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WORKSHOP REPORT
ROLE OF DEMONSTRATIONS IN RESERVOIR ASSESSMENT
AND EVALUATING DIFFERENT RESOURCE TYPES

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At Workshop Session 7B, the participants discussed the definition of demonstration as it affects resource developers: Does a developer obtain any benefit from a demonstration or should a demonstration plant just be considered Unit 1 of the regular field development? A contrast was drawn between a pilot plant, whose data is open only to the company sponsoring the plant, and a demonstration project, whose data is open to the public at large. The decision makers who matter to the resource developer are those who can pay for the plant or plants that produce revenue for the field developer. To the developer, the most crucial parameter is the time interval Δt between the time when the developer is satisfied the resource can be sold and the time when the developer is receiving a return on the investment.

A number of points of view were expressed by participants in the workshop discussion. Nearly all addressed the problem of decreasing the time interval between investment and revenue. Views expressed included the following:

- Information versus Testing Time A smaller size plant, operated at an earlier time, will enable the resource developer to have more information to use in selling the resource than would be obtained from short intermittent tests over the longer period it would have taken to build an initial full-size plant.
- Decision Making When do we know enough about the reservoir? An early decision can be made regarding the capability of the reservoir to support the first unit, somewhere in the 10 to 50 MWe

size range. Prolonged data gathering won't add much for the first unit decision. Experience in connection with operation of the first unit, be it "pilot plant" or "demonstration" or whatever, can be valuable for estimating ultimate reservoir capacity and for making decisions on additional units. Thus, a demonstration plant should be viewed primarily as a way to obtain power production early and to provide data for decisions on field capacity and subsequent units.

- Time Lapse before Return on Investment The value of a demonstration to a resource developer is measured by the extent to which it reduces the time between investment in field development and revenue from sales of electricity.
- Size of Initial Plant About 10 MW is required for a useful demonstration: 3 or 4 MW per well for hope of economic success and 3 wells to properly test the reservoir. It is better to get this sooner from a demonstration or pilot plant than to go on testing wells indefinitely while trying to sell a 50 MW project.
- Verification of Predictive Simulators For reservoir analysis, a demonstration has value to the extent that it provides a way to test and improve simulation models that must perform the task of predicting long term behavior of the reservoir from tests that last only a week or a month or so.

- Supply Guarantee versus Full Disclosure
A full disclosure of reservoir data, such as would result from a "demonstration" rather than a "pilot plant," is needed if the reservoir risk is to be shared by the utility and its regulatory agencies. If the developer is willing to provide a contractual, financial guarantee of fluid supply and replacement electricity, then only the developer needs the information to make the go-ahead decision and the supply guarantee can substitute for full disclosure. However, if the risk is to be shared by the utility, then the reservoir information must be acceptable to the utility and its financing and regulatory authorities. In this latter situation, the utility must assess security (i.e., reliability of supply) and cost. Acceptable cost is also an issue to be decided by a public utilities commission. Information from a demonstration must match the needs of the decision maker. The decision making process must be open enough for the demonstration to be planned properly, so it meets the needs of the decision makers.
 - Pragmatic Size Development The realities of the need to produce some revenue, combined with the need to gain information and operating experience sooner rather than later, lead to a pragmatic size of plant that may be smaller than the economic size.
 - Steam versus Electricity A developer can take the initiative in decreasing the time between investment and revenue by investing more and building the power plant himself and selling electricity rather than steam. This appeared to be a tough decision for a developer to make.
 - Demonstrations versus Pilot Plants As mentioned above, a pilot plant, with information held proprietary to the owner(s), is an alternative to a demonstration if the decision maker for the subsequent power generating units is simply the owner of the pilot plant.
 - Professionalism "Gut feeling" or professional judgment is still likely to determine the estimates put forth by different reservoir engineers. The Wairakei field in New Zealand has been analyzed by at least three different groups of reservoir engineers with three different predictions arising from the same data. After 30 years, there are still surprises emerging from the experience at Wairakei.
- To summarize, the question of how demonstrations relate to the resource developer side of the industry hinged around the goal of shortening the time between investment and revenue (i.e., the time between developer commitment and power plant production). Shortening this time will require the following measures, if the "demonstration" rather than the "pilot plant" approach is taken:
- Open access to data and analysis for checking and cross checking by other participants: utilities, insurance companies, banks, etc.
 - Enough open access to the decision making process (through a combination of field developer and utility) considered as a process for making a prudent business decision.
 - Sufficient visibility to the public (i.e., PUC's and other regulatory bodies) regarding how decisions were made.
 - A clear basis for expansion to the next steps of developing and utilizing the field.

The conclusion appeared to be that there is a key role for "demonstration" plants to play in the development of geothermal fields.

*Don Harban of Phillips Geothermal Company was Chairman of the workshop session. Paul Kruger of Stanford University presented the workshop results to the plenary session. Evan Hughes of EPRI prepared this written summary using notes by Paul Kruger.