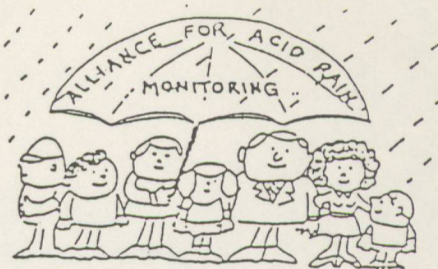


ALLARM BULLETIN

Edited by Lisa Hovis



June 1987

STREAM RANKINGS

Here is the promised preliminary data analysis. Each stream has been categorized into groups according to its pH and alkalinity. More analysis is in the works. ALLARM is now in the process of finding trends over time.

ENDANGERED

pH 4.0-5.0 Alk 0-5

<u>Stream</u>	<u>County</u>	<u>Collector</u>
Kings Gap Hollow, 1	Cumb.	Kings Gap Center
Kings Gap Hollow, 2	Cumb.	Kings Gap Center
Laurel Run	Perry	Egolf
Lehigh	Bucks	Broadbent
Loyalsock	Bucks	Broadbent
Nescopeck	Bucks	Broadbent
Red Run	Lycom.	Huggins

VERY VULNERABLE

pH 5.0-6.0 Alk 0-20

<u>Stream</u>	<u>County</u>	<u>Collector</u>
Big Bush Kill	Unk.	Broadbent
Canbaugh Run	Frank.	Dropp
Conewago	Adams	Platt
Conococheague	Frank.	Dropp
Conococheague, E.B.	Frank.	Dropp
Duncannon Reservoir	Perry	Reilly
Frozen Run	Lycom.	Huggins
Furnace Run	Frank.	Adams
Grays Run	Lycom.	Huggins
Jackson Run	Perry	Brown
Laurel Run	Hunt.	Long
Logan Run	North.	Prutzman
Long Run	York	Sunbury
Muddy Creek	Lanc.	Ream
Otter Creek	York	Reilly
Pennsylvania Canal	Dauph.	Flately
Pleasant Stream	Lycom.	Huggins
Poe Valley Lake	Centre	Reilly
Powells Creek	Unk.	Frantz
Shavers Creek	Hunt.	Long
Sherman's Creek	Perry	Egolf
Toms Run	Cumb.	Herrold
Trout Run	Frank.	Eschenman
Trout Run	Lanc.	Axelrod
Walnut Run	Lanc.	Kerchner

VULNERABLE

pH 5.0-7.0 Alk 5-50

<u>Stream</u>	<u>County</u>	<u>Collector</u>
Antietam Cr. E.B.	Frank.	Etchison
Brock	Bucks	Broadbent
Cocalico Creek	Lanc.	Kerchner
Conewago Creek	Lanc.	Kistler
Conoy Creek	York	Keitsock
Conoy Creek	Lanc.	Longenecker
Hammer Creek	Lanc.	Kerchner
Kelly's Run	Lanc.	Axelrod
Manada Creek	Dauph.	Schaffer
Manada Creek	Dauph.	Davenport
Muddy Creek	Lanc.	Ream
Neshaminy	Bucks	Stout
Penns Creek	Centre	Reilly
Pond	Lanc.	Longenecker
Rabbit Run	Bucks	Klyce
Rock Run	Chester	Nature Center(Pill)
Sherman's Creek	Perry	Reilly
Shover Run	Hunt.	Long
Spring	Lanc.	Longenecker
Swatara	Leban.	Gahres
Swatara	Dauph.	Dice
Tucquan Creek	Lanc.	Axelrod
Unnamed	Dauph.	Fetterman
Yellow Breeches	Cumb.	Seville

SLIGHTLY RESISTANT

pH 6.0-7.5 Alk 20-80

<u>Stream</u>	<u>County</u>	<u>Collector</u>
Beaver Creek	Dauph.	Davenport
Beaver Creek	Dauph.	Mahey
Codorus	York	Reilly
Conestoga	Lanc.	Bare
Hammer Creek	Lanc.	Axelrod
Little Buffalo Cr.(Y)	Perry	Reilly
Little Buffalo Lake	Perry	Reilly
Little Juniata Cr.(m)	Perry	Reilly
Mill Creek	Lanc.	Bare
Montour Run	Perry	Egolf
Plum Run	Adams	Platt
Susquehanna River	Cumb.	Reilly
Tohickon	Bucks	Broadbent
Yellow Breeches Creek	Cumb.	Reilly

MODERATELY RESISTANT

pH 6.5-7.5 Alk 60-120

<u>Stream</u>	<u>County</u>	<u>Collector</u>
Conodoguinet Creek	Cumb.	Reilly
Landis Run	Lanc.	Axelrod
Little Juniata Cr(NB)	Perry	Reilly
Lutman Run	Perry	Reilly
Mill Creek (quarry)	Bucks	Baddeley
Mill Creek (above q.)	Bucks	Baddeley
Neshaminy (above q.)	Bucks	Baddeley
Neshaminy (below q.)	Bucks	Baddeley

DID YOU KNOW...

6,000 miles of Pennsylvania's trout streams are now vulnerable to acidification and fish loss, according to Pennsylvania's Fish Commission.

Poconos' lakes are second only to the Adirondacks in suffering from acid deposition.

Forest dieback from acid deposition has reached 75% in the Black Forest.

Liming, a proposed "post-solution" to acid deposition, is temporary, extremely expensive, and often results in peculiar water chemistry and life forms.

Inhalation of sulfate and nitrate particulates can cause bronchitis, Emphesema, cancer, and cardiovascular diseases.

Inhalation of SO₂ and NO_x particles is ranked as the 3rd cause of respiratory cancers according to Dr. Landrigan of the Mt. Sinai School of Medicine.

The senate majority leader Robert C. Byrd is the most visible opponent to acid rain legislation.

Canadian environmental minister labeled the majority leader in the U.S. senate as a "Neanderthal".

ALLARM WORKSHOPS

This summer, we plan to have two ALLARM workshops on July 18 and August 8 which are both Saturdays. A workshop on acid deposition is a wonderful excuse to meet fellow volunteers, be updated on the latest happenings with ALLARM and the acid rain issue, and actually visit creeks in the local area. A picnic lunch will top off the workshop. Please try to attend! Watch the mail for more details.

RAIN GAUGES

ALLARM is now expanding our data collection to rain! Knowing the quantity and acidity of rainfall would supplement the stream data in helping to show a relationship between acid rain and its effects on your stream. A rain gauge is very simple to use and costs between \$3.00 and \$6.00. If you are interested in expanding your monitoring to rain and would like to obtain a rain gauge, please call or write to ALLARM.

SPOTLIGHT

We are thrilled to be receiving data from all of our hardworking volunteers. Keep up the good work! ALLARM would like to take this opportunity to recognize some members.

*A warm thanks to our first volunteer, the folks up at Kings Gap Environmental Center who have been consistently collecting data at two sites on King's Gap Run since November 1986.

*Pattie Longenecker, thank you for the beautiful photos of your sites! It sounds like you are measuring alkalinity correctly, so keep a close eye on those low numbers.

*Arnold Mahey, thanks for sharing your vivid observations, the extra information on acid rain that you sent, and the history on land use. Reading your data reports might be as fun as collecting it!

*Thanks for the group collecting effort at Bell Socialization Services and the Nature Center of Charlestown.

*Randy Axelrod, congratulations on your new jobs. Your consistent monitoring of a 60 mile creek check loop since March has given us some great data!

*A thanks to John Dropp for the documentation of the pH for the June 20th rain storm. Those numbers are scary!

-3.5 pH 15 minutes into the storm (3:30 PM)

-4.5 pH 45 minutes into the storm (4:00 PM)

-3.5 pH 1 hour and 45 min. into the storm (5:00 PM)

-4.5 pH at 10:30 PM.

FUNDING

Since ALLARM receives no outside funding and expenses are starting to mount, we need funding ideas in addition to donations. Do you have any suggestions on funding sources?

NAME THE ALLARM BULLETIN

ALLARM needs your help in forming a title to this newsletter. Please send us your creative ideas.

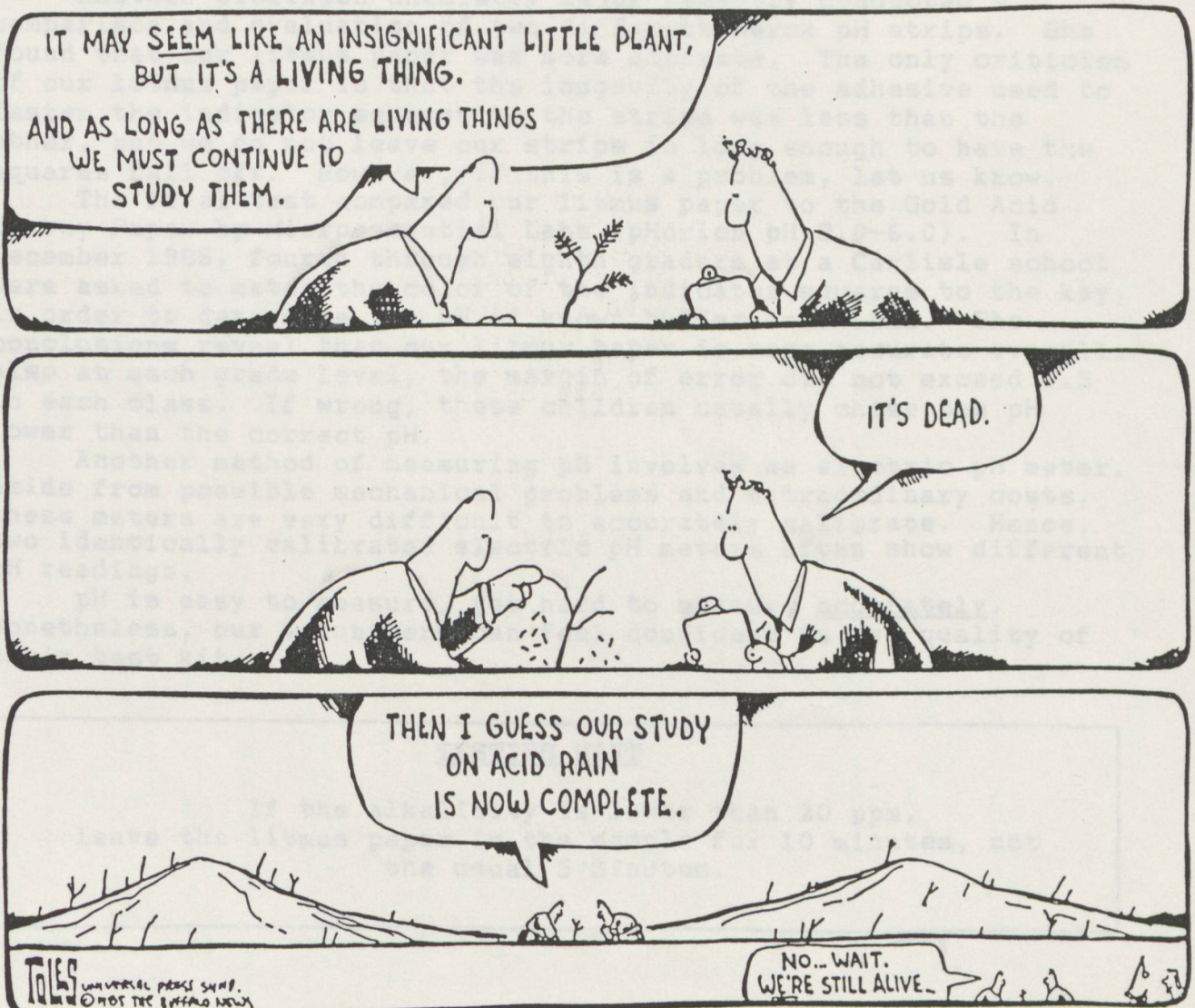
CALL FOR ALLARM DELEGATE TO PennARC

Would you like to become more active in the fight to save our natural resources from acid rain? A volunteer is needed to serve as an alternate delegate to PennARC. While the time commitment is small, the responsibilities are substantial.

Pennsylvanians for Acid Rain Control (PennARC) is a state wide coalition whose membership entails organizations, institutions, and corporations interested in promoting a comprehensive acid deposition control policy. ALLARM is on its Executive Board.

As an alternate delegate, you would sit on the Board of Delegates with the responsibility of casting ALLARM's vote on all matters when the delegate is absent. The Board meets annually, unless the Chairperson calls additional meetings. By representing ALLARM, you would not only have a say in the strategies for statewide controls on the factors contributing to acid rain, but would also keep our organization up to date on the latest developments statewide and on the acid rain issue in general.

Volunteer one day a year. You can make a difference! Interested? Call or write to us for more information.



TESTING KITS

Many of you have been asking questions concerning the accuracy of the Hawk Creek testing kits. ALLARM feels that for our purposes, these kits are accurate and cost-efficient. The company that makes our Merck Spezialindikator litmus paper claims a margin of error of less than 0.2 pH units. Four independently conducted tests support this conclusion.

In the spring of 1986, three Dickinson students evaluated four kits for testing pH. The HACH, HELLIGE, HYDRION (limited range), and HAWK CREEK kits were compared. They concluded that the color grading on the HAWK CREEK litmus test was the most easily readable.

A year later, other Dickinson students tested our Merck (Spezialindikator pH 2.0-9.0) litmus paper for accuracy. The litmus paper was tested in known buffer solutions covering a wide range of pH by 58 randomly selected students. The average error margin of 0.3 was very good. The most inaccurate interpretations were in highly alkaline buffer solutions. This is not a concern for us, since the pH of natural surface waters, and in fact all ALLARM data, fall below 8.0.

Another Dickinson chemistry major recently conducted a comparison and evaluation of two different Merck pH strips. She found that our litmus paper was more accurate. The only criticism of our litmus paper is that the longevity of the adhesive used to fasten the indicator squares to the strips was less than the other, but we do not leave our strips in long enough to have the squares fall off. However, if this is a problem, let us know.

The final test compared our litmus paper to the Gold Acid Survey Paper by Microessential Labs (pHdriion pH 3.0-6.0). In December 1986, fourth through eighth graders at a Carlisle school were asked to match the color of the indicator squares to the key, in order to determine the pH of known buffer solutions. The conclusions reveal that our litmus paper is more accurate overall. Also at each grade level, the margin of error did not exceed 0.3 in each class. If wrong, these children usually chose the pH lower than the correct pH.

Another method of measuring pH involves an electric pH meter. Aside from possible mechanical problems and extraordinary costs, these meters are very difficult to accurately calibrate. Hence, two identically calibrated electric pH meters often show different pH readings.

pH is easy to measure, yet hard to measure accurately. Nonetheless, our volunteers can feel confident in the quality of their test kit.

TESTING HINT

If the alkalinity is lower than 20 ppm,
leave the litmus paper in the sample for 10 minutes, not
the usual 5 minutes.

ACROSS

- 1) _____ is one solution for temporarily reducing the acidity of a lake.
- 2) Water that sinks into the soil, where it may be stored for long times in slowly renewed underground reservoirs.
- 3) 4.0 is the pH level of _____ rainwater.
- 4) A citizens' volunteer organization that is trying to elicit a response from the PA legislation by individually monitoring streams and collecting data.
- 5) Volunteers should _____ their streams on a weekly basis.
- 6) Water with a pH reading of 4.0 is said to be _____.
- 7) The _____ of a lake determines its ability to neutralize or absorb acidity.
- 8) Acidification can cause leaching of lead and copper into _____ water systems due to corroded pipes.
- 9) _____ smog is a type of air pollution, primarily from sulfur oxides and particulates produced by the burning of coal and oil in households, industries and power plants.
- 10) Higher concentrations of _____ metals are present in acidified aquatic systems.
- 11) A principal cause of acid rain are _____ from automobiles.
- 12) When the snow melts in the spring time, the rapid decreases in pH values creates a condition known as _____.
- 13) A type of fish that is most vulnerable to acidification.
- 14) The scientific study of physical, chemical and biological conditions in lakes, ponds and streams.
- 15) This type of matter can be found as solid particles, or liquid droplets suspended or carried in the air.
- 16) One of the gases found in exhausts from automobiles.

DOWN

- 1) Acid rain leaches necessary _____ out of the ecosystem.
- 2) When we test water using the ~~Woot~~ ~~Coal-Hatt~~ water kit, we test for _____ and _____ (ans. to #12 down)
- 3) Another term for acid rain is acid _____.
- 4) Another gas found in exhausts from automobiles. (other than #16 across)
- 5) All of our existing lakes and streams are _____ to the effects of acid rain.
- 6) Wooded area adversely affected by acid rain.
- 7) 5.6 is the pH level of _____ rainwater.
- 8) Acid deposition is not always in the form of rain. It may also be found as a _____.
- 9) Fish caught in acid waters in the U.S., Canada and Sweden have higher concentrations of _____ than fish taken from waters that are not acidic.
- 10) A gaseous layer of the earth's atmosphere that is being depleted due to acid rain.
- 11) Acid rain causes serious damage to our aquatic _____.
- 12) See #2 down
- 13) Acid rain is responsible for the deterioration of the Statue of Liberty and other famous _____.
- 14) Acid rain reduces _____ fertility
- 15) An difference of 7.0 to 6.0 on the pH scale is said to be a _____ increase in acidity.

ALLARM CROSSWORD PUZZLE

ANSWERS

ACROSS	DOWN
1) Liming	1) Nutrients
2) Groundwater	2) Alkalinity
3) Pennsylvania	3) Deposition
4) ALP ₁	4) Nitrogen Oxide
5) Monitor	5) Vulnerable
6) Acidified	6) Forest
7) Buffering Capacity	7) Normal
8) Drinking	8) Dust Particle
9) Industrial	9) Mercury
10) Toxic	10) Drone
11) Emissions	11) Systems
12) Acid Shock	12) pH
13) Trout	13) Monuments
14) Limnology	14) Soil
15) Particulate	15) Tenfold
16) Sulfur Dioxide	

SPEAK UP AND BE HEARD

CONTACT your politicians with a letter or a call at the federal and state levels to urge their support for efforts to curb acid rain.

What is needed is strong legislation reducing emissions from new, as well as existing producers of sulfur dioxides and nitrogen oxides, not more research without action. According to the National Clean Air Coalition, two excellent bills have been introduced at the federal level: Senator Stafford's New Clean Air Act Amendments, S.300 and Senator Mitchell's Acid Deposition Control Act, S.321. NCAC considers the Mitchell bill as the better of the two. Both bills will achieve a fifty percent reduction in acid rain causing pollution and embrace a flexible, least cost approach that allows sources to decide what means they will use to achieve the standards. Both bills are "polluter pays" approaches.

A brand new bill, HR 2666, just introduced by Congressman Sikorski (Minn.) on June 11 reduces SO₂ emissions by 10 million tons and NO_x by 4 million tons and guarantees utility bills will not increase more than 10%. HR 2666 has a good chance on the House floor if it can get out of Committee. In the Senate, the situation is reversed. Getting the Senate bills out of Committee is not a problem, but with Senator Byrd (W. Va) as Senate leader, the bills will probably have problems on the Senate floor.

At the state level, Representative Broujos from Carlisle, who chairs the Bipartisan Caucus on Acid Rain, hopes to introduce a bill to curb acid rain. ALLARM has been attending information meetings for this caucus every Wednesday.

Your delegates try to be sensitive to the concerns of their constituents, so your voice will be heard. Provided is a sample letter and a list of some of the Pennsylvanian delegates to the State Senate and House of Representatives. A complete list may be found at your local library in the Taylor's Encyclopedia of Government Officials: Federal and State by John Clements or by calling your courthouse. If you do not have the time to write your own letter, feel free to fill in and send the sample letter to your representatives.

SUGGESTIONS ON YOUR LETTER TO YOUR REPRESENTATIVE

- 1) Make your letter personal!
- 2) Get friends and neighbors to cosign the letter.

In general, our politicians are ill-informed on the issue of acid rain and seldom receive feedback from the voters. So write a letter and make a difference!

*Send letters to the Senate Post Office (Senators) or the House of Representatives (Legislators).

STATE REPRESENTATIVES

NAME	DISTRICT	CITY	SENATE	STATE SENATOR	DEM	STATE LEGISLATOR	DEM	LEGISLATOR
Charles	Scranton	Scranton	35	Robert W. McLaughlin	D	Art Hareway	D	17
Charles	Jackson	Bedford	36	Robert G. Schallert	D	Dick L. Hunt	D	78
Robert G. Schallert	Scranton	Scranton	37	William J. Morris	D	Halter F. Scharler	D	82
William J. Morris	Scranton	Scranton	38	Robert L. McLaughlin	D	Anthony J. Ciarro	D	83

Dear

I am a member of a volunteer citizens' monitoring group in Pennsylvania called Alliance for Acid Rain Monitoring, ALLARM, and I have witnessed the effects of acid rain first-hand. In my opinion, acid rain is one of the most serious threats to our natural resources. Acid deposition is formed by the air pollutants, sulfur dioxide (SO₂) which comes mainly from coalfired power plants, and nitrogen oxides (NO_x) which comes mainly from automobiles. Acid deposition may take the form of rain, snow, sleet, dew, or fog; or fall to earth as dry particles.

The consequences of inaction are great. Acid deposition is seriously impacting our forests and surface and ground waters, it is corroding our buildings and monuments, and it even contributes to human health problems, through inhalation of the pollutants or through ingestion of polluted drinking water.

Acid rain is a very real and immediate problem in Pennsylvania. Pennsylvania receives the most acid rain in the nation due to its location downwind from the highly industrialized Ohio Valley and Pennsylvania's own SO₂ and NO_x emissions which are ranked third in the U.S. According to the Pennsylvania Fish Commission, about 6,000 miles of trout streams are now threatened by acidification in our state. In addition to the costs of fish loss, tourism, and industries who rely on forests and fresh water resources, Pennsylvanian taxpayers must bear the brunt of damage to monuments and architecture. For example, the corrosion of the battlefield monuments in Gettysburgh has been labeled "The Melting Popsicle Effect". The dome of the State Capitol last year underwent a \$2.2 million renovation which was caused by acid rain. In fact, nationwide the structural damages due to acid rain is costing us over \$5 billion annually. Furthermore, one cannot put a price tag on the premature deaths of as many as 50,000 people nationwide which are attributed to the pollutants associated with acid rain.

As a concerned Pennsylvanian resident, I ask you to support acid rain legislation. While the problem is not confined by state boundaries, action must be taken to drastically reduce these emissions statewide as well as nationwide. Enough evidence as to the existence, causes, and effects of acid deposition is known. As a representative of the people, it is your privilege and responsibility to protect our vulnerable natural resources for the future.

Sincerely,

William J. Morris	Scranton	Scranton	38	Robert L. McLaughlin	D	Anthony J. Ciarro	D	83
Robert L. McLaughlin	Scranton	Scranton	39	Ralph W. Hunt	D	A. Corville Foster, Jr.	D	79
Ralph W. Hunt	Scranton	Scranton	40	Ralph W. Hunt	D	Michael L. Scharler	D	75
Ralph W. Hunt	Scranton	Scranton	41	Robert L. McLaughlin	D	Anthony J. Ciarro	D	83

STATE REPRESENTATIVES

TOWN	VOLUNTEER	COUNTY	SENATE DISTRICT	STATE SENATOR	POL	STATE LEGISLATOR	POL	LEGISLAT DISTRICT
Atglen	Brendle	Chester	36	Noah W. Wenger	R	Art Hershey	R	13
Everett	Jackson	Bedford	30	Robert C. Jubelirer	R	Dick L. Hess	R	78
Honey Grove	Klinedinst	Juniata	33	William J. Moore	R	Walter F. Deverter	R	82
Williams- port	Huggins	Lycoming	23	Roger A. Madigan	R	Anthony J. Cimini	R	83
Duncannon	Miller Thomas Brown	Perry	33	William J. Moore	R	Fred C. Noye	R	86
Elliotts- burg	Egolf	Cumber- land						
Landisburg	Wilson							
Marysville	Adams							
Shippens- burg	Eschenman							
Newville	Coates	Cumber- land	31	John D. Hopper	R	Fred C. Noye	R	86
Camp Hill	Seville Bowers Wilderman Reilly Reilly	Cumber- land	31	John D. Hopper	R	Hal Mowery	R	87
Wormleys- burg								
Grantham	Gehman Petersheim Bonarrigo Cline Grothe	Cumber- land	31	John D. Hopper	R	John Kennedy	R	88
Mechanics- burg								
New Cumber- land								
Fayette- ville	Etchison	Franklin	33	William J. Moore	R	Jeffrey W. Coy	D	89
Waynesboro	Arthur Smith	Franklin	33	William J. Moore	R	Terry Punt	R	90
Carroll Valley	Davis	Adams	33	William J. Moore	R	Kenneth J. Cole	D	91
Gettysburg	Platt							
Littlestown	Bream							
Orrtanna	Hammett							
Dillsburg	Miller Hallisey	York	31	John D. Hopper	R	Bruce Smith	R	92
Loganville	Shoffer	York	28	Ralph W. Hess	R	A. Carville Foster, Jr.	R	93
York	Kirkwood Long Keitsock	York	28	Ralph W. Hess	R	Michael E. Bortner	D	95
Bird-in- Hand	Bare	Lancaster	36	Noah W. Wenger	R	Marvin E. Miller, Jr.	R	96

<u>TOWN</u>	<u>VOLUNTEER</u>	<u>COUNTY</u>	<u>SENATE DISTRICT</u>	<u>STATE SENATOR</u>	<u>POL</u>	<u>STATE LEGISLATOR</u>	<u>POL</u>	<u>LEGISLAT DISTRICT</u>
Lititz	Axelrod	Lancaster	13	Gibson E. Armstrong	R	June N. Honaman	R	97
Elizabeth- town	Kistler Longenecker	Lancaster	13	Gibson E. Armstrong	R	Kenneth E. Brandt	R	98
Ephrata Reamstown	Kerchener Ream	Lancaster	36	Noah W. Wenger	R	Terry R. Scheetz	R	99
Lebanon	Gahres	Lebanon	48	David J. Brightbill	R	George W. Jackson	R	101
Harrisburg	Childe Davenport Dice Egenrieder Ibberson Libeck Mahey Shaefer	Dauphin	15	John J. Shumaker	R	Pete Wambach, Jr	D	103
Dauphin	Corson Flatley Mitzel	Dauphin	15	John J. Shumaker	R	Jeffrey E. Piccola	R	104
Halifax Harrisburg	Frantz Stoner							
Lingles- town	Fetterman	Dauphin	15	John J. Shumaker	R	Joseph C. Mannmiller	R	105
Danville	Prutzman	Montour	27	Ed Helfrick	R	Robert E. Belfanti, Jr	D	107
Tunkhannock	Williams	Wyoming	20	Charles D. Lemmond, Jr	R	Thomas J. Murphy	D	111
Scranton	Haas	Lack- awanna	22	Robert J. Mellow	D	Gaynor Cawley	D	113
Lehighton	Deebel	Carbon	29	James J. Rhoades	R	Keith R. McCall	D	122
Yardley	Broadbent	Bucks	10	Jim Greenwood	R	James L. Wright, Jr.	R	142
Newtown	Baddeley	Bucks	10	Jim Greenwood	R	David W. Heckler	R	143
New Hope	Stout Klyce							
Chester Springs	Dailey	Chester	19	John Stauffer	R	Peter R. Vroon	R	157
Devault	Pill	Chester	19	John Stauffer	R	Robert J. Flick	R	167
Hanover	Cubbison Sunbury Zeman	York	28	Ralf W. Hess	R	Donald W. Dorr	R	193
Boiling Springs Carlisle	Nickerson Withrum Albericic Herrold Spicer	Cumber- land	31	John D. Hopper	R	John H. Broujos	D	199
Dover	Raab	York	28	Ralph W. Hess	R	John H. Broujos	D	199

RETURN TO: Candie C. Wilderman
ALLARM
Dickinson College
Carlisle, PA 17013

ALLIANCE FOR ACID RAIN MONITORING
DATA COLLECTION FORM

Collection date: _____

Time of Day: _____

Name of Monitor: _____

Name of Stream: _____

Air temperature: _____ Water temperature: _____

Weather: 1 Cloudless 2 Partly cloudy 3 Overcast 4 Fog/Haze
5 Drizzle 6 Intermittent 7 Rain 8 Snow
Rain

Water clarity: 1 Clear 2 Slightly cloudy 3 Cloudy 4 Very cloudy

pH _____ ALKALINITY _____ ppm

Other observations or comments:

Collection date: _____

Time of Day: _____

Name of Monitor: _____

Name of Stream: _____

Air temperature: _____ Water temperature: _____

Weather: 1 Cloudless 2 Partly cloudy 3 Overcast 4 Fog/Haze
5 Drizzle 6 Intermittent 7 Rain 8 Snow
Rain

Water clarity: 1 Clear 2 Slightly cloudy 3 Cloudy 4 Very cloudy

pH _____ ALKALINITY _____ ppm

Other observations or comments:

Signature: _____ Date: _____