

erally welcome geothermal development as an alternative to its more environmentally destructive relatives, fossil fuels and nuclear power, but they have made it clear that in the coming months they will be watching the leasing agencies—the Forest Service and the Bureau of Land Management (BLM)—and energy companies like hawks to ensure that exploration is carried on with minimal environmental effects. Fred Hersh, Geothermal Coordinator for the Club's Oregon chapter, explains: "The key issue is how much right to development goes to the operator when the lease is issued."

The fact that such leasing requires no environmental impact statement after exploration but before construction of a plant alarms Hersh because the Geothermal Leasing Act of 1970 does not clearly establish what rights go along with leasing. According to Hersh, Union Oil has argued that once the lease is issued, it carries an unconditional right to develop the source. Moreover, geothermal leases do not expire after a set time period if no sources are found on the property, as they do with oil and gas leasing. The Forest Service dropped a so-called Conditional Development Stipulation from its lease arrangements — no development to be allowed if the environmental impact is too great — because of industry's objections. Spokesmen for Union Oil had no comment on the geothermal leasing process when contacted by SCIENCE NEWS.

The Sierra Club has already lost two administrative appeals within the Forest Service to block leases for the Fort Rock Ranger District in central Oregon and the Clackamas Geothermal Block in Mt. Hood National Forest. They are currently waiting on appeals to block leasing in the non-wilderness area part of Oregon's Willamette Forest, and the Mt. Hood Geothermal Block of Mt. Hood National Forest. Sierra Club officials say they are not planning any legal actions on these appeals.

A second hazy area in the leasing process concerns the national wilderness areas. According to Hersh, all wilderness areas created before 1970, when the Geothermal Leasing Act was passed, will not be open for leasing. However, in the opinion of Interior Department's Solicitor William Coldiron, those created after 1970 can legally be leased. The Forest Service has thus far held back on leasing present wilderness areas or those under consideration for wilderness status while BLM has offered similar lands under its control for leasing if the operators restore the areas after they are through.

The Solicitor's opinion puts into question the leasing of the Northwest's hottest geothermal gem: Newberry Crater. A post-1970 wilderness area, it boasts two lakes as well as fishing and hunting grounds. The Forest Service has issued a proposal that would open the outer flanks

of the caldera to leasing and leave its interior, including its lakeside portions, untouched. The comment period on this proposal is now over, says Greg McClarren of the Forest Service's regional office at the Deschutes National Forest where Newberry is located. He believes the Forest Service will decide early next year at the latest if they will go with this plan.

A second geothermal prize under a cloud of uncertainty is Mt. Lassen National Forest, Calif. Although the national park of the same name is off-limits, the surrounding national forest is available for leasing, according to Hamilton Hess, Geothermal Coordinator in the National Energy Committee of the Sierra Club. He feels that development in the buffer zone of the national forest could adversely affect conditions within the park itself, and that parts of the forest and hot springs, fumaroles and natural geothermal features in the park's southwestern corner are endangered by drilling.

His fears that geothermal exploration might endanger hot springs, geysers and related phenomena may not be groundless, in the view of some geologists. The geyser field near Beowawe, Nev., was active and healthy until exploratory drilling in the early 1970s depleted its underground steam reservoirs. Although some springs remain, the geysers there are now dead.

No one can yet say just how much the environmentalists have to fear from geothermal development in these sensitive areas. Oil prices are low and geothermal power is not competitive just now. But, says Hook, "there is a surplus of energy that I think is momentary." Geothermal power is easier to work with than nuclear power, since utilities have to predict power demand 10 or more years ahead to determine if they want a large nuclear plant, while a geothermal plant can be brought on-line quickly: "If we make a discovery . . . there are off-the-shelf systems that can be mounted in a four-month period," says Hook. The number of small 10-megawatt plants like these could be increased as demand grows. "Geothermal is something that you could bring on in small increments of power," Hook says. "You can bring those plants on-line as they're needed."

Black predicts a rosy future for geothermal. Although no more than 50 megawatts should be on-line in Oregon before 1995, he says that "in the long run geothermal could supply a significant amount of energy in Oregon." But, he cautions, "unless oil prices skyrocket, geothermal development will slow down."

Commercial development of geothermal energy might even be worthwhile in spite of the economy if, as Hook believes, it could reduce U.S. dependence on foreign sources: "These are resources that are available in significant enough quantities to make some kind of impact on energy supplies in the U.S." □

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**The Great Evolution Mystery** — Gordon Rat-tray Taylor. A synthesis for the general reader of the arguments now raging among the students of evolution. Recent work on genetics and the origin of "non-equilibrium systems" that have bearing on evolution are explained. Line drawings and photographs enhance the text. Har-Row, 1983, 277 p., illus., \$15.95.

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**The Solar Energy Almanac** — Martin McPhillips, Ed. An introduction to the use of solar energy, with an emphasis on passive solar heating for houses. The introduction calls this "the most appealing and significant use of solar." Gives sources of additional information and manufacturers by state. Illustrates and describes 35 solar houses around the country. Facts on File, 1983, 240 p., illus., \$15.95.

**The Weather-Wise Gardener: A Guide to Understanding, Predicting, and Working with the Weather** — Calvin Simonds. This is a "gardener's understand-it-yourself book about the weather," says the introduction. Explains the basic principles of meteorology from everyday weather experiences. Shows how these principles conspire to make the weather that prevails in different parts of the country at different times of the year. Tells how you can apply your understanding of the basic principles to anticipate weather emergencies and cope with the effects of weather on you and your garden. Rodale Pr Inc., 1983, 244 p., illus., \$16.95.