Water Dictates Western Future

by Tom Bell

Water—the lack of it and the need for it—looms ever larger in the West's developing energy situation. Water is used in huge amounts to generate electricity in coal-fired plants, to gasify coal, to liquefy coal, and to develop oil shale. But the arid West has not been overly blessed with abundant amounts of water.

The Fort Union geological formation of Montana, North and South Dakota and Wyoming holds one of the largest deposits of coal in the world. Literally billions of tons of the coal is low in sulfur and can be easily strip mined. So now that oil reserves are either running low, or are held by Middle East nations, the potential for profits in coal are enormous. That is, the profits are potential if the costs of strip mining can be held down and the water for development can be obtained as cheaply as possible.

Similarly, the development of oil shale to produce literally millions of barrels of oil is going to require rivers of water. In fact, so much water may be required that a recent Atomic Energy Commission report questions the development of oil shale. A draft report says that even if all the water available in Colorado, Utah and Wyoming were used to process the shale, it would only be enough to produce three to five million barrels of oil daily. The report said a more reasonable level of development would be closer to one million barrels of oil daily by 1983. It is reasonable simply because the available water has to be shared with other uses. (The AEC later qualified the statement on the report by saying the limiting factor of water would only be applicable to above-ground retorting. The AEC is encouraging in situ retorting by the use of underground nuclear blasts.)

A senior technical specialist for Hercules, Inc., at Salt Lake City has also suggested that oil shale development may be impractical for lack of water. Dr. Billings Brown says, "It would take all of the water in the Colorado River to cool the equipment needed to get oil from the oil shale, and that is something you don't read about in the newspapers."

There is no doubt that water is one of the key elements in impending development. But not only is water the key to energy development, it is the key to the irrigated agricultural industry of the West. Look down from above on the vast majority of the western landscape and you see the irrigated farmlands concentrated for the most part along the natural waterways. Only where the works of the Bureau of Reclamation have diverted water onto lands some distant from the live streams do you see other irrigated lands. And rainfall is so sparse that diversified agriculture cannot exist except where water

Most western water issues from the mountains, out upon the plains and through the deserts. All along the way, it is put to work for man's purposes. But the time may now be at hand to take stock of what we have, how we are to use what is available, and how we will be allocating water for society in the years ahead. (Continued on page 4)
Water is so precious in the arid West that men have been shot in disputes over its use. The question of water rights first arose in western gold mining districts. At about that same time, water rights for irrigation were established. First in time, first in right became a by-word in the lexicon of water appropriators.

It soon became apparent to some early administrators that some kind of order had to be brought to water appropriations, and some kind of record kept. Only by establishing a system and keeping records could the prior rights of early appropriators be protected. Not all states kept good records, including Montana. It is now in the process of reviewing and adjudicating water rights, particularly for irrigation.

Even the keeping of records does not tell the whole story. Some western streams were over-appropriated. That is, more water was appropriated from the stream than natural flows could supply. And not all water appropriated for use was always put to use. The result is that no one actually knows how much water is being put to use. Flow records have been kept by the United States Geological Survey long enough to know what is flowing at certain points along a river system. Most have assumed from those records that there is excess water flowing by and going to the ocean. And that, in most western rivers, is being wasted.

A problem of western water flows is its fluctuation. Much annual precipitation falls as snow in the mountains. As spring comes on with a rush, large volumes of water fill the streams and rivers. By August, a good many of the same streams may contain only a trickle. And since minimum flows for fisheries and recreation were unrecognized in earlier days, some streams are completely dewatered by the end of summer. During dry years, water becomes very short on some smaller streams.

The Bureau of Reclamation, that agency which has, by building big dams, solved many problems, has also created other problems. The Bureau captured the supposed excess flows; prevented flooding, and generated cheap hydroelectric power. It once arrogated all the water that it could capture, and sent it seeping away, unused.

As with all other exploitive deeds, the projects were accomplished first. Then that followed have become so questionable and marginal that the Bureau has found itself in a continuing series of environmental lawsuits. Undaunted, the Bureau has a way to continue to exploit the pork barrel. This time, they turned a cold shoulder on agricultural interests and took up quarters with the energy industry.

The energy crisis seemingly has played right into the hands of the Bureau's hands. The experts at building dams and huge irrigation projects now sell their wares to the energy industry to build additional dams and equally huge aqueducts.

The question becomes, how do you supply all of the water for all of the grandiose projects? The Colorado River has already been overused. It appears the Upper Missouri is going to be next.

Of even more consequence is the nagging question that surely must afflit some officials and bureaucrats. And that question is: What kind of energy and food could be precipitated if a prolonged and widespread drought should afflict the West in the 1990's as it did in the 1930's? With a great dependence on fuels from coal and oil is this suitable? As well as the contribution to the nation's food supply of western irrigated agriculture, what would happen if the water supply was suddenly reduced?

It would appear that everybody ought to be keeping track of the store. The nation is flitting with a danger as ominous as the Middle East powderkeg when so much dependence is being placed on the precious water of the arid West.
Double Standard on National Resources

Now we are getting the message — national needs or wants come ahead of regional or state desires.

One of the energy company spokesmen, Kenneth Reim of Getty Oil Co., said so at a public meeting in Billings this past week.

Reim emphasized that 200 million people own the coal in our region, it is a national resource. Our taxes support a national resource.

Now that that has been established by mutual agreement, let us include some other things that belong to the public, too. Take air and water, just for starters.

Energy companies haven't been too concerned about clean air and clean water until late when an irate citizenry rose up to call a halt to their dirty work.

The fact of the matter is, the energy companies still are battling for the right to pollute our air and water. If you doubt it, talk to your congressmen to learn what they are trying to do to scuttle reasonable legislation concerning coal strip mining practices.

We don't think one area of the nation has the inherent right to stink up and befoul another for its own convenience. That may seem strange to an energy giant spokesman but not to us.

We think the rights of the people in this area deserve to be respected.

Montana has reasonably clean air, most of the water is potable and the land sustains life to varying degrees, largely dependent on available water.

Sure, we can share the water. How many shovel-fulls do you want?
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can be diverted from streams... of Green River, Wyoming.
Unconfirmed reports now indicate PP&L may be contemplating a plant of equal or even larger size...
size near Creston Junction. That location would be some 60 miles further east (26 miles west of Rawlins). In that case the company may need additional water.

Wyoming bought 60,000 acre-feet from the Bureau of Reclamation and immediately sold the water to PPLA and the remainder to Sun Oil Co. at $5 per acre-foot. The state is now negotiating with the Department of the Interior for an additional 60,000 acre-feet for resale. Nine companies have registered interest in buying the water. All would be taken out of the Green River for consumptive uses in industry.

The State of Utah is reported to have tentatively allocated 102,000 acre-feet of water a year to the proposed Raigain addpowerplant in southern Utah. A plant of equal or larger size is now being proposed in southern Utah by a consortium of California and Utah municipal utilities. Every 1,000 megawatts of generating capacity requires between 10,000-20,000 acre-feet of water per year.

A recent report by the Western Interstate Nuclear Board says Utah generating capacity will increase 10-fold by 1982. The increase will be from 414 megawatts now to an estimated 4,300. Colorado will increase from a present 1,922 megawatts to 5,002. Western Wyoming will increase from 700 megawatts to 3,690.

A HOLD ON WATER

Concern for enough water to go around has already moved both Montana and Wyoming to impose moratoriums on water-use. Montana Gov. Thomas L. Judge asked the Legislature for a three-year moratorium on any large water withdrawals from the Yellowstone River Basin. The Legislature acted without hesitation. The moratorium applies to requests for water-use permits to develop waters; and to diversions from any stream of amounts greater than 30 cubic feet per second. The prohibition does not apply to either municipal or agricultural withdrawals. In asking for the moratorium, Gov. Judge said the "water rush" was on and that it posed a serious threat to the state's agricultural industries.

Two Montana legislators have had second thoughts about the imposed ban. Rep. Allen Kolstad, president of the Montana Water Development Association, says Montana could lose its water to North Dakota. He says North Dakota could establish beneficial use for water flowing through Montana and therefore preempt the water for later use. His thoughts are echoed by Rep. James P. Lucas, twice speaker of the Montana House.

Following upon the Legislature's action, the Montana Fish and Game Department announced it would seek a reservation of waters in the Yellowstone River. The reservation would require minimum flows to protect fisheries, wildlife habitat and recreational opportunities.

The Department has the authority under a 1973 water-use act.

Authorities say other reservations may be made by the Department of State Lands for irrigation and development, the Department of Health for preservation of water quality, and even the Department of Highways for preservation of scenic values important to the tourist industry.

Another significant factor has also entered the scene. Early in the session, Montana and Wyoming sought to end the moratorium for the Little Big Horn River, where history was made nearly 100 years ago. The Little Big Horn originates in Wyoming but enters the Crow Indian Reservation where it crosses into Montana. The Crow claim the paramount right to all water flowing through the reservation. And the right applies to all present and future needs. They claim the right through an 1868 treaty with the U.S. government.

Crow Tribal chairman David Stewart says his people can use all the water in the river. He cites needs for more water for a growing population, for a local industry, and for irrigation of an additional 130,000 acres.

At issue is the application of a Wyoming development firm to build a reservoir near Parkman, Wyoming. The firm has already been granted permits to divert 44,000 acre-feet of water from the Little Big Horn. The water is said to be related to proposed coal gasification plants.

The State of Wyoming claims constitutional and statutory authority to permit appropriation and use of any waters within the state. The Crow have warned publicly, in newspaper notices, that anyone planning to divert water does so at the risk of a legal suit.

Late in March, representatives of 17 Indian tribes met in Billings to form an alliance for mutual protection of their natural resources. One of the big orders of business was to draft a definitive statement on Indian water rights. Out of that came a conclusion that Indians are being forced to make some major development decisions with insufficient data.

WYOMING'S EFFORTS

Early in the session of the Wyoming Legislature, Rep. William Holland of Buffalo introduced legislation which would have prohibited transfer of water rights from irrigation use to industrial use until April 1, 1975. The bill would have also placed a limitation on permits to withdraw water from underground aquifers. The bill never got out of committee.

Before the session was over, the Legislature had approved the taking of 15,000 acre-feet a year for a 1,000-mile coal slurry line to Arkansas. But the approval was a tentative one for the one line and Rep. Holland was successful in an amendment much like his bill. The Legislature approved the amendment to limit underground water withdrawals to 6,000 acre-feet per year in any one county until April 1, 1976.

The proposal for a coal slurry line came as almost a complete surprise to the public and most state legislators. This was in spite of the fact that Energy Transportation Systems, Inc., was already drilling test wells in eastern Wyoming, near Lusk. BTSL, the public found out, is a New Jersey consortium composed of Peabody Coal Co., Lehman Brothers, and the engineering firm of Bechtel. Inc. Peabody Coal is to provide the coal for Arkansas Power & Light Co. from its leases in Campbell County.

The pipeline would originate at the site of the wells in Nebraska County, carry water to the coal mine in southern Campbell County, and carry coal in a water slurry through Nebraska, Kansas and Missouri to its destination near Pine Bluff, Ark. The 38-inch diameter line would carry some 25 million tons of coal per year to provide fuel, in part, for four 750-megawatt steam-generating units.

The entire pipeline project is estimated to cost $2 billion, with Wyoming's share of the investment to be $204 million. The project was sold to Wyoming on the merits of a large investment with a few highly paid employees (hence no people pollution), minimal environmental disturbance from a buried pipeline, and the use of an untapped, brackish water source. The water is to come from a series of deep (2,500-3,000 ft.) wells in the Madison limestone formation. However, continuing tests indicate the production of water from the geologic formations are less than half of what was anticipated.

Approval of the pipeline was not without opposition. Knowledgeable people point out that underground water resources are generally tied directly to surface waters. These people contend that to recharge the aquifers will require more of the surface waters, and that will only aggravate the existing water scarcity dilemma.

Shortly after the Arkansas slurry line gained prominence in the news, the president of Houston Natural Gas Corp., Robert Herring, announced his company had reached a "general agreement" on a slurry line. Coal would be carried in an 18-inch slurry line from Wyoming or Colorado to the Gulf Coast. The company had coal leases in both states.

Wyoming Gov. Stanley K. Hathaway said his office had not been contacted by the Houston (Continued on page 6)
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firm. The new state approval. The Governor said such an amendment was therefore premature. Hathaway's office also denied rumors that nine additional slurry pipeline requests had been received.

Coal slurry lines offer certain advantages to states facing large population influxes and massive industrialization. Coal can be carried to where industry and population centers already exist, and with the use of less water than industrial processes consume. It requires slightly less than a ton of water to carry a ton of coal away in a pipeline. Powerplants consume seven tons of water for every ton of coal burned. Coal gasification plants consume two tons of water per ton of coal processed.

Nevertheless, concerned observers feel Wyoming could be drained of its water resources by uncontrolled demands through both slurry lines and proposed industrialization. There is still another concern for underground water. The huge deposits of strip mineable coal in the Fort Union Formation of Wyoming, Montana, and North Dakota are tremendous reservoirs of water. The best aquifers in the region are often associated with the coal beds. Strip mining will disturb or destroy those aquifers.

UNDERGROUND WATER

Montana Lt Gov. Bill Christiansen says he feels there is now more concern for underground water than for surface land reclamation. He says the major problem is not necessarily what happens on the surface, it is what happens beneath the surface as overburden replaces the porous and permeable material which constituted the aquifer.

The special National Academy of Sciences/National Academy of Engineering committee report on western strip mining also expressed concern. The report, Rehabilitation Potential of Western Coal Lands, said, "A matter for more immediate attention is the fact that underground mining activities may disrupt ground water flow patterns and interrupt traditional sources of water supply. These direct and indirect consequences may be far more important than the ability to reclaim the actual site of the mining and should guide decisions regarding regional development."

The report considers both on-site and off-site impacts on water. In regard to the on-site impacts, it says, "Ofprimary consideration are the effects of soil erosion, channel erosion and the disruption of surface drainage and groundwater aquifers."

Consideration of a national strip mining act is now taking place in the House Interior and Insular Affairs Committee. Industry and Nice Administration amendments have consistently been aimed at weakening strong provisions to prevent or ameliorate water problems associated with strip mining in the West.

As an example, the Academy report said, "In the planning of any proposed mining and reclamation it is essential to stipulate that alluvial valley floors and stream channels be preserved." That wording is incorporated into an amendment offered by Rep. Morris Udall and accepted by the House Interior Committee.

The amendment is understood by industry because of the high cost and additional work required to protect the water resource. (For example, see High Country News editorial, April 12, 1974). Last week, the National Coal Association called for defeat of the strip mining act, HR 11500. Carl Baggy, president of NCA, listed among the objections the following: "In arid and semi-arid areas of the West, the bill makes mine operators responsible for preserving throughout the mining and reclamation the hydrologic integrity of alluvial valley floors. It is possible to restore subterranean water seepage, stream beds and alluvial valley floors, after mining, but this bill sets an impossible task: mine and reclaim land without disturbing it."

Mining engineers do indeed say that it is possible to retain the hydrologic integrity during mining and to restore the aquifers after mining, but only at great economic cost. The mining industry obviously opposes additional costs and efforts. They say that would increase the cost of coal, and, eventually, cost of energy to consumers.

But to do otherwise than to protect the aquifers throughout the entire region will doom much of the surface economy — the grazing industry. Well water sources in the area will be disrupted or destroyed unless the underground sources are somehow protected.

AGRICULTURE THREATENED

At the same time that many ranchers in northeastern Wyoming and southeastern Montana are concerned about loss of surface water, the high economic value of water to industry has already begun a round of purchases from agricultural interests. As this is written, Panhandle Eastern Pipeline Co. is negotiating for purchase of agricultural water out of the North Platte River. Extensive holdings of ranch lands are already in the hands of large energy industries in various parts of Wyoming.

Montana agricultural interests along the Yellowstone River are worried about loss of springs and wells. The energy industry's requests for water now total more than 3.5 million acre-feet. The question becomes, during the dry years which would get the water? Powerplants and gasification plants, dependent upon the available water, could take priority.

The Bureau of Reclamation and the State of Wyoming both point to more reservoirs as a way to hold excess water for use in industry. That water would then be diverted to the coal fields through an extensive system of aqueducts. The Montana-Wyoming Aqueducts report by the Bureau of Reclamation indicated that as much as 3.2 million acre-feet could be diverted to industry.

Such heavy demands for water do not reassure agricultural users. Nor does it bode well for recreational uses of the large man-made reservoirs. About half the water in the huge Lake Sakakawea in North Dakota on the main stem of the Missouri comes from the Yellowstone River. Large investments have been made for recreation by Indians on the Fort Berthold Reservation, and by whites at various points around the lake. Large drawdowns for power purposes could leave thousands of square miles of mud-flat.

Power production from six generating stations at dams along the Missouri in Montana, North Dakota and South Dakota during nearly 10 billion kilowatt hours a year.

At the same time that huge diversions are planned for industrial use, new coal beds could be carried 1,040 miles from south of Gillette, Wyoming, to near Pine Bluffs, Arkansas. The pipeline was given approval by Wyoming's 1974 Legislature.
Reclamation's environmental impact statement also admits that power for pumping on the project may someday have to be supplied from coal-fired plants. Allocation and marketing of water from the Missouri has become so controversial that a special federal study has been set up. Scheduled to report to the Missouri River Basin Commission on Feb. 1, the study committee asked for an extension until July 1. The delay was said to be needed to provide additional information for federal policy decisions, and to give the states more time to prepare their position.

In the meantime, the rush for water goes on. Recent months have brought to light applications for reservoirs throughout northern Wyoming. And while more reservoirs are planned, the water level in Yellowtail Reservoir on the Bighorn River has dropped some 35 feet, exposing extensive mud flats and threatening spawning fish. A series of reservoirs, some of them overlapping, have been filed on Wyoming's Clark Fork River. The filings have been made by individuals in applications to the Wyoming State Engineer. The sites coincide to some degree with Bureau of Reclamation proposed sites.

Those filings, as well as for some reservoirs in the Powder River Basin, have raised questions on procedures in the State Engineer's office. Until the filings were revealed in newspaper articles, the public had no knowledge of the planned reservoirs. In one case, involving a reservoir in Wyoming for use in a proposed gasification plant in Montana, two ranchers were unaware that their land was involved. And in their case, the State Engineer could have issued permits for water without their ever having been notified.

Applications for reservoirs have also been filed on the Nwoold River on the west slope of the Big Horn Mountains, and on Tongue River on the east slope. Wyoming Water Planning Program Report No. 10 has identified 19 sites on which reservoir permits or applications are on file with the State Engineer.

Throughout the West, the thread of development runs willy-nilly, helter-skelter, seemingly without order. And like the shortage of fuel and energy, it seems likely that uncoordinated use of such a finite resource will undoubtably lead to shortage of water. No one seems to be keeping track of all the real and potential demands.

Worse yet, the best laid plans of men do not take into account the vagaries of nature. Cliff dwellings in the Southwest are mute testimony to the recurring patterns of drought. Society is dependent upon the basic natural resources of land, water and air. When extraordinary reliance is put on any one of those resources, as it is in the present case to light applications, then society is placing itself in jeopardy.

This would appear to be a time to sit back and take a closer look at man's relationship to nature, as we are going. If we do not, the consequences could be as fatal as they were for those people of the cliff dwellings long ago.

In his book, The Liquid Metal Fast Breeder Reactor, Cochran examines the analysis which convinced the Atomic Energy Commission (AEC) to push the breeder. Using the data and analyses developed by the AEC, he shows that very small changes in a number of the key variables produce large differences in predicted results. For example, he points out that the use of a 10% rather than a 7% discount rate would wipe out 75% of the benefits claimed in the ABC analysis, even if all other variables were unchanged. The most important flaw in the ABC study, Cochran says, is its failure to fully take into account environmental and safety factors.

The book has just been released by the John Hopkins University Press, Baltimore, Md. 21218. It is a 260-page paperback and costs $6.95.

Wyoming Environmental Congress Citizens will gather May 18 in Sheridan, Wyo., to examine the socio-economic impact of coal development. The meeting is Wyoming's fourth Environmental Congress. Sessions will begin at the Sheridan Inn at 8:30 a.m. Speakers include Dr. Dean Kohrs, a psychiatrist who has worked in Gillette. Duane Bowler, editor of the Billings Gazette; Rep. Ken Hechler of West Virginia and Ed Debes of Friends of the Earth. Tours of coal mines are scheduled to begin at 9 a.m. the day before the Congress, May 17. For more information contact Bob and Joan Wallack, (307) 672-2320.

Rep. Ken Hechler
Sing louder brook! I've missed for months
Your patter fresh and gay;
Your sparkling riffles in the sun,
When you were full of play.
Sing louder brook! This April day
Will bring no dour storm,
The pussy-willows are in bud
And airs blow soft and warm.

SING LOUDER BROOK
by Hans Kleiber in Songs of Wyoming
Reckoning from Washington

by Lee Catterall

The government's lengthy, new prediction of the approaching era of coal development in Wyoming is about to come true, according to Casper psychologist Dr. Dean V. Kohrs. He told about something he called the "Gillette Syndrome," a sharp rise in social problems caused by a population boom. The new Interior Department study agrees with much of what Kohrs said, but adds that steps can be taken to avoid the worst part of it.

The population impact caused by coal "may be both for the good and bad," it says. "Conservative social values of traditional population will have to change somewhat to accommodate more liberal values brought in by newcomers. Impact is dependent on the ability of local populations to accept social change.

"Immigration of a modest number of people into a small community could result in their being welcomed and rapidly assimilated into the existing social fabric. "On the other hand, the influx of large numbers of ethnically diverse outsiders would probably have adverse social impacts. So far as radical changes affect the social fabric, rates of delinquency, crime, personality disturbances, alcoholism, alienation and rootlessness may be increased." (Kohrs spoke of the Three A's — alcohol, accidents and absenteeism — and the Three D's — divorce, delinquency and depression.)

Obviously, the transformation of an area from a ranching and agricultural setting into a coal complex will shake up systems that grow from people — politicians beware: "Immigrant populations, dependent on and oriented toward coal mining and energy conversion and the influence of powerful business corporations engaged in the same and related industries," the statement says, "cannot help but threaten established political patterns."

Another part of the statement makes this startling claim: "The social fabric may be altered by the influx of newcomers, and the cultural framework, for what's worth, will never be the same again. For what's it's worth?" The person who spoke is not named.

As for the land, that pretty picture Exxon puts on the tube showing us how it plans to put the land back into the ground is nice to look at. But the Wyoming Department of Environmental Quality is about as true to life as the jackalope, if what the statement says is right.

It may be the same again, but it could take what might seem an eternity. "The long time necessary to restore vegetation in some areas is evidenced by the fact that segments of the Salt Lake City to Los Angeles wagon trail, used in the 1860's, is still devoid of vegetation." The return of wildlife run off by strip mining is "either completely impossible, or not feasible," until the plant life returns.

Solar Industry Emerges

by Joan Nice

Early in May a group of people convinced that they have a gift for mankind met together in Denver to discuss the details. The topic of solar heating and cooling, and energy conservation drew over 400 scientists, architects, developers, small businessmen, big businessmen, representatives of utilities, government officials, students and private citizens.

The predictions are made in an 800-page document, produced so government actions scheduled later this year will comply with the National Environmental Policy Act. That law requires environmental impact statements to be written up before government action is taken.

There were surprises — pleasant and unpleasant — for many people. Some were amazed by the number of people from all over the country who would pay the $100 registration fee to talk about solar devices. Some were surprised by the number of businessmen who've already committed themselves to the solar venture. Some were moved by the wide philosophical gaps they found between themselves and fellow "solar nuts."

Vigorous activities in the field were reflected by lively, flexible sessions. In the midst of the "progress report" meetings, descriptions of two projects "just completed" were handed to the chairman and added to the program.

CONSERVATION AND SUN

The architects who spoke agreed that energy conservation and solar energy should go hand in hand.

Some "very effective solar buildings" have no solar collectors, said New York architect Richard G. Stein. He showed slides of the sun-oriented structure which were traditional in many cultures. Mesa Verde is "one of our earliest solar buildings," he said.

Stein is alarmed by the prevailing attitude in the U.S. that seems to be, "now that we've developed technology, we can ignore any consequences of what we do." This attitude will be outdated," Stein predicts.

He tries to make buildings "compatible with the major source of energy in our lives." His firm is "old-fashioned enough to continue to use operable windows in all designs."

Architect Richard Crowther underlined the need for use of passive, rather than mechanical systems. "Even the slightest effort is passive," said Crowther.

In his own home in Denver, Crowther has incorporated "energy conservation and passive solar design factors." That means no collectors, no storage bins — but use and storage of the sun through strategically placed walls.

Malcolm Lillywhite (pictured above) is part of the team of scientists whose system will make the manure at the world's largest cattle feedlot into methane gas. The Gilcrest feedlot, one of two owned by Monfort of Colorado, will produce 6 million cubic feet of methane gas per day by processing manure in an anaerobic solar-heated digester.

The gas is generated by bacteria. What's left over is carbon dioxide and hydrogen sulfide, which are removed, and a good organic fertilizer.

Lillywhite's company, Solar Power Supply, served as consultants on the project. Bio-Gas of Colorado, Inc. will actually build the digester on a 40-acre site adjacent to Monfort's Gilcrest feedlot near Greeley, Colo. The facility will utilize the wastes of about 100,000 cattle. It should produce enough gas to operate Monfort's feedlots and its beef and lamb processing plants.

Solar Power Supply's interests lie in "natural energy systems." They are researching solar space heating and cooling, solar electrification, solar heated greenhouses, solar dryers, wind conversion and improved methods of waste treatment. For more information write to Lillywhite at Route 3, Box A10, Evergreen, Colo. 80439.

Solar, wind, and methane power will work together at the permanent teaching center to be built at the Wright-Ingram Institute's Running Creek Field Station in Colorado. Environmental structure which Crowther (picture above) described the Institute's plans to build "solar food systems" at the solar heating and cooling conference in Denver.

The station has already begun the 2-year project of measuring the incoming sun, wind, and waste at the site. Eventually students and volunteers will build the facility, an enclosed six to eight acres of space. The station is in a semiarid plains and canyon region between Denver and Colorado Springs.

The Institute is at 1228 Terrace Road, Colorado Springs, Colo. 80904.
In what may be one of the greatest ironies in the West, Gillette, Newcastle and Moorcroft, Wyoming, may have to restrict new natural gas developments. The oil and gas fields which supply them are to be flooded with water to increase oil flows. That process cuts gas production. Only a few years ago, billions of cubic feet of gas were recovered in southern Campbell County. Production from the fabulous Hilight Field was burned because there were no pipelines to carry it away. Drilling continues as shown above, and in a few years the vast deposits of coal will be used to make pipeline gas.

The Colorado Air Pollution Control Commission has notified county commissioners in the shale region that air quality standards may be too high to allow for much oil shale development. The Colorado Air Pollution Control Commission has notified county commissioners to assess public opinion regarding potential development and present air quality standards.

Colony Development Corp. has been notified by the Colorado Department of Health that its application for a permit to build a shale oil plant has been held up. The Department says it needs additional data on air pollution problems. Those problems relate to ambient air standards and the possibility of cancer-causing substances in air emissions from the plant. Colony Development Corp. vice president for health affairs, Dr. Edward Dreyfuss, pointed out to Colony that the Department is concerned with the anticipated effect of a plant on air quality from a fully developed oil shale industry. Some projections have indicated ultimate production of 560,000 barrels per day, using plants similar to that proposed by Colony. Such production, it is estimated, would result in emissions 30 times as great as those from any existing Colorado power plant. The Colony plant would have a 50,000 barrel per day capacity.

An Idaho Public Utilities Commission staff report has recommended that intermountain gas companies stop advertising for new customers, stop selling appliances, and be denied the inclusion of certain purchased gas costs as working capital. The gas company applied to the PUC for a 12% rate hike. Intermountain argues that such a recommended change in policy would be so radical that public hearings should be held. A spokesman for the company said natural gas is the most efficient use of energy, and the continued increased usage, through advertising, should be encouraged.

The National Science Foundation report says some shale oil wastes contain cancer-causing substances. Such wastes, says the report, must be treated in such a way as to prevent their escape into the waters of the oil shale region.

Wyoming Rep. Teno Roncalli had the support of the entire Colorado delegation in the House but still saw his amendment on underground nuclear testing defeated. Roncalli's amendment would have cut off all funding for underground nuclear tests to develop natural gas and oil shale. Roncalli and the five Colorado House members said the ABC should finish evaluating the Rio Blazo test before spending an additional $4.3 million for planning additional tests.

Clean air standards which electric utilities say will jeopardize efforts to achieve national energy self-sufficiency were upheld by the U.S. Supreme Court. The Court refused to review a lower court decision which found Environmental Protection Agency rules were reasonable. The Edison Institute, composed of 153 utility companies supplying 77% of the nation's power, said EPA rules and regulations threatened the development of electrical power.

Dr. Philip Abelson, a physical chemist and respected spokesman for the scientific community, says the United States will face an even greater energy crisis in about two years. Abelson, editor of Science, the weekly publication of the American Assn. for the Advancement of Science, says the crisis will come because American's failure to conserve energy. Abelson also labeled President Nixon's pledge to achieve energy independence by 1985 as "political eyewash."

A high official of Atlantic Richfield Co., Dr. James Gibson, says Project Independence is "politically popular but a hopelessly unrealistic conception."

South Dakota Sen. Jim Abourezk has called for a General Accounting Office investigation of an Atomic Energy Commission report on solar energy. Abourezk and environmentalist Dr. Barry Commoner have accused the AEC of withholding a report favorable to the development of solar power. The AEC had denied the accusation but the report was sent to Abourezk until he cited the Freedom of Information Act to the AEC.

Washington, D.C., is undertaking one of the most ambitious mass transit programs in the country. "Every day," says a D.C. Metro executive, "a million and a half dollars worth of public works is placed in the ground; and by 1990 the system will transport some 352 million riders a year. "The first trains will run in mid-1975 on the system's first four and a half miles of track. By 1989 the regional network will include 88 miles of track. The Department of Housing and Urban Development estimates that the area will receive a $3 return for every dollar invested in building the rapid transit system."

A White House energy study team says the nation suffers from lack of an overall energy policy. It also found energy regulation is unresponsive to change, and coordination is poor among government agencies and between the federal government and the states. The team warned that the federal government may have to preempt decisions on energy facility siting unless federal, state and local governments can do a better job of coordinating.
Solar Industry...
(Continued from page 10)
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Energex Corporation's first attempts to sell 
solar water heaters were "a brilliant failure," said corporation president A. Jenkins.

Solar Energy Applications Laboratory in Providence, R.

A project was one of four isolated cases 
build devices that will slip neatly into the exist-

Solar energy systems will never look 
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"Black is not always the best absorber," Farber pointed out. Color is only a part of ab-
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Farmer is doing his part by building an energy conservation center in Providence which is powered by "benign energy systems" utilizing the sun, wind, etc.

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"I don't say it will solve all our problems — no

single source can," said Farmer.

"Let's tell people what solar energy will do — and what it will not," said Dr. George Lot, direc-
tor of the Solar Energy Applications Laboratory at Colorado State University.

"Recently I've seen many (solar) products on the market which are not very good. Codes may be necessary," Farber said.

P. Richard Rittelman, a Pennsylvania ar-
chitect, said that solar heating and cooling sys-
tems will make economic sense only when we begin to assess all costs over the lifetime of 
products. If only the initial outlay of cash is 
considered, solar systems will never look 
cheaper than the available alternatives, he 
said.

Rittelman said that because of the artificial 
cycles we've adopted — including fiscal years 
and political terms — the "life cycle costing" of 
products probably won't be easily accepted.

The building industry looks like another ob-
tacle to solar enthusiasts. Dr. Jerome Weingart 
called the industry an "innovation resistant sub-culture" which is conservative because, to 
do business, so many different people within 
the industry have to agree. To travel along the tradi-
tional avenues of the construction industry, 
solar technologists "will have to provide simple, 
low-risk systems," Weingart said.

GOVERNMENT SUPPORT

Naturally, conferences were interested in gov-
ernment grants.

"The National Science Foundation put the 
pants on solar energy," said Dr. George C. 
Szego, the president of InterTechnology Corpo-
rations in Warrenton, Va. Szego's firm received NSF money to put a solar heating system on a 
local high school.

The foundation "thinks it's collective need out — give an example of acceptability to the back-
yard screwball," Szego said.

To fulfill its part of the bargain with the gov-
ernment, InterTech had to improvise. Since 
there was no trained labor force in their rural 
community, they "striped the communes." A 
truck strike put them off schedule. The ideal 
built buildings were not available. In spite 
of these problems, the builders had to agree to 
deliver a heating system to the school.

The first day after the collector was complete 
was the sunniest day in the month. The 
thermometer in the classroom read 95 de-
gress. "We wanted to show them we could heat," 
Szego said.

Szego's project was one of four isolated cases 
where government funds for solar energy went 
to small businesses. The bulk of federal money 
is going to large corporations, however. In an 
article reprinted from the Village Voice which 
was circulated at the conference, James Ridge-
way reports that "although solar energy is often 
advocated as a perfect example of small-scale 
technology that can be used to break the hold 
of the big oil companies and utilities, it doesn't 
seem to be working out that way . . . all compa-
nies and aerospace firms are major research 
recipients."

Among the firms to be included on current government research teams are Honeywell, 
the Los Alamos Laboratory of the Atomic Energy 
Commission, General Electric, Westinghouse and 
TW. It looks like the defense industry all over 
again," Ridgeway says.

One of the conference speakers, Harold Hay, 
president of SkyTherm Processes and En-
geering in Los Angeles, was also critical of the 
federal funding program. "Ninety per cent of the federal money is wasted," Hay says, 
while they're passing it out "they won't even 
look at what exists today."

Hay believes simple solar systems and solar architecture are best. "Nature is the highest 
technology," he said. Hay's home in Arizona 
was built on the principle of movable installa-
tion. When the insulation is rolled back his 
home is heated by letting the sun in during the 
daylight hours and cooled by radiating heat out of the roof at night.

The man with the money, Dr. Lloyd Horvig, a 
research manager program for the National 
Science Foundation, defined the goals of the 
government's program for the conferences.

"We will succeed when solar power enters the 
commercial market — reliable, low-cost and 
built in," he said. To achieve this goal, NSF has 
designed a three-phase program which begins 
at "Phase 0 — proof of concept experiments." 

This carefully paced advancement in the 
hands of big corporations and their university 
partners will require more money and time 
then some solar advocates think is necessary.

"We're ready for the early stages of applied 
solar technology by the end of this month — not 
the end of this decade," says Harold Hay.

THE USER

The user," said R. Robert Dempsey, head of 
station resources and planning at the Naval 
Ammunition Depot in Hawthorne, Nev. With 
625 civilian and military homes to heat, 
"we started receiving four or five messages 
weekly about saving energy," Dempsey said. 
Then, in December his gas supplier warned of a 
shutdown.

When he finally tried to find someone who 
could solar heat two of the Navy's homes within 
three weeks, "you've never seen so many ex-
cuses," Dempsey said.

Finally, Materials Consultants Inc. a small 
Denver firm, accepted the job. They completed a 
$15,000 solar system for the two houses by the 
end of January.

"How many of you have here have spent more 
money than that just to write a proposal?" De-
mpsey asked the audience. "We're on technolog-
ical welfare. We don't seem to know what we're 
going to do until we find out how much our welfare 
check from the government is."

THE SOLAR SCHISM

At least two kinds of people at the conference 
expressed strong philosophical feelings about 
solar development. Some want to use small, 
simple systems to develop in isolated communities — to make them independent of 
the national utility networks. Others want to 
build devices that will slip neatly into the exist-
ing networks.

"We have to interface with utility companies 
either in competition or cooperation," said E. S. 
Davis, an engineer at Caltech. Davis has chosen 
to infiltrate the system through a co-operative 
offshoot with the Southern California Gas Com-
pany. Davis is manager of Project SAGE, a plan 
to use solar collectors to supplement gas water 
heating for new apartments in Southern 
California.

INTERNATIONAL ENERGY

The longest look into the future was taken by 
the conference banquet speaker, Dr. Thomas 
Stonier, director of the Peace Studies Program 
at Manhattan College in New York. If solar 
energy development became a higher goal than 
nationalism, we might achieve two things, 
Stonier said. As developing nations indus-
triize, we'd have a cleaner globe and we might 
also learn to work together.

"A solar energy development decade could ecome a significant construct in the develop-
ment of a global community," Stonier said.
Western Roundup

Howls Used to Find Wolves

Wolf howls on tape are being used to search for the Northern Rocky Mountain wolf, once thought to be extinct. U.S. Fish and Wildlife Service biologists hope the recorded howls will lure into view a remnant or returned population of about 20. At least two positive identifications of the Northern Rocky Mountain wolf have been made in Montana recently, the U.S. Fish and Wildlife Service says. The wolves, Canis lupus irremotus, are suspected to be in the backcountry of Yellowstone National Park and the Shoshone Forest in Wyoming as well. The tapes used in the experiment contain the sounds of the eastern timber wolf, a close relative. "Like a community sing, a howl is a happy social occasion," says a 1958 study cited by the U.S. Fish and Wildlife Service. "Wolves love a howl. When it is started, they instantly seek contact with one another, troop together fur to fur. Some wolves will run from any distance, panting and bright-eyed to join in, uttering as they near, fervent, little wows, jaws wide, hardly able to wait to sing." The Northern Rocky Mountain wolf formerly ranged over parts of Montana, the Black Hills of South Dakota, all of Idaho, and parts of Oregon, Washington, and two provinces of Canada. Poisoning, trapping, hunting and land development caused the wolf's decline.

Arizona Debate Canyon Dam

Sen. Barry Goldwater doubts that the Arizona Power Authority will be allowed to build their proposed Hualapai Dam in Grand Canyon: "I don't think you are ever going to see this country build another big dam," said the Arizona senator. The Hualapai Dam would be killed off by Congress in 1968.

Matt Ringer, president of the Arizona branch of Friends of the Earth, held a special press conference in Phoenix to voice his objections to the reviled dam proposal. He said the aesthetic consequences of the dam would be overpowering and the benefits small - 3.6% of Arizona's electrical power needs.

The dam would wipe out a major portion of Arizona's last wild section of river. The Gila has been channelized recently. The Verde and Little Colorado are threatened respectively by the Central Arizona Project and flood control. "We are informed that Arrowhead is but one of a number of developments proposed or in the Upper Eagle River Valley which, if completed as planned, would produce in the neighborhoods of Avon, Edwards, Wolcott and Eagle a new population of at least 40,000 persons over and above the present population," the health director said. According to rough estimates, the flow of the Eagle River may not have the capacity to assimilate the waste of that large number of persons, even though the effluents meet state waste discharge standards, the health director says.

Health May Curtail Vail

The executive director of the Colorado Department of Health has advised the Eagle County Commissioners that his agency may not be able to issue the land use permits to authenticate various planned developments in the county. The state health director's comments were in reply to a request that the commissioners be informed of initial reaction to the proposed 1,000-unit Arrowhead development west of Vail, Colo. "We are informed that Arrowhead is but one of a number of developments proposed or in the Upper Eagle River Valley which, if completed as planned, would produce in the neighborhoods of Avon, Edwards, Wolcott and Eagle a new population of at least 40,000 persons over and above the present population," the health director said. According to rough estimates, the flow of the Eagle River may not have the capacity to assimilate the waste of that large number of persons, even though the effluents meet state waste discharge standards, the health director says.

County Faces Zoning Suits

The county commissioners in Pitkin County, Colo., face $32 million worth of law suits as a result of the zoning amendments they passed in March. The nine landlords suing claim that lowering the allowable densities on their properties is an unconstitutional taking of property without compensation. "I think they're going to lose their lawsuits," said Commissioner Dwight Shalman, an Aspen lawyer who was elected by a wide margin in a controlled growth platform in the last election. "We feel the county has a legitimate position and we're going to try to vindicate that position." Under the Taylor Grazing Act buffalo are not classified as domestic livestock. For that reason, a herd donated to the state of Wyoming by the late rancher Herman Wernher is having difficulty carrying the right to auburn in federal lands. The rancher who maintains the herd of 298 years on his property near Ten Sleep has been denied a permanent federal grazing permit. While he appeasds that he will appeal through Bureau of Land Management-administrative channels, he will be allowed to graze the bison on federal land for one year. Wyoming Secretary of State Thye Thomas says that if the federal government can "let the coyotes roam," it should allow the same privilege to buffalo.

Colorado Lacks Land Policy

The Colorado legislature passed land use legislation last month. But environmentalists in the state are quick to quip the news. "To hail HB 1041 as an answer to any type to our pressing land use problems is being less than candid with the people of Colorado," said the representatives of three environmental groups in a letter to Gov. John Vanderhoof. The three - Jim Menoughan of the Colorado Open Space Council, John Barros of the Sierra Club and Margot Zaller of PLAN jeffco - asked Vanderhoof to veto the bill.

Briefly noted...

The Utah Association of Counties has endorsed the newly enacted state land use planning bill. The UAC also charged in a resolution that the act has been "grossly misrepresented" by opponents. Earlier, Gov. Calvin L. Hampton had defended the bill against a petition drive to defeat land use planning.

The environment lost 113-66 in the 1974 Montana legislature, according to a Billings Gazette reporter. The numbers reflect the ratio of bills and resolutions killed to those passed dealing with land, water and other natural resources, and pollution control.

Private land regulations in the Sawtooth National Recreation Area will eliminate two small Idaho communities - Obsidian and Petit Lake. Landowners have three options. They may sell their land to the Forest Service for a "fair market price" and move elsewhere. They may sell the land and continue to live on it until the end of 1988. Or they may trade their land for public forest lands in a less conspicuous place.

The effect of coyote predation on game animals and game birds is the aim of a six-year study approved by the Montana Fish and Game Commission. The study is estimated to cost about $213,000. The Montana Department says the coyote is controversial because of its alleged effect on both livestock and game. It says accurate information on coyote populations and predatory effects is unknown.
Thoughts from the Distaff Corner
by Marge Higley

Sometimes I wonder if a little bit of judicious housewifely wisdom might not help to solve some of those seemingly insolvable problems.

I've been reading about all the difficulties to be encountered in the extraction of oil from shale. The biggest obstacle, of course, is the disposal of the spent shale, after the oil has been removed. Environmental and other considerations prohibit just piling it all up into barren mountains. And it hardly makes sense to do something like grind it up, add oil, and utilize it in the paving of the nation's miles of highways! But they do have to put it somewhere, if they're going to use the oil from it.

Colony Development Operation, of Colorado, has spent seven years and millions of dollars trying to figure out just one way. They're considering the feasibility of using it to fill up deep natural caverns. They would then level it off and plant stuff on it, so it would somewhat resemble natural surroundings. But, unfortunately, it isn't soil. It contains no organic material, and the minerals in it are the kind that tend to inhibit, not enhance, plant growth. So, in order to support plant life the soils must be leached out, fertilizers and mulch continually added, and then it must always be irrigated. And plants must be found which will grow and reproduce at that altitude and in that short growing season. It's a very costly procedure, and far from having had any success in small-scale trials.

Small scale. That's the rub! There can be nothing small about it. We're talking about leftover spent shale at the rate of something like 50 thousand tons a day! And a frustrating fact is that it increases in size, until the oil is extracted. So even if it could somehow be put back in the hole it came from, there wouldn't be any left over. Like when you ex-. 

Which reminds me of Helen the Housewife. Years ago, when she was an inexperienced young bride, she decided one day to surprise her husband by serving rice instead of potatoes for dinner. That was before the day of packaged convenience foods with explicit directions on every box. Rice was sold in bulk, so Helen bought five pounds of it, took it home, and dumped it into a pan of boiling water. Pretty soon she had to move it into a larger saucepan, and then into a galvanized bucket, which was the largest container she owned. Finally, she ran to the hardware store and bought a huge kettle, in which she completed the cooking process.

The three plain rice for a couple of days, then Helen bought raisins and to add to some of the rice, just for a change. She bought sugar and eggs and milk and made some of it into rice pudding. Then she bought cheese and tomatoes and onions and meat, and they ate Spanish rice for awhile. Eventually her young husband objected that he never had been fond of rice — she really preferred potatoes. So she threw out what was left, thoughtfully thinking of all the money and time and effort she had wasted trying to furnish just one small portion of one single meal.

In the years since that episode, Helen has successfully tried to serve rice and has become a very practical about such things as wasted time, money, effort and other resources. All of this is absolutely nothing to do with oil shale, of course. Oil shale — which might someday supply less than two percent of the nation's oil needs, provided that they can solve all these problems.

I showed the article to Helen the other day, and asked her what she thought about it. Her answer was, "Well, I think we'd be better to stick with potatoes until we're absolutely sure that we really need rice."
The book is about life on a poor farm in central Michigan in the '30s and '40s, about the neighbors and the livestock, about the woods and the small town nearby and about the school — the way it was before the war. And the book is about the changes the war brought, the advance of technology, the mechanization of life. He speaks of "agriculture in combat with the environment" and "the danger ... that we might conquer so completely that the environment will cease to fight back."

One interesting bit of philosophy: "We bought hay choppers in the first place for the same reasons we go to the moon; we found out we could, and so we thought we must." And further, "We are captives of our technology. We need more fertilizer to grow the big crops that the machines need to make themselves profitable."

But he is hopeful too: "We may some day learn how to strike a balance between useful progress and the thoughtless gouging away of the land. We are becoming more cautious in these judgements."

I certainly hope so. I too have hope, perhaps responding to Stadtfeld's observation that "The land is neutral to you: you can leave it as it is and it will revert to its natural ways ... I also respond to his words. The woods provided shelter for deer that we did not hunt, and a place to be alone in a spot that man visited but did not dominate. They gave an ideal for walking. When there was a confidence to be shared, a companionship to be nourished, a special time to spend with someone, it was always a good idea to take a walk to the woods."

May I suggest a verbal walk From the Land and Back?

The book is not all ecology and environmental destruction. The so-calledlazy syndrome does not pervade it. It "ravaged by the nineteenth century greedy lumbermen" so that it looked like "an easily-wrested old-grade Nagasaki, a quality of destruction not yet much advanced by technology," in those days he says, "We had only begun to learn about the pillage of nature, and the battle was still on fairly even ground."

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Stadtfeld is a farmboy at heart, but he has left the farm and become a university professor. From his ivory tower he can see more than he could from his Michigan farm, but his life is stamped with a closeness to the earth and a hint

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May I suggest a verbal walk From the Land and Back?
Bart Koehler, Environmental Advocate

Bart Koehler helped build condominiums in Florida after graduating from the University of Wyoming in 1967. But he left the construction business to return to Laramie, where he was born, in 1972. "I had a job in the oil business in Dallas, but I got interested in environmental problems," Koehler says. That was the late 1960s; the anti-Vietnam War movement was in full swing and environmental awareness was growing.

Koehler joined the Wyoming Wilderness Council in July 1974. "Our original idea was to go down, meet people and get their feet wet. But as it was, I was out there swimming," says Koehler. "The Council debated whether they even needed a lobbyist down in Cheyenne for a budget session. As it was, the session blew open and everyone was taken by surprise. In the course of two weeks, the legislature deliberated on a utility siting act, a subdivision act, a real estate tax, a slurry pipeline act, a forest products discrimination act, a joint powers act and a budget session."

"I didn't know the fine art of lobbying but I did know a little about industry. You can't push yourself on the legislators," admits Koehler. "I hate to call myself a lobbyist. I'm not doing it for profit or public service — it's for the public interest. I think of myself as an environmental advocate," he says. "We were low key. We weren't pushy. The legislators thought that, for environmentalists, we were awfully moderate. We came off as sensible people."

Tight budget and bill language under consideration was the utility siting act according to Koehler. "We almost get that one through. The bill would have provided for knowledge to the state and the communities before a major impact occurs. It was more of a social and economic planning bill than an environmental bill," he says.

"The bill was never supposed to even get into committee and no one expected it would ever get out, but surprisingly enough it made it. We worked very closely with the sponsor, we attended, we spent time with the meetings, and we worked closely with the legislator's constituents asking them to vote their conscience," says Koehler.

"Protecting constituants is our only power, and it's the ultimate power in the long run. Legislators are as good as the public that elected them. If they aren't responsive to their constituents' needs, they may not stay in office next time around."

"We try to help people realize that they have power. Too often people give up and say that there's nothing they can do. That's wrong. They can change things, it may be slow, but it works," says Koehler.

"You should have seen the change that came over legislators as they got phone calls and letters flooding on their desks about the utility siting act. Many turned about and said, 'I'll be damned if I'm going to let this bill die in committee.'"

"It came out of committee and passed the House. Again no one thought it had a chance, but it passed. It was only when the vote came to shut down the Legislature that the measure lost its momentum. Now it's under study in an interim committee. I think it will emerge next session as a stronger bill," he says.

When the session was over, the Wyoming Outdoor Council met in Kemmerer to decide if they should offer Koehler their executive directorship. On the same day the Wilderness Society met in Cheyenne to decide if they could hire Koehler as a Wyoming consultant. Both groups were impressed with Koehler's performance, so he was hired full-time in the Denver office, but he felt it was a compromise and luckily both parties accepted it. Even though the jobs overlap in many areas, Koehler has more than a full-time job on his hands.

"With the Society, I'll be running some citizen awareness workshops, getting grass roots involvement in the decision making process. I'll be using wilderness as a tool to work this out. I hope to run one this summer and several this coming fall," says Koehler.

As more wilderness in Wyoming, Koehler thinks "we're in good shape" but he'd like to see the addition of a few key additional areas — areas to be added to the Cloud Peaks area, an enlargement of the Gros Ventre, and several areas in the Medicine Bow National Forest — notably Houston Park.

He'll also be looking at BLM (Bureau of Land Management) primitive areas for wilderness potential. "The wilderness process goes on and on," he says.

With the Council, Koehler thinks he'll have to go on tour to reach more people. "I hope to put on a program in each town and city and let the state know what we think is happening to our environment. We don't have enough time right now, though. I am the entire full-time staff. I have a few volunteers helping me, but I need much more support.

One of Koehler's volunteers is the Council's secretary, Kelly. Kelly, Koehler's environmental advocate...