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AMINOIL PLANS THREE MORE GEOTHERMAL DEVELOPMENT PROJECTS AT THE GEYSERS

Aminoil USA, which last month began supplying geothermal steam for Unit #13, the world's largest geothermal generation facility at The Geysers in northern California, has formulated plans for at least three more electrical generation projects within the Known Geothermal Resource Area.

J. Thomas Devins, manager of geothermal resources for Aminoil, at a news conference prior to a company-sponsored field trip to the project area, said the independent oil and gas firm intends to supply steam from its properties at the Geysers in Lake and Sonoma counties for Unit #16, a planned 110 megawatt generation plant; a joint venture between Sacramento Municipal Utility District and Aminoil for the SMUDGEO #1 powerplant, rated at 55 megawatts; and for a third proposed 55 megawatt power plant to be known as Unit 19. Units 16 and 19 are to be built and operated by Pacific Gas and Electric, as was Unit 13. Contract agreements have been signed for all three projects. (See map on Page 3.)

Devins estimated the projects could require more than 40 new geothermal wells and expenditures in excess of $150 million. He said the Unit 16 plant, proposed for startup in 1984, will require drilling as many as 19 producible steam wells to supply some two million pounds of steam per hour at a preproduction investment of $56 million. The Unit 16 plant site, the second extension of The Geysers' generating facilities into Lake County, is about a mile southeast of the recently completed twin turbine 135 megawatt Unit 13 plant, the first in Lake County (NGS 6-13-80), and less than a mile south and a little west of the town of Anderson Springs. Because of the plant's proximity to the town, Devins said, monitoring and protection of the environment is anticipated to be "of great concern to Aminoil." Steam is to be fed to this unit through 15,000 ft of new insulated pipeline.

The planned 55 megawatt unit which the Sacramento Municipal Utility plans to build and operate is expected to be under construction in 1982, with start up scheduled for 1984. It will be built in an area known as Federal Unit 7 West, a 400-acre portion of The Geysers KGRA in Sonoma County. Devins said Aminoil intends to drill up to 11 wells to supply about a million pounds per hour of steam. Total preproduction investment is estimated at $38 million, he said. This unit would also require one well to reinject condensate from the plant's operation back into the steam producing reservoir and construction of more than 14,000 ft of delivery pipeline. The third project area, proposed as Unit 19, Devins said, "would appear to have potential steam reserves for a 55 megawatt plant." Drilling is under way to delineate the reservoir and evaluate steam reserves, he said.

The company is drilling with air below 8200 ft 1 M & W, ne se se 22-11n-8w, in Lake County. The well is projected to about 9000 ft. On a test of the Franciscan formation at about 8000 ft, it flowed steam at the rate of 150,000 pounds per hour. Company officials said analysis of the steam indicated a lower than average hydrogen sulfide content. Further tests of deeper zones are planned.

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PUBLICATION NOTICE: Petroleum Information offices will be closed Friday, July 4 in observance of Independence Day. PI's National Geothermal Service will be delayed and published Monday, July 7. Regular publication schedules will resume Friday, July 11.

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AMINOIL PLANS THREE GEOTHERMAL DEVELOPMENT PROJECTS AT THE GEYSERS (Contd)

Contractor is Montgomery Drilling using Rig #6. The hole is being directionally drilled to bottom approximately 2000 ft from the surface location. Drilling averages 150 ft a day. New bits are required every 24 hours with three and a half to four hours needed to trip out of and back into the hole.

A typical geothermal steam well at The Geysers, Devins said, costs $1.2 to $1.5 million and requires about sixty days to complete. Devins said proved developed and undeveloped steam reserves being produced for Unit 13 and planned for use in the Unit 16 and SMUDGEO #1 projects are estimated at 1 trillion pounds which, "on an energy producing basis, are equivalent to almost 90 million bbls of oil."

Aminoil drilled its first exploratory well at The Geysers in 1967 and since the company's first commercial steam discovery in 1969, it has drilled nearly 50 wells, more than 30 of which are capable of commercial production. The company has acquired leases on about 95,000 acres in northern California and has already committed more than 3000 acres at The Geysers to exploration and production. The company's first commercial contract to develop and supply steam was signed with PG&E in 1973.

Devins said the price paid by PG&E for steam is related to its costs for fossil and nuclear fuels through a complex formula based on the previous year's price. The rate charged the utility is based upon the amount of electricity generated, rather than on the quality of steam entering the power plant. The rate is expressed in mills per kilowatt hour at net outpout.

The steam price increased from 2.6 mills per kilowatt hour in 1970 to 3.15 mills per kilowatt hour by 1973, "the point at which fuel prices began to rapidly escalate as a result of the actions of the Organization of Petroleum Exporting Countries," Devins said. The current 1980 price is 18.63 mills per kilowatt hour. This represents an average compound growth rate since 1973 of approximately 130 per cent per year, he said.

The steam for the single unit SMUD project is to be priced according to a base rate that escalates through a price-indexing formula and applied to the volume of steam supplied instead of being weighted against the cost of fossil and nuclear fuels.

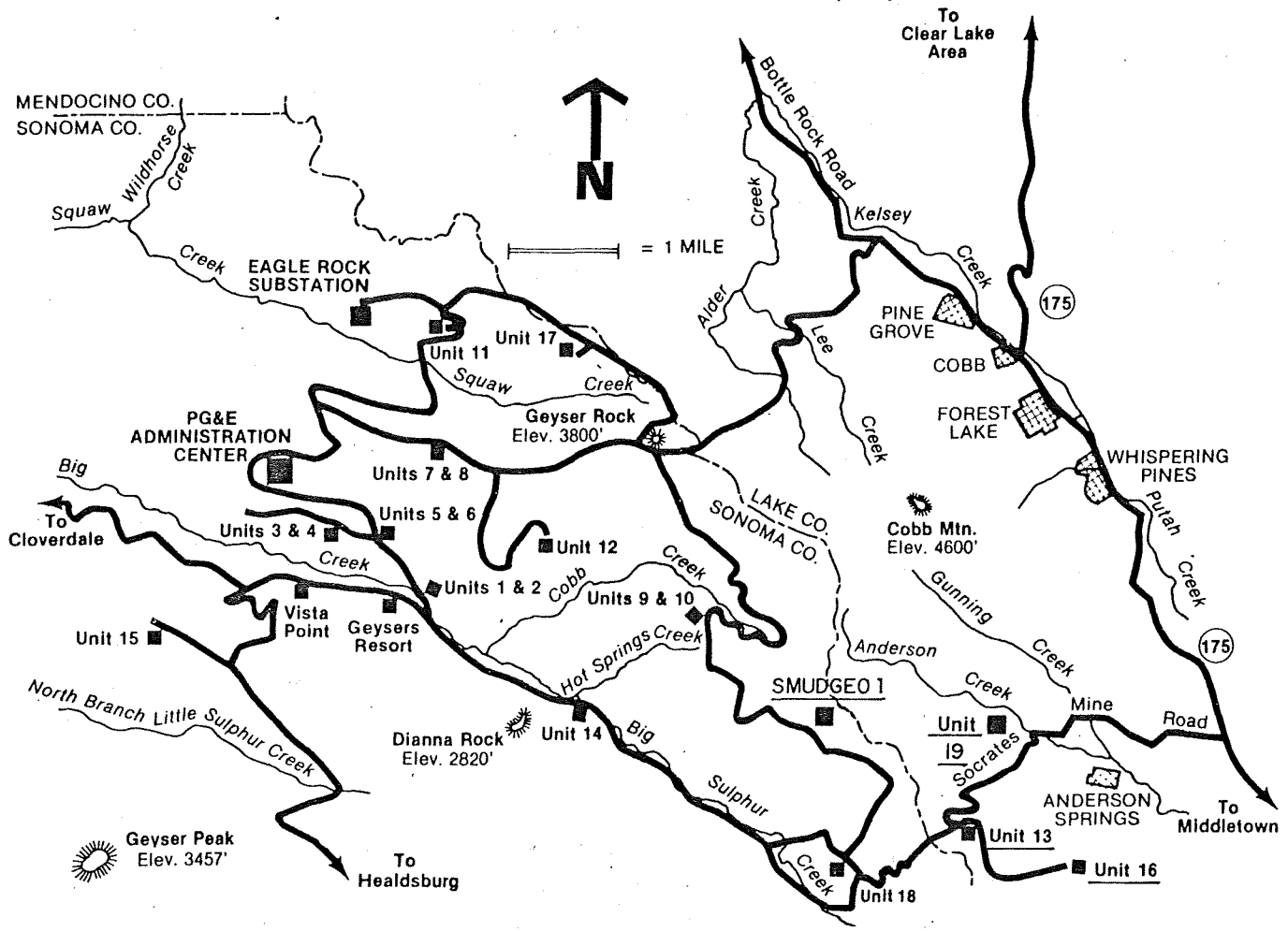
Additionally, the Energy Tax Act of 1978 allows intangible drilling costs to be expensed for tax purposes, and percentage depletion is permitted. These tax incentives, with depletion rates declining to 15 per cent by 1984, are part of the federal government's policy to encourage geothermal development, Devins said.

LATEST TECHNOLOGY UTILIZED AT THE GEYSERS' LARGEST UNIT

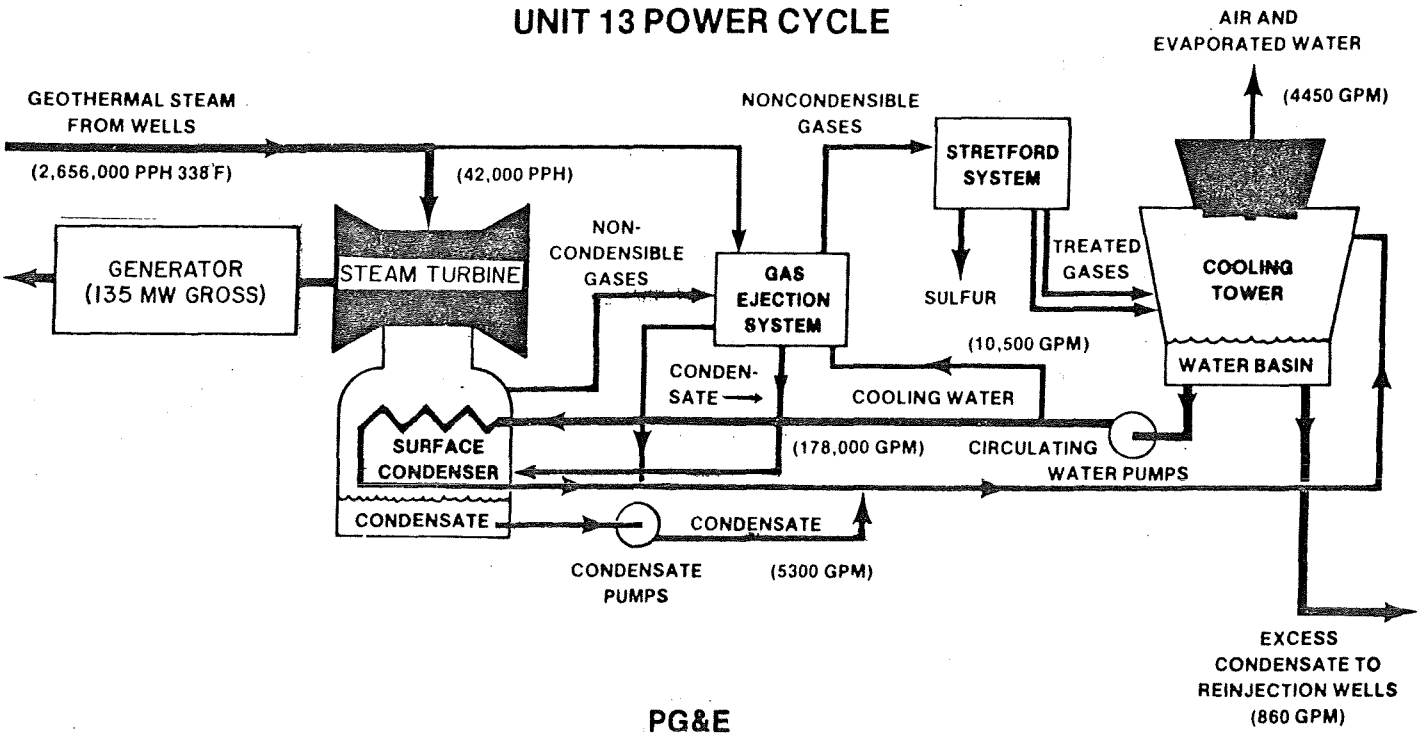
The first commercial geothermal steam development project completed by Aminoil USA at The Geysers KGRA and operated by Pacific Gas & Electric utilizes the best available technology for controlling steam flow, generating electricity and meeting environmental standards for air and noise pollution. The steam transmission system is designed with an automated throttling device operated from a computer terminal to maintain constant pressure and control the volume of steam supplied to the 135 megawatt generating plant from 21 producing wells. The steam powers twin 90,000 horsepower General Electric low temperature and pressure turbines in the world's largest single geothermal generating unit mounted on the upper deck of a three story facility owned by PG&E. Of the 2.7 million pounds per hour of steam which flows into the turbines, approximately 20 per cent of the steam is condensed and reinjected into the reservoir. Condensate return averages two million gpd and is stored in a 400,000 gallon sedimentation basin where solids are removed. Hydrogen sulfide and other gases are removed by the Stretford process, a series of chemically charged tanks which break up the hydrogen sulfide and extract commercially pure sulfur at 135 pounds per hour. A rock muffler, in the form of a large concrete structure filled with one million pounds of volcanic rock, is used to attenuate the noise of venting steam.

MAP OF THE GEYSERS AREA

Pacific Gas and Electric Company



UNIT 13 POWER CYCLE



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