

ENVIRONMENTALLY BENEFICIAL ALTERNATIVE ENERGY



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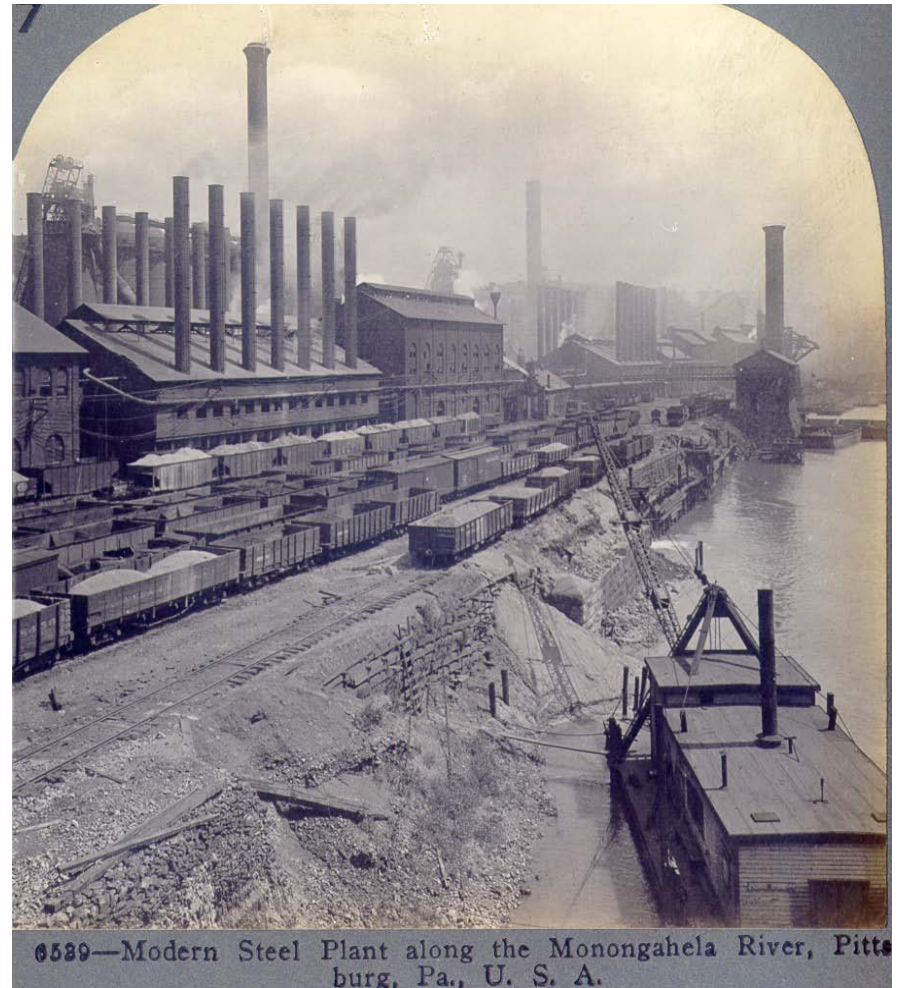
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Fortunate Legacy

Fueled by the Industrial Revolution, coal mining began in the mid-1700s.

For generations, coal was the mainstay of the economy of several coal mining regions.



0589—Modern Steel Plant along the Monongahela River, Pittsburgh, Pa., U. S. A.

...and Unfortunate Legacy

Manual labor, including children, mined and sorted 16.3 billion tons of anthracite & bituminous coal in PA... however; undesirable coal “rejects” accumulated



“Coal Refuse” Piles Up

- Coal refuse (culm-bony-gob-waste coal) is the undesirable mineral product of coal mining...It's comprised of minerals and overburden (shale's, sandstones, quartzite, and conglomerates) extracted incidentally along with coal
- In the past this “undesirable mineral product” with low carbon content (low BTU value) and accordingly undesirable in the marketplace was separated from marketable coal and stock piled on nearby surface lands
- Over time coal refuse piles accumulated and became common throughout coal mining regions. For decades coal refuse simply laid idle on thousands of acres of land
- Current mining operations continue to unearth “coal refuse”, however today coal refuse is immediately utilized and managed in a vastly improved, environmentally consciences, manner.

For decades the raw hands of breaker boys separated marketable coal from “rejects”...leaving mountains of undesirable “coal refuse”



A multi-billion dollar environmental problem that still exists today!



By the early 1800s coal mining was producing a negative environmental footprint; accumulating and increasing coal refuse piles, and utilizing mining practices with little environmental concern

7069—Dumping Culm, Slate Pile, Anthracite Coal Mine
Scranton, Pa., U. S. A.

Coal refuse was commonly discarded for decades ...helping to create water pollution, and a public health and safety hazard



Coal mines were abandoned... mountains of coal refuse was left behind



- Billions of tons of coal refuse remains today covering more than 189,000 acres in PA alone
- More than 5000 mine sites were abandoned...Former legally responsible parties/owners vanished
- However since the 1970s coal mining companies have been reclaiming current and former mining sites

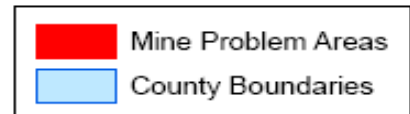
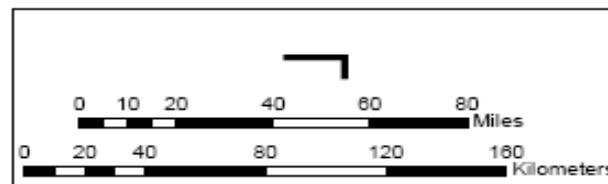
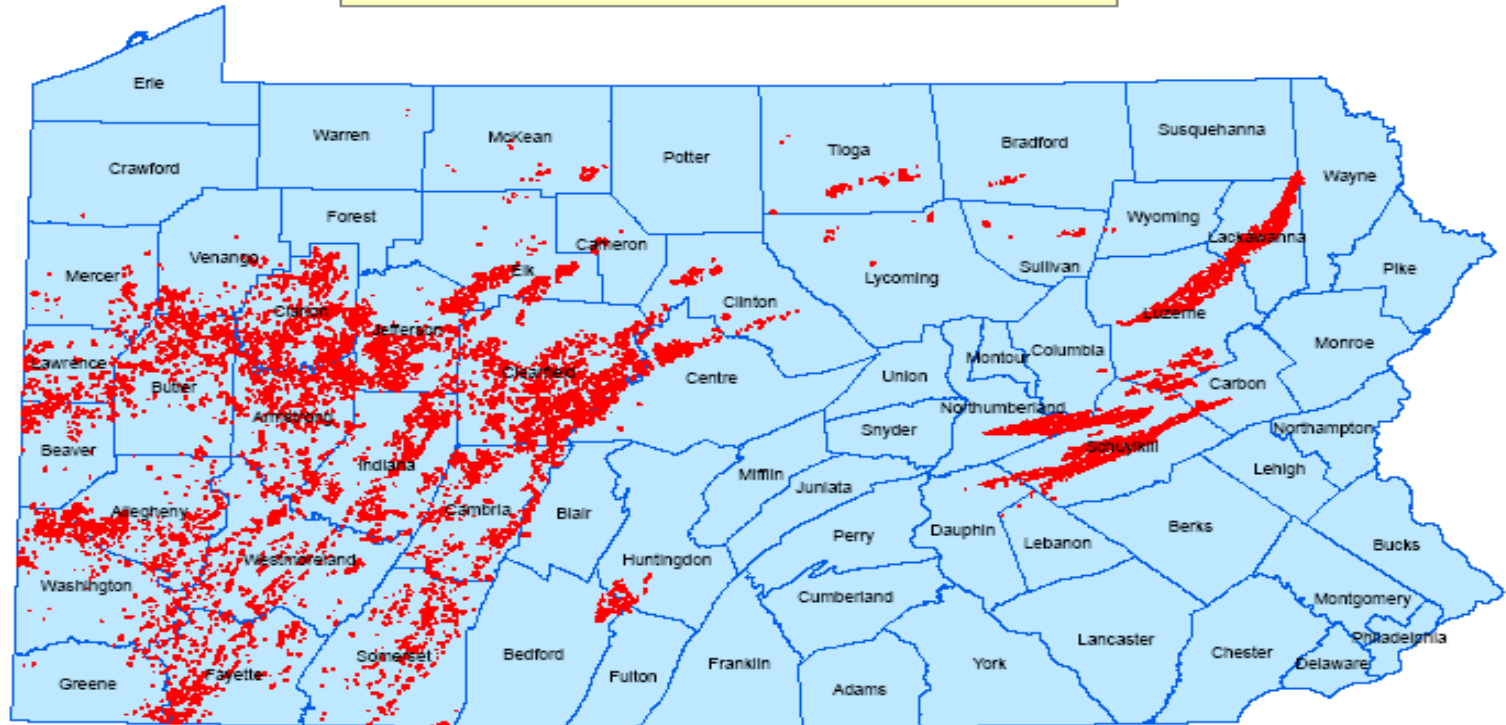
AML POLLUTED & UNSAFE LAND



Coal refuse piles are typically barren and highly erosive...a significant subset of AML sites in PA

Abandoned Mine Lands in PA

Abandoned Mine Lands in Pennsylvania





AML POLLUTED & UNSAFE LAND



- Hundreds of millions of tons of legacy coal mining “rejects” have long imposed an environmental burden on the land.

Million tons of discarded “coal refuse” covering 1000’s of acres





AML POLLUTED & UNSAFE LAND



PA's Abandoned Mine Reclamation Bureau estimated (in 2004) cleanup costs to be \$14.6 billion and take nearly 500 years

AMD POLLUTED STREAMS



AMD (Abandoned or Acid Mine Drainage) is water contaminated when pyrite (an iron sulfide) is exposed and reacts with air and water to form sulfuric acid and dissolved iron.

Acid leached from abandoned mines and coal refuse piles created thousands of miles of polluted streams



AMD POLLUTED STREAMS



Acid leached from abandoned coal mines contributed to the degradation of more than **5,500 miles** of streams and associated ground waters.

In PA it is the most extensive water-pollution problem affecting four of its major river basins.

AMD PA's largest source of water pollution,
degrading 5,500 miles of rivers and streams



AMD POLLUTED STREAMS

Acid runoff dissolves heavy metals such as copper, lead, and mercury into ground or surface water.





AMD POLLUTED STREAMS



AMD damages:

- aquatic plants and animals
- recreational fish species
- outdoor recreation and tourism
- surface and ground water
- infrastructure (wastewater pipes corrosion)



AMD POLLUTED STREAMS

Most coal-mine discharges in PA are acidic, with a pH greater than 5.



SCMRA 1977 & PURPA 1978

- SCMRA, “*Surface Mining Control and Reclamation Act*” which applies to all surface mining conducted **after 1977**, requires complete reclamation of surface mine-affected lands and requires posting of financial assurances/bonds to ensure reclamation.
- In 1978, Congress enacted “**PURPA**,” *Public Utility Regulatory Policies Act*, to encourage “greater use of highly efficient low emitting co-generation technology “to meet nations electricity needs””

Polluted Lands and Streams



PA taxpayers and volunteers have spent millions of dollars and hours on clean-up efforts...but it simply isn't enough

ALTERNATIVE ENERGY



1. Private and public investors
2. Public Utility Regulatory Policies Act (PURPA)
3. CFB Technology

Created Industry that converts once-useless low BTU fuel into Alternative Energy

STEP 1

Remove and convert coal refuse



ARIPPA plants
remove and
convert coal refuse
from both past and
current mining
activities to
produce alternative
energy

**Removing yesterday's "rejects" ...
using it today to make clean alternative energy
...at a zero cost for taxpayers**



STEP 1

Remove and convert coal refuse

Without industry removal and clean up efforts would fall entirely on volunteers, taxpayers and governmental agencies



CFB plants eliminate a principal source of environmental contamination at no cost to taxpayers!



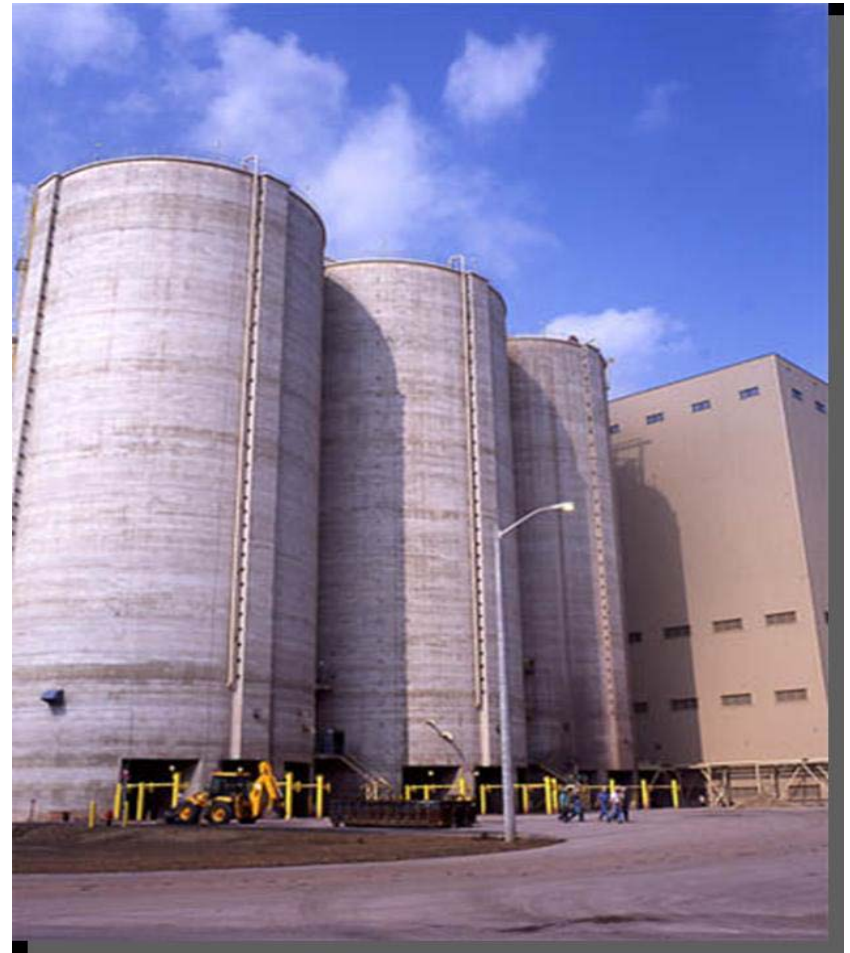
Thanks to CFB technology, mine refuse of yesterday is removed and converted into alternative energy today



STEP 2

BENEFICIALLY USE CFB ASH

- CFB ash: a mixture of limestone and the indigenous rock/dirt found in coal refuse (and the local area) before conversion.
- A fabric filter captures lighter particulate matter, the fly ash



STEP 2

BENEFICIALLY USE CFB ASH



Limestone added during conversion, renders the ash to a rock-hard consistency and a pH level that neutralizes acidic mine drainage

STEP 2

BENEFICIALLY USE CFB ASH

CFB ash is typically placed in currently damaged abandoned mine lands (with coal refuse piles, mine pits, and underground workings) – areas often currently polluted with acid mine drainage.



BENEFICIAL USE of CFB ASH



Ash from the coal refuse into energy conversion process is beneficially used to backfill abandoned coal mines and strip mine pits.

BENEFICIAL USE of CFB ASH

CFB ash is beneficially used in a highly regulated fashion.

Placement, compaction, grading, and the final phase of covering the ash with topsoil, and planting the area with appropriate vegetation is all monitored and tested



Beneficially used ash reclaims thousands of acres of mine-scarred lands and restores life to once polluted streams



**Beneficially used ash reclaims thousands of acres of
mine-scarred lands
and restores life to once polluted streams
(Revloc 1998)**



Summary Beneficial use-CFB ash

Managed regulated industry beneficial use has:

1. Reclaimed thousands of acres of previously damaged mine lands and streams
2. Saved taxpayers millions of dollars in reclamation and clean-up costs
3. Eliminated mine fires, highwalls, subsidence and “sealed off” underground mines
4. Improved overall safety for the general public
5. Neutralized existing acidity in groundwater
6. Decreased AMD further reducing the potential pollution of surface waters

STEP 3

RECLAIM LANDS

Land reclamation involves covering the ash with topsoil, and planting the area with appropriate vegetation.



STEP 3

RECLAIM LANDS



Covering and planting reduces erosion and prevents exposure of potential pollutants to surface waters and soil.

STEP 3

RECLAIM LANDS



Reclamation procedures are monitored and tested even after the top soil is applied and the indigenous vegetation is planted.

LANDS RECLAIMED

Reclaimed land into new productive uses as community or industrial parks or future development sites...some reclaimed areas are simply being returned back into a natural wildlife or fish habitat.



BEFORE RECLAMATION

Acosta



AFTER RECLAMATION Acosta



BEFORE RECLAMATION

Bakerton



AFTER RECLAMATION

Bakerton



BEFORE RECLAMATION

Earnst



AFTER RECLAMATION

Earnst



Summary Lands Reclaimed



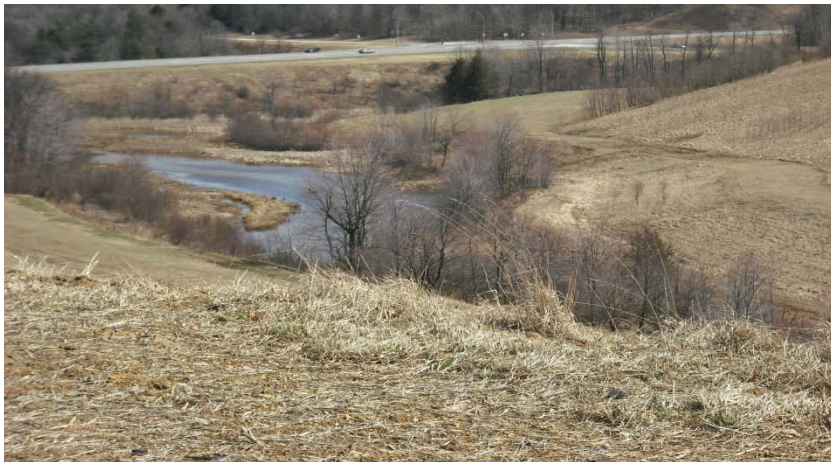
2010 Industry Data : since 1988, removed over 171 million tons of coal refuse and reclaimed over 5,000 acres of damaged mine scarred lands!

...renewed life for 5,000 acres of land
and hundreds of miles of formerly dead streams

STEP 4

RECLAIM STREAMS

- The AMD reclamation process reduces the amount of acid mine drainage and acidic runoff to groundwater, streams, and rivers.



Big Gorilla Project (NE PA)

PADEP taxpayer costs to eliminate this AMD site totaled \$4.5 million in 2004



Big Gorilla Project (NE PA)



Taxpayer costs would have been \$80 million (PADEP est.) without direct aid and assistance from the coal refuse to alternative energy industry

Loomis Site (Northampton Generating) - Before

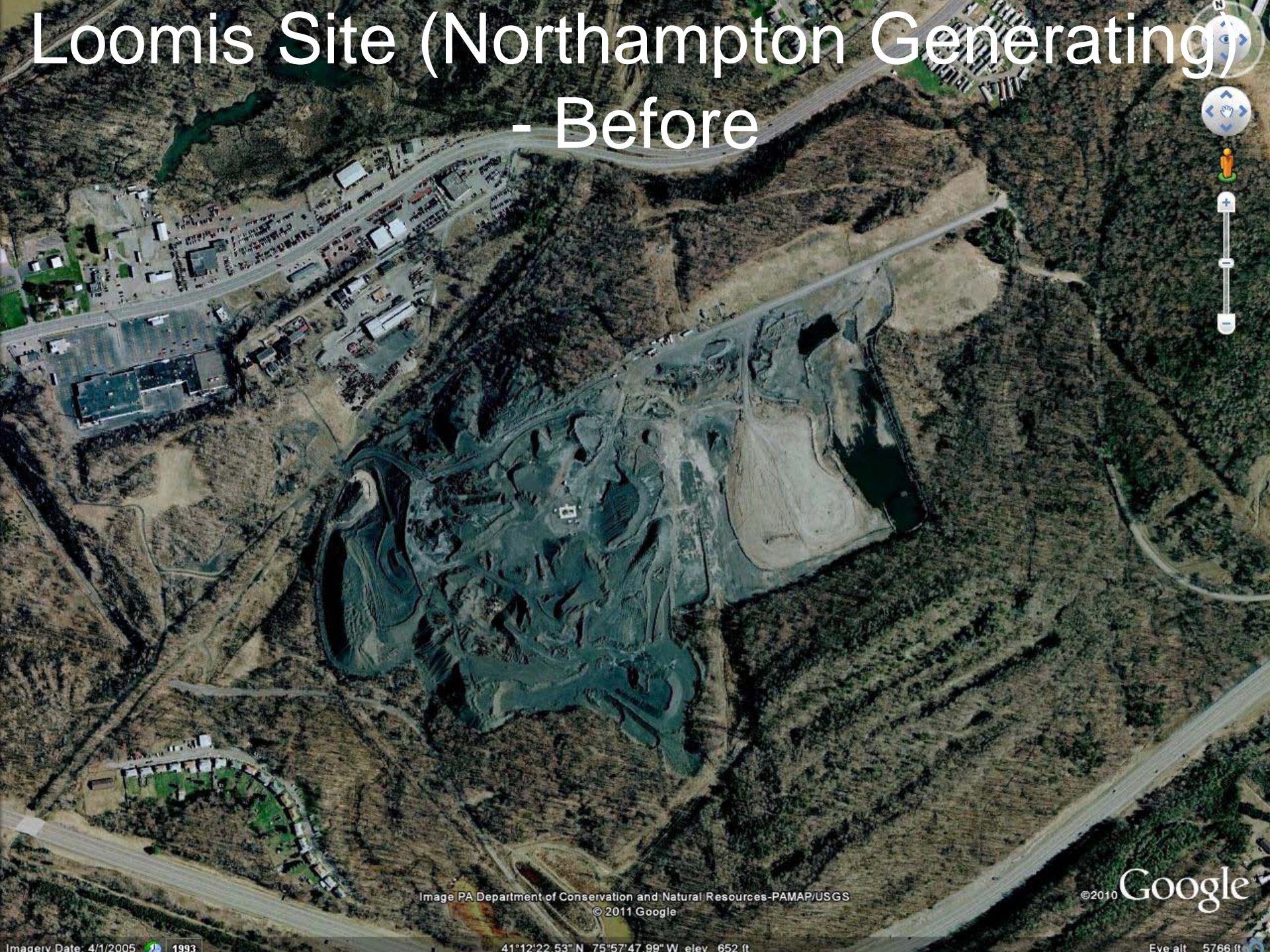


Image PA Department of Conservation and Natural Resources-PAMAP/USGS
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Imagery Date: 4/1/2005 1993

41°12'22.53" N 75°57'47.99" W elev 652 ft

Eye alt 5766 ft

Loomis Site (Northampton Generating) – Before/In Process



Loomis Site (Northampton Generating) - Before



Loomis Site (Northampton Generating) - Before



Loomis Site (Northampton Generating) - Before

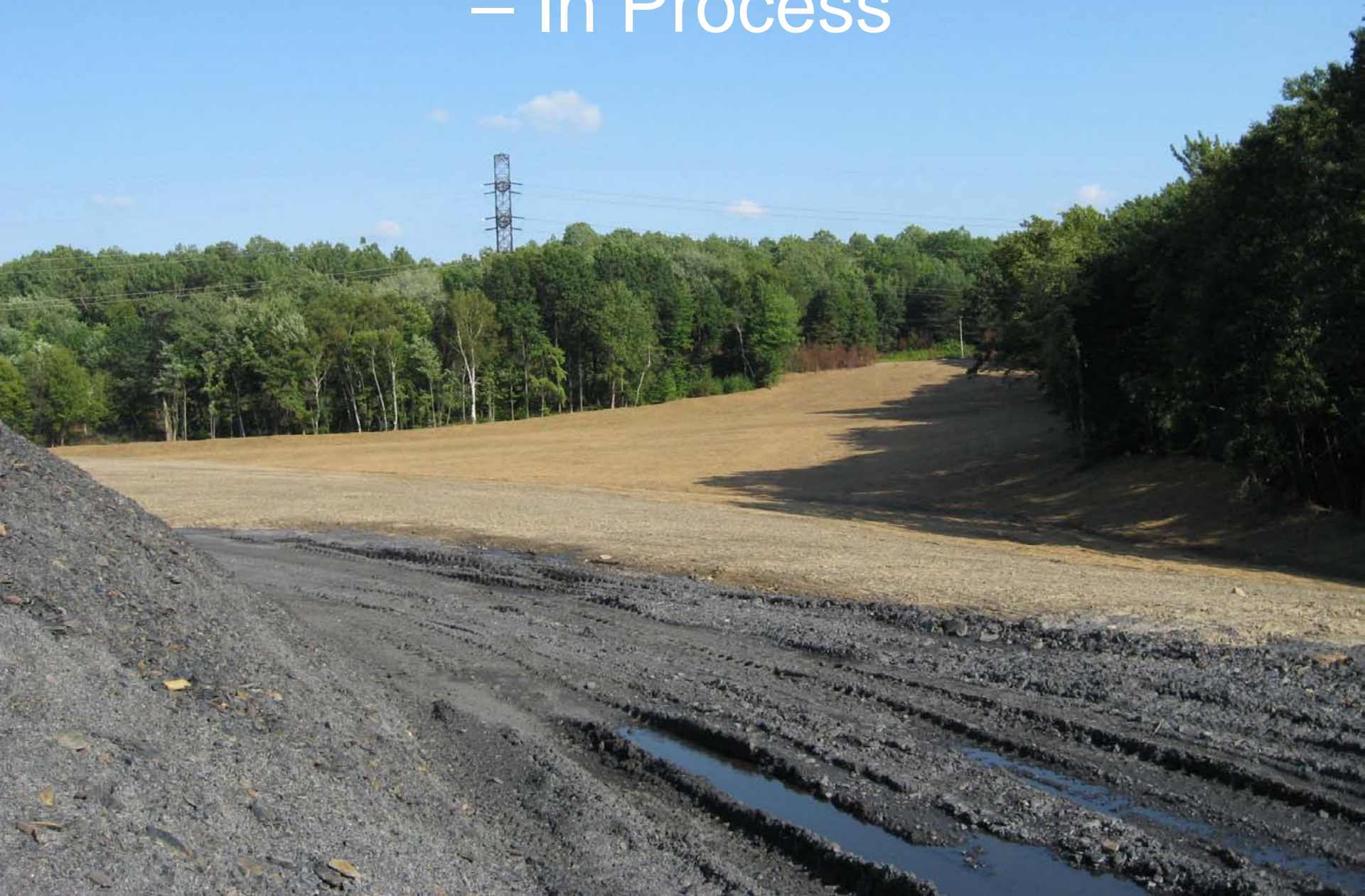


Loomis Site (Northampton Generating) – Bank Fire Extinguished with Ash



3. 5. 2005

Loomis Site (Northampton Generating) – In Process



Loomis Site (Northampton Generating)



Plymouth Flats

Buttonwood

Hanover Mall

Loomis Site (In Process)

Hanover Area HS

Rte 29 Exit 2

Alden

Loomis Site (Northampton Generating) - Finished



Loomis Site (Northampton Generating) - Finished



Loomis Site (Northampton Generating)

Loomis Site (Finished)

Hanover Area HS



STREAMS RECLAIMED

- CFB plants work with environmentally concerned hands-on volunteers and state/federal agencies to help convert polluted streams to clean and usable waterways.
- This working relationship helps to significantly reduce taxpayer costs and voluntary efforts needed to reduce or eliminate acid mine drainage.



Summary Streams Reclaimed



“This stream was polluted with toxic acids and metals...Today it’s clean and I’m fishing again...Thanks Co-Gen’s!”

Coal Refuse to alternative energy ...a unique industry!

One of the few environmentally beneficial alternative energy industries.

1. Coal refuse tonnage removed from surface lands
2. Coal refuse cleanly converted with CFB technology into alternative energy
3. Thousands of jobs, wages, and economic expansion realized
4. Thousands of acres of land and miles of streams beneficially reclaimed
5. Tax payer reclamation costs saved
6. A successful partnership effort between private investors, government and volunteers to improve our communities

PARTNERSHIP

The unique nature of our industry relies upon a working relationship between investors and government to be environmentally beneficial to communities.



PARTNERSHIP

This unique nature combined with our industry's desire to work in conjunction with various environmentally concerned hands-on volunteer groups and governmental agencies



Symbolize our industry's commitment to improving the landscape and the environment of our nation.



“Before reclamation our Community Park used to be an ugly mess of coal refuse piles and polluted water!

Thanks Co-Gen's!”

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