

KILAUEA RIFT: The Geothermal Power Struggle

Coso geothermal project walks thin line

A path between Navy ballistics, a fragile desert and arrowhead sites

By Jim Borg
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CHINA LAKE NAVAL WEAPONS CENTER, Calif. — Several times a month, the crews that run the Coso Geothermal Project get up and walk off the job.

The evacuation is required by the Navy, which operates an elaborate ordnance-testing range in this 3,000-foot-high corner of the Mojave Desert.

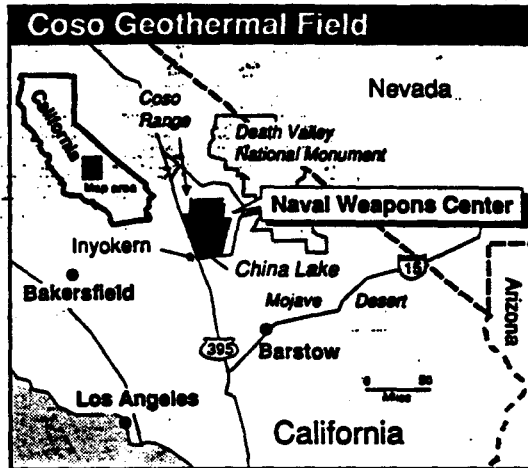
No one wants a stray cruise missile to claim lives as well as property.

For two or three hours at a stretch, Coso's high-tech steam turbines spin under the guidance of computers. When the range reopens, the crews return and pick up where they left off.

"We designed the plant so it could operate itself and shut itself down if something goes wrong," says Lee Ezzell, vice president for plant operations with California Energy Co., the Coso project developer. "Any alarm goes off, it shuts down."

Perched on an ancient network of seismic faults between the Sierra Nevada and Coso mountains, the \$615-million operation since January has been churning out 240 megawatts of electricity for Southern California Edison. This is now the second-largest commercial geothermal field in the United States.

California Energy Co. and its engineering and construction contractor, Mission Power Engineering Co., are members of



Advertiser graphic by James Taramiya

Kilauea Energy Partners, one of two groups negotiating with Hawaiian Electric Co. for possible development of 500 megawatts of geothermal energy on the Big Island.

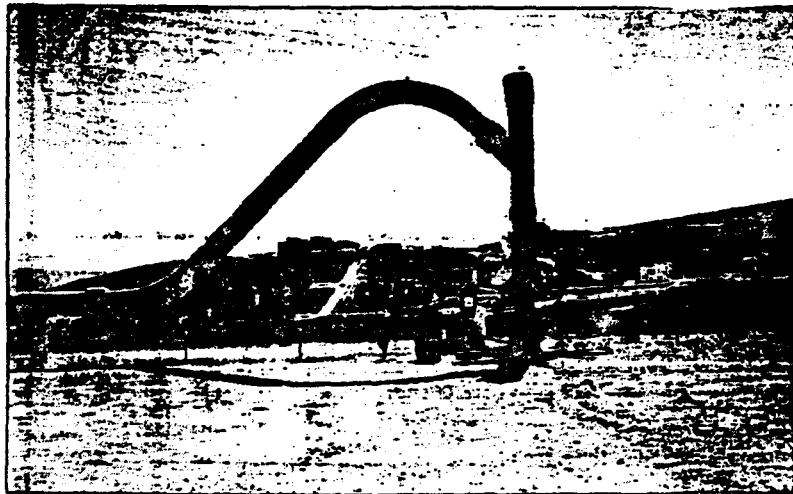
While the Mojave's subterranean soup may be markedly different from the geothermal resource beneath Kilauea, the basic technology for harnessing hot water and steam remains the same.

"New Zealand, Italy, Japan, the Philippines, Central America basically all have similar conditions," says Ezzell, who has also worked at the Pacific

Gus & Electric geothermal field at The Geysers in northern California.

And while Coso is not the only geothermal plant run at times by computers, it has become a model for the industry for its relationship with the fragile desert ecosystem and its technique for dealing with the dark side of the geothermal force: hydrogen sulfide.

Through 61 wells ranging up to two miles deep, the Coso project taps pressurized 400-degree water, fed by mountain runoff. Only three shallow wells produce from a steam



Advertiser photos by Jim Borg

A geothermal production well feeds Coso's Navy-1 plant in the Mojave Desert.

reservoir.

The nine Coso generators use a "double flash" system of geothermal power production, meaning steam separates from water twice at different pressures. The water that cascades from the plants' cooling towers — the noisiest part of the operation — then is reinjected through wells penetrating deep into the ground.

Since Coso is a water-dominated system, as are Kilauea's geothermal zones, it hasn't had the problems with water reinjection experienced at The Geysers in northern California, a reservoir of almost pure steam, where sharp temperature differences have damaged some injection wells.

Toxic hydrogen sulfide gas is reinjected along with the condensed steam and waste brine.

"We put the gases back in the water and put it all back in the ground," says Ezzell. "We end up with a cleaner system."

Adds Cal Energy's environmental compliance technician, Jony Homer, "We don't put anything into the air but water vapor."

In terms of cleanliness and

plant safety, geothermal power has huge advantages over every other form of power generation except hydroelectric, says Sean Maney, the 28-year-old supervisor of Coso's Navy-1 plant.

"I don't have a boiler, I don't have a reactor plant," says Maney. "All I've got is some hot water coming out of the ground. We're the original plant that recycles everything that's produced in the field."

Although the project is on federal land, the developers comply with the environmental requirements of the California Energy Commission and California Department of Fish and Game.

Bob Haussler, manager of the commission's environmental protection office in Sacramento, gives high environmental marks to Coso in particular and geothermal energy in general.

During drilling and construction at Coso, the commission was concerned about the effects on archeological sites. Haussler says. Some 6,000 to 7,000 years ago, native Americans flocked in great numbers to the desert, where they collected and fashioned obsidian, a dark volcanic glass, into knife

points and arrowheads.

Cal Energy agreed to preserve as many sites as possible and catalog those that had to be disturbed, says Haussler.

"I'm not aware of any violations," Haussler said in a telephone interview.

To an unschooled eye, the Mojave may seem a wasteland, but biologists know better.

The desert supports a treasure house of animal and plant species, some of them, like the Joshua tree and desert tortoise, endangered.

The company has gone as far as to dig up and relocate an entire den of state-protected Mojave ground squirrels, says Homer.

Workers also routinely rake up tire tracks that would otherwise mar the desert surface for a decade, he says.

"One of the real challenges is going to be ensuring that for the long-term we are able to keep all those balls in the air," says retired Maj. Gen. Mark Sisinyak, the Coso project's general manager and a 32-year veteran of the Army Corps of Engineers. "It helps to know how the federal bureaucracies and state bureaucracies work."



A lone Joshua tree stands amid pipes and power lines on the Navy testing range.