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SOUTHEAST GEYSERS EFFLUENT PIPELINE PROJECT

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KEY WORDS

injection; reservoir management; wastewater effluent; public/private partnership

PROJECT BACKGROUND AND STATUS

The project concept originated in 1990 with the convergence of two problems: 1) a need for augmented injection to mitigate declining reservoir productivity at The Geysers; and 2) a need for a new method of wastewater disposal for Lake County communities near The Geysers. A public/private partnership of Geysers operators and the Lake County Sanitation District (LACOSAN) was formed in 1991 to conduct a series of engineering, environmental, and financing studies of transporting treated wastewater effluent from the communities to the southeast portion of The Geysers via a 29-mile pipeline as shown in Figure 1. By 1994, these evaluations concluded that the concept was feasible and the stakeholders proceeded to formally develop the project, including pipeline and associated facilities design; preparation of an environmental impact statement; negotiation of construction and operating agreements; and assembly of \$45 million in construction funding from the stakeholders, and from state and federal agencies with related program goals.

The project development process culminated in construction groundbreaking in October 1995. As of November 30, 1996, the status of the project's major components were as follows:

- *Pipeline:* 139,000 feet (or approximately 91% of the total length) of main pipeline has been installed. Several portions of pipeline have been filled with water for hydrostatic testing which will occur during the 1996-97 winter. The remaining 14,000 feet of pipe will be installed during the spring and summer of 1997.
- *Pump stations:* Foundations have been poured for all six pump stations. This will allow building construction and pump installation to occur during the winter of 1996-97.
- *Flow control tank:* A 250,000 gallon steel tank has been installed at the pipeline's mid-point. Leak testing for this facility will occur over the winter.
- *Steamfield distribution pipelines:* Approximately 65% of the steamfield distribution pipelines between the main effluent pipeline and injection wellheads have been completed.
- *Control system:* Initial site work for the telemetry system has occurred, and this work will continue over the winter. Computer hardware and software will also be procured during the winter.
- *Environmental mitigation:* All erosion control and standard revegetation has been completed for the portion of pipeline that has been installed. Maintenance of this work will occur over the winter. Special woody plant revegetation will begin in late December 1996.

The construction accomplished through November 1996 and the completion date of August 1997 are both in conformance with the project's original schedule. Funds expended to date are similarly in conformance with forecasted construction cash flow.

PROJECT OBJECTIVES

The overall objectives of the project are to demonstrate that large-scale augmented injection is a viable reservoir management practice that can simultaneously convert the community liability of wastewater into a sustainable energy asset.

Technical Objectives

- Mitigation of reservoir productivity declines through augmented injection.
- Use of treated wastewater effluent as an injection fluid.
- Use of a public/private partnership of stakeholders to plan and implement a synergistic solution to their respective problems.

Expected Outcomes

- Construction of the 29-mile, 20-inch diameter effluent pipeline and associated facilities on schedule and within budget.
- Delivery of 7.8 million gallons per day of wastewater effluent and lake make-up water to the Southeast Geysers for injection.
- Recovery of effluent-derived geothermal steam in an amount equivalent to approximately 70 MW of generating capacity, or approximately 625,000 MWh of effluent-derived electricity generation annually.
- Operation of the system for 25 years or more.

APPROACH

The project's approach to problem solving is distinguished by two characteristics: 1) a public/private partnership that includes all key stakeholders working together on a consensus basis; and 2) a comprehensive and thorough series of reservoir assessment, pipeline engineering, and environmental impact studies to insure that risks have been minimized, and that the constructed project will perform according to specifications. A strong monitoring and evaluation component will be used to verify the degree of success in attaining project goals.

RESEARCH RESULTS

Pipeline operation and reservoir injection results will not be available until the third quarter of 1997 when start-up and testing commences. Thereafter the project expects to issue periodic performance reports.

FUTURE PLANS

Following construction completion in mid-1997, the project will initiate monitoring of pipeline operations and evaluation of reservoir productivity to determine if expected results have been achieved. Additionally, other Lake County communities are considering disposal of their wastewater via the pipeline if its initial operations are satisfactory.

INDUSTRY INTEREST AND TECHNOLOGY TRANSFER

The following geothermal industry organizations are participating with LACOSAN in the project:

Organization**Type and Extent of Collaboration**

Northern California Power Agency

Co-funder; operator of pipeline control system; steamfield injection operator; power-plant operator.

Unocal Corp.

Co-funder; steamfield operator.

Calpine Corp.

Co-funder; steamfield operator.

Pacific Gas & Electric Co.

Co-funder; power plant operator.

LACOSAN, NCPA, Unocal, and Calpine constitute the membership of the project's Joint Operating Committee (JOC). The JOC will oversee pipeline operation and maintenance, and conduct monitoring and evaluation of the project's performance.

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Figure 1
PROJECT VICINITY & MAJOR COMPONENTS



