THE PGandE GEYSERS POWER PLANT--A UTILITY COMPANY'S VIEWPOINT

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The existing generating capacity of The Geysers Power Plant constitutes about 5% of the total electric generating capacity of the PGandE system. The Geysers geothermal resource has and will continue to play an important role in our overall planning for generation additions. By 1979, four more units, Units 12 to 15, ranging in capacity from 55,000 kW to 135,000 kW, are planned to be in operation, almost doubling the capacity of The Geysers Power Plant to 908,000 kW.

Some PGandE Considerations as They Relate to the Steam Reservoir

Attached is our conceptual schedule of the time required for geothermal development, from the exploration phase through the power production phase. Geothermal steam as an energy resource is an economic alternative when compared with other forms of energy such as fossil and nuclear. PGandE continues to view geothermal development favorably; however, many of the issues and problems, etc., inherent in geothermal development affect the end-user of steam as well as the developer of the resource.

PGandE, as a utility that is regulated by the CPUC, the new ERC&DC, FPC and others, is somewhat different from a steam developer. PGandE is responsible for taking reasonable steps to provide adequate firm electric power to its customers at reasonable rates. In discharging this responsibility, the Company must of course act within all the applicable environmental, economic, and legal restraints that exist for utilities in California today. Because the steam developers are willing and able to produce adequate quantities of steam, and market it at reasonable rates, PGandEhas not participated in exploration and development of the steam resources.

In accordance with current ratemaking, and operating experience, PGandE amortizes its investment in a generating unit and in related electric transmission facilities over about a 30 to 35-year period. Adequate reservoir information is required prior to the commitment of major expenditures for a power plant in order to assure that the reservoir will supply steam over the life of the using facility.

PGandE presently has steam supply contracts with Union Oil Company-Magma Power Company-Thermal Power Company, Pacific Energy Corporation, and Burmah Oil and Gas Company. An important feature of all our steam supply contracts is that PGandE and the suppliers agree to accept reservoir engineering data as a basis for estimating the ability of The Geysers steam field to deliver steam over a long period of time. Many of you are no doubt aware that PGandE has been and continues to be grateful for the assistance of the reservoir engineering discipline, especially here at Stanford University, in the development of guidelines and procedures that are used in evaluating the geothermal reservoir.

Our contracts also provide that as additional steam reserves are proved, PGandE will install additional generating units. Our present resource program calls for approximately 100,000 kW per year. The additional reserves are proved by both successful stepout drilling and study of production history of existing wells. We anticipate that we can beneficially utilize any or all of firmly available geothermal steam that can be proved by steam developers in The Geysers area in the foreseeable future.

Status of H_2S Abatement at The Geysers

Anyone even remotely familiar with The Geysers development must be aware that H_2S emissions have been one of the major factors causing the current reduced rate of development. Because some of you are associated with companies which may get into geothermal development at The Geysers, let me take a minute or so to briefly describe the status of the H_2S abatement efforts now underway.

The hydrogen sulfide in the geothermal steam is presently released from the power plant in two ways. The larger portion of it dissolves in the cooling water in the direct contact condenser and is then stripped out in the cooling tower. The remainder is removed along with other noncondensable gases by the condenser off-gas removal equipment, and is discharged into the atmosphere.

One abatement system PGandE developed is the catalytic iron oxidation method, now in operation at Unit 11. It effectively reduces emissions from both th condenser vent gases and cooling tower emission sources. This process works to reduce releases from the cooling tower by addition of an iron su fate catalyst to the cooling waters. This catalyst causes the oxidation of hydrogen sulfide to elemental sulfur. The process has been demonstrated to work very well in removing H_2S from the cooling tower emissions; however this method appears to cause accelerated corrosion of unit components which in turn can reduce unit reliability and thus the amount of steam we can accept from the producers. Also, this process produces a sulfur sludge that is not saleable or reclaimable, and must be disposed of in a specially-approved land fill site.

Another system, which we call the "burner scrubber" technique, is under test at Unit 4. The condenser off-gases, which contain enough methane and hydrogen in addition to hydrogen sulfide to be combustible, are burned. This results in sulfur dioxide which is scrubbed in the cooling waters.

For future units (starting with Unit 12), we plan to use the Stretford system in conjunction with a surface condenser. This is a chemical system which reduces the H_2S to elemental sulfur.

PGandE's Concern with Certain Federal Leasing Regulations

As a user of geothermal steam for electric generation, PGandE is concerned over several elements of the federal Geothermal Leasing Regulations. One concern is the requirement that certain terms of federal leases

be renegotiated 10 years after the first commercial steam is produced. Since capital investment in geothermal generating facilities is amortized over a 30- to 35-year period, this provision in the leasing regulations places some doubt upon the wisdom of investing large capital sums in building such facilities when the steam supply is not assured over a comparable period of time.

Another element of concern is the provision that a lease "supervisor" is given the authority to close down, without giving notice or hearing, an entire geothermal operation which he considers to be unsafe or which could cause pollution. This unilateral authority given to one individual also places doubt upon the wisdom of making large capital investments in these facilities.

A third concern is about the uncertainties that are raised by the gratuitious insertion in the federal leases of a provision, not required by the leasing regulations, reserving to the government the right to issue orders necessary to "insure the sale of the production from the leased lands at reasonable prices, to prevent monopoly, and to safeguard the public interest." What this reservation does for security of tenure and long-term assurance of the right to operate, deliver, and use a geothermal resource is unknown.

Conclusion

To sum up, PGandE believes that existing and future geothermal development at The Geysers has and will make an important contribution as as source of electric energy. I have briefly described some problem areas of both a technical and institutional nature that we think can be satisfactorily resolved if all of us in the geothermal industry continue to apply the necessary combination of creativity and effort. The reservoir engineering aspects of the project have played a significant role in the development of this important resource and we look forward to the continuation of the work being described by the participants of this workshop to enhance our understanding of the resource so that its development can advance in a manner that produces benefits for the developers, users and society at large.

TYPICAL SCHEDULE FOR THE GEYSERS DEVELOPMENT