUNCTION:
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : D. Lombard USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : INEL* LAB DIRECTOR : G. Sommers
LAB TECH MNGER: J. Ramsthaler LAB CONTACT : J. Ramsthaler
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : Exxon ** USER CONTACT :
COMMENT : * Also: Gas Research Institute

DB# 96 ACCESS# 3396 Improved Well Logging TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1096 IN USE? : BEST INFO FROM: 84 TT Plan
ITEM NAME : Improved Well Logging Interpretation Methods
TECHNOL. TYPE : PROCESS FUNCTION:
SYSTEM LEVEL : PROCESS XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : D. Lombard USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :P. Brookshire
R&D LAB : INEL LAB DIRECTOR : G. Sommers
LAB TECH MNGER: J. Ramsthaler LAB CONTACT : J. Ramsthaler
R&D FIRM : U. Texas, Austin R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 97 ACCESS# 3850 HDR Technologies TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1097 IN USE? : BEST INFO FROM: 84 TT Plan
ITEM NAME : HDR Technologies at Fenton Hill
TECHNOL. TYPE : PROCESS FUNCTION:
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 98 ACCESS# 9850 HDR Program 1970-82 TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1098 IN USE? : BEST INFO FROM: 84 TT Plan
ITEM NAME : Major Accomplishments of HDR Program 1970-82
TECHNOL. TYPE : REPORT FUNCTION:
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 99 ACCESS# 1380 Downhole Instruments TASK STEP: F/LIST TASK STATUS: AAC
CONTROL# 1099 IN USE? : BEST INFO FROM: 84 TT Plan
ITEM NAME : Downhole Instrument Component Design
TECHNOL. TYPE : DESIGN FUNCTION:
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : B. Dennis
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: Pan Amer. Energy Co. PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Also used by Hot Hole Instrument Company.

DB# 100 ACCESS# 1250 Turbodrills TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1100 IN USE? : BEST INFO FROM: LANL - Late 1984
ITEM NAME : Turbodrills
TECHNOL. TYPE : HARDWARE FUNCTION: A high-temperature, downhole mud motor.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: YR LAST R&D: 79 YR READY: 79 YR FIRST USED: 78
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: J.W. Neudecter LAB CONTACT : J. Rowley
R&D FIRM : Maurer Engr. Inc. R&D FIRM CONTACT: Wm. C. Maurer
PRODUCING FIRM: Maurer Engr. Inc. PRODUCER CONTACT: Wm. C. Maurer
USED BY : ONCOR Drilling Tools USER CONTACT :
COMMENT : Also m'f'd by Komateu LTD., Japan. Used in Japan and Canada.

DB# 101 ACCESS# 1251 Hard Rock Rotary Bit TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1101 IN USE? : BEST INFO FROM: 84 TT Plan
ITEM NAME : Hard Rock Geothermal Drilling Bit, Coring Bit
TECHNOL. TYPE : HARDWARE FUNCTION:
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: J. Rowley LAB CONTACT : J. Rowley
R&D FIRM : Smith Tool Co. R&D FIRM CONTACT: Wm. Baker
PRODUCING FIRM: Smith Tool Co. PRODUCER CONTACT: Wm. Baker
USED BY : Smith Tool Co. USER CONTACT :
COMMENT : Wide geothermal use, ok w/ air, mud, extr.hard, abrasv rock

DB# 103 ACCESS# 2503 BTHERM Computer Model TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1103 IN USE? : N BEST INFO FROM: Meridian 1/85
ITEM NAME : BTHERM Computer Model
TECHNOL. TYPE : SOFTWARE FUNCTION: Economic factors involved in district or process heating.
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: 80 YR READY: YR FIRST USED:
GHTD CONTACT : L. Pratsch USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :E. Bray
R&D LAB : NEMI LAB DIRECTOR : R. Cunniff
LAB TECH MNGER: R. Cunniff LAB CONTACT : R. Cunniff
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 105 ACCESS# 2405 GCFM Computer Model TASK STEP: F/LIST TASK STATUS: AAC
CONTROL# 1105 IN USE? : N BEST INFO FROM: Meridian 1/85, SAN 7/85
ITEM NAME : Geothermal Loan Guaranty Cash Flow Computer Model
TECHNOL. TYPE : SOFTWARE FUNCTION: Generates cash flows for well fields and powerplants
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 82 YR READY: 81 YR FIRST USED: 81
GHTD CONTACT : P. LaBrie USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :K. Bromberg
R&D LAB : LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : Mitre Corp. METREK R&D FIRM CONTACT: D. Entingh
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Used by SAN, Navy, Sierra-Pacific, AMAX, O'Briaen Resources

DB# 107 ACCESS# 2407 GELCOM Computer Model TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1107 IN USE? : N BEST INFO FROM: Meridian 1/85
ITEM NAME : Geothermal Levelized Busbar Cost Computer Model.
TECHNOL. TYPE : SOFTWARE FUNCTION: Cost of liquid dominated resource: field or electric utility
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 78 YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: OPS CONTACT :
R&D LAB : LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : MITRE Corp. METREK R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 108 ACCESS# 2508 GEOCITY Computer Model TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1108 IN USE? : N BEST INFO FROM: Meridian 1/85
ITEM NAME : GEOCITY Computer Model
TECHNOL. TYPE : SOFTWARE FUNCTION: Cost of district heating systems for space heating & cooling
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: 82 YR READY: YR FIRST USED:
GHTD CONTACT : L. Pratsch USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :E. Bray
R&D LAB : PNL LAB DIRECTOR : D. Shannon
LAB TECH MNGER: H. Huber LAB CONTACT : H. Huber
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : A large scale simulation model.

DB# 109 ACCESS# 2281 GEOCOM Computer Model TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1109 IN USE? : N BEST INFO FROM: Meridian 1/85
ITEM NAME : GEOCOM Economic Computer Model
TECHNOL. TYPE : SOFTWARE FUNCTION: For well completion, production, and performance of well.
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: 82 YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: OPS CONTACT :
R&D LAB : LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : BDM Corporation R&D FIRM CONTACT: E.R. Anderson
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Emphasis on lifetime cost and performance of a well.

DB# 110 ACCESS# 2410 GEOCOST Computer Model TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1110 IN USE? : N BEST INFO FROM: Meridian 1/85
ITEM NAME : Geothermal Cost Analysis, Steam Cycle Version Computer Model
TECHNOL. TYPE : SOFTWARE FUNCTION: Over-all design of geothermal steam electric power plant.
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: 84 YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : PNL LAB DIRECTOR : D. Shannon
LAB TECH MNGER: H. Huber LAB CONTACT : H. Huber
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Components sized-themodynamic rela. Costs: function of size

DB# 111 ACCESS# 2411 GEOCOST-BC Computer Model TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1111 IN USE? : N BEST INFO FROM: Meridian 1/85
ITEM NAME : Geothermal Cost Analysis, Binary Cycle Version Model
TECHNOL. TYPE : SOFTWARE FUNCTION: Over-all design of geothermal binary electric power plant.
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: 84 YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : PNL LAB DIRECTOR : D. Shannon
LAB TECH MNGER: H. Huber LAB CONTACT : H. Huber
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : * same as 1110 comment.

DB# 112 ACCESS# 2412 GEOTHM Computer Model TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1112 IN USE? : N BEST INFO FROM: Meridian 1/85
ITEM NAME : GEOTHM Economic Computer Model
TECHNOL. TYPE : SOFTWARE FUNCTION: Optimization of design of elec. plant to min. user obj. fnct
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: 77 YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: OPS CONTACT :
R&D LAB : Lawrence Berkeley LAB DIRECTOR : M. Lippmann
LAB TECH MNGER: M.A. Green LAB CONTACT : W. Pope
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 113 ACCESS# 2513 GEOTHM TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1113 IN USE? : N BEST INFO FROM: Meridian 1/85
ITEM NAME : GEOTHM Economic Computer Model
TECHNOL. TYPE : SOFTWARE FUNCTION: For process heat applications using geothermal energy.
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: 80 YR READY: YR FIRST USED:
GHTD CONTACT : L. Pratsch USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :E. Bray
R&D LAB : Mass. Instit.of Tech LAB DIRECTOR : M. Packer
LAB TECH MNGER: M. Packer LAB CONTACT : M. Packer
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 114 ACCESS# 2114 GPCM Computer Model TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1114 IN USE? : N BEST INFO FROM: Meridian 1/85
ITEM NAME : Geothermal Probabillistic Cost Model
TECHNOL. TYPE : SOFTWARE FUNCTION: For a geothermal field in terms of distrib. func. of input.
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: 81 YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: OPS CONTACT :
R&D LAB : Jet Propulsion * LAB DIRECTOR : T. Lee
LAB TECH MNGER: T. Lee LAB CONTACT : T. Lee
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : * Laboratory at California Institute of Technology.

DB# 116 ACCESS# 2516 GRITS Computer Model TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1116 IN USE? : N BEST INFO FROM: Meridian 1/85
ITEM NAME : Geothermal Resource Interactive Temporal Simulation Model
TECHNOL. TYPE : SOFTWARE FUNCTION: For direct use geothermal energy applications.
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: 82 YR READY: YR FIRST USED:
GHTD CONTACT : L. Pratsch USED AT PLANT :
DOE OPS OFFICE: OPS CONTACT :
R&D LAB : Johns Hopkings U. LAB DIRECTOR : R. Weissbrod
LAB TECH MNGER: R. Weissbrod LAB CONTACT : R. Weissbrod
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 117 ACCESS# 2857 HDR3 Computer Model TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1117 IN USE? : N BEST INFO FROM: Meridian 1/85
ITEM NAME : HDR3 Reservoir Costs Computer Model
TECHNOL. TYPE : SOFTWARE FUNCTION: For geothermal space heating system using hot dry rock.
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: 82 YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetten
LAB TECH MNGER: C. Arundale LAB CONTACT :
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 118 ACCESS# 2418 TCN Computer Model TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1118 IN USE? : N BEST INFO FROM: Meridian 1/85
ITEM NAME : Technecon Simulation Computer Model
TECHNOL. TYPE : SOFTWARE FUNCTION: For commercial potential development of geoth. power in U.S.
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: 83 YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: OPS CONTACT :
R&D LAB : LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : Technecon Analytic R&D FIRM CONTACT: T. Cassel
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 119 ACCESS# 2809 TGRE Computer Model TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1119 IN USE? : N BEST INFO FROM: Meridian 1/85
ITEM NAME : Texas Geopressured Resource Evaluation
TECHNOL. TYPE : SOFTWARE FUNCTION: Alternatives for Texas geopressured resources development.
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: 79 YR READY: YR FIRST USED:
GHTD CONTACT : D. Lombard USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :P. Brookshire
R&D LAB : U. of Texas, Austin* LAB DIRECTOR : R. Morton
LAB TECH MNGER: R. Morton LAB CONTACT : R. Morton
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : * Center for Energy Studies.

DB# 120 ACCESS# 2920 VENVAL Computer Model TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1120 IN USE? : N BEST INFO FROM: Meridian 1/85
ITEM NAME : Venture Analysis Computer Model
TECHNOL. TYPE : SOFTWARE FUNCTION: To aid in evaluation of proposed business investments.
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: 80 YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: OPS CONTACT :
R&D LAB : LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : Dupont Inc. R&D FIRM CONTACT: J. Whelan
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 121 ACCESS# 2282 WELCST Computer Model TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1121 IN USE? : N BEST INFO FROM: Meridian 1/85
ITEM NAME : WELCST Cost Computer Model
TECHNOL. TYPE : SOFTWARE FUNCTION: For drilling geothermal wells and tech improv. to total cost
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 79 YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: OPS CONTACT :
R&D LAB : LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : MITRE Corp. METREK R&D FIRM CONTACT: D. Entingh
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 122 ACCESS# 2223 GEOTEMP2 Computer Model TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1122 IN USE? : N BEST INFO FROM: Meridian 1/85
ITEM NAME : GEOTEMP2 Wellbore Thermal Simulator Computer Model
TECHNOL. TYPE : SOFTWARE FUNCTION: For geothermal well drilling and production problems.
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: 84 YR READY: 84 YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: L. Duda LAB CONTACT : L. Duda
R&D FIRM : Enertech Engineering R&D FIRM CONTACT: R. Mitchell
PRODUCING FIRM: Nat. Energy Software PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Extensively modified version of previous GEOTEMP model.

DB# 123 ACCESS# 2203 Interactive Fracture Model TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1123 IN USE? : N BEST INFO FROM: Meridian 1/85
ITEM NAME : Interactive Fracture Design Computer Model
TECHNOL. TYPE : SOFTWARE FUNCTION: For fracture stimulation process for geothermal reservoirs.
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Dunn LAB CONTACT : J. Dunn
R&D FIRM : Republic Geothermal* R&D FIRM CONTACT: C. Schlamberger
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Also developed by Petroleum Training & Technical Services.

DB# 124 ACCESS# 2224 GEOFLO Computer Model TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1124 IN USE? : N BEST INFO FROM: Meridian 1/85
ITEM NAME : Wellbore Thermodynamics Computer Model
TECHNOL. TYPE : SOFTWARE FUNCTION: Shows steady, one-dimensional & two phase flow in a wellbore
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : Brown University LAB DIRECTOR : Z. Bilicki
LAB TECH MNGER: Z. Bilicki LAB CONTACT : Z. Bilicki
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 125 ACCESS# 2225 WELBORE Computer Model TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1125 IN USE? : Y BEST INFO FROM: LBL-10910
ITEM NAME : Wellbore Fluid & Heat Flow Computer Model
TECHNOL. TYPE : SOFTWARE FUNCTION: Calc. fluid & heat flow in 1&2 phase geothermal wellbores
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 82 YR READY: 80 YR FIRST USED: 79
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :M. Molloy
R&D LAB : Lawrence Berkeley LAB DIRECTOR : M. Lippmann
LAB TECH MNGER: M. Lippmann LAB CONTACT : M. Lippmann
R&D FIRM : BGI R&D FIRM CONTACT: C. Miller
PRODUCING FIRM: BGI PRODUCER CONTACT: C. Miller
USED BY : USER CONTACT :
COMMENT : Transient wellbore flow simulator

DB# 126 ACCESS# 2216 DEGEOWEL Computer Model TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1126 IN USE? : N BEST INFO FROM: Meridian 1/85
ITEM NAME : Wellbore Flow Computer Model
TECHNOL. TYPE : SOFTWARE FUNCTION: For single & two phase fluid flow in geothermal wells.
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: 83 YR READY: 83 YR FIRST USED: 80
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : Denver Research Inst LAB DIRECTOR : J. Butz
LAB TECH MNGER: J. Butz LAB CONTACT : J. Butz
R&D FIRM : Coury & Associates R&D FIRM CONTACT: G. Coury
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Can be used in geothermal production well design.

DB# 127 ACCESS# 2127 VARFLOW TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1127 IN USE? : Y BEST INFO FROM: IDO-10099
ITEM NAME : Reservoir Pressure-Response Computer Model
TECHNOL. TYPE : SOFTWARE FUNCTION: Calculate pressure changes in an anisotropic, 1 phase reserv
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 82 YR READY: 82 YR FIRST USED: 80
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :M. Malloy
R&D LAB : Lawrence Berkeley LAB DIRECTOR : M. Lippmann
LAB TECH MNGER: M. Lippmann LAB CONTACT : S. Benson
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Can account for arbitrarily variable flow rates from wells

DB# 128 ACCESS# 2128 TERZAGI Computer Model TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1128 IN USE? : N BEST INFO FROM: Meridian 1/85
ITEM NAME : Reservoir Fluid Flow Computer Model
TECHNOL. TYPE : SOFTWARE FUNCTION: Fluid potential in 1 2 & 3-dimensional confined systems. *
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :M. Malloy
R&D LAB : Lawrence Berkeley LAB DIRECTOR : M. Lippmann
LAB TECH MNGER: T. Narasimhan LAB CONTACT : T. Narasimhan
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : * Systems are saturated & deformable with isothermal flow.

DB# 129 ACCESS# 2129 ANALYZE Computer Model TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1129 IN USE? : Y BEST INFO FROM: LBL-10907
ITEM NAME : Analysis of Well Interference/Production Computer Model
TECHNOL. TYPE : SOFTWARE FUNCTION: Tests in single phase/fluid saturated/hydrothermal reservoir
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 80 YR READY: 80 YR FIRST USED: 77
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :M. Molloy
R&D LAB : Lawrence Berkeley LAB DIRECTOR : M. Lippmann
LAB TECH MNGER: M. Lippmann LAB CONTACT : S. Benson
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: Nat. Energy Software PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Automated well test analysis

DB# 130 ACCESS# 2130 SHAFT79 Computer Model TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1130 IN USE? : Y BEST INFO FROM: DOE/CE/30784-2 pp. 85-86
ITEM NAME : Reservoir Fluid and Heat Flow Computer Model- SHAFT79
TECHNOL. TYPE : SOFTWARE FUNCTION: For simultaneous heat and fluid transport in a porous media.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 80 YR READY: 80 YR FIRST USED: 80
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: MOLLOY OPS CONTACT :M. Malloy
R&D LAB : Lawrence Berkeley LAB DIRECTOR : M. Lippmann
LAB TECH MNGER: M. Lippmann LAB CONTACT : K. Pruess
R&D FIRM : LBL R&D FIRM CONTACT: Nat. En. Sftwr.
PRODUCING FIRM: LBL PRODUCER CONTACT:
USED BY : Bechtel Power Corp. USER CONTACT : M.H.L. Jester
COMMENT : Available: Nat. Energy Sftwr. Center, 9700 S. Cass ArgonneIL

DB# 131 ACCESS# 2131 CCC Computer Model TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1131 IN USE? : Y BEST INFO FROM: Meridian 1/85, DOE/CE/30784-2 (pp. 87-88
ITEM NAME : Conduction- Convection-Consolidation Computer Model
TECHNOL. TYPE : SOFTWARE FUNCTION: Computes heat, mass transfer and consolidation in porous med
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 80 YR READY: 88 YR FIRST USED: 77
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :M. Malloy
R&D LAB : Lawrence Berkeley LAB DIRECTOR : M. Lippmann
LAB TECH MNGER: M. Lippmann LAB CONTACT : M.Lippmann
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: Nat. Ener.S.ware sys PRODUCER CONTACT: A.J. Strecok
USED BY : LANL USER CONTACT : M. Kadowaki
COMMENT : *also National Energy Software Center.

DB# 132 ACCESS# 2132 GEOTHERM Computer Model TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1132 IN USE? : N BEST INFO FROM: Meridian 1/85
ITEM NAME : Geothermal Well (springs and fumaroles) Computer Model
TECHNOL. TYPE : SOFTWARE FUNCTION: To gather, organize and provide an info data base.
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: 82 YR READY: YR FIRST USED:
GHTD CONTACT : R. Wallace USED AT PLANT :
DOE OPS OFFICE: USGS OPS CONTACT :J. Bliss
R&D LAB : LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: US Dept. of Commerce PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 135 ACCESS# 8235 UURI/ESL Open Data File TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1135 IN USE? : Y BEST INFO FROM: P.M. Wright
ITEM NAME : Industry Coupled Program Open File Data.
TECHNOL. TYPE : DATABASE FUNCTION: Surveys and drilling data from 14 projects in N. NV & SW UT
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 84 YR READY: 78 YR FIRST USED: 78
GHTD CONTACT : L. Pratsch USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : UURI/ESL LAB DIRECTOR : P.M. Wright
LAB TECH MNGER: D. Nielson LAB CONTACT : D. Nielson
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: UURI/ESL PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : For public: Marriott Library & US Geological Survey

DB# 136 ACCESS# 8236 UURI/ESL Geothermal Library TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1136 IN USE? : Y BEST INFO FROM: P.M. Wright
ITEM NAME : UURI/ESL Geothermal Sample Library
TECHNOL. TYPE : LIBRARY FUNCTION: Collection of geo. well cuttings & core from DOE projects.
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 83 YR READY: 77 YR FIRST USED: 77
GHTD CONTACT : L. Pratsch USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : UURI/ESL LAB DIRECTOR : P. Wright
LAB TECH MNGER: P. Wright LAB CONTACT : P. Wright
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: UURI/ESL PRODUCER CONTACT: P. Wright
USED BY : Various Companies USER CONTACT :
COMMENT : Located in Salt Lake City.

DB# 137 ACCESS# 8150 Site Data Base Reports TASK STEP: F/LIST TASK STATUS: AAC
CONTROL# 1137 IN USE? : Y BEST INFO FROM: Meridian 1/85
ITEM NAME : Oregon Institute of Technology Site Data Base Reports
TECHNOL. TYPE : REPORT FUNCTION: To provide info to dev resources in AL,ID,MN,OR,WA,& WY.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 79 YR READY: 79 YR FIRST USED: 79
GHTD CONTACT : L. Pratsch USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :P. Brookshier
R&D LAB : GeoHeat Center, OIT LAB DIRECTOR : P. Lienau
LAB TECH MNGER: P. Lienau LAB CONTACT : P. Lienau
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: NTIS, GeoHeat Center PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Goal to summarize factors affecting development.

DB# 138 ACCESS# 8101 Leasing & Permitting Data Base TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1138 IN USE? : Y BEST INFO FROM: Meridian 1/85
ITEM NAME : Geothermal Leasing and Permitting Data Base
TECHNOL. TYPE : SOFTWARE FUNCTION: Monitors leasing programs & gives info. on geot. prospecting
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: 79 YR READY: YR FIRST USED:
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: OPS CONTACT :
R&D LAB : LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : Wapora, w/Meridian R&D FIRM CONTACT: G. Beeland
PRODUCING FIRM: NTIS PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 139 ACCESS# 8839 LOGDEX Computer Model TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1139 IN USE? : Y BEST INFO FROM: Meridian 1/85
ITEM NAME : LOGDEX Data Base Computer Model
TECHNOL. TYPE : SOFTWARE FUNCTION: DOE geopressured, geothermal programs along TX/LA Gulf Coast
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: 85 YR READY: YR FIRST USED:
GHTD CONTACT : D. Lombard USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :P. Brookshire
R&D LAB : U. of Texas, Austin* LAB DIRECTOR : K. Sepehrnoori
LAB TECH MNGER: K. Sepehrnoori LAB CONTACT : K. Sepehrnoori
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Center for Energy Studies. Mention Log Header Database also.

DB# 140 ACCESS# 9040 Handbook of GHTD Models TASK STEP: MERIDIAN WRITES TASK STATUS: AB
CONTROL# 1140 IN USE? : Y BEST INFO FROM: Meridian 1/85 (copy)
ITEM NAME : Handbook of GHTD Computer Models
TECHNOL. TYPE : HANDBOOK FUNCTION: Compiling geothermal computer models.
SYSTEM LEVEL : SYSTEM XFER STATUS: YR LAST R&D: 85 YR READY: 85 YR FIRST USED: 85
GHTD CONTACT : R. Burr USED AT PLANT :
DOE OPS OFFICE: OPS CONTACT :
R&D LAB : LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : Meridian Corporation R&D FIRM CONTACT: R. Blackett
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 141 ACCESS# 1441 Electric Systems: Steam TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1141 IN USE? : BEST INFO FROM: Beeland's GPM List
ITEM NAME : Geothermal Dry Steam Electric Plants
TECHNOL. TYPE : HARDWARE FUNCTION:
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT : The Geysers, CA
DOE OPS OFFICE: NONE OPS CONTACT :NONE
R&D LAB : Meridian Corp. LAB DIRECTOR : G. Beeland
LAB TECH MNGER: G. Beeland LAB CONTACT : G. Beeland
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : PG & E USER CONTACT :
COMMENT : Page = Brief description, and list of such plants.

DB# 142 ACCESS# 3142 Baca, NM Exploration TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1142 IN USE? : BEST INFO FROM: L. Pratch/J. Bresee/Malloy
ITEM NAME : Hydrothermal Exploration at Baca, New Mexico
TECHNOL. TYPE : PROCESS FUNCTION: Case study of an effort that failed.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : L. Pratsch USED AT PLANT : N.A.
DOE OPS OFFICE: SAN OPS CONTACT :M. Malloy
R&D LAB : LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : Union Geothermal R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : N.A. USER CONTACT :
COMMENT : Reports: Union Geo. On Res.,critiques.SAN to write this item

DB# 143 ACCESS# 1445 Electric Systems: Hybrid TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1143 IN USE? : BEST INFO FROM: Pratsch/Bray (policy questions)
ITEM NAME : Geothermal plus Other Fuel Hybrid Electric Plants
TECHNOL. TYPE : HARDWARE FUNCTION: Use G.T. energy as part of fuel to plant.
SYSTEM LEVEL : SYSTEM XFER STATUS: DESIGN YR LAST R&D: 85 YR READY: YR FIRST USED:
GHTD CONTACT : L. Pratsch USED AT PLANT : Honey Lake, CA
DOE OPS OFFICE: IDO OPS CONTACT :E. Bray
R&D LAB : LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : Dow Engineering R&D FIRM CONTACT: (Design)
PRODUCING FIRM: GeoProducts, Inc. PRODUCER CONTACT: K. Boren
USED BY : GeoProducts, Inc. USER CONTACT :
COMMENT : Continued work is being negotiated. Contac only Pratsch/Bray

DB# 144 ACCESS# 1442 Electric Systems: Flash TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1144 IN USE? : BEST INFO FROM: G. Beeland's GPM Status List
ITEM NAME : Geothermal Flashed Steam Electric Plants
TECHNOL. TYPE : HARDWARE FUNCTION:
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT : Heber
DOE OPS OFFICE: NONE OPS CONTACT :NONE
R&D LAB : Meridian Corp. LAB DIRECTOR : G. Beeland
LAB TECH MNGER: G. Beeland LAB CONTACT : G. Beeland
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : DRAVO USER CONTACT :
COMMENT : Other small plants predate this. Include list of plants.

DB# 145 ACCESS# 1444 Advanced Binary Plant TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1145 IN USE? : BEST INFO FROM: LaSala/J. Whitbeck
ITEM NAME : Advanced Geothermal Binary Electric Technology
TECHNOL. TYPE : HARDWARE FUNCTION: Reduce costs at moderate-temp reservoirs.
SYSTEM LEVEL : SYSTEM XFER STATUS: DESIGN YR LAST R&D: 85 YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : INEL LAB DIRECTOR : G. Sommers
LAB TECH MNGER: J. Whitbeck LAB CONTACT : J. Whitbeck
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : R & D on components is in process.

DB# 146 ACCESS# 1443 Geothermal Binary Electric Pl. TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1146 IN USE? : Y BEST INFO FROM: SDGE Progress Reports on Heber
ITEM NAME : Geothermal Binary Electric Plants
TECHNOL. TYPE : HARDWARE FUNCTION: Demonstrate Binary Technology on a Commercial Scale
SYSTEM LEVEL : SYSTEM XFER STATUS: INNOVATION YR LAST R&D: 88 YR READY: 88 YR FIRST USED: 85
GHTD CONTACT : L. Pratsch USED AT PLANT : Heber, CA
DOE OPS OFFICE: SAN OPS CONTACT :P. Thrash
R&D LAB : None LAB DIRECTOR : R. Lacy
LAB TECH MNGER: R. Lacy LAB CONTACT : R. Lacy
R&D FIRM : SDGE R&D FIRM CONTACT: R. Lacy
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : SDGE USER CONTACT : R. Lacy
COMMENT : First full-sized U.S. binary plant.

DB# 147 ACCESS# 1447 Electric Systems: Well Head TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1147 IN USE? : BEST INFO FROM: GRC Bulletins Transactions
ITEM NAME : Geothermal Electric Well-Head Generators
TECHNOL. TYPE : HARDWARE FUNCTION: Produce electricity from a single well.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: INNOVATION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT : Puna, Hawaii
DOE OPS OFFICE: OPS CONTACT :
R&D LAB : LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : HELCO USER CONTACT :
COMMENT : Brief description, list of plants 3MW & less.

DB# 148 ACCESS# 1448 Rotary Separator Turbine TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1148 IN USE? : BEST INFO FROM: GRC Bulletin, Feb. 1985 article
ITEM NAME : Biphase Rotary Separator Turbine
TECHNOL. TYPE : HARDWARE FUNCTION: Converts kinetic energy of brine to shaft power.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT : Roosevelt Hot Springs
DOE OPS OFFICE: OPS CONTACT :
R&D LAB : LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : Biphase Turbines R&D FIRM CONTACT:
PRODUCING FIRM: Biphase Turbines PRODUCER CONTACT:
USED BY : Utah Power & Light USER CONTACT :
COMMENT : Will be used at Desert Peak (2nd Installation).

DB# 149 ACCESS# 1449 Helical Screw Expander TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1149 IN USE? : BEST INFO FROM: R. LaSala
ITEM NAME : Helical Screw Expander
TECHNOL. TYPE : HARDWARE FUNCTION:
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: FIELD TESTED YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : JPL LAB DIRECTOR : R. McKay
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: HPC PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : HPC=Hydrothermal Power Co., Runs but leaks like a sieve.

DB# 153 ACCESS# 1803 Geopressured Well Head TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1153 IN USE? : BEST INFO FROM: A design handbook, Sandia?
ITEM NAME : Geopressured Wellhead Control Technology
TECHNOL. TYPE : HARDWARE FUNCTION: Control geopressured wells.
SYSTEM LEVEL : COMPONENT XFER STATUS: INNOVATION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : D. Lombard USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : INEL LAB DIRECTOR : G. Sommers
LAB TECH MNGER: J. Ramsthaler LAB CONTACT : J. Ramsthaler
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : DOE USER CONTACT :
COMMENT : Made from standard industry components.

DB# 154 ACCESS# 1804 Geopressured Methane Separator TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1154 IN USE? : BEST INFO FROM:
ITEM NAME : Geopressured Methane Separators
TECHNOL. TYPE : HARDWARE FUNCTION: Extract methane from brine.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: FIELD TESTING YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : D. Lombard USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : INEL LAB DIRECTOR : G. Sommers
LAB TECH MNGER: J. Ramsthaler LAB CONTACT : J. Ramsthaler
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : DOE USER CONTACT :
COMMENT : Is a standard industry choke and separator tank.

DB# 155 ACCESS# 1805 Geopressured Electric Technol. TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1155 IN USE? : BEST INFO FROM: EPRI Reports
ITEM NAME : Geopressured Electric Technology
TECHNOL. TYPE : HARDWARE FUNCTION: Make electricity at geopressured wells.
SYSTEM LEVEL : XFER STATUS: FIELD TESTING YR LAST R&D: 85 YR READY: 88 YR FIRST USED:
GHTD CONTACT : D. Lombard USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : INEL LAB DIRECTOR : G. Sommers
LAB TECH MNGER: J. Ramsthaler LAB CONTACT : J. Ramsthaler
R&D FIRM : EPRI R&D FIRM CONTACT: E. Hughs
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Include: Methane, Heat, Hydraulic Convertors

DB# 159 ACCESS# 1771 ECT: Subsidence Monitoring TASK STEP: WRITING TASK STATUS: AB
CONTROL# 1159 IN USE? : BEST INFO FROM: G. Hooper
ITEM NAME : Environmental: Subsidence Monitoring Technology
TECHNOL. TYPE : HARDWARE FUNCTION: Detect and prevent subsidence due to draw-down.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : G. Hooper USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : Lawrence Berkeley LAB DIRECTOR : Oleh Wares
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Describe subsidence monitoring equipment and techniques.

DB# 160 ACCESS# 1772 ECT: Liquid Effluents TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1160 IN USE? : BEST INFO FROM: M. Reed
ITEM NAME : Environmental: Liquid Effluent Controls
TECHNOL. TYPE : HARDWARE FUNCTION: Various
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : INEL LAB DIRECTOR : S. Spenser
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : Magma Power USER CONTACT :
COMMENT : Transfer: Crystallizer/Clarifier.

DB# 162 ACCESS# 1773 ECT: Hydrogen Sulfide TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1162 IN USE? : BEST INFO FROM: EPRI, GRC Reports
ITEM NAME : Hydrogen Sulfide Emissions Control Technology.
TECHNOL. TYPE : HARDWARE FUNCTION:
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: FIELD TESTING YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : G. Hooper USED AT PLANT : The Geysers
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : PG & E USER CONTACT :
COMMENT : SAN: PLEASE SELECT & TASK AN AUTHOR FOR THIS ITEM. G.HOOPER.

DB# 163 ACCESS# 9763 Envir. Control Technology TASK STEP: F/LIST TASK STATUS: AAC
CONTROL# 1163 IN USE? : BEST INFO FROM: NTIS Report
ITEM NAME : Environmental Control Technology for Geothermal Energy
TECHNOL. TYPE : HANDBOOKS FUNCTION: Status cost of current technology
SYSTEM LEVEL : XFER STATUS: YR LAST R&D: YR READY: 84 YR FIRST USED:
GHTD CONTACT : USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : Escor, Inc. R&D FIRM CONTACT: R. Zimmerman
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 164 ACCESS# 8864 Geopressured Wells Database TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1164 IN USE? : BEST INFO FROM: U. Texas at Austin
ITEM NAME : Geopressured Zone Wells Database
TECHNOL. TYPE : DATABASE FUNCTION: Locations and data on about 6000 wells.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : D. Lombard USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :P. Brookshire
R&D LAB : INEL LAB DIRECTOR : G. Sommers
LAB TECH MNGER: J. Ramsthaler LAB CONTACT : J. Ramsthaler
R&D FIRM : U. Texas, Austin R&D FIRM CONTACT: K. Sepehrnoori
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Compiled a few years ago. Used to map G.P. zones.

DB# 165 ACCESS# 8501 Direct Heat Projects Database TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1165 IN USE? : BEST INFO FROM: Meridian: Blackett, Satrape
ITEM NAME : GTD Direct Heat Projects Database
TECHNOL. TYPE : DATABASE FUNCTION:
SYSTEM LEVEL : SYSTEMS XFER STATUS: DIFFUSION YR LAST R&D: 85 YR READY: 85 YR FIRST USED:
GHTD CONTACT : L. Pratsch USED AT PLANT :
DOE OPS OFFICE: OPS CONTACT :
R&D LAB : LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : Meridian Corporation R&D FIRM CONTACT: B. Blackett
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Technology Transfer Product. Ready late 1985.

DB# 166 ACCESS# 3166 Cascades Exploration Technol. TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1166 IN USE? : Y BEST INFO FROM: R. Toms, M. Reed, P.M. Wright
ITEM NAME : Cascades Range Exploration Technology, Rain Curtain
TECHNOL. TYPE : PROCESS FUNCTION: Defect hot reservoirs beneath cool ground water.
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: 85 YR FIRST USED: 85
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : UURI/ESL LAB DIRECTOR : P.M. Wright
LAB TECH MNGER: P.M. Wright LAB CONTACT : P.M. Wright
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Drilling of three areas in Oregon Cascades

DB# 167 ACCESS# 8110 Cascades Range Geophysics TASK STEP: MERIDIAN WRITES TASK STATUS: AA
CONTROL# 1167 IN USE? : BEST INFO FROM: Don Klick, U.S.G.S., Washington D.C.
ITEM NAME : Results of Cascades Range Geophysics experiments.
TECHNOL. TYPE : DATABASE FUNCTION:
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: OPS CONTACT :
R&D LAB : U.S.G.S. LAB DIRECTOR : D. Klick
LAB TECH MNGER: D. Klick LAB CONTACT : D. Klick
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Per R. Toms, 2/25/85

DB# 168 ACCESS# 9468 Geothermal Well Design Handbk. TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1168 IN USE? : BEST INFO FROM:
ITEM NAME : 2-Phase Flow Engineering Handbook, with Models
TECHNOL. TYPE : HANDBOOK FUNCTION: Design tool for wells producing two-phase brine
SYSTEM LEVEL : DESIGN XFER STATUS: YR LAST R&D: 80 YR READY: 80 YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT : Desert Peak
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : None LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : Denver Rsch. Inst. R&D FIRM CONTACT: J. Butz
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Used to design Desert Peak brine pipelines.

DB# 171 ACCESS# 8271 User-Coupled Drilling TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1171 IN USE? : Y BEST INFO FROM: Lew Pratsch/P. Wright
ITEM NAME : DOE Geothermal User-Coupled Drilling Projects
TECHNOL. TYPE : DATABASE FUNCTION: Database of results, at UURI.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 82 YR READY: 81 YR FIRST USED: 81
GHTD CONTACT : L. Pratsch USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : UURI/ESL LAB DIRECTOR : P.M. Wright
LAB TECH MNGER: P.M. Wright LAB CONTACT : P.M. Wright
R&D FIRM : UURI R&D FIRM CONTACT: P.M. Wright
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : Various USER CONTACT :
COMMENT : Emphasize database of results.

DB# 172 ACCESS# 8272 Industry-Coupled Drilling TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1172 IN USE? : Y BEST INFO FROM: Lew Pratsch/P. Wright
ITEM NAME : DOE Geothermal Industry-Coupled Drilling
TECHNOL. TYPE : DATABASE FUNCTION: Database of drill results, geologic, geochem. geophys. resea
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 80 YR READY: 77 YR FIRST USED: 77
GHTD CONTACT : L. Pratsch USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : UURI/ESL LAB DIRECTOR : P.M. Wright
LAB TECH MNGER: P.M. Wright LAB CONTACT : D.L. Nelson
R&D FIRM : UURI R&D FIRM CONTACT: P. Wright
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Emphasize database of results. XREF#1171.

DB# 173 ACCESS# 9673 Materials Selection Handbook TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1173 IN USE? : Y BEST INFO FROM: Handbook itself. We have it.DOE/RA/27026
ITEM NAME : Materials selection guidelines for geothermal energy utl.sys
TECHNOL. TYPE : HANDBOOK FUNCTION: Increase materials lifetime in geothermal applications.
SYSTEM LEVEL : MATERIALS XFER STATUS: DIFFUSION YR LAST R&D: 81 YR READY: 81 YR FIRST USED: 81
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : Brookhaven LAB DIRECTOR : N. Samios
LAB TECH MNGER: L. Kukacka LAB CONTACT : W. Marcuse
R&D FIRM : Radian Corporation R&D FIRM CONTACT: P. Ellis
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : used by U.S. and foreign countries

DB# 174 ACCESS# 9674 Corrosion Handbook TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1174 IN USE? : Y BEST INFO FROM: Handbook itself, DOE/SF/11503-1
ITEM NAME : Corrosion Ref. for Geothermal Downhole Materials Selection
TECHNOL. TYPE : HANDBOOK FUNCTION: Increase materials lifetime.
SYSTEM LEVEL : MATERIALS XFER STATUS: DIFFUSION YR LAST R&D: 83 YR READY: 83 YR FIRST USED: 83
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : Brookhaven LAB DIRECTOR : N. Samios
LAB TECH MNGER: L. Kukacka LAB CONTACT : W. Marcuse
R&D FIRM : Radian Corporation R&D FIRM CONTACT: P. Ellis
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Used by U.S. and foreign countries

DB# 175 ACCESS# 1075 Geothermal Drilling Org. TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1175 IN USE? : BEST INFO FROM: GDO Minutes and Reports
ITEM NAME : Geothermal Drilling Org. Projects
TECHNOL. TYPE : HARDWARE FUNCTION: Cooperate on Evaluation of Drilling Technology
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: INNOVATION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : There are minutes and reports. Get them from J. Kelsey.

DB# 177 ACCESS# 1371 Hybrid Coring Bit TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1177 IN USE? : Y BEST INFO FROM: LANL - Late 1984
ITEM NAME : Hybrid Hard Rock Coring Bit
TECHNOL. TYPE : HARDWARE FUNCTION:
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSION YR LAST R&D: 77 YR READY: 77 YR FIRST USED: 77
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : J. Schille
R&D FIRM : Smith Tool Co. R&D FIRM CONTACT: W.M. Baker
PRODUCING FIRM: Smith Tool Co. PRODUCER CONTACT: W.M. Baker
USED BY : USER CONTACT :
COMMENT :

DB# 179 ACCESS# 1375 High-Temp. Jars TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1179 IN USE? : Y BEST INFO FROM: LANL - Late 1984
ITEM NAME : High-Temperature Jars
TECHNOL. TYPE : HARDWARE FUNCTION: Used as jarring tools in drilling assemblies
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSION YR LAST R&D: 81 YR READY: 81 YR FIRST USED: 81
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : J. Rowley
R&D FIRM : Houston Engineering* R&D FIRM CONTACT: D. Webb
PRODUCING FIRM: Houston Engineering* PRODUCER CONTACT: D. Webb
USED BY : USER CONTACT :
COMMENT : Also Bowen Tools, Inc., also gen. avail. thru comm.catalogs

DB# 180 ACCESS# 1377 High-Temp. Casing Packers TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1180 IN USE? : Y BEST INFO FROM: LANL - Late 1984, OTIS Engineering R&D
ITEM NAME : High-Temperature Casing Packers
TECHNOL. TYPE : HARDWARE FUNCTION: Used in both Phase II wells at Fenton Hill.
SYSTEM LEVEL : COMPONENT XFER STATUS: FIELD TEST YR LAST R&D: 83 YR READY: 83 YR FIRST USED: 82
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : D. Dreeser
R&D FIRM : OTIS R&D, Dallas, TX R&D FIRM CONTACT: D. Taylor
PRODUCING FIRM: Otis Engineering PRODUCER CONTACT: D. Taylor
USED BY : Union Geothermal USER CONTACT :
COMMENT : * Guiberson/Dresser Industries & Otis Engineering Corp.

DB# 181 ACCESS# 1379 High Temp. Fluid Sampler TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1181 IN USE? : Y BEST INFO FROM: LANL - Late 1984
ITEM NAME : High-Temperature Fluid Sampler
TECHNOL. TYPE : HARDWARE FUNCTION: Used in hydrothermal wells and seafloor vents.
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSION YR LAST R&D: 77 YR READY: 77 YR FIRST USED: 77
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : B. Dennis
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 182 ACCESS# 1382 Fluid Injectors TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1182 IN USE? : Y BEST INFO FROM: LANL - Late 1984
ITEM NAME : Fluid Injectors
TECHNOL. TYPE : HARDWARE FUNCTION: To inject dyes & chem. reactive or radioactive tracers.
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : B.Dennis
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 183 ACCESS# 1383 Downhole Accelerometer Sonde TASK STEP: F/LIST TASK STATUS: AAC
CONTROL# 1183 IN USE? : Y BEST INFO FROM: LANL - Late 1984
ITEM NAME : Downhole Accelerometer Sonde
TECHNOL. TYPE : HARDWARE FUNCTION: For acoustic mapping from inclined wellbores.
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : B. Dennis
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 184 ACCESS# 1384 Detonator Acoustic Source TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1184 IN USE? : Y BEST INFO FROM: LANL - Late 1984
ITEM NAME : Detonator Acoustic Source
TECHNOL. TYPE : HARDWARE FUNCTION: Provides an acoustic signal for geophone calibration.
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : B. Dennis
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: Reynolds Industries PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 185 ACCESS# 1385 Downhole Explosive Devices TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1185 IN USE? : Y BEST INFO FROM: LANL - Late 1985
ITEM NAME : Downhole Explosive Devices
TECHNOL. TYPE : HARDWARE FUNCTION: Initiate fracturing, aid in side-tracking & cut stuck pipes.
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : B. Dennis
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 186 ACCESS# 1386 Arm Caliper Tool TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1186 IN USE? : Y BEST INFO FROM: LANL - Late 1984
ITEM NAME : Three-Independent-Arm Caliper Tool
TECHNOL. TYPE : HARDWARE FUNCTION: Exact measurement of borehole/sensitive inspection of casing
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : B. Dennis
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 187 ACCESS# 1387 Gamma Ray Detector TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1187 IN USE? : Y BEST INFO FROM: LANL
ITEM NAME : Downhole Gamma Ray Detector
TECHNOL. TYPE : HARDWARE FUNCTION: Well logging & w/radioactive tracers for fluid flow investi.
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : B. Dennis
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 188 ACCESS# 1388 Temperature Probes TASK STEP: F/LIST/ITEM TASK STATUS: AAAFA
CONTROL# 1188 IN USE? : Y BEST INFO FROM: LANL - Late 1984
ITEM NAME : Temperature Probes
TECHNOL. TYPE : HARDWARE FUNCTION: For well logging & identifying fluid flow in & out of well.
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : B. Dennis
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 189 ACCESS# 1389 Collar Locator TASK STEP: F/LIST TASK STATUS: AAC
CONTROL# 1189 IN USE? : Y BEST INFO FROM: LANL
ITEM NAME : Precision Collar Locator
TECHNOL. TYPE : HARDWARE FUNCTION: Also incorporated in downhole tools for depth reference.
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : B. Dennis
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 190 ACCESS# 1390 Heat Pipes TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1190 IN USE? : Y BEST INFO FROM: LANL - Late 1984
ITEM NAME : Small Heat Pipes
TECHNOL. TYPE : HARDWARE FUNCTION: Transport heat from source to sink within the dewars.
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 191 ACCESS# 1391 Geophones TASK STEP: F/LIST TASK STATUS: AAC
CONTROL# 1191 IN USE? : Y BEST INFO FROM: LANL
ITEM NAME : Downhole Acoustic Sonde-Geophones
TECHNOL. TYPE : HARDWARE FUNCTION:
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSION YR LAST R&D: 78 YR READY: 78 YR FIRST USED: 78
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : B. DENNIS
R&D FIRM : Mark Products U.S. R&D FIRM CONTACT:
PRODUCING FIRM: Mark Products U.S. PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 192 ACCESS# 1392 High-Temp. Explosives TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1192 IN USE? : Y BEST INFO FROM: LANL - Late 1984
ITEM NAME : High-Temperature Termally Stable Chemical Explosives
TECHNOL. TYPE : HARDWARE FUNCTION: Used as downhole explosive devices.
SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Also developed by U.S. Air Force.

DB# 193 ACCESS# 4293 Bearing/Seal Test Facility TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1193 IN USE? : N BEST INFO FROM: Sandia Annual Reports
ITEM NAME : High Pressure Temperature Bearing/Seal Package Test Facility
TECHNOL. TYPE : TEST FACILITY FUNCTION:
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: YR LAST R&D: 83 YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : Terra Tek R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 194 ACCESS# 4294 Laboratory Drilling Rig TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1194 IN USE? : Y BEST INFO FROM: Sandia Annual Reports
ITEM NAME : Laboratory Drilling Rig
TECHNOL. TYPE : TEST FACILITY FUNCTION: Test drill bit mechanics.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Under modification, 1985.

DB# 195 ACCESS# 4295 Surfactant Test Facility TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1195 IN USE? : N BEST INFO FROM: Sandia Annual Reports
ITEM NAME : Foam Surfactant Screening Apparatus
TECHNOL. TYPE : FUNCTION:
SYSTEM LEVEL : XFER STATUS: YR LAST R&D: 80 YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Not used since 1980.

DB# 196 ACCESS# 4296 Foam Autoclave Test Facility TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1196 IN USE? : Y BEST INFO FROM: Sandia Annual Reports
ITEM NAME : Foam Autoclave Test Facility
TECHNOL. TYPE : FUNCTION:
SYSTEM LEVEL : XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 197 ACCESS# 4297 Foam Rheology Test Rig TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1197 IN USE? : Y BEST INFO FROM: Sandia Annual Reports
ITEM NAME : Foam Rheology Test Facility
TECHNOL. TYPE : FUNCTION:
SYSTEM LEVEL : XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 198 ACCESS# 4298 Foam Heat Transfer Tester TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1198 IN USE? : Y BEST INFO FROM: Sandia Annual Reports
ITEM NAME : Foam Heat Transfer Test Facility
TECHNOL. TYPE : FUNCTION:
SYSTEM LEVEL : XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 199 ACCESS# 4299 Lost-Circ. Mater. Test Rig TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1199 IN USE? : Y BEST INFO FROM: Sandia Annual Reports
ITEM NAME : Lost Circulation Materials Screening Apparatus
TECHNOL. TYPE : FUNCTION:
SYSTEM LEVEL : XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 200 ACCESS# 4200 Lost Circ. Test Facility TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1200 IN USE? : Y BEST INFO FROM: Sandia Annual Reports
ITEM NAME : Lost Circulation Test Facility
TECHNOL. TYPE : FUNCTION:
SYSTEM LEVEL : XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 201 ACCESS# 4201 PDC Cutter Test Rig TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1201 IN USE? : Y BEST INFO FROM: Sandia Annual Reports
ITEM NAME : PDC Single Cutter Facility
TECHNOL. TYPE : FUNCTION:
SYSTEM LEVEL : XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 202 ACCESS# 4202 HT/HP Viscometer TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1202 IN USE? : BEST INFO FROM: Sandia Annual Reports
ITEM NAME : High Temperature, High Pressure Viscometer
TECHNOL. TYPE : FUNCTION:
SYSTEM LEVEL : XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: Fann Industries PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 203 ACCESS# 4203 Bit Hydraulics Test Stand TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1203 IN USE? : Y BEST INFO FROM: Sandia Annual Reports
ITEM NAME : Bit Hydraulics Test Stand
TECHNOL. TYPE : FUNCTION:
SYSTEM LEVEL : XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 204 ACCESS# 4204 Flexible Pipe Test Rig TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1204 IN USE? : N BEST INFO FROM: Sandia Annual Reports
ITEM NAME : Flexible Drill Pipe/Liner Test Device
TECHNOL. TYPE : FUNCTION:
SYSTEM LEVEL : XFER STATUS: YR LAST R&D: 82 YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : L'Garde R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 205 ACCESS# 4205 Drilling Fluid Test System TASK STEP: WRITING TASK STATUS: AA
CONTROL# 1205 IN USE? : BEST INFO FROM: Sandia Annual Reports
ITEM NAME : Geothermal Drilling Fluid Test System
TECHNOL. TYPE : FUNCTION:
SYSTEM LEVEL : XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : Sandia LAB DIRECTOR : R. Traeger
LAB TECH MNGER: J. Kelsey LAB CONTACT : J. Kelsey
R&D FIRM : N L Baroid (Houston) R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 206 ACCESS# 3815 G.P. Scaling Control TASK STEP: MERIDIAN WRITES TASK STATUS: BA
CONTROL# 206 IN USE? : BEST INFO FROM: D. Lombard / Mason Tomson
ITEM NAME : Geopressured Scaling Control Technology
TECHNOL. TYPE : PROCESS FUNCTION: R & D on Scale Control
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: ENGINEER.DEVEL YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : D. Lombard USED AT PLANT :
DOE OPS OFFICE: NONE OPS CONTACT :
R&D LAB : Rice Un.,Houston LAB DIRECTOR :
LAB TECH MNGER: M. Tomson LAB CONTACT : M. Tomson
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Supported by Gas Research Institute (not DOE)

DB# 207 ACCESS# 8815 USGS GeoPress. Database TASK STEP: MERIDIAN WRITES TASK STATUS: BA
CONTROL# 207 IN USE? : BEST INFO FROM: D. Lombard (5/30/85)
ITEM NAME : USGS Database on Gulf Coast Geopressured Wells
TECHNOL. TYPE : DATABASE FUNCTION: At: USGS, Bay St.Louis, Mississippi
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. Wallace USED AT PLANT :
DOE OPS OFFICE: NONE OPS CONTACT :
R&D LAB : USGS LAB DIRECTOR :
LAB TECH MNGER: T. Kramer LAB CONTACT : T. Kramer
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Get to Tom Kramer via Ray Wallace, GHTD.

DB# 208 ACCESS# 3811 G.P. Rock Behavior TASK STEP: WRITING TASK STATUS: BA
CONTROL# 208 IN USE? : BEST INFO FROM: D. Lombard
ITEM NAME : Mechanical Behavior of Geopressured Reservoir Rocks*
TECHNOL. TYPE : PROCESS FUNCTION: Improve predictability of production
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: ENGINEER. DEVEL YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : D. Lombard USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :P. Brookshire
R&D LAB : U. of Texas, Austin LAB DIRECTOR : M. Dorfman
LAB TECH MNGER: K. Gray LAB CONTACT : K. Gray
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : *Under production conditions

DB# 209 ACCESS# 3810 G.P. Well Log Interpretation TASK STEP: WRITING TASK STATUS: BA
CONTROL# 209 IN USE? : BEST INFO FROM: D. Lombard
ITEM NAME : Geopressured Well Log Interpretation Methods
TECHNOL. TYPE : PROCESS FUNCTION: Locate and understand production zones
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: ADVANCED. DEVEL YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : D. Lombard USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :P. Brookshire
R&D LAB : U. of Texas, Austin LAB DIRECTOR : M. Dorfman
LAB TECH MNGER: H. Dunlap* LAB CONTACT : H. Dunlap*
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : *Dept.of Petroleum Engineering

DB# 210 ACCESS# 2810 G.P. Reservoir Model TASK STEP: WRITING TASK STATUS: BA
CONTROL# 210 IN USE? : BEST INFO FROM: D. Lombard / D. Riney
ITEM NAME : Geopressured Reservoir Behavior Model
TECHNOL. TYPE : SOFTWARE FUNCTION: Analyze and predict production behavior
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: ADVANCED> DEVEL YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : D. Lombard USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :P. Brookshire
R&D LAB : S-CUBED LAB DIRECTOR :
LAB TECH MNGER: D. Riney LAB CONTACT : D. Riney
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: S-CUBED PRODUCER CONTACT: D. Riney
USED BY : USER CONTACT :
COMMENT :

DB# 211 ACCESS# 1635 Binary Cycle Materials TASK STEP: F/LIST TASK STATUS: BAC
CONTROL# 211 IN USE? : Y BEST INFO FROM: L. Pratsch / A. Adduci
ITEM NAME : Binary Power Plant Materials Analysis
TECHNOL. TYPE : HARDWARE FUNCTION: Reduce downtime in geothermal power plants
SYSTEM LEVEL : MATERIAL XFER STATUS: FIELD TEST YR LAST R&D: YR READY: 85 YR FIRST USED: 85
GHTD CONTACT : L. Pratsch USED AT PLANT : Heber, CA
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : Radian R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : SDG&E USER CONTACT : R. Lacy
COMMENT : Describe this as "Research/Analysis"

DB# 212 ACCESS# Hydrocarbon Turbine TASK STEP: WRITING TASK STATUS: BA
CONTROL# 212 IN USE? : BEST INFO FROM: L. Pratsch / A. Adduci
ITEM NAME : Commercial Size Hydrocarbon Turbine
TECHNOL. TYPE : TEST FACILITY FUNCTION: Generate power
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: FIELD TEST YR LAST R&D: YR READY: 85 YR FIRST USED: 85
GHTD CONTACT : L. Pratsch USED AT PLANT : Heber, CA
DOE OPS OFFICE: SAN OPS CONTACT :
R&D LAB : LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : Fluor R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : SDG&E USER CONTACT : R. Lacy
COMMENT :

DB# 213 ACCESS# 4411 Binary Cooling Tower TASK STEP: WRITING TASK STATUS: BA
CONTROL# 213 IN USE? : Y BEST INFO FROM: L. Pratsch / A. Adduci
ITEM NAME : Heber Binary Plant Cooling Tower
TECHNOL. TYPE : TEST FACILITY FUNCTION: Cooling binary power plant
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: FIELD TEST YR LAST R&D: 81 YR READY: 85 YR FIRST USED: 85
GHTD CONTACT : L. Pratsch USED AT PLANT : Heber, CA
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : Fluor R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : SDG&E USER CONTACT : R. Lacy
COMMENT :

DB# 214 ACCESS# 8810 G. P. Bibliography TASK STEP: WRITING TASK STATUS: BA
CONTROL# 214 IN USE? : BEST INFO FROM: D. Lombard / K. Sepehrnoori
ITEM NAME : Geopressured Technology Bibliographic System
TECHNOL. TYPE : DATABASE FUNCTION: Retrieve Geopressured technical information
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : D. Lombard USED AT PLANT : G. P. Design Wells
DOE OPS OFFICE: IDO OPS CONTACT :P. Brookshire
R&D LAB : U. of Texas, Austin LAB DIRECTOR : M. Dorfman
LAB TECH MNGER: K. Sepehrnoori LAB CONTACT : K. Sepehrnoori
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Contains abstracts on 1500-plus reports

DB# 215 ACCESS# 1630 Process Control Instruments TASK STEP: WRITING TASK STATUS: BA
CONTROL# 215 IN USE? : Y BEST INFO FROM: G. Hooper, L.Pratsch
ITEM NAME : In-Plant Brine Chemistry Monitoring
TECHNOL. TYPE : HARDWARE FUNCTION: Electric Plant Analysis and Control
SYSTEM LEVEL : COMPONENT XFER STATUS: FIELD TEST YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : G. Hooper USED AT PLANT : Heber Binary Plant
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : PNL LAB DIRECTOR : D. Shannon
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : pH,CO2, Corrosiom, Redox, Particulates, Pitting.

DB# 216 ACCESS# 3620 Toxic Waste Disposal TASK STEP: WRITING TASK STATUS: BA
CONTROL# 216 IN USE? : BEST INFO FROM: G. Hooper 6/12/85
ITEM NAME : Environmental: Toxic Waste Disposal
TECHNOL. TYPE : PROCESS FUNCTION: Methods for Handling Toxic Wastes from Brines
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: FIELD TEST YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : R. LaSala USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : Brookhaven LAB DIRECTOR : L. Kukacka
LAB TECH MNGER: L. Kukacka LAB CONTACT : L. Kukacka
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Report is in Progress?

DB# 217 ACCESS# 1631 Materials in Binary Cycle TASK STEP: WRITING TASK STATUS: BA
CONTROL# 217 IN USE? : Y BEST INFO FROM: G. Hooper 6/12/85
ITEM NAME : Brine/Materials Compatibility in Binary Plants
TECHNOL. TYPE : HARDWARE FUNCTION: Data on Fiels Testing of Coupons, Probes
SYSTEM LEVEL : MATERIAL XFER STATUS: FIELD TEST YR LAST R&D: YR READY: 85 YR FIRST USED:
GHTD CONTACT : G. Hooper USED AT PLANT : Magma Binary
DOE OPS OFFICE: SAN OPS CONTACT :A. Adduci
R&D LAB : PNL LAB DIRECTOR : D. Shannon
LAB TECH MNGER: D. Shannon LAB CONTACT : D. Shannon
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Tech. Report is Almost Done. 7-Year Exposure.

DB# 218 ACCESS# 2630 Scale Deposition Prediction TASK STEP: WRITING TASK STATUS: BA
CONTROL# 218 IN USE? : BEST INFO FROM: G .Hooper 6/12/85
ITEM NAME : Computer Model to Predict Scaling in Power Plants
TECHNOL. TYPE : SOFTWARE FUNCTION: Reduce Power Plant Downtime
SYSTEM LEVEL : MATERIAL XFER STATUS: ADVANCED. DEVEL YR LAST R&D: 85 YR READY: YR FIRST USED:
GHTD CONTACT : G. Hooper USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :
R&D LAB : U.Cal.,San Diego LAB DIRECTOR : J. Weare
LAB TECH MNGER: J. Weare LAB CONTACT : J. Weare
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Models Brine Chemistry in Process Stream.

DB# 219 ACCESS# Borehole Acoustic Televiewer TASK STEP: F/ITEM TASK STATUS: CBBFA
CONTROL# IN USE? : BEST INFO FROM: LANL
ITEM NAME : Borehole Acoustic Televiewer
TECHNOL. TYPE : COMPONENT FUNCTION:
SYSTEM LEVEL : COMPONENT XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : USED AT PLANT :
DOE OPS OFFICE: OPS CONTACT :
R&D LAB : LANL LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT : B. Dennis
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 220 ACCESS# Spinner/T/P Collar Locator TASK STEP: F/ITEM TASK STATUS: CBBFA
CONTROL# IN USE? : BEST INFO FROM: LANL
ITEM NAME : Spinner/Temperature/Pressure With Collar Locator
TECHNOL. TYPE : COMPONENT FUNCTION: Acurate pressure measurements, maintaining infinite resolutn
SYSTEM LEVEL : COMPONENT XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : USED AT PLANT :
DOE OPS OFFICE: OPS CONTACT :
R&D LAB : LANL LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT : B. Dennis
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 221 ACCESS# Detonator Tool TASK STEP: F/ITEM TASK STATUS: CBBFA
CONTROL# IN USE? : BEST INFO FROM: LANL
ITEM NAME : Slimline Detonator Tool and String Shot
TECHNOL. TYPE : HARDWARE FUNCTION: Detonator Carrier
SYSTEM LEVEL : COMPONENT XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : USED AT PLANT :
DOE OPS OFFICE: OPS CONTACT :
R&D LAB : LANL LAB DIRECTOR :
LAB TECH MNGER: LAB CONTACT : B. Dennis
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 222 ACCESS# 12XX Cement Placement Tool TASK STEP: F/LIST/ITEM TASK STATUS: CBAFA
CONTROL# IN USE? : N BEST INFO FROM: LANL
ITEM NAME : Double Wiper Plug Down Hole Cementing Tool
TECHNOL. TYPE : HARDWARE FUNCTION: Supports Cement Placement
SYSTEM LEVEL : COMPONENT XFER STATUS: ADVANCED DEVEL. YR LAST R&D: 84 YR READY: YR FIRST USED:
GHTD CONTACT : J. Rannels USED AT PLANT :
DOE OPS OFFICE: ALO OPS CONTACT :G. Tennyson
R&D LAB : LANL LAB DIRECTOR : J. Whetton
LAB TECH MNGER: LAB CONTACT : D. Dreesen
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: Brown Hughes, TX PRODUCER CONTACT: Rod Bennet
USED BY : USER CONTACT :
COMMENT : Prototype Successfully Spotted Cement Plug in HDR well EE-3

DB# 223 ACCESS# Mapping Fracture-Dominated Flw TASK STEP: F/LIST/ITEM TASK STATUS: CBAFA
CONTROL# IN USE? : Y BEST INFO FROM: Proc. of the Geothermal Resource Counsil
ITEM NAME : Mapping Flow Path in Fractue-Dominated Reservoirs
TECHNOL. TYPE : PROCESS FUNCTION:
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: ADVANCED YR LAST R&D: 82 YR READY: 84 YR FIRST USED:
GHTD CONTACT : A. David Allen USED AT PLANT :
DOE OPS OFFICE: H.Q. OPS CONTACT :
R&D LAB : Los Alamos LAB DIRECTOR :
LAB TECH MNGER: James Albright LAB CONTACT :
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

***** GEOTHERMAL TECHNOLOGIES DATABASE ********* DATE: 03/19/86

DB# 224 ACCESS# 30XX Well Log Data Base Management` TASK STEP: F/LIST/ITEM TASK STATUS: CBAFA
CONTROL# IN USE? : Y BEST INFO FROM: P. E. Wannamaker
ITEM NAME : Geophysical Well Log Database Management-WELLOG
TECHNOL. TYPE : SOFTWARE FUNCTION: Geophysical Well Log database Management & Plotting Systems
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 81 YR READY: 81 YR FIRST USED: 79
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : UURI/ESL LAB DIRECTOR : P. M. Wright
LAB TECH MNGER: P. M. Wright LAB CONTACT : P. E. wannamakr
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Computer Program Made Public by UURI/ESL, NESC (Argonne, IL)

DB# 225 ACCESS# 31XX Borehole Geophysical Research TASK STEP: F/LIST/ITEM TASK STATUS: CBAFA
CONTROL# IN USE? : Y BEST INFO FROM: Geophysics, v. 50
ITEM NAME : Borehole Geophysical Research for Fracture Detection
TECHNOL. TYPE : PROCESS FUNCTION: Design system based on theoretical model responses
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 85 YR READY: YR FIRST USED: 83
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: IDOSFO OPS CONTACT :S. Prestwich
R&D LAB : UURI/ESL LAB DIRECTOR : P. M. Wright
UU/GG
LAB TECH MNGER: P. M. Wright LAB CONTACT : S. H. Ward
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Model results published in GEOPHYSICS
system design in prog

DB# 226 ACCESS# 30XX Geothermal Exploration Strateg TASK STEP: F/LIST/ITEM TASK STATUS: CBAFA
CONTROL# IN USE? : Y BEST INFO FROM: AAPG Bull. 65, 86-102
ITEM NAME : Geothermal exploration strategy
TECHNOL. TYPE : PROCESS FUNCTION: Industries exploration techniques and strategy
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 81 YR READY: 81 YR FIRST USED: 80
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : UURI/ESL LAB DIRECTOR : P.M. Wright
LAB TECH MNGER: P.M. Wright LAB CONTACT : H. P. Ross
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Publication in AAPG Bull., reprinted in AAPG/EMD monograph

DB# 227 ACCESS# 30XX Geothermal Well Cuttings TASK STEP: F/LIST/ITEM TASK STATUS: CBAFA
CONTROL# IN USE? : Y BEST INFO FROM: P. M. Wright
ITEM NAME : Interpretation of drill cuttings from geothermal wells
TECHNOL. TYPE : PROCESS FUNCTION: Disseminate subject knowledge to industry geologists&enginee
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 81 YR READY: 78 YR FIRST USED: 78
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S.Preswich
R&D LAB : UURI/ESL LAB DIRECTOR : P.M. Wright
LAB TECH MNGER: P. M. Wright LAB CONTACT : J. B. Hulen
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : various USER CONTACT :
COMMENT : Paper in SPWLA regarding interpretation of well cuttings

DB# 228 ACCESS# 31XX Geologic Model-Baca Reservoir TASK STEP: F/LIST/ITEM TASK STATUS: CBAFA
CONTROL# IN USE? : Y BEST INFO FROM: D. L. Nielson
ITEM NAME : Geologic model of Baca geothermal reservoir
TECHNOL. TYPE : PROCESS FUNCTION: Determine nature, location and potential of production zones
SYSTEM LEVEL : XFER STATUS: DIFFUSION YR LAST R&D: YR READY: 84 YR FIRST USED: 83
GHTD CONTACT : M. Reed USED AT PLANT : Baca
DOE OPS OFFICE: SAN OPS CONTACT :M. Molloy
R&D LAB : UURI/ESL LAB DIRECTOR : P. M. Wright
LAB TECH MNGER: P. M. Wright LAB CONTACT : D. L. Nielson
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 229 ACCESS# 30XX Gas Contents-Geothermal Fluids TASK STEP: F/LIST/ITEM TASK STATUS: CBAFA
CONTROL# IN USE? : N BEST INFO FROM: J. N. Moore
ITEM NAME : Gas contents of geothermal fluids
TECHNOL. TYPE : PROCESS FUNCTION: Determine true gas compositions of fluids in subsurface stat
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED: 85
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: SAN OPS CONTACT :M. Molloy
R&D LAB : UURI/ESL LAB DIRECTOR : P. M. Wright
LAB TECH MNGER: P. M. Wright LAB CONTACT : J. N. Moore
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Novel investigation of fluid inclusions-in progress (85)

DB# 230 ACCESS# 80XX State Coupled Resource Assess. TASK STEP: F/LIST/ITEM TASK STATUS: CBAFA
CONTROL# IN USE? : Y BEST INFO FROM: Duncan Foley
ITEM NAME : State Coupled Geothermal Resource Assessment Program
TECHNOL. TYPE : DATABASE FUNCTION: Provide technical support to state geothermal teams
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED: 77
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Preswich
R&D LAB : UURI/ESL LAB DIRECTOR : P. M. Wright
LAB TECH MNGER: P. M. Wright LAB CONTACT : D. Foley
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : State geothermal resource maps released to public

DB# 231 ACCESS# 30XX Geologic Occurence G.T.Resourc TASK STEP: F/LIST/ITEM TASK STATUS: CBAFA
CONTROL# IN USE? : Y BEST INFO FROM: GRC Spec. Report No. 9
ITEM NAME : Nature and Geologic Occurance of Geothermal Resources
TECHNOL. TYPE : PROCESS FUNCTION: Information Dissemination: U.S. geothermal resource types
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: 83 YR FIRST USED: 80
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : UURI/ESL LAB DIRECTOR : P. M. Wright
LAB TECH MNGER: P. M. Wright LAB CONTACT : P. M. Wright
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Published key paper on subject in GRC Bull.

DB# 232 ACCESS# 30xx Self-Potential Theory&Programs TASK STEP: F/LIST/ITEM TASK STATUS: CBAFA
CONTROL# IN USE? : Y BEST INFO FROM: Geophysics, v. 48, 76-83
ITEM NAME : Self- Potential Data Interpretation- Theory&Comp. Programs
TECHNOL. TYPE : SOFTWARE FUNCTION: Explain SP anomalies in geothermal areas&provide model cap.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 82 YR READY: 82 YR FIRST USED: 82
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : UURI/ESL, UU/GG LAB DIRECTOR : P. M. Wright
LAB TECH MNGER: P. M. Wright LAB CONTACT : P. M. Wright
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Theory published in GEOPHYSICS, Software at NECS (Argonne,IL

DB# 233 ACCESS# 30xx Magnetotelluric Data Interpret TASK STEP: F/LIST/ITEM TASK STATUS: CBAFA
CONTROL# IN USE? : Y BEST INFO FROM: P. E. Wannamaker
ITEM NAME : Magnetotelluric Data Inter.: Theory, Methodology, Comp. Algo
TECHNOL. TYPE : SOFTWARE FUNCTION: Evaluate use of MT in geothermal exploration, improve inter.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 82 YR READY: 81 YR FIRST USED: 79
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Preswich
R&D LAB : UURI/ESL, UU/GG LAB DIRECTOR : P. M. Wright
LAB TECH MNGER: P. M. Wright LAB CONTACT : P. Wannamaker
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : various USER CONTACT :
COMMENT : Publications & modeling programs have advanced state-of-art

DB# 234 ACCESS# 30xx Computer Prog. for Geophysics TASK STEP: F/LIST/ITEM TASK STATUS: CBAFA
CONTROL# IN USE? : Y BEST INFO FROM: P. E. Wannamaker
ITEM NAME : Computer programs for geophysical data interpretation
TECHNOL. TYPE : SOFTWARE FUNCTION: Improve geophysical data inter. through modeling & reports
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 82 YR READY: 82 YR FIRST USED: 78
GHTD CONTACT : M.Reed USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : UURI/ESL, UU/GG LAB DIRECTOR : P. M. Wright
LAB TECH MNGER: P. M. Wright LAB CONTACT : P. Wannamaker
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : various USER CONTACT :
COMMENT : Computer programs made public by UURI/ESL, NESC (Argonne, IL

DB# 235 ACCESS# 31xx Tracer Invest. for Injection TASK STEP: F/LIST/ITEM TASK STATUS: CBAFA
CONTROL# IN USE? : Y BEST INFO FROM: P. M. Wright
ITEM NAME : Tracer Investigations for Geothermal Injections
TECHNOL. TYPE : PROCESS FUNCTION: Integrate reservior vol. & char. through injection testing
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: YR READY: YR FIRST USED: 82
GHTD CONTACT : M. Reed USED AT PLANT : Raft River, East Mesa
DOE OPS OFFICE: IDO OPS CONTACT :S. Preswich
R&D LAB : UURI/ESL, EG&G LAB DIRECTOR : P. M. Wright
LAB TECH MNGER: P. M. Wright LAB CONTACT : J. N. Moore
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : Development and testing of high temperature tracers

DB# 236 ACCESS# 30xx Trace Element Geochemistry TASK STEP: F/LIST/ITEM TASK STATUS: CBAFA
CONTROL# IN USE? : Y BEST INFO FROM: J. N. Moore
ITEM NAME : Trace Element Geochemistry of Hydrothermal Systems
TECHNOL. TYPE : PROCESS FUNCTION: Find position of well in reservoir, temp. potential,fracture
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 84 YR READY: 80 YR FIRST USED: 80
GHTD CONTACT : M. Reed USED AT PLANT : The Gysers, Roosevelt Hot Spr.
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : UURI/ESL LAB DIRECTOR : P. M. Wright
LAB TECH MNGER: P. M. Wright LAB CONTACT : J. N. Moore
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : ,Devel. models for Roos. Hot Springs, The Gysers, CO.

DB# 237 ACCESS# 46xx Scale Inhibitors: Injection TASK STEP: F/LIST/ITEM TASK STATUS: CBAFA
CONTROL# IN USE? : N BEST INFO FROM: J. N. Moore
ITEM NAME : Scale Inhibitor Effectiveness: The Injection Backflow Tech.
TECHNOL. TYPE : PROCESS FUNCTION: Determine extent of prod. scale deposition through injection
SYSTEM LEVEL : MATERIAL XFER STATUS: FIELD TEST YR LAST R&D: YR READY: YR FIRST USED: 84
GHTD CONTACT : M. Reed USED AT PLANT : East Mesa
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : UURI/ESL LAB DIRECTOR : P. M. Wright
LAB TECH MNGER: P. M. Wright LAB CONTACT : J. N. Moore
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 238 ACCESS# 80xx Exploration Technique-D.Base TASK STEP: F/LIST/ITEM TASK STATUS: CBAFA
CONTROL# IN USE? : Y BEST INFO FROM: Dennis Nielson
ITEM NAME : Explorations tech.- field surveys, critique, and database
TECHNOL. TYPE : PROCESS FUNCTION: Exploration ,methodology dissemination thru wrkshops, publ.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 82 YR READY: 80 YR FIRST USED: 80
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : UURI/ESL, UU/GG LAB DIRECTOR : P. M. Wright
LAB TECH MNGER: P. M. Wright LAB CONTACT :
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT : relflection seismic, geochemistry&self-pot. surveys, ect.,

DB# 239 ACCESS# 30xx Geologic Mapping-Geother. Area TASK STEP: F/LIST/ITEM TASK STATUS: CBAFA
CONTROL# IN USE? : Y BEST INFO FROM: P. M. Wright
ITEM NAME : mapping of 8 high temp & several low temp. western resources
TECHNOL. TYPE : PROCESS FUNCTION: Dev. primary geologic d.base for resource eval.inUT,ID,ND,CA
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 82 YR READY: 79 YR FIRST USED: 79
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : UURI/ESL LAB DIRECTOR : P. M. Wright
LAB TECH MNGER: P. M. Wright LAB CONTACT : D. L. Nielson
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : various USER CONTACT :
COMMENT : Map base for forming unit,(Roosevelt H.S.), exploration

DB# 240 ACCESS# 30xx Fluid Movement in Volc. Terr. TASK STEP: F/LIST/ITEM TASK STATUS: CBAFA
CONTROL# IN USE? : N BEST INFO FROM: J. N. Moore
ITEM NAME : Fluid Movement in Volcanic Terraines
TECHNOL. TYPE : PROCESS FUNCTION: Determine probable prod. zones & potential volc. reservoirs
SYSTEM LEVEL : XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED: 84
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : UURI/ESL LAB DIRECTOR : P. M. Wright
LAB TECH MNGER: P. M. Wright LAB CONTACT : J. N. Moore
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 241 ACCESS# High Temperature Drilling Jars TASK STEP: F/LIST/ITEMS TASK STATUS: CBBFA
CONTROL# IN USE? : Y BEST INFO FROM: LAMS-9671-HDR, Gloria Bennett
ITEM NAME : High Temperature Drilling Jars
TECHNOL. TYPE : HARDWARE FUNCTION:
SYSTEM LEVEL : COMPONENT XFER STATUS: ADVANCED DEVEL. YR LAST R&D: YR READY: 85 YR FIRST USED:
GHTD CONTACT : George Tennyson USED AT PLANT :
DOE OPS OFFICE: ALOO OPS CONTACT :G. Tennyson
R&D LAB : Los Alamos Nat. Lab LAB DIRECTOR : J. Whetten
LAB TECH MNGER: Bert Dennis LAB CONTACT : Gloria Bennett
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: Los Alamos Nat. Lab PRODUCER CONTACT: Bert Dennis
USED BY : Los Alamos Nat. Lab USER CONTACT : Bert Dennis
COMMENT :

DB# 242 ACCESS# PTC CompOuter Code TASK STEP: F/LIST/ITEM TASK STATUS: CBAFA
CONTROL# IN USE? : BEST INFO FROM: C. H. Lai, G. S. Bodvarsson-LBL
ITEM NAME : PTC (for Pressure, Temperature and Chemical)
TECHNOL. TYPE : SOFTWARE FUNCTION: Numerical simulation of mass, heat chem. trans. in porous
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: FIELD TEST YR LAST R&D: 85 YR READY: 85 YR FIRST USED: 85
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: MOLLOY OPS CONTACT :
R&D LAB : LBL LAB DIRECTOR : M. Lippmann
LAB TECH MNGER: M. Lippmann LAB CONTACT : Lai, Bodvarsson
R&D FIRM : LBL R&D FIRM CONTACT:
PRODUCING FIRM: LBL PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 243 ACCESS# PT Computer Code TASK STEP: F/LIST/ITEM TASK STATUS: CBAFA
CONTROL# IN USE? : Y BEST INFO FROM: G. S. Bodvarsson - LBL
ITEM NAME : PT (For Pressure and Temperature)
TECHNOL. TYPE : SOFTWARE FUNCTION: Num. simulation of fluid & heat flow in frac. or porous med.
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 82 YR READY: 82 YR FIRST USED: 80
GHTD CONTACT : M. Reed USED AT PLANT :
DOE OPS OFFICE: MOLLOY OPS CONTACT :
R&D LAB : LBL LAB DIRECTOR : M. Lippmann
LAB TECH MNGER: M. Lippmann LAB CONTACT : G. Bodvarsson
R&D FIRM : LBL R&D FIRM OONTACT:
PRODUCING FIRM: LBL PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

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DB#     244  ACCESS#          Mapping Frac. Dominated Flow     TASK STEP: F/LIST/ITEM      TASK STATUS: CBAFA
CONTROL#        IN USE? : Y   BEST INFO FROM: Proc. of the Geothermal Resource Counsil
ITEM NAME      : Mapping Flow Path in Fracture-Dominated Reservoirs
TECHNOL. TYPE : PROCESS              FUNCTION:
SYSTEM LEVEL  : SUBSYSTEM            XFER STATUS: ADVANCED          YR LAST R&D: 82  YR READY: 84  YR FIRST USED:
GHTD CONTACT  : A. David Allen       USED AT PLANT    :
DOE OPS OFFICE: HQ                   OPS CONTACT      :
R&D LAB       : Los Alamos           LAB DIRECTOR     :
LAB TECH MNGER: James Albright       LAB CONTACT      :
R&D FIRM      :                      R&D FIRM CONTACT:
PRODUCING FIRM:                      PRODUCER CONTACT:
USED BY       :                      USER CONTACT     :
COMMENT       :

DB#     245  ACCESS#          Passive Thermal Protection sys   TASK STEP: F/LIST/ITEM      TASK STATUS: CBAFA
CONTROL#        IN USE? : Y   BEST INFO FROM: LAMS-9671-HDR, Gloria Bennett
ITEM NAME      : Passive Thermal Protection System for Downhole Electronics
TECHNOL. TYPE : PROCESS/H.BOOK       FUNCTION:
SYSTEM LEVEL  : SUBSYSTEM            XFER STATUS: ADVANCED DEVEL.   YR LAST R&D:     YR READY: 85  YR FIRST USED:
GHTD CONTACT  : G. Tennyson          USED AT PLANT    :
DOE OPS OFFICE: ALOO                 OPS CONTACT      :G. Tennyson
R&D LAB       : Los Alamos Nat. Lab  LAB DIRECTOR     : J. Whetton
LAB TECH MNGER: B. Dennis            LAB CONTACT      : G. Bennet
R&D FIRM      :                      R&D FIRM CONTACT:
PRODUCING FIRM: Los Alamos Nat. Lab  PRODUCER CONTACT: Burt Dennis
USED BY       : Los Alamos Nat. Lab  USER CONTACT     : Burt Dennis
COMMENT       :

DB#     246  ACCESS#          Injection Backflow Test          TASK STEP: F/LIST           TASK STATUS: CBC
CONTROL#        IN USE? : Y   BEST INFO FROM: INEL/UURI Reports
ITEM NAME      : Injection Backflow Test Technique
TECHNOL. TYPE : TEST                 FUNCTION:  Single Well Reservoir Test and Water Rock Interaction
SYSTEM LEVEL  :                      XFER STATUS:                YR LAST R&D: 84  YR READY: 83  YR FIRST USED: 83
GHTD CONTACT  : Reed                 USED AT PLANT    : East Mesa, Raft River
DOE OPS OFFICE: IDO                  OPS CONTACT      :S. Prestwich
R&D LAB       : INEL/UURI            LAB DIRECTOR     : G. Sommers
LAB TECH MNGER:                      LAB CONTACT      : S. Spencer
R&D FIRM      :                      R&D FIRM CONTACT:
PRODUCING FIRM:                      PRODUCER CONTACT:
USED BY       : RGI                  USER CONTACT     : D.E. Michels
COMMENT       :

DB#     247  ACCESS#          FRACSL Code                      TASK STEP: F/LIST           TASK STATUS: CRC
CONTROL#        IN USE? : N   BEST INFO FROM:
ITEM NAME      : FRACSL Injection Transport Code
TECHNOL. TYPE : SOFTWARE             FUNCTION:  Transport of injected fluids in fractured reservoirs
SYSTEM LEVEL  :                      XFER STATUS:                YR LAST R&D: 85  YR READY: 86  YR FIRST USED:
GHTD CONTACT  : Reed                 USED AT PLANT    :
DOE OPS OFFICE: IDO                  OPS CONTACT      :S. Prestwich
R&D LAB       : INEL                 LAB DIRECTOR     : G. Sommers
LAB TECH MNGER: S. Spencer           LAB CONTACT      : S. Spencer
R&D FIRM      :                      R&D FIRM CONTACT:
PRODUCING FIRM:                      PRODUCER CONTACT:
USED BY       :                      USER CONTACT     :
COMMENT       :
```

DB# 248 ACCESS# TASK STEP: F/LIST TASK STATUS: CBC
CONTROL# IN USE? : Y BEST INFO FROM: INEL
ITEM NAME : The NM Geothermal Commercialization Program Final Report
TECHNOL. TYPE : FUNCTION:
SYSTEM LEVEL : XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:
GHTD CONTACT : L. Pratsch USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :P. Brookshier
R&D LAB : INEL LAB DIRECTOR : Sommers
LAB TECH MNGER: LAB CONTACT : B. C. Lenis
R&D FIRM : NM Energy& Min. Dept R&D FIRM CONTACT: C. Wentz
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 249 ACCESS# Calcite Scale Control TASK STEP: F/LIST TASK STATUS: CBC
CONTROL# IN USE? : Y BEST INFO FROM:
ITEM NAME : Calcite Scale Inhibitor Squeeze Technique
TECHNOL. TYPE : PROCESS FUNCTION: Long-term control of calcite scale deposition
SYSTEM LEVEL : XFER STATUS: YR LAST R&D: 85 YR READY: 86 YR FIRST USED: 85
GHTD CONTACT : Lombard USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : INEL LAB DIRECTOR :
LAB TECH MNGER: J. Ramsthaler LAB CONTACT : J. Ramsthaler
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 250 ACCESS# Low-Temp. Reservoir Engineerin TASK STEP: F/LIST TASK STATUS: CBC
CONTROL# IN USE? : Y BEST INFO FROM: IDO Report #10099
ITEM NAME : Low to Mod. Temp. Hydrothermal Reservoir Engineering H.Book
TECHNOL. TYPE : HANDBOOK FUNCTION: Survey of methods and equipment
SYSTEM LEVEL : XFER STATUS: YR LAST R&D: 82 YR READY: 82 YR FIRST USED: 82
GHTD CONTACT : Reed USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :S. Prestwich
R&D LAB : INEL/LBL LAB DIRECTOR : G. Sommers
LAB TECH MNGER: LAB CONTACT : S. Spencer
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 251 ACCESS# TASK STEP: F/LIST TASK STATUS: CBC
CONTROL# IN USE? : BEST INFO FROM:
ITEM NAME : MT Geothermal Comm.Planning- Final Report DE FC07-791012014
TECHNOL. TYPE : HANDBOOK FUNCTION:
SYSTEM LEVEL : XFER STATUS: YR LAST R&D: YR READY: 84 YR FIRST USED: 84
GHTD CONTACT : L. Pratsen USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :P. Brookshier
R&D LAB : INEL LAB DIRECTOR : G. L. Sommers
LAB TECH MNGER: LAB CONTACT : B. Lunis
R&D FIRM : MT Dept. of Nat. Res R&D FIRM CONTACT: J. Birkey
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 252 ACCESS# TASK STEP: F/LIST TASK STATUS: CBC
CONTROL# IN USE? : BEST INFO FROM: INEL
ITEM NAME : Resource Development: System Design, Const. and Operation
TECHNOL. TYPE : HANDBOOK FUNCTION: For Geothermal Direct Use Applications DOE/ET/12099-4
SYSTEM LEVEL : XFER STATUS: YR LAST R&D: YR READY: 85 YR FIRST USED: 85
GHTD CONTACT : L. Pratsch USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :L. Brookshier
R&D LAB : INEL LAB DIRECTOR : G. L. Summers
LAB TECH MNGER: LAB CONTACT : B. Lunis
R&D FIRM : ICF, Inc. R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 253 ACCESS# TASK STEP: F/LIST TASK STATUS: CBC
CONTROL# IN USE? : Y BEST INFO FROM: INEL
ITEM NAME : Resource Assessment for Geothermal Direct Use Applications
TECHNOL. TYPE : HANDBOOK FUNCTION: DOE/ET/12099-3
SYSTEM LEVEL : XFER STATUS: YR LAST R&D: YR READY: 85 YR FIRST USED: 85
GHTD CONTACT : L. Pratsch USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :P. Brookshier
R&D LAB : INEL LAB DIRECTOR : G.L. Summers
LAB TECH MNGER: LAB CONTACT : B. Lunis
R&D FIRM : ICF INC. R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 254 ACCESS# 25 Heat Pump Computer Model TASK STEP: F/LIST TASK STATUS: CBC
CONTROL# IN USE? : Y BEST INFO FROM: GEO-Heat Center
ITEM NAME : Heat Pump Heating System Computer Model
TECHNOL. TYPE : SOFTWARE FUNCTION: For Space Heating Analysis and Design
SYSTEM LEVEL : SUBSYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 85 YR READY: 85 YR FIRST USED: 85
GHTD CONTACT : L. Pratsch USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :P. Brookshier
R&D LAB : Geo-Heat Center, OIT LAB DIRECTOR : P. Lienau
LAB TECH MNGER: LAB CONTACT : K. Rafferty
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

DB# 255 ACCESS# 25 Economic Computer Model TASK STEP: F/LIST TASK STATUS: CBC
CONTROL# IN USE? : Y BEST INFO FROM: Geo-Heat Centere, OIT
ITEM NAME : Direct-Use Economic Analysis Spread Sheet
TECHNOL. TYPE : SOFTWARE FUNCTION: For Space and Process Heating Applications
SYSTEM LEVEL : SYSTEM XFER STATUS: DIFFUSION YR LAST R&D: 85 YR READY: 80 YR FIRST USED: 80
GHTD CONTACT : L. Pratsch USED AT PLANT :
DOE OPS OFFICE: IDO OPS CONTACT :P. Brookshier
R&D LAB : Geo-Heat Center, OIT LAB DIRECTOR : P. Lieniau
LAB TECH MNGER: LAB CONTACT :
R&D FIRM : R&D FIRM CONTACT:
PRODUCING FIRM: PRODUCER CONTACT:
USED BY : USER CONTACT :
COMMENT :

***** GEOTHERMAL TECHNOLOGIES DATABASE ********* DATE: 03/19/86

DB# 256 ACCESS# 15 Downhole Heat Exchangers TASK STEP: F/LIST TASK STATUS: CBC

CONTROL# IN USE? : Y BEST INFO FROM: Geo-Heat Center, OIT

ITEM NAME : Eval. & Design of Downhole Heat Exchanger for Direct Appl.

TECHNOL. TYPE : HARDWARE FUNCTION: For Space Heating

SYSTEM LEVEL : COMPONENT XFER STATUS: DIFFUSION YR LAST R&D: 78 YR READY: 79 YR FIRST USED: 79

GHTD CONTACT : L. Pratsch USED AT PLANT : Reno & Klamath Falls

DOE OPS OFFICE: IDO OPS CONTACT :P. Brookshier

R&D LAB : Geo-Heat Center, OIT LAB DIRECTOR : P. Lieniau

LAB TECH MNGER: LAB CONTACT : G. Culver

R&D FIRM : R&D FIRM CONTACT:

PRODUCING FIRM: PRODUCER CONTACT:

USED BY : Residence USER CONTACT : L. Suanevik

COMMENT : Several hundred operating

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DB# 257 ACCESS#

CONTROL# IN USE? : BEST INFO FROM: INEL TASK STEP: F/LIST/ITEM TASK STATUS: CBD

ITEM NAME : From Attached as Desired

TECHNOL. TYPE : FUNCTION:

SYSTEM LEVEL : XFER STATUS: YR LAST R&D: YR READY: YR FIRST USED:

GHTD CONTACT : USED AT PLANT :

DOE OPS OFFICE: IDO OPS CONTACT :Brookshier

R&D LAB : INEL LAB DIRECTOR : Summers

LAB TECH MNGER: LAB CONTACT : S. Prestwich

R&D FIRM : varies R&D FIRM CONTACT:

PRODUCING FIRM: PRODUCER CONTACT:

USED BY : USER CONTACT :

COMMENT :