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...
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?
AIR FORCE THOR FIRING SUCCCEDES

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 sat in its launching pad, shot in fire and headed skyward. Then it turned into graceful arcs and veered to the southeast over the Atlantic Ocean. It was believed the Thor was carrying for the first time the 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

Woman as Enemy

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Heads Skyward

The long, gleaming white missile sat in its launching pad, shot in fire and headed skyward. Then it turned into graceful arcs and veered to the southeast over the Atlantic Ocean. It was believed the Thor was carrying for the first time the new type guidance “brain.” The Defense Department did not confirm this.

New Effort to Fire Satellite Into Space Gets Under Way

Soviets Reprint U.S. Comment on Rocket Test

MOSCOW, Dec. 7 (UPI)—To hammer home American failure yesterday to launch an earth satellite, the Soviet press used the simple device of reprinting 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 press was literally spiced with such phrases as “devastating blow to America’s prestige,” “shattering of morale” and “Washington plunged into a sea of disappointment and selection.”

Press comment from Crimea carried by the Soviet press was tersely put: “terrific fiasco,” “far from forward America’s self-congratulations.”

They found publication 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.

Believed Possible in Month

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

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

1. An airplane-crank type investigation of every detail of the launching failure yesterday which cleared 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. Said the weapon “landed short of the intended target area.”

The flight equipment necessary for the second Vanguard launch was already on hand.
FIRST COMMERCIAL “ATOMIC” POWER PLANT
SHIPPINGPORT PA
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.
<table>
<thead>
<tr>
<th>Year</th>
<th>Total Production (tons)</th>
<th>Surface Mined (tons)</th>
<th>Coal Refuse (tons)</th>
<th>Employees</th>
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<tr>
<td>1920</td>
<td>89,636,036</td>
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<td>149,117</td>
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<tr>
<td>1940</td>
<td>51,526,454</td>
<td>6,010,364</td>
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<td>90,790</td>
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<td>1951</td>
<td>42,389,055</td>
<td>11,376,379</td>
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<td>79,577</td>
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<td>29,163,466</td>
<td>7,888,166</td>
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<td>17,721,113</td>
<td>7,135,803</td>
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<td>16,801</td>
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<td>6,162,093</td>
<td>3,492,658</td>
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<td>6,293,049</td>
<td>3,284,575</td>
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<td>8,526</td>
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<td>2009</td>
<td>6,811,771</td>
<td>1,771,876</td>
<td></td>
<td>727</td>
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</table>

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

<table>
<thead>
<tr>
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<td>CAPOUSE</td>
<td>ALASKA</td>
<td>BEAVER MEADOW</td>
<td>EXETER</td>
<td>LANSFORD</td>
<td>BALTIMORE</td>
<td>INDIAN HEAD</td>
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<td></td>
<td>CRANBERRY</td>
<td>NATALIE</td>
<td>GREENWOOD</td>
<td>CONTINENTAL</td>
<td>FORTY FORT</td>
<td>HEIDELBERG</td>
<td>NESQUEHONING</td>
<td>BUTLER</td>
<td>DORRANCE</td>
<td>HYDE PARK</td>
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<td>HARWOOD NORTH</td>
<td>DERINGER</td>
<td>GAYLORD</td>
<td>HUMBOLDT NORTH</td>
<td>OLD FORGE</td>
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<td>EWEN</td>
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<td>SILVERBROOK</td>
<td>HARWOOD SOUTH</td>
<td>HAMMOND</td>
<td>GILBERTON</td>
<td>HUMBOLDT SOUTH</td>
<td>PINE KNOT</td>
<td>ECKLEY</td>
<td>HENERY</td>
<td>COALDALE</td>
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<td></td>
<td>JOLIET</td>
<td>HIGHLAND No 5</td>
<td>HARRY E</td>
<td>KNICKERBOCKER</td>
<td></td>
<td></td>
<td></td>
<td>NUMBER 9</td>
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<td></td>
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<td>MAPLE HILL</td>
<td>JEDDO BASIN</td>
<td>SUSQUEHANNA No 7</td>
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<td>PINE RIDGE</td>
<td>LANCE</td>
<td>HAZLETON SHAFT</td>
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<td></td>
<td>MAHANOY</td>
<td>MOREA</td>
<td>LOCUST GAP</td>
<td></td>
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<td>SPRING BROOK</td>
<td>PACKER No 5</td>
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<td></td>
<td>MALTBY</td>
<td>MT LOOKOUT</td>
<td>OAK HILL</td>
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<td></td>
<td></td>
<td>WILLIAM A</td>
<td>PARK No 1&amp;2</td>
<td></td>
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<tr>
<td></td>
<td>MARKSON</td>
<td>NOTTINGHAM</td>
<td>ST CLAIR</td>
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<td></td>
<td>MARVINE</td>
<td>PHOENIX PARK</td>
<td>SULLIVAN TRAIL</td>
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<td>SCHEELS</td>
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<td>ONEIDA NORTH</td>
<td>PROSPECT</td>
<td>TAMAQUA</td>
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<td>STOCKTON</td>
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<td>ONEIDA SOUTH</td>
<td>TOMHICKEN</td>
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<td></td>
<td>WESTMORELAND</td>
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</table>

During the 1950s, 72% of the anthracite collieries closed.
<table>
<thead>
<tr>
<th>YEAR</th>
<th>WATER PUMPED: PA ANTHRACITE COAL MINED RATIO</th>
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<tbody>
<tr>
<td>1929</td>
<td>WATER: 1 TON COAL</td>
</tr>
<tr>
<td>1940</td>
<td>WATER: 1 TON COAL</td>
</tr>
<tr>
<td></td>
<td>27 TONS WATER: 1 TON COAL</td>
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</table>
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 (Φ) at the inlet in the Eddy Creek Mine, Throop PA
• 16’ Φ 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)

<table>
<thead>
<tr>
<th>Description</th>
<th>Discharge (CFS)</th>
<th>Discharge (GPM)</th>
<th>pH</th>
<th>Sulfate (mg/L)</th>
<th>Iron (mg/L)</th>
<th>Manganese (mg/L)</th>
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</thead>
<tbody>
<tr>
<td><strong>NORTHERN FIELD</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Jermyn Slope</td>
<td>26</td>
<td>11,500</td>
<td>5.8</td>
<td>205</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Peckville Shaft</td>
<td>14</td>
<td>6,000</td>
<td>5.6</td>
<td>160</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Old Forge Borehole</td>
<td>83</td>
<td>37,000</td>
<td>6.0</td>
<td>600</td>
<td>33</td>
<td>4</td>
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<tr>
<td>Duryea Breech</td>
<td>20</td>
<td>9,000</td>
<td>6.1</td>
<td>505</td>
<td>37</td>
<td>5</td>
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<tr>
<td>Solomon Creek Boreholes</td>
<td>30</td>
<td>13,000</td>
<td>5.7</td>
<td>1220</td>
<td>190</td>
<td>11</td>
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<tr>
<td>Airshaft Number 22</td>
<td>16</td>
<td>7,200</td>
<td>5.8</td>
<td>760</td>
<td>74</td>
<td>7</td>
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<tr>
<td><strong>EASTERN MIDDLE FIELD</strong></td>
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<td></td>
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<tr>
<td>Beaver Meadows Tunnel</td>
<td>13</td>
<td>6,000</td>
<td>3.7</td>
<td>160</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Jeddo Tunnel</td>
<td>83</td>
<td>37,000</td>
<td>3.8</td>
<td>515</td>
<td>4</td>
<td>8</td>
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<tr>
<td>Audenreid Tunnel</td>
<td>12</td>
<td>6,000</td>
<td>3.4</td>
<td>290</td>
<td>2</td>
<td>4</td>
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<td><strong>WESTERN MIDDLE FIELD</strong></td>
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<tr>
<td>Gilberton Pump</td>
<td>15</td>
<td>7,000</td>
<td>6.1</td>
<td>820</td>
<td>53</td>
<td>13</td>
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<td>Packer Number 5</td>
<td>35</td>
<td>16,000</td>
<td>6.1</td>
<td>1000</td>
<td>32</td>
<td>10</td>
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<tr>
<td>Scott Ridge Mine</td>
<td>11</td>
<td>5,000</td>
<td>5.4</td>
<td>680</td>
<td>41</td>
<td>5</td>
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<td><strong>SOUTHERN FIELD</strong></td>
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<tr>
<td>Greenwood Mine</td>
<td>17</td>
<td>8,000</td>
<td>6.7</td>
<td>1400</td>
<td>21</td>
<td>9</td>
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<tr>
<td>Pine Knot Mine</td>
<td>16</td>
<td>7,000</td>
<td>5.9</td>
<td>335</td>
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<tr>
<td>Field</td>
<td>CFS</td>
<td>GPM</td>
<td></td>
<td></td>
<td></td>
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<td>------------------------</td>
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<tr>
<td>Northern Field</td>
<td>618</td>
<td>277,000</td>
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<tr>
<td>Western Middle Field</td>
<td>149</td>
<td>67,000</td>
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<tr>
<td>Southern Field</td>
<td>121</td>
<td>54,000</td>
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<tr>
<td><strong>Conowingo Total</strong></td>
<td><strong>888</strong></td>
<td><strong>398,000</strong></td>
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**Estimated Mine Drainage Remaining in NEPA**

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<thead>
<tr>
<th>Eastern Middle</th>
<th>CFS</th>
<th>GPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Middle</td>
<td>107</td>
<td>58,000</td>
</tr>
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</table>
SCOTT RIDGE DISCHARGE
KULPMONT PA
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.
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 $17 million was to be made available and $7 million 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.
I'M RUNNING OUT OF BAD PUNS!

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

TAMAQUA #14

today
STREAMBED IMPROVEMENT

NANTICOKE PA

2000
STREAMBED IMPROVEMENT

LITTLE MILL CREEK
BUTLER MINE SEEPAGE
DUPONT PA
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.
Today water is not being diverted from the bottom rock exposures and crop falls in the Panther Valley nor many other sites.
Streams in Nanticoke, Pittston, Plymouth and other sites are disappearing into the mines.
And mine drainage gushes from the tunnels, boreholes, strip pits, and other openings whenever it rains hard.
• 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.
• 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.

If we don’t conserve water we could go from one ex-stream to another.

this conference could be a watershed moment
GOT ANY MORE IDEAS, MR. PEABODY?

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

I ALWAYS HAVE MORE IDEAS, MICHAEL

mkorb@pa.gov
570-826-2371

www.dep.state.pa.us
I know. They're ALL bad!

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