



**WARNING**  
**THIS IS AN**  
**ACTUAL PHOTO OF**  
**MIKE KORB'S**  
**LAST PRESENTATION**



# Welcome to the 2011 Pennsylvania Statewide Conference on Abandoned Mine Reclamation



**“Working Together for Innovation and Success”**  
**August 5th @ Genetti Inn & Suites Hazleton, PA**

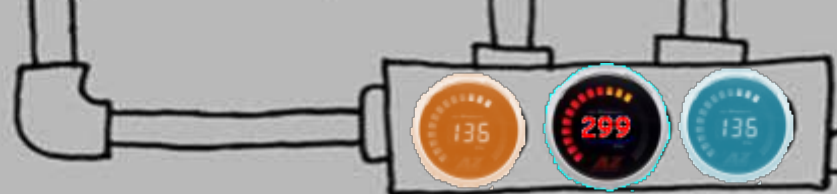
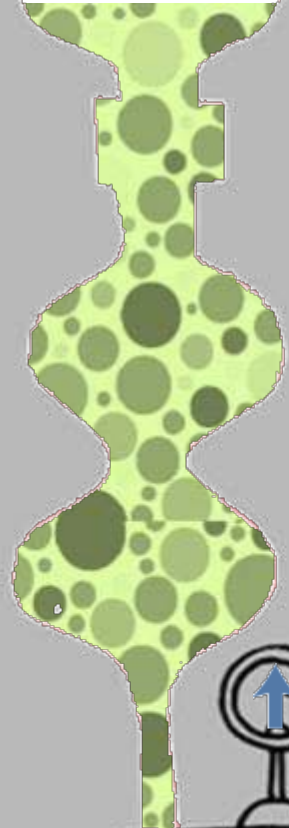


# The Conowingo Tunnel and the Anthracite Mine Flood-Control Project



**Michael C Korb, PE**

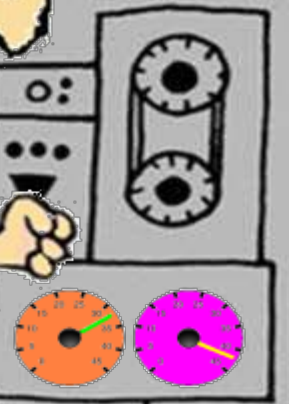
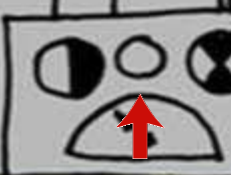
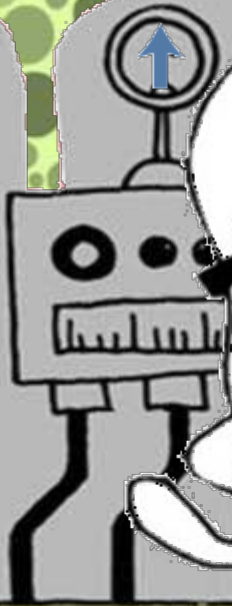
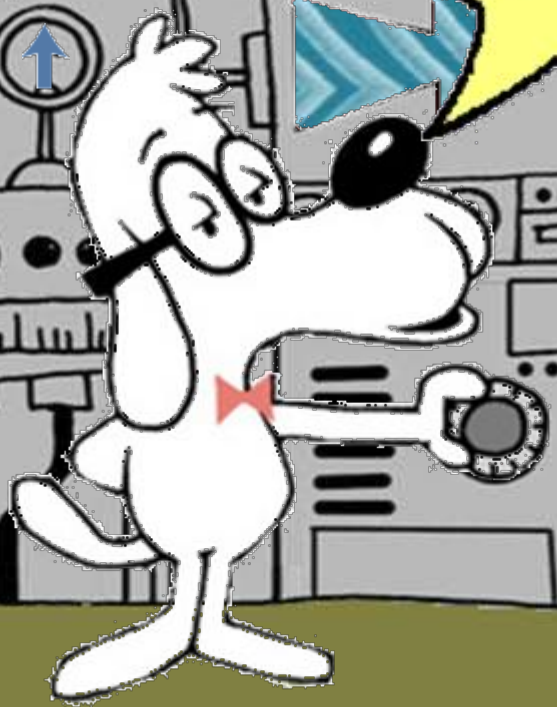
13th Annual PA Conference on Abandoned Mine  
Reclamation and Coal Mine Heritage



MICHAEL, SET THE WABAC TO THE YEAR 1955...



DANGER



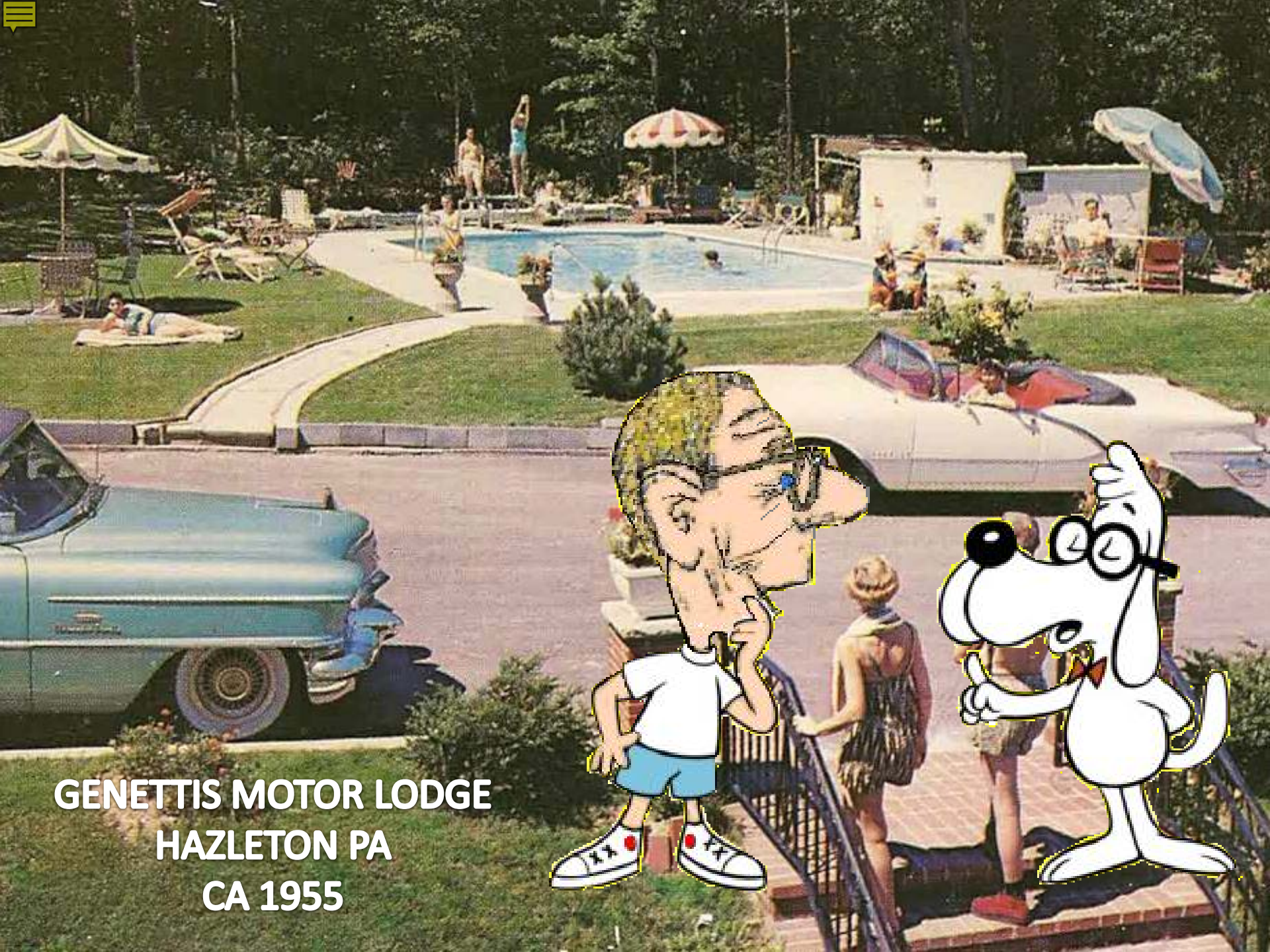


MR PEABODY,  
THEY MADE  
"VERTIGO"  
IN 1958!

THAT'S OK,  
WE HAVE  
TIME TO  
SPARE



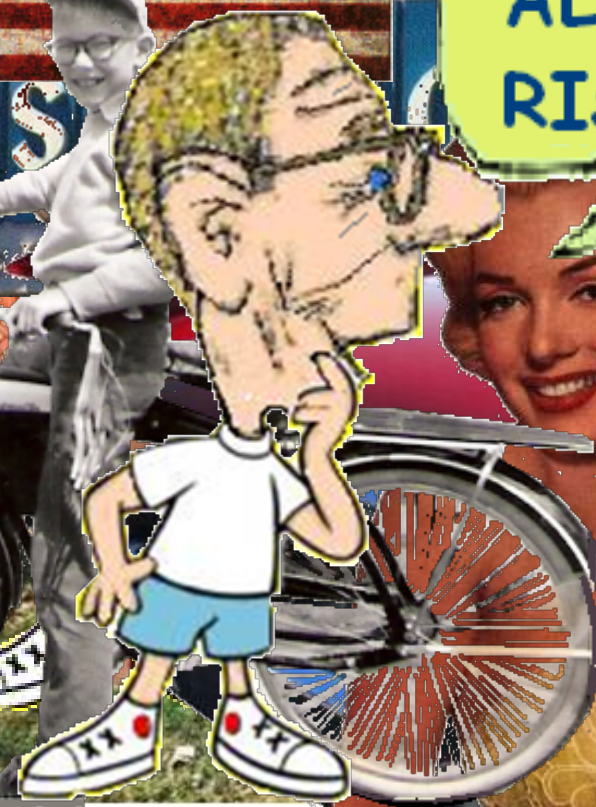
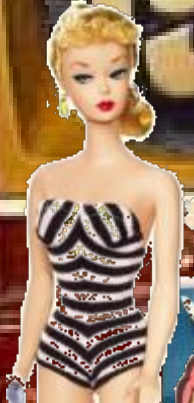




**GENETTIS MOTOR LODGE  
HAZLETON PA  
CA 1955**



THE  
PUN  
ALSO  
RISES?



HULA-HO









**EISENHOWER LOCK  
ST LAWRENCE SEAWAY  
MASSENA NY**



CROSS ROADS AT ST. JOHNS  
INTERSTATE ROUTE I-80&I-81 INTERCHANGE



## AIR FORCE THOR FIRING SUCCEEDS

Defense Dept. Says Missile Lands Short of Target Area; Effectiveness Doubted

CAPE CANAVERAL, Fla., Dec. 7 (AP)—The Air Force's Thor missile was shot skyward in a beautiful launching today but the effectiveness of its flight was in doubt.

The Defense Department in Washington first hailed the firing of the 1500-mile Thor as a success but later said the weapon "landed short of the intended target area."

### Heads Skyward

The long, gleaming white missile left its launching pad sheathed in fire and headed skyward. Then it turned into graceful arc and veered to the southeast over the missile testing range in the Atlantic Ocean.

It was believed the Thor was carrying for the first time a new type guidance "brain." The Defense Department did not confirm this.

A rumbling noise like a dull roar of thunder came from the Thor as it made its majestic flight before

### Berlin Reds Pick

Wagner as Enemy. Effectiveness of its flight was in doubt.

The Defense Department in Washington first hailed the firing of the 1500-mile Thor as a success but later said the weapon "landed short of the intended target area."

### Heads Skyward

The long, gleaming white missile left its launching pad sheathed in fire and

hundreds of sight-seers. A vapor trail, similar to that following in the wake of jet bombers, drifted behind the Thor, which remained visible for more than two minutes. Sight of it was lost over the thick cloud bank.

### Data Withheld

Veteran missile watchers said this was the straightest fired Thor yet. Others have wobbled or wavered in flight.

The Air Force has kept a closed book on information about the Thor. About all that's known about it is that Douglas Aircraft Co. is its main contractor and it has an engine similar to that used by the Army's Jupiter, also a 1500-mile missile.

Both the Thor and Jupiter are in production.

### Seventh Fired

Although the Thor is a ballistic missile—like an artillery shell—it requires some form of inertial guidance to keep it from yawing, pitching or rolling.

This was the seventh Thor to be test-fired. Of the six previous launchings three were successful. The Thor, which remained visible for more than two minutes. Sight of it was lost over the thick cloud bank.

### Data Withheld

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The Air Force has kept a closed book on information about the Thor. About all that's known about it is that Douglas Aircraft Co. is its

## Soviets Reprint U.S. Comment on Rocket Test

MOSCOW, Dec. 7 (AP)—To hammer home American failure yesterday to launch an earth satellite, the Soviet press used the simple device today of republishing acid U.S. and European comment. So ample was the U.S. self-condemnation that none of the Soviet propaganda agencies found it necessary to add any criticism.

They found republication of U.S. official and press comment more than sufficient to emphasize to their own people and the rest of the world Russia's leadership in rocketry.

### Devastating Blow

U.S. press comment as relayed by the Soviet news agency Tass was liberally spiced with such phrases as "devastating blow to American international prestige," "shattering of morale" and "Washington plunged into a gulf of disappointment and dejection."

Press comment from Copenhagen carried such phrases as "terrible fiasco." Tass forwarded from London "American self-sufficiency exploded."

Today of republishing acid U.S. and European comment, so ample was the U.S. self-condemnation that none of the Soviet propaganda agencies found it necessary to add any criticism.

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# New Effort to Fire Satellite Into Space Gets Under Way



## Believed Possible in Month

CAPE CANAVERAL, Fla., Dec. 7 (AP)—A new effort to fire a baby moon into an orbit, possibly this month, got under way here today.

The renewed program, announced at a news conference shortly before a news blackout was imposed here, started off in these primary directions:

1—An airline-crash type investigation of every detail of the launching failure yesterday which destroyed TV-3, the first U.S. satellite-bearing rocket ever fired.

### Seek Exact Cause

The experts urgently need to know exactly what caused the huge vehicle to lose thrust at the very moment of take-off and topple back upon its own fiery tail.

2—An expedited effort to "clean up" the fire-damaged launching stand and the concrete-paved area surrounding it.

The flight equipment necessary for the second Vanguard was already in a hand-

LONDON GETS THE NEWS—Headlines in London urge to launch a satellite with Vanguard rocket.



**FIRST COMMERCIAL  
"ATOMIC" POWER PLANT  
SHIPPINGPORT PA**

Wow! Now  
**CHEMCRAFT**  
has **ATOMIC ENERGY!**



MR PEABODY,  
SHOULD I BUY A  
NEW ATOMIC  
ENERGY PLAYSET?

MICHAEL,  
A WISE MAN  
KNOWS WHATS  
WATT



*Safe! Exciting! Real!*  
**ATOMIC ENERGY**  
*Exclusive with CHEMCRAFT!*

# PENNSYLVANIA ANTHRACITE MINING IN THE 1950s

MINES THAT  
AREN'T DEEP ARE  
LIKELY TO BE  
UNDERMINED

OH,  
MR PEABODY!



HAZLETON SHAFT  
COLLIERY



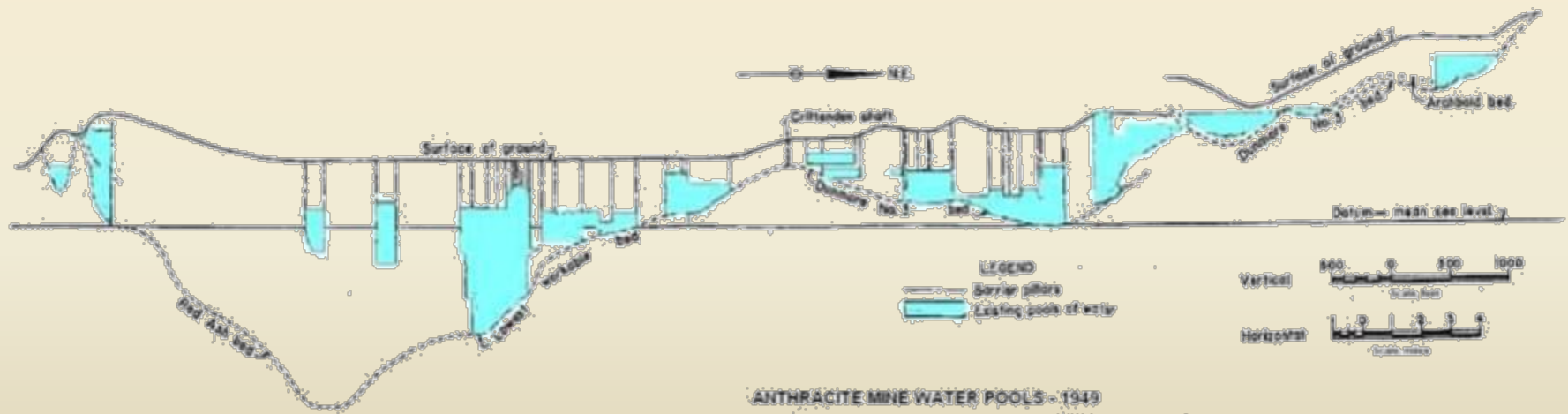
## KNOX MINE DISASTER

On January 22, 1959, twelve men died in a tragic accident at the River Slope Mine near this site. The mine had been illegally excavated beneath the Susquehanna River at the direction of the Knox Coal Company. When the force of the ice-laden river broke the thin layer of rock, over ten billion gallons of water flowed through this and other mines. This disaster ended deep mining in much of the Wyoming Valley.

PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION

1999





ANTHRACITE MINE WATER POOLS - 1949

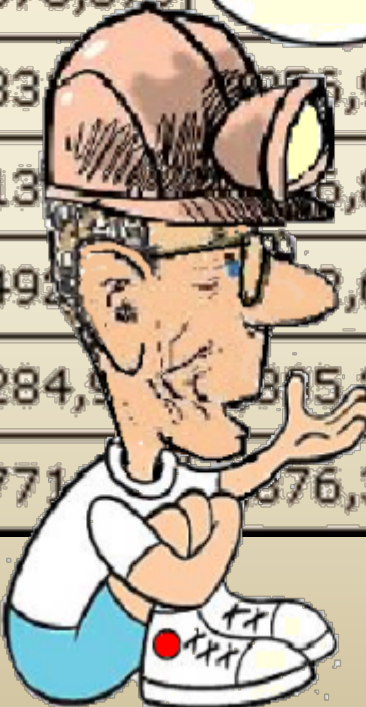
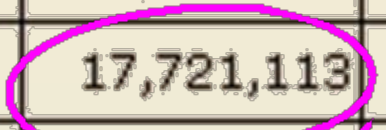
U.S. GEOLOGICAL SURVEY

# ANTHRACITE COAL MINING ACTIVITIES 1920 to 2009

| Year | Total Production (tons) | Surface Mined (tons) | Coal Refuse (tons) | Employees |
|------|-------------------------|----------------------|--------------------|-----------|
| 1920 | 89,636,036              | 5,010,364            | 5,010,364          | 149,117   |
| 1940 | 51,526,454              | 6,010,364            | 6,010,364          | 90,790    |
| 1951 | 42,389,055              | 11,376,379           | 11,376,379         | 57,000    |
| 1957 | 25,162,486              | 7,831,998            | 7,831,998          | 35,000    |
| 1960 | 17,721,113              | 7,136,803            | 7,136,803          | 25,000    |
| 1972 | 6,462,093               | 3,492,658            | 3,492,658          | 10,000    |
| 1973 | 6,293,019               | 3,284,915            | 3,284,915          | 9,000     |
| 2009 | 6,817,771               | 3,76,312             | 3,76,312           | 727       |

Mr Peabody, how can any of the anthracite companies still be in business?

It must be obvious that it's a miner miracle.



YEARS IN WHICH ACTIVE MINING CEASED, SELECTED ANTHRACITE COLLIERIES

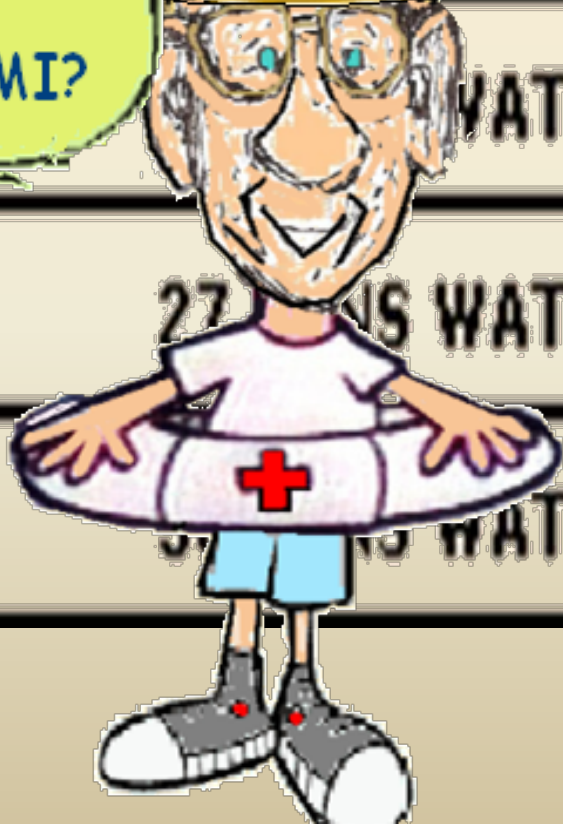
| 1950      | 1951        | 1952          | 1953          | 1954           | 1955             | 1956         | 1957         | 1958        | 1959           |
|-----------|-------------|---------------|---------------|----------------|------------------|--------------|--------------|-------------|----------------|
| BUCK RUN  | COLKET      | CAPOUSE       | ALASKA        | BEAVER MEADOW  | EXETER           | LANSFORD     | BALTIMORE    | INDIAN HEAD | LOREE          |
| CRANBERRY | NATALIE     | GREENWOOD     | CONTINENTAL   | FORTY FORT     | HEIDELBERG       | NESQUEHONING | BUTLER       | DORRANCE    | HYDE PARK      |
|           | OTTO        | HARWOOD NORTH | DERINGER      | GAYLORD        | HUMBOLDT NORTH   | OLD FORGE    | DELAWARE     | EWEN        | POWDERLY       |
|           | SILVERBROOK | HARWOOD SOUTH | HAMMOND       | GILBERTON      | HUMBOLDT SOUTH   | PINE KNOT    | ECKLEY       | HENERY      | COALDALE       |
|           |             | JOLIET        | HIGHLAND No 5 | HARRY E        | KNICKERBOCKER    |              | NUMBER 9     | JERMYN      | GERMANTOWN     |
|           |             | KINGSTON      | MAPLE HILL    | JEDDO BASIN    | SUSQUEHANNA No 7 |              | PINE RIDGE   | LANCE       | HAZLETON SHAFT |
|           |             | MAHANOY       | MOREA         | LOCUST GAP     |                  |              | SPRING BROOK | PACKER No 5 |                |
|           |             | MALTBY        | MT LOOKOUT    | OAK HILL       |                  |              | WILLIAM A    | PARK No 1&2 |                |
|           |             | MARKSON       | NOTTINGHAM    | ST CLAIR       |                  |              |              | POTTS       |                |
|           |             | MARVINE       | PHOENIX PARK  | SULLIVAN TRAIL |                  |              |              | SCHOOLEY    |                |
|           |             | ONEIDA NORTH  | PROSPECT      | TAMAQUA        |                  |              |              | STOCKTON    |                |
|           |             | ONEIDA SOUTH  | TOMHICKEN     |                |                  |              |              |             |                |
|           |             | RELIANCE      |               |                |                  |              |              |             |                |
|           |             | WESTMORELAND  |               |                |                  |              |              |             |                |

**DURING THE 1950s,  
72% OF THE ANTHRACITE  
COLLIERIES CLOSED**



| YEAR | WATER PUMPED: PA ANTHRACITE COAL MINED RATIO |
|------|--|
| 1921 | 1 TON WATER: 1 TON COAL                      |
| 1941 | 1 TON WATER: 1 TON COAL                      |
| 1971 | 1 TON WATER: 1 TON COAL                      |
| 2001 | 1 TON WATER: 1 TON COAL                      |

WATER you going to do?  
TSUNAMI?





From 1944 to 1954 engineers of the USBM Anthracite Flood-Prevention Section carried out a study to suggest potential solutions to the mine water problem in anthracite.

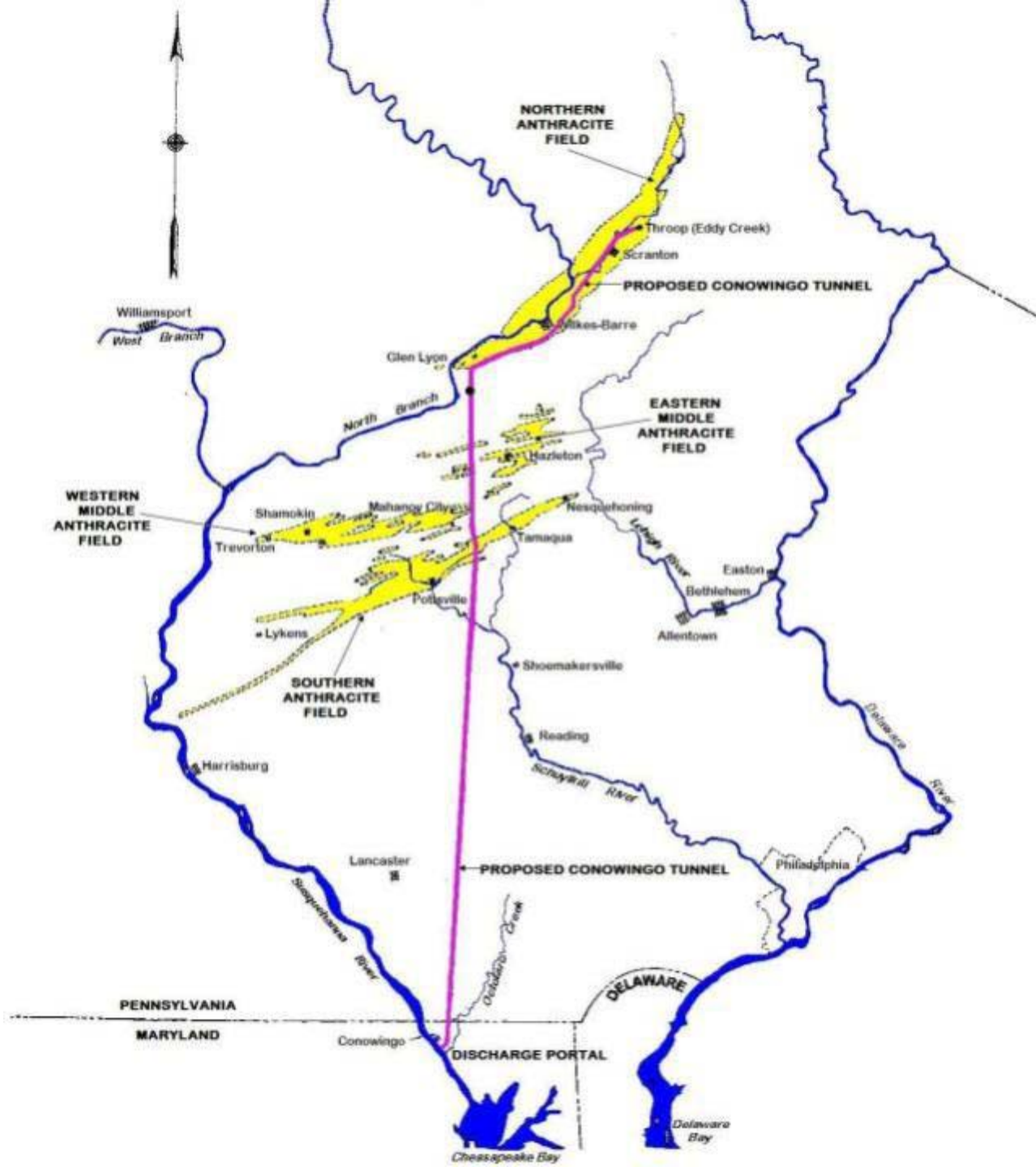
In the course of this study the USBM published 25 bulletins, information circulars, reports of investigations, and technical papers on all aspects of the mine water problem, such as pumping records of all mines, underground mine water pools, condition of barrier pillars, evaluation of surface and stream bed seepages, corrosion properties of mine water, and mapping of the buried valley of the Susquehanna River.

The engineering study made comprehensive recommendations for possible solutions of the anthracite mine water problem.



# The Conowingo Tunnel









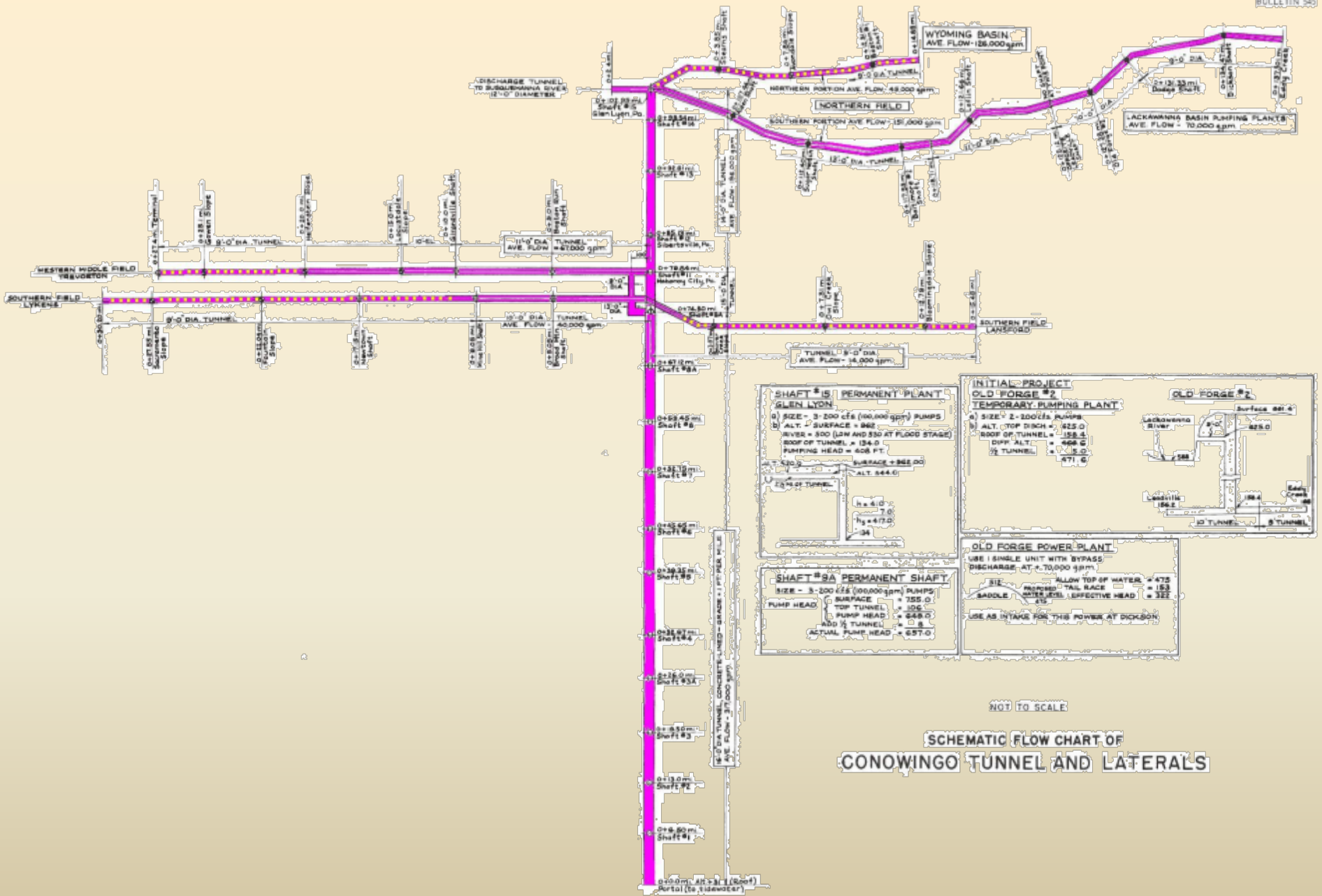
**EAGLE ROCK RESORT, 1700' ABOVE  
ELEVATION OF THE CONOWINGO TUNNEL**





## The Conowingo Tunnel

- A single circular concrete-lined tube 137 miles long
- 9' diameter ( $\Phi$ ) at the inlet in the Eddy Creek Mine, Throop PA
- 16'  $\Phi$  at the discharge portal on Octoraro Creek near Conowingo MD
- Gradient of 1 foot per mile
- Design flow of 280,000 GPM - Capacity of 381,000 GPM
- At Eddy Creek the invert would have been 152' above sea level (700' below the surface)
- At Conowingo the invert would have been 15' elevation
- Several lateral and connector tunnels (most not part of the cost)
- Fifteen new shafts for construction and maintenance
- Rehabilitation of another 15 existing mine shafts
- Two emergency pumping plants with 300,000 GPM capacity each
- “estimated” cost \$280,292,163 in 1954 (\$3.8 billion in today's dollars)
- Five to ten-year construction period.





## MAJOR ANTHRACITE MINE WATER DISCHARGES (all data approximate)

| Description                 | Discharge (CFS) | Discharge (GPM) | pH  | Sulfate (mg/L) | Iron (mg/L) | Manganese (mg/L) |
|-----------------------------|-----------------|-----------------|-----|----------------|-------------|------------------|
| <b>NORTHERN FIELD</b>       |                 |                 |     |                |             |                  |
| Jermyn Slope                | 26              | 11,500          | 5.8 | 205            | 1           | 1                |
| Peckville Shaft             | 14              | 6,000           | 5.6 | 160            | 1           | 1                |
| Old Forge Borehole          | 83              | 37,000          | 6.0 | 600            | 33          | 4                |
| Duryea Breech               | 20              | 9,000           | 6.1 | 505            | 37          | 5                |
| Solomon Creek Boreholes     | 30              | 13,000          | 5.7 | 1220           | 190         | 11               |
| Airshaft Number 22          | 16              | 7,200           | 5.8 | 760            | 74          | 7                |
| <b>EASTERN MIDDLE FIELD</b> |                 |                 |     |                |             |                  |
| Beaver Meadows Tunnel       | 13              | 6,000           | 3.7 | 160            | 1           | 3                |
| Jeddo Tunnel                | 83              | 37,000          | 3.8 | 515            | 4           | 8                |
| Audenreid Tunnel            | 12              | 6,000           | 3.4 | 290            | 2           | 4                |
| <b>WESTERN MIDDLE FIELD</b> |                 |                 |     |                |             |                  |
| Gilberton Pump              | 15              | 7,000           | 6.1 | 820            | 53          | 13               |
| Packer Number 5             | 35              | 16,000          | 6.1 | 1000           | 32          | 10               |
| Scott Ridge Mine            | 11              | 5,000           | 5.4 | 680            | 41          | 5                |
| <b>SOUTHERN FIELD</b>       |                 |                 |     |                |             |                  |
| Greenwood Mine              | 17              | 8,000           | 6.7 | 1400           | 21          | 9                |
| Pine Knot Mine              | 16              | 7,000           | 5.9 | 335            | 9           | 4                |

| <b>ESTIMATED MINE DRAINAGE TO CONOWINGO</b>      |            |                |
|--|------------|----------------|
|  | (CFS)      | (GPM)          |
| NORTHERN FIELD                                   | 618        | 277,000        |
| WESTERN MIDDLE FIELD                             | 149        | 67,000         |
| SOUTHERN FIELD                                   | 121        | 54,000         |
| <b>CONOWINGO TOTAL</b>                           | <b>888</b> | <b>398,000</b> |
| <b>ESTIMATED MINE DRAINAGE REMAINING IN NEPA</b> |            |                |
| <b>EASTERN MIDDLE</b>                            | <b>107</b> | <b>58,000</b>  |



**Newport Cemetery**



Route 309 Tamaqua



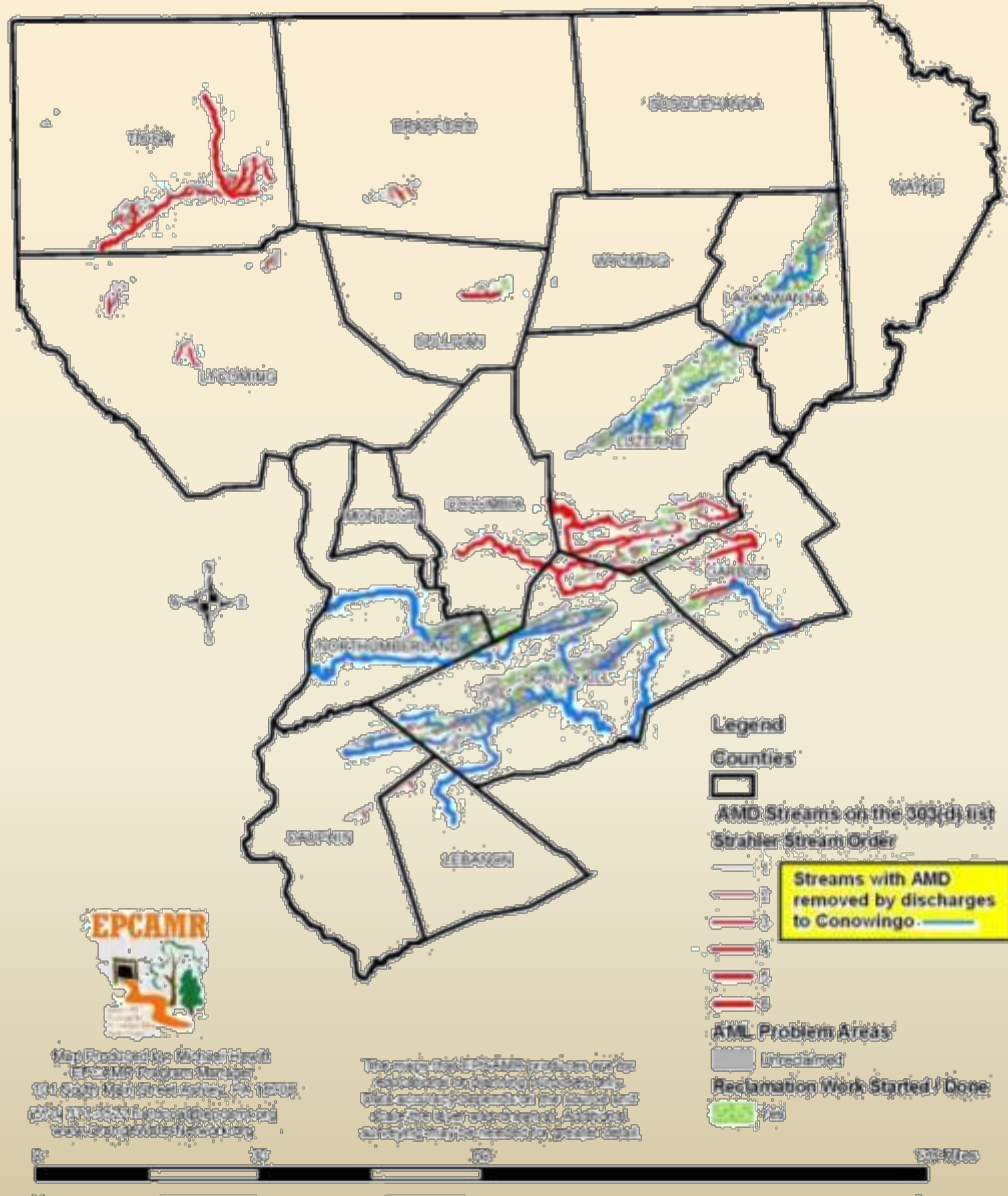
**Excelsior**





Mahanoy Creek

# EPCAMR Regional Coverage Area: Anthracite and Northern Bituminous Coal Fields of Pennsylvania



Map Produced by: Michael Hood  
EPCAMR Regional Manager  
101 South Main Street, Suite 10100  
P.O. Box 10000, Harrisburg, PA 17105  
www.epcamr.org

The map is not a guarantee of the  
accuracy of the information. It is  
provided for informational purposes  
only. It is not intended to be used  
for any other purpose.

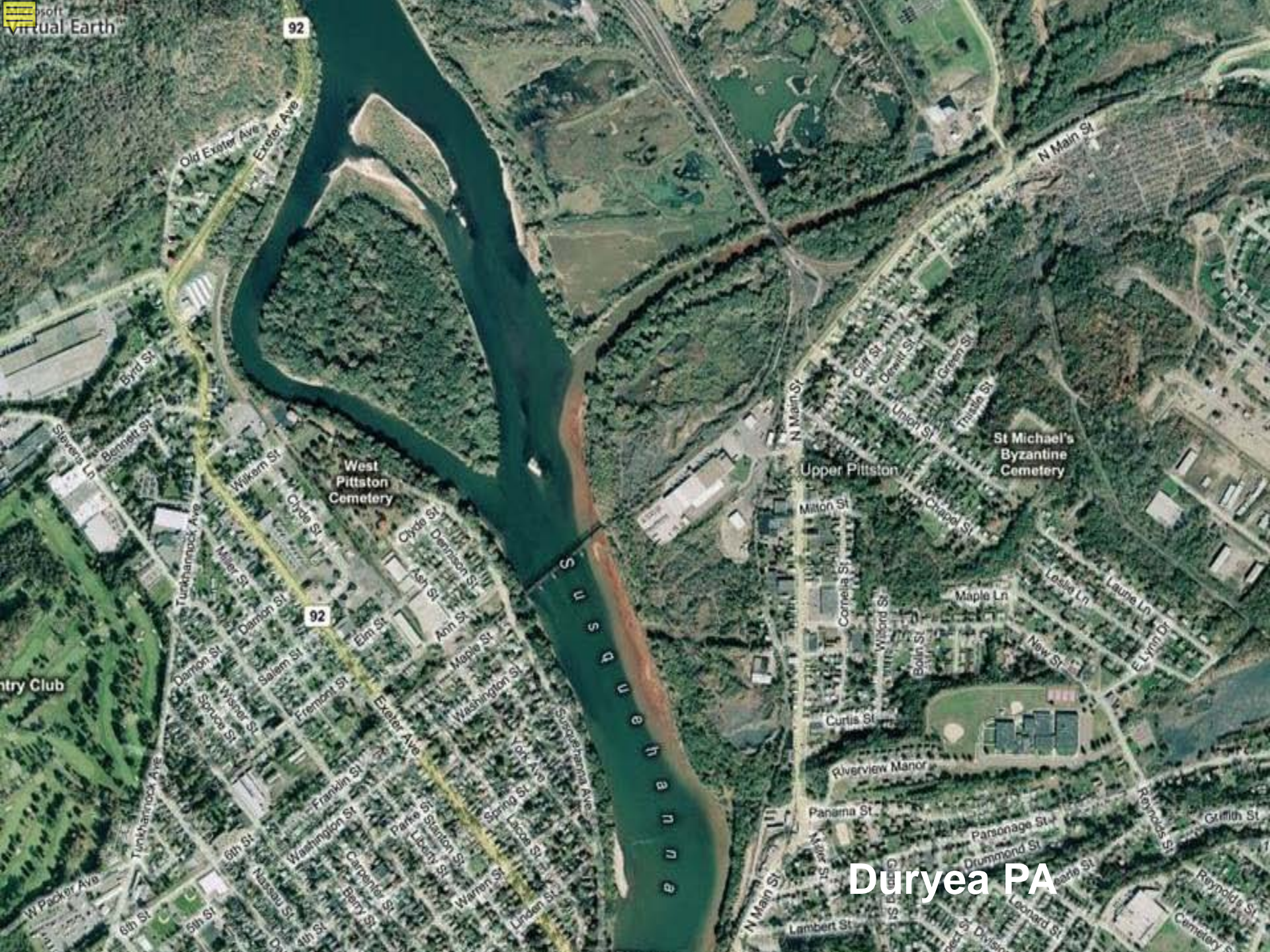




**JEDDO TUNNEL**  
**DRUMS PA**



**SCOTT RIDGE DISCHARGE  
KULPMONT PA**



92

92

West Pittston Cemetery

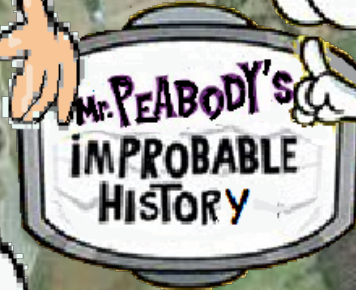
St Michael's Byzantine Cemetery

Upper Pittston

Duryea PA



MICHAEL,  
TEACHING  
HISTORY IS  
OLD NEWS



CONOWINGO MD

An aerial satellite view of a landscape, likely in the anthracite region. A prominent river or stream flows through the center, surrounded by agricultural fields and some industrial or mining structures. The text is overlaid on this image.

## Reasons the Anthracite Mine Drainage Commission Gave for Recommending the End of the Tunnel Project

- *borrowing \$400 million @3% interest would cost \$12 million/year vs. pumping costs of \$8.5 million;*
- *The danger of lowering the water table in the limestone area south of the mine lands;*
- *special land condemnation legislation in PA and MD would be required for the rights-of-way and shaft locations and rock disposal;*
- *high standby costs for power at pump stations;*
- *communities in the anthracite region might lose their stream sources of drinking water during low flow periods;*
- *possible damage to aquatic habitat and wildlife such as oyster beds in the Chesapeake Bay;*
- *The inability of the anthracite companies to financially participate in the plan.*

An aerial satellite image of a river basin, likely the Susquehanna River. The river is a prominent reddish-brown line winding through a landscape of green fields and brownish terrain. A red pin is placed on the river. The text is overlaid on the image in yellow.

In its 2010 State of the Susquehanna Report, the Susquehanna River Basin Commission stated:

***“The effects of abandoned mine drainage on the Chesapeake Bay may not be immediately apparent, but AMD has an effect on upstream reaches in the Susquehanna basin, which then can impact the Bay ecosystem.”***

**Obviously the Tunnel would have made the effects of abandoned mine drainage immediately apparent to the Bay and the introduction of the AMD in a large slug in the estuary without the dilution and settling in the River likely would have caused a substantially different impact on the Bay ecosystem.**

**However, it would have also cleaned up some 400 miles of rivers and streams that are impaired by AMD.**



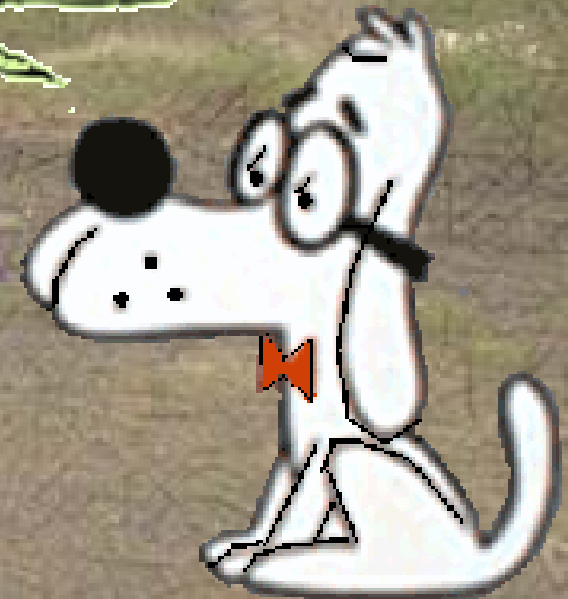


I'M GOING TO  
TAKE NOTES -  
THIS MAY BE  
IMPORTANT!

TO WRITE WITH  
A BROKEN PENCIL  
IS POINTLESS



# The Anthracite Mine Flood-Control Project



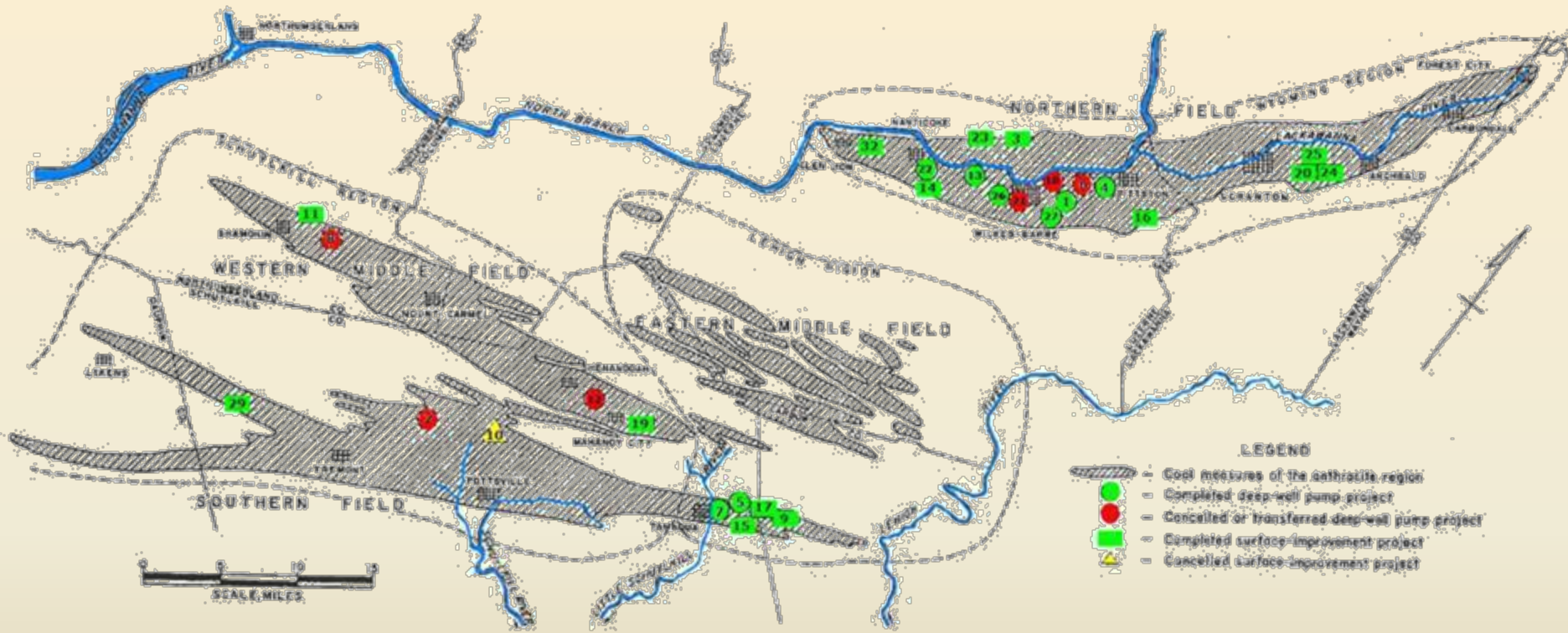
**In 1954 the Conowingo Tunnel Project was shelved, because of its magnitude and scope of expenditures, in favor of a short-range "action plan" of more limited scope and cost.**

**The General Assembly of Pennsylvania and the 84th Congress of the U. S. enacted legislation that established a State-Federal Mine Drainage Program, for which a total appropriation of \$17million was to be made available and \$7million was spent.**

**The Federal government established a Branch of Mine Drainage in the USBM Branch of Anthracite, and the Pennsylvania legislation authorized the Department of Mines and Mineral Industries Mine Drainage Program to formulate and execute projects under the acts.**

**Actual work done under the State-Federal flood control program included installation or construction of three major types of facilities designed to assist the operating companies in their individual and cooperative efforts to reduce pumping costs and prevent the flooding of active mines:**

- 1) Electrically driven deep-well pumps to be placed in shafts or boreholes of idle and abandoned mines.**
- 2) Stream bed improvement to materially reduce stream bed seepage.**
- 3) Surface improvement to reduce surface seepage by diversion.**



LOCATION OF FEDERAL/COMMONWEALTH MINE WATER CONTROL PROJECTS



**TAMAQUA #14**  
**today**

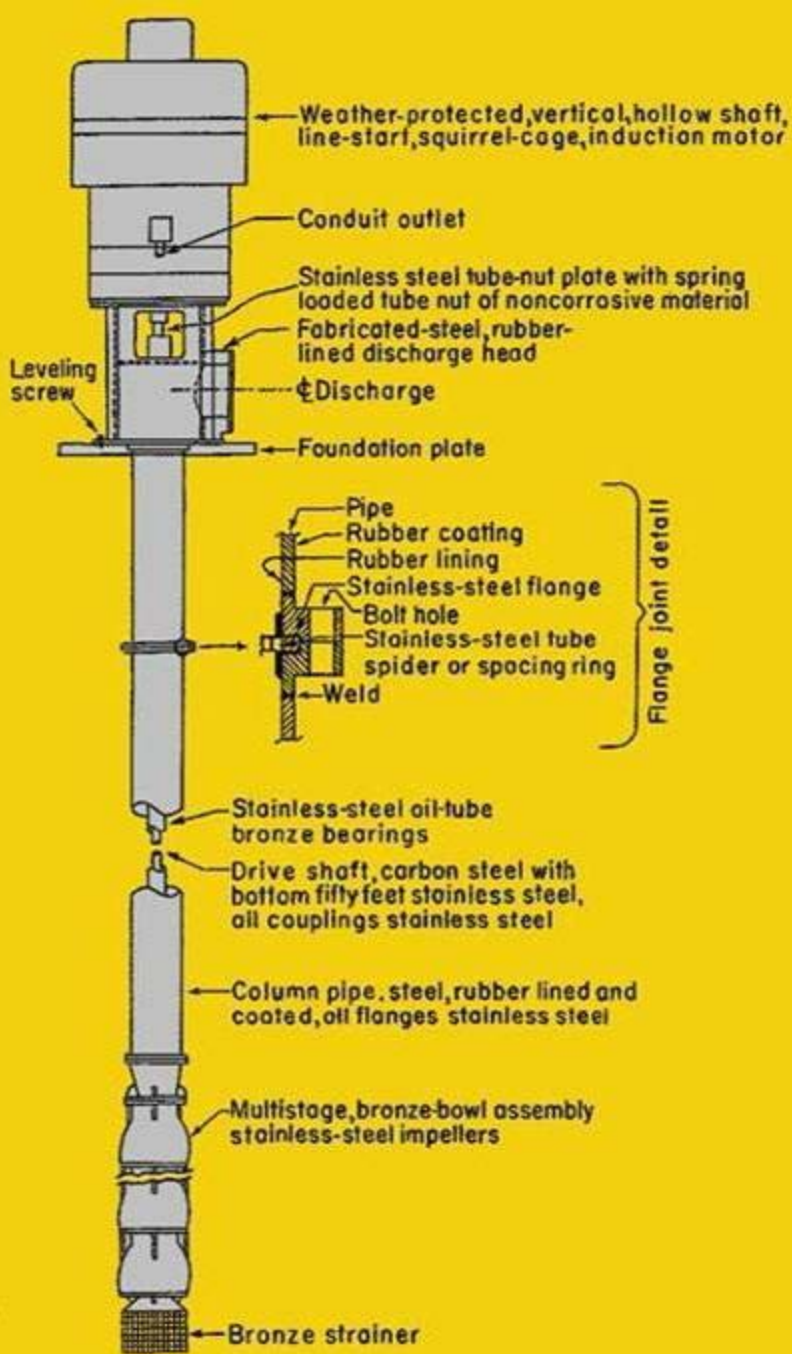


I'M RUNNING  
OUT OF BAD  
PUNS!



I BELIEVE HE  
IS BECOMING A  
BIT OF A  
PUN-GENT

**TAMAQUA #14**  
**today**



Principal Features of a Deep-Well Pump



DEEPWELL PUMP INSTALLATION  
GILBERTON PA



**STREAMBED IMPROVEMENT**

**NANTICOKE PA**

**2000**



# STREAMBED IMPROVEMENT



Chestnut St

315

Atwell Dr

Atwell Dr

Wood St

81

LITTLE MILL CREEK  
BUTLER MINE SEEPAGE  
DUPONT PA

81





# IMPROVEMENTS TO DIVERT SURFACE WATER

COALDALE PA



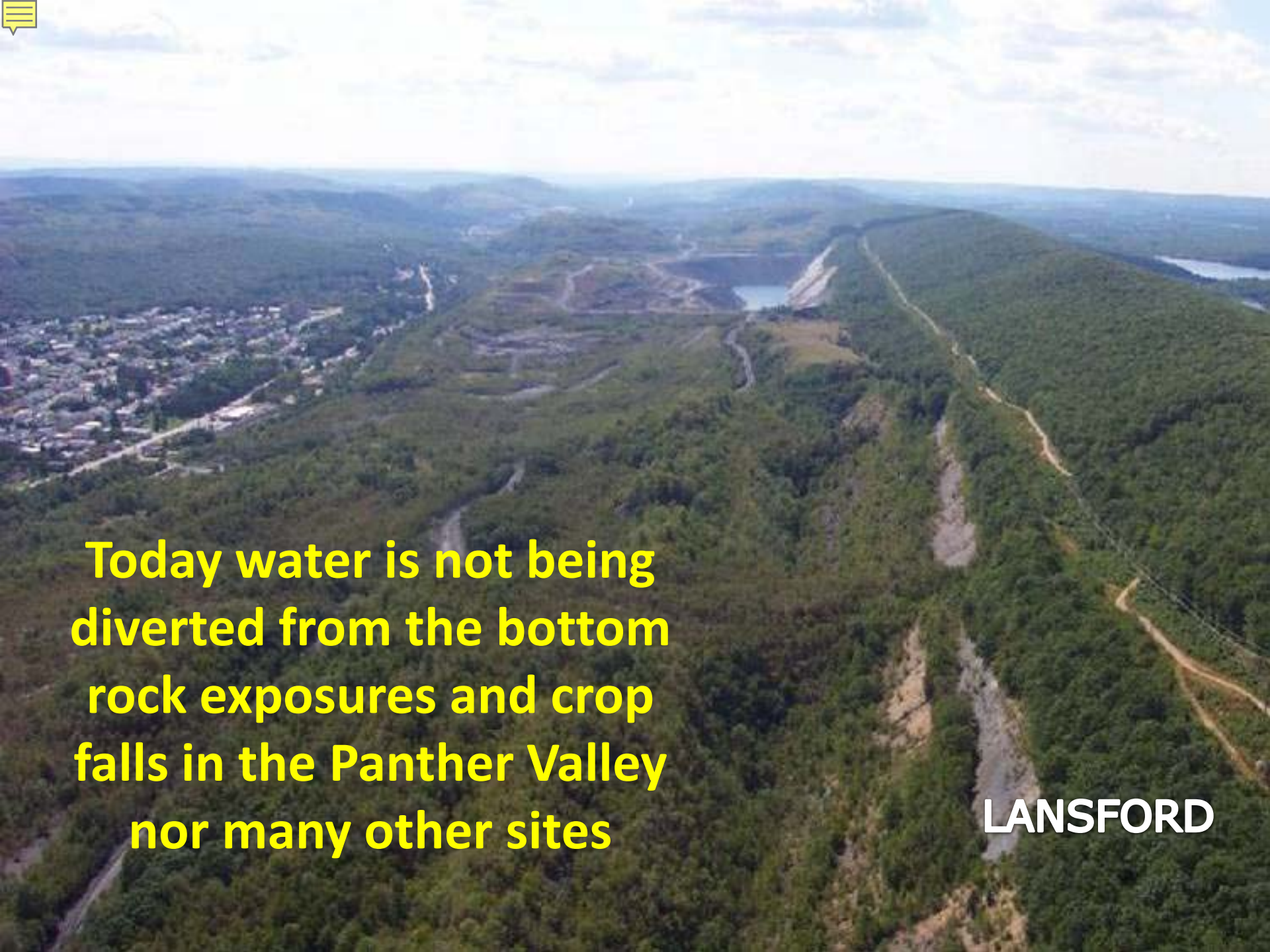


Operation and maintenance of the projects was dependent upon the large companies that were in financial stress and soon went out of business, and few, if any of the projects were maintained.

The benefits of the ditch installations, diversions and stream bed improvement only lasted for a short time.

← Coaldale flume today





**Today water is not being diverted from the bottom rock exposures and crop falls in the Panther Valley nor many other sites**


**LANSFORD**



**Streams in Nanticoke,  
Pittston, Plymouth and other  
sites are disappearing into  
the mines**

**PLAINS**



A large, powerful gush of water spraying upwards from a wooded area, likely a mine drainage point. The water is white and turbulent, creating a thick mist. The background shows bare trees and a clear blue sky.

**And mine  
drainage gushes  
from the  
tunnels,  
boreholes, strip  
pits, and other  
openings  
whenever it  
rains hard**

**BIG MINE RUN**



- Mine drainage treatment is expensive and the magnitude of the mine drainage problem in Pennsylvania is great.
- Estimates to correct the entire AMD problem exceed \$5 billion in capital costs alone.
- With current technology, there would be a tremendous ongoing operation and maintenance cost as well, which would reduce the amount that could be spent on capital construction of new treatment systems.
- At current estimates, Pennsylvania could potentially focus up to \$400 million toward AMD problems over the next 15 years which means that a vast majority of mine drainage problems will not be addressed through the AML Program during this time period unless less costly technologies are implemented.

## Mine Drainage Treatability and Project Selection Guidelines

Developed jointly by the Pennsylvania Department of Environmental Protection, Bureau of Abandoned Mine Reclamation and the Office of Surface Mining Reclamation and Enforcement, Harrisburg Field Office.



AMD Treatability and Project Selection Workgroup Participants:

Eric Cantone  
Dan Chinnice  
Paul Kishner  
Frank Wozniak  
Mark Allen

Clarke Office  
Clarke Office  
Wilkes-Barre Office  
Harrisburg Field Office  
Harrisburg Field Office

PA-007, Bureau of Abandoned Mine Reclamation  
PA-1007, Bureau of Abandoned Mine Reclamation  
PA-2007, Bureau of Abandoned Mine Reclamation  
PA-3007, Bureau of Abandoned Mine Reclamation  
EPA, Office of Surface Mining



June 18, 2008

- Landowners are not required to abate, prevent, remediate, or ameliorate abandoned mine drainage from their properties.
  - They are not required to divert drainage from abandoned mine features, nor in some cases, from active mine openings.
  - They have no responsibility for the environmental damage caused by mine drainage from abandoned discharges
  - Many of them do not want the open strip pits filled because they may be remined in the future.
- 
- Landowners should be encouraged to divert water from mine openings they do not want to have reclaimed.
  - Regulations to prevent highways, active mine operations, municipalities, and developments from directing water into underground mine openings should be promulgated.
  - Consideration should be given to making diversion of water from mine pools the highest priority of the use of AML Program AMD reclamation money.



“Almost all of the problems that we have had on any of our systems on the Catawissa can be traced back to storm events when we had extremely high flows through the discharges. If a way can be found to slow down or even stop streams [and storm water drainage systems] from entering the underground mine system it would not only help to then have continuous treatment of AMD but also reduce considerably repair costs due to frequent high water events. The only way we are going to be able to have reliable, long term treatment of AMD on these systems, in my estimation, is to stop the incursion of surface streams [and storm water drainage systems] into the mine drainage system especially during storm events.” – Ed Wytovich





**There will never be enough money available to construct, operate and maintain treatment facilities for Pennsylvania's Mine Drainage.**

**Urge your legislature and the DEP to make laws and regulations prevent surface water from entering the Northeast Pennsylvania's Mine Pools.**

**Utilize AML Set-Aside and future Growing Greener funding to keep water out of the mines rather than for treating it when it leaves them.**





GOT ANY MORE IDEAS, MR. PEABODY?



I ALWAYS HAVE MORE IDEAS, MICHAEL

'PUN' BACKWARDS IS 'NUP'. AND A NUP IS A NUP



[mkorb@pa.gov](mailto:mkorb@pa.gov)  
570-826-2371

[www.dep.state.pa.us](http://www.dep.state.pa.us)

I know.  
They're  
ALL bad!

Hey, some  
of those  
puns weren't  
half bad!



THE MINE SHOW

[www.onemine.org](http://www.onemine.org)

[pa.water.usgs.gov](http://pa.water.usgs.gov)

[www.oldforgecoalmine.com/Anthracite%20Archives](http://www.oldforgecoalmine.com/Anthracite%20Archives)

[www.portal.state.pa.us/portal/server.pt/community/environmental\\_heritage](http://www.portal.state.pa.us/portal/server.pt/community/environmental_heritage)

[www.portal.state.pa.us/portal/server.pt/community/abandoned\\_mine\\_reclamation](http://www.portal.state.pa.us/portal/server.pt/community/abandoned_mine_reclamation)