Mountaintop Mining/Valley Fills in Appalachia

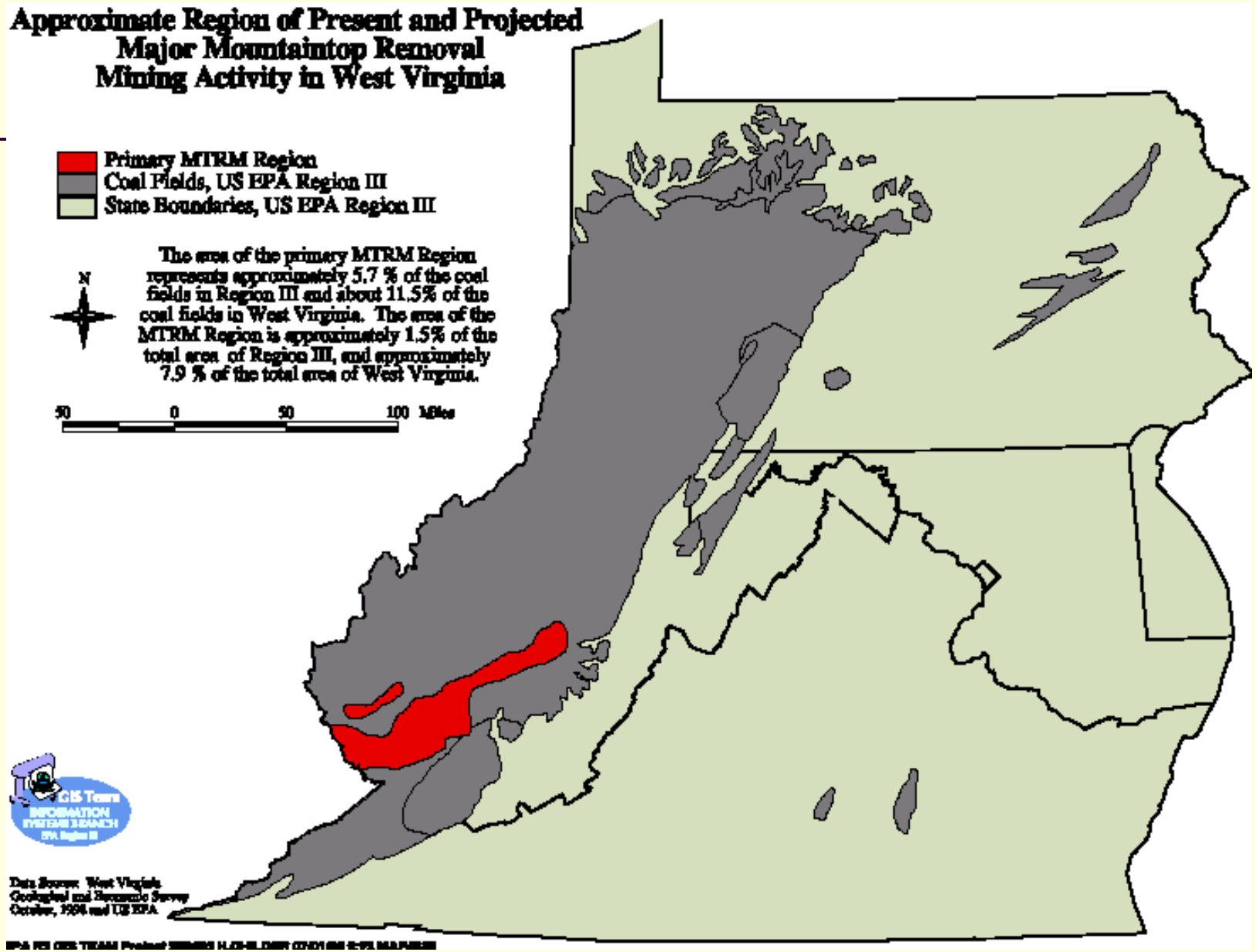
Background

- Mountaintop coal mining is a surface mining practice used in the Appalachian states involving the removal of mountaintops to expose coal seams and disposing of the associated mining overburden in adjacent valleys.
- The overburden is disposed in “valley fills.” Valley fills occur in steep terrain where there are limited disposal alternatives.
- The valley fill disposal method has resulted in substantial loss of headwater streams and habitat.

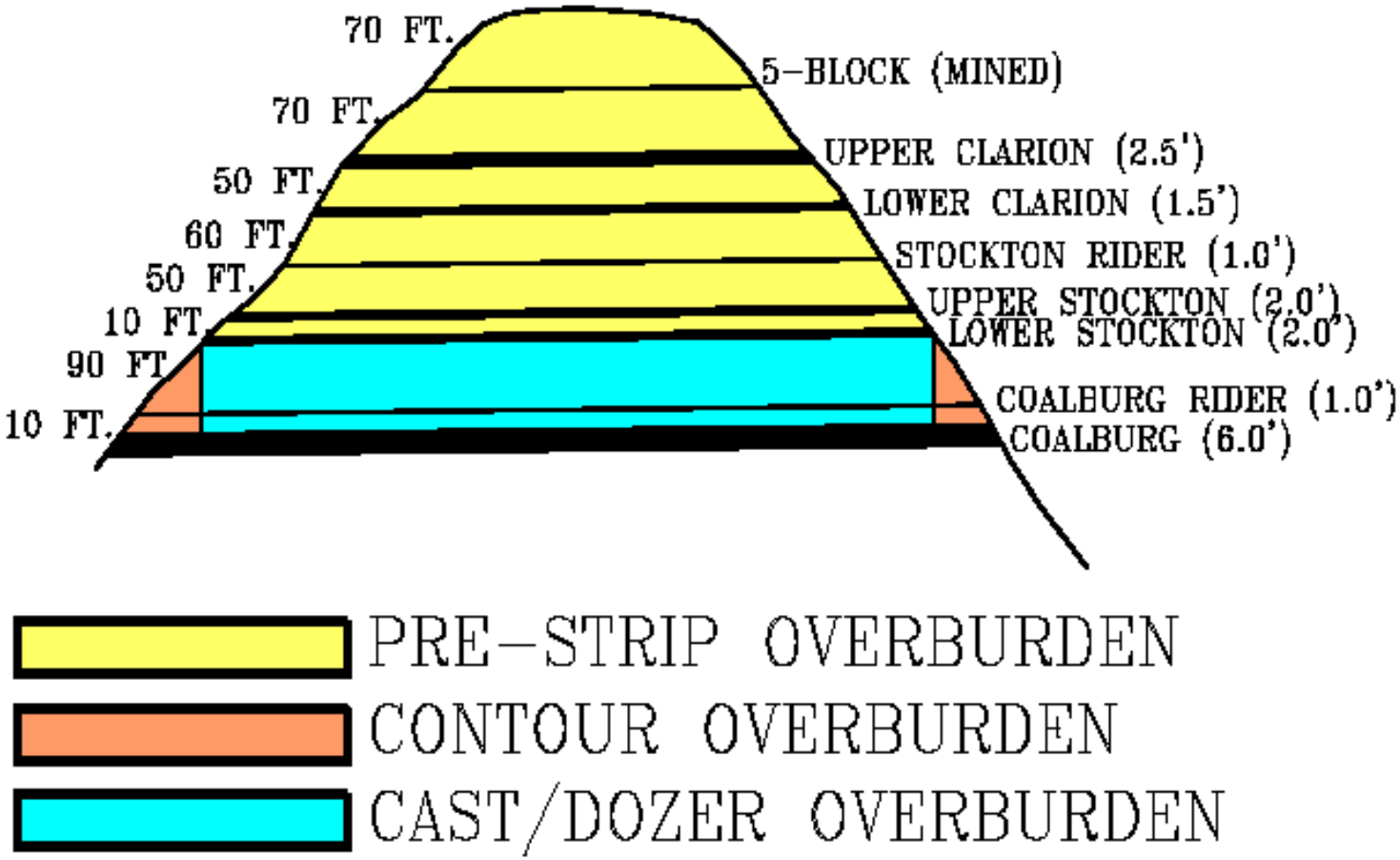
Background

- Mining operations regulated under the Clean Water Act (CWA) including discharges of pollutants to streams from valley fills (CWA Section 402) and the valley fill itself where the rock and dirt is placed in streams and wetlands (CWA Section 404).
- Coal mining operations also regulated under the Surface Mining Control and Reclamation Act of 1977 (SMCRA).

Mountaintop Mining Impacts on Streams


Approximate Region of Present and Projected
Major Mountaintop Removal
Mining Activity in West Virginia
Primary MTRM Region
Coal Fields, US EPA Region III
State Boundaries, US EPA Region III
The area of the primary MTRM Region represents approximately 5.7 % of the coal fields in Region III and about 11.5% of the coal fields in West Virginia. The area of the MTRM Region is approximately 1.5% of the total area of Region III, and approximately 7.9 % of the total area of West Virginia.
N
50 0 50 100 Miles
GIS Team
INFORMATION SYSTEMS BRANCH
EPA Region III
Data Source: West Virginia Geological and Economic Survey October, 1998 and US EPA

MATERIALS HANDLING CROSS SECTION

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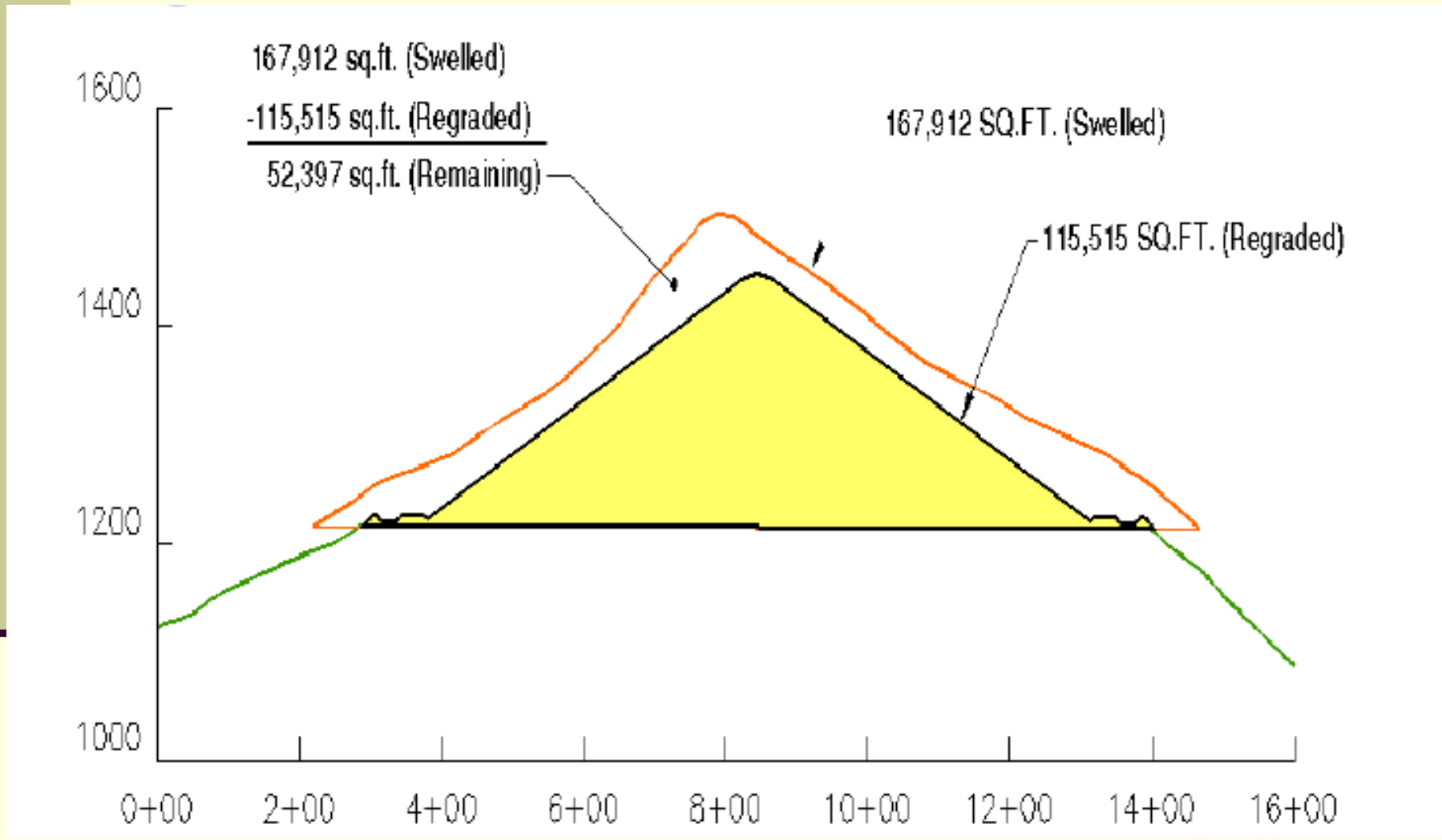
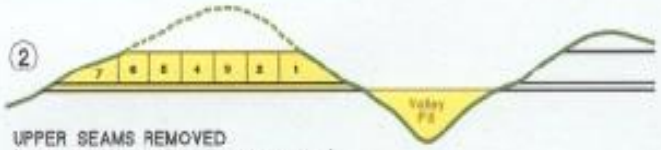

167,912 sq.ft. (Swelled)
-115,515 sq.ft. (Regraded)
52,397 sq.ft. (Remaining)
167,912 SQ.FT. (Swelled)
115,515 SQ.FT. (Regraded)
1600
1400
1200
1000
0+00
2+00
4+00
6+00
8+00
10+00
12+00
14+00
16+00

METHOD OF MINING

Many companies utilize a method known as mountain top mining. The mining method employs five basic steps.

ORIGINAL SECTION

Originally, the coal is covered by layers of rock and dirt called overburden.



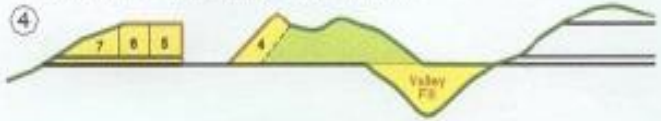
UPPER SEAMS REMOVED
(Area Ready for Dragline Operation)

Mountain peaks are removed by an electric shovel, loaders, and trucks. The mining area is divided into pits for efficient removal of overburden.

The overburden removed by the shovel is placed in a valley fill.

BEGINNING DRAGLINE OPERATION

The dragline excavates the first pit and places spoil on the valley fill plateau.



BEGIN REGRADING (Spoil from Cuts 1, 2, & 3 Regraded)

Each pit is sequentially excavated and placed in spoil piles across the mountain.

REGRADED SECTION

Once coal removal is complete, the land is graded by bulldozers and revegetated to reclaim the land in an environmentally sound way that is both attractive and productive.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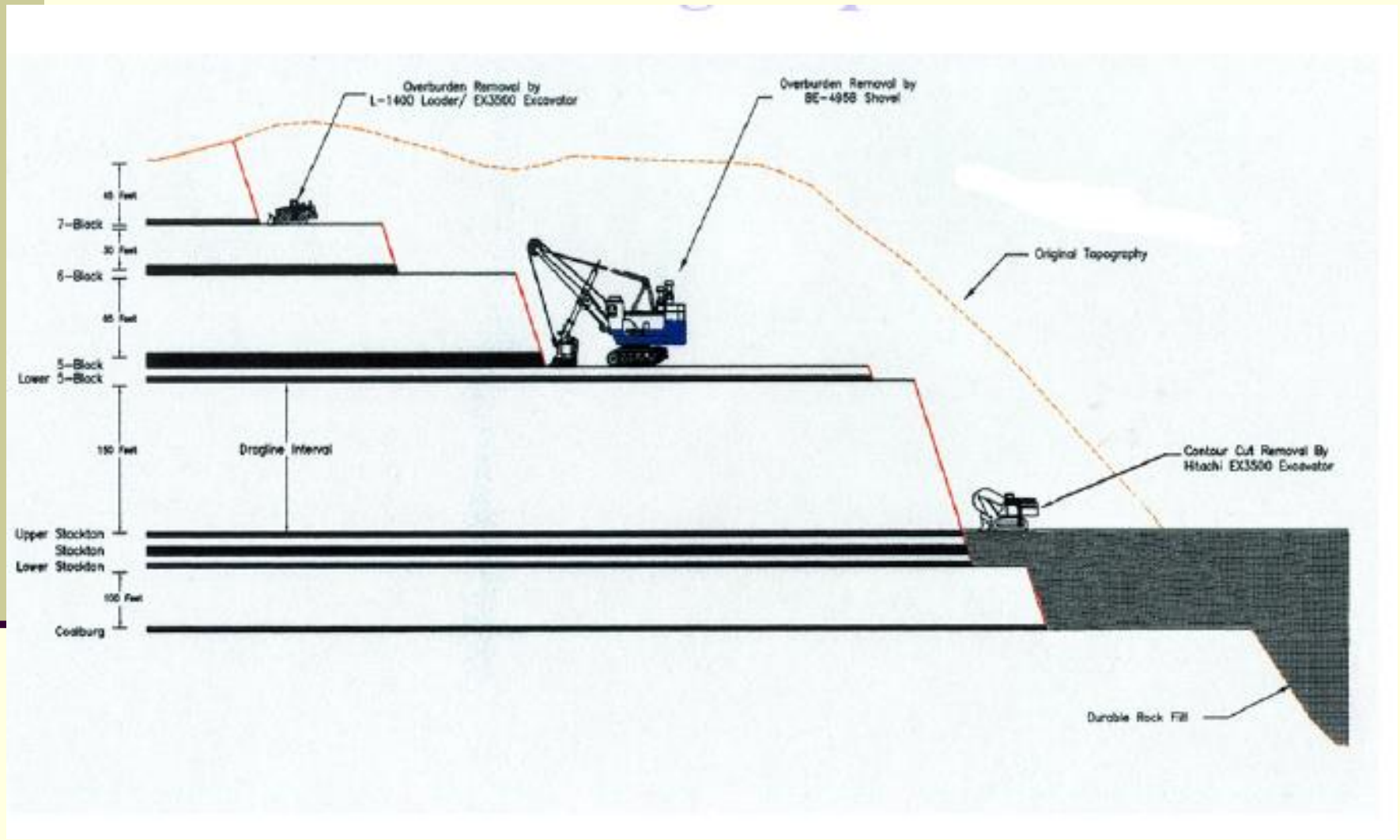
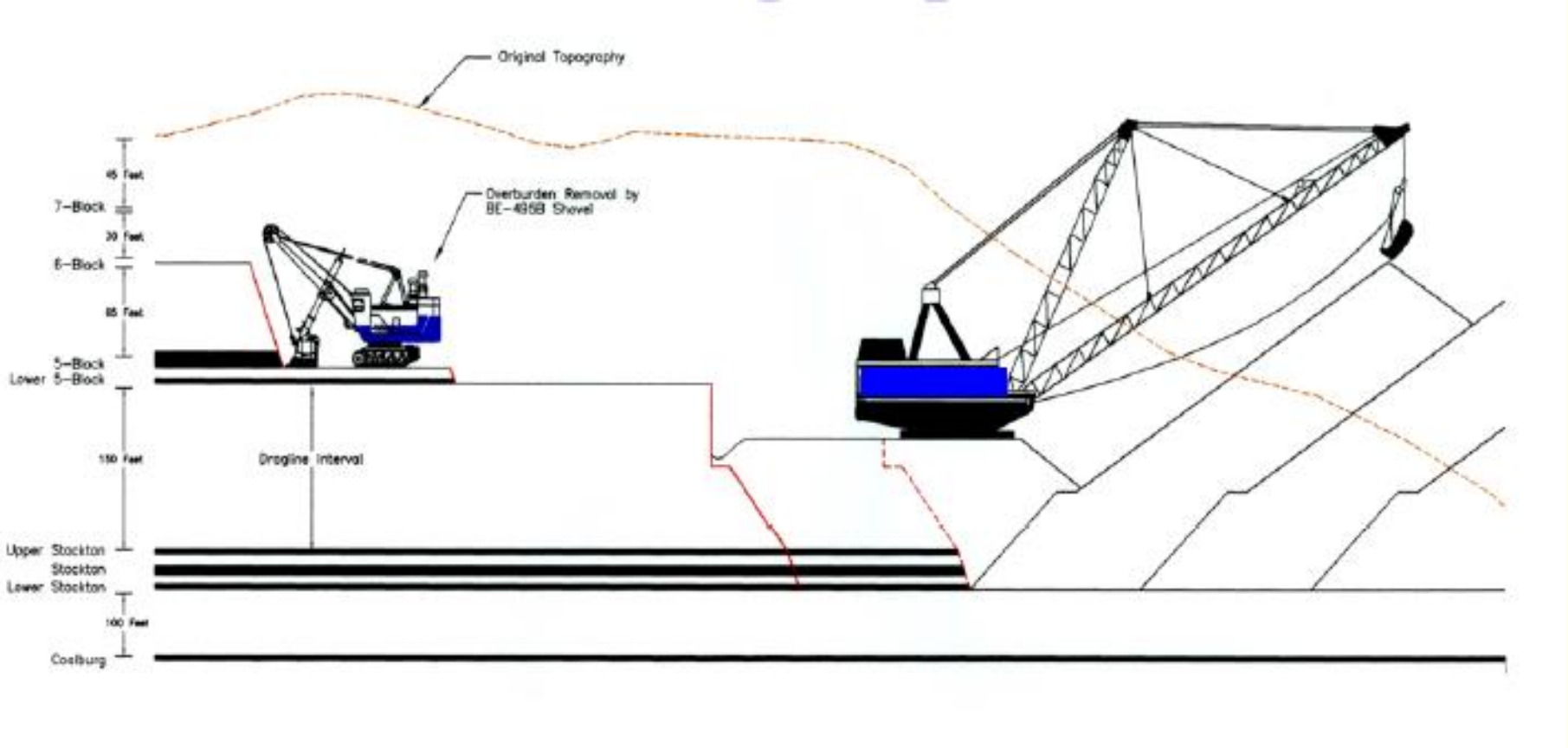
Dragline Operation

Mining Sequence

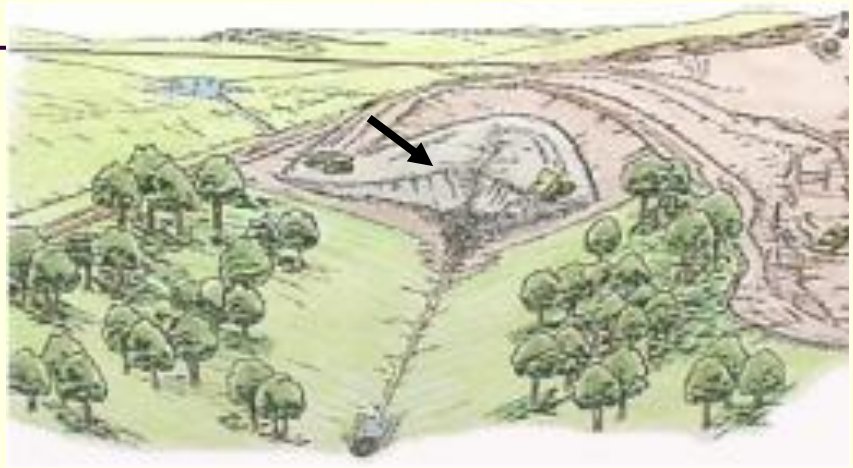


Mining Sequence



Typical Valley Fill Construction

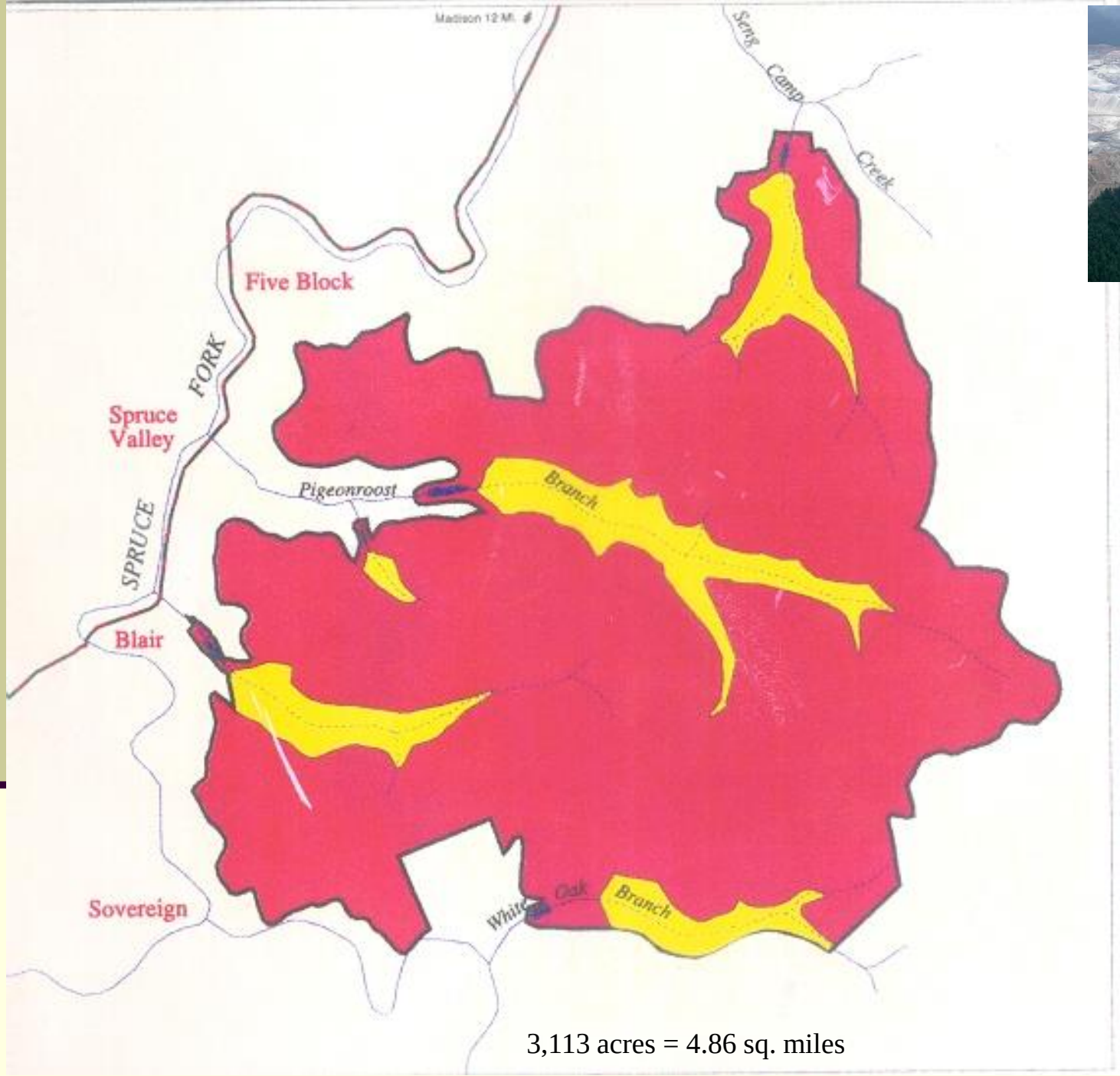
Sediment Pond Construction



Fill Placement

Completed Fill Placement

Regrading and Revegetation Completed



US EPA
Region III
GIS Team

3,113 acres = 4.86 sq. miles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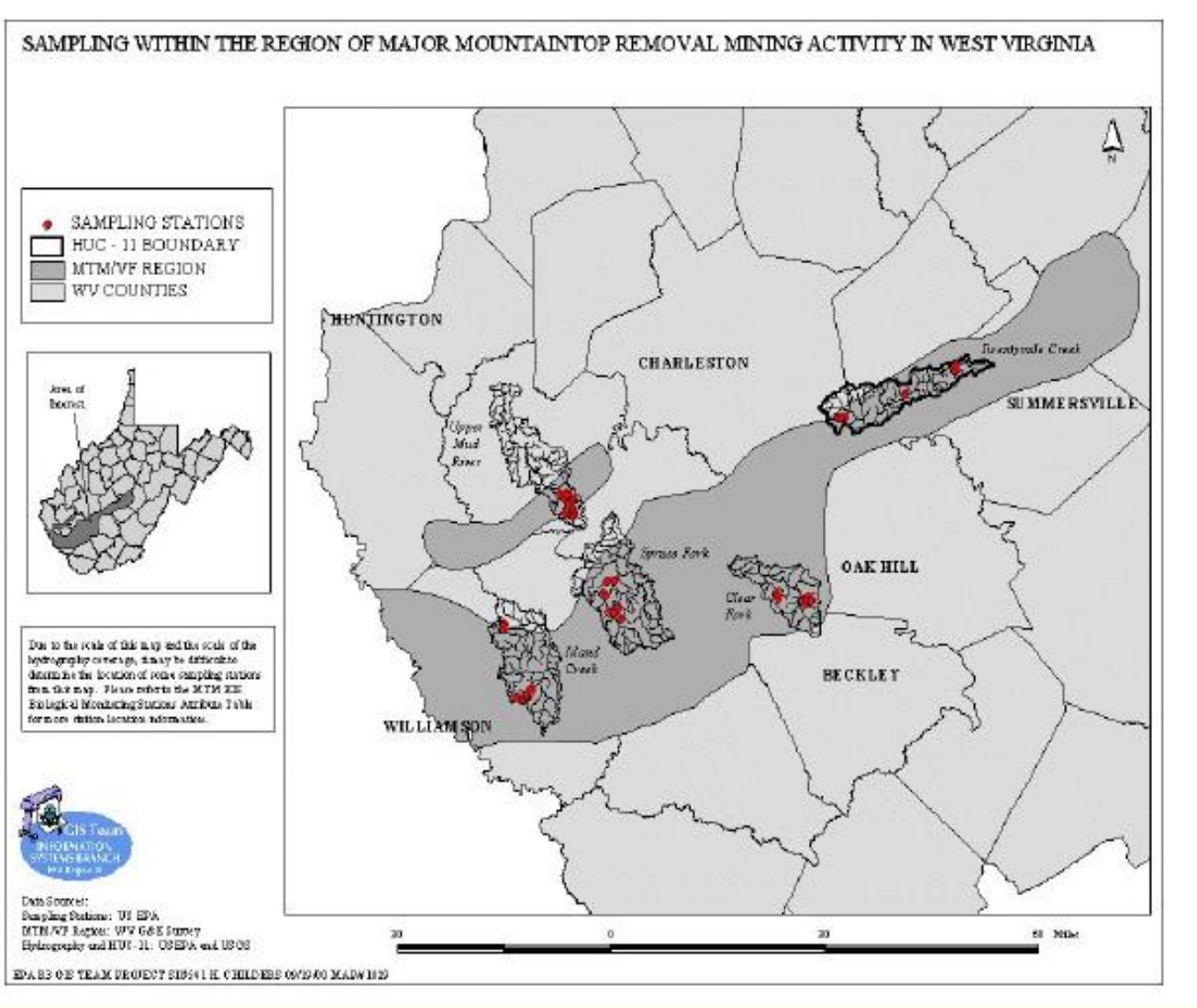
HAULPAK


Mountaintop Mining

Technical Studies



Mountaintop Mining Impacts on Streams

- Approximately 1200 miles of headwater streams (or 2% of the streams in the study area) were directly impacted by MTM/VF features including coal removal areas, valley fills, roads, and ponds between 1992 and 2002. An estimated 724 stream miles (1.2 % of streams) were covered by valley fills from 1985 to 2001. Certain watersheds were more impacted by MTM/VF than others.

- Based upon the study of 37 stream segments, intermittent streams and perennial streams begin in very small watersheds, with a median of 14 and 41 acres respectively.

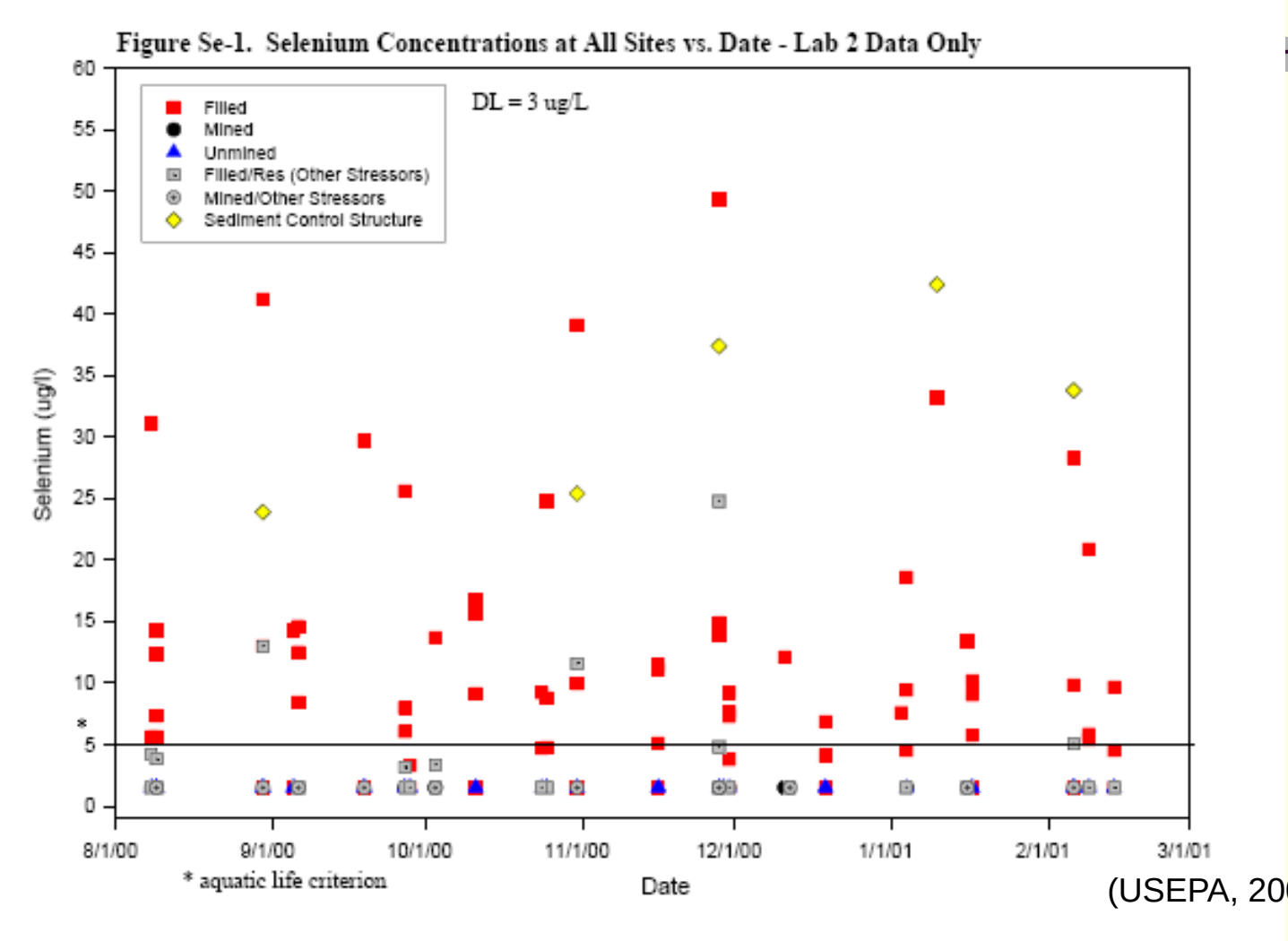
- Streams in watersheds where MTM/VFs exist are characterized by an increase of minerals in the water as well as less diverse and more pollutant-tolerant macroinvertebrates and fish species. Questions still remain regarding the correlation of impacts to the age, size, and number of valley fills in a watershed, and effects on genetic diversity. Some streams below fills showed biological assemblages and water quality of good quality comparable to reference streams.

Mountaintop Mining Impacts on Streams

- Streams in watersheds below valley fills tend to have greater base flow. These flows are more persistent than comparable unmined watersheds. Streams with fills are generally less prone to higher runoff than unmined areas during most low-frequency storm events; however, this phenomenon appears to reverse itself during larger rainfall events.

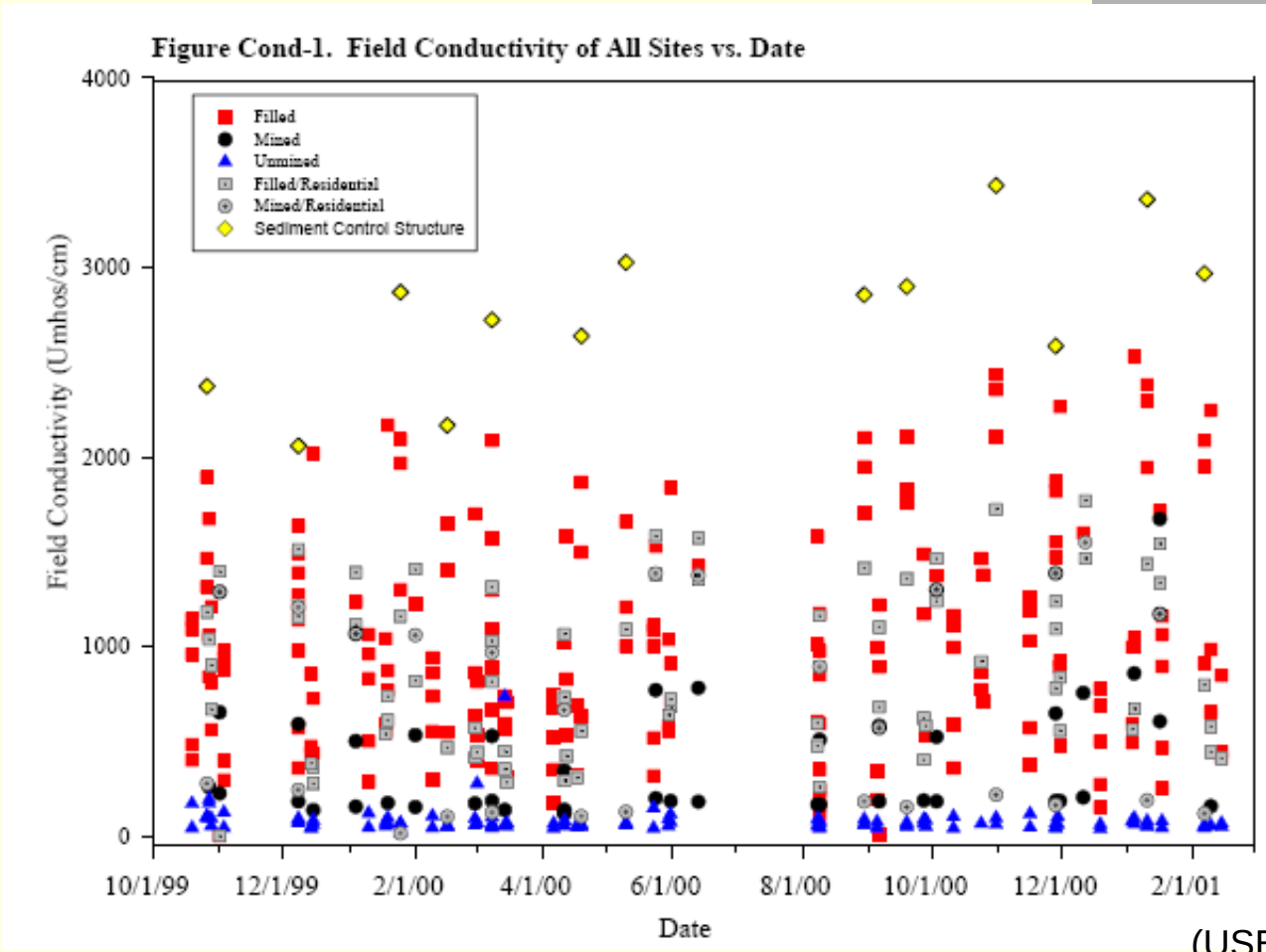
- Wetlands are, at times inadvertently and other times intentionally, created by mining via erosion and sediment control structures. These wetlands provide some aquatic functions, but are generally not of high quality.

Mountaintop Mining Impacts on Streams



(USEPA, 2002a)

Mountaintop Mining Impacts on Streams



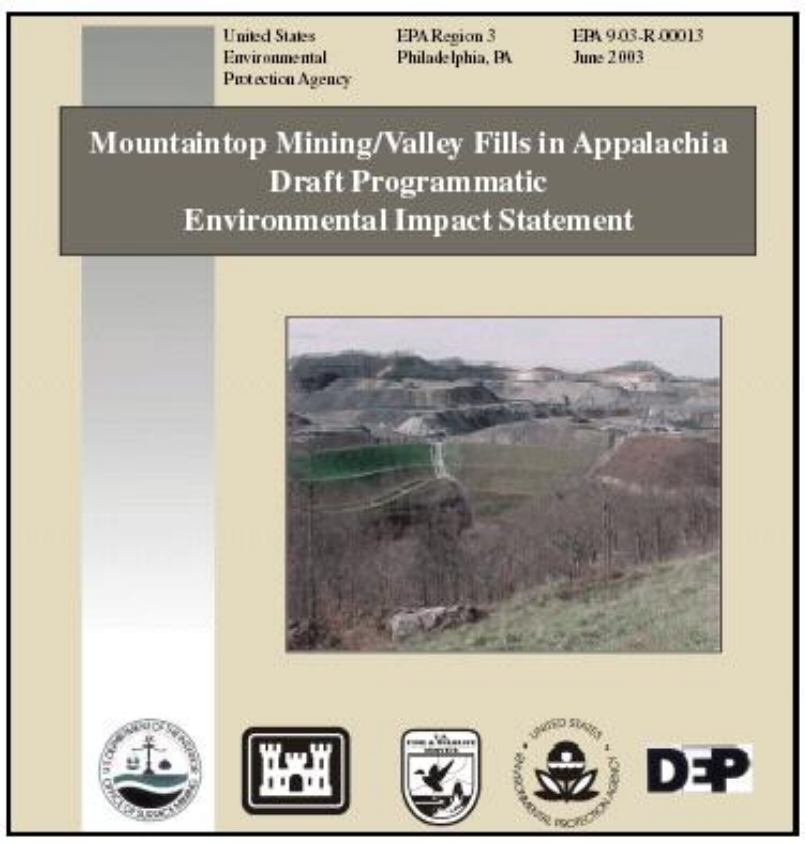
(USEPA, 2002a

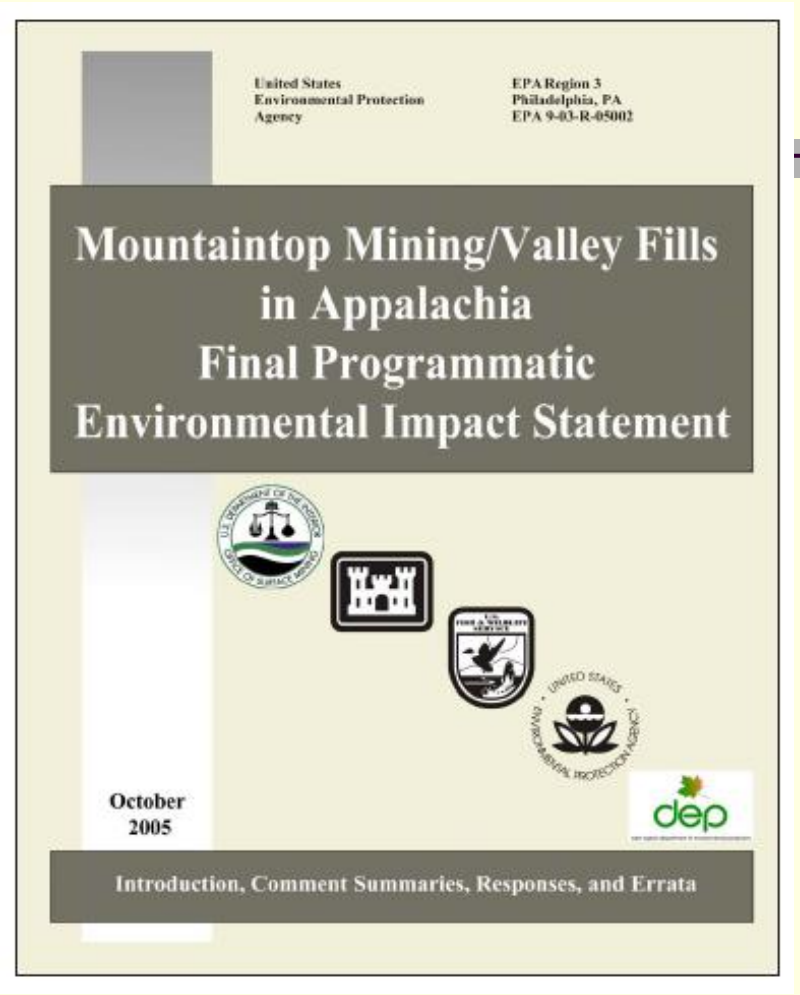
Mountaintop Mining Impacts on Streams

- Statistical analyses were applied to determine correlation of parameters in unmined, filled, filled/residential and mined sites.
- The analysis indicates that biological integrity is impaired by mining.
- Unmined sites have a higher biotic integrity.
- Unmined sites have more taxa and more sensitive taxa.
- The strongest association with water chemistry suggested that zinc, sodium, and sulfate concentrations were negatively correlated with fish and macroinvertebrate impairments.
- Selenium and zinc were negatively correlated with the West Virginia Stream Condition Index (WVSCI).
- The potential drivers of the impaired condition are mining practices and material handling practices and the geological factors associated with specific coal seams and overburden.

EPA Concerns

- **Value of Headwater Streams** – The ephemeral and intermittent reaches of are vital components of the ecosystem and require greater attention to functional importance
- **Forest Fragmentation** – Not directly regulated through CWA or SMCRA – Timing and location of mining activity may reduce impacts
- **Compensatory Mitigation for Headwater Streams** – Protocols need to be developed to replace functions lost
- **Selenium Bioaccumulation Potential** – The scientific community needs to reach consensus on a selenium standard
- **Social/Economic and Heritage issues** – Local and regional information and understanding is not adequate to quantify issues including Environmental Justice
- **Cumulative Impacts –** Science-based thresholds for individual and cumulative environmental costs have not been identified

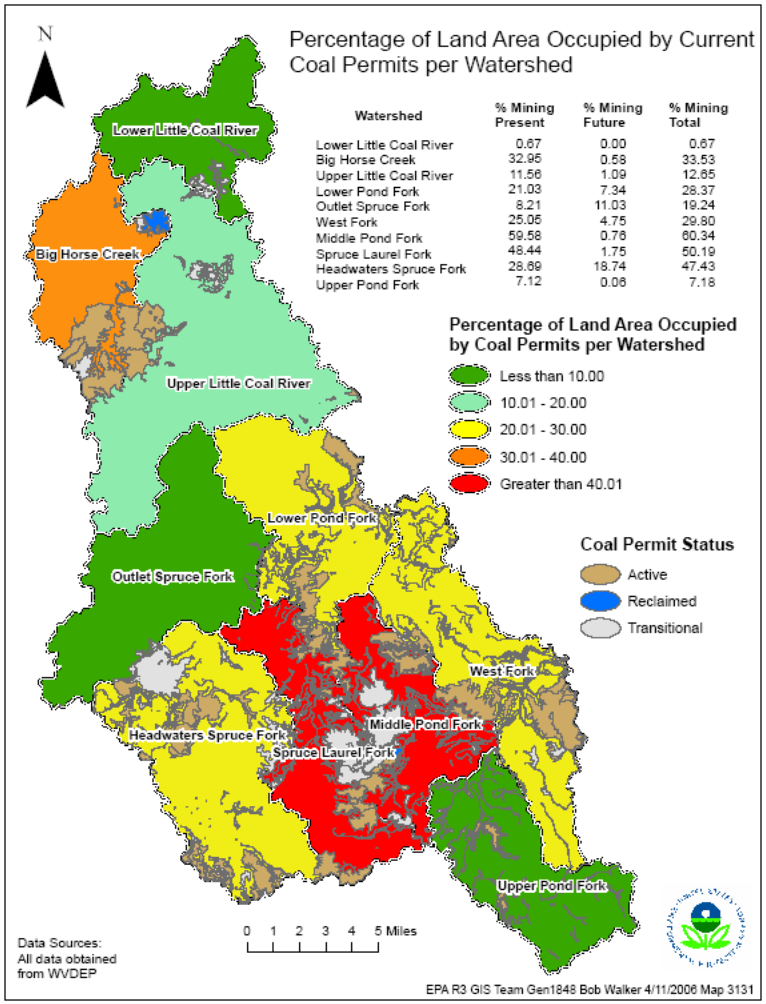


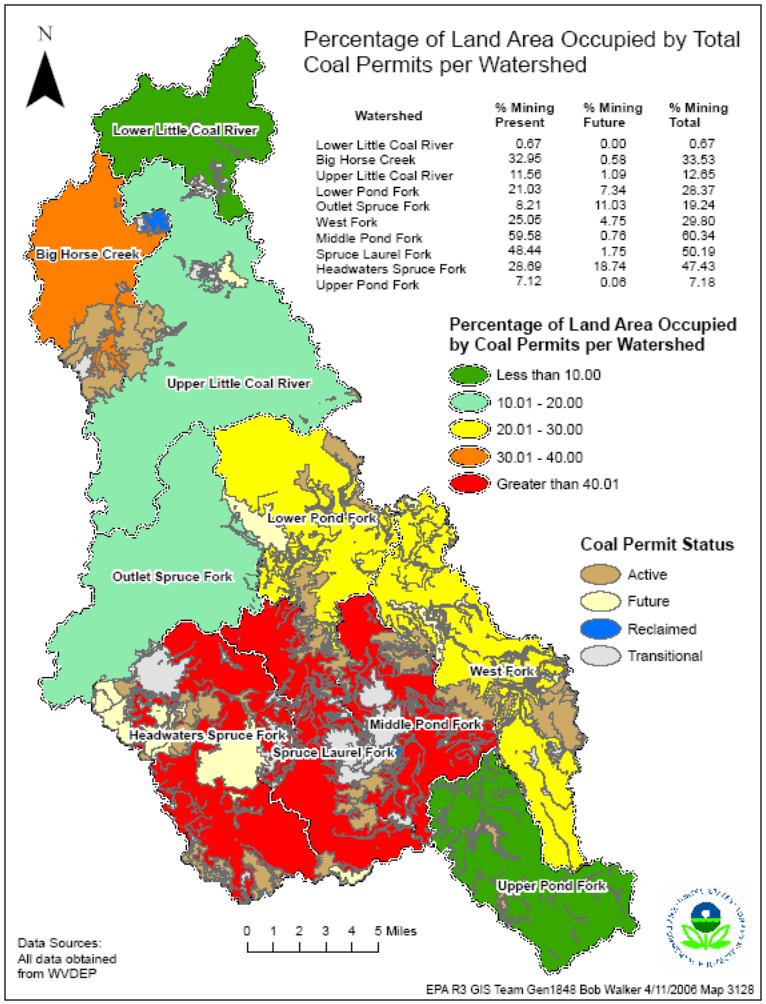


Comment period closed
January 21, 2004

83,500 Comments Received

http://www.epa.gov/region3/mtntop/index.htm


N
Percentage of Land Area Occupied by Current Coal Permits per Watershed
Watershed | % Mining Present | % Mining Future | % Mining Total
Lower Little Coal River | 0.67 | 0.00 | 0.67
Big Horse Creek | 32.95 | 0.58 | 33.53
Upper Little Coal River | 11.56 | 1.09 | 12.65
Lower Pond Fork | 21.03 | 7.34 | 28.37
Outlet Spruce Fork | 8.21 | 11.03 | 19.24
West Fork | 25.05 | 4.75 | 29.80
Middle Pond Fork | 59.58 | 0.76 | 60.34
Spruce Laurel Fork | 48.44 | 1.75 | 50.19
Headwaters Spruce Fork | 28.69 | 18.74 | 47.43
Upper Pond Fork | 7.12 | 0.06 | 7.18
Percentage of Land Area Occupied by Coal Permits per Watershed
Less than 10.00
10.01 - 20.00
20.01 - 30.00
30.01 - 40.00
Greater than 40.01
Coal Permit Status
Active
Reclaimed
Transitional
Lower Little Coal River
Big Horse Creek
Upper Little Coal River
Lower Pond Fork
Outlet Spruce Fork
West Fork
Middle Pond Fork
Headwaters Spruce Fork
Spruce Laurel Fork
Upper Pond Fork
0 1 2 3 4 5 Miles
Data Sources:
All data obtained
from WVDEP
EPA R3 GIS Team Gen1848 Bob Walker 4/11/2006 Map 3131


N
Percentage of Land Area Occupied by Total Coal Permits per Watershed
Watershed | % Mining Present | % Mining Future | % Mining Total
Lower Little Coal River | 0.67 | 0.00 | 0.67
Big Horse Creek | 32.95 | 0.58 | 33.53
Upper Little Coal River | 11.56 | 1.09 | 12.65
Lower Pond Fork | 21.03 | 7.34 | 28.37
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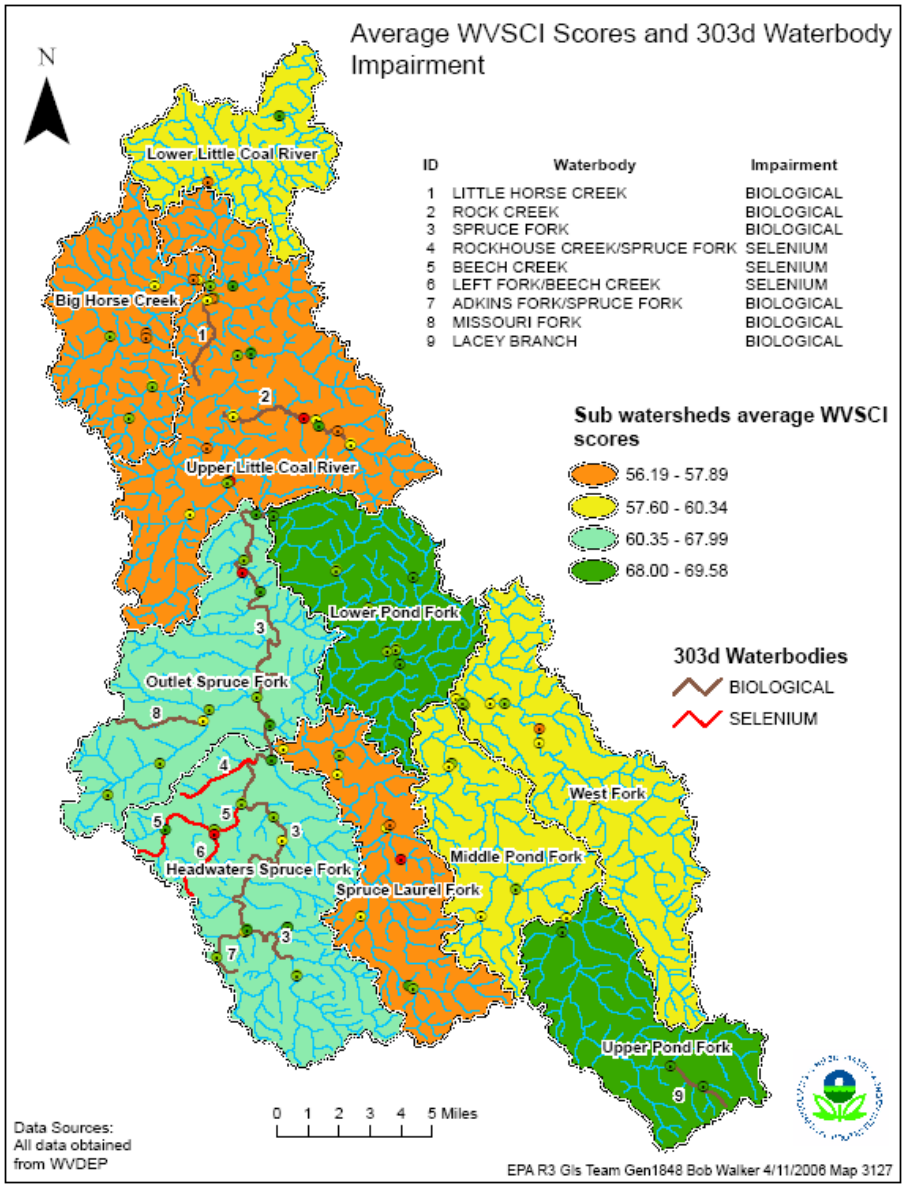
Lower Pond Fork
Outlet Spruce Fork
West Fork
Middle Pond Fork
Headwaters Spruce Fork
Spruce Laurel Fork
Upper Pond Fork
0 1 2 3 4 5 Miles
Data Sources:
All data obtained
from WVDEP
EPA R3 GIS Team Gen1848 Bob Walker 4/11/2006 Map 3128


Average WVSCI Scores and 303d Waterbody Impairment
N
Lower Little Coal River
Big Horse Creek
Upper Little Coal River
Lower Pond Fork
Outlet Spruce Fork
Headwaters Spruce Fork
Spruce Laurel Fork
Middle Pond Fork
West Fork
Upper Pond Fork
1
2
3
4
5
6
7
8
9
ID Waterbody Impairment
1 LITTLE HORSE CREEK BIOLOGICAL
2 ROCK CREEK BIOLOGICAL
3 SPRUCE FORK BIOLOGICAL
4 ROCKHOUSE CREEK/SPRUCE FORK SELENIUM
5 BEECH CREEK SELENIUM
6 LEFT FORK/BEECH CREEK SELENIUM
7 ADKINS FORK/SPRUCE FORK BIOLOGICAL
8 MISSOURI FORK BIOLOGICAL
9 LACEY BRANCH BIOLOGICAL
Sub watersheds average WVSCI scores
56.19 - 57.89
57.60 - 60.34
60.35 - 67.99
68.00 - 69.58
303d Waterbodies
BIOLOGICAL
SELENIUM
0 1 2 3 4 5 Miles
Data Sources:
All data obtained
from WVDEP
EPA R3 GIs Team Gen1848 Bob Walker 4/11/2006 Map 3127