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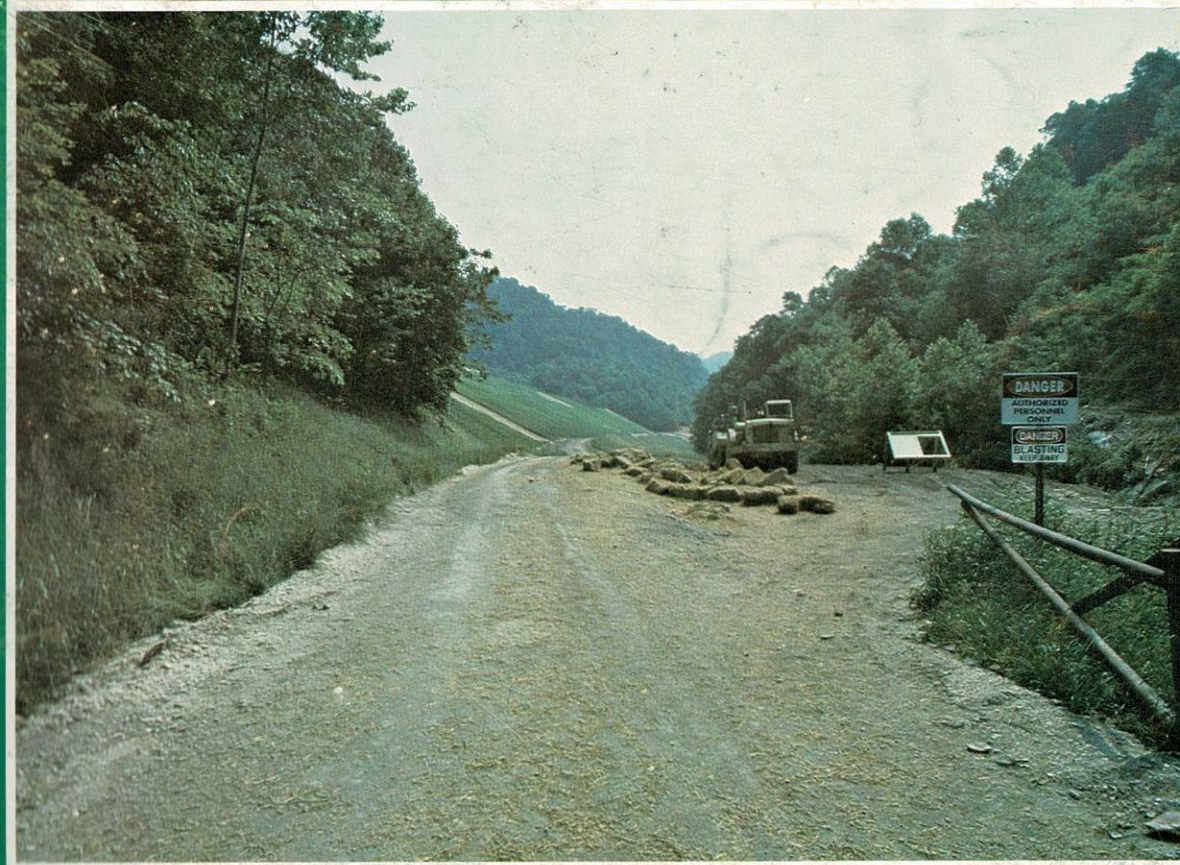
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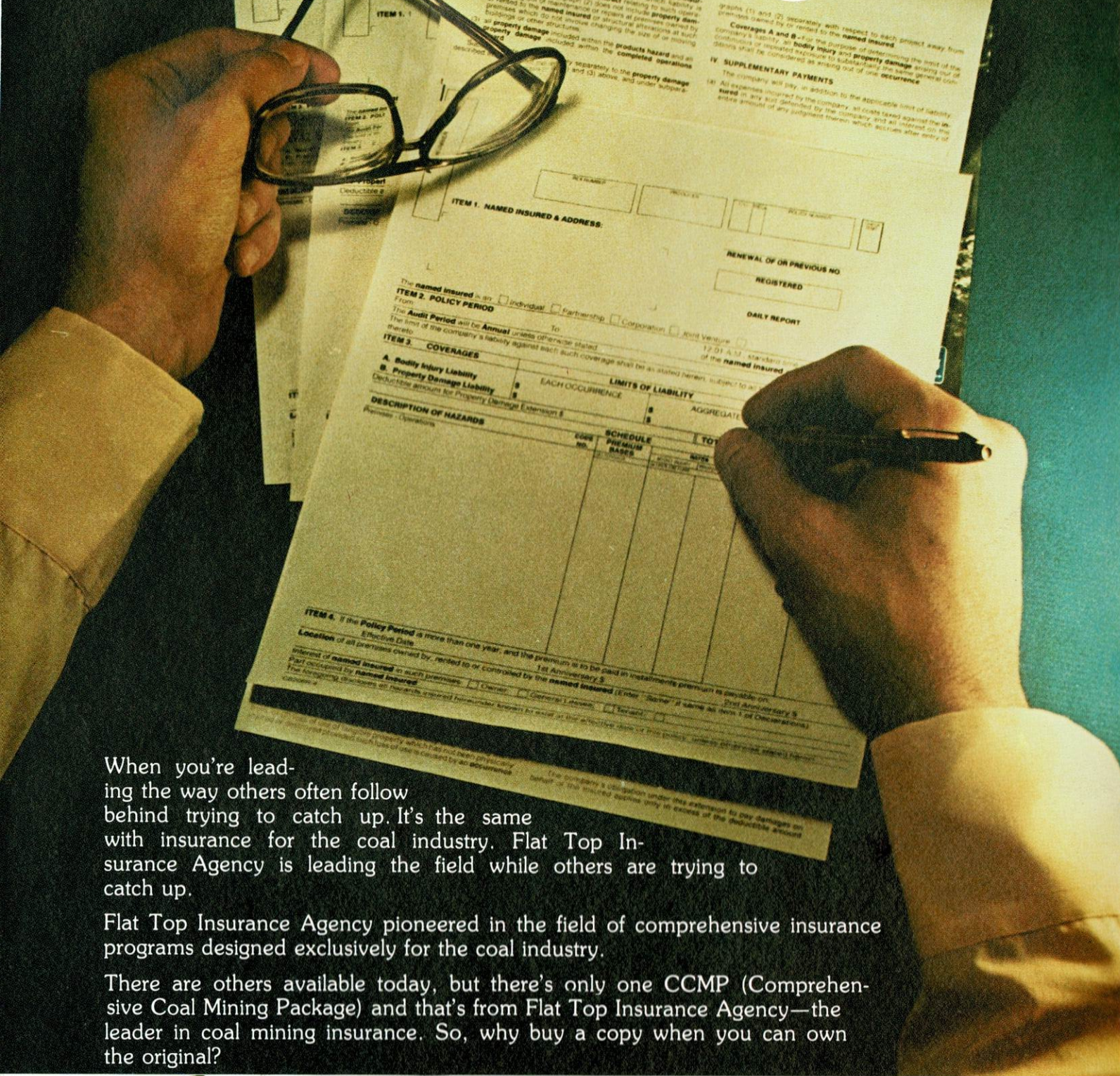
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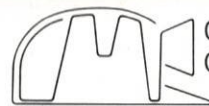
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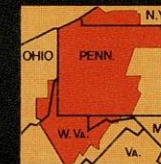
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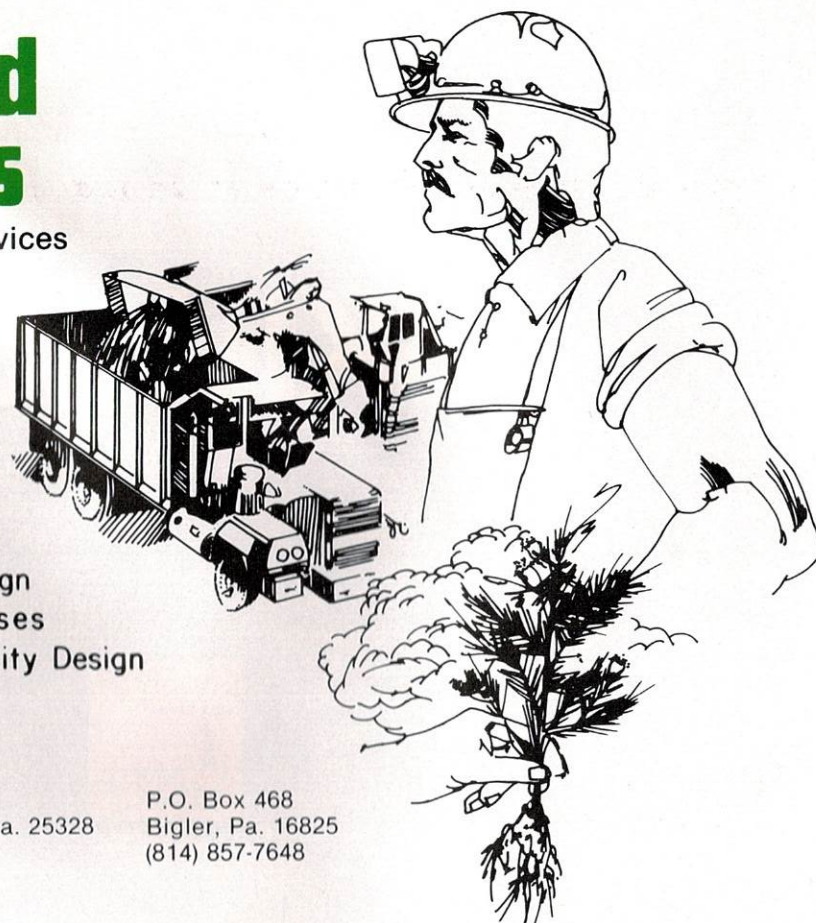
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Green Lands

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Cover — After years of red tape, and millions of dollars in contributions, the Abandoned Mine Lands program is finally coming of age in West Virginia. Our cover illustrates the difference good reclamation can make in these scenes from the Peach Creek refuse piles in Logan County, taken just five months apart.



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The Peach Creek job involved the reclamation of five burning refuse piles, covering some 70 acres.

The Money Flows Back

The money is coming back to West Virginia. Well, a good bit of the money is coming back.

"The money" is comprised of contributions from West Virginia coal producers to the Abandoned Mine Lands Reclamation Fund, as mandated by the Surface Mining and Reclamation Act of 1977. The federal law imposed a tax of 35¢ per ton on all surface production, and 15¢ per ton on underground mines.

The theory behind congressional discussion of this measure projected that approximately half of the money would be returned to the contributing

state, and that the other half would be disbursed to those areas which needed it the most. Theoretically, a state like West Virginia, with a long mining history, would get back more than it gave. It hasn't quite worked that way.

As the AML program evolved through the regulatory process, it did indeed designate 50% of the funds for return to the contributing state. But the remaining half was divided like this: 10% to the Small Operators Assistance Program (SOAP), which doesn't really relate to reclamation; 20% to the restoration of mined farm land (RAMP), of which West Virginia has very little;

20% to a discretionary fund which the federal Office of Surface Mining, within certain guidelines, may use as it sees fit.

From 1977 through 1981, while the Act was undergoing implementation, collections proceeded at an orderly pace, but in the area of disbursements, nothing really happened. State governments and regulatory agencies were concerned with getting their programs approved by the Department of Interior and achieving regulatory primacy. Installation of state AML programs, necessary to recover AML funds, was on the back burner.

CONTINUED...



AML funds worked a complete transformation in the Peach Creek area of Logan County.





Peach Creek was reclaimed under the same stringent standards as any surface mine in West Virginia.



The Peach Creek job was paid for with \$4.3 million from OSM's discretionary fund.

Worse yet, because the funds were in the hands of the U.S. Treasury, they languished in non-interest bearing accounts.

Were it not for the diligence of West Virginia Department of Natural Resources personnel, and the doggedness of the State's governor and congressional delegation, the statistical picture of the AML program in West Virginia would be bleak indeed.

As it is, after six years of collections, the money is finally flowing to West Virginia, and more importantly, reclamation on the ground is well underway.

DNR was about as prompt as the federal process would allow in getting its AML program approved and in line for grants. When a federal snafu threatened to cut available 1983 funds in half last spring, West Virginia's major officeholders howled until the full

amount was restored.

Through 1982, Mountain State operators had paid \$106.5 million into the fund. The 50% formula made \$53.25 million available to DNR's program, though it must be applied for to OSM and appropriated by Congress. Thus far, West Virginia has received and spent \$28.2 million, \$18.1 million from the 50% fund, and \$10.1 million of OSM's discretionary dollars.

The money approved, removed, and restored in April came to \$17.8 million. Grants currently in the application process total \$30 million.

Part of the grant application process is site selection. This is done according to a priority list instituted by the federal office. At the top of the list is imminent danger, followed by environmentally harmful. This usually translates to mine subsidence, toxic mine drainage, and refuse piles, all

problems more closely associated with underground mining than with surface operations. This is more than a little galling to surface operators, who are saddled with more than twice the per ton reclamation fee than their underground brethren.

Nevertheless, it is the site selection process which will enable DNR to utilize its AML leadership to maximize the flow of reclamation tax dollars back to West Virginia. The total of grants received and applied for is expected to deplete the state's 50% share of AML funds. This means that the State may get into the OSM discretionary purse to restore its remaining inventory of high priority abandoned lands.

Through continued wise manipulation of the bureaucratic process, West Virginia may yet get a fair return on the huge investment of its coal operators.



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The 1983 U.S. Energy Picture – We’re Still in Trouble!

By Dr. John J. McKetta

The public is still being told by the media that we are having an energy glut. They do not specify that the overall supply of energy is a world phenomenon but that we are having a shortage of domestic usable energy in the United States. They do not tell us that during 1982 we spent \$72.5 billion to import energy to satisfy the U.S. needs (\$67.9 billion for liquid plus \$4.6 billion for natural gas). They also do not point out that we have spent over \$500 billion for energy imports since the OPEC embargo in 1973. We tried to pay for this expenditure by exporting grain, food, equipment, services, etc. but again in 1982 we missed the balance of payments. This time we had a

negative balance of payments of \$46.1 billion. The media does not tell the public that over 33% of the liquid hydrocarbons we used in 1982 came from outside our borders. They do not tell us that the actual liquid production in the United States will be about the same in 1983 as it was in 1982 and less than it was in 1970. In fact, the production of crude oil in the 48 contiguous United States has been decreasing year after year since 1970. The imported liquid, however, has increased approximately 59% over 1979. These data are shown in Table 1. Table 1 also shows that the cost of the imported liquid was \$67.9 billion in 1982 compared to \$3.19 billion in 1970.

The balance of payment deficit of \$46.1 billion in 1982 adds greatly to the decreased value of the U.S. dollar. This is the information that should be made available to the general public so that they know that even though our supply of gasoline is high at the present time, our country is having great difficulty paying for the imported liquid from which the gasoline is manufactured. The public should also be told that we do have vast, vast quantities of potential energies that could be put to public use if the producers and consumers did not have to follow such senseless, inflexible governmental rules.

“Earth Day” pressures have resulted in the use of 3½ to 4 million barrels of oil equivalent each day more than we would have if these demands had not been adopted.

Individuals, as well as groups of people, establish certain priorities under which they wish this country to operate. When things go awry they do not hold themselves accountable for the troubles

that their demands have brought. The priorities resulting from the demands brought about from “Earth Day” pressures have resulted in the use of 3½ to 4 million barrels of oil equivalent each day more than we would have if these demands had not been adopted by the U.S. Congress. (See Appendix D and E)

The decrease in energy used in 1974-75 and from 1980-82 accompanies the high recession years in the USA. Although many people brag about the great amount of conservation, over 80% decreased energy use during the past three years has been because of the energy curtailment by industry due to the severe recession we are experiencing.

NATURAL GAS

Beginning in 1967 we consistently discovered less new gas than we have produced or used each year up until 1981. In 1981 and in 1982 we have found more natural gas than we used or produced. There are severe restrictions in the Fuels Use Act of 1977 which prohibits the use of natural gas under large new utility boilers. It borders on the ridiculous that we follow such a stringent rule of not using natural gas under new boilers at the same time that we have many of our natural gas wells capped (and not producing) while we are spending \$67.9 billion buying liquid hydrocarbons which are permitted to be burned under these boilers. Notice that the natural gas production has declined each year since 1971. In 1969 about 38 Qs* of gas were discovered in Northern Alaska but no gas pipeline construction has been started yet nor have there been any liquified natural gas plants built to deliver such gas to the markets in the lower 48 states.

LIQUIDS

We imported over 33% of liquid hydrocarbons used in this country in 1982. It is most undesirable to import these large quantities for many reasons. Among these are:

(a) imports add to a negative balance of payments (minus \$46.1 billion in 1982)

(b) dependence on imports constitutes a threat to our national security.

“There is no greater threat to our national security than our dependence on a large percentage of our imported energy which comes to us over sea lanes that we do not control.”

Dr. Harold Brown, former Secretary of the Department of Defense said, “There is no greater threat to our national security than our dependence on a large percentage of our imported energy which comes to us over sea lanes that we do not control.”

We are finding much more oil than we did in 1977, but we are actually finding less new oil each year than we produce or use. The increase in production in 1977 and ‘78 was because of the oil delivered to the United States through the Alaskan pipeline. In 1979 and ‘80 there was a decrease in total liquid production. In 1981 and ‘82 the oil production remained essentially constant.

LIQUIDS IMPORTED INTO THE U.S.

It is more than a coincidence that

the dramatic increase in the liquid fuels purchased from other countries occurred at the same time that the EPA and Mine Safety Administration were formed. During the normal economical growth periods such as in 1976 and 1977 over 5 million barrels a day of liquid were used over that predicted. This is part of the great cost that the Clean Air Act has brought to this country. If the U.S. economy increases in 1983, as many of us believe, the amount of imports will begin to increase in 1983. If we get back eventually to the economic growth periods such as we had in 1976 and 1977, we will be importing about 4-6 million barrels more of liquid per day than we imported in 1982 (a total of 9-10 million barrels per day total).

COAL

The picture for coal is just the reverse of oil and gas. We have consistently produced more coal than we use. Because of the strict governmental and environmental demands we burn much less coal than we can produce. We export large volumes of coal to Canada, Germany, Japan, and other countries. The total income from the export of coal was \$5.6 billion in 1982 compared to the 67.9 billion we spent for hydrocarbon liquids last year.

In 1982 we produced 810 million tons of coal (3% less than the 835 million tons in 1981) and consumed 700 million tons. At a time when we are in a serious energy problem we have almost 165 million tons of excess mining capacity each year. There are

CONTINUED ON NEXT PAGE

*Q is defined here as 1 quadrillion British Thermal units. This is the energy in 1 trillion cu. ft. gas or 46 million tons of coal or 180 million barrels of oil or 293 megawatt hours.

| Table 1 PRODUCTION - IMPORTS (Million Barrels Per Day) | | |
|---|-------|-------|
| | 1970 | 1982 |
| Prod. (Crude + NGL) | 10.90 | 10.30 |
| Import (Crude + Products) | 3.20 | 5.10 |
| Total Liquid | 14.17 | 15.40 |
| % Imported | 22.5 | 33.1 |
| Cost of Import \$/bbl | 2.8 | 36.0 |
| Billion \$/year | 3.19 | 67.9 |
| Trade Balance (Billion \$) | +2.8 | -46.1 |

also approximately 45,000 unemployed coal miners.

In 1970, my National Energy Policy Committee recommended to President Nixon that we double the amount of coal produced (and coal used) in the United States by 1985. This would have been a simple goal that we could have met very easily at that time. President Nixon presented his energy policy to the Congress, but because of the clamor and pressures of Earth Day, Congress did not even take up the bill. Instead, the Clean Air Act and other regulations were passed which resulted in the formation of EPA, OSHA, Mine Safety Administration (MESA), and other helpful (?) groups.

Here's how MESA helped with the coal problem:

- (a) Twenty two percent of the coal mines were closed in 1970 because they could not meet MESA standards.
- (b) The productivity in the coal mines fell from 16.8 tons per man per day in 1969 to 7.8 tons per day per man in 1979.

For this reason, the utilities in Jacksonville and Tampa, Florida, find it cheaper to buy coal from South Africa and Poland than to bring the coal from West Virginia. Houston Light and Power Company was offered coal from a company in Australia at a lower price than Houston Light and Power could obtain coal from Kentucky.

How EPA helped with the coal problem.

- (a) Over 700 foundries were closed in 1970 because they could not meet the Clean Air Act.
- (b) 235 coal-fired electric generating plants were forced by the United States government to change from coal to another fuel. They all chose gas or oil (two fuels that were in

very short supply). To this day, only one of these 235 coal-fired electric generating plants has converted back to coal. This is a 430-megawatt plant in Massachusetts which was converted back to coal in the spring of 1980.

Utilities in Jacksonville and Tampa, Florida, find it cheaper to buy coal from South Africa and Poland than to bring the coal from West Virginia.

So you see there are only three problems with coal:

1. Federal leasing policy makes it illegal to get near the coal;
2. MESA makes it illegal to mine the coal;
3. EPA makes it illegal to burn the coal.

Over 60% of the economically recoverable coal in the west is owned or controlled by the Federal Government. Less than 1% of this land has never been leased. Since 1970, a complete moratorium has been in effect on coal leasing programs until February 23, 1982 when Secretary of Interior James Watt, offered 23,600 acres for sale in the Powder River Basin (between Montana and Wyoming). The average price was approximately \$7,000 per acre.

The extremists continuously bring up different arguments against the use of coal. At first they wanted 99.5% removal of the particulate matter from the stack. Now that most of the stacks are essentially free of particulates these extremists bring up other topics to rouse the emotions of the public.

- (a) The carbon dioxide greenhouse effect (Appendix A)

- (b) Sulfur dioxide health effects (Appendix B)

- (c) Acid rain and acid lakes (Appendix C)

NUCLEAR POWER

Years ago my Committee's recommendation was that we should have 1,000 nuclear power plants in operation in the United States by the year 2000. We had a very good acceptance of the nuclear program. Eight new nuclear reactors were ordered by industry in 1968, 14 in 1970, 16 in 1971, 31 in 1972, and 35 in 1973. 1973 is when the anti-nuclear people became highly active so that by 1974 only 23 new nuclear plants were ordered (19 of these have been cancelled). In 1975, only 4 were ordered (3 were cancelled) and in 1976 and 1977, 2 were ordered each year and 2 were cancelled each year. In 1978, 1 was ordered. Since 1979 no new plants have been ordered.

Outside the United States nuclear power is making great strides. In 1982 21% more nuclear power was generated outside the United States compared to 1981. There will be an additional 20-24% more nuclear power outside the United States in 1983 compared to 1982.

We are not going to have energy self-sufficiency this century. However, we could alleviate the energy problem only through large use of both coal and nuclear (in addition to conservation). Unfortunately, over 300 new electrical generating plants have been cancelled during the past 9 years. Although 300 sounds like a small number, there are only 680 large electric generating plants in the United States. Over half of these are 25 years old or older, and almost all of these 680 plants are small compared to the 1,000 megawatt plants that have been cancelled.

The general public is highly concerned about nuclear power because the media puts out so much propaganda about radioactive nuclear waste. Dr. Bernard Cohen, a renowned physicist from the University of Pittsburgh points out that fewer people will die of radioactive waste from nuclear power plants than from the byproducts of other energy sources such as coal and photovoltaic cells. He states that high level radioactive waste from nuclear power is the least thing the public should worry about. Although this nuclear waste is toxic for a few hundred years, Dr. Cohen says the radioactive toxicity from one nuclear power plant each year adds to the natural radioactivity (already present in the environment) by less than one part per billion. The radioactive waste generated in one year by a large nuclear power plant could fit under a card table with room to spare. We do not have methods of storing nuclear waste by embedding the waste in glass and burying the waste in deep underground areas far away from ground water supplies. If it were not for the hysteria that would be caused by the extreme non-nuclear activists we could be placing the radioactive waste directly into the ocean. If all the world used nuclear energy to generate power and 100 years of high level waste was dumped in the ocean, at no time in the future would radiation dose to sea creatures be higher than 1% of the present radioactivity. There would be absolute minimal damage to the ocean ecology. Even though this is the case it is highly unlikely that the public would permit such storage.

PEOPLE ARE AGAINST AVAILABLE ENERGY

For some reason there are many people in the United States who are very strongly against the economic recovery of the U.S. Most of these

people are financially well off and do not depend on a healthy industrial economy for their well being. These people are against all energies that are available. They favor only those energies which are not available in large amounts such as solar energy, wind energy, tide, etc. I'm almost certain, however, that if President Reagan would make a statement on national TV that his number one priority energy-wise would be toward the use of windmills, that these same people would carry placards saying "conserve our winds."

If President Reagan made Windmill Energy a priority, people would carry placards saying "conserve our winds."

Just as an indication of how some people are against all energies that are available in large amounts, read the discussion between Ralph Nader and former U.S. Congressman Robert Krueger:

In 1975 when U.S. Representative Robert Krueger was on the House of Representatives Interstate and Foreign Commerce Committee he served on the Energy and Power Sub-Committee. Ralph Nader appeared before this committee to argue for increased use of Federal price controls on oil. After his testimony there was a question and answer session as follows:

Rep. Krueger: "Mr. Nader, last year we obtained 2% of our U.S. energy from nuclear sources. I wonder, Mr. Nader, if you favor an increase in the use of nuclear energy?"

Ralph Nader: "No"

RK: Mr. Nader, we got 2% of energy last year from fire wood. Are you in favor of cutting down any more forests?
RN: "No"

RK: Mr. Nader, last year we obtained about 4% of our energy from hydroelectric power. Are you in favor of damming up our streams and rivers?
RN: "No"

RK: Mr. Nader, last year we obtained about 17% of our energy from coal. I'm in favor of the increase of the use of coal. You have mentioned many times in the past the great number of problems with the use of coal. These were environmental problems, health problems and transportation problems. You also expressed concern about black lung disease. Are you in favor of increasing the use of coal in the USA?

RN: No

RK: Mr. Nader, I have just covered 25% of our energy supply. The rest of our energy comes from oil and gas. Do you have any suggestions to increase the production of oil and gas?

RN: No

RK: Mr. Nader, are you in favor of the U.S. increasing the drilling on the outer continental shelf and on governmental lands?

RN: No

ALTERNATE ENERGIES

We stated earlier in this report that the United States imported 5.1 million barrels of oil per day in 1982. Suppose we wanted to replace just one million barrels of oil per day using any of the alternates or any combination of alternates. What would be required of the most popular alternates to produce one million barrels of oil per day? These are shown in Table 2 along with the initial cost in billions of dollars for the in-

CONTINUED ON NEXT PAGE

stallations.

In considering alternate energies one should determine the actual amount of energy available from a certain fuel compared to the amount of energy required to produce that fuel.

SYNFUELS PROGRAM

The U.S. government set aside \$20 billion to encourage the synfuels program. The government still insists on developmental-sized plants rather than full-size plants. It is my recommendation that we go directly to the

full-size plants. Unfortunately, the goal set by President Carter in 1979 cannot be met. We have some information on the SASOL II plant. This plant is in South Africa, cost \$2.2 billion to build and produces approximately 50,000 barrels of oil/day. Because the costs are higher in the United States (again because of our senseless regulatory pressures), the \$20 billion could produce approximately seven similar plants in the United States by 1990. These seven plants would produce only 350,000 barrels/day rather than the 500,000 barrels/day that President

Carter aimed for at that time. It's interesting when you weigh your priorities because you could save 350,000 barrels of oil/day beginning next month if you would cut out forced bussing of school children in the United States. You would also have prevented the loss of 260,000 b/d of oil if you did not adopt the windfall profits tax. Just what are our priorities???

There is another great loss of energy when one converts solid coal to another fuel. For example, if you start with a pound of coal that has 12,000 Btu's, you would end up with approximately 6,500 Btu's of gas, or you could end up with about 5,000 Btu's in the form of a liquid. My recommendation, of course, is to burn the original coal and go after the 12,000 Btu's.

My recommendation is that you make the liquid from a solid fuel which has no other purpose. Coal can be burned.

The argument against my suggestion is that we need a liquid. If you need liquid, then make the liquid from a solid fuel which has no other purpose. Coal can be burned. Neither oil shale nor tar sands can be burned directly as a fuel. Therefore I recommend we make liquid hydrocarbon from tar sands and shale oil. Incidentally, you can do it for approximately 2/3 of the price of making liquid from coal.

Many people are stating in public that the price of a certain fuel is higher today than crude oil, but when crude oil reaches a higher price than their particular fuel will then be economical.

This is not necessarily the case. As oil prices increase, the cost of other energies increase also because of the increase in price of the basic energies required to produce a given fuel. One exception might be energy from shale oil or from tar sands which could be an economically acceptable process when the price of crude oil is in the range of \$50-60/bbl.

Table 3 shows the vast resources we have in coal, shale, and tar sands compared to other countries in the world.

WHAT CAN WE DO TO EASE UP THE ENERGY PROBLEM?

There is a lot that can be done by the public, industry and government to alleviate the energy problem. The President should ask the people to try a voluntary conservation program that would be matched by the government. The following voluntary program could save 3½ million barrels a day of oil equivalent.

A. Voluntary Savings By Public:

The voluntary conservation bordering on hardship and sacrifices by the public would include many of the following:

- Eliminate the use of air conditioning in automobiles.
- Cut back on heating (60 degrees maximum) and air conditioning (80 degrees maximum).
- Cut out the use of clothes dryers - this is one place where solar energy is very effective.
- Cut out the use of escalators - cut down the use of elevators.
- Buy smaller, more efficient automobiles.
- Increase car pooling tenfold.
- Retain the 55-miles speed limit. (The average car uses 15 percent less fuel at 55 than 75 mph. More

important, we have found that we save 10,000 lives per year in addition to 250,000 bbl/day of fuel.)

- Increase mass transportation threefold.
- Make sure that the new buildings are better insulated.
- Make sure that new office buildings have windows that can be opened.
- Burn solid waste and garbage in our communities.
- Raise the legal age of car driving to 18 years of age.
- Decrease use of cars on Saturdays and Sundays.
- Decrease highway driving to absolute necessity.

B. Savings By The Government:

After making these requests, the President and Congress should promise to match the voluntary conservation by the public with some corrective actions by the U.S. government as follows:

- Cut out forced busing of school children.
- Cut out catalytic mufflers from automobiles (except in the Los Angeles Basin and downtown

New York City and Chicago.).

- Put lead back into the gasoline.
- Ease up on environmental restrictions to permit burning of more coal without sulfur removal equipment.
- Cut back on unnecessary government regulations.
- Go back to the free enterprise system and let the market place decide the price of energy.
- Encourage energy producers to produce more energy.

For Example:

- Triple coal production/consumption by 2000.
- Have 400 nuclear reactors by 2000.
- Bring back the breeder reactor program.
- Discover and produce 10-15 percent more oil and gas by 2000.
- Open more federal lands for coal mining and drilling.
- Encourage shale, tar sands development.
- Support research and development on solar, on the breeder, fusion, wind, etc.

CONTINUED ON NEXT PAGE

Table 2
Alternates required to produce
Equivalent of 1 million barrels of oil per day

| Source | Cost/Installation \$ | No. Installations Required | Initial Invest. Billion \$ |
|--------------------------|----------------------|----------------------------------|----------------------------|
| 1. Oil from Shale, Sands | \$0.2 billion | 100 at 10,000 b/d | 20 |
| 2. Gas from Coal | | | |
| a) 150 Btu gas | \$0.05 billion | 6,000 modules at 1 bill. Btu/day | 30 |
| b) 300 Btu gas | \$0.50 billion | 84-75 bill. Btu/day | 42 |
| c) 1,000 Btu gas | \$2.00 billion | 25-250 bill. Btu/day | 50 |
| 3. Geothermal | \$1,500 kw installed | 1,100 req'd. at 45 mw each | 75 |
| 4. Coal Liquefaction | \$3.00 billion | 20-50,000 b/d | 60 |
| 5. Forests | | 30,000 sq. miles | 80 |
| 6. Nuclear | \$2.5 billion | 40-1,000 mw | 100 |
| 7. Hydro | | | |
| a) small | \$3,000 kw installed | 12,500 at 4 mw ea. | 150 |
| b) large | \$3,500 kw | 60-1,250 mw ea. | 180 |
| 8. Ethanol | | 300,000 sq. ml. to grow grain | 200 |
| 9. Wind | \$6,000 kw | 35,000 req'd at 2 mw ea. | 210 |
| 10. Solar | | | |
| a) cells | | 3,000 sq. mi. cells | 480 |
| b) orbiting satellite | \$10-20,000 kw | | 1,000 |
| 11. Tidal Machines | | 1,500 linear miles | 1,000 |

Table 3
COAL, SHALE AND TAR SAND RESOURCES
(Billion Barrels of Oil Equivalent)

| Area | Coal | Shale | Tar Sands | Total |
|---------------|----------------|--------------|--------------|----------------|
| USSR | 524.2 | 7.7 | ? | 531.9 |
| USA | 697.3 | 216.2 | 3.2 | 916.7 |
| China | 306.7 | 31.3 | 0.0 | 338.0 |
| Europe | 486.2 | 3.7 | 0.1 | 490.0 |
| Oceania | 94.0 | 0.3 | 0.3 | 94.6 |
| Canada | 21.1 | 18.5 | 75.0 | 114.6 |
| Rest of Asia | 67.1 | 0.4 | 0.0 | 67.5 |
| Africa | 59.8 | 2.6 | 0.2 | 62.6 |
| Latin America | 10.7 | 0.8 | 116.0 | 127.5 |
| Totals | 2,267.1 | 281.5 | 194.8 | 2,743.4 |

The government in this manner could decrease the demand and increase the supply by approximately 2 1/2 million barrels a day by 2000. But this will require a Congress and administration to set a policy with conviction. The combination of A and B above cut import requirements by 6 million barrels of oil a day. This ought to be your priority.

WHAT ARE THE BASIC DECISIONS?

The answers today are the same as they were in 1955, 1965, 1970, 1975, 1980:

- Reconsider our priorities.
- Turn the energy exploration, production and distribution over to those who understand what they are doing.
- Ease up on the extreme environmental demands. We do want clean air but we can't have essentially zero risk.
- Let the market place determine the price and the choice of fuel to be used where it is used.
- Let the various energy producers decide on whether they should use gas or coal or shale or whatever source.
- Let's go back to a free, competitive system where the various energy companies will compete, and you and I will select the winners of this competition.
- Let's go back to the free enterprise system that once made this country the greatest in the world.

APPENDIX A CARBON DIOXIDE GREENHOUSE EFFECT.

A number of scientists have alarmed the public and members of congress that the increased use of coal will produce large quantities of carbon

dioxide which will form a carbon dioxide blanket around the earth. This blanket then supposedly increases the nightly re-emission of the energy from the earth to the outer space and causes and accumulation of heat between the earth and the carbon dioxide blanket. The theory is then the earth will heat up, the ice caps will melt and the coastal states will be inundated. There is no evidence - merely speculation. We are advised by the National Atmospheric Laboratories that although the carbon dioxide concentration of the atmosphere has increased from 288 ppm to 320 ppm during the past 90 years, the actual measurement of the earth shows that temperature is continuing to decrease (not increase). They also predict that it will continue to decrease for the next 7,000 years.

Termites, on a global scale, produce twice as much carbon dioxide as all the world's smoke stacks.

There are about 1500 pounds of termites for each single person on Earth.

It's embarrassing when we have to advise the anti-coal people that the burning of natural gas, oil and wood also produce carbon dioxide. In fact, there is more carbon dioxide produced at the present time from oil and gas than there is from coal simply because we burn much more oil and gas than we do coal.

You'll be surprised to learn that researchers report that termites, digesting vegetable matter on a global scale, produced twice as much carbon dioxide as all the world's smoke stacks. The insects also add methane gas to the atmosphere. Methane has been found

to be increasing at a rate of 2% per year. This study was conducted by a number of independent researchers. In fact, Dr. James P Greenburg of the National Center for Atmospheric Research in Boulder, Colorado points out that there are about 1500 pounds of termites for each single person on earth.

Also, you will recall that 99% of the carbon dioxide comes from nature and the additional amount that would result from the burning of coal should not have the dramatic results that they predict. Of course, we should observe the conditions and keep close track of the temperature, but we should not shut down the coal, oil, gas and wood industries because of these alarming predictions.

APPENDIX B SO2 Health Effects

In 1975, EPA called sulfur dioxide a "deadly atmospheric pollutant killing thousands of people each year."

The responses to this statement (from the world's outstanding epidemiologists who specialize in sulfur dioxide health effects in mankind) deny that there are any adverse health effects. These include world experts such as Dr. Arend Bouhyus (Chairman of the Cambridge Medical College), Dr. Dr. Arthur Stern, Dr. Merrill Eisenbud, Dr. Arthur stern, Dr. Herbert Shimmel, Dr. Lawrence Hinkle, Dr. A. Battigelli, Dr. Thaddeus J. Murawski, and many others.

Here are a few of their comments.

Dr. Murawski at the New York Academy of Medicine said "There is not convincing medical evidence that SO2 below 10 ppm (the national requirement is 0.02 ppm in the ambient air) has any adverse health effects either acute or chronic. The evidence is even less that there are synergistic effects with pollutants."

Dr. Herbert Shimmel of the Albert Einstein Medical College says, "We do

not find any association between SO2 pollution and mortality."

Dr. Lawrence Hinkle, the great toxicology expert of Cornell University Medical School says, "Man can tolerate exposure to SO2 up to 25 ppm (that's 1250 times the current ambient level of 0.02 ppm) with no ill effects. Even at these high concentrations the nasal filters are so effective that very little SO2 gets into the lungs."

Then in 1979, after hearing the comments of the above experts, EPA called "SO2 a mild respiratory irritant which must be removed." This is quite a bit different than their original claim as shown above "a deadly atmospheric pollutant killing thousands of people each year."

APPENDIX C Acid Rain and Acid Lakes

Acid rain is one of the most abused, overused and dramatized terms since "Three Mile Island." Some people in the northeast claim that acid rain is making the lakes in the northeast acid. In fact, many newspapers and magazines displayed a map showing the acid lakes. The lakes that were shown were the volcanic origin lakes which have been acid for millions of years. These lakes have few or no fish. Generally, the fish are extremely small. Within a relatively few miles of these lakes there are lakes that are not volcanic based and these lakes have fish that are of standard size.

There have been emotional statements made about fish kills in Canada, Norway, and Sweden. These fish kills in Norway and Sweden have been observed nearly every spring for the past hundred years. The forest soil micro-organism activity produces natural acidity, sulfates, and nitrates which flush into these lakes as it rains, or as snow melts. The fish kills are nothing new. The media which have

covered the documentaries on acid rain have done a great disservice to the American and Canadian people by over dramatizing the issue and quite obviously citing some scientists out of context and interjecting their own side comments as prophets of doom.

Many newspapers and magazines displayed a map showing the 'acid rain' lakes in the northeast. The lakes that were shown were the volcanic origin lakes which have been acid for millions of years. These lakes have few or no fish.

The acidity of most of the waters involved are actually the greatest in the spring time of the year. The fish kills occur almost yearly even in the mid-western United States lakes such as in Wisconsin because of the interception of the light by ice and snow on the lakes and green aquatic plants are not able to produce adequate oxygen and then the fish simply suffocate.

Up to this date (March 1, 1983), there has not been a single incidence anywhere in the world documenting an adverse effect of the quality of natural precipitation on natural or cultivated terrestrial vegetation that can withstand scientific scrutiny.

We have all noticed that rainfall makes the grass in our yard grow faster there was not a corresponding decrease in their rain acidity measurement. They concluded the observations might be due to the neutralization of sulfuric acid by particulates in the air.

Since the ratio of sulfates to nitrates is two to one in eastern North America,

sulfur gases have been labelled as the major contributor to rain acidity. The ratio is reversed in the West and in most instances the acidity of rain samples does not differ greatly between eastern and western United States.

The pH of natural, uncontaminated rain is near 5.6. This figure is based on the theoretical pH associated with the equilibrium of carbon dioxide in the atmosphere. Recent work in the Antarctica indicates that precipitation in that pristine environment through analysis of the ice pack, has not varied much from a value of 4.8 over the last 380 years. The "average" pH of rain in the Eastern United States, as well as in Scandinavia, is between 4.4 and 4.5 which is certainly nothing to be alarmed about when one considers the natural nitrogen and sulfur emissions.

In my own back yard in Austin, Texas, I have measured the pH of rain in January of 1981 at an average of 4.4. The normal direction of the wind was from the Northwest. There is no coal burning within 1,000 miles of my house from that direction. Also the California Air Resources Board announced March 4, 1981, that "rain with more acid than vinegar is falling on California and may poison the lakes." CARB Chairwoman Mary Nichols added "We've learned that the Sierra Lakes are especially vulnerable to acid because of the chemistry surrounding them." There are not coal burning electric generating plants upwind of this area.

As a relative point, the pH of sea water is about 8.2 which means that it is not acidic but basic.

There is a great deal of evidence that the acidity of the rainfall may have increased because of the catalytic mufflers on automobiles. The minute particles of material that have passed the catalyst is reported to be more reactive to form the acids.

Of course, we must carry on a

strong research program concerning the acidic content of rain and lakes under and become greener than it would if the grass were merely sprinkled by the water from our house source. The reason is that the green plants require the nitrates, ammonia, sulfates, magnesium, phosphorus, potassium, and other substances. The nitrates and sulfates in rainfall are the ions which are used as the indicators of the major strong acid components in rain. Likens and Bormann, pointed out way back in 1974 that the sulfur content of rain had decreased in New York State but that very carefully measured conditions. There are those who are arguing hysterically that we must regulate now and cut out all burning of sulfur containing fuels because of the measurement of acid rain.

The general public must be told that approximately 65% of the sulfur dioxide, and 99% of the carbon dioxide and the total oxides of nitrogen come from nature. These components make acid rain, too, as well as the lower percentages that come from mankind.

APPENDIX D CAN WE HAVE ZERO POLLUTION?

In the late 1960's, there was a great clamor from many of the environmental extremists for zero pollution. Many nationally noted people asked the public "Do you want zero pollution or emphysema?" The answer is obvious. "Which would you choose?" In April of 1970, 25 million people in the United States took part in what was called "Earth Day." Their efforts were hailed by the communications media as "Advances for Humanity." These people marched on city halls, the state capitols, and the national capitol. President Nixon opened the White House gates to them. Congress was very happy to see 25 million votes all in one pile. The Muskie supporters were elated and sure enough

the Muskie Clean Air Act passed unanimously in the Senate... an impossible bill whose provisions are impossible to bring about. The resulting standards have been set far, far too high. The National Environmental

Many nationally noted people gave the public only two choices: "Do you want zero pollution or emphysema?" The answer is obvious-which would you choose?

Protection Administration was formed with William D. Ruckelshaus as the first Administrator. Ruckelshaus was responsible for setting most of the ridiculously high standards. In setting these senseless standards, the NRPA listened to the cries of the extremists rather than to common sense from the science, engineering and medical sources. Standards were set and rules were made and now are being forced to such a degree that the cost is not only more than 10% of the GNP, but more important, the extra energy needed is in the neighborhood of 4 million barrels of oil equivalent each day. The standards are still not being met because they are not reasonable. In fact, today Ruckelshaus himself admits that they went too far when he recently stated "I question whether the aggravation and expense of achieving absolute conformance to the air quality standards is worth the resultant social benefit. We have no credible, universally accepted process to arrive at a common data base. Nor is there any public understanding of what adverse health effects we are trying to protect against.

Automotive emissions account for as much as one-quarter or as little as one-hundredth of the pollution. Thus, autos may contribute as little as one-millionth of the urban health hazard. We need to re-examine our basic goal - zero health risk air quality - in light of our experience of trying to achieve it. Without a strong effort by EPA to inform, it is unlikely the public will ever understand their choices. The result is an environmental overkill."

Jacques Cousteau was quoted by the Los Angeles Times as saying, "When the exhaust from factory smokestacks can be breathed and the effluents from paper mills can be drunk, only then will we have done a credible job in cleaning up the environment. What we need is zero pollution - nothing less will be acceptable." If one of my freshmen made such a statement, I would have to give him an F since if one has perfect combustion, the discharge from a smokestack would be only carbon dioxide and nitrogen. I'd like to see Jacques Cousteau take three whiffs of the results of perfect combustion. He would never be quoted again.

The reason that you cannot have zero pollution is because of nature itself. Nature puts the following contaminants into the air and has been doing so millions and millions of years before man ever came on the scene: 55% of the particulates, 65% of the sulfur dioxide, 70% of the hydrocarbons (Did you know that the grass in my yard puts out more hydrocarbons each day than my automobile does? I hope you will not tell EPA because they might require that I put catalytic mufflers on my grass blades.), 90% of the ozone, 93% of the carbon monoxide, and 99% of the total oxides of nitrogen and 99% of the carbon dioxide. WE now require catalytic mufflers on automobiles to remove the hydrocarbons, carbon monoxide, and oxides of nitrogen so

that they will not form ozone. We are nuts! Not only did we spend 31 billion dollars the first year on catalytic mufflers and multi-billions since, but we now waste approximately 12-17% of our crude oil making unleaded gasoline in order that we can continue to use these catalytic mufflers.

In January, 1979, while he was still the Attorney General to the U.S.A., Mr. Griffin Bell said, "What happened to the South during the Reconstruction is a subject of continuing interest to political scientists as well as to historians. It was a period when one part of our country was under occupation by the armed forces of the nation. We have no occupation as such today, but the entire nation - not just the South - is presently regulated by a force more pervasive and more powerful than all the Union armies of the Reconstruction. That force is the federal bureaucracy, which by laws and regulations, by orders and printed forms, and by a thousand other unseen methods, subject all of us to some degree of federal scrutiny and control. If the Republic is to remain viable, we must find ways to reduce this government by bureaucracy. When our society is threatened from within and without by such awesome problems as inflation, energy, military aggression, poverty, world famine, and others, this ever-growing bureaucracy is more than a painful nuisance; it is a subscription for societal suicide."

I agree that environmentally we are committing suicide. Sure, we all want clean air, but there is no way we can have zero pollution. We'd better get off that goal soon.

APPENDIX E CAN WE HAVE ZERO RISK?

EPA uses statistics to prove that "even negative experiments do not guarantee absolute safety."

Since when has it been a government function to "guarantee safety" to a 100 percent level? There is no activity of man, including normal basic physiological functions, without risk. As some witty Irishman once said, "The path from the cradle to the grave is so beset with perils, 'tis a wonder any of us live to reach the latter." All that any of us have the right to expect, and all that the vast majority of us ask is that government regulations help keep the risks within reasonable bounds, not that they "guarantee absolute safety" - there is no such animal!

The plain fact is that there is no substance including water and oxygen, which is not harmful to, or which will not produce toxic reaction in, laboratory animals when administered in massive overdoses.

During the past 20 years, we again have dire warnings from many highly educated people. They tell us of the imminent doom from hazards (which are, by any reasonable assessment, really quite small). They have helped convince the average U.S. citizen that all chemicals are dangerous and should be avoided. They proclaim the terrible danger that few people may fall victim to cancer originated by the chlorination of public water supplies, and they cause widespread concern about the safety of the water the public drinks. But they totally ignore the millions of people who died of typhoid and other waterborne diseases before the general adoption of

chlorination. They shudder over the possibility that a few people may be adversely affected by food preservatives. They neglect to point out that there would be greater incidence of disease, and loss of food-stuffs (in a world already concerned about adequate food supply) if the preservatives are not used. Here are other examples of their misguided crusading:

You know the plain fact is that there is no substance including water and oxygen, which is not harmful to, or which will not produce toxic reaction in, laboratory animals or in human beings when administered in massive overdose. Similarly, there is no substance which, even in small amounts, will not cause problems to a few unfortunate individuals who happen to be sensitive or allergic to that particular material. We simply cannot guarantee complete safety by government fiat or by any other means. Of course, we need to curb pollution, but we need to do it rationally, balancing general benefits against general risks.

Shouldn't we rather get a better perspective on relative hazards and devote more of our energies to stopping some of the more genuine menaces to the average citizen, such as our annual highway death toll, the rise of violent crime, increasing rates of rape, murder, etc.? If I should be injured in a collision with a drunken or reckless driver, or if helpless people should be robbed and perhaps murdered, it would be a small consolation to know that EPA has "protected" us from the very slight chance that we might develop cancer from any additive which has been in general and beneficial use for many years with no discernible ill effect on the general public health! Let's get off cloud nine and down to earth about the real risks and chances involved in living in this imperfect world.

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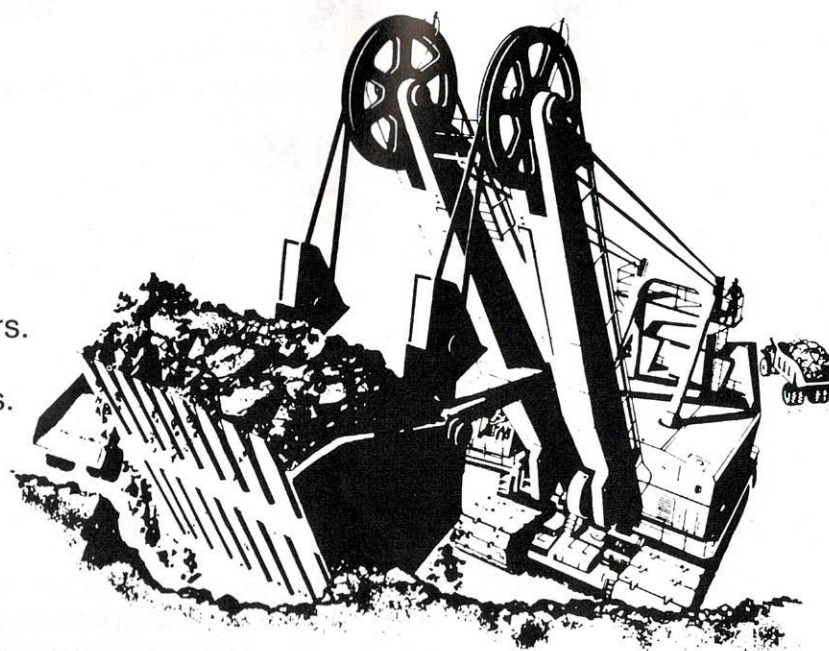
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Observations On The Evolution Of Coal Mine Drainage Control

By Harold L. Lovell
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Presented At
West Virginia Coal Mine Drainage Task Force Symposium
Clarksburg, West Virginia
July 12, 1983

Prior to the sixties, coal mine drainage control related to ecological implications through such approaches as dilution and defined "Clean Streams," or most commonly, was ignored. During the last twenty years, attention to Coal Mine Drainage Control has evolved through a series of approaches. In the mid-sixties, emphasis was placed on treatment of discharges to achieve effluent guidelines which were based upon arbitrary standards. The parameters generally incorporated: pH, acidity, iron, suspended solids, and more recently, manganese, and settleable solids. This approach still remains with us.

Subsequently, amelioration efforts incorporated water diversion, "toxic" strata isolation, etc. This concept was based mainly on isolation and minimization of contact of the reactants. It seems that reclamation and acid formation prevention was the logical extension of amelioration. Here practical approaches centered upon abandoned

mining operations - flooding of deep mines and civil engineering - one time "house cleaning" efforts for surface mining. Subsequently, there were distinct rumblings of identification of acid-producing seams which would not be permitted to be mined, the denial of mining permit applications, and rescinding of existing permits in certain areas. Now "unsuitable for mining" declarations are being issued.

To many of us, research-engineering philosophies of "prevention" centered upon prevention of water quality degradation - not prevention of coal mining. Such concepts, fundamental and innovative, were based upon limited, but improving understanding of the description of complex natural equilibria. Especially, application of the second law of thermodynamics - THE PIPER MUST BE PAID. Understandably, the price may be unacceptable.

This evolution proceeded from laws and regulation at all government levels,

but the rate and direction of the evolution has seemed to be enhanced by limited research efforts and by the industrially-utilized control procedures. Now, as ALL of these control approaches are being utilized, we find the task increasingly, complex, costly, and uncertain. The current efforts seek, by premining planning, to predict the potential FOR, and extent OF, water quality degradation on the basis of overburden characterization, the total hydrologic regime, and the total mining system (including rate) by a specific mining plan. Based upon this costly planning effort, the Federal-State laws requires a regulatory decision to be made whether the mining may proceed as described at that site.

The naturally occurring system is identified: 1). solid phase iron sulfide species at fixed, highly disseminated locations. 2). Water - its quantity, quality, and flow rates into, through, and from the defined volume to be disturbed. 3). Air - specifically the

oxygen component. The fluid properties of oxygen and water make their location almost infinitely motile but highly variable on the near surface of the earth. THE IRON SULFIDE MINERALS ARE STABLE TO CHANGE IN AN ALKALINE, REDUCING ENVIRONMENT. They are unstable in an acid, oxidizing environment thus subject to oxidation and hydrolysis to create different iron-sulfur-oxygen products, most of which are highly water soluble, thus water degrading.

The propensity of iron sulfide instability increases with its: 1). concentration, dissemination, reactivity - especially surface area, etc. 2). time and magnitude of contact with the fluids - oxygen and water. 3). oxidation-reduction and hydronium ion environment. This propensity is HIGHLY VARIABLE WITH LOCATION AND TIME.

Geologists seek to define the parameters controlling the "fixed" locations and characteristics of the iron sulfides in terms of their depositional origins - primarily marine versus fresh water. Geohydrologists seek to identify subsurface water quantity and movement via regime budgets. Hydrologists, using climatological and topographical data, define surface flow and recharge rates. Engineers seek to determine the subsurface concentrations and movements of oxygen at locations related to the sulfides. Chemists - geochemists seek to identify the sulfide reaction mechanisms and rates as a function of reactant concentrations and reaction tendency propensity.

What are the significances of control measure approaches?

1). TREATMENT. A post de facto response. Most reliable, provides

regulatory compliance, can be expensive and continuous. Generally results in some form of water quality degradation although not necessarily precluding any particular water usage. High energy requirements as used in flash distillation, reverse osmosis, etc. thus an operating cost, prohibits total quality restoration. The techniques are available.

2). RECLAMATION. A post de facto response. Partially effective, cost effective. Limited effectiveness may be inadequate to insure maintenance of regulatory standards and "acceptable" premining ecosystems.

3). LIMITED or CESSATION of mining. Denies societies need for available, low cost energy source. Severe economic impacts. How to control which operation may proceed in an equitable manner? There are areas without mining where natural discharges still produce unacceptable quality water equivalent to coal mine drainage.

4). PREVENTION of water quality degradation during mining. Possibly excessive cost. Uncertainty of effectiveness. Needs further research and field testing. Regulatory agencies unwilling to approve procedures without fully demonstrated results.

- a). Segregation of reactive components. Helpful but of limited effectiveness. Can be expensive.
- b). Microbiological control - Lauryl sulfates, etc. Locally effective with acceptable costs. Requires repeated application due to reagent instability. Potential side effects. Uncertainty whether effective response is truly microbiological control or from reaction environment control

due to alkaline character of the reagent.

- c). Control of reaction environment. (Inhibitors) phosphates, ferric iron, etc. Maintenance of alkaline-reducing environment.

Each of the control approaches cited, including combinations thereof, have their merits and limitations. None is totally satisfactory to all concerned. In efforts to predict responses by premining planning procedures, a quote from a recent "Request For Proposal" from the U.S. Bureau of Mines, may be helpful: "--quantitative prediction is impossible, primarily because of complications introduced by the relative kinetics of alkaline overburden dissolution and pyrite oxidation. -- it is relatively simple to predict those sites at which acid drainage shall definitely not be a problem and where it shall definitely be a problem."

Despite the author's concurrence and acceptance of that quote, the implications are not clear. The criteria could be: 1). The total absence of iron sulfides (which would preclude all mining at the site), 2). Some arbitrarily defined iron sulfide concentration and distribution level. 3). The presence of some arbitrarily defined level of alkalinity source. 4). Other.

Such criteria imply consistency with the previous statement: IRON SULFIDE MINERALS ARE STABLE TO CHANGE IN AN ALKALINE, REDUCING ENVIRONMENT. Thus acid formation can be predicted and controlled by limitation of component concentration and/or maintenance of non reactive environment based upon alkaline component availability.

If there is inadequate alkaline mineral components available within the mining site, it is not unreasonable that they can be introduced. The data needed for premining planning to minimize water quality degradation

must center around iron sulfide and alkaline mineral (probably carbonates) concentrations, distributions, and characteristics. The existing approach of "acid-base" accounting² by defined strata lithology - which has evolved from the practices of the coal chemist, the water chemist, and the agronomist is fundamental. Continued attempts to evaluate "rates" of acid-forming reactions under simulated in situ field conditions remain inadequate and probably unreliable in interpretation and application. These efforts date back before Braley, Hall and Emrick³ at the Pennsylvania Department of Health.

OBSERVATIONS ON ACID-FORMATION RATES IN COAL MEASURES

Recently several sets of "weathering" data became available to me for study. The tests were responsibly carried out by experienced analysts utilizing the approach that has evolved from Carruccio's thesis⁴. Although proprietary considerations prevent citing any data, some generalizations regarding these and related results can be noted. Other experiences suggest the trends are not unique to these or any particular sample group. Most of the patterns have previously been observed. Further, these comments are not offered as conclusions resulting from an extensive, designed experiment representing multifarious samples from many locations, which have been proven by statistical evaluation.

1). Many of the samples showed "negative" acidity values. Previously such values have been treated by subtracting them from the cumulative acidity values. This is actually an alkalinity component and should be ADDED to any observed alkalinity measured and thus related to "net" relationships, if desired. This is not

simply a matter of "bookkeeping". The occurrence of such observations indicates a correlation with leachate pH, the values increasing linearly with Ph to about 6.6. Above that level the increase becomes exponential. The "negative" acidities occur only when the sample develops some alkalinity in the leachate. There are several possible explanations for these results - possibly the absorption of atmospheric carbon dioxide (and local sources) during the "aeration" cycle of the test which could enhance the indicated strata dissolution. The phenomena may be an artifact of the test procedure, leading to uncertainty in interpretation. It is noted that the "leachate" is decanted through a filter paper, which, after draining is returned with the test solids to the test chamber. Accordingly, the paper surfaces along with the particle surfaces remain wetted with the dissolved solids from the dissolution step.

.....
An attempt to devise a laboratory acid-formation rate for coal measures was abandoned... by seeking to introduce many of the multifarious parameters in a controllable manner, ... the procedure became impractically complex and tedious.
.....

2). In utilizing these data, the dissolved alkalinity is not cumulatively treated, thus ignoring potential reaction environmental responses. Similarly, the results are considered in terms of mg CaCO₃ per unit weight (grams) of sample tested and does not consider the actual concentration of acidity, alkalinity, iron, etc. in the leachate. Since the

recovery of the leachate varies widely from extraction to extraction step and sample to sample, the leachate concentrations and thus the reaction environment can be expected to vary - and does.

3). Since any solid-fluid phase reaction is dependent upon particle surface area, the variation in particle size distribution of the test sample can be expected (and does) vary with strata hardness, weathered condition, clay content, etc. The type and procedure of comminution is variable among laboratories and individuals. As the weathering tests continue, particle slacking may further enhance surface areas in some strata at rates differently than others. One can expect deviations from these causes which effect laboratory dissolution and reaction rates but do not necessarily relate to in situ field conditions. This concern also relates to alkaline earth carbonate solubility which varies with temperature, water quality, and existing carbon dioxide partial pressure.

4). The existence of a highly variable induction period is observed. The indicated acid-forming rate appears to be most uncertain in strata whose gross neutralization potential is limited (thus responding to the environmental conditions of the test) while strata with almost no neutralization potential but higher iron sulfide contents appears to be initiated at a higher rate which may or many not continue at that rate. This behavior may relate to in situ surface oxidation or surface oxidation between coring and testing. This could create a leachate water residue that could unduly enhance apparent acid-forming rates.

5). Data show that some strata with apparent acid-forming rates upon continued testing may show significant rate reductions (responding as a negative

reaction rate?). These observations shed uncertainty as to the appropriate time frame for the weathering tests, the technique used to establish the data curve slope (manual drafting procedures or by equation fitted by computer) to some defined criterion and whether a correlateable, sustained curve slope has been achieved.

6). Strata developing ALKALINITY equivalent to 0.1 T CaCO₃/1000 T or greater tend to show little propensity for acid formation. This observation is not to suggest a reduction in the more conservative 5 T CaCO₃/1000 T deficiency previously cited by Sobek et al and the West Virginia Task Force. Smaller alkalinity and neutralization potential values always show a propensity to form acid, although considerable variations are indicated. The near lack of alkalinity and neutralization potential can be reasonably certain to produce acidic drainage. The amount and/or rate of acid-formation does not necessarily relate to strata iron sulfide content but the trend is toward such correlation.

7). In strata having low levels of neutralization potential, the tendency to use total sulfur content rather than iron sulfide values as a measure of acid production potential can be very misleading. The somewhat greater expense and time frame for the iron sulfide analyses can not justify the lack of specific data.

8). The several chemical mechanisms which are believed to be involved in acid-formation in coal measures and related strata have drastically different reaction rates under different environmental conditions and between the several reactions. Since the environmental conditions of the weathering test are known to vary, it would be expected that different reactions and rates must result.

OTHER "RATE" MEASUREMENT APPROACHES

An attempt by the author to devise a laboratory acid-formation rate for coal measures was abandoned although the approach was reported⁵. By seeking to introduce as many of the multifarious parameters in a controllable manner as was feasible and hold others constant, (including counts of chemolithotropic bacteria), the procedure became impractically complex and tedious.

.....
Many of the samples showed 'negative' acidity values. This is actually an alkalinity component and should be added to any observed alkalinity measured.
.....

More recently, with Richardson^{6,7} we attempted to simplify the procedure by studying only isolated, relatively pure iron sulfide grains liberated from a single coal (Clarion seam). They were controlled to be of limited particle size range. Hopefully, the reaction was mostly limited to that between the mineral surface and a ferric sulfate lixiviant of constant concentration, under sterile(?) conditions and constant temperature. A constant, reproducible reaction rate was measured for specific samples. Drastic rate differences were measured between samples due to variations in surface area, crystallinity, defect structure, and impurity levels among other parameters. Several other related studies now remain in limbo due to another rate phenomena - my retirement from University activities. Perhaps it will be feasible for them to resume in the future.

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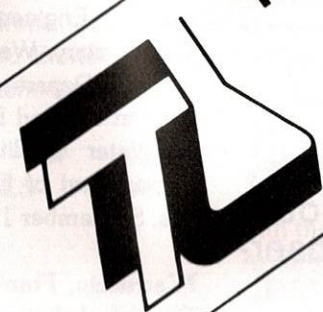
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Leckie Smokeless Coal Co., a 1983 Reclamation Award Winner, loaned its cooperation to the experimental program.

Leckie's reclamation helps fish and wildlife program

By Roger J. Anderson

The Department of Natural Resources, Wildlife Resources Mining Coordination Program has seen its first spring planting season. This program was created to provide an opportunity for the mining operator, under the direction of a fish and wildlife biologist, to establish high quality habitat.

This past spring, several companies put their wildlife revegetation plans into effect. One of the larger sites (650 acres) revegetated under the program was the Leckie Smokeless Coal Company operation in Greenbrier County. Prior to the development of Leckie's wildlife plan, the area was field reviewed by the company, reclamation inspectors, and Wildlife Resources district mining coordination biologists.

The field review consisted of an on-site investigation where several parameters were taken into consideration. (i.e., spoil composition, slope, contour, aspect, compaction, surrounding wildlife population, and the proposed herbaceous ground cover). During the review, the benefits that could be derived from using a wildlife revegetation plan were discussed, and the decision was made to develop such a plan.

Because Leckie's sites were granted permits under the old regulations, a modification to the existing permit was required. The guidelines listed below are followed to modify an existing permit to include a Wildlife Resources fish and wildlife plan.

1. The post-mining land use must already be stated as woodland-

wildlife.

2. The permit holder must obtain the reclamation inspector's approval for a planting plan change.
3. The district mining coordination biologist must develop the plan.
4. The permit holder must write a letter to the Director requesting that the existing surface mine permit and planting plan be modified. Included with the letter are the modifications with necessary signatures.

The Cold Knob area of Greenbrier County where Leckie is mining, has excellent black bear, white-tailed deer, and wild turkey habitat. Also existing are high quality native and stocked trout fisheries. The revegetation plan



Leckie didn't need any help with it's reclamation, but wildlife in the area will benefit from the joint venture.

was designed to assist in the replacement of these species disturbed habitat and prevent watershed degradation.

The wildlife plan was designed to provide food and cover by planting shelter belts of fruiting shrubs. Each shelter belt connects undisturbed wooded areas and 1-acre clump plantings of fruiting shrubs, trees, and coniferous cover species. The concept behind the shelter belt-clump plan is to break-up expansive grasslands with travel lanes which will enable wildlife to use shrubs as a food source, the grass areas for forage and still have the security of the forest or a shrub canopy for cover. Planting schemes of this type maximize use not only by the featured species (i.e., bear, deer, turkey), but by most game and nongame species.

In areas with rough topography such as this, the availability of water can also be a factor limiting wildlife use; sediment channels with acceptable water quality can provide needed water sources. Again, shrubs are planted adjacent to these channels to provide cover to maximize wildlife usage. By leaving these channels intact, added protection is also given to existing native and stocked fisheries by protecting the streams from sediment loading and controlling run-off even after the area has been reclaimed.

Revegetation in this manner also aids in reforestation of the area by leaving open spaces for reseeding by natural seed dispersal from the surrounding area; this aids natural plant succession.

Leckie's plan has been implemented and has a long way to go before a final product can be realized. Constant monitoring by all concerned parties will determine if the planting is a total success.

Planting plan costs are a major concern of the mining industry. Presently the Greenbrier County Soil Conservation District (SCD), in cooperation with Leckie, has been documenting all reclamation costs. Leckie and the SCD expect the wildlife planting plan designed by the mining coordination biologist to save between \$30,000 and \$50,000 in reclamation costs.

The fish and wildlife plan

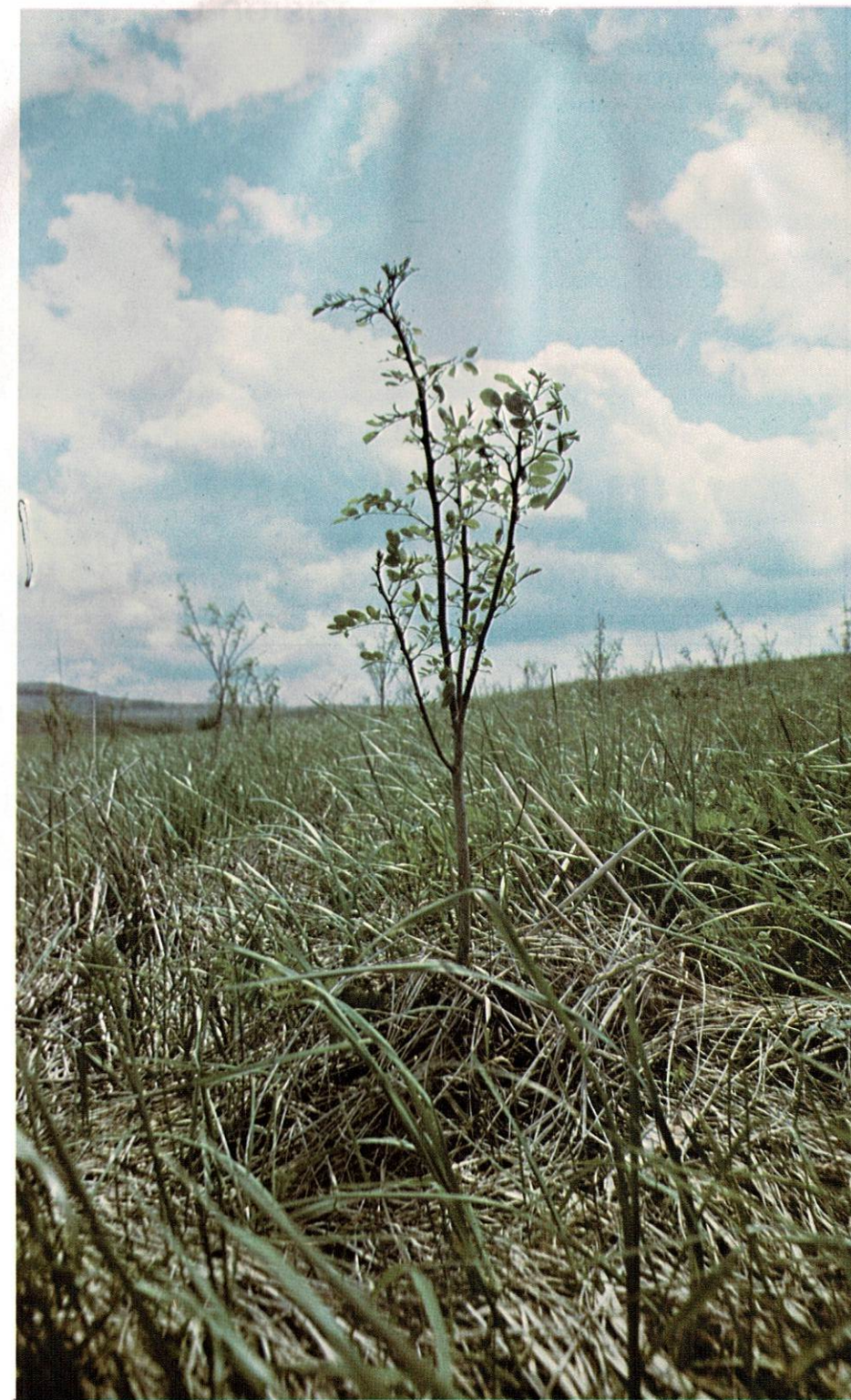
developed for Leckie Smokeless Coal Company is one of the many developed by Wildlife Resources over the past year. In 1982, the mining coordination biologists reviewed surface mine, deep mine, refuse area, and prospecting permits involving 30,119 acres and 79 high quality streams. Fish and wildlife plans were developed on 16,320 acres, and comments were compiled concerning mining impacts on high quality streams in 46 counties. Much of the remaining 13,799 acres reviewed will have plans developed prior to permitting. Based on the October, 1982 West Virginia Geological and Economic Survey data, the 16,320 acres for which plans were developed comprise 15% of the total bonded coal mine acreage in West Virginia.

The Wildlife Resources Division feels that the program has accomplished much over the past year. One of the most significant accomplishments has been to strengthen working relationships between the coal industry and the Reclamation and Wildlife Resources Divisions. The lower reclamation costs of the fish and wildlife post-mining land use provide an important incentive for coal operators to implement such plans.

Added expertise concerning water quality and utilization of different vegetation types assists the reclamation inspectors. The primary benefits derived from the program are the establishment of high quality fish and wildlife habitat and reduction in water quality problems through professional advise.

Both the Wildlife Resources and Reclamation Division stress that the mining coordination biologists have no regulatory power. Their expertise is available to the mining industry through funds provided by West Virginia's sportsmen. The program is funded both by hunting and fishing lisencc and by Pittman Robertson/Dingle-Johnson monies; it does not utilize general revenue funds. The program benefits and enhances the fish, wildlife, and forest resources of West Virginia.

If you want more information concerning the program, you may contact the author at P.O. Box 67, Elkins, WV 26241, telephone number 304-636-1767.



Leckie has its own trees coming up, through the use of Black Locust in the hydroseed mix.



Bolt Mountain in Raleigh County (left) presents a glaring example of unreclaimed surface mined land. In contrast, this surface mined area of Greenbrier County (below and opposite) has been restored to develop new wildlife habitat by Leckie Smokeless Coal Company in a cooperative project with the Wildlife Resources Section.

Creating New Wildlife Habitat On Surface Mined Lands

By CURTIS I. TAYLOR
Photographs by RON SNOW

Surface mining has always been a controversial issue which generates many local and statewide debates. Just the mentioning of surface mining often starts the pot boiling. To some it represents jobs and economic security; others see it only as an environmental catastrophe with irreversible damage to the landscape. Given West Virginia's vast coal reserves, there is little doubt that surface mining has the potential to impact every region of the state. With today's mining methods and machinery, large amounts of land can be transformed, seemingly overnight. Single operations may range from less than 50 acres to 1,000 acres or more. Each year, the West Virginia Division of Energy issues permits to mine approximately 20,000 surface acres. During most years, surface mining operations are in progress on approximately 100,000 acres statewide.

Considering this amount of land and the associated potential for impact, the Division of Natural Resources, Wildlife Resources Section, initiated its Mining Coordination Project in 1982. The concept, radical at the time, allows state wildlife biologists to work cooperatively with state and federal regulatory agencies and the surface mining industry to restore damaged land and water and develop new wildlife habitat on mined lands.

Under this program, existing and proposed mine sites are

individually reviewed for ongoing or potential impact on terrestrial and aquatic habitat. After review, biologists approach company officials and regulatory agencies with proposals to develop wildlife habitat on completed mine sites. When the mining companies are interested, Wildlife Resources Section biologists provide technical, site specific plans for planting grasses, trees, and shrubs beneficial to wildlife. These plans are then incorporated into the company's surface mining permits. Often, the wildlife proposals are more economical than standard reclamation methods.

Revegetation plans developed by wildlife biologists are designed not only to prevent soil erosion and sedimentation of adjacent streams, but to provide new and replacement habitat types for wildlife species affected by mining operations. This is accomplished using four basic techniques: seeding of grasses and clovers, creating shelterbelts, planting "clumps" of trees and shrubs, and developing water sources. Implementation of these techniques varies depending on which wildlife species the plan will feature.

Selecting the best grass and clover species and planting rates is the first and most important step in developing wildlife habitat on reclaimed mine land. Ground cover to control soil erosion is the first objective of any land reclamation effort. Crown vetch, flatpea, and sericea lespedeza do control erosion, but should be excluded from wildlife plantings because they limit growth and survival of shrubs and trees and eliminate any natural reseeding that might occur. These species, especially if planted at high rates, tend to form mats so dense that they restrict the movements of small animals. Some grasses provide little or no benefit to wildlife. Seed mixes developed by the Wildlife Resources Section control erosion while providing maximum benefit to wildlife.

Planting the right mix at the right rate provides valuable wildlife habitat. Forage for deer and rabbits, seeds attractive to dove, quail, and a host of songbirds, and seeds and insects vital



to broods of wild turkey and grouse are produced. Sites in southern counties, revegetated with wildlife in mind, can provide excellent dove hunting opportunities previously unavailable in the mountainous, forested terrain. They also provide turkey and grouse brood range especially valuable because of their scarcity in continuous forest stands.

Shelterbelts, actually row plantings connecting roughly one-acre clumps of trees and shrubs, provide dependable food sources valuable to most wildlife species. Whenever possible, native species such as dogwood, hawthorn, chinquapin, sumac, and crab apple are used. Non-native shrubs like autumn olive and Japanese barberry are normally recommended only in southern counties. These plantings provide much needed cover, but more importantly, create lots of the edge-type habitat critical to grouse, fox, rabbit, quail, deer, and other wildlife found in these habitats. This arrangement of vegetation creates a maze of interconnecting travel lanes that allow wildlife to use a much larger percentage of the reclaimed site. Without this cover, animals would only rarely venture past the forest edge, at least until natural succession provided sufficient protective cover in 15 to 20 years. This component of the wildlife habitat plan is vital in providing additional turkey and grouse brood range and deer fawning sites. Also, it produces small game habitat in a relatively short period of time.

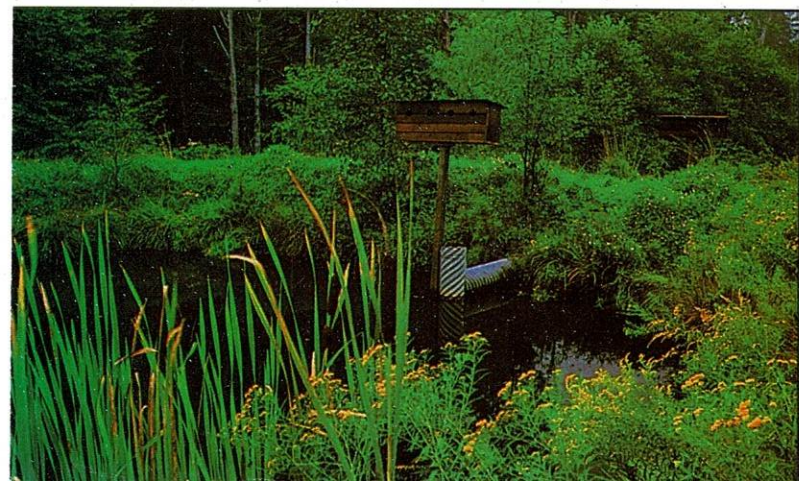
Since the availability of water is often a major limiting factor for many wildlife species, biologists usually recommend that settling ponds and diversion ditches constructed to control sediment during mining be left intact upon completion. Trees and shrubs such as alder, willow, and shrubby dogwood species are planted adjacent to these waters to provide cover and food. This management technique provides excellent waterfowl habitat, especially for wood ducks, green and blue-wing teal, and even Canada geese. In many areas, waterfowl habitat is limited or completely absent. Developing surface mined lands emphasizing this habitat type adds diversity as well as new

hunting opportunities.

More recently, biologists and mining companies have been investigating the possibility of creating shallow water wetland habitat on surface mined lands. This habitat type is very rare in West Virginia, but wherever it occurs, it supports the most diverse and productive ecological systems. Developing these shallow water areas during mining activity can maximize the wildlife benefits of reclaimed mine lands. Properly constructed wetlands offer nesting areas for mallards, black ducks, and geese as well as habitat for mink, muskrat, and beaver. In addition to providing wildlife habitat, wetlands may also improve water quality. Cattail marshes and other wetland systems act as a natural sponge, slowing and storing water runoff while removing the iron, manganese, and acid that impact water quality. This technique offers benefits far downstream of the actual mining activity.

Since the Mining Coordination Program began in 1982, biologists with the Wildlife Resources Section have developed wildlife habitat plans for approximately 75,000 acres of surface mined land across the state. As mining companies implement these long-term plans, significant amounts of new and diverse habitat will be added for use by the state's wildlife. The technical assistance provided to the mining industry by Wildlife Resources biologists is financed by the state's hunters and anglers through license fees and through the federal Fish and Wildlife Restoration Acts. Incorporating wildlife habitat benefits during reclamation of surface mined land is a major step toward protecting and developing the rich wildlife heritage of West Virginia.

Curtis Taylor is the Wildlife Resources Mining Coordination Biologist in District IV, headquartered in MacArthur.



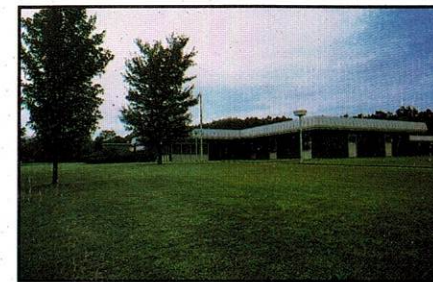


source. Wildlife management had never been able to compete with the perennial giants such as education, transportation, and social services, so the P-R Act required states to establish a dedicated fund to receive all hunting license revenues and the new federal money generated by the excise tax on firearms and ammunition. From this dedicated funding each agency could plan, develop, and operate its programs without the constant fear of revenue loss to other portions of government.

These changes were the turning point for wildlife conservation in this nation. It determined how West Virginia and all other states would structure their wildlife management programs. The P-R Act was so successful that a similar Act for fish management, the Federal Aid in Sport Fish Restoration Act, commonly known as the Dingell-Johnson or D-J Act was passed in 1951. Both Acts net approximately \$326 million annually and apportion this money to state fish and wildlife agencies for the continued management of wildlife resources. West Virginia's annual share is currently \$3.5 million.

These cornerstones, the P-R and D-J acts, really are the basis for a solid fish and wildlife program. They embody the professional spirit and insure the stable funding which make today's wildlife management programs possible. That brings us back to the questions first posed at the beginning of this article. What do we do and where do we get the funds to operate? The Wildlife Resources Section has its responsibilities set forth in Chapter 20 of the Code of West Virginia. They are broad and impart the stewardship of all wildlife resources to the Wildlife Resources and Law Enforcement sections of the Division of Natural Resources. Maintaining these responsibilities entails a very comprehensive program and approximately a \$12 million budget.

A solid wildlife resource management effort includes law enforcement, communication and education with the public, habitat protection for the resources, availability of the resource to the state's citizens, and research to assist in the discovery of new management techniques. Combine these ingredients with a professional staff and stable funding and use a decision-making process which considers the economic and social consequences of resource management, and



Ron Snow

The DNR Operations Center in Elkins houses many of the offices and research facilities of the Wildlife Resources Section.

you have all the parts to maintain a successful wildlife resource program.

The West Virginia Division of Natural Resources program addresses all of these. The Wildlife Resources Section programs range from environmental review, nongame, endangered species, warmwater and coldwater fisheries, big and small game, to land acquisition and public access to lands and waters. The most widely known of these programs are the hunting and fishing portions and the nongame program. Our efforts in environmental review are quite extensive but rarely in the public eye. Likewise, the section's endeavors for better stream and lake access and more public lands is often taken for granted. This is a major effort by the Wildlife Resources Section with over \$3.2 million obligated for land acquisition during the last 18 months. This enabled the section to purchase over 13,500 acres for new wildlife management areas for the enjoyment of all citizens.

The section's staff is 186 strong, covers the entire state and stays active in state, regional, national, and international affairs concerning fish and wildlife. Association with professionals from other states, agencies, and counties allows our staff a wider perspective on problem solving and innovative ideas and is important to our continuing success.

The funding of the Wildlife Resources Section comes from four general areas: license revenues, all permits for hunting, trapping, and fishing; federal aid, the P-R and D-J Acts previously mentioned; donations such as those made to the nongame program and the Wildlife Endowment Fund; and miscellaneous receipts, revenues from the sale of calendars, oil and gas receipts, admission fees,

etc. Fish and wildlife agencies generally operate under the user pay concept, that is, those who use the resource pay for the management, research, and public access to the resource, even though wildlife in the United States is a public resource.

In West Virginia, the Wildlife Resources Section is entirely dependent on this system. No tax monies are used to pay for the program. While this system is sound, it does present unusual situations. The most worrisome to administrators and field biologists alike, is that revenues for nonhunted species are never enough, although the public demand grows each year for information, management, and research on everything from crayfish to cardinals. The mechanisms are in place for funding work on these species: an income tax check-off and donations. However, like many other states West Virginia must find better ways to enable the nonhunting public to support these types of programs.

Last, but not least, to maintain a good wildlife resource program, the Wildlife Resources Section must maintain good communications with the diverse wildlife interests in the state. This is always a challenge, because some view the various types of programs within our operations as competitive. They are not. To the contrary, they are complementary. An agency never does anything for just one species. Everything accomplished provides habitat for many species, opportunities for many diverse public interests, and knowledge about the continuing wonder of our forests and fields and their inhabitants.

As I asked near the beginning of this article, why does this type of article have everything to do with this edition and everything the Wildlife Resources program in West Virginia accomplishes? Simple, it portrays the foundation by which we are funded and the important prerequisites any agency must have to maintain a program which answers the wildlife resources needs. It gives the ingredients by which we are able to engage in long-term wildlife resource management—and that is what it is all about.

Gordon Robertson is the Deputy Chief of the Wildlife Resources Section for the Division of Natural Resources.

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Coal Calendar

SEPTEMBER

- 3 WVU Football Saturday Seminar, “Business Applications of the Microcomputer,” Ramada Inn, Morgantown, contact Robert L. Moore, Conference Office, Room 67, Towers, WVU, Morgantown, 26506, (304) 293-4013.
- 7-8 49th Annual Governor's Safety and Health Conference and Exposition, Civic Center Coliseum, Charleston, contact West Virginia Safety Council, Room 217, 1550 Fourth Ave., Charleston, 25312, (304) 343-3171.
- 10 WVU Football Saturday Seminar, “Creative Thinking, Problem-Solving, Decision-Making,” Sheraton Lakeview, Morgantown, contact Robert L. Moore, Conference Office, Room 57 Towers, WVU, Morgantown, 26506, (304) 293-4013.
- 13-14 7th Annual Midwest Reclamation Tour, Carbondale, IL, contact Kathy Lindauer, Coal Extraction and Utilization Resources Center, Southern Illinois University, Carbondale, IL 62901, (618) 536-5521.
- 11-14 American Mining Congress--Mining Convention '83, Hilton Hotel, San Francisco, CA, contact AMC Suite 300, 1920 N. St. NW, Washington, DC, 20036, (202) 861-2800.
- 14-16 1983 Bluefield Coal Show, Brushfork Armory-Civic Center, Bluefield, WV.
- 19-20 Sediment Pond Design Workshop, UK Agricultural DataCenter, Lexington, KY, contact Nancy Hopper, P.O. Box 13015, Iron Works Pike, Lexington, KY, 40512, (606) 252-5535.
- 18-20 National Coal Association seminar, “Coal Demand and Transportation Policies,” Royal Orleans Hotel, New Orleans, LA, contact Kathy Eichel, NCA, 1130 17th St., NW, Washington, DC 20036, (202) 463-2629.
- 22-23 “Pooling, Unitization and Spacing in the Appalachian Basin,” Marriott Hotel, Charleston, WV, contact Eastern Mineral Law Foundation, WVU Law Center, P.O. Box 6130, Morgantown, 26506, (304) 293-2470.
- 26-27 “Coal Marketing Days: Is the Turnaround at Hand?” William Penn Hotel, Pittsburgh, PA, contact Coal Outlook, 1401, Wilson Blvd., Arlington, VA 22209.

28-30 68th Annual Meeting of the West Virginia Manufacturers Association, Greenbrier Hotel, White Sulphur Springs, contact WVMA, 1313 Charleston National Plaza, Charleston, WV 25301, (304) 342-2123.

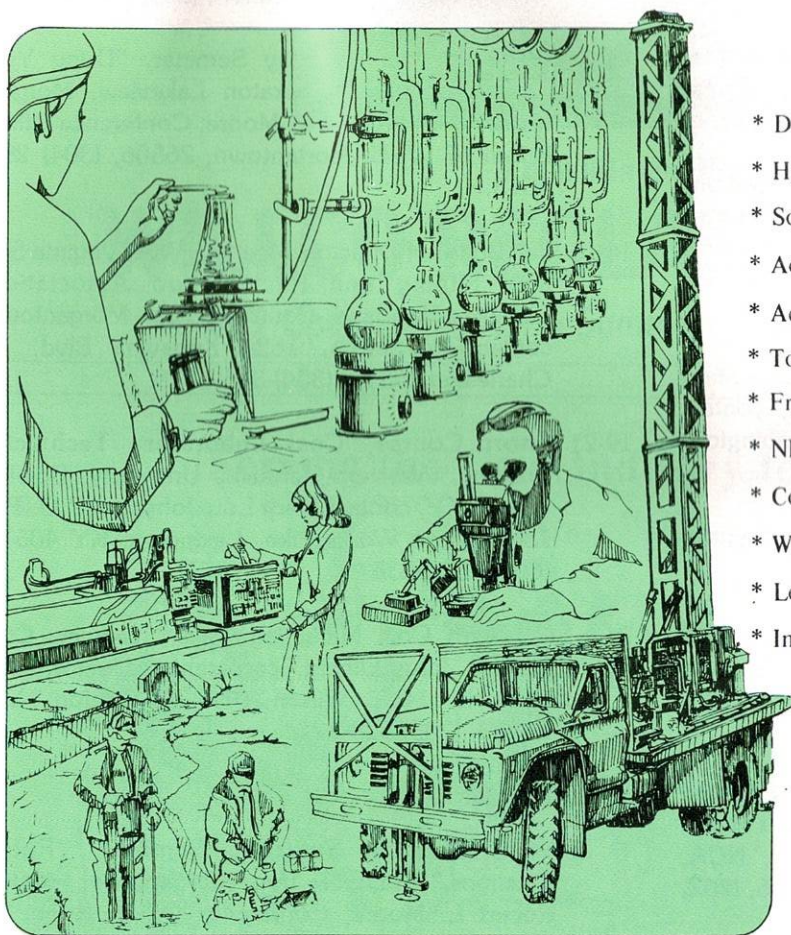
OCTOBER

- 1 WVU Football Saturday Seminar, “Business Communications,” Ramada Inn, Morgantown, Contact Robert L. Moore, Conference Office, Room 67 Towers, WVU, Morgantown, 26506, (304) 293-4012.
- 11-12 Sixth Annual Mining Institute, University of Alabama, Birmingham, AL, contact UA Continuing Engineering Education, (205) 348-6222.
- 15 WVU Football Saturday Seminar, “Using Your Time Effectively,” Sheraton Lakeview, Morgantown, contact Robert L. Moore, Conference Office, Room 67 WVU, Morgantown, 26506, (304) 293-4013.
- 14-15 Fall Board of Directors Meeting, West Virginia Surface Mining and Reclamation Association, Lakeview Inn and Country Club, Morgantown, contact WVSMRA, 1624 Kanawha Blvd. E., Charleston 25311, (304) 346-5318.
- 19-21 Short Course, Coal Laboratory Technician Training, Western Kentucky University, Bowling Green, KY, contact Mary Lou Johnson, P.O. Box 13015, Iron Works Pike, Lexington, KY 40512, (606) 252-5535.
- 31-N1 “Western Coal Marketing Days,” Denver, CO., contact John Ekberg, conference director, Coal Outlook, 1401 Wilson Blvd., Arlington, VA, 22209, (703) 528-1244.

NOVEMBER

- 5 WVU Football Saturday Seminar, “Public Relations,” Ramada Inn, Morgantown, contact Robert L. Moore, Conference Office, Room 67 Towers, WVU, Morgantown, 26506, (304) 293-4013.
- 12 WVU Football Saturday Seminar, “Advertising,” Sheraton Lakeview, Morgantown, contact Robert L. Moore, Conference Office, Room 67 Towers, WVU, Morgantown, 26506, (304) 293-4013.
- 13-16 Western Oil Shale Symposium, Lexington, KY, contact Connie Blakemore, OISTL, P.O. Box 13015, Lexington, KY 40512, (606) 252-5535.

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