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High Country News

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A Paper for People who Care about the West

One dollar

Solar power becomes a reality

by Don Olsen

A California solar energy company that wants to generate thousands of megawatts of pollution-free electricity is finding surprising success in the sun-drenched American Southwest.

Luz International, a Los Angeles-based firm that designs and builds commercial-scale solar electric generating plants, is already producing enough power in the Mojave Desert near Kramer Junction to meet the needs of half a million people. By 1994 the company — which has almost singlehandedly re-energized the dormant solar power field — plans to generate more than 680 megawatts, enough electricity for a city the size of Phoenix or San Francisco.

"Luz has a bright future," says Brady Bancroft, a renewable-energy expert at the Rocky Mountain Institute in Aspen, Colo. "They are probably the hottest thing going in the solar energy field right now."

Utilities in several Western states are seriously considering using Luz's solar technology to generate clean, inexpensive energy for the fast-growing Sunbelt region. One of those utilities, Public Service Co. of Colorado, may even use a Luz system to solarize its currently moth-balled Fort St. Vrain nuclear power plant.

"The environmental benefits of solar energy are obvious," says Michael Lotker, Luz's vice president for business development. "It's a non-polluting source of electrical energy." Lotker says the company is currently pursuing the construction of solar electric generating plants in Nevada, Colorado, Texas, Arizona, Mexico and Brazil.

To Westerners concerned that the region's vistas and pristine air are slowly being obscured by smog, the prospect of an expanding solar energy industry couldn't come at a better time. On some days, Western views as beautiful as those of the Grand Canyon are veiled by haze the coal-fired power plants generate. Luz's shimmering fields of parabolic mirrors may someday offer the region a cleaner, cheaper alternative.

Parabolic mirror system

Luz uses huge fields of moving parabolic mirrors to generate its solar electricity. The trough-like mirrors individually track the sun and focus its light onto fluid-filled pipes mounted inside vacuum-insulated glass tubes. The fluid, boiled to 735 degrees Fahrenheit, then flows through a heat exchanger, creating superheated steam that powers a turbine generator. The resulting electricity is sold to Southern California Edison.

Luz generates most of its power during peak periods when Southern California's sun is hot and when homes and businesses gulp huge amounts of electricity for air conditioning. To ensure uninterrupted power during high-demand periods, a supplemental natural gas system is used as a back-up source of heat.

The company was formed in 1979



Solar collectors near Kramer Junction, California, produce enough power to meet the needs of half a million people

by an Israeli-American engineer named Arnold Goldman. He says it has attracted more than \$1 billion from a variety of large financial institutions and utilities to develop its Southwestern solar energy plants. Its newest plants generate electricity for about 8 cents per kilowatt-hour — substantially less than that of nuclear power plants now coming into production. Lotker adds that Luz's solar power becomes even cheaper when environmental and other hidden costs are figured into the final price.

"People now considering building coal-fired power plants in the West may soon decide to switch to solar," says Ray Williamson, an energy specialist for the Arizona Corporation Commission, the agency that oversees the state's public utilities. "If you consider all the social costs of producing electricity — the cost of scrubbers, the greenhouse gases — a solar power plant is the best alternative."

Williamson says that although Arizona won't need more electrical generating capacity until later this decade, the

commission's staff has already recommended that the state's next power plant be a solar thermal system using Luz-type technology. "It recommended that the commission adopt a 'rebuttable presumption' that intermediate and peaking power plant construction between 1990 and 2000 be solar-thermal using solar-trough technology," says Williamson. A rebuttable presumption means the staff's recommendation would be adopted

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HIGH COUNTRY NEWS

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Dear friends,

Filling in some blanks

On last issue's Dear Friends page, no credit line appeared with Jack McLellan's Canyonlands landscape; it probably came unpasted en route to the printer's. We were very sorry for the omission, because the photograph shows so gorgeously why that windswept view was Emily Jackson's favorite. We would also like to credit Wendy Shattil and Bob Rozinski for their picture of deer at Rocky Mountain Arsenal that we printed on Page 4 of our April 22 issue. This photograph, we since have learned, comes from a book by Shattil and Rozinsky, *The Greening of Rocky Mountain Arsenal*, published last year by Roberts Rinehart; \$14.95 softbound.

Fish

Our special issue on Northwest salmon has occasioned a few informal messages as well as letters to the editor. John McCarthy of Moscow, Idaho, asks that we convey his thanks to Pat Ford, who edited the issue, and to other staff and contributors involved, "especially my pal Chris Pietsch, who once again says it all in one photo" — the cover image of a salmon leaping at the base of a gargantuan dam. Virgil Bush, 81, a Trout Unlimited member and new *HCN* subscriber from Longview, Wash., was inspired to send us a picture of himself with a 37-pound springer caught in the Kalama River. And Dorothy Dodge Duncan, a subscriber "from the beginning," called "to say amen to the glorious salmon issue" and to order five copies for her brother in Washington state. Dorothy, who tells us she is 92, lives in Sheridan, Wyo. To this year's editorial replacement team she says, "You've done beautifully."

We want to hear from you

We mailed our annual reader survey a week ago and are beginning to receive responses — particularly from readers in western Colorado, who are closer on the mail route.

This year we want your feedback on our switch to recycled paper. We have already received many personal letters from readers, but wanted to give all *HCN* readers an easy way to comment on the change and on future choices we

will have to make.

We also ask again why you read *High Country News*, and for your recommendations of people who may want to become subscribers. Your answers to other questions will tell us if you want your name exchanged with other publications or environmental organizations, and will also give us an idea how many non-subscribers use *High Country News*.

Your responses to earlier surveys have been a valuable source of information and advice. We hope you will take a few minutes to check off your answers and send us any other comments or story ideas, as well.

Piggybacking

The survey mailing is doing double duty for *HCN* because we also ask you to consider a contribution to the HCN Research Fund. Every year contributions from readers help us balance our budget by covering the editorial costs of producing *HCN*. This year we are also asking if you want to help defray the extra costs of converting to recycled paper. Although we ask that you contribute only once a year, inserting the donation cards with this mailing was a cost-saving measure, since we were already providing business reply envelopes.

As the cards went into the envelopes, however, we noticed that we had omitted one contribution category. Those of you who send between \$500 and \$999 are "Associate" donors, and will receive a hardbound copy of *Beyond the Mythic West*, a powerful collection of photos and essays that examines the contrasts and challenges of the region.

Other premiums for this Research Fund year include a set of notecards with color scenes of the region for Sponsors (\$100-\$249), a canvas shopping bag with the *HCN* goat logo for Benefactors (\$250-\$499), and a bound volume of 1990 *HCN*s for Publisher's Circle contributors (\$1,000 and above). All contributors of \$50 or more may designate the recipient of a new *HCN* gift subscription.

Critters

On a visit to Albuquerque, a member of the staff developed a fixation on the giant-size happy octopus that towers

over the Octopus Car Wash on San Mateo Ave. She called the car wash to ask if they might have a used octopus for sale and was stunned to hear it had cost \$10,000 20 years ago — so much that the car wash company couldn't even afford one for its branch office. We would like to invite readers with high-quality photographs of animal statues seen along Western highways to submit them for consideration. If we get enough good ones, preferably not just horses and steers, we would like to carry on tradition with a giant-creatures centerspread.

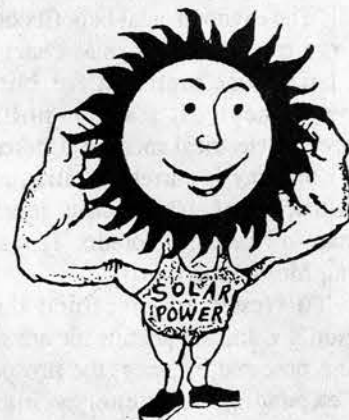
High Country News picnic

The High Country Foundation board of directors will gather in Paonia this June for its next regular meeting, after which board members, staff, former staff and readers will converge for a potluck party. This summer's gathering is an outdoor picnic in the Paonia Town Park on Saturday, June 15, at 6 p.m. Readers within a few hours of Paonia will receive invitations in the mail, but all *HCN* friends are welcome. We often meet readers who have scheduled the evening into their vacation or weekend camping plans. If you want to come and need more information, call Linda at 303/527-4898.

A breather

Readers occasionally complain that they get depressed by *HCN* as the bearer of environmental bad news. This comparatively sunny issue brings good news about solar power and such ingenious old and new wrinkles as making houses out of straw, cooking with the sun and squashing refuse into building panels. We hope you enjoy it.

— Larry Mosher and Mary Jarrett
for the staff



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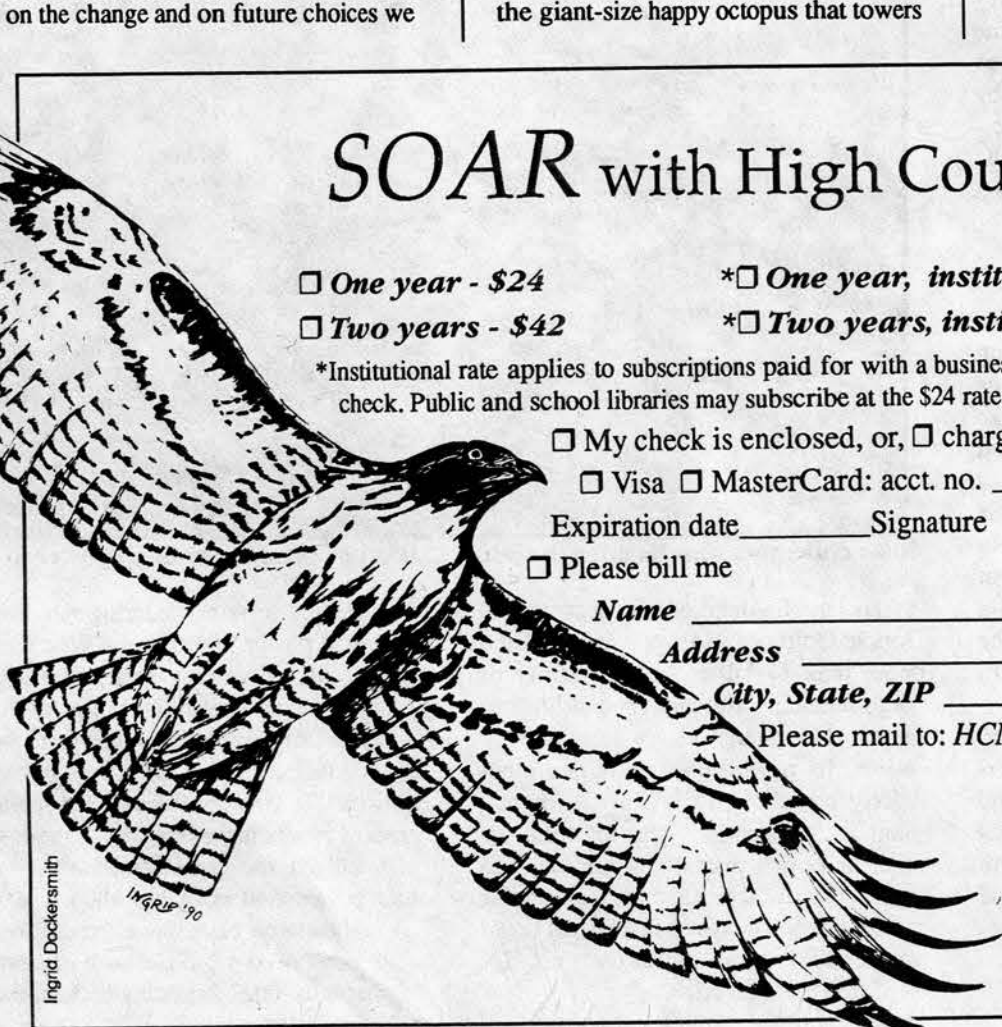
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WESTERN ROUNDUP

Forest Service staffers appeal their own forest plans

For the first time, staffers on two national forests have appealed their own forests' plans. Members of the Association of Forest Service Employees for Environmental Ethics (AFSEEE), the two-year-old forest reform group started by former Forest Service timber sale planner Jeff DeBonis, have asked for changes in the plans of Oregon's Umpqua and California's Stanislaus national forests.

The Umpqua chapter, which is trying to amend an already completed forest plan, is requesting new inventories of both the timber and wildlife on the forest. Without accurate information, says chapter leader Alan Baumann, the plan can't be realistic.

"We don't even know how much old growth is left," he says. "How can you sell a product for 40 years and not know what's left in the warehouse?" Baumann works on timber stand

improvement on the Umpqua.

"Planning is a continuous process," counters Doyle Ward, one of the forest's planners. "As inventories come in, we use that information."

The Stanislaus chapter is calling for a virtual overhaul of its forest's plan, which is scheduled for completion this year. "Typical of forest plans," says Steve Brouger of the Stanislaus chapter, "this one continues to do 'top down' planning, based on a timber-cut level set politically. But planning should be done from the bottom up, starting with environmental protection."

Steve Waterman, public affairs officer for the Stanislaus National Forest, says the chapter's suggestions were among 5,100 comments the forest received on its proposed plan. Like the other comments, AFSEEE's will be considered while the forest finalizes its plan this summer.

"We're talking about a whole new approach," says Brouger, the wilderness supervisor on the Stanislaus. "We know these changes won't happen overnight, and not without Congress and the Forest Service leadership. But we've got to put it on the table. We're in this for the long haul; we're not just rearranging deck chairs on the Titanic."

The moves on the Umpqua and Stanislaus are likely to blaze the path for similar requests on other forests, as AFSEEE searches for ways to change forest policies. DeBonis has said, "It's time to expose the soft belly of the beast."

AFSEEE now has about 5,000 members, including 1,800 present or past Forest Service employees. A recent nationwide survey, conducted by University of Idaho graduate student Greg Brown, uncovered 127 Forest Service workers who said the existence of

AFSEEE had encouraged them to take specific actions such as leaking information to environmental groups or speaking against certain timber sales.

AFSEEE's Lolo chapter has declared support for the Wild Rockies National Land Act, which would protect all significant wild areas in parts of Montana, Idaho, Washington and Oregon. And AFSEEE has objected to this year's U.S. Forest Service budget. In a five-page letter to Forest Service Chief F. Dale Robertson, DeBonis blasted the budget provision that promises a 5 percent funding increase in 1992 to any national forest that meets its timber quota in 1991.

—Jim Stiak

Jim Stiak, a free-lance writer from Eugene, Oregon, is a regular contributor to *High Country News*.

MacDonald wins and loses as legal ordeal continues

Former Navajo Chairman Peter MacDonald's long legal odyssey passed the halfway mark last month when an all-Navajo jury acquitted him of tribal election fraud charges.

After two corruption convictions in tribal court, being found not guilty in his third trial was the kind of verdict MacDonald had been waiting for since tribal special prosecutors filed criminal charges against him in July 1989. He declared then that a Navajo jury would not convict him.

But while his trials in Navajo court have ended and he now faces appeals and back-to-back jail sentences totaling seven years and three months, his legal troubles are far from over. In March, a federal grand jury indicted MacDonald and his former business associate, Carlos Pimentel. The indictment included 34 counts of racketeering, conspiracy, bribery, mail fraud, wire fraud and interstate travel for racketeering enterprises in the takeover of a Navajo-owned computer company and personal use of a \$2.25 million tribal loan.

Peter MacDonald Jr., son of the 63-year-old ex-chairman and co-defendant in his first two trials, also was indicted on 30 similar counts. Both MacDonalds and Pimentel have entered not-guilty pleas in federal court. The MacDonalds have not commented on the case because they remain under tribal court order not to speak to the press or attend public gatherings. Pimentel's attorney, Christina Arguedas, has denied her client is a racketeer.

The indictments concluded a two-and-a-half-year-long federal investigation that began when the Senate Select Committee on Indian Affairs launched its Special Committee on Investigations probe into Bureau of Indian Affairs mismanagement. The investigators also decided to look into the activities of a few tribal chairmen, including MacDonald. The case was first scheduled to be heard in Phoenix federal district court this month, but has been postponed because of procedural delays.

This will mark MacDonald's fourth corruption case. His fifth and last case is a multi-million-dollar civil suit brought against him and some 50 co-defendants by the Navajo Nation in Arizona state court.

The tribe hopes to recover some of the \$7.2 million profit that MacDonald supposedly split with his two non-Indian co-conspirators, Byron Bud Brown and

Tom Tracey, from the 1987 purchase of the \$33.4-million Big Boquillas Ranch, a half-million-acre spread near Seligman, Ariz. That case is set for June 17, but postponements are expected.

MacDonald's tribal court acquittal was received with something akin to a collective sigh across the Navajo Reservation. Many felt the verdict — not guilty on five charges of accepting illegal campaign contributions from non-Navajos and failing to report all of his campaign contributions and spending — was mostly a gesture of sympathy for the defeated leader, who has been under fire for two years without let-up. MacDonald had served about five weeks in jail between trials.

"He obviously broke the law, but it's a case of who cares?" says Bill Donovan, editorial writer for the *Navajo Times*, who had been fired by MacDonald four times over the years for his articles. "I never could see why they wanted to do the third trial anyway."

In his editorials, Donovan wrote that little could be accomplished by a third conviction, especially after MacDonald's two earlier convictions on a total of 54 bribery, conspiracy and ethics violations. He concluded that finding the tired, thin and ill MacDonald not guilty this time was "a prime example of Navajo justice."

As for his jail time, Donovan says, "He's not going to serve that. We all know that." Even now, MacDonald is free again to prepare his defense for his federal case.

The federal indictment alleges that in 1987, MacDonald, his son and Pimentel conspired to defraud the Navajo Tribe out of a \$2.25 million business loan to Navajo Technologies Inc., or NTI, of Leupp, Ariz., and secretly put aside three million shares of company stock for MacDonald to pick up when his term of office ended. But his unprecedented fourth term began to unravel in February 1989, two years short of the end of his term, when he was suspended by the Navajo Tribal Council.

While president of NTI, Pimentel paid himself \$120,000 a year and Michael Morelli, an undicted co-conspirator named in the indictment, \$86,000 a year. Before taking that job, Morelli was deputy director of the Navajo Tribe's now-defunct CANDO, or Commission to Accelerate Navajo Development Opportunity. In that capacity he allegedly walked NTI's tribal

business loan through the necessary tribal committees.

The scheme was unfolding at a time when the newly elected MacDonald was making every effort to sell the Navajo Reservation to the country's largest corporations as a business and industrial site. In July 1987, he staged the successful Navajo Economic Summit that attracted five U.S. senators, three governors, dozens of corporate presidents and CEOs. He even arranged for a special videotaped message from President Reagan.

This was soon followed by the Navajo High Tech Summit, which showcased NTI as a humming shop that built computer work stations and trained Navajo programmers in the computer language used by the Defense Department. MacDonald dubbed the dusty, one-road town of Leupp the "Silicon Valley of the Navajo Reservation."

At the time, NTI was presented as a company with the potential to grow into a \$50 million business with 200 employees. Today it employs only 12 workers,

has cancelled its training program and owes the tribe \$1.5 million.

Incredibly, a topic still being discussed is whether the resilient MacDonald has any political life left after all this. People are still not willing to write his political obituary because the base support he's retained, although vastly reduced, remains surprisingly loyal.

"Politics has a strange way of playing its hand," says Daniel Peaches, a former MacDonald confidant and now an administrator for the tribe's Ethics and Rules office.

"If you say Mr. MacDonald's conviction in tribal, state and federal court precludes him from being eligible to run for elected position, that's one thing. But if you're talking about electability, I feel he still has a lot of support. But whether he wants to go into public life again, I really can't say."

—George Hardeen

George Hardeen is a free-lance writer and radio producer based in Tuba City, Arizona.

HOTLINE

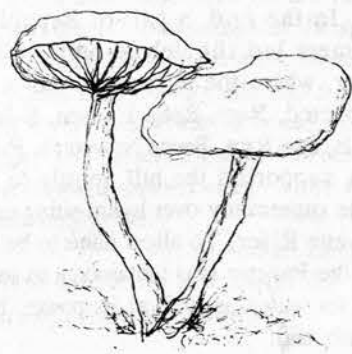
Dalai Lama meets with tribal leaders

At a meeting with tribal leaders in Santa Fe, N.M., the Dalai Lama, exiled leader of Tibet, compared the struggles of Native Americans to those of Tibetans who have been oppressed by the Chinese since 1950. The Dalai Lama stressed the tribes' need to "develop long-term plans to preserve" tribal languages and cultures and to establish "a proper identity" in order to combat oppression. He also likened Buddhist environmental philosophy to that of Native Americans. "If we think of the planet as our house or as our mother, — Mother Earth — we automatically feel concern for our environment," he said. The Dalai Lama also spoke to the Congress and President Bush during his tour of the United States, according to the *Navajo Times*. "A 'new world order' cannot truly emerge unless it is matched by a 'new world freedom.' Order without freedom is repression," he said, referring to recent events in the Middle East.

U.S. proposes habitat for spotted owl

The U.S. Fish and Wildlife Service has proposed to set aside 11.6 million

acres of forests in Washington, Oregon and California as critical spotted owl habitat. U.S. District Judge Thomas Zilly ruled in Seattle that the agency had abused its discretion by failing to identify and map habitat critical to the survival of an endangered species (*HCN*, 4/8/91). The proposal won't be final for another seven months, but it has already drawn an angry response from the timber industry. "Timber sales were already at a trickle and now they will come to a halt," Denny Scott, a union economist with the United Brotherhood of Carpenters and Joiners of America, told the *McClatchy News Service*. Industry officials claim the plan will cost the region an estimated 100,000 jobs. Until the plan is final, all timber sales will have to be reviewed by the Fish and Wildlife Service. Some environmentalists contend that the plan is inadequate because it doesn't ban logging outright.



Oregon firm recycles trash to replace wood products

Gene Davis wants to take some of that trash you've been dutifully recycling each week and put it back into your home. Home as in the walls, subflooring, cabinets — even the furniture. Davis, a wood-products consultant in Eugene, Ore., has developed a line of building panels made entirely from recycled goods including plastic, newspaper, cardboard, rubber, yard clippings and polystyrene food containers.

The panels would be a substitute for all-wood building products like plywood, oriented strandboard, particleboard and waferboard made from virgin wood chips. The cost of making traditional building panels is rising sharply in the Pacific Northwest as logging in the

region's federal forests is slashed to protect old growth and threatened animals like the northern spotted owl.

Davis, who started his own engineering and marketing company five years ago, is developing the line of construction panels for Earth Partners Inc., a company started by a North Powder, Ore., rancher who wants to build a \$3 million factory in Oregon's Willamette Valley. Earth Partners also wants to build a series of small mills, drawing on recycled goods from local areas. The first mill may be built in the Eugene area because of its high rate of recycling.

Davis believes that a key to success is to make a product that has the same size, strength and versatility as tradition-

al panels. Test panels produced in Oregon, New Jersey and England have proved, so far, to be just as strong as solid-wood panels. They will be marketed under the name Enviroboard.

The manufacturing process is similar to that for making particleboard. A recycled material, like plastic, is mixed with a recycled wood fiber — corrugated boxes, yard clippings or recycled lumber that has been ground up. The whole mixture then is glued together under intense heat and pressure. The glue is free of environment-damaging formaldehyde.

Jim Wilson, an Oregon State University professor and head of the College of Forestry's Composite Materials Laboratory, says Davis's idea is far from

being wacky or unworkable. Substituting composite materials for solid wood is being embraced by a number of wood products companies.

"There are techniques in manufacturing that enable you to do a lot of amazing things," Wilson says. "You can make a board out of almost anything."

Few such mills have been built in the Northwest so far because "we've always had the wood supply," Davis adds. "We in the wood products industry have been real slow to look around us."

— Lance Robertson

Lance Robertson reports on forestry issues for the Eugene, Oregon, *Register-Guard*.

A grassroots campaign stops new dams on an Idaho river

BOISE, Idaho — Friends of the Payette used every trick in the political trade, and created a few more of their own, to convince the pro-development Idaho Legislature to ban new dams on the Payette River, a highly popular whitewater gem.

On March 25 the Idaho House of Representatives passed legislation protecting the Payette by a bipartisan vote of 53-30. The controversial measure had cleared the evenly divided Senate by a two-thirds margin three weeks before. Gov. Cecil Andrus signed the bill into law on April 2.

Friends of the Payette's forces — more than 9,000 members — waged the most aggressive grassroots campaign ever seen before the Legislature to secure the victory. They left nothing to chance. Their three-year effort peaked with a multi-pronged political attack that included an eight-member all-volunteer lobbying squad, citizen letter-writing days in the Capitol, yard signs saying "Pass the Payette Plan," TV advertisements, signature ads, expert testimony, constituent arm-twisting and more.

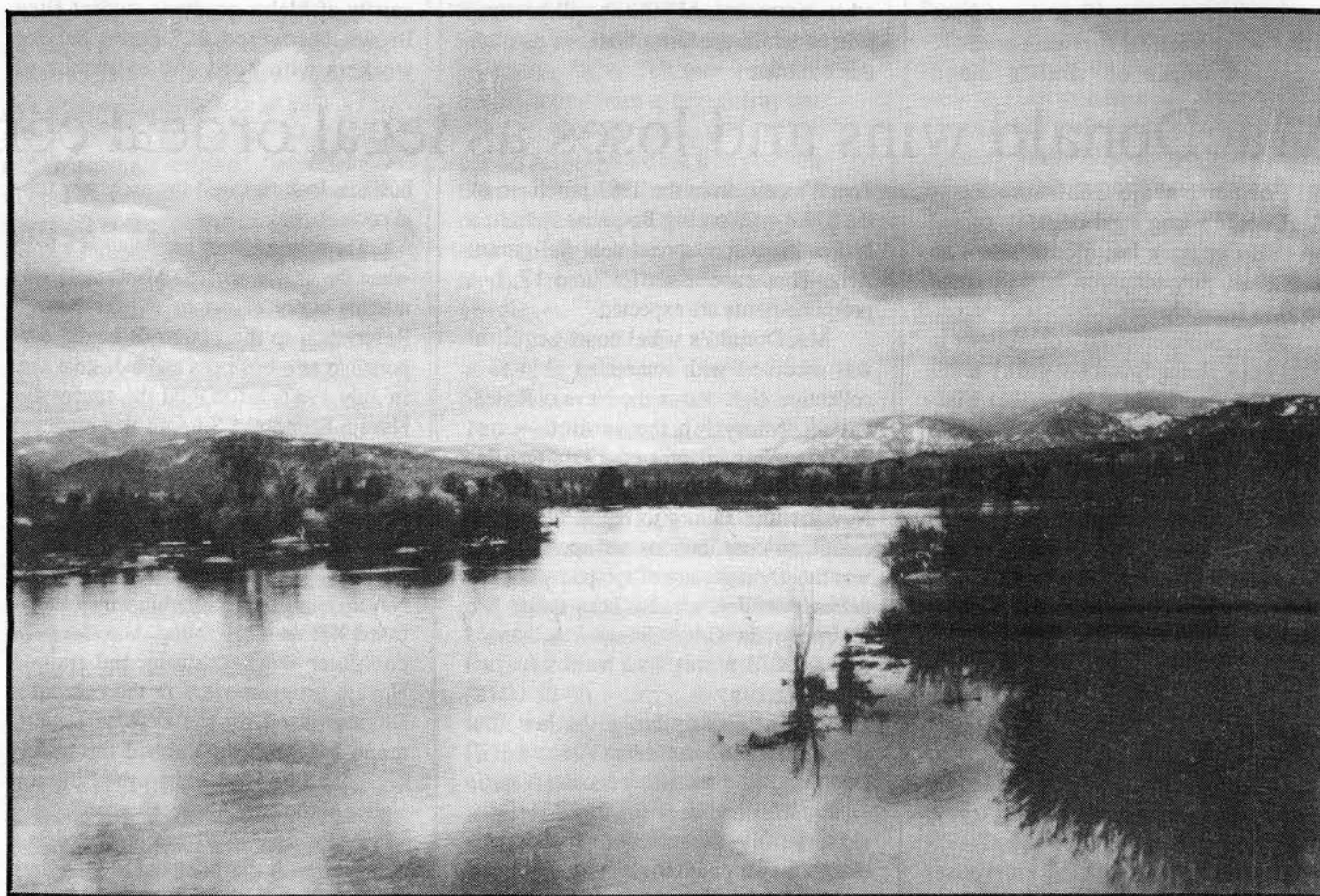
Even the opposition was impressed. "I can give nothing but accolades to Friends of the Payette — they did a tremendous job," said Jim Yost, a lobbyist for the Idaho Farm Bureau. "That's exactly how to get something passed through the Legislature!"

Legislators stopped short, however, of calling the Payette River victory a turning point in Idaho environmental politics. State Sen. John Peavey, D-Carey, a key environmental supporter in the Legislature, noted that many other measures were defeated in the 1991 session, such as funding boosts for water quality protection and the Idaho Conservation League's big disappointment — the killing of legislation giving strict water-quality protection to the Middle Fork of the Salmon and 27 of its tributaries. That bill died in committee.

"The Payette was a significant victory," Peavey said. "But it shouldn't take a whole army of supporters to get something like that passed."

State Rep. Judi Danielson, R-Council, who opposed the bill, said, "There gets to be a point of oversaturation, and they were really close to that line."

In the end, a pair of Republican farmers led the debate on the House floor, where the biggest showdown was expected. Rep. Reed Hansen, R-Idaho Falls, and Rep. Bruce Newcomb, R-Burley, supported the bill, mostly to gain state supremacy over hydro-siting on the Payette River. To allow dams to be built on the Payette was tantamount to selling off its water as well as its power, Newcomb said.



Idaho Rivers United

A quiet stretch of the North Fork of the Payette River

"The biggest mistake this state ever made was to allow the city of Seattle to purchase the power from Lucky Peak Dam," he said, referring to another example of out-of-state interests scheming over Idaho's rivers.

Two hydro projects are proposed on the Payette: a 500-megawatt pump-storage facility on the world-renowned North Fork, whose 100-foot-per-mile cataracts exceed the vertical drop of the Grand Canyon; and a 3-megawatt diversion dam at an old mining shaft at Oxbow Bend on the South Fork, a Class Four whitewater stream.

Now the hydro developers will have to play a waiting game with the Federal Energy Regulatory Commission, the nation's dam-licensing agency. If FERC determines that the state's new comprehensive plan for the Payette River meets federal standards, it would defer to Idaho's Water Resources Board when making decisions on new dams. Eventually the board plans to write comprehensive plans for about 60 river basins in the state.

When Friends of the Payette formed more than three years ago, its co-directors, Wendy Wilson and Scott Montgomery, knew it would be like swimming up the North Fork to get the Idaho Water Resources Board and the Legislature to ban new dams on the river. Idaho is the only state in the union without a

coal- or nuclear-powered generating plant. More than 24 dams fragment the mighty Snake River, including three in Hells Canyon, the nation's deepest gorge. Before the battle over the Payette, hydro development had ruled supreme.

For the past decade most of the state has enjoyed a surplus of electricity and cheap rates that are expected to continue through the next decade. Any new dams built today will produce surplus power. The city of Tacoma, Wash., has a one-third option on the power from the North Fork project, and Connecticut-based Consolidated Hydro Inc., hoped to reap profits by selling valuable peaking power — at rates double or triple the production cost.

Friends of the Payette focused on the theme of "protecting Idaho's rivers for Idahoans," and it worked. During the three summers leading up to the legislative campaign, Friends sponsored VIP whitewater boating excursions on the Payette's three forks. Water board members, several dozen legislators, and the state treasurer and attorney general went on the river trips.

Montgomery recalls two conservative Republicans sitting in the front of a raft, roaring with laughter as whitewater crashed over them, and turning around to shout, "This is great. What can we do to help?"

John Watts, a Boise consultant and the

group's key political advisor, says Friends ran "the Cadillac of a grassroots campaign ... We had a sexy issue. We had the largest population base in Idaho that appreciated the river. We had all the essential elements of a grassroots campaign."

The Friends also received \$40,000 from the Outdoor Alliance and \$20,000 from American Rivers, along with in-state contributions from local fund-raisers. Friends' benefit dances drew crowds to the Mardi Gras, a popular Boise bar with a roomy dance floor.

Rep. Rex Furness, a Rigby agribusinessman, likened protecting the Payette to invoking a "socialistic system" that unilaterally restricts economic growth. His message won't die easy in Idaho, but because of the Friends' grassroots networking, lawmakers know they have to cope with the growing throng of citizens who will rise up to protect their playgrounds.

"This is a plan where the people have spoken," Burkett said. "If you look at communist countries, their rivers are totally fouled. But the Payette is free-flowing, it's clean and it's beautiful. That's the way I want to keep Idaho."

— Stephen Stuebner

The writer lives in Boise and reports on the environment for *The Idaho Statesman*.

A Vietnam vet tries to preserve the Blackfeet culture

Twenty years after a Viet Cong rocket left him with a concussion and flesh wounds, Ron West has become a warrior for Blackfeet spiritual leaders fighting to preserve the Badger-Two Medicine area south of Glacier National Park.

"When those people in Browning say they need that cultural habitat for their youth, I know from personal experience they're telling the truth," West says.

The Vietnam War left West shaken. After volunteering, he became a helicopter mechanic and machine gunner in a light infantry brigade. His unit spent a lot of time bailing others out of trouble.

He was working on a helicopter when a Viet Cong rocket struck the airfield 20 yards away. The explosion knocked him flat, but he jumped up and sprinted to a bunker. Later he lived in the bunker, made of a metal shipping container, with some dogs.

West came home in 1976 a sergeant, decorated for his service. But as a Vietnam veteran he was shunned. "It was a stigma I would gladly have forgotten were I able to," he says.

West also was suffering from a progressive nervous disease that mimicked multiple sclerosis. He went home to Coram, Mont., a small town between Glacier Park and the Bob Marshall Wilderness. A high school buddy suggested he spend time in the Bob Marshall. West now says, "The quiet was the first step in healing."

When he hiked out of Badger Canyon onto the Blackfeet Reservation during the summer of 1977, Alfred and Agnes Wells befriended him. Veterans have special standing on the reservation, and the acceptance helped him come to peace with his experiences.

West remembers living in a two-bedroom house at the mouth of Badger Canyon with 14 other people during the winter of 1977-78. Money from his disability check and the others' incomes bought food the first few weeks of the month. The last week they went without.

During one winter storm, ground blizzards were so severe that no one could go outside to cut firewood. They cut up a radial tire with a hacksaw and twice a day burned bits of it to cook tea. When grease and flour ran out, the last few cans of commodity peas were divided among the children. West noticed that the children did not complain, but simply took the hardships in stride.

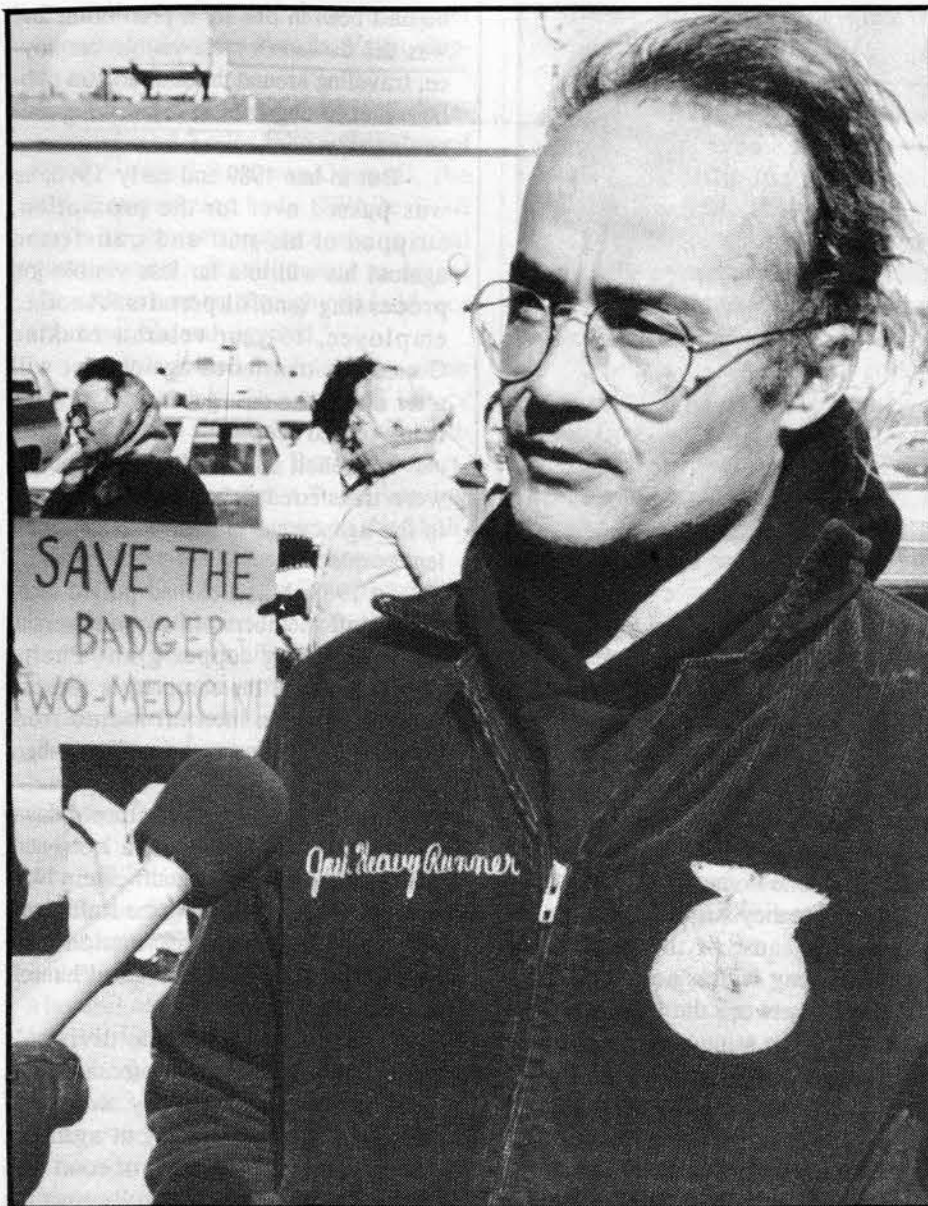
Many times, whether they ate or not depended on whether any of the men killed a deer. "That's when it became very clear to me how vital subsistence hunting was and continues to be for that community," West says. "So in that respect, things haven't changed much since former times."

West helped the Wellses by getting firewood, dickering for hay off the reservation and cutting holes in the ice so their cattle could drink.

The Wellses were healers. Agnes Wells would sometimes sit by herself for a while, then announce that they had to travel to a certain home on the Blood Reservation in Alberta. They would wait there and eventually someone would show up looking for a healer. Alfred Wells performed the work.

One time, West recalls, Agnes Wells came to him and described a person in Coram that she thought he should know. Then she described a possession she needed and said the person would give it to West.

Everything worked out precisely as she had told him. "From that day," West says, "I understood, and became a believer in, an order of things absolutely



Ron West

alien to the society that has overrun these people."

In 1985 Floyd Heavy Runner, the Wellses' grandson, asked West to keep an eye on the Forest Service's plans for oil and gas exploration. Heavy Runner is chief of the Brave Dogs, a Blackfeet warrior society responsible for the Sun Dance, the tribe's most important religious ceremony.

The Sun Dance was driven underground at the turn of the century by Christian fundamentalists alarmed by the self-torture of braves, who had wooden pegs inserted in slits in their chests. Thongs attached the pegs to a pole, and the braves danced until the pegs tore free. Even though other tribes were forced to abandon the Sun Dance, the Blackfeet continued it.

During the Sun Dance, a woman of good health and unimpeachable character makes vows on behalf of the people. "Both she and the ground and water surrounding the event must be absolutely clean and without blemish," West wrote in a report. "If the environs surrounding this event were to be ill or contaminated, the event could not be held because the damage would be incorporated into the life and luck of the people as a whole and bring certain disaster upon the entire tribe."

The drainages of the Badger and Two Medicine rivers west of the Blackfeet Reservation are among the lands the Blackfeet sold to the United States for mining development in 1896. The Blackfeet retain a variety of rights under the agreement, such as the right of access and to cut wood for domestic purposes. But the Blackfeet Tribal Business Council contends that according to oral history, the tribe's rights are far greater. They say the agreement expired after 50 years, giving the Blackfeet ownership of the land now managed by the Lewis and Clark National Forest.

The Forest Service disagrees. "They conveyed and released all their right,

title and interest except to go upon the lands to cut and remove timber and hunt and fish in accordance with state law," said Dale Gorman, Lewis and Clark National Forest supervisor.

During the early 1980s, the Forest Service leased 130,000 acres in the Badger-Two Medicine and other national forest lands for oil and gas exploration. After extensive seismic testing, the Fina and Chevron companies filed applications to drill exploratory wells in the Badger-Two Medicine. Fina wants to drill in the Hall Creek drainage, two-and-one-half miles south of Glacier National Park. Chevron wants to drill on the slopes of Goat Mountain, in roadless lands east of the Bob Marshall Wilderness.

These lands interest oil and gas companies because they lie in the Rocky Mountain Overthrust Belt — between large natural gas fields north of Canada's Waterton Lakes National Park and large oil and gas fields in Wyoming. In addition, a producing natural gas field lies south of the Badger-Two Medicine in Blackleaf Canyon. In the Rocky Mountain Overthrust Belt, younger rocks that could form oil and gas lie beneath older rocks shoved over them from the west.

During the seven years since Fina first submitted its application to drill at Hall Creek, the debate has centered largely on wildlife and on the area's proximity to Glacier National Park. Glacier National Park is in favor of a study of the wildland and Native American values in the Badger-Two Medicine as proposed in past Congresses by Sen. Max Baucus, D-Mont., and Rep. Pat Williams, D-Mont.

Environmental groups and the Blackfeet have twice won delays by appealing the proposed drilling, but the Forest Service and Bureau of Land Management have continued working on the project. In March, Fina received a permit to drill its well in Hall Creek, subject to a number of environmental restrictions.

Those restrictions prevent any drilling before July to protect wildlife. Appeals or lawsuits could delay the project.

Chevron's proposal is undergoing Forest Service review to determine if traditional Blackfeet cultural sites in the Badger drainage are eligible for nomination to the National Register of Historic Places. "If they're eligible, we'll nominate them," Gorman said. Nomination wouldn't necessarily stop drilling.

The Forest Service determined that sites in the Hall Creek area weren't eligible for nomination. West says he and Heavy Runner tried to work with the Forest Service to explain the area's importance, but contends that "they have stonewalled, used bureaucratic maneuvers and attempted to duck and dodge everything we've brought their attention to. We attribute this in the main," he says, "to the religious fervor of Dale Gorman to see the ceded lands developed for oil and gas."

Gorman says the Forest Service received little comment from traditional Blackfeet about religious uses of the Two Medicine area where Fina's well is proposed.

"Perhaps, Ron, the problem really lies in the fact that as much as you say you have provided us with information, that information is insufficient to support a nomination to the National Register based on National Historic Preservation Act requirements," Gorman wrote West.

Gorman points out that development activities already have occurred in the Badger-Two Medicine. A well was drilled on Kiyo Crag. Hundreds of miles of seismic line were cut or blasted in the area. One of the mountains had a fire lookout on top. Mount Baldy now has electronic repeaters atop it. Snowmobilers and motorcyclists ride through the area, and motorists used to, before the Two Medicine road was closed by floods and the road to Badger Creek was closed by the Forest Service.

The Blackfeet are reluctant to tell the Forest Service about sacred sites. "The spirits would take direct retribution on the people that violated the cultural laws and the sanctity and privacy of those locations," West says. "You just simply cannot send strangers into burial sites and to fasting places without putting the traditional people at severe risk of harm according to their own oral history and cultural law."

West and Mark Randall Mueller, Heavy Runner's attorney, have sought help from the United Nations. They claim that development of the area amounts to "ethnocide," or destruction of a culture. In addition, they have prepared an appeal of the Fina permit. In all, 50 appeals have been filed against the well.

West wants all of the Badger-Two Medicine protected and included in the National Register of Historic Places as a traditional Blackfeet cultural area. Despite the opposition of the Forest Service and the oil companies, he says he will continue the fight that has consumed the last year and a half of his life.

"Heavy Runner states and we believe that we have something greater than all of those resources on the other side, and that is the blessings of the spirit," West said. "Having seen the devastation visited on a countryside and a people in a very nasty war, I could never rest easy with myself if I didn't do something toward preserving what has become holy to me."

— Bert Lindler

Bert Lindler is a reporter for the Great Falls Tribune in Montana.

New Mexico's Gov. King moves to get tougher on polluters

Long accused of being soft on polluters, New Mexico's troubled state Environment Department has taken on a new face. Recently elevated to Cabinet status, the agency has a new chief who promises a tougher enforcement stance.

Judith Espinosa, appointed in mid-February by Gov. Bruce King, inherits an agency whose employees have been waging guerrilla war with their leaders over environmental policy. Decisions by division leaders not to take polluters to court in two major cases met with stiff criticism from the division's own staff.

The division has been plagued by turnover, with many veteran technical staff members fleeing to the private sector for jobs paying 20 to 100 percent more. The state's tight budget has left the division with such a small staff that it is able to inspect many potential polluters only once every two or three years.

Espinosa, a former state transportation secretary, brings impeccable environmentalist credentials to the job and has the endorsement of the state's environmental groups and the union that represents the division's employees. In her last job, Espinosa started an auto emissions inspection program in car-dependent Albuquerque that has helped slash the number of times the city violates federal air-pollution standards.

Although he is a cattle rancher, King himself was elected last year with near-unanimous support from environmental groups. His predecessor, Garrey Caruthers, in contrast, spent much of his four-year term fending off charges that he was anti-environment. His officials left behind a string of controversial decisions whose legacy will stretch well into the new administration.

The case of the Lee Acres landfill is a key example. The landfill lies about halfway between Farmington and Bloomfield in rural northwestern New Mexico. It has become a *cause célèbre* among environmental groups and division staffers because of management's failure to take tough enforcement action against the landfill's owner, long after scientists at the agency had concluded it was polluting the groundwater. The division's outgoing director, Richard Mitzelfelt, has said the agency felt it could accomplish more by cooperating with the owner, the Bureau of Land Management.

Lee Acres, operated by the San Juan County government, put toxic solvents from local industries into unlined pits and lagoons during the early 1980s. In



Judith Espinosa

1985 the landfill briefly made the national news when clouds of hydrogen sulfide gas from the pits burned the hands and face of a caretaker.

In 1986, scientists for the environmental division found some of the same toxic solvents that had been dumped at the landfill in the groundwater beneath part of a mobile-home subdivision. They told Congress they suspected the landfill was a prime cause of the groundwater pollution, along with a nearby oil refinery that lies between the landfill and the subdivision. The same year, the administration of ex-Gov. Toney Anaya sued the BLM to force a cleanup of the pollution.

In 1987, the state and the BLM signed a consent order in which the bureau agreed to submit an investigative report on the site by February 1988. Since then, the BLM has not submitted an acceptable report to the division, the state has done nothing to enforce the 1987 order and no cleanup has started. Instead, BLM has argued that the evidence from water tests at the site hasn't been strong enough to show that the landfill, rather than the oil refinery, had caused the pollution.

"If the state was going to sue someone, it should have sued the citizens of San Juan County who put the wastes in the landfill, or the county, which ran the landfill," said Michael Burkhardt, the deputy secretary who made the key decision not to go to court for a second time against BLM. "BLM owns the landfill, but they didn't pollute it."

One division staffer who disagreed in 1989 with the landfill decision, veteran geologist Dennis McQuillan, spent the following year fighting for his professional life. Until the Lee Acres case,

he had been in line for a promotion and was the division's most visible employee, traveling around the state to run public water-testing fairs in areas with contaminated water.

But in late 1989 and early 1990, he was passed over for the promotion, stripped of his staff and transferred against his will to a far less visible job processing landfill permits. Another employee, 15-year veteran Maxine Goad, was transferred against her will after she spoke out against McQuillan's being passed over.

Mitzelfelt said Goad and McQuillan were transferred to help other programs in the agency and praised both as excellent employees.

In 1988, Mitzelfelt had pulled technical staff members off a controversial case involving copper giant Phelps Dodge Corp. at the company's request, according to an internal memo from Cynthia Ardito, one of the staff members on the case.

Mitzelfelt had previously turned down the company's application for a 1,600-acre tailings disposal area in southwestern New Mexico. But after removing the staff members and getting more information from Phelps Dodge, Mitzelfelt reversed himself and approved the proposal.

In September 1990, the division's management sent another veteran staffer, Albert Dye, home for a day and a half with pay, after Dye spoke out against a pending decision to settle out of court with Phelps Dodge over a 180-million-gallon spill of contaminated water from Phelps Dodge's Chino Mines near Silver City in the summer of 1988. Division leaders signed off on the settlement while Dye was absent.

The spill, the largest in state history, sent heavily acidic and salty water into a neighboring creek. But the state felt it lacked the legal and financial muscle to sue Phelps Dodge to enforce a previous agreement that would have allowed it to fine the company \$1.8 million. Instead, the state accepted a \$300,000 contribution from Phelps Dodge for groundwater research in New Mexico. The mining company also agreed to pay \$2.9 million to improve the discharge control equipment at its massive Silver City mining complex.

That case was one of several factors that prompted Ron Conrad, a 12-year veteran of the division, to quit last year for a job at Los Alamos National Laboratory. "We felt, why bust our butts every day working on a site when some-

one up above can stifle you? We felt we were losing the respect of the regulated community," Conrad said recently.

Espinosa's appointment seems unlikely to turn the division into a free-wheeling agency that takes polluters to court at the drop of a hat. The day Espinosa's appointment was announced, she and the governor said they, like most previous division officials, believe in trying to get polluters to voluntarily fix environmental problems without taking them to court.

Espinosa said she favored using environmental audits of companies to improve enforcement. She said she would try to get the state's slender inspection force out into the field to make sure companies are obeying pollution laws.

She also said flatly, "I don't retaliate" against dissenters.

"I am usually willing to listen to anyone," she said in an interview. "People can bring me bad news, the stuff I don't want to hear. You can't be a good administrator if you don't listen."

But despite the changes at the environmental agency, several bills that would have helped carry out King's campaign promises died in this year's state legislature.

The Legislature refused to pass bills that would have allowed the state to seek criminal penalties for violators of water quality and hazardous waste, and to boost penalties for violators of air quality laws. A key factor in the bill's death was a Santa Fe Democratic state senator, Eddie Lopez, who pigeonholed the bills in his committee until the next-to-last day of the session.

But some legislators and environmentalists express disappointment at King's performance.

"His campaign promises on the environment turned out to be kind of hollow," said Rep. Max Coll, D, a veteran environmentalist. "I didn't see the kind of pushing I would have expected."

King's press secretary, John McKean, noted that one of King's sons, who is a state legislator, introduced many of the environmental bills, and another son tried to shepherd them to the Legislature as a lobbyist for the governor.

"If the governor had applied any more pressure, people would say, 'King's running roughshod over the Legislature,'" McKean said.

— Tony Davis

Tony Davis is a reporter for the *Albuquerque Tribune*.

HOTLINE

Gas well threatens Utah canyon, falcons

The Bureau of Land Management has approved another gas well for Utah's White River Canyon. While the area has traditionally been used for petroleum development, the latest well would be placed in a pocket of nearly 10,000 acres where no such drilling has ever occurred. The site is included in the wilderness area proposed by Rep. Wayne Owens, D-Utah. It also is eligible for inclusion in the nation's Wild and Scenic River System. The Sierra Club Legal Defense Fund and the Southern Utah Wilderness Alliance plan to appeal the BLM decision to the Interior Department's Board of Land Appeals. The U.S. Fish and Wildlife Service also is at fault for failing to protect the endangered peregrine falcon habitat by allowing roads and development within 200 yards of the cliff face, says the alliance's Ken Rait.

Hazardous fuel

A Colorado cement company, Holnam Inc., has notified the Environmental Protection Agency that it intends to burn hazardous wastes as a fuel source at two of its plants in LaPorte and Florence, Colo. Approximately three dozen cement companies in the United States burn hazardous wastes, and the EPA is working on a new set of stricter regulations for such companies. Residents of LaPorte, LaPorte, however, fear the incineration will threaten their health and property values, according to *The Denver Post*. They cite tests at other plants showing excess cadmium, copper, lead, mercury and selenium in smokestack emissions and waste ash. They also doubt the 1927 factory's ability to upgrade its equipment and phase in the new EPA rules over the next two years. EPA regional combustion specialist Nat Miullo claims, "If the [owners] upgrade the plant and maintain the facility, there is very little calculated risk to the public health."

Hazardous waste slows gambling development

Some prime chunks of real estate in Central City and Black Hawk, Colo., could be off-limits for development until their hazardous waste is cleaned up. Many vacant sites targeted by hotel and casino developers are on or near mine and mill tailings contaminated by toxic substances such as lead, zinc and arsenic. Some lots are Superfund sites, reports *The Denver Post*. Van Cullar, owner of the Central City Land Co., contends that the Environmental Protection Agency and the Colorado Department of Health are "using scare tactics" to prevent development. "They have flat thrown cold water on this whole project," Cullar said. "We're going to end up with gambling starting this fall with no overnight accommodations." A proposed cleanup plan is due to be released next month. It could cost property owners as much as \$45 million over a 30-year period.

Casper and Las Cruces violate clean water laws

The Environmental Protection Agency says the wastewater treatment program in Casper, Wyo., violates the Clean Water Act on seven counts. The city has failed to conduct pretreatment tests for some contaminants and has failed to take appropriate action against "significant industrial users" who are violating local discharge limits, reports the *Casper Star-Tribune*. Many of the violations are linked to an Amoco Oil Co. refinery that failed to produce a "baseline monitoring report" before beginning to discharge last October. Las Cruces, N.M., also has been cited by EPA for violating a permit that regulates wastewater dumping into the Rio Grande. According to the *Albuquerque Journal*, excess amounts of "residual chlorine" were released by the city's wastewater treatment plant. The city has until May 31 to build a dechlorination facility and comply with its discharge limit.

Idaho's Andrus battles the U.S. over nuclear 'waste'

Shortly after Gov. Cecil Andrus banned the shipment of nuclear waste from the Rocky Flats Plant to Idaho in October 1988, state troopers noticed a boxcar of Rocky Flats waste on a railroad track near Blackfoot. The carload of plutonium-contaminated trash was promptly sent back to Colorado.

Idaho now is embroiled in another nuclear waste controversy. This time the showdown is occurring in a courtroom, not along a railroad siding.

This time around, both the federal government and a Colorado utility are suing Andrus for refusing to allow the shipments of high-level nuclear waste. Andrus, in turn, is suing the Department of Energy, saying it failed to follow environmental laws before planning waste shipments to its Idaho National Engineering Laboratory (INEL).

The battle is being waged over spent nuclear fuel from the Fort St. Vrain nuclear power reactor. Public Service Co. of Colorado, the utility that operates Fort St. Vrain, is now storing the waste on-site, at a reported cost of \$2 million a month.

The utility, which provides 75 percent of Colorado's electricity, finds itself in the middle of a feud between the Department of Energy and Andrus. It wants to convert Fort St. Vrain into a natural gas and solar plant, but it first has to move about 300 tons of spent nuclear fuel off-site.

"We are truly a small David caught between the two Goliaths," Public Service spokesman Mark Severtz said. "We need that power to meet the generation needs of our customers."

From 1980 to 1986, the utility made 121 safe shipments of spent nuclear fuel from Fort St. Vrain to INEL. Now it wants to make another 247 truck shipments, containing as many as 1,482 blocks of spent nuclear fuel. (See story on page 11.)

Originally, those shipments were supposed to begin in February and run for about a year. The utility even made a test run to the INEL in late January, although this shipment did not contain any radioactive materials. But before the actual shipments could begin, the roadblocks started going up.

First, on Feb. 6, the Shoshone-Bannock Tribes banned Fort St. Vrain shipments through their Fort Hall Indian Reservation north of Pocatello. Interstate 15, the major highway route to INEL, runs through the reservation.

Tribal leaders said they were never consulted about the Fort St. Vrain shipments.

"This is becoming a damned dictatorship," said Kesley Edmo, chairman of the Fort Hall Business Council, the tribes' governing body. "While DOE gives lip service about recognizing tribal governments, when it comes to actual shipments running through our land, our tribes are blatantly ignored."

Andrus joined the fracas the same day, reiterating his 18-month-old ban of Fort St. Vrain shipments. He did so with a flourish, calling the Energy Department "lying so-and-sos," and vowing again to send state troopers to the Utah-Idaho border to block the deliveries.

"I don't trust them," Andrus said. "I've been lied to and I've been cheated."

For a short while, it looked as if Public Service Co. would blink. On Feb. 7, the utility said it had cancelled its shipments. But later, Public Service filed a suit in U.S. District Court against Andrus. The utility cited a 1965 agreement with the Atomic Energy Commission, DOE's predecessor agency, in which the federal government agreed to take spent fuel from Fort St. Vrain.

A day later, Andrus responded with a lawsuit of his own. In it, he claimed the federal government had not complied with the National Environmental Policy Act (NEPA) before going ahead with its shipment plans. Andrus also has said Idaho never signed on to the 1965 Public Service-AEC agreement.

The federal government joined the legal skirmish as well, filing suit against Andrus for blocking the Fort St. Vrain shipments. And on May 7 the U.S. district court in Boise ruled in favor of the Energy Department and Public Service Co., saying Andrus's waste ban was illegal. "Although the governor's position may be politically favorable, it clearly violates the Constitution and is completely unsupported in the law," Judge Harold L. Ryan wrote.

This means Fort St. Vrain could resume shipping its nuclear wastes to INEL by May 20, unless the Ninth Circuit Court of Appeals in San Francisco issues a temporary restraining order. Idaho asked for the delay pending an appeal of the Judge Ryan decision.

But the legal wrangling seems almost subdued when compared to the political infighting about Fort St. Vrain.

Within a matter of days, the waste issue polarized Idaho Republicans and Democrats.

Idaho Republicans, who said little about Andrus's 1988 Rocky Flats waste ban, wasted little time going on the offensive this time. They said the ban — and the governor's verbal attacks against the Energy Department — could threaten the long-term future of INEL, the state's second largest employer.

"The governor's political posturing will probably receive great plaudits and praise from the media and will most likely be received well by the public," said Sen. Steve Symms. "I fear, however, that in the long run this is very damaging to the state and the nation."

During a recent Senate committee hearing, Energy Secretary James Watkins said the Andrus waste ban could cost Idaho its chances for the New Production Reactor, a mammoth defense project that could create up to 2,000 construction jobs and hundreds of permanent jobs (HCN, 3/25/91). He said this work could go to another site — perhaps the Savannah River Site in South Carolina — where the DOE is welcomed "with open arms."

"I'm not going to want to put something in the state that is constantly fighting us in the court with a litigious relationship," Watkins said in response to a question from Larry Craig, Idaho's other Republican senator.

Andrus dismissed Watkins's remark as well-orchestrated blackmail between a Bush administration appointee and a GOP senator.

As Watkins has turned up the political volume over the waste ban, Andrus is seeking tacit approval from Congress. Under the Nuclear Waste Policy Act of 1982, Andrus's rejection of the waste becomes final unless Congress passes a resolution overturning it within 90 days.

"Unfortunately, the DOE has failed to meet its legal obligations in several respects with regard to the storage of this material in Idaho," Andrus wrote in a Feb. 14 letter to congressional leaders.

Reaction to Andrus's move was, predictably, partisan. Symms said he may fight on Capitol Hill to allow the shipments. Rep. Richard Stallings, D-Idaho, who had said the Andrus waste ban was legally shaky, said the Nuclear Waste Policy Act gives the governor a winning legal strategy that Congress

wouldn't dare oppose. "I can't imagine them trying to [repeal the ban], for no other reason than the precedent," Stallings said.

Andrus's letter to Congress adds another political dynamic to the waste issue: the power of the federal government as opposed to states' rights. Representatives may be reluctant to vote against Idaho's waste ban, Stallings said, for fear that their state could be next on the Energy Department's list of waste storage sites.

Symms, a self-avowed supporter of states' rights, conceded it would be an uphill battle to get Congress to back DOE over the states.

Meanwhile, the Energy Department has sent out mixed signals about its plans for the Fort St. Vrain fuel. Energy Department officials don't like to hear the Fort St. Vrain fuel described as "nuclear waste." They say the spent fuel has research value, but it's unclear exactly what research DOE has in mind.

A year ago, the Energy Department said the fuel would be used for New Production Reactor-related research. The Fort St. Vrain fuel closely resembles the fuel design for the gas-cooled reactor the Energy Department has proposed for Idaho. Since then, though, the Fort St. Vrain-NPR connection has become unclear.

For Andrus, the confusion provided an easy opportunity to slap the Energy Department. "This is absolute confirmation that the Department of Energy is only looking for a garbage dump for this dangerous waste — that they used their subterfuge to pressure Idaho into accepting new waste shipments," he said.

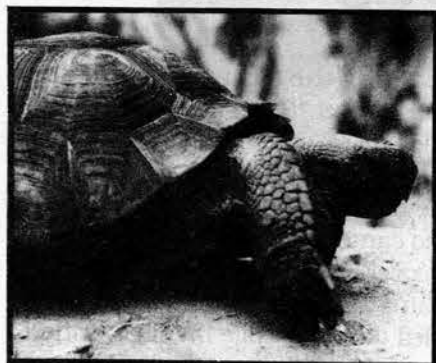
Since then, DOE's long-term intentions have become a bit more clear. The agency says it wants to build a multi-million-dollar plant — perhaps in Idaho — to do research on nuclear fuel reprocessing.

Andrus says he supports this research, but wants a firm guarantee that a reprocessor would be built. He also wants the state to have the power to fine the federal government if it decides not to build the project and tries to keep the waste in Idaho. DOE has said it can't go along with either demand.

— Kevin Richert and Rocky Barker

The authors are reporters for the Idaho Falls Post Register.

HOTLINE



Elden Hughes

Bill protects tortoise — and developers

A bill that would avert a moratorium on construction in southern Nevada by building a habitat for the endangered desert tortoise has won overwhelming state assembly approval. The bill — AB 376 — would allow county commissioners to impose a fee of up to \$1,000 per acre on construction projects that would then be used to build and maintain habitat, and to remove the reptiles from areas such as Laughlin and west Las Vegas. The bill

pleases both conservationists and developers, according to The Associated Press. The tortoise was placed on the endangered species list two years ago when environmental groups claimed they were dying in Nevada, Southern California and Utah from a respiratory illness.

Logging stopped near Walnut Canyon

The Forest Service has reversed its decision to permit logging in a 7,152-acre area adjoining Walnut Canyon National Monument in Arizona. The area also has been declared ineligible for private development, Coconino National Forest district ranger Clyde Thompson told *The Arizona Republic*. "We decided that the recreational, wildlife and scenic values of that area far outweighed the need to take timber out of it," Thompson said. The decision will cost about \$600,000 in lost jobs and stump fees, predicts Fay Fisk, a forester for Stone Forest Industries of Flagstaff. Fisk hopes the decision will not set a precedent in the Flagstaff area, but local environmentalists hope it will. "The last thing we wanted to see were homes being built on the rim of

Walnut Canyon," said Betsy McKellar of the Friends of Walnut Canyon, a group of rural residents.

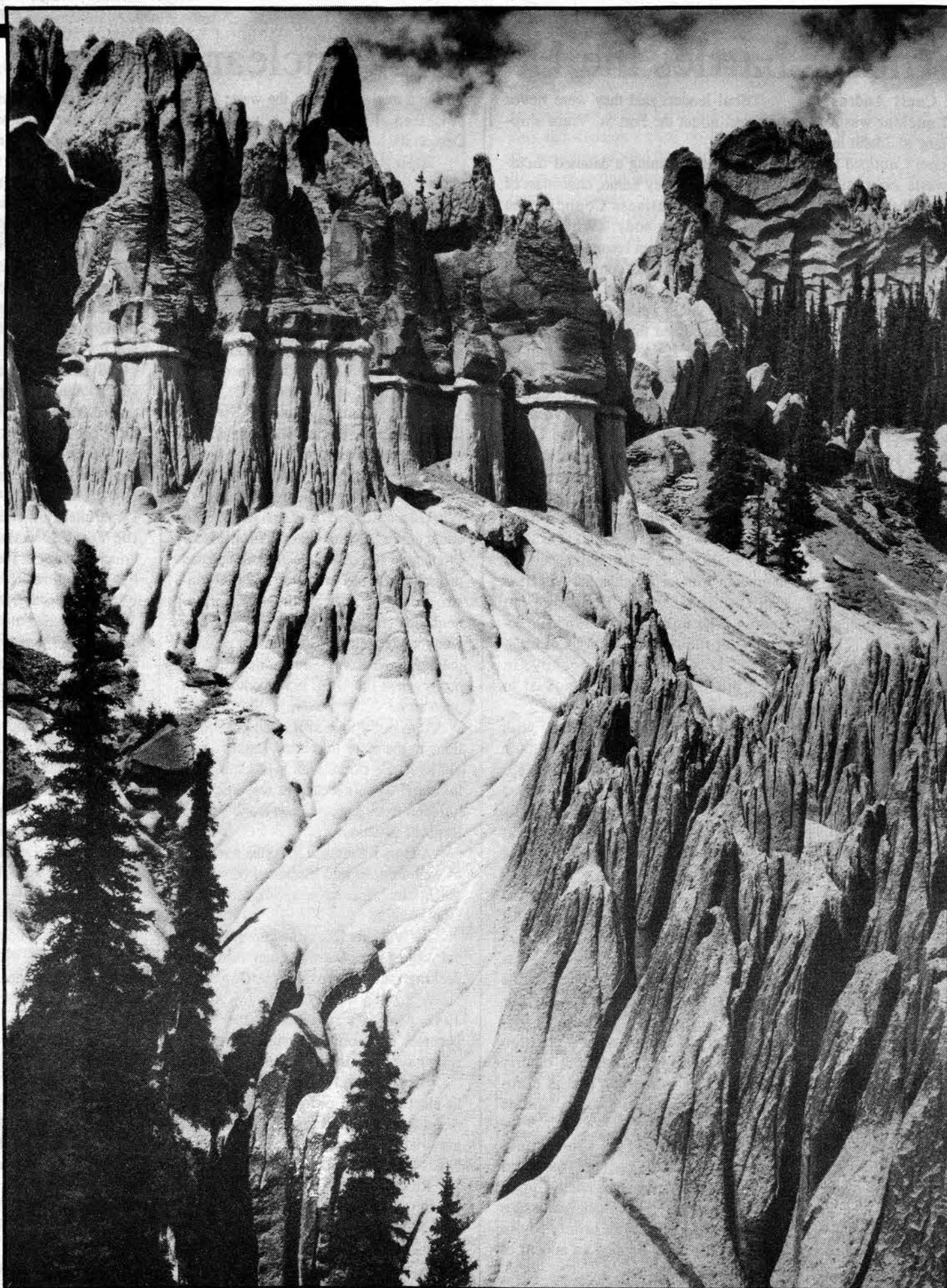
Public gains access to Montana cattle land

Four million acres of state land leased to Montana cattlemen will be opened to the public for an annual fee of \$5 per person. Previously, only ranchers who leased the land from the state could use the land. Three years ago the Coalition for the Appropriate Management of State Lands, a coalition of Montana sportsmen, sued the state to gain free access to the 4 million acres of state land. "You can't tell me the people of the state of Montana have to pay to use their own land," said state Rep. Bob Raney. On the other hand, Kim Enkerud of the Montana Stockgrowers Association told the *Billings Gazette*, "Those state lands are essential to the ranching units of those people who lease them." The \$5-per-person annual fee is the compromise reached by the ranchers, the sportsmen, and the public schools to settle the suit. The schools will get 60 per-

cent of the fees. The remainder will be used to administer the program, control weeds and compensate leaseholders for damage to the land caused by the public.

A second incinerator for Utah?

The Utah Board of Solid and Hazardous Waste has issued a draft permit for USPCI, a subsidiary of Union Pacific Corp., to build a hazardous waste incinerator 80 miles west of Salt Lake City. According to the *Salt Lake Tribune*, the Bureau of Land Management also has authorized the construction of an access road. The BLM's Environmental Impact Statement concluded that the incinerator would not cause significant toxic air emissions or transportation problems. The town of Wendover City and environmental groups appealed the BLM's decision and won a stay. But they fear that if their appeal permanently blocks the federal access road, the county will condemn private lands for another access road. USPCI spokesman Joseph A. LaSala Jr. says the company would not be involved with a county condemnation.



The Pipe Organs at Wheeler Geologic Site in Colorado

This land is sacred

It is a long way from New York City to Colorado's remote San Luis Valley; a long way from a youthful career as a concert violinist to the life of a freelance photographer. J.D. Marston was born in New York and raised in Stamford, Conn., performing at the age of 12 with the Stamford Symphony. Later he turned from music to the study of journalism and photography. He worked briefly for a small advertising firm, but his insistent desire to use his life experience "as a way to discover what we're all about" led him to study Asian philosophy and medicine.

He apprenticed himself to a Chinese master in British Columbia, Canada, and practiced as an acupuncturist for 14 years. During this time he spent long periods of time in the Canadian Rocky Mountain wilderness.

"For eight months I lived alone in a tepee 50 miles from the nearest other human," he remembers. "Away from electricity and everything else, I became aware of how our technologies are influencing us on the psychological and neurophysical level. In the stillness of the night and the wilderness my mind started playing back every advertisement and

rock song I had ever heard. It took six weeks before the noise quieted down, and then I was left with a profound stillness inside. When I first went to Canada I was afraid of wild animals, afraid of the dark, but I regained communion with nature up there — I re-connected."

Marston's search for a sane way to live took him to northern India, where he spent the next seven years as a monk in the foothills of the Himalayas. He didn't wear shoes for five of those years, and for a while his nearest neighbor was a white cobra.

Just before he left India, Marston took a flight in a small plane. "We flew over the Himalayas and you could see so far, but I suddenly realized that even here there was a layer of brown pollution over everything. That hit me incredibly hard, and I thought, 'If the Himalayas are going, the rest of the world is going too.'"

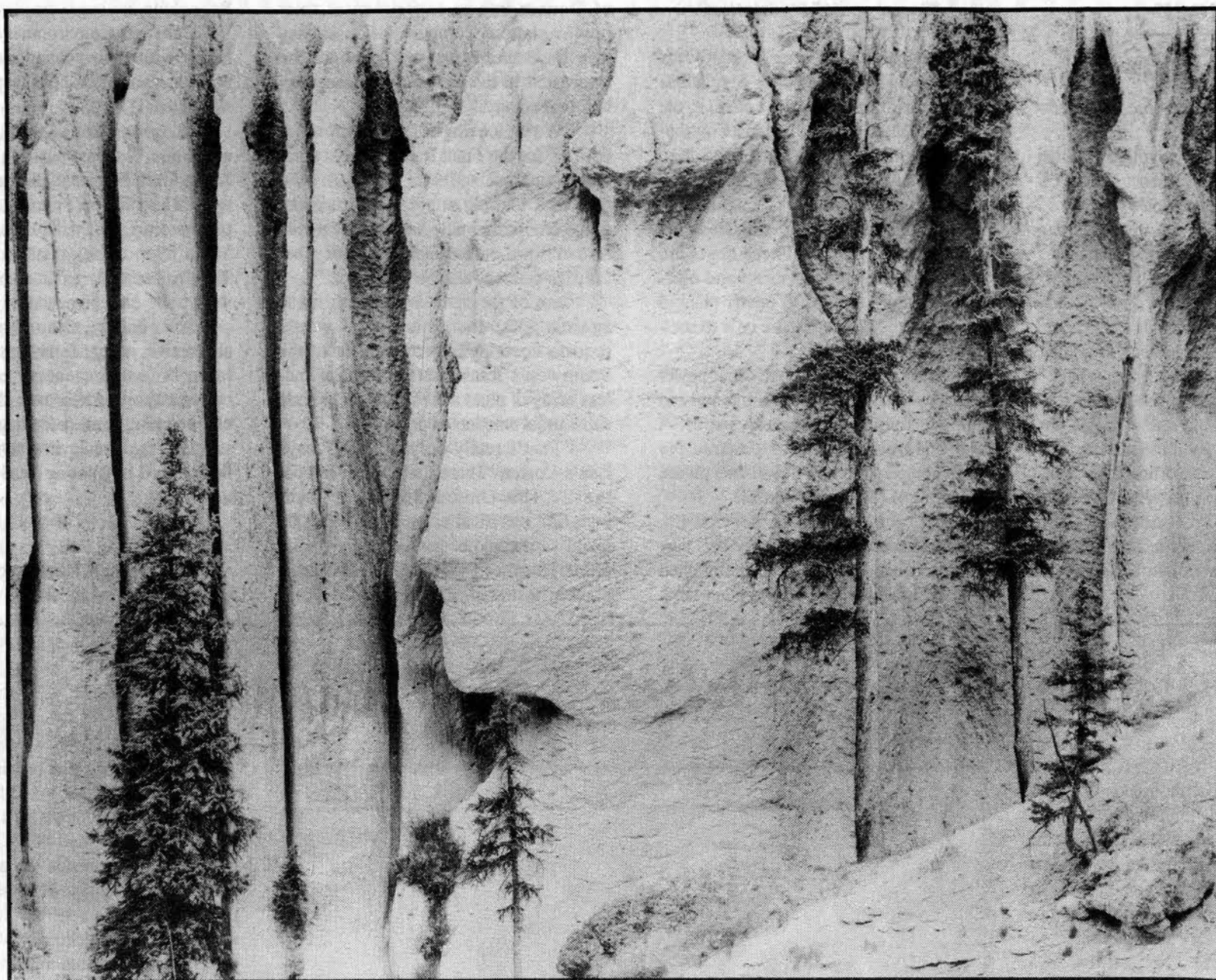
Marston returned to America during what he calls the "come on in and get yours" Reagan years. Wandering through the crazy streets of Manhattan, the ex-monk looked around him and wondered what he was going to do with the

rest of his life. One of the tenets of the Buddhist Eightfold Path is called "Right Livelihood," and Marston decided he must choose his work carefully. He began to photograph again.

In India he had met his future wife, Deborah Wood, who came from Colorado. To be with her, he moved to the San Luis Valley, where mountains as abrupt and jagged as a child's scribbled drawing edge the high, wide sagebrush spaces. He explores the landscape with his camera, documenting the shapes of seldom-seen places like the Wheeler Geologic Site, shown on these pages. He seeks out human subjects as well, photographing Colorado folk artists and recording pictographs and historic sites, "so that I may honor both the purely natural and the humanly beautiful."

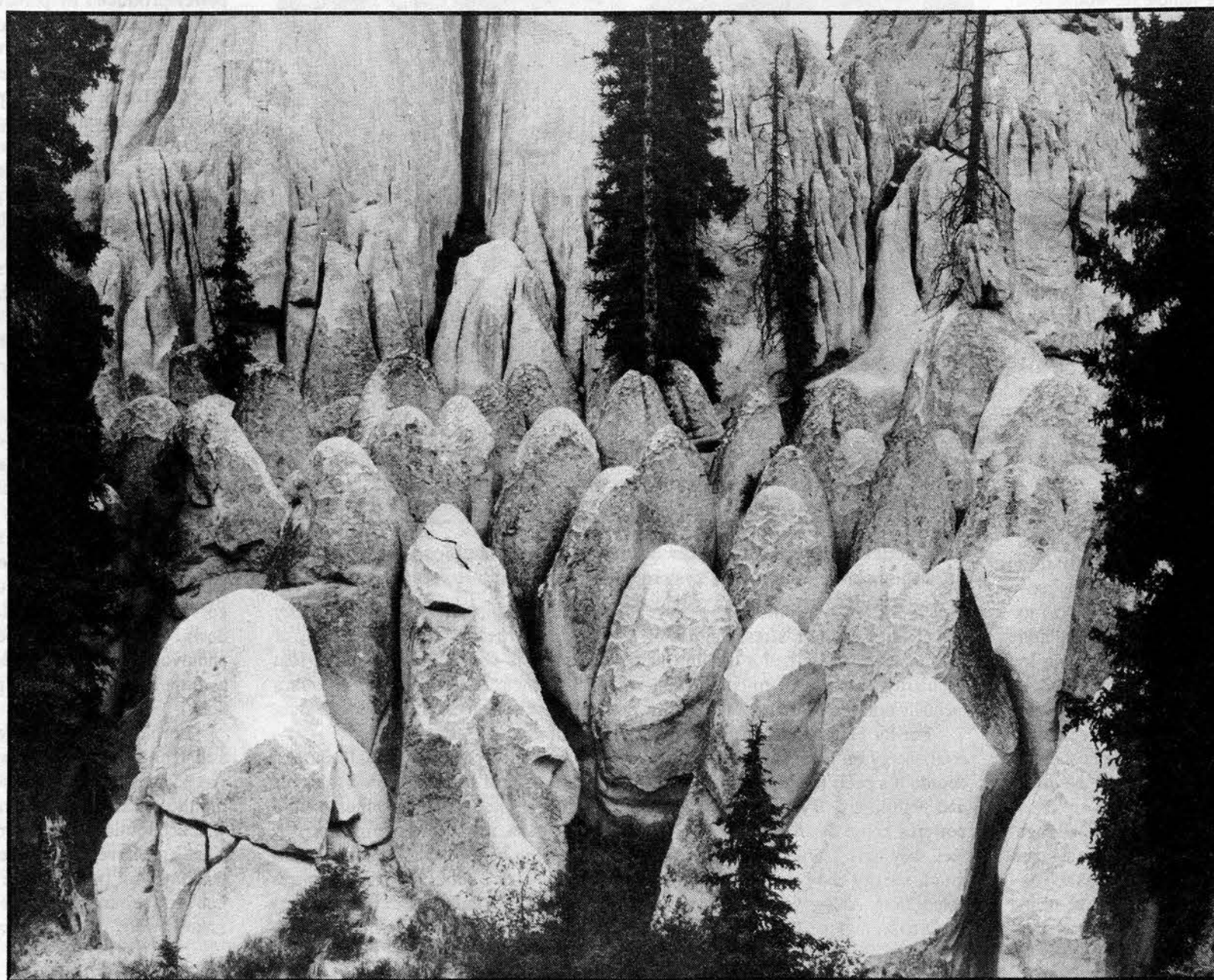
Through his photographs, many of which have appeared in *HCN*, Marston hopes to help awaken people to the world they live in. "I want to make a window into the natural world, so that people turn to the pictures before making their business decisions. I want to help people get back in communion with the land."

— Diane Sylvain, *HCN* staff artist



"The Guardian Spirit of Wheeler"

Photographs by J.D. Marston



"The Egg Carton," facing east at the base of the formation

Solar power ...

(Continued from page 1)

unless successfully challenged by a better technology.

Luz is currently negotiating with Nevada Power & Light about building a solar-thermal plant that would produce up to 140 megawatts of electricity for the burgeoning Las Vegas metropolitan area.

"Nevada Power is the fastest-growing utility in the country," says Rose McKinney-James, a Nevada Public Service commissioner. "Las Vegas is adding 3,000 to 5,000 new residents per month." She says that because of this growth, and because of an innovative new Nevada law that considers the environmental costs of power generation, state officials are looking seriously at Luz's proposal. "We have very concentrated sunshine here, and from a general standpoint, I would definitely look to solar as part of our future power mix," she said.

"Social costs" legislation

Impetus for solar energy in Nevada is being helped by new regulations requiring utilities to consider the environmental and social costs of producing electricity when planning future power plants. Under the regulations, environmental impacts like carbon dioxide or carbon monoxide emissions are given a dollar value. These costs are then added to the construction and operation costs of a proposed power plant to determine the project's true cost to society.

These regulations make clean-power sources — such as solar, geothermal and demand reduction (conservation) — much more economically attractive when compared to new fossil-fuel plants, according to McKinney-James.

In Colorado, Public Service Co. officials announced in January that they plan to convert part of the mothballed Fort St. Vrain nuclear power plant north

of Denver into an experimental solar power station. Company officials say they have already met with Luz and are interested in the company's solar-thermal technology.

"We're looking for environmental options for the Front Range," says company spokesperson Kim DeVigil. "We feel that looking at solar might make sense environmentally and could provide research and development data for other utilities that may also be interested."

One of the main arguments made against solar energy is that it would require covering huge expanses of the Southwest's scenic deserts with an endless array of pipes and mirrors to provide substantial amounts of power.

"That's really only a myth," says Luz's Lotker. "There's a lot of desert out there. The United States' current installed electrical capacity of 730,000 megawatts could be generated by a solar plant 78 miles by 78 miles. The DOE nuclear test range and Nellis Air Force

Base alone are larger than that."

California environmentalists seem happy with the company and the potential it has shown to help keep the West's skies clear.

"Luz has been a very, very good neighbor," says Southern California Sierra Club Regional Director Bob Hattoy. "They haven't chosen any incompatible sites for their plants, and we've had a friendly relationship with them. They're basically environmentalists who want to be entrepreneurs."

Solar energy, along with a variety of alternative energy forms, may grow into large industries, energy experts say, because they address both the high cost of importing (and defending) petroleum supplies, and the environmental degradation caused by burning fossil fuels.

Don Olsen is a free-lance writer living in Hotchkiss, Colorado.

Staying off the grid in solar country

YELLOW JACKET, Colo. — Set amidst thousands of acres of dryland pinto beans, spectacular canyons, sacred mesas and some of the Southwest's most important Anasazi Indian ruins, Jerry Fetterman and his wife, Linda Honeycutt, have become 20th-century solar pioneers.

Fetterman and Honeycutt live in a house powered by the brilliant sunshine that floods across this high, semi-arid landscape about 30 miles west of Mesa Verde National Park.

Professional archaeologists whose company excavates ancient Indian sites in the Four Corners region, Fetterman and Honeycutt built their passive solar log home overlooking a wild canyon several miles from the nearest power lines. When they found that bringing electricity to the remote site would cost almost \$10,000 (probably \$20,000 today), they decided to use solar photovoltaic (PV) panels instead.

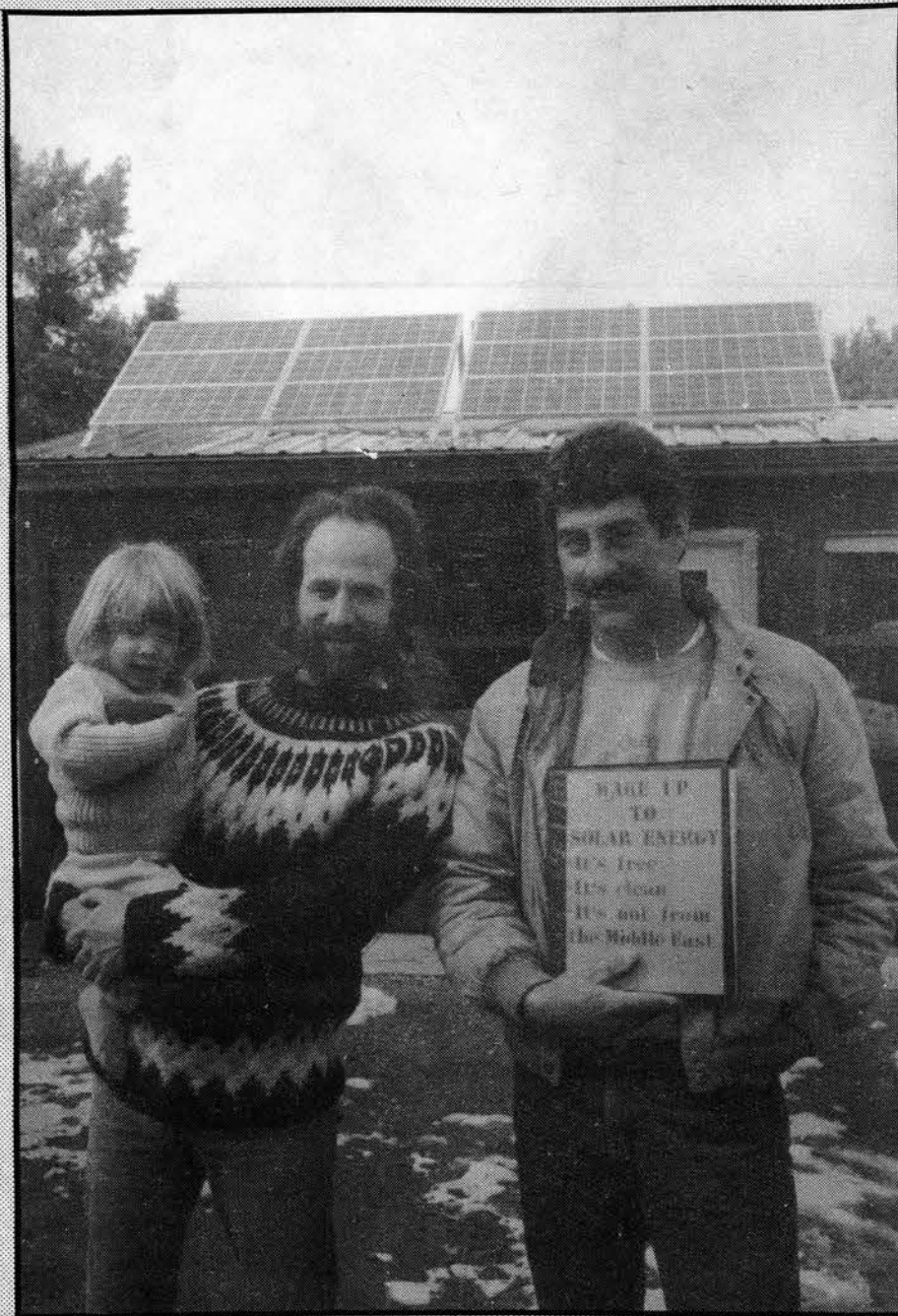
If power companies like Luz International represent the large-scale future of solar energy in the West, it is the tiny, home-grown solar producers like Fetterman and Honeycutt who are pioneering the movement toward more diversified, residential-scale renewable energy systems.

"To most people, power is what comes out of a plug," Fetterman says as he points to the large array of PV panels glistening in the sunlight on his roof. "With these, you are your own power company. You have to learn how to live more efficiently and to pay more attention to the climatic conditions around you."

Residential PV panels, essentially like those used in pocket calculators, convert the sun's energy directly into electricity. While the cost of such panels remains relatively high (about 25 to 30 cents per kilowatt hour to buy and install), their popularity has grown in recent years because of the costs associated with bringing electrical power to remote locations. Supplying conventional power to such sites can cost up to \$60,000 per mile, especially in the often rugged terrain of the West.

A PV system with panels, storage batteries and electrical components can be installed for \$15,000 to \$20,000.

In some Western resorts like nearby Telluride, where remote home sites abound, PV systems are increasingly in demand. In addition to saving home-



Jerry Fetterman with daughter Bonny and Willson Bloch, who helped build the solar photovoltaic system at the Fetterman-Honeycutt place

owners the cost of running expensive power lines to their sites, the use of such systems has gained a certain chic popularity among well-to-do, environmentally oriented residents.

But for Fetterman and Honeycutt, solar energy isn't just fashionable; for a decade it's been integral to their work and philosophy. By living in a solar-powered house at an altitude of 6,700 feet, they have learned intimately how much energy they use and where it comes from. Along with the PV system, the archaeologists use a passive solar design to heat their home and office during the winter. They also use ener-

gy-saving appliances, high-efficiency lighting systems and apply a variety of electricity-conserving practices that allow them the freedom to live in a patch of wilderness little changed from the time of the Anasazis.

Inside Fetterman's small shop, a large bank of batteries slowly charges from the late March sunshine. With a PV system, direct current from the batteries can be used to run lights, radios and other DC (direct current) applications. DC current can also be converted to 120-volt AC (alternating current) with an inverter to supply conventional electrical appliances.

While Fetterman explained the system, his inverter made tiny intermittent buzzing noises as the instrument tripped on and off. "That's the heating element inside the office photocopying machine," he said, noting that few people realize their Xerox machines eat up electricity while not in use. But for someone running off sunshine and batteries, such details become important.

"You could do a whole article just on the inefficiencies of the American refrigerator," Fetterman said.

In March, Colorado's Public Utility Commission issued a ruling — believed to be the first of its kind in the nation — that requires utilities to inform customers with remote building sites about the comparative economics of solar power produced by photovoltaic systems. According to commission spokesperson Barbara Fernandez, the regulation is designed to encourage utilities to cut their need for expensive new power plants while helping customers reduce personal consumption.

Brady Bancroft, an alternative energy expert at the Rocky Mountain Institute in Snowmass, Colo., says the regulation should help boost the popularity of photovoltaic systems. The industry, he notes, is growing about 30 percent a year.

"It's becoming especially popular in the West," he said. "Clearly, there's a lot of sunshine out here."

Bancroft, whose institute promotes the "soft energy path" policies espoused by energy gurus Amory and Hunter Lovins, says that solar electricity has a bright future worldwide.

"There's no question in my mind that when you look at the continued progress, efficiencies have continued to go up and costs have continued to go down. By the mid-90s we could see photovoltaics generating electricity for as little as 10 to 12 cents per kilowatt hour."

For solar pioneers like Fetterman and Honeycutt, living with photovoltaics has as much to do with protecting the West's environment as it does with economics and freedom.

"You have to remember that when you buy your power, you're also buying into strip mining and you're buying into Lake Powell," says Fetterman.

—D.O.

Colorado utility may use solar power

by Jay Stein

When the Public Service Company of Colorado announced last January that it was studying the possibility of converting a portion of its troubled Fort St. Vrain nuclear power plant to solar energy, company spokeswoman Kim Devigil said, "Denver has a brown cloud problem, and we have a responsibility to look for environmental solutions." Perhaps Public Service really is motivated by environmental concerns, but there are certainly other motivations as well. To understand them, it's important to understand the history of the Fort St. Vrain plant.

Twenty-six years ago, Public Service's officials announced plans to build a nuclear plant 35 miles north of Denver. Those plans included an experimental reactor design that was immune to nuclear core fires or meltdowns. Instead, the plant was plagued with other, less catastrophic problems that caused it to generate electricity at an average capacity fac-

tor just below 15 percent. The industry average hovers just above 60 percent.

Fort St. Vrain's performance was so abysmal that in 1986 the Colorado Public Utility Commission ruled that Public Service could no longer recover Fort St. Vrain's operating costs from its customers. The commission also ordered the utility to refund \$70 million. Then, in 1989, technicians discovered hairline cracks in the plant's steam lines. Public Service decided it was better to shut the plant down than make the expensive repairs.

Even shutting down Fort St. Vrain proved to be troublesome. Idaho Gov. Cecil Andrus refused to allow the utility to ship spent fuel blocks removed from Fort St. Vrain's reactor core to the Idaho National Engineering Laboratory, and a legal battle ensued. (See page 7.)

On April 24, Public Service filed an application with the commission that included a plan to dismantle the nuclear portion of Fort St. Vrain over a three-year period, and re-power the non-nuclear portion with natural gas. The plan has the

advantage of making good use of the \$60.7 million worth of on-site generating and transmission equipment that would otherwise go to waste. Natural gas also is a less polluting fuel than coal. However, the price of the dismantling and re-powering plan is high — approximately \$335 million.

In the application, Public Service says it will not ask its shareholders, who have already paid \$170 million in conversion costs, to shoulder the burden of the plan. Instead, the company asks for special consideration from the commission to pass these costs along to its customers.

Public Service's solar proposal almost looks like an afterthought in the application. After preliminary discussions with consultants and equipment suppliers, the utility is considering both a 14 megawatt photovoltaic (PV) installation and a solar thermal system, and says it will decide between the two next month.

To put the size of the proposed installation in perspective, the Fort St. Vrain nuclear plant produced 330 megawatts at maximum capacity and

consumed approximately 14 megawatts on-site. A 14-megawatt PV field would be the world's largest, and there is some question whether manufacturers could supply enough panels by 1996. Until then, Public Service will test six .2 megawatt demonstration systems.

Ron Binz, the director of the Office of Consumer Council and the official representative of Colorado's consumers in cases before the Public Utilities Commission, has not reached any conclusions on Public Service's application, but he seems skeptical.

"I think there is some genuine interest at [the utility] to explore solar energy," he said, "but I also think they hope that adding solar to the package will make the Fort St. Vrain natural gas conversion more attractive to the commission. I would hate to see this project go forward without thorough consideration just because it has a 14-megawatt solar sweetener."

Jay Stein is an energy efficiency and solar energy consultant who lives in Denver, Colorado.

Arizona grandmothers push solar cookers

by Vennie White

A simple box that sits in the sun could help solve fuel and health problems faced by people both in the West and around the world. It also could help heal the environment.

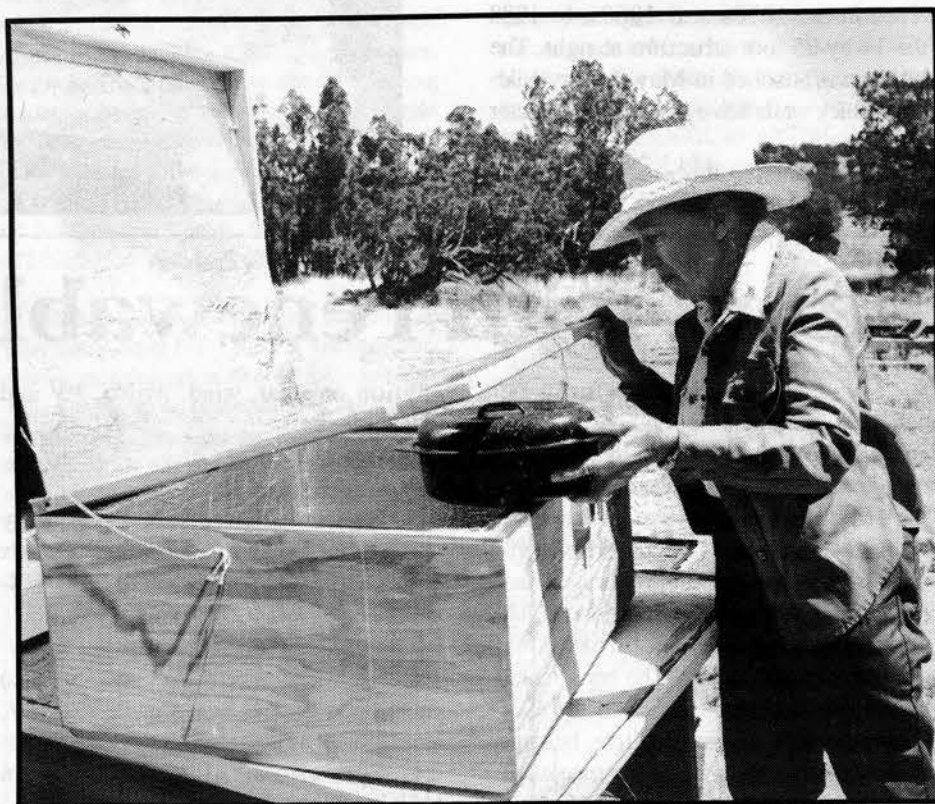
An inexpensive, easy-to-make solar box cooker reaches temperatures as high as 325 degrees Fahrenheit and easily kills cholera bacteria at 150 degrees, according to microbiologist Bob Metcalf of California State University in Sacramento. By pasteurization, the cooker can reduce diseases associated with contaminated water. The World Health Organization says these diseases kill 50,000 people every day.

Metcalf and other members of Solar Box Cookers International in Sacramento and Solar Box Cookers Northwest in Seattle have a modest goal. By the year 2000 they want 2.4 billion people to know how to cook with the sun. That's the number of people who will be affected by fuelwood shortages 10 years from now, according to the United Nations Food and Agriculture Organization.

Metcalf points out that although sunshine is the only source of energy most poor people have, a 1987 U.N. report on environment and development fails to mention it. The report states that while rapid loss of forest will be ecologically, environmentally and economically disastrous, "significant substitutions" for fuelwood seem impossible. But malnutrition in some countries is caused by fuel shortages, not food shortages. Workers in those places are learning that solar energy can do fuelwood's job and can change lives when it does.

Because of the success of solar box cookers (SBCs), designed 15 years ago by Barbara Kerr, 65, and Sherry Cole, 74, people are beginning to take the power of the sun seriously. Last March Metcalf presented information about SBCs in Geneva, where representatives of the U.N. High Commission for Refugees, the International Red Cross and Red Crescent, Oxfam and other agencies met to plan the 1992 U.N. Conference on the Environment and Development.

Kerr learned about sun power when, as a child, she showered in water heated in a black drum that sat on the roof of her family's cabin in the Smoky Mountains. Years later she turned her back



Dale E. Schickelanz

Barb Kerr with a solar cooker in Taylor, Arizona

yard into a laboratory, determined to find easy ways to cook with the sun. One of her cookers, a simple, insulated box-within-a-box with a glass lid, black bottom tray and adjustable foil reflector, caught Cole's attention.

The reflector directs sunlight through the lid into the insulated box, where dark cooking pots absorb the sun's energy. Several pots of food can cook in two to four hours. Foods never burn, so they don't need watching.

Metcalf purchased the first cooker sold by Kerr and Cole 14 years ago and has been promoting SBCs ever since. Since Metcalf and Beverly Blum formed Solar Box Cookers International in 1987, volunteers from both that company and the Northwest group have taught people how to build and use the cookers. Volunteers also developed a teaching manual, available in English, Spanish, Chinese and Arabic.

Church groups, Girl Scouts and service organizations have helped spread the word. In California, the Conservation Corps built 100 cookers to sell and distribute to senior citizens, and Pacific Gas and Electric featured them in mailings to 4.3 million customers.

In Haiti, where forests are almost gone and fuelwood is practically non-

existent, the cookers are used in villages and at Albert Schweitzer Hospital in Port-Au-Prince. Women in Bolivia use SBCs to heat water for washing clothes and bathing, as well as for cooking.

After Iran's earthquake left hundreds of people with no way to cook, volunteers distributed 60 sets of cooker plans, translated into Farsi, throughout the country. In Pakistan, a solar box cooker project assists Afghan refugees, and in London, a Kurdish support group now has plans for solar cookers, as a help to people in Desert Storm-ravaged cities, refugee camps and isolated mountains.

The original cooker has gone through many changes to adapt it to people's needs. In northern Pakistan and Nepal, Seattle schoolteacher Mary Lou Krause built 33 cardboard cookers in demonstrations at schools and agencies. Wanting an alternative to hard-to-find cardboard, she experimented with a basket-within-a-basket cooker, in which she cooked rice, potatoes and eggs. She has also used a cooker made of felt.

Kerr, too, continues her experimenting. She's now trying grow-your-own solar cookers from gourds and hopes to find that rice paper made in a solar cooker can be used as glazing for windows. While the cookers constantly evolve,

Kerr's and Cole's basic concepts remain the same. The cooker is successful, Cole says, because it was designed by grandmothers, not engineers.

The failure over the years of more complex, impractical solar devices has sometimes made people skeptical of their simple box. But as these Arizona grandmothers cook their solar meals — Kerr in rural Taylor and Cole in Tempe — they often think about families in Guatemala, Zimbabwe, Kenya, Sierra Leone, the Philippines and other countries around the world who are using versions of their cooker.

"I'm cooking under the same sun," Kerr said. "There's a sense of kinship, of satisfaction in knowing these women's daughters will not have to carry wood 20, 30 or even 50 miles, two or three or four times a week."

Besides freeing women and children from hours of drudgery spent collecting wood and cooking over open fires, the cookers are saving trees that would otherwise be cut for fuel. Juan Estrada, in Guatemala, calls solar cookers "a vaccination against deforestation."

Solar cooking also decreases air pollution caused by smoke and prevents health problems created by constant exposure to smoke and fire. The cookers can even sterilize instruments at remote clinics or hospitals.

It was in a hospital emergency room where she did social work that Kerr got incentive to pursue her solar interests. One day she met a mother who was unable to make hot meals because her utilities were disconnected.

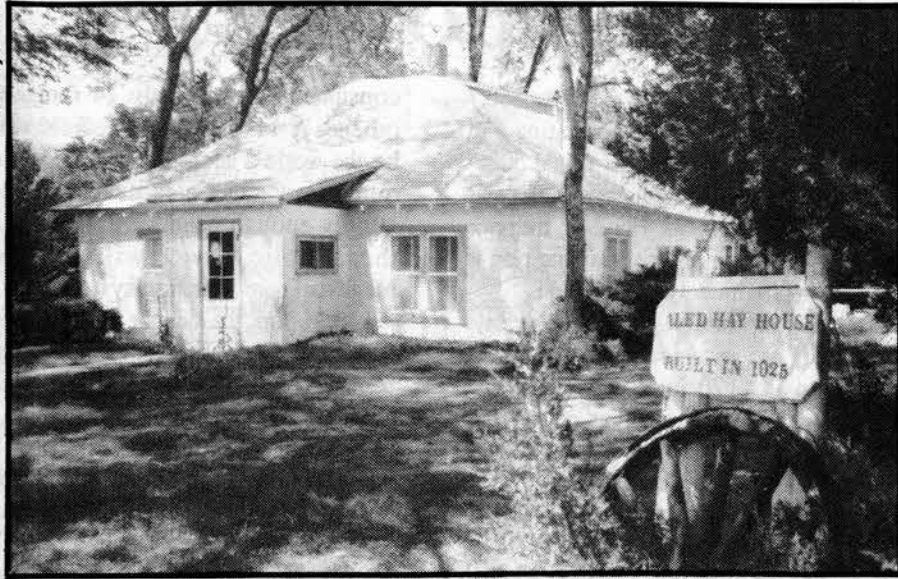
"She could have kept her children warm, fed them and washed them, even in her circumstances," Kerr said. "I began to think solar energy was something everybody needs to know about."

"When many things aren't flowing from the government, when they aren't flowing through the relief organizations and they aren't flowing through the stores," Kerr said, "to be able to grasp something you need that badly, and be able to do it yourself, is priceless."

"Once people have the concept in their minds," Cole added, "no monopoly, no bureaucracy can take it away."

Vennie White is a free-lance writer and photographer in Billings, Montana.

Matts Myhrman



Straw houses save most energy

"A photovoltaic electrical system coupled with a super-energy-efficient plastered straw-bale house would be a marriage made in ecological heaven," says Matts Myhrman of Tucson, Ariz. Myhrman's company, Out on Bale, designs straw-bale structures, supervises their construction and offers workshops in plastered straw-bale building techniques.

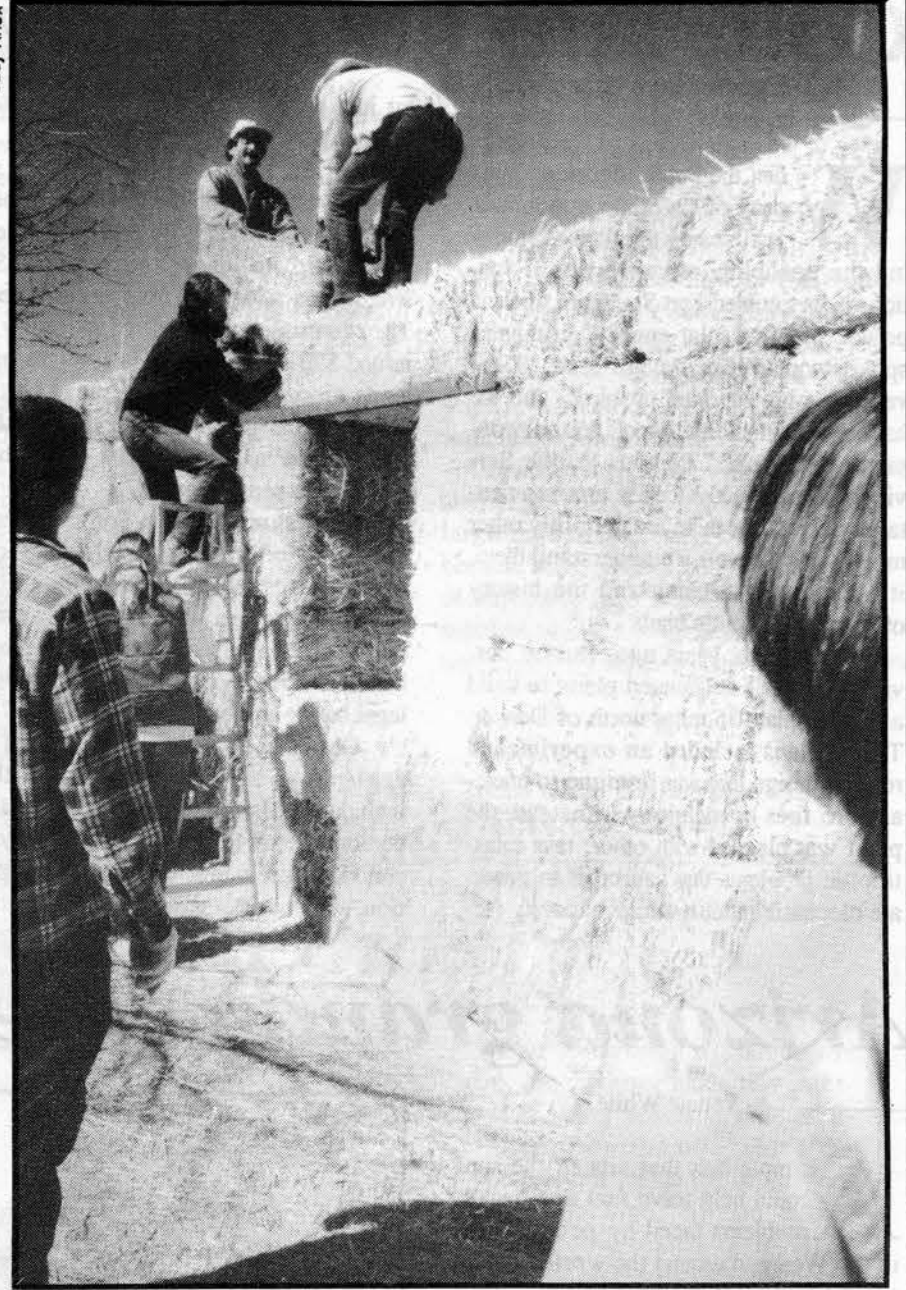
The oldest documented bale structure, Myhrman says, was an unfenced, unplastered one-room schoolhouse built in western Nebraska about 1896. Cows soon ate it, but plastered bale construction — less palatable — saw considerable use from about 1900 to 1935 in the Sandhills area of Nebraska and South Dakota.

By stacking and pinning bricklike bales of native hay instead of the traditional sod, homesteaders built up thick, highly insulating walls set on solid foundations and protected by tight roofs and thick coats of stucco. The Martin House, left, in Arthur County, Neb., is still in good shape after almost 80 years.

Interest in the Sandhills technique revived in the 1970s and 1980s. In 1988 Myhrman built his first straw-bale project, the 14-by-25-foot structure at right. The walls went up in four hours in March, stucco netting was attached in May and the building was in use by June. Myhrman says its two-foot-thick walls have an insulation factor of at least R-45.

Costs per square foot have ranged from \$7.30 for an owner-built house without inside plumbing to \$65 for a bank-financed, Santa Fe-style house built this year by a contractor.

Judy Knox



How to get going with renewable energy

Information about solar energy applications is sprouting as fast as the trends described in this issue. Thanks to the efforts of a few pioneers, the information and hardware to become more energy-independent are now surprisingly easy to find. Here are intern Jeff Hanissian's suggestions on some of the best places to start:

Home Power Magazine, P.O. Box 130, Hornbrook, CA 96044-0130. 916/475-3179

"Home Power specializes in hands-on, practical information about small-scale, renewable energy production and use," according to Richard and Karen Perez, who publish the 70-to-100-page bimonthly. Home Power contains articles on everything from alternate fuels to wind generation. A six-page index of recent articles is available on request. \$20 by first-class mail, \$10 by third-class mail.



Solar Electric Today, PV Network News, 2303 Cedros Circle, Santa Fe, NM 87505. 505/473-1067

If Home Power does not advertise a retailer to suit your needs, you can probably find it in Solar Electric Today, a directory of more than 500 retailers, 200 manufacturers, and 100 information sources. The national directory, published by Paul Wilkins's PV Network News, is updated annually. It lists books, catalogs, newsletters, magazines, dealers, mail-order houses and manufacturers of photovoltaics, batteries, controls, regulators, inverters, refrigeration, lighting and pumping. \$7.

Resource-Efficient Housing: An Annotated Bibliography and Directory of Helpful Organizations, Rocky Mountain Institute, 1739 Snowmass Creek Road, Snowmass, CO 81654-9199. 303/927-4178

My copy arrived just before I sat down to write this compendium. It listed every source I intended to include, and many others. Organized into 15 chapters, the 161-page book covers all facets of resource efficiency. It characterizes periodicals, reviews and excerpts books, and describes schools and organizations. Full addresses or ordering information accompany each listing. The book, compiled by Robert Sardinsky and the staff at the Rocky Mountain Institute, belongs on the energy resources reference shelf of beginners and experts alike. \$15.

The New Solar Electric Home: the Photovoltaics How-To Handbook, The Davidson Company, P.O. Box 4126, Culver City, CA 90231.

Joel Davidson's book contains the nuts-and-bolts knowledge necessary to design, install and run a home PV power system, and includes enough basic theory so it all makes sense. \$18.95.



Conservation and Renewable Energy Inquiry and Referral Service (CAREIRS), P.O. Box 8900, Silver Spring, MD 20907. 800/523-2929

CAREIRS is a Department of Energy-funded service that provides general consumer information on solar, wind, hydro, PV and conservation.

information on solar, wind, hydro, PV and conservation.



National Appropriate Technology Assistance Service (NATAS), P.O. Box 2525, Butte, MT 59702-2525. 800/428-2525, or 800/428-1718 in Montana.

This federally funded service provides tailored information responses to specific questions on wind, hydro, PV, passive solar, thermal solar and efficiency. They also assist entrepreneurs in starting alternative energy businesses.

Alternative Energy Sourcebook 1991, Real Goods Trading Corp., 966 Mazzoni Street, Ukiah, CA 95482. 800/762-7325

Real Goods' 400-page, annually updated Alternative Energy Sourcebook contains articles (11 from Home Power) mixed with some 3,500 product listings. Real Goods sells everything from efficient lights and solar cookers to complete home power systems. The catalog has sections on systems planning, power generating devices and whole systems, power storage and management, alternative power loads, conservation and purification, tools and appliances, education and consumer products, and electric vehicles. With sales that rose from \$80,000 in 1986 to a

projected \$7 million this year, Real Goods is the country's biggest alternative energy supplier. \$14.



Retailers of alternative energy equipment sell many of the same goods, made by manufacturers like Siemens, Solarex, Trace, Heliotrope, General and Windseeker. What differentiates the companies is the level of support they offer along with the products. Many catalogs contain articles and have information hotlines. Since almost all the retailers use or test the products they sell, they are treasure-houses of hands-on information. Four retailers I found particularly helpful or often mentioned were Dan Brandborg's Sunelco, Steve and Elizabeth Willey's Backwoods Solar Electric Systems, Daniel Katz's Alternative Energy Engineering and Gunar Peterson's Alternative Power and Light Co. Their addresses follow:

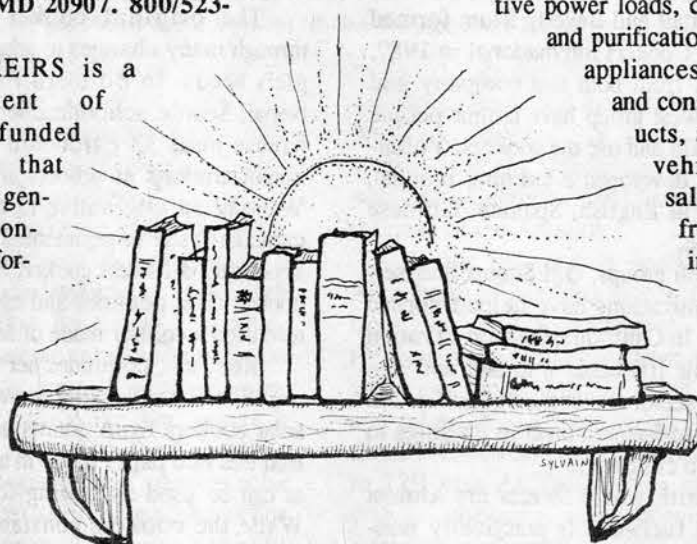
Sunelco
100 Skeels Street
P.O. Box 1499
Hamilton, MT 59840
800/338-6844

Backwoods Solar Electric Systems
8530 Rapid Lightning Creek Road
Sandpoint, ID 83864
208/263-4290

Alternative Energy Engineering
P.O. Box 339
Redway, CA 95560
707/923-2277

Alternative Power and Light Co.
128 Weister Creek Road
Cashton, WI 54619
608/625-4123

— Jeff Hanissian, HCN intern



BULLETIN BOARD



PHOTOGRAPHY WITH THE EYE OF LISTENING

Outdoor photographers can use sound and smell as well as vision to create meaningful photographs. An outdoor photography workshop on June 7, 8 and 9 in Blanca, Colo., investigates the use of all senses in outdoor photography, an approach that is said to reduce stress and lead to deeper enjoyment of the outdoors. J.D. Marston, the workshop instructor, has been a photographer since 1968. The cost is \$250 per person and includes lodging and meals. To register call 719/379-DUCK.

"YES"

Youth Environmental Services (YES), sponsored by the Telluride Institute, is taking applications for its summer program. The students, high school girls aged 16 to 18, will help revegetate old roadways with The Nature Conservancy, collect soil data with the Forest Service and evaluate range conditions with the Bureau of Land Management. Participants learn map and compass use, data collection techniques, plant identification, ecologically sound camping practices and outdoor survival skills. YES teams also get an understanding of current environmental issues. Three groups of six Colorado high school students will be selected for the three summer sessions, based on recommendations by principals, guidance counselors or science teachers. The sessions run from June 16 to 29, July 7 to 27 and Aug. 4 to 24. YES will furnish housing, food, transportation, training and supervision.

For more information and application forms, contact Peggy Lyon, Youth Environmental Services, 114 County Road 5, Ridgeway, CO 81432; 303/626-5526.

ORPHAN ISSUE WORKSHOP

The Colorado Environmental Coalition will host an orphan issue workshop on June 15 in Frisco, Colo. An "orphan issue" is an issue that currently is not being addressed by environmental groups. The coalition has started compiling a list of such issues, including domestic wood-burning and motor-oil recycling. The aim of the workshop is to get participants to "adopt" these issues and address them publicly. For more information, contact Dorothy Cohen at the Colorado Environmental Coalition, 777 Grant St., Suite 606, Denver, CO 80203, or call 303/837-8701.

WESTERN WATER LAW

"Innovation in Western Water Law and Management" will be the topic of the Natural Resources Law Center annual conference, to be held June 5-7 in Boulder, Colo. The conference will focus on innovation and change in water planning, special water management areas, negotiated settlements of tribal water rights, conjunctive use of ground and surface water and public values in water decision-making. Former Arizona Gov. Bruce Babbitt will be among the speakers at the conference. For more information contact Kathy Taylor, conference coordinator, at 303/492-1288.

NATIONAL FOREST REFORM POWWOW

A weekend symposium on the national forest system will be held May 24 to 27 at the Carson National Forest in New Mexico. Panels will discuss the status of national forest reform legislation and other reform efforts. Topics will include forestry, Forest Service internal reform and community welfare. Jeff DeBonis, founder and president of the Association of Forest Service Employees for Environmental Ethics; John Adams, president of the Natural Resources Defense Council; and Reps. John Bryant, D-Texas, and Jim Jontz, D-Ind., will speak. Tours of Carson National Forest spruce and fir stands and sing-alongs also are planned. Cabins are available, but participants are encouraged to bring their own sleeping bags and tents. For information call 505/982-9656 or Fax 505/984-8381.



CLASSIFIEDS

HIGH COUNTRY NEWS classified ads cost 30 cents per word, \$5 minimum. Display ads 4 column inches or less are \$10/col inch if camera-ready; \$15/col. inch if we make up. Larger display ads are \$30 or \$35/col. inch. We reserve the right to screen all ads. Send your ad with payment to: HCN, Box 1090, Paonia, CO 81428 or call 303/527-4898 for more information.

HIKE OREGON'S ANCIENT FORESTS. Cascade Mountains hot springs retreat. Trailhead/airport transportation, cabin, ecologist, vegetarian meals, soaks — \$525/wk! AF Hikes, Box 13585, Salem, OR 97309; 503/370-8944. (3x7p)

OUTDOOR SINGLES NETWORK, bi-monthly newsletter, ages 19-90, no forwarding fees, \$18/1-year, \$4/trial issue information. OSN-HCN, 1611 Cooper #7, Glenwood Springs, CO 81601. (8x2p)

DEVELOPMENT DIRECTOR. Leading environmental advocacy group seeks staff leader to recruit members and donors, obtain grants, organize events, manage volunteers. Requires fund-raising experience, writing ability, concern for the environment, people skills. Occasional out-of-state travel required. 80 percent of full-time. \$1,280/month plus benefits. Reply to the Montana Environmental Information Center, Box 1184, Helena, MT 59624, by June 6. (1x9b)

STRING BAGS — Large string bags knit in USA using seine twine. Cotton webbing handles — long enough to fit over your shoulder. Take shopping, on boat cruises, or use to separate things in your pack. Lightweight enough to be shoved in your pocket. Very strong when filled. \$12 includes shipping. Send order to: 117 E. Louisa St. #140, Seattle, WA 98102. (6x6p)

THE FELLOWSHIP FOR ECOLOGY AND THE ARTS has staff openings for maintenance person and organic gardener. Based at remote ranch in New Mexico's beautiful Gila wilderness. We teach environmental awareness through example and direct experience, and offer RETREATS, an ARTIST-IN-RESIDENCE PROGRAM, and WILDERNESS CLASSES for artists, educators, healers, etc. 536-2879. (1x9p)

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VOLUNTEERS NEEDED. The National Audubon Society's Adopt-a-Forest program is seeking volunteers this summer to assist in field-checking the data collected on possible old-growth stands in the Flathead National Forest. The program is being conducted in cooperation with, and with training from, Forest Service personnel. Volunteers will enjoy an opportunity to learn about old-growth ecology while actively participating in an outdoor conservation project of great importance. For more information regarding the effort, please contact Dawn Gaitis, Star Route, Polebridge, MT 59928; 406/756-4446. (1x9b)

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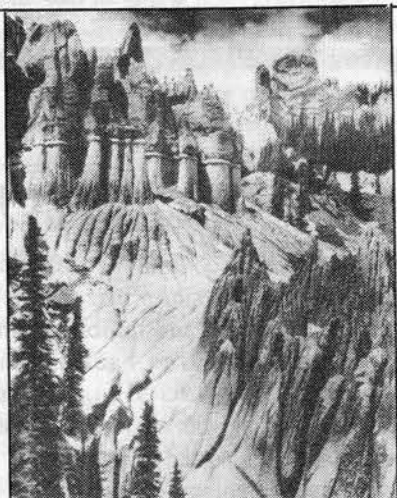
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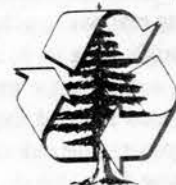
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LETTERS

OLD-GROWTH ECONOMICS I

Dear HCN,

William H. Boyer's article attempts to justify saving old-growth forests on the basis of economic arguments, but its reasoning is so flawed that it succeeds only in supporting the view that selling old-growth forests is economically very profitable.

Mr. Boyer argues that the true replacement cost of an old-growth tree is not simply the \$1 that he claims it costs to plant a replacement tree (10 cents per tree divided by 10 percent survival probability), but also the loss of interest on that \$1 over the years that the replacement tree is growing. Assuming an annual interest rate of 8 percent, Boyer concludes that the true replacement cost

of a 200-year-old tree is over \$4.8 million (\$1 multiplied by 1.08 to the 200th power). However, Boyer also supposes that each old-growth tree could be sold for about \$100. If this \$100 would earn interest at the same annual rate (8 percent) during the 200-year period that the replacement tree is growing, the result is a *net financial gain* 99 times the replacement cost, or \$479 million!

Boyer also neglects the inflation, which would make the above figures much less dramatic. For example, if the annual rate of inflation over 200 years were 5 percent, the effective interest (lost or gained) would be only 3 percent per year. This would change the replacement cost for a 200-year-old tree from the \$4.8 million quoted above to \$369 in constant 1991 dollars. But the net "profit" in constant dollars from cutting the old-growth tree is still 99 times greater — over \$36,000. Regardless of the exact numbers used, the simple cost-benefit

tradeoff outlined here overwhelmingly favors the cutting of old-growth forests.

We do not advocate the cutting of old-growth forests on economic grounds or any other. A more complete economic analysis requires consideration of many factors, such as the value of removal of carbon dioxide from the atmosphere and its replacement with oxygen, the economic value of the watershed, and the replacement cost of topsoil that is washed away in a clear-cut area. Further, it is difficult or impossible to quantify the economic value of species whose survival requires old-growth forests. The reduction in genetic diversity that results from extinction increases the risk of an ecological catastrophe to a degree which is not understood. Such a catastrophe could have severe economic (and other) consequences.

We are physicists; neither of us has spent a day in our lives studying economics. If we can find such gaping holes

in Mr. Boyer's arguments, representatives of the timber industry can find the same problems. They could use these problems to argue that the opponents of logging are unreasonable people who should not be taken seriously. A poorly reasoned article can do a disservice to its cause by providing ammunition to its opponents.

Bonny Schumaker
Jim Ulvestad
La Cañada, California

THE SALMON ISSUE

Dear HCN,

I am not sure who put my name on your mailing list, but I was extremely pleased to receive Volume 23, No. 7 of the *High Country News*, April 22, 1991: "Northwest Salmon at the Crossroads."

I thought that the discussion of Northwest salmon contained in your issue was very well done, provided a regional viewpoint of the difficulties in which the salmon find themselves, and focused the debate regarding salmon in a way that few publications have. I particularly appreciated Paul Shaffer's article on Mr. Ed Chaney's regional viewpoints.

Daniel A. Raas
Bellingham, Washington

The writer is reservation attorney with the Lummi Indian Business Council.

Dear HCN,

Congratulations on your fine special edition of HCN dealing with the problems of wild salmon in the Snake/Columbia basin. A great many commercial fishermen share the concern for habitat. It's sad we have to use a nuclear weapon like the Endangered Species Act to protect it.

John van Amerongen
Seattle, Washington

John van Amerongen is editor of *Alaska Fisherman's Journal*.

OLD-GROWTH ECONOMICS II

Dear HCN,

In a very nice article, "Why an old-growth tree is worth millions" (HCN, 2/25/91), the author seriously underestimates the values of trees of various advanced ages.

Before the advent of computers, bankers calculated interest by compounding annually or semi-annually. Today, computers allow interest to be compounded continuously, which results in higher returns. You see this in the bank ads in the newspapers, where they show figures such as "Rate, 8.00%; Yield, 8.33%." What this means is that 8 percent compounded continuously gives the same yield as 8.33 percent compounded once a year.

The article gives the correct values of a \$1 tree at various times in the future at 8 percent compounded annually. If

VALUE OF A \$1 TREE AT VARIOUS TIMES IN THE FUTURE

Years from now	Compounding Annually	Compounding Continuously
50	\$ 46.90	\$ 54.60
100	\$2,200.00	\$2,981.00
200	\$4.84 million	\$8.89 million
300	\$10.6 million	\$26.5 million
400	\$23.4 trillion	\$79.0 trillion
500	\$51.5 thousand trillion	\$235 thousand trillion

you repeat the calculations for 8 percent compounded continuously, the figures are even more impressive, as shown in the table.

Need I go further?
If we are going to use the arguments

of bankers, then we should do our calculations in the same way that they do them. We should compound continuously, as they do.

Albert A. Bartlett
Boulder, Colorado

afield

The high country society of marmots at play

by Michelle Mara

The sun-drenched slope high in Rocky Mountain National Park was a scene of complete tranquility. A whole colony of yellow-bellied marmots lazily drowsed on warm rocks and boulders, spread out across an area of perhaps an acre and a half. Farther up the mountain, I watched them through binoculars.

Then, all in a fleeting instant, an eagle dropped from the sky, a marmot gave a shrill warning whistle, and every member of the colony vanished. The eagle came to a halt on a flat rock where three marmots had been sunning, missing its prey by less than a second. The small mammals are not always this fortunate; a large percentage of the golden eagle's summer diet consists of marmot. But this day, alertness and teamwork prevailed.

When danger had passed and the marmots had begun to reappear, one handsome male stood upright on a rock, turning slowly, carefully surveying the mountainside until he seemed satisfied that all was well. At such moments, the individual characteristics of these high-altitude animals are very much in evidence.

The warning whistle is one of the impressive features of the close-knit society of marmots. They exhibit the philosophy of "one for all and all for one," and cooperate in virtually every aspect of their lives. They assist one another in digging

burrows, cleaning the burrows out in spring and carrying in fresh, dry grasses for bedding. In addition to each family's quarters, they dig large communal burrows into which any and all may escape when warned of a predator's approach.

The seeming affection marmots display is a form of social bonding by which colony members are recognized and accepted. They greet others with caresses and nose-rubs and bite playfully at necks and ears. There is much mutual grooming and constant touching. Some become inseparable companions. One summer I observed two females who were always together and sunned themselves with one draped languidly over the other, like domestic cats. If one moved to a different rock, the other followed like a shadow.

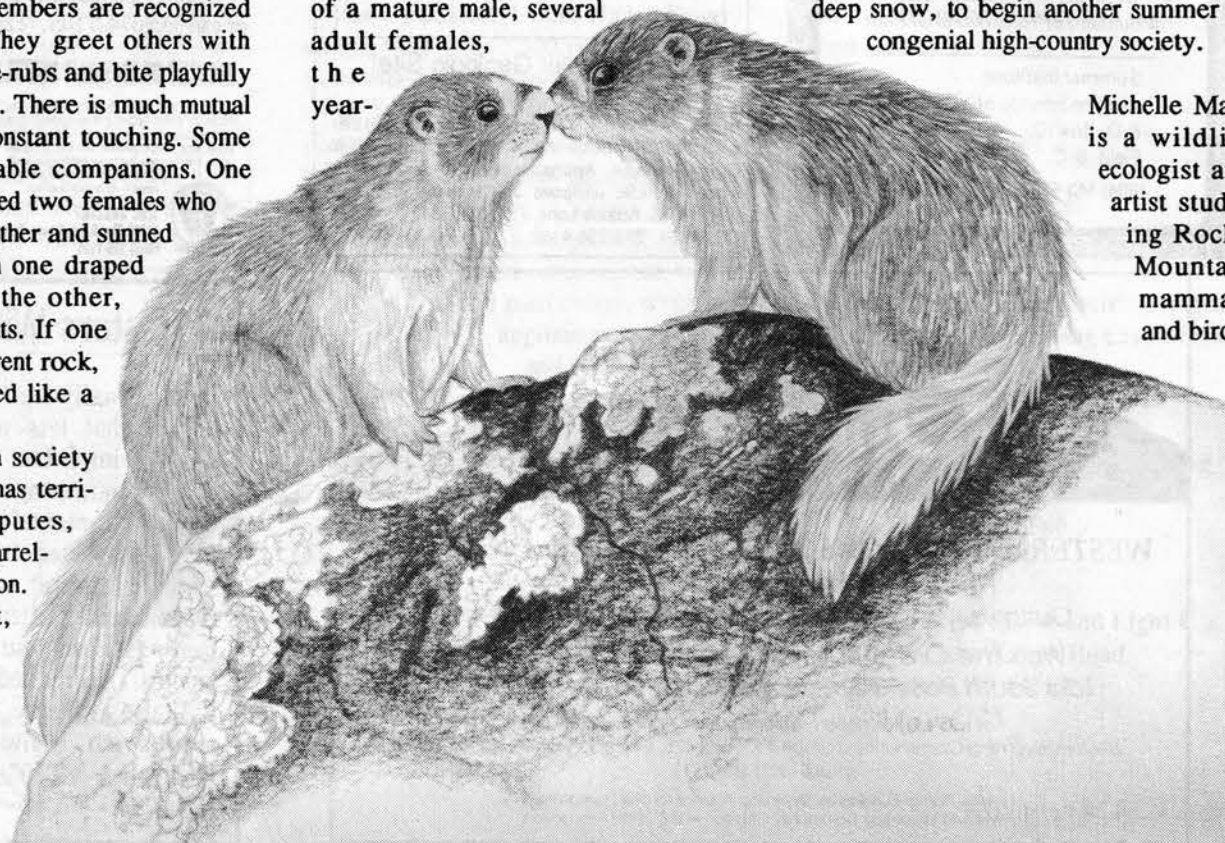
Even such a society of togetherness has territorial disputes, expressed in quarreling and aggression. To some extent, marmots relieve these tendencies by play-fighting. Both sexes engage in wrestling matches and

establish dominance without inflicting serious injury. Sometimes two marmots in a clinch will roll and tumble all the way down a slope, run back up and begin again. I once watched a pair standing erect, sparring with such rhythm and grace that they appeared to be dancing.

A marmot colony consists of a mature male, several adult females, the year-

ling offspring and the current season's new babies. Winter is spent in true hibernation, with greatly reduced respiration and body temperature. By mid- to late-August, males have settled in for their long sleep, followed in four to six weeks by females and young. They emerge in May, usually digging out through still-deep snow, to begin another summer of congenial high-country society. ■

Michelle Mara is a wildlife ecologist and artist studying Rocky Mountain mammals and birds.



Michelle Mara

EDITORIAL

The unholy marriage of Bush and oil

by Lawrence Mosher

Last October I argued against President Bush's determination to go to war in the Persian Gulf, ostensibly to punish an Arab bully but in reality to protect our access to cheap foreign oil. I linked this to Bush's concomitant willingness to risk additional environmental degradation of our own spaces to produce more fossil fuels rather than push energy conservation. One dramatic improvement Bush personally blocked was a proposal in Congress to obtain 40-mile-per-gallon vehicles. That in itself would have made this country independent of Persian Gulf oil.

The events since then have not altered this position a whit. Our swift military victory was a godsend that showed what modern weaponry can do in desert warfare against an overcentralized command and bad generalship. If this victory also wiped away some of the stains of Vietnam, so be it. Our military deserve that.

But let's not lose sight of why we fought in the Gulf, why we killed over 100,000 Iraqi soldiers, why we decimated that country's basic infrastructure, why we helped to create incredible suffering and death for Iraq's Kurdish and Shiite populations, and why we are now militarily involved in the Gulf for what may be a long time. The reason is this government's unwillingness to begin to



deal with the end of the petroleum era.

It's revealing to note where President Bush is willing to use the vast powers of the federal government to intervene in the international oil market, and where he is not. Yes to military intervention; no to regulatory intervention. Yes to risks of death, starvation, disease and still unmeasured environmental destruction in the Gulf; no to the stated willingness of Americans to conserve energy and protect the environment, even at some economic cost.

The extent of this dichotomy in the Bush administration's vision of governance came fully into view with the announcement of its National Energy Strategy earlier this spring. As Richard Guadagno makes clear in his analysis on page 16, the Bush energy strategy ignores the observable fact that the international energy market is not a market at all, but merely a vehicle for selling Per-

sian Gulf crude oil to countries like the United States that will use it voraciously as long as it doesn't cost too much.

Iraq's President Saddam Hussein challenged this system by occupying Kuwait and threatening Saudi Arabia. Saddam needed more money to rebuild his country following his eight-year war with Iran, but Kuwait and Saudi Arabia were not willing to raise the world price from the \$15-a-barrel price that existed a year ago. Saudi Arabia, which controls the most oil, saw what higher-priced oil did to its prime markets during the energy crises of the 1970s and was unwilling to risk seeing this market shrink again.

By rushing to defend Saudi Arabia and then resolving to throw Iraq out of Kuwait, President Bush has reinforced the Gulf system that is committed to cheaper oil. And by proposing a laissez-faire domestic energy strategy that relies on so-called market forces, President Bush would guarantee that this country do as little as possible to prepare for the end of the oil era while draining America as fast as possible.

But as this issue reports, solar power is becoming more competitive with some of our traditional, non-renewable sources of energy. And this is partially the result of our environmental laws that have intervened in the economy to build in the costs of pollution control. If and when the economic playing field is truly leveled, solar power and other non-pol-

luting renewables will become even more competitive with the fossil fuels. When this transition occurs, however, it will be with no thanks to George Bush, a Texas oil man to the end.

Colorado's Sen. Timothy E. Wirth, on the other hand, is pushing hard from his position as chairman of the subcommittee on energy regulation and conservation to provide a more far-seeing energy strategy. His bill, S-741, emphasizes conservation and alternative energy sources. Wirth also is including more money for electric vehicle development in his global warming bill, S-324.

Richard Guadagno takes issue with the natural gas provisions of Sen. Wirth's energy bill because natural gas will soon vanish, too. Wirth argues that the nation's large natural gas reserves can provide a bridge to the renewable era. But this assumes that the nation's current annual increase in natural gas usage of 5 percent will decrease, a likelihood Guadagno doubts. Regardless of who's right, the emergent Senate energy bill may also propose for the first time a tax on imported oil. It would take the form of a required 9 percent contribution to the nation's strategic petroleum reserve taken from imported oil.

All and any of these proposals would consign the Bush energy strategy to the trash can, where it belongs.

Lawrence Mosher is HCN's editor.

ESSAY

How energy efficiency can help bail us out

by George Everett

After Earth Day last year, I believed that as an individual I should make contributions to help protect the environment.

Realizing that one of the biggest causes of environmental problems was the way we use fossil fuels — the way we find them, exploit them, transport them and ultimately burn them to fuel our society — I understood that one of the best ways to help was to be more conscious of how I used energy for heating, cooling and especially transportation.

I learned that most cars generate their own weight in carbon emissions every year, which contributes to global warming, acid rain and ozone depletion. I also learned that two-thirds of all imported oil we use in our society goes for gasoline and oil for transportation.

I believed that I could do my small but important part by conserving energy in my home and car. I tuned up my appliances and checked the insulation in my walls and attic. I bought compact fluorescent light bulbs that screw into regular sockets and use 18 watts of electricity, while providing the same amount and quality of light as a 75-watt incandescent bulb. I recycled. I kept my car well tuned and made sure that my tires were properly inflated to help conserve gasoline.

I felt that if only a fraction of the country's citizens were taking the same simple and painless steps as I, then we were surely making progress to secure the future for our children's world.

But I have since realized that there is a limit to what individuals can do to address problems of the magnitude that confront us. These problems will require

cooperation and concerted efforts on the part of everybody, but most importantly policy makers and corporate planners.

One of the major multinational oil corporations is now conducting an ad campaign to encourage individual drivers to inflate their tires properly. A year ago, I would have walked to my car with a pressure gauge and headed for an air hose. For it is true that you can increase the fuel efficiency of any car by about 5 percent simply by keeping tires properly inflated. About half the drivers in the United States have underinflated tires, which means they waste billions of gallons of gasoline every year.

But it is equally true that the average car made in the United States gets only about 26 to 28 miles per gallon of gasoline. It is true that if that average fuel efficiency were raised to about 40 or 45 miles per gallon we would have to import much less oil, if any. And it is also true that Japan and Sweden are producing cars that can get up to 100 miles per gallon.

Meanwhile, the same oil company that urges Americans to conserve fuel by inflating their tires also inflated its profit margin for the fourth quarter of 1990 to the tune of \$388 million — an increase of 41 percent over the same period in 1989.

The United States now imports more than half of all the oil needed to fuel the economy. We have never been more dependent on foreign oil than we are now. Part of the reason is that world markets do not include many of the true costs of that gasoline. A barrel of oil that costs about \$22 on the open market would cost about \$250 a barrel if you figured in the health costs, security costs and environmental costs triggered by its use.

Yet a gallon of bottled water from an artesian well in the United States can cost more than a gallon of gasoline that was transported halfway around the world, refined and delivered to your neighborhood gas station. This economic anomaly boggles the mind.

The American economy has expanded by 40 percent since the 1970s while we use the same amount of energy as we did then. This is largely the result of increased energy efficiency in all sectors of the economy, and it proves that energy efficiency works. Still, we use much more energy than other industrialized nations.

Probably the biggest bugaboo that discourages energy-conservation talk is the dread of asking Americans to sacrifice even a fraction of their standard of living to end dependence on foreign oil. Many people have nightmares of Jimmy Carter sitting in a sweater in front of a fire declaring the moral equivalent of war and asking us to carpool and turn down our thermostats.

Leaving aside the issue of whether our quality of life would suffer without electric air fresheners and disposable cameras, the fact is that technologies have advanced so much in the last decade that we can have much greater energy efficiency without sacrifice. Technical advances have increased energy efficiency in all areas, including automobiles, appliances, variable speed drives for industrial motors, and residential and commercial lighting. These advances hold great potential for energy efficiency improvements.

More widespread implementation of energy efficiency would not necessarily

require frugality and belt-tightening, but it would require planning and common sense, both of which have been missing from our national energy planning efforts for the last 20 years.

The problem is not technical; it is political. We need a coherent national energy policy that draws from a variety of sources at hand, with increased energy efficiency to reduce demand as the cornerstone of that policy. When the Department of Energy held a series of regional hearings on this subject, the American public overwhelmingly spoke out to reduce demand through increased energy efficiency. Energy efficiency makes overwhelming economic sense for everyone except those who would benefit from short-term increases in oil exploration. Yet the Bush administration has recommended that we increase supply through increased oil exploration and production, and expanded nuclear energy development.

If we have the political will to steel ourselves to the possibility of our sons' and daughters' dying to protect our vital interests in the world, then we should be able to muster the will to take steps now to protect our national interests by investing in energy efficiency to reduce our future energy needs.

The Bush administration has told us how it will approach the problem. It remains to be seen if Congress will do the right thing to protect our future by mandating energy efficiency as the cornerstone of a comprehensive national energy strategy.

George Everett is a free-lance writer in Butte, Montana.

ESSAY

Facing up to the end of the petroleum era

by Richard Guadagno

Imagine this nightmare: You are riding in a car down a road that begins to get rough. Ahead is a sheer precipice. But the driver, who appears not to see the danger, speeds up. Some passengers egg him on, while others shout to take a different route. Farther away and partially hidden lie other cliffs that are just as precipitous as the one ahead.

Unfortunately, this nightmare is real. It is the Bush administration's National Energy Strategy.

The car is American civilization, and the cliff is the impending exhaustion of the world's petroleum resources. Ex-oilman George Bush is at the wheel, and he is being abetted by oil-state Senators Bennett Johnston, D-La., and Malcolm Wallop, R-Wyo. Sen. Tim Wirth, D-Colo., backed by environmentalists and some scientists, is trying to steer the nation onto a different path. And the cliffs down the way are the little-known physical characteristics of certain proposed alternative energy schemes.

The National Energy Strategy, revealed earlier this year, is not really an energy strategy at all. It is an economic program, aimed toward the short-term benefit of the domestic oil industry and other existing energy corporations. This bias is copiously illustrated by excerpts from the document.

"Wherever possible, markets should be allowed to determine prices, quantities, and technological choices," it states. "Government action should be aimed at removing or overcoming barriers to efficient market operation.... Regulations and other government interventions are extremely blunt tools that always impose unforeseen costs by reducing the flexibility of the economy." Consumer electricity supply should be regulated by "demand reduction or supply addition, whichever is most cost-effective."

An even better example of the philosophy behind this strategy is an unbelievably bizarre graph that utilizes a decline in the parameter "barrels of oil per day per million dollars of GNP [Gross National Product]" as a measure of the reduction in the importance of oil to the U.S. economy. The steepest declines in this parameter occurred during the Arab oil embargo beginning in 1973, and the seizure of Iran by Khomeini in 1978.

According to the strategy, these were the periods when our dependence on oil was at its lowest! But in reality they were periods of fuel shortages, long gas lines, skyrocketing gasoline prices, widespread uncertainty and stark declines in real standard of living for almost all Americans. At no other time in our history was it made more clear how thoroughly our society was dependent on foreign oil.

How can anyone reasonably claim that these were eras of reduced importance of oil to the economy? How could it possibly be construed that these periods were beneficial? The only so-called positive feature is that the domestic oil industry was able to reap huge profits from the attendant dislocation of our society.

Read my lip service

This, then, is the criterion, described by President Bush himself as "a keystone of this strategy," by which our government appears to measure the welfare of society: the share of the GNP that accrues to business interests.

The National Energy Strategy has been roundly criticized because of its proposed invasion of the Arctic National Wildlife Refuge and the Outer Continental Shelf, and for its almost total neglect of active conservation measures. It does offer lip service to such beneficial pursuits as energy research, "environmentally responsible" development processes, renewable energy resources, alternative fuels, mass transit and ride sharing, and science education. But this support consists solely of "encouragement."

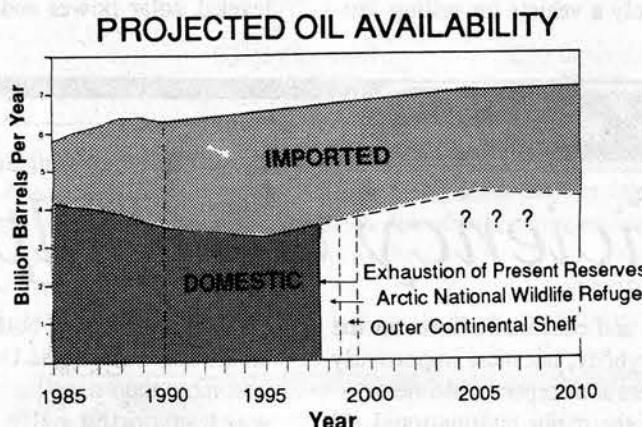
There are no provisions for significant additional government support for education, in either science or other fields. Proposed increases in energy research, which are essential to the success of many of the other items, are hopelessly inadequate, especially when compared to the massive government-sponsored, non-military research efforts conducted between the onset of World War II and the mid-1960s. This was the period when — by no coincidence — the United States was

the world's unchallenged leader in science, technology and the standard of living of its citizens.

The Johnston-Wallop bill, the legislative equivalent to the National Energy Strategy, is designed to mollify critics by including a small number of conservation measures. But its salient feature, like that of the strategy, is to promote energy independence by accelerating domestic oil production. This requires opening up the Arctic National Wildlife Refuge and the Outer Continental Shelf to drilling.

The irony is that this would actually make us even more dependent on imported oil. The immensity of the fallacy of this accelerated domestic production can best be illustrated by the graph below which has been modified from one in the strategy. The government's chart shows an increase in domestic production, which is supposed to continue at a high rate beyond the year 2010. Indeed, another chart projecting oil use up to the year 2030 assumes that even in that year, 86 percent of our motor fuel (which already accounts for more than two-thirds of our total oil consumption) would still come from petroleum, while less than 14 percent would be supplied by alternative fuels.

My prediction, based on current industry data, shows that all of our 25.9 billion barrels of domestic reserves will be completely exhausted before the end of the year 1997! If the unproven reserves thought to lie beneath the Arctic National Wildlife Refuge do indeed exist, then this deadline might be extended for perhaps another year. Offshore wells could conceivably supply us for another eight months or so. But inevitably, contrary to the Bush administration's rosy predictions, the United States will be completely out of oil before the turn of the century. The United States will then be entirely dependent on imported oil for all of its supplies.



Moreover, present trends — an annual increase in consumption of 3.13 percent — indicate that the entire world supply of nearly a trillion barrels of oil is likely to be used up by the year 2018. This means, according to the Bush strategy, that by the year 2030 the United States will have been running on imported oil for at least 18 years, and then on totally imaginary oil for another 12 years!

The Bush administration refuses to recognize that the age of petroleum is nearly over, and that we don't have much time left to find alternative sources of energy, especially for transportation purposes.

Wirth bill also flawed

Sen. Wirth's bill, on the other hand, is replete with potentially effective conservation measures that would significantly cut down on the rate of consumption of many energy resources. With a couple of significant exceptions, it also is free from industry-relief provisions, and concentrates on the development of alternative energy sources to replace oil. The Wirth bill also goes much further than either the National Energy Strategy or the Johnston-Wallop bill in recognizing the need to find new energy sources. But even the Wirth bill fails to accurately assess the real physical nature of the problem.

Why won't the provisions of the Wirth bill, if implemented, solve our energy problem? Unfortunately, the alternative fuels upon which a major part of this alternative strategy is based are no more of a solution than is the production of phantom petroleum. While the producers of natural gas claim that this resource is quite plentiful, simple calculations show that a continuation of the present trend of a 5 percent per annum increase in natural gas usage will totally exhaust known U.S. reserves by the year 2018. Ironically, this is the same year that we can

expect world petroleum reserves to disappear.

Any attempt to utilize natural gas as an alternative to gasoline would merely accelerate the depletion, and leave us with the dual problem of not only finding another alternative to gasoline, but also finding another way to heat our homes. If we are to continue our present way of life very far into the 21st century, we should instead be looking for ways to conserve our remaining natural gas reserves, not ways to accelerate their depletion.

The Wirth bill supports active efforts to expand the use of renewable energy resources. This is an excellent policy, but in following it we must be careful to determine which of the various methods that have been proposed can actually supply us with a meaningful and truly renewable supply of energy. The efficacy of solar and wind power in meeting some of our needs is not in question; they should be pursued to the fullest extent practicable, and their development should be accelerated as much as possible.

Forget biomass energy

However, this is not true in the case of biomass energy, which is often lumped along with solar and wind as a viable renewable energy source. Unfortunately, its proponents, and especially those promoting alcohol as an alternative motor fuel, do not seem to recognize the limitations put on the production of fuel from biomass by the laws of thermodynamics.

To begin with, the conversion of solar energy to liquid fuel is a hopelessly inefficient process. No more than 2 percent of the solar radiation can be converted to biomass; of this, only a similarly small fraction can be further changed into alcohol. Finally, the fuel is designed to be burned in another extremely inefficient device, the internal combustion engine.

The energy losses inherent in this multi-stage process are so great that the amount of land needed to supply motor fuel for one automobile could alternatively be used to supply energy, through the installation of photovoltaic cells, for 600 electric cars! In a recent Washington, D.C., meeting with representatives of the National Audubon Society, Rep. Sid Morrison, R-Wash., lauded the prospects of alcohol, claiming that only a small amount of "unused" land would be needed to grow enough poplar trees to produce the necessary alcohol. But even using Morrison's rather optimistic figures, this "small" acreage calculates out to be about 80 percent of all the land east of the Mississippi!

If we use more conservative figures instead, we find that the amount of land needed to produce enough alcohol exceeds by far all of the land in the United States that is suitable to grow the necessary crops. Since most of this land is already being used to grow food, house people and provide us with other needed services, it is patently impossible that alcohol can ever become a meaningful energy source.

But if we can't use natural gas, and we can't use alcohol (and hydrogen is even more energy-inefficient than either of these), where does this leave us in our search for alternative fuels to power our cars? The answer is that we must abandon any thought of continuing to use the internal combustion engine as the primary means of moving people and goods from one place to another.

There appears to be only one way out of the nightmare, one path that does not lead to a precipice. Not only are electric motors far more efficient than the internal combustion engine, but the energy needed to power them can come from virtually any source, including those that are truly renewable or truly abundant. It seems we have no choice in determining the nature of our future transportation systems; they must be electrically powered.

With the demise of the petroleum age, we can no longer enjoy the luxury of basing our decisions on our own whims, or on economic theories that don't apply to a world of limited resources, or on naive political precepts that have no basis in reality. Our choice is mandated solely by the laws of nature, and there is no possible way that we can disobey them.



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