the Highlands Voice

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Quakes Seen Possible If New River Dam Is Built

Winston-Salem, N.C. (AP) - The possibility that moderate earthquakes could be touched off by the proposed New River Dam merits close study, three geologists said in interviews recently.

"There is some possibility for earthquake activity from a large reservior in the New River area," said Douglas W. Rankin of Washington, one of two U.S. Geological Survey geologists who studied the proposed dam sites near Independence and Galax in Virginia.

Rankin said studies showed that a "major thrust fault" cuts diagonally across the area, just across the border from the North Carolina counties of Alleghany and Ashe.

"The faults along the New River apparently haven't shifted in the past couple of hundred million years," he said. "Most earthquakes from reservoir loading have occured in the western part of the country where faults are more unstable."

Nevertheless, he said, the possibility should be studied carefully before construction is allowed to begin on the hydroelectric project proposed by the Appalachian Power Co. of Roanoke, Va.

He said recent earth tremors around two South Carolina reservoirs, on land geologically similar to the New River area, show how unpredictable earthquakes can be.

James Devine, deputy for engineering for the U.S. Office of Earthquake Studies, said the link between earthquakes and reservoirs in the Southeastern United States are a "fairly new and little understood phenomenon."

At the University of North Carolina, geology professor Dr. David Steward said there is a long history of earthquakes around the world triggered by manmade reservoirs.

"The classic examples are in unstable areas or from dams built very high, say from 500 to 700 feet," he said. "But there is no doubt in my mind that the relationships of the dams on the New River to the geological setting should be thoroughly checked out. In fact, it would be downright irresponsible not to check it out."

The three geologists commented in telephone interviews with the Winston-Salem Sentinel.

A 520-page environmental impact statement by the Federal Power Commission on the two proposed hydroelectric dam projects has little to say about earthquakes and faults.

The impact statement said minor earthquakes have been recorded within 50 miles of the area but added: "No geological hazards are known in the area. The site is in an area of low seismic activity."

Ronald Corso, deputy chief of the commission's division of licensed projects, said the possibility of earthquakes from the proposed reservoirs is "unlikely."

"We always put in geological data, but the amount of data is dictated by the problem," Corso said.

WV-CAG Urges Confirmation Of New Era Denial

The West Virginia-Citizen Action Group (WV-CAG), a Charleston-based environmental and consumer group, has called for the State Water Resources Board to uphold the Division of Water Resources' denial of New Era Resources' water pollution control permit for its coal preparation facilities on Shavers Fork.

WV-CAG's researcher Ed Light on a recent trip to the Cheat Bridge plant found that the company's "closed circuit" facility was leaking black water from one of its ponds into Shavers Fork.

Light noted that the discharge appeared to be polluting the stream. A subsequent analysis of the water discharge by the Division of Water Resources confirmed this finding.

A closed-circuit coal preparation plant such as New Era's should not have a discharge if it were operating properly.

In sworn testimony at a hearing before the Water Resources Board, company representatives testified that no discharge would occur unless an "unforeseen disaster" such as an earthquake should take place. Although no earthquakes have been reported in the Cheat Bridge area, the polluted water was found entering Shavers Fork from New Era's pond.

"We are shocked by this finding, and we hope the Water Resources Board will no longer fall for New Era's shenanigans," Light said.

The Board hearing held in February, for which the decision will soon be handed down, was the result of two appeals made by New Era. The Kentucky-based firm appealed two orders made by the Chief of the Division of Water Resources. The first was a cease and desist order, and the second a denial of their water pollution control permit to construct and operate the coal washery.

The appeal board overturned the first order and allowed the company to operate on a "test basis". The duration of the "test" was not specified.

The U.S. Fish and Wildlife Service of the Department of Interior on April 15 requested EPA Regional Administrator Daniel Snyder to issue a "stop work order" to New Era and other coal operations on Upper Shavers Fork. The request was made because of a study being conducted in that area.

Light urged EPA to act quickly on Interior's request and stressed the urgent need for the Water Resources Board to uphold the permit denial in order to save Shavers Fork from further deterioration.

HIGHLAND VOICE DEADLINE

All material submitted for publication in The Highlands Voice must be in the Editor's hands no later than the 15th of the month for that month's issue. No manuscripts, photographs or announcements can be accepted for a particular month's edition after the 15th of that month.

Submit all material to:
Ron Hardway, Editor
The Highlands Voice
Webster Springs, WV 26288

RUFFED GROUSE NEED STRIPPING

By the Ruffed Grouse Society of North America,
David C. Batson,II, National Executive Director

Gentlemen:

The Ruffed Grouse Society of North America, an international association of sportsmen, conservationists and concerned citizens for wildlife, is now headquartered nationally in Kingwood, West Virginia. This organization is dedicated to the propagation of ruffed grouse, the American woodcock and all wildlife. Our utmost concern is the future of wildlife in America today.

The Ruffed Grouse Society of North America strongly opposes Senate Bill No. 10, and the constant parade of over-restrictive and unrealistic measures, which every year come before this Senate on surface mining. West Virginia leads the nation in tough surface mine regulations; and well it should, for we are wealthy in these resources. However, every year our nation's needs increase, and yet - our coal production decreases. We say it's time to do as we have done - work with the industry (coal) and not against them. Certainly, there are environmental problems created with land disturbances, such as when surface mining takes place. We recognize this fact; and we are deeply concerned about it; however, our nation desperately needs the energy resource; West Virginia needs the economic benefit of coal; and wildlife needs the reclamation. Senators, The Ruffed Grouse Society of North America does not support the premise that surface mining is detrimental to our wildlife population.

For years, sportsmen have noticed an abundance of wildlife on orphaned and reclaimed surface mined sites. Experienced sportsmen hunt primarily on these sites. Why?because **the majority of our wildlife are dependent upon periodic disturbance in their habitat, which sets back forest succession.**

Heretofore, we have depended upon wild fire, glacial movement, or other natural disasters to accomplish this interruption in natural succession. Now, with man's ability to control fire, the lack of glacial movement, and the increasing growth of civilization, man is forced to manage nature. He does this with clear cutting, controlled fire, or in some cases, the abandonment of small farms. These methods, however, are slow, and in many cases, costly or inconsistent with human populations.

On these orphaned and reclaimed sites, one finds herbaceous plants, young trees, a multitude of shrubs, grain crops, grasses, and water, that are the primary food resource for a whole host of wildlife species. Unfortunately, these areas, in the past, have not been aesthetically appealing. Present reclamation procedures, however, have solved most of these aesthetic problems.

Surface mining could very well be the answer to our dwindling wildlife habitat problems. Literally hundreds of thousands of acres, annually, are affected by surface mining. By developing better, and expanding our current techniques for woodland and wildlife reclamation, we are offered a tremendous opportunity to rehabilitate and improve thousands of acres annually for our renewable resources: wildlife; and this can and does benefit both game and non-game species. **In many cases, areas can be reclaimed to a better state for wildlife than existed prior to the mining operatin.**

The Ruffed Grouse Society of North America is not a proponent of surface mining. We support, however, sound ecological reclamation. We cannot, though, condone the abolition of surface mining because of the previously mentioned reasons: energy, economics and wildlife. **Also, we would be less than honest if we said that our Departments of Natural Resources were capable of improving sufficient habitat annually to take care of our wildlife.** To affect the necessary acreage, it would take departments ten times the current size of our existing units.

Now that the clear cutting on federally-owned forest lands has been curtailed, it is even more important that we develop a means to create these forest disturbances. We are a nation of extremes. The abolishment of clear cutting on federally-owned forests is a prime example of this. It signed the death warrants of literally thousands of species of wildlife that are dependent upon early growth successional stages of forest lands. If we abolish surface mining, we would be signing even more death warrants. **Let's get off this hocus-pocus environmental bandwagon and start using the advice of our trained biologists, foresters, soils engineers and professional conservationists.**

. With the cooperation of the West Virginia Department of Natural Resources, the West Virginia Surface Mining and Reclamation Association and our organization – The Ruffed Grouse Society – we are beginning a program to develop more and better ways to reclaim surface mined lands. Based on data we already have, knowledge we've gained concerning soils, etc. and ideas we have long wanted to try, this project will explore, in depth, and develop better reclamation techniques. The knowledge gained here in West Virginia will not only benefit West Virginia's wildlife, but utilized elsewhere, could have far-reaching effects on this problem in other states. It is interesting that the funds to implement this project were generated from within the coal industry, and, during a depressed coal market, when money is tight. This demonstrates to us that this industry is concerned no longer with just coal extraction and money, but in the environment.

Many could point their finger and saythe Ruffed Grouse Society is supported by the coal industry. We *categorically* deny this before it is mentioned. We set a precedent and went to the industry – it didn't come to us. The money they have donated goes entirely to this project, not to the Ruffed Grouse Society, and I am here on society expenses, not coal money.

BOR Surveying Streams in the East

The Federal Bureau of Outdoor Recreation is currently engaged in area-wide surveys to identify potential additions to the National Wild and Scenic Rivers System. The purpose of this study is to provide the Department of the Interior with a list of rivers which have the potential to be considered as future candidates to the National System.

The Office is involved with the survey effort for the thirteen northeastern states from Maine through Virginia. The survey is based upon Fenneman's "Physiographic Divisions of the United States". Each physiographic division is divided into provinces, and each province is further divided into sections. Within the Northeast, for example, there are nine provinces and twenty sections.

At this time this Office has completed evaluation of two provinces, namely the Adirondack and the St. Lawrence Valley provinces. We are currently working on the portions of the Ridge and Valley within the states of Virginia, West Virginia, Maryland and Pennsylvania. Briefly, the major steps in the study process are:

1. An inventory of streams and rivers within each physiographic province.
2. The elimination from the list through preliminary screening of those rivers or river segments which do not qualify for further consideration as potential additions to the National Wild and Scenic Rivers system.
3. The collection of data about the current conditions of the candidate streams.

To accomplish this survey and evaluation, a vast amount of specific river data must be collected. Although the responsibility for the data collection lies with the Bureau of Outdoor Recreation, we will need the inputs of state and local agencies, and outing/canoe clubs.

Stream evaluations by individuals may be entered on a form prepared by the BOR for this purpose. Copies of the evaluation forms and instructions for completing the forms will be sent on request. Contact the BOR at the following address:

United States Department of the Interior
Bureau of Outdoor Recreation
Northeast Regional Office
Federal Building - Room 9310
600 Arch Street
Philadelphia, PA 19106

In requesting forms one should mention that one wants copies of the River Resource Evaluation Form.

WV-CAG Releases Legislative Scorecard

The West Virginia-Citizen Action Group (WV-CAG) has released its second annual "Legislative Scorecard".

According to WV-CAG staff member David Grubb, "the scorecard represents an attempt to evaluate the voting performance of West Virginia's legislators on issues of broad public interest - including utility rate reform, environmental quality, consumer protection, human rights and governmental reform."

The scorecard ranked legislators in both the Senate and House of Delegates on twelve floor votes considered "important" by the statewide citizen's group. The specific legislation included in the scorecard was determined by the Staff and Board of Directors of WV-CAG, in consultation with numerous citizens and citizen groups throughout the state.

Each legislator was assigned a percentage figure (or score) based on the total "right" votes divided by the total number of votes in the scorecard. "As a consequence," Grubb added, "a legislator scoring a 100% voted correctly on all twelve pieces of legislation, a legislator scoring 50% voted correctly on just six of the issues, and so forth." Grubb stressed that "this year's scorecard also treats absences as "wrong" votes on the particular legislation."

In the Senate, two legislators received perfect 100% scores: Si Galperin (D.-Kanawha) and Warren McGraw (D.-Wyoming). In addition, six Senators received near-perfect marks of 92%. Russell Beall (D.-Wood), Pat Hamilton (D.-Fayette), Moreland (D.-Monongalia), William Oates (D.-Hampshire), Mario Palumbo (D.-Kanawha) and Roland Saville (D.-Kanawha). The lowest score in the Senate was recorded by J. Robert Rogers (D.-Boone).

In the House of Delegates, two legislators received perfect 100% ratings: John "Si" Boettner (D.-Kanawha) and Larry Sonis (D.-Kanawha). A total of three Delegates received near-perfect scores of 92%: Darrell E. Holmes (D.-Kanawha), James McNeely (D.-Mercer, Monroe and Summers) and M.E. Mowery (D.-Wood). The lowest score in the House was given to Delegate Albert C. Esposito (R.-Cabell).

The average score was a 75% in the Senate and a 57% in the House of Delegates.

Grubb emphasized that "legislators must begin to feel accountable to the people of West Virginia. My publishing and distributing their voting records on key pieces of public interest legislation, we hope to encourage a more educated electorate and a more responsive state legislature."

Grubb cautioned that "even though voting on a key issue is the most fundamental responsibility of a legislator, it is important to remember that it is not the sole performance indicator. Other factors, such as committee votes, subcommittee work, services to constituents, sponsorship of bills and the assistance given to citizen group lobbyists, are also relevant in any evaluation."

"We do feel, however, that the voting index we have prepared is a good, rough measure of the attitudes and performance of West Virginia's lawmakers from our perspective."

For a copy of the complete scoreboard, please send 25 cents in a self-addressed envelope to: West Virginia-Citizen Action Group; 1324 Virginia Street, East; Charleston, WV 25301.

SENATE

A. Oil and Gas Reclamation. SB 157 is one of the few pieces of environmental legislation to be passed this year. It was designed to require a bond to ensure reclamation of all oil and gas well sites. This vote is on passage, carried 30-0-4. Yea votes right (+).

B. Water Pollution. SB 183 would require a permit from the Department of Natural Resources for any coal preparation plant pertaining to Water Pollution Control Act. This vote is on final passage of the bill, carried 29-1-4. Yea votes right (+).

C. Utility Tax. SB 572 was designed to increase the B & O Tax on all out-of-state power sales and reduce the tax to in-state residential and industrial consumers. This vote is on Senator Hinkle's motion to return the bill to the Committee on Finance and thereby "kill" it for this session. On passage of the amendment, defeated 10-21-3. Nay votes right (+).

D. Utility Fuel Adjustment Clause. This vote is on an amendment to HB 1643 by Senator Susman to strengthen the prohibition of the fuel Adjustment Clause. On passage of the amendment, failed 12-19-3. Yea votes right (+).

	A	B	C	D
Beall	+	+	+	A
Benson	+	+	+	-
Brotherton	+	+	+	-
Darby	A	A	A	+
Davis	+	+	A	-
Deem	+	+	-	A
Fanning	+	+	+	-
Gainer	+	+	+	-
Galperin	+	+	+	+
Gilligan	+	A	-	A
Hamilton	+	+	+	+
Harmon	+	A	-	-
Hatfield	+	+	+	+
Hellems	A	+	+	-
Herndon	+	+	-	-
Hinkle	+	+	-	-
Huffman	+	+	-	-
Jones	A	+	+	+
Kusic	+	A	+	+
McGraw	+	+	+	+
Moreland	+	+	+	+
Neeley	+	+	+	+
Nelson	+	+	+	+
Oates	+	+	+	+
Palumbo	+	+	+	-
Rogers	A	-	A	-
Rogerson	+	+	-	-
Savilla	+	+	+	-
Sharpe	+	+	-	-
Steptoe	+	+	+	-
Susman	+	+	-	+
Ward	+	+	+	-
Williams	+	+	-	-
Willis	+	+	+	-

HOUSE OF DELEGATES

A. Public Hearing on B & O Coal Tax Usage. This vote is on an amendment to HB 1088 by Delegate Sonis and McNeely to require County Commissions to conduct public hearings concerning the use of revenues raised from the additional B & O Tax on coal. The amendment was defeated, 25-69-6. Yea votes right (+).

B. Lifeline Utility Rates. This vote is on an amendment by Delegates Sonis and Boettner to HB 1643 which would establish a low, fixed rate for basic electricity and gas requirements. This amendment would have resulted in substantial savings to residential utility consumers. The amendment failed, 38-59-3. Yea votes right (+).

C. Peak Load Pricing of Utility Rates. This vote is on an amendment to HB 1643 by Delegates Sattes and Tompkins to remove the peakload pricing section from the bill. The peak-load pricing concept is designed to encourage energy conservation by providing a higher price to industrial customers for energy used during periods of highest demand. The "killing" amendment carried, 78-18-4. Nay votes right (+).

D. Utility Reform. This vote is on HB 1643, a bill which would establish an Office of Public Counsel to represent residential consumers, clarify the Fuel Adjustment section of the present law and establish procedures for the termination of service designed to protect consumers. The bill passed, 89-7-4. Yea votes right (+).

E. Oil and Gas reclamation. SB 157 is one of the few pieces of environmental legislation to be passed this year. It was designed to require a bond to ensure reclamation of all oil and gas well sites. This vote is on final passage, carried 96-0-4. Yea votes right (+).

	A	B	C	D	E
Albright	-	+	+	+	+
Allen	-	-	-	+	+
Altmeyer	A	-	-	+	+
Arnold	-	-	-	+	A
Artrip	-	-	-	+	+
Ballouz	-	-	-	+	+
Bell	+	-	-	+	+
Bird	-	+	+	+	+
Boettner	+	+	+	+	+
Brenda	-	-	-	+	+
Brown	-	+	+	+	+
Bryan	-	-	-	+	+
Bumgarner	+	+	-	+	+
Burke	-	-	-	+	+
Burleson	+	+	+	+	+
Canfield	+	+	-	+	+
Caudle	-	+	+	+	+
Chafin	-	+	-	+	+
Childers	-	+	-	+	+
Christian	+	-	-	+	+
Colombo	-	-	-	+	+
Copeland	+	-	-	+	+
Crabtree	-	+	+	+	+
Dalton	-	-	-	+	+
Damron, C.	+	+	-	+	+
Damron, I.	-	+	-	+	+
Dinsmore	-	-	+	+	+
Donely	+	-	-	+	+
Erdie	-	-	-	+	+
Esposito	-	A	A	A	A
Fantasia	-	-	-	+	+
Farley	-	-	+	+	+
Fitzgerald	-	-	-	+	+
Gilliam	-	+	+	+	+
Given	-	-	-	+	+
Goldstron	-	-	-	+	+
Goodwin	-	+	-	+	+
Gvoyich	+	+	+	+	+
Hagedorn	-	-	A	+	+
Harman	-	-	-	+	+
Holliday	-	+	-	+	+
Holmes	+	+	-	+	+
Johnson	-	-	-	-	+
Jones	-	+	-	+	+
Kincaid	+	-	-	+	+
Kopp	-	-	-	+	+
Lewis	+	+	-	+	+
Kohr	-	-	-	+	+
Long	-	-	-	+	+
Mathis	-	-	-	+	+
McCuskey	-	+	+	+	+
McLaughlin	A	+	-	-	+
McManus	-	-	-	+	+
McNeely	+	+	+	+	+
Miller	-	+	-	-	+
Milleson	-	-	-	+	+
Moats	-	-	-	+	+
Moler	A	-	-	+	A
Moore	-	-	-	+	+
Morasco	-	-	-	+	+
Mowery	-	+	+	+	+
Moyle	-	A	A	A	+
Neal	-	-	-	+	+
Otte	-	-	-	+	A
Payne	+	-	-	+	+
Peak	-	-	-	+	+
Pitsenberger	A	-	+	+	+
Polan	-	-	-	+	+
Prestera	-	A	A	A	+
Rollins	-	+	-	+	+
Sattes	+	+	-	+	+
Scott	-	-	-	+	+
See	-	-	-	-	+
Seibert	-	-	-	-	+
Shaffer	-	-	-	+	+
Shepherd	-	+	-	+	+
Shiflet	+	-	-	+	+
Shingleton	-	-	-	+	+
Shuman	+	+	-	+	+
Smith	A	-	-	+	+
Somerville	-	-	+	+	+
Sonis	+	+	+	+	+
Spears	+	-	-	+	+
Stacy	+	+	-	+	+
Swann	-	-	-	+	+
Teets	A	-	-	+	+
Terry	-	-	-	-	+
Tomblin	-	-	+	+	+
Tompkins	+	-	-	+	+
Toney	-	+	-	+	+
Tonkovich	-	+	-	+	+
Tucker	-	+	+	+	+
Underwood	-	+	-	+	+
Wanstreet	-	-	-	+	+
Wehrle	+	-	-	+	+
Wells	+	+	-	A	+
Wiedebusch	-	+	-	+	+
Withrow	+	+	-	+	+
Worden	-	-	+	+	+
Wright	-	-	-	+	+

TIMES CHANGE. Nowhere is one more aware of the frailty of human nature than in the arena of politics, particularly on a state and local level. Although the West Virginia Highlands Conservancy tries to remain above political dealings, the end result is something we all must live with.

THE HIGHLANDS VOICE has had this photograph (left) on file for several months, but we hesitated to run it before the May Primary. Our reasons for not running the photo were, perhaps, noble, but what's done is done. We can say with justice that the VOICE maintained objectivity during the feverish campaign months and printed nothing to cast suspicion on any candidate.

However, the primary is history, and we need not skulk behind a curtain of impartiality anymore. We present for our readers the disquieting photo left of the Democratic Candidate for Governor of West Virginia, John D. Rockefeller IV, shaking hands with the most notorious stripper in southern West Virginia, the intractable Tracy Hylton. The photo was snapped by Doug Yarrow of the RALEIGH REGISTER at the opening of "Jay's" campaign headquarters in Beckley in February.

For these readers who may know Mr. Hylton personally, his apparent height equality with tall "Jay" was achieved by standing on a step.

The Toxic Substances Control Bill

For the past decade, many Americans have had uneasy second thoughts about the effect that industrialization has upon the environment. Air pollution was killing trees, dirty water was depleting fisheries, and pesticides were genetically damaging birds. Gradually, many people realized that if factory smoke and effluent were such a hazard, conditions inside the manufacturing plants must be many times worse. Recently the realization has come home to Americans with a vengeance - the intrusion of toxic substances into the environment has begun to show up in human health statistics.

In 1974 it was discovered that workers in an Ohio rubber factory were dying from frightening high rates of angiosarcoma, a rare liver cancer, which has been traced to their handling of vinyl chloride. Vinyl chloride is a commonly used plastic found in such items as automobile interiors, plastic toys and various food packages.

The following year it was discovered that workers using bis(chloromethyl)-ether (BCME) were contracting cancer at eight times the rate expected. BCME, an industrial resin, is used in the production of sugar, wine and water purification systems, among other items.

Late in 1975 tragedy struck Hopewell, Virginia when workers at a makeshift pesticide plant began losing control of their limbs due to having worked with Kepone, a pesticide developed by Allied Chemical.

Cancer-causing substances have been discovered in the drinking water of numerous communities, vinyl chloride has shown up in the air in towns near plymerization facilities, and even some wives and children of asbestos workers have come down with deadly asbestosis.

Most ominously, the annual cancer death rate in the United States jumped by nearly 300 percent between 1974 and 1975. Since cancer has a lengthy latency period, many scientists agree that the statistics are likely to get worse in the coming decades.

Under the Food and Drug Act, manufacturers of food additives are required to demonstrate the safety of such substances before selling or using them. Similarly, drug manufacturers must demonstrate the safety of the drugs they make. Incredibly, however, chemical manufacturers are in no way held accountable for public exposure to their products - even though workers are often exposed to these chemicals in high concentrations for eight out of every 24 hours, and the general public may be drinking smaller amounts of the substances in the water and breathing them in the air. Furthermore, the manufacturers are not even required to identify such chemicals or test them for any effects they may have on human health or the environment.

This is by no means a small problem. What James Turner called "the chemical feast" is all around us: approximately 8000 new chemicals and new uses of existing chemicals are developed each year; between 300,000 and 600,000 illnesses and deaths are estimated to occur every year in the U.S. due to occupational exposure; the National Cancer Institute's Atlas of Cancer Mortality shows a distinct clustering of cancer mortality in the urban industrialized areas of the U.S., particularly in the Northeast Corridor, the lower Mississippi area and around the Great Lakes.

Unfortunately, our pollution laws are not adequate to prevent the mounting threat. Under existing laws, toxic pollutants must already be in the environment in sufficient quantities to cause damage before regulatory measures can be used. Often such damage is irreparable. Moreover, if a toxic substance has been proliferated widely enough to cause damage, it is generally beyond adequate control. For instance, polychlorinated bphenyls (PCBs) - substances similar to DDT - have escaped into the environment in large amounts even though the government has restricted their use to "closed systems."

The Environmental Protection Agency has been quick to admit that it has authority to prevent harmful exposure "only after the substances have been introduced into production," according to Assistant Administrator John Quarles. Quarles terms the Toxic Substances Control Act "one of our most urgently needed environmental laws."

Although it is hard to believe, pollution control laws provide no compensation to the victims of toxic pollutants; employees must go through workman's compensation proceedings while other victims must file suit in court. However, it is virtually impossible to determine manufacturer liability in court because there is so little data available on the effect of low-level human exposure to toxic chemicals. Also, many years often pass between exposure and the onset of occupationally and environmental induced disease such as asbestosis or emphysema, and blame is difficult to establish. In fact, most state workman's compensation laws prohibit payment for conditions which develop more than two years after retirement!

Perhaps most disturbing, however, is the unmistakable fact that certain chemical manufacturers have tried to hide evidence that their products pose risks to our nation's health - and too many public health officials have let them get away with it. In three noteworthy cases - involving asbestos, vinyl chloride and BCME - manufacturers either delayed or withheld disease and mortality data which would have alerted health officials to the serious threats posed by the substances. In the recent Kepone incident, both the producer and the government ignored the pleas of diseased workers. And in New York, workers at two General Electric plants which were fined for polluting the Hudson River only found out that they were PCBS by reading about it in the newspapers!

Currently legislation is moving through both the House and Senate Commerce Committees. The coalition that has backed a strong, effective bill includes environmentalists, consumers groups, health organizations and several labor unions. Together we are working for a law which would:

1. Require notification to EPA by all manufacturers who intend to produce a new chemical, or produce an existing chemical for a new commercial use.

2. Mandate testing of all potentially toxic chemicals, both new and existing; also, testing all chemicals which will be produced in large volumes regardless of their known potential for toxicity.

3. Regulate the manufacture, distribution, use and disposal of toxic substances and obligate quick action whenever an imminent hazard exists.

4. Require regular reporting by manufacturers to EPA on production and testing data as well as disclosure of important information on any adverse effects.

5. Guarantee citizens the right to participate in the regulatory process, petition EPA to issue rules, and file suit in cases on non-compliance.

6. Protect employees against corporate retaliations if they "blow the whistle" on hazardous working conditions.

7. Authorize EPA to use the Toxic Substances Control Act before chemicals are distributed rather than relying on less effective air and water pollution laws first.

As the toxic substances legislation move closer to passage in the committees, the chemical industries are fighting harder to block it. Even though American public opinion supports environmental controls by almost two-to-one, these powerful interests have successfully thwarted us in the past. It is vital that you make your voice heard right now so that we can finally begin to stem the tragic tide of death and disease that haunts the workplace and surrounding communities.

WHAT TO DO

1. Write you senators today and ask them to support the Toxic Substances Control Act, as reported by the Senate Commerce Committee. Advise them not to support any weakening amendments.

2. If you representative is on the House Interstate and Foreign Commerce Committee ask him or her to support H.R. 10318 without any weakening amendments.

3. If your representative is not on the Commerce Committee, write to him or her about the need for strong toxic substances control legislation and ask him or her to urge the Commerce Committee to act on such legislation before May.

4. Write your local newspapers and ask for editorials in support of strong toxic substances control legislation. Send copies of your letters to your Congressman.

NOTE: In the Highlands Region the following representatives serve on the House Commerce Committee: Harley Staggers, W. Va.; Fred Rooney and John Heinz, Pa.; Goodlie Byron, Md.; and David Satterfield, Va.

THE CLEAN AIR ACT . . . In the House

In mid-March the House Interstate and Foreign Commerce Committee reported the Clean Air Act Amendments of 1976 (H.R. 14098). The bill was in markups in Subcommittee and full committee for approximately one year, reflecting the controversy that surrounds the Clean Air Act. The committee took action on virtually every major aspect of the Clean Air Act, including auto emissions, deadlines for compliance by stationary sources, significant deterioration, indirect sources, new source performance standards, and enforceability of intermittent controls.

The bill contains provisions both strengthening and weakening the law. Environmentalists will be trying to strengthen the bill and various industrial groups will be trying to weaken it. Several issues will be raised on the floor of the House. Two provisions will be the most controversial:

1. Significant Deterioration. In 1972 the Supreme Court upheld a lower court decision which interpreted the Clean Air Act to mean that in areas of the country which had air quality cleaner than the national ambient air quality standards "no significant deterioration" of air quality should be allowed. EPA promulgated regulations which would set three classes of allowable deterioration and let the states determine whether these clean air areas would be Class I, very little additional pollution allowed, Class II, moderate deterioration, or Class III levels deterioration up to the ambient air standards. All clean air areas would start out as Class II. The most important improvement made by the Committee is the requirement that all National Parks and Wilderness Areas over 25,000 acres by Class I, while smaller wilderness areas and national parks, national monuments and national recreation areas would start out as Class I, but could be downgraded to Class II by states and local governments. The importance of the provision is immense for without it many of our national parks and other important federal lands will suffer vast degradation of air quality from emissions of huge new coal-fired power plants. Visibility reduction of 60 to 80% over parks like the Grand Canyon may occur unless this provision is adopted. The utilities and the U.S. Chamber of Commerce are mounting a major campaign to eliminate this provision.

2. Auto Emissions. The full Committee adopted a substantial and unnecessary delay of auto emissions deadlines which was proposed by Congressman Brodhead (D-Mich.). Brodhead postponed the achievement of statutory standards until 1980 for hydrocarbons and carbon monoxide and delayed the implementation of the statutory standard for nitrogen oxides until 1981, with possible waiver until 1985. Congressman Dingell (D-Mich.) had proposed the elimination of the statutory standards and freezing standards at existing levels for 5 years, but his amendment failed.

Environmentalists are supporting the Waxman-Maguire amendment which would delay the statutory standards until 1980, but would set tougher interim standards for 1978 and 1979 equivalent to those met by 1976 California vehicles. There is no fuel economy penalty associated with the enactment of these standards. In addition the unnecessary additional exposure of millions of people to more frequent levels of dangerous air pollutants will be avoided.

THE CLEAN AIR ACT . . . In the Senate

The vote on the Clean Air Act Amendments (S. 3219) has been postponed in the U.S. Senate until at least May 18th, but probably until June 2nd. This delay was caused by the unexpected illness of Sen. Edmund Muskie (D-ME.), the bill's chief sponsor.

Top priority for environmentalists is still the defeat of the Moss Amendment which eliminates the "no significant deterioration" provisions from the bill and replaces them with a study. Reasons why we are opposed to the Moss amendment are summarized below. Environmentalists are supporting the Hatfield-Hart amendment on non-degradation which gives initial Class I clean air protection to National Monuments.

The National Clean Air Coalition is opposed to the Moss Amendment because it would eliminate three key elements of S. 3219. The Moss Amendment would eliminate a requirement that protection be granted to the air quality values in National Parks and Wilderness Areas in the form of a Class I designation. The Moss Amendment would also remove a requirement that each new major stationary source of air pollution in a clean air region use the best available control technology to control pollution, and the Moss Amendment would also eliminate the bill's limitation on the overall amount of pollution that would be allowed in clean air regions.

Although weak in some respects, the Clean Air Act Amendments' provisions on non-degradation are important in order to prevent large scale reductions in visibility over our National Parks when and if huge coal-fired power plants are constructed within the immediate vicinity. Best available control technology is necessary to insure that industrial growth is as pollution-free as possible.

Sen. Moss's amendment would provide for a one year study of non-degradation policy and would eliminate the amendment adopted by the Senate Public Works Committee. Existing EPA policy would be left intact. The Moss Amendment should be opposed for the following reasons:

1. A year's study would give the business community another opportunity to prevent Congress from adopting a meaningful policy to prevent degradation since Congress would have to adopt the amendment all over again.

2. Moss's amendment would remove protection of air quality values of national parks and wilderness areas.

3. The amendment would eliminate the requirement that each new source use best available control technology as determined by the state, thus allowing new sources to be far dirtier than they would be if the bill was adopted.

4. Moss's amendment, by restoring Class III, would allow pollution in clean air areas up to the national standards thus allowing air to be equally dirty across the country.

5. Senator Moss claims that the issue should be studied further. The Committee has, however, authorized in legislation the National Air Quality Control Commission to provide feedback on the implementation of the regulations.

6. Sen. Moss claims that the Class II increments are too restrictive and would inhibit growth. Yet no state has asked EPA to redesignate an area now designated Class II under the EPA regulations to be reclassified Class III. EPA studies show that virtually any kind of well controlled source can be built with Class II increments.

7. If Sen. Moss's amendment succeeds, it would allow the utilities to go back to court to try to get the Supreme Court to reverse its decision concerning the intent of the 1970 Clean Air Act. The Court decided on a 4-4 vote to uphold a lower court decision that the Clean Air Act mandated a policy of non-degradation.

8. Sen. Moss is against the Senate amendment because it may fail to balance energy and environmental needs. The Senate provision does exactly that, since Class II increments allow for the development of well controlled sources. At the same time the bill gives needed protection to the air quality values of national parks and wilderness areas and permits the state to protect other areas.

What You Can Do For Clean Air

Write to your Senator and urge him to vote against the Moss Amendment to S. 3219. Urge him to support the Hatfield-Hart Amendment instead.

Write to your Congressman and urge him to vote against all amendments designed to weaken Section 108 of the Clean Air Act Amendments [H.R. 14098]. This is the section on significant deterioration. Urge your Congressman to support the Waxman-MACGUIRE amendment.

Acid Precipitation: Some Effects

by Gordon T. Hamrick

The June 1974 issue of **Science** carried an article by Gene E. Likens, of Cornell University, and E. Herbert Bormann, of Yale University, titled, "Acid Rain: A Serious Environmental Problem?". This article was reviewed in the September 1974 issue of the **Voice**. The substance of the **Science** article was that acid precipitation is occurring over the eastern part of the United States. The exact cause of such acid precipitation had not been determined, but it appeared that the problem was related to an excess of pollutants, such as sulfur dioxide, in the air.

Likens and Bormann expressed the view that the excess pollutants could possibly originate with smokestacks equipped with electrostatic precipitators which removed particulate matter, particularly alkaline substances, but which permitted stack gases to escape unchanged.

The foregoing article was followed up in the May 1975 issue of **Science** in an article by Leonard Newman, of Brookhaven National Laboratory, titled, "Acidity in Rainwater: Has an Explanation Been Presented?" Newman's thesis was that Likens and Bormann did not prove that taller smokestacks and electrostatic precipitators significantly contributed to the problem of acid precipitation.

Dr. Albert Krueger, in an item in the September 1973 issue of **Smithsonian**, pointed out that polluted air was deficient in ions, particularly in negatively-charged ions. Thus, by this line of reasoning, polluted air must have an excess of positively-charged ions. Since hydrogen ions determine the acidity or alkalinity of a solution, polluted air which contains an excess of positively-charged hydrogen ions should produce acid precipitation.

Upon further study, it appears that in the absence of moisture - under conditions of zero humidity - ions and molecules could drift about forever in the air without combining to form acidic compounds; therefore, moisture serves as a catalyst and also provides the hydrogen ions for acid precipitation. Apparently free hydrogen ions or atoms in the atmosphere play little part in acid precipitation, other than possibly combining with ozone to form water.

The amount of carbon dioxide in the atmosphere has increased considerably over the past few decades, the increase ranging from possibly 20 percent to 100 percent, depending upon the source used for data. Carbon dioxide unites with water in the air to form carbonic acid, a weak acid. Carbonic acid, however, eventually reaches an equilibrium with the carbon dioxide/moisture content of the air and does not further increase. The increase in acidity of precipitation from this source is therefore small, probably on the order of a value (pH) of .1 or slightly more.

It may be significant that acid precipitation has become a major problem only since the end of World War II. This period has seen taller smokestacks equipped with electrostatic precipitators, as noted in Likens and Bormann's study, but it has also seen a change in home heating from coal to natural gas. Thus, the decrease in sulfur oxide emissions has been offset by an increase in oxides of nitrogen emissions. Too, there has been a tremendous increase in the number of vehicles in operation and the by-products of combustion include both oxides of sulfur and oxides of nitrogen.

The oxides of sulfur and oxides of nitrogen are among the major pollutants found in the atmosphere. These unite with moisture to form sulfuric acid and nitric acid, acids not so weak. And, recent research on the effects of aerosols on the ozone layer in the atmosphere have turned up significant quantities of hydrogen chloride gas in the atmosphere. Hydrogen chloride unites with water to form hydrochloric acid, another acid not so weak. Also, there are quite a number of other compounds in the atmosphere, in smaller quantities, which can unite with water to form still other acids. Therefore, one can reasonably predict that precipitation will be acidic.

The EPA Research Laboratory at Corvallis, Oregon, has underway a study to determine the long-range effects of pollutants and acidic precipitation upon plant life. One of the more recent developments of the EPA study is the finding that sulfur dioxide significantly reduces nitrogen conversion by alfalfa plants (plants which with the aid of certain bacteria fix nitrogen directly from the air) and that concentrations as low as .06 parts per million seriously affected plant conversion of nitrogen. Sulfur dioxide and oxides of nitrogen have long been known to cause "burns" or black spots upon tobacco leaves and leaves of other broad-leafed plants and to seriously stunt growth or completely kill plants of the pine family.

To carry things a little further, burning of a single ton of two percent sulfur coal will eventually result in production of 120 pounds of sulfuric acid. How many tons of coal does the John Amos generating facility burn in a single day? How many tons of coal of unknown sulfur content are burned each day by homeowners, businesses, and facilities other than power generating stations?

Acidic precipitation can have marked effects upon plant growth. Extremely high or low pH (over 8 or below 4) values can directly affect or damage plants but, in general, the influence of an unfavorable pH is reflected by other indicators. If the pH is too low, clay soils lose their crumb structure and become closely packed. Nutrients are generally unavailable when the pH drops below 6.5 because insoluble compounds are formed as hydrogen-positive ions replace other cations (positive ions) in the soil particles by cation exchange, resulting in leaching of these cations. A low pH is detrimental to nitrifying bacteria, resulting in a decrease in available nitrogen. Certain fungus diseases occur only in acid soils. And, at low pH ranges, certain substances such as iron and aluminum become concentrated enough to become toxic to plant life.

Aside from plant damage, considerable damage from acid precipitation occurs to metals such as fencing, sheet-metal roofing, and other exterior metals containing zinc. Zinc happens to be one of the most widely-used metals in our industrial society and, significantly, the reaction between zinc and sulfuric acid is widely used in the laboratory to produce hydrogen gas. Small wonder that galvanized fencing lasts only a few years. Or that a farmer must repaint or reroof his out-buildings every few years. Or, pity the poor car owner who does not wash and polish his vehicle frequently.

Utilities and industry can plead for reductions in air-quality standards, but the public is ultimately paying the bill. Reduced forest and agricultural yields; costs of repairing or replacing fencing and roofing; costs of vehicle maintainence; even the cost of clothing (remember that nylon deterioration is one of the checks for the presence of sulfur dioxide) are only a few of the costs of relaxing air standards.

BRIEF STRIPS.....

1. DUO. [SMA-1833]. On March 23 my neighbor Sandy Lilly and I sent a letter to the DNR via our lawyer, James Blankenship of Rainelle, asserting that the publication of this application did not give the public legal notice of the proposed strip because the DNR had not received the complete application. The DNR has not as yet replied (May 13). Deborah Baker of the RALEIGH REGISTER quoted Reclamatin Division Chief Ben Green:

"'It's impossible to have a completed application at the time the legal ad is published" he said, noting that one of the requirements for a completed application is an affidavit of the ad's publication in a newspaper."'

In fact the law says no such thing – only that "the director shall upon receipt of the application for a permit, cause to be published, as a Class III legal advertisement...etc." (Section 20-6-8).

My suggestion to other protestors is to shoot out a similar letter whenever you see a legal advertisement and you find that there's nothing specific in the DNR's file at Charleston. It's clear from the law that you should have 30 days to "protest" after the application is complete.

Nicholas Zvegintzov

2. NEW RIVER. In our March issue we reported that the DNR, after protests from nearly 1000 individuals and several organizations including the Fayette Plateau Chamber of Commerce and the Three Rivers Chapter of the Izaak Walton League, denied SMA-1739 by Betty Jane Coal Company above the New River Gorge. The company then appealed to the Reclamation Board of Review, which met on May 3 and 4. No decision yet (May 13).

The Three Rivers Chapter is also protesting the Summers County portion of SMA-1883 by Barjuls Coal for 50 acres on the divide between the Meadow River flowing into Greenbrier County and Lick Creek of New River, flowing into Summers County. Summers County has little coal and many anglers, and strong action from them turned back the last attempt to strip in the County in 1973.

3. CAMPING IN THE HILLS. "Combining a multidisciplinary and computer-oriented approach within a system context, a research project is proposed stressing the aesthetic factor in surface-mine rehabilitation (SMR). By inspecting, documenting and assessing already reclaimed sites in Appalachia, and by combining this first-hand experience with research in a computer and studio environment, SMR can be improved (sic) through an in-depth study of such topics as: the aesthetic perception of natural and man-made landscapes; the principles of visual/spatial design as they apply to SMR; the use of professional design expertise for SMR, and the use of computer-graphics for designing, simulating and testing SMR design options against relevant criteria and constraints."

With this illiterate verbiage four enterprising academics at the University of Massachusetts pried $15,540 from the National Endowment for the Arts, some of which was spent taking the DNR's summer strip mine tour.

The National Endowment and the Massachusetts group have declined to send me more details of their activities, perhaps wisely, but Skip Deegans of Meadow Bluff has sent me a report by one of the group grooving on "an acid-water control system" installed by the Douglas Coal Company: "The revolving drums were a kind of kinetic sculpture whose slow turning was mildly hypnotic."

It is good to know that Uncle Sam, though entirely unable to control the ruin of his hills by strip mining, can nevertheless keep idle Professors off welfare by sending them to camp in the West Virginia hills.

Nicholas Zvegintzov

BRIEF DAMS.....

1. NEW RIVER. On May 10 the National Parks and Recreation subcommittee of the House Interior Committee reported out to the full committee a bill giving Wild and Scenic River status to 26.5 miles of the New River in North Carolina, which would block the building of an Appalachian Power Company dam licensed in December 1974.

At hearings on this bill Jim Watkins of Beckley, Chairman of the Coalition to Save New River, analyzed the provisions of this license and pointed out that the requirement to increase summer flow to 2,500 cfs (cubic feet per second) below the dam only applies as a weekly average. The specified minimum is only 350 cfs and the maximum is a "two foot rise" below the dam, calculated by the Coalition as 6,000 cfs, which can be raised if it does not allow enough power production.

In counter-testimony, A. Joseph Dowd, Executive Vice-President of American Electric Service Corporation, claimed that "the license constitutes a contract between the USA and Appalachian Power Co. It is a vested property right which is subject to divestment only if the Supreme Court reverses the decision of the Court of Appeals."

Never perhaps has the notion of a "Government giveaway" been so nakedly acknowledged by the recipient.

(Information from the **BECKLEY POST-HERALD**, May 8 and 11)

A Primer for Acid Water Chemistry

by Don Gasper

A basic understanding of acid water chemistry by today's intelligent and questioning citizen would be desirable. For many it might be merely a review of a chapter in their old high school chemistry book. The pH you will find is the measure of the acid activity on the number of free hydrogen ions. The concepts are not difficult, but they are important. Many of West Virginia's mountain trout streams contain so little alkalinity that even a small amount of acid can turn them acid.

When considering acid water, quality is generally measured by the pH, the acidity (hot and cold) and the alkalinity. A balance exists between these measures of the amount of acid and the amount of alkalinity or basic material. Also of considerable value are measurements of the conductivity, sulfate, and Iron. No other measurements will be considered here.

The balance between the acidity and the alkalinity results in the pH. They balance easily because both acidity and alkalinity have a value of one (essentially) and are each in terms of parts per million. Consequently, it is possible to construct a pH scale that goes from an acid of pH of 4.4 to an alkaline 8.4 Remember that pH 7 is neutral, and that a pH of 6 is ten times more acid than one of pH 7. Many infertile streams have a pH around 6, and those that are somewhat richer have a pH around 7.

On this scale we can measure the amount of alkaline material (N/50 NaOH) needed to raise the pH of the sample to 8.4, and measure the amount of acid material (NaOH) of the same strength (N/50) needed to lower the pH to 4.4. If 100 ml. (or cc) of sample is used one ml of acid or basic material will equal 10 ppm. The pH values of 4.4 and 8.4 are commonly used because the sample can be caused to change color at these pH values by adding a few drops of yellow methyl orange indicator solution which turns to rose at pH 4.3 and the clear phenalphthalein which turns pink at pH 8.4. No alkalinity is said to exist below a pH of 4.4, and no acidity above a pH of 8.4.

If the sample is highly acid and the pH is already near pH 4.4 it will take only a little N/50 H_2SO_4 Acid to reach 4.4, and since this is the alkalinity measurements the sample will be measured to have only a little alkalinity. On the other hand if the pH is near 7.0 or higher, perhaps five times this amount of acid is required to lower the pH to 4.4. Quite a bit of alkalinity (five times as much) then, will be measured.

In measuring the amount of acid present the same process is followed. The alkaline material (N/50 NaCH) is used to raise the pH to 8.4. If there is a lot of alkaline material in the sample it will only take a little more alkaline N/50 NaOH to reach 8.4, and since this is a measure of the acidity, only a little acidity will be measured. Finally (to follow through with the last example) if the sample pH is around 6.0 or a little less, it will take a greater amount of alkaline material to reach a pH of 8.4. Consequently since this is the acidity measurement a higher amount of acidity will be measured.

The balance between the acid and alkaline material in the sample will result in a characteristic pH value. In natural stream water not all reactions between them take place, and some acid exists with some alkaline material. These relationships vary with richness and the averages of some waters are described next and presented in table form for comparison.

Moderately rich streams may have 1ppm acid and 60ppm alkalinity at the same time with a pH around 7.5. Others less rich have 2 ppm acid and 30 ppm alkalinity, and the pH will be around 7.0. Many infertile mountain trout streams have 5 ppm acid and 10 ppm alkalinity at the same time, and the resulting pH is about 6.0. Some very pure native brook trout streams will have 5 ppm acid and 5 ppm alkalinity with a pH averaging around 5.5. Finally there are some undisturbed streams that are naturally too pure for even native brook trout to survive. These have about 5 ppm acid and 3 ppm alkalinity, and pH will be about 5.2 or 5.0.

Acid polluted streams also vary in these relationships. For a rich stream with 50 ppm alkalinity to lower its pH to the degree that fish are threatened will require a great amount of mine acid. Mine acid sources vary greatly - commonly from 20 to 2000 ppm in acid content, and may average 200 ppm. Sometimes a very great amount of mine acid does enter even large rich streams making them devoid of fish life - or waters in which only acid resistant bullheads and bluegills are found. Mine acid itself has an acid-base relationship that may, as a very rough average, be considered to: alkalinity 0, acidity 200 ppm, and pH 4.0 (See Table 1).

Table 1
DIFFERENT TYPES OF STREAMS AND THEIR AVERAGE CHARACTERISTICS

Stream Type	Alkalinity [ppm]	Acidity [ppm]	pH	Conductivity [m/c]
Moderately rich	60	1	7.5	150
Less rich	30	2	7.0	70
Infertile	10	5	6.0	25
Some pure native brook trout streams	5	5	5.5	18
Too pure for fish	3	5	5.2	14
Acid polluted	0	200	4.0	1000

The acid-base balance is determined by measuring the alkalinity with N/50 H_2SO_4 acid to the methyl Orange rose end point of pH 4.4, and the acid is measured with the N/50 NaOH base to the phenolphthaein pink at pH 8.4. This is best done at streamside, for it is a state of equilibrium that can shift either way, because there are basic and acid compounds that have not yet completed all the interactions of which they are capable. Yet it is this incomplete status that results in the actual pH, and the pH can itself be a very important lethal factor when it gets down around 5.0. The pH can obviously shift a little also, and ideally it should be done at streamside also - especially in infertile, lightly buffered water.

It is important to describe this balance with these parameters, but it is also important to know what occurs when all the possible interactions have taken place. This is accomplished by boiling for three minutes. If there is a preponderance of alkaline material the pH will rise - sometimes above 8.4, and the color will change while boiling. If there is a preponderance of acid the alkalinity will be used up, and again it may be below pH 4.4, and the sample can be caused to change color. Generally, though, immediately after boiling the sample will have to be tested just exactly as was done earlier with the cold sample to determine the acidity with N/50 NaOH. These checks should be called the Hot Total Acid and Cold Total Acid tests.

The Hot Total Acid test measures the acid potency, not the acid activity. The Hot Total Acid can be run from a sample and is the single most important measurement needed to determine the effect of one flow upon another. It is a measure of neutralizing ability of the receiving stream and the acid potency of the acid flow.

When mine acid enters an infertile stream with only 10 ppm alkalinity the results can be catastrophic. The pH of 6.0 can be changed to 5.0 by decreasing the alkalinity from 10 ppm to 5 ppm and increasing the Cold Total Acid from 5 to 7 ppm. This is about the equilibrium or balance the acid and basic materials would take, and the pH that would result would be around 5.3. This would eliminate all fish life (except perhaps bullheads and bluegills which have been found at pH 4.5). Only 7 ppm additional acid was required to do this. Of this 7 ppm acid, 5 ppm became neutralized and 2 ppm remained actively acid and lowered the pH to lethal levels.

Many of these infertile streams are important trout streams: the Cranberry River, North Fork of Cherry, the streams in Holly River State Park and Kumbrabow State Forest, reaches of Shavers Fork, Red Creek and Kumbrabow State Forest, reaches of Shavers Fork, Red Creek and Red Run in Tucker County, Little Kanawha, Buckhannon River, and Middle Fork River. In order for 7 ppm additional acidity to enter these relatively large streams the smaller acid flow would have to be pretty potent - and they generally are - perhaps 200 ppm acid.

In the cases of Cranberry River and Shavers Fork there are now reaches that sometimes cannot be stocked before May 1 with catchable-sized hatchery rainbow trout without losing half the fish within a week due to the acidity and/or the lack of alkalinity in the water. These are chemically fragile streams without buffering surpluses of alkalinity, and they could easily become more acid. If the pH were lowered to pH 5.5 they could not be stocked at all, and these beautiful clear streams would have very little productivity of their own. These priceless fisheries would be lost as we know them, probably forever.

The 7 ppm additional acidity used above would lower the pH to 5.3 - beyond pH 5.5. To lower the pH to 5.5 would only take about 3 additional ppm acidity. A very small flow then of one-half cubic foot per second (225 gal. per minute) at only 100 ppm hot total acid would eliminate this famous stocked trout fishery throughout the entire Cranberry River. That is, it would not recover as it became larger near its mouth. It could remain in this condition forever in spite of all our efforts to restore it.

If this is all the acidity it would take to degrade the relatively large Cranberry River, one can imagine how little mine acid flow it would take to eliminate a small native brook trout stream that might have even a little less alkalinity to neutralize the mine acid. Perhaps half of West Virginia's actual and potential native brook trout streams are in this extremely fragile group, and greatly endangered by any increase acid sources on their watersheds.

This acid-base balance and resulting pH that we have been considering is pretty easily understood and measured. There are few complications, but these parameters do change with the seasons throughout the year. We have dealt so far with yearly averages, or May and June conditions which approach the yearly average. The pH ranges about 1.0 pH unit throughout the year, being most acid in spring and least in fall. The balance causing this pH change retains the same relationship between acid and base components throughout the year, so none of this should confuse anyone. That is, the Cranberry's pH is 6.0 in the spring, when the pH is 6.8 its alkalinity is about 15 and its acid about 2 ppm. It is a more fertile stream in the fall, and has the typical acid-base balance and resulting pH characteristic of a more fertile stream at that time. The same acid-base-pH relationships hold.

In addition to the yearly fluctuation, right after a rain the infertile streams become a little more so, and hence a little more acid. They return to normal after about a week.

Some of the acid is due to carbonic acid in that it can be boiled off as CO_2. This is shown in the spring when half the 5 ppm acid can be boiled away and the Hot Total Acid check is actually less than the Cold Total Acid. Of course, this can only be found when there is not much potentially acid material that would become acid when boiled and mask the Carbonic Acid loss. The Carbonic Acid probably comes from decay and respiration in the forest floor. Later in the summer in these infertile streams there is less Carbonic Acid. Also as the flows recede a greater portion of the flow comes from ground water that may have come into contact with sulphur bearing materials. Some of the acid is due to naturally produced Sulfuric Acid - perhaps another 1 or 2 ppm. Humic acids (tannic, etc.) may make up the other 2 ppm at times. There is never more than 6 ppm acid (hot or cold) in natural unpolluted waters.

Conductivity is a useful measurement in understanding the acid-base nature of the sample. If a lot of salts are present the conductance of electricity will be good. Fertile streams and mine acid have many salts and high readings of several hundred even several thousand. The sample may contain a lot of alkalinity, or a lot of acid, or both, partially neutralized. Infertile streams have readings of only about 20 - just about like distilled water. The units for conductivity are in michromhos/centimeter square (m/c2). The conductance can be translated to Total Dissolved Solids rather straight forwardly, so the TDS is also low. This shows how little of anything these infertile streams contain - let alone alkalinity. These infertile streams flow only from infertile, entirely sandstone watersheds. If even one limestone strata is exposed on even a small portion of the watershed the limestone derived soils are such a source of enrichment the streams become several times richer.

Finally, a remark that attempts to place pH in perspective in infertile waters. The pH kills 50% of our rainbow trout direct from the hatchery in about 5 days at pH 5.9, and all trout at any stage and all our common mountain stream fishes at pH 5.0.

Brief springtime low pH values of 5.2 are responsible for the absence if fish in about half of Red of Dry Fork, Dogway Fork, Middle Fork of Williams and lower North Fork of Cranberry. Later in summer some reinvasion of these reaches occur.

(Continued on next page)

The pH kills by penetrating certain vital gill functions.

While the pH itself is important, trout physiologists have found that over half the calcium used in body building of brook trout is absorbed as ionic Calcium from the water by the gills, rather than as dietary calcium. In infertile waters with 5 ppm Calcium (like the Cranberry with from 8 to 10 ppm alkalinity) the trout must expend a great deal more effort to absorb the needed Calcium than they would have to in richer water. Any further increase in stress (merely scaring the trout a couple of times a day) caused brook trout mortality in these experiments. There can be little doubt that mine acid pollution would take up what little Calcium there is available in the water. Clearly, with these pH values and lack of Calcium, and considering their unknown combined effect, no acid must ever enter these important, fragile, infertile streams.

MNF Hiking Guide Needs Update

If the trend continues we will be sold out of the 5000 copies of our *Hiking Guide to the Monongahela National Forest and Vicinity* by this fall. It is time now to think about what additions and improvements to make before we get another 5000 copies printed late this coming summer. In order to keep our guide up to date we need the help of all our hiking members to revise the existing trail writeups and other material.

Next time you go hiking in or near the MNF take a small notebook with you and jot down whatever you learn that might be useful to other hikers in planning and executing the same trip. Some examples of useful information might include:

- -- how to get to the trailhead by car.
- -- the location of sources of water along or near the trail.
- -- possible campsite locations along or near the trail.
- -- directions for staying on the trail in areas where the possibility of getting lost exists.
- -- a description of the natural and scenic values to be seen along the trail.
- -- a description of interesting side trails.
- -- and whatever else comes to mind.

Send whatever material you collect, regardless of how insignificant it may seem, to:

Bruce Sundquist
210 College Park Dr.
Monroeville, PA 15146

If you can still recall some of the details of hikes and backpack trips you have been on in the past, send these in also. Everything should be in by August 1, 1976. Comments on ways to make general improvements would also be appreciated. Black-and-white prints are also needed. Your originals will be returned.

Contributors to the guide receive a free copy as soon as the new guide comes off the press. If you would like some suggestions as to areas that need exploration contact Bruce Sundquist at the address above.

The way the Monongahela National Forest is managed depends a great deal on the attitudes of those who use it. By promoting non-consumptive uses of the forest we build support for forest management that gives careful attention to the natural and esthetic values the Monongahela contains.

CONSERVANCY PUBLICATIONS

1. Dolly Sods. Management Proposal and trail guide, includes areas adjacent to the Dolly Sods National Wilderness Area. 1973 edition, 75 pages, 4 maps, 8½ x 11. $3.25
2. Hiking Guide to the Monongahela National Forest. A survey of hiking and backpacking trails in the Monongahela National Forest. Includes general information on use of the MNF and an essay on winter camping in the Monongahela. 1974 edition, 151 pages, 9 maps. $3.25.

The Conservancy no longer publishes and no back copies are available of the Otter Creek Trail Guide. For information on use of Otter Creek National Wilderness Area contact the U.S. Forest Service, Cheat District Ranger, Parsons, WV 26287.

A new edition of the Cranberry Back Country trail guide and management proposal is now in preparation. Watch future issues of THE HIGHLANDS VOICE for publication date.

Copies of Dolly Sods and Hiking Guide to the Monongahela National Forest may be obtained at one-third discount to stores and clubs. Address inquiries concerning wholesale orders to Bruce Sundquist, 210 College Park Dr., Monroeville, Pa. 15146.

Address all other trail guide orders to the address below. Make checks and money orders payable to WVHC.

Trail Guides
c/o West Virginia Highlands Conservancy
Box 711
Webster Springs, WV 26288

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