A Geologic Overview of Mountaintop Removal Mining in West Virginia

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Executive Summary
of a report to the Committee on
Post-Mining Land Use and
Economic Aspects of Mountaintop Removal Mining
October 26, 1998

Coal Production Trends

West Virginia coal production has increased to record levels with total 1997 production of nearly182 million tons, breaking post-World War II records (Fig. 1). Traditionally, surface-mining production has accounted for about 20-25% of statewide production. Surface-mined coal production has increased from 19% of the total in 1982 to 31% in 1997 (Fig. 2).

The majority of the production gains from both underground and surface mines in West Virginia have come from the upper part of the Kanawha and the Allegheny formations (Figs. 3 and 4). These economically important, coal-bearing formations crop out in southern West Virginia and are exposed at the surface over most of Boone, Logan, and Mingo counties, and smaller parts of Clay, Fayette, Lincoln, McDowell, Nicholas, Raleigh, Wayne, Webster, and Wyoming counties. This increased production from the Kanawha Formation is in response to the demand for low sulfur compliance steam coal. Approximately 38.9% of West Virginia's 1997 coal production, amounting to 69,744,299 tons, came from Mingo, Logan and Boone counties. In these three counties, surface-mined coal has increased from 24% of the total production in 1982 to 39% of the total in 1997 (Fig. 5).

Geology of Mountaintop Removal Mining

A high percentage of the increase in surface-mined coal in the Kanawha Formation region has come from large mountaintop removal operations. The term "mountain top removal mine" is used herein for any areally-extensive surface mine with large head-of-hollow valley fills. The majority of the mountaintop removal mines target the Coalburg coal zone and overlying Stockton coal and associated riders (Kanawha Formation), and/or the "Block" coal zones (No. 5 Block, No. 6 Block, and No. 7 Block) of the overlying Allegheny Formation (Fig. 3). The region encompassing the outcrop belt of this target interval is shown on an accompanying map (Fig. 6). A review of mining trends strongly suggests that, for the foreseeable future, the majority of mountaintop removal mining activity in West Virginia will continue to focus on the upper Kanawha/Allegheny target interval and occur within the indicated region. It is imperative to realize that not every ridge top in the indicated region will meet the geologic and economic criteria for profitable mountaintop removal mining.

Coal beds in the target interval generally occur as multiple-bedded coal zones containing numerous inorganic partings. Laterally, individual benches can vary widely in thickness and continuity. Target interval coal beds are currently mined extensively for steam generation, with production from the Coalburg zone ranking second in West Virginia in 1997 with reported production by all mining methods of 23,431,687 million tons; the No. 5 Block ranking third

(14,000,913 tons); and the Stockton interval fifth (11,365,344 tons). Without considering production from minor beds within the target interval, production from these three zones represents 26.8% of West Virginia's 1997 coal production. Surface production from the Coalburg, Stockton, and No. 5 Block coal zones amounted to 27, 464,311 tons in 1997, representing approximately 15.1% of the State's 1997 production.

If the practice of mountaintop removal mining is disallowed or curtailed, the production from these operations will not be replaced with underground mining production in the short term and very likely not in the long term. As mentioned above, coal beds in the target interval are frequently split into numerous benches separated by inorganic partings of highly variable thickness. Only some of these benches are economically minable by underground methods. In mountaintop removal mining, many, if not all of the coal benches are recovered, representing a more efficient recovery of the resource.

Mountaintop removal mining operations do occur in other parts of the State in other target intervals. For example, a secondary target interval within the Kanawha Formation occurs below the primary target interval and includes, in ascending order, the Powellton, No. 2 Gas, Peerless, and Williamson coal beds. In many areas, one or more of the beds in this interval have already been depleted by underground mining, severely limiting the economic viability of mountaintop removal mining in these areas. There are a handful of permits designated as mountaintop removal operations located in northern West Virginia and extreme southern West Virginia that target other stratigraphic intervals. In our judgement, very limited opportunities exist for large-scale mountaintop removal operations in these areas either because of previous mining depletion or insufficient reserves.

Areas Impacted by Mountaintop Removal Mining

To provide some perspective concerning the impact mountaintop removal mining and associated valley fills have had in West Virginia, the WVGES compiled the areas of mountaintop removal mining and valley fills for the Amherstdale, Myrtle, and Cowen 7.5-minute topographic quadrangles from aerial photography flown in 1996 and 1997. An example of one of these photographs depicting an area of the Amherstdale 7.5-minute quadrangle is included (Fig. 7).

The Amherstdale 7.5-minute quadrangle is located in southeastern Logan County and also includes parts of Boone and Wyoming counties. Within this quadrangle, 2,650 acres have been impacted by mountaintop removal mining and another 556 acres are covered by valley fills. Therefore, 8.5% of the area of the quadrangle has been impacted by mountain top removal mining (Fig. 8). (A 7.5-minute quadrangle encompasses approximately 37,800 acres.)

The Myrtle 7.5-minute quadrangle is located in Mingo and Logan counties. A total of 1,291 acres are covered by mountaintop removal mining and an additional 324 acres are covered by valley fills for a total of about 4.4% of the quadrangle area (Fig. 9).

The Cowen 7.5-minute quadrangle is located to the northeast in Webster County. Here, 1,080 acres have been impacted by mountaintop removal mining and another 246 acres are covered by valley fills for a total of 3.6% of the quadrangle area (Fig. 10).

The Coal Bed Mapping Project at WVGES

The Coal Bed Mapping Project (CBMP) was funded by the Legislature in 1995 to provide improved geologic data for the assessment and taxation of coal lands in West Virginia. The CBMP is part of the Mineral Lands Mapping Program (MLMP). Partners with WVGES in this effort are the Department of Geology and Geography at West Virginia University, who are creating digital base maps, and the Department of Tax and Revenue, who are creating digital mineral ownership maps.

The CBMP is designed to utilize Geographic Information System (GIS) technology to create, store, and analyze basic coal maps and data. Coal maps being created and stored in the GIS include for each bed:

- Coal bed elevation and surface outcrop lines;
- Variation in coal bed overburden thickness;
- Variation in coal bed thickness and amount of in-bed, non-coal partings;
- Underground-, surface- and auger-mined areas;
- Local coal bed discontinuities; and
- Variation in coal quality parameters, such as sulfur and ash content.

The status of the CBMP GIS products is shown on an accompanying map (Fig. 11). These coal maps are basic resource assessment maps and are useful not only for mineral lands taxation, but for analysis of a variety of issues concerning coal and coal mining.

For example, as was demonstrated to the Committee, the overburden maps and coal thickness maps can be used to derive overburden-to-coal ratio maps. The example illustrated how the mountaintop removal-mined area on Bullpush Mountain on the Fayette-Kanawha county line, near Montgomery, was identified as an area of low overburden-to-coal ratio. If this

mapping was completed for southern West Virginia, it would require a few computer keyboard strokes to identify the ridges most attractive for future mountaintop removal mining. The resulting maps would focus the discussion considerably. We are working toward that goal, but cannot complete the work before decisions must be made by the Governor's committees concerning the future of mountaintop removal mining in West Virginia.

Recommendations

We at the WVGES firmly believe that the coal geology data being created by CBMP is vital to the citizens of West Virginia and needs to be available in public forums in order to encourage educated discussion and informed descision-making. While not fully available for analysis of mountaintop removal mining issues, we must press forward to complete the work so that the information is available for future issues such as resource studies, mine drainage, underground mine pools, subsidence, and others. The investment in creation of this information now will be recouped many-fold in the future. If the Committee members share these convictions, we ask the following recommendations be made:

1) That the Administration continue support for the Coal Bed Mapping Project and the Mineral Lands Mapping Program at a minimum by restoring funding to original FY95 levels *and* giving serious consideration to additional funding so that map production can be accelerated.

2) That the WVGES be given the mandate to take the lead in working with the West Virginia Department of Environmental Protection, the federal Office of Surface Mining, the United States Geological Survey, and other parties to develop additional databases and maps relevant to issues of coal and coal mining as they are identified *and* to seek additional funding from federal agencies or other external sources to realize these goals and objectives.

3) That the Administration fund the orthorectification of the aerial photography of West Virginia flown by the United States Geological Survey in 1996 and 1997 and invested in by many West Virginia agencies so that it can be readily utilized in a GIS for compilation of surface-mined areas and other numerous map updating applications.

In addition, it was clear from the symposium discussions that GIS could be used to bring

together the varied information needed to plan for the best post-mining use of many sites. For example, having the routes of future roads from the West Virginia Department of Transportation in the same GIS system with existing development sites from the West Virginia Development Office and with past, present, and proposed mining sites, would go a long way toward better planning and decision-making. Therefore, we further suggest:

1) That the Administration direct the relevant State agencies to develop the necessary GIS expertise in their agencies and to work with the State GIS Coordinator in the WVGES to bring together and maintain this information.

Figure 1
West Virginia Coal Production, 1925 to 1997

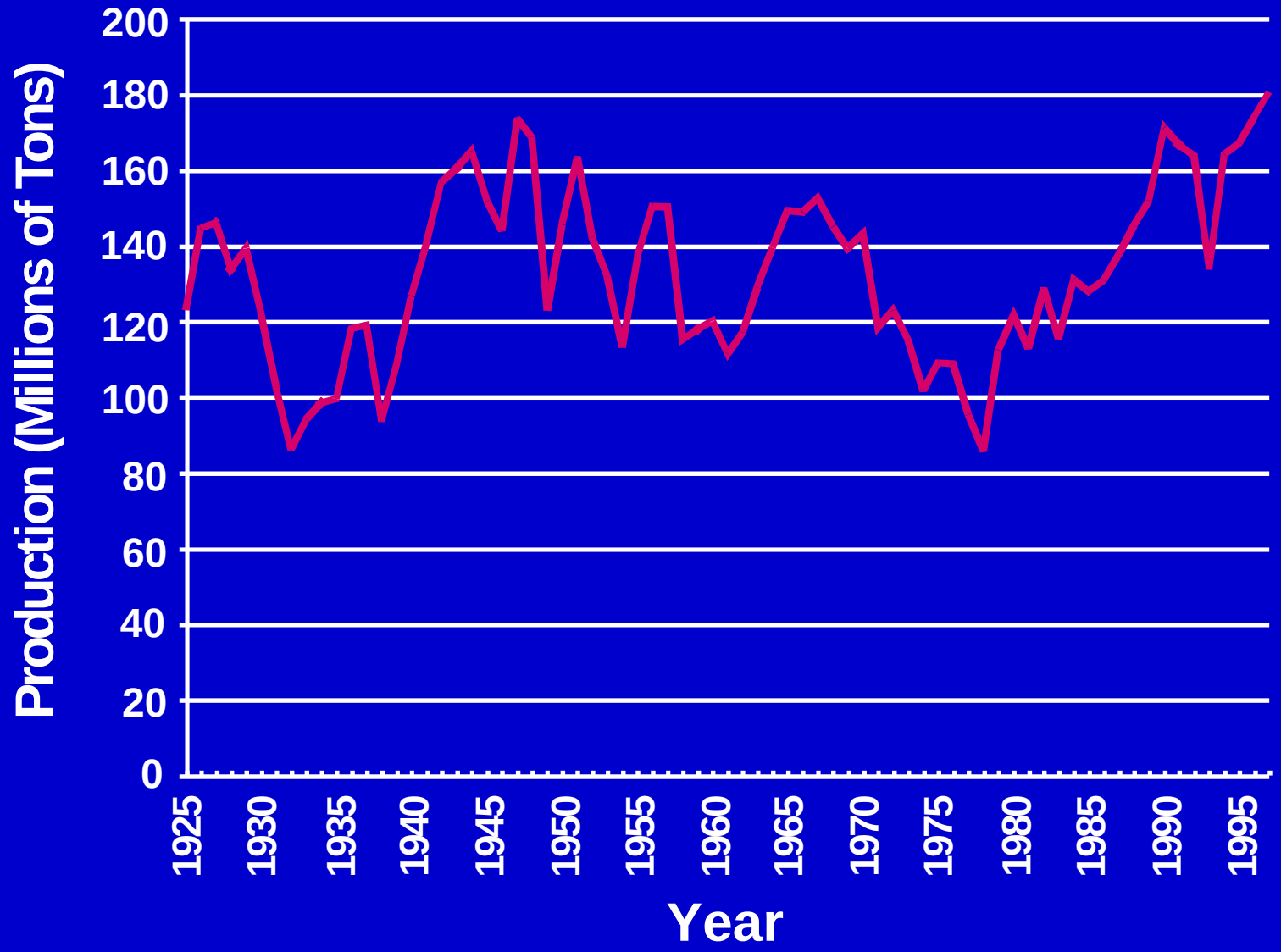


Figure 2
West Virginia Coal Production, 1982-1997

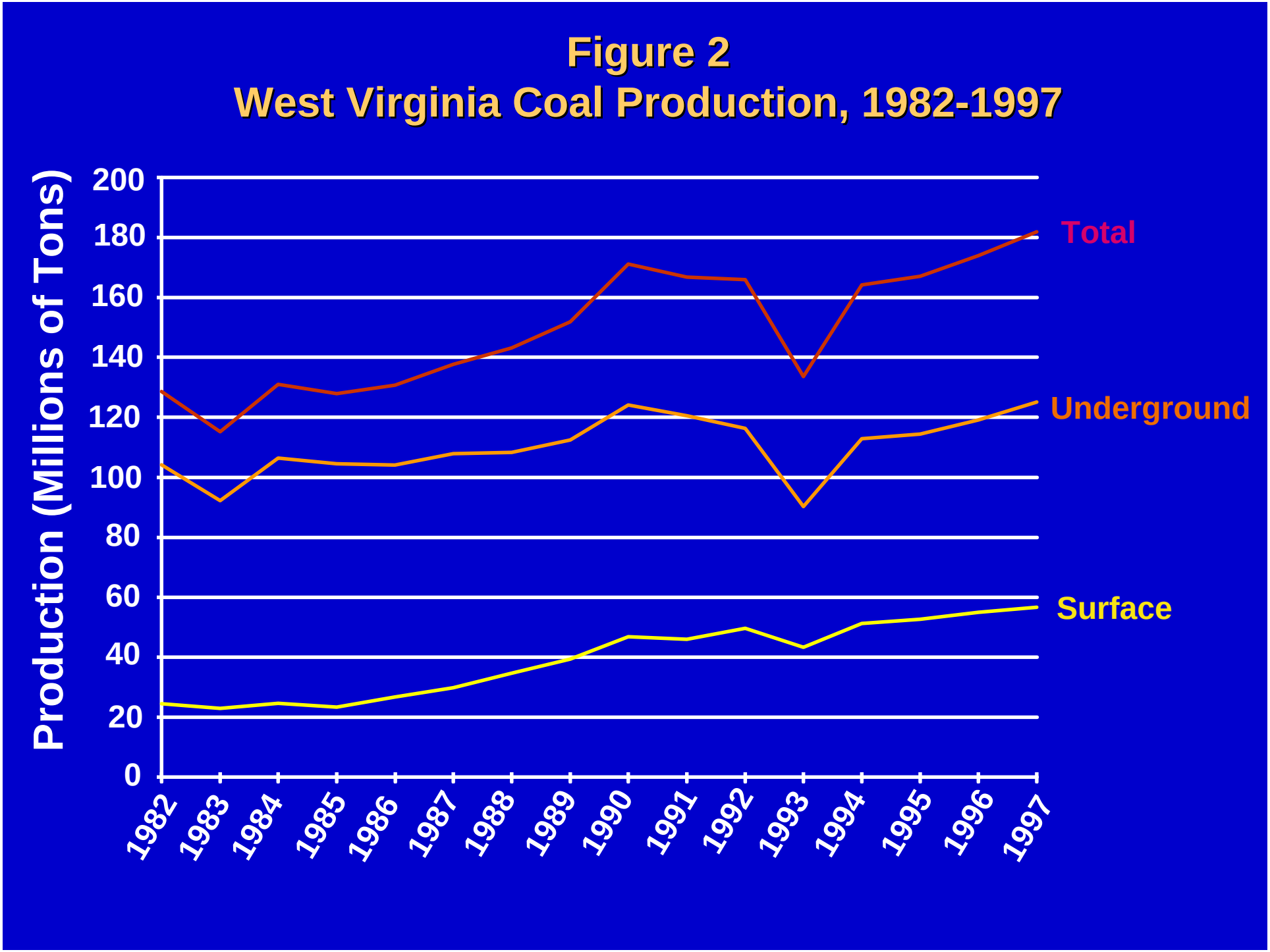
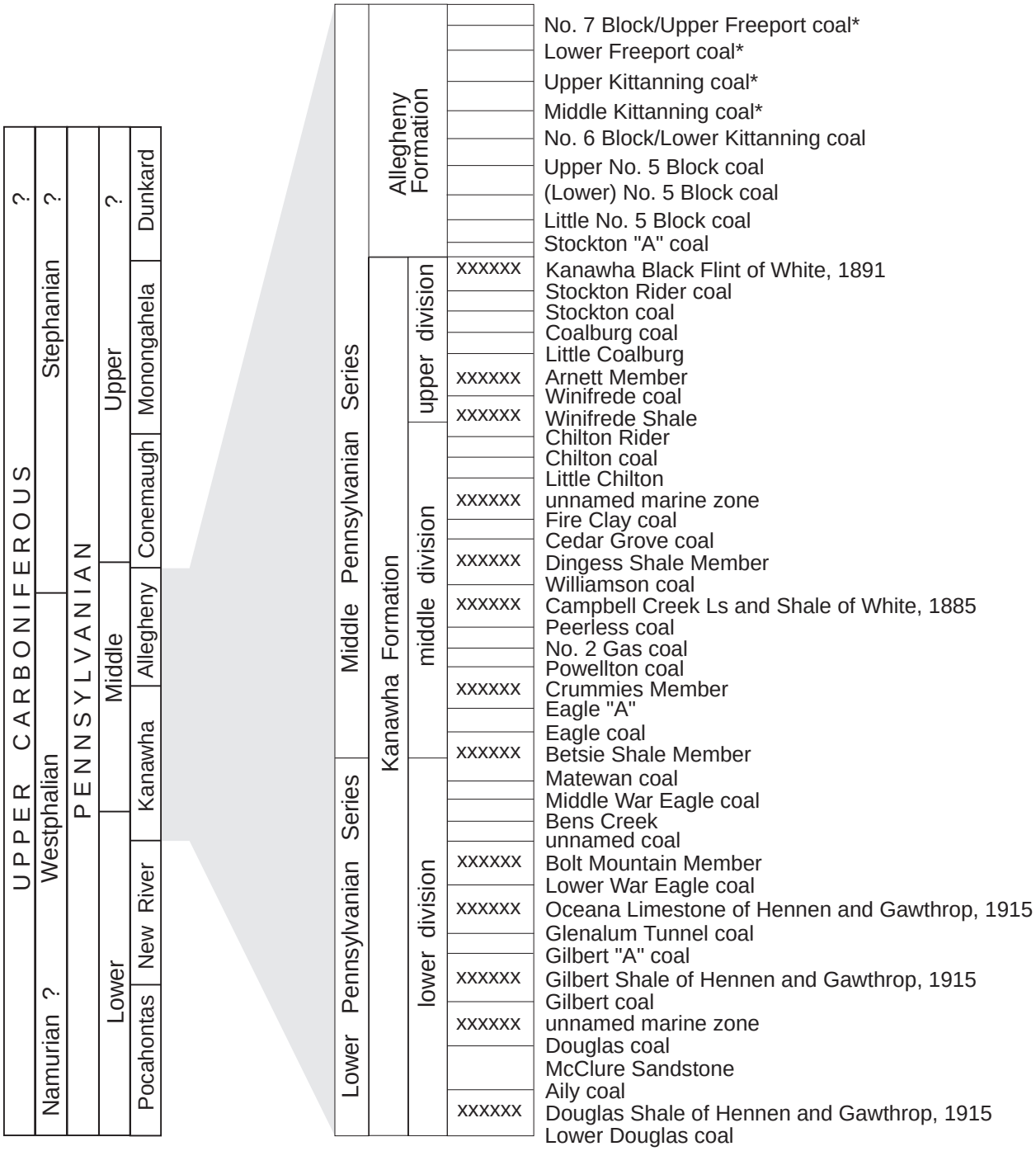


Figure 3



* Northern West Virginia Coal Field only

Figure 4
West Virginia Coal Production by Geologic Formation, 1983 to 1997

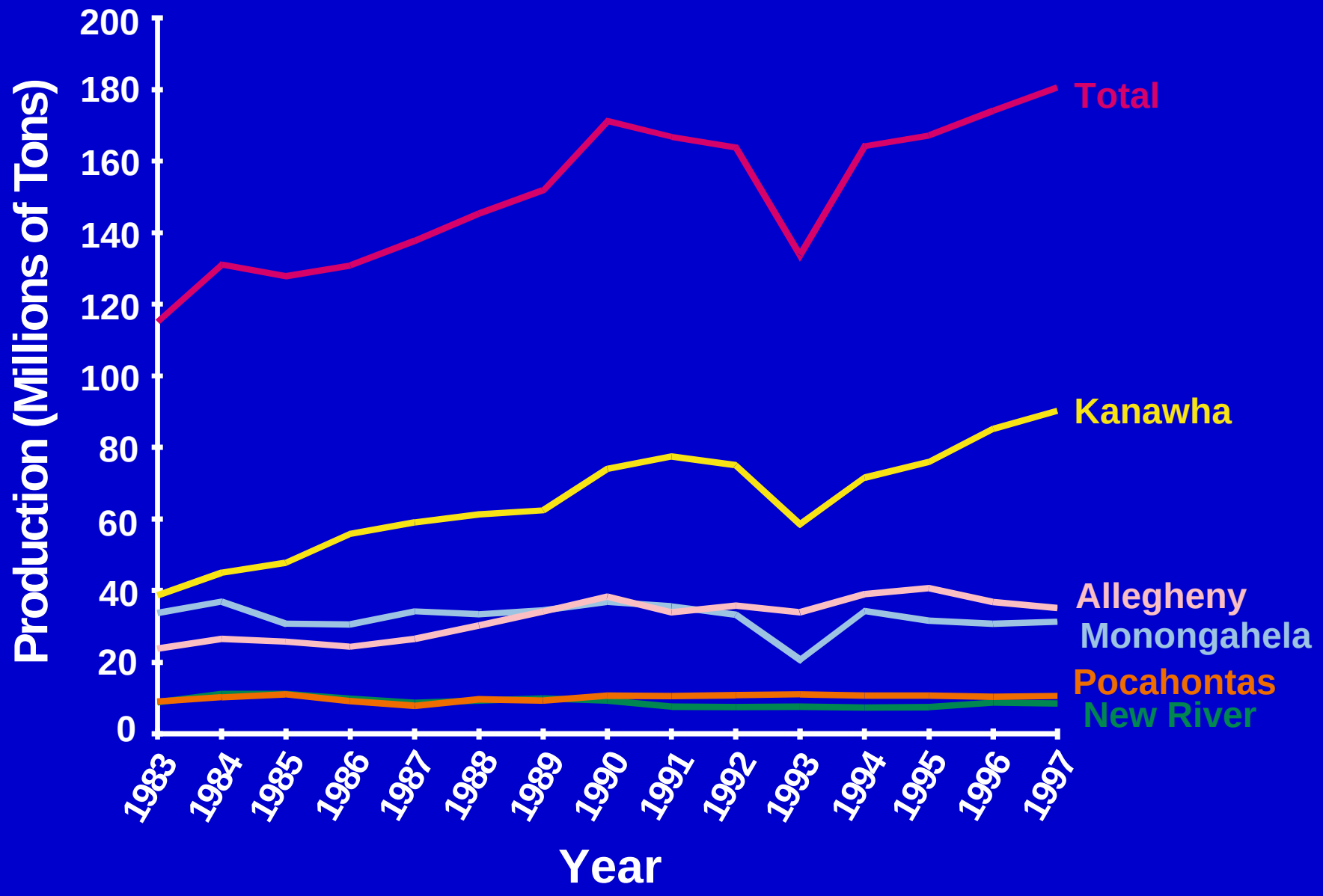
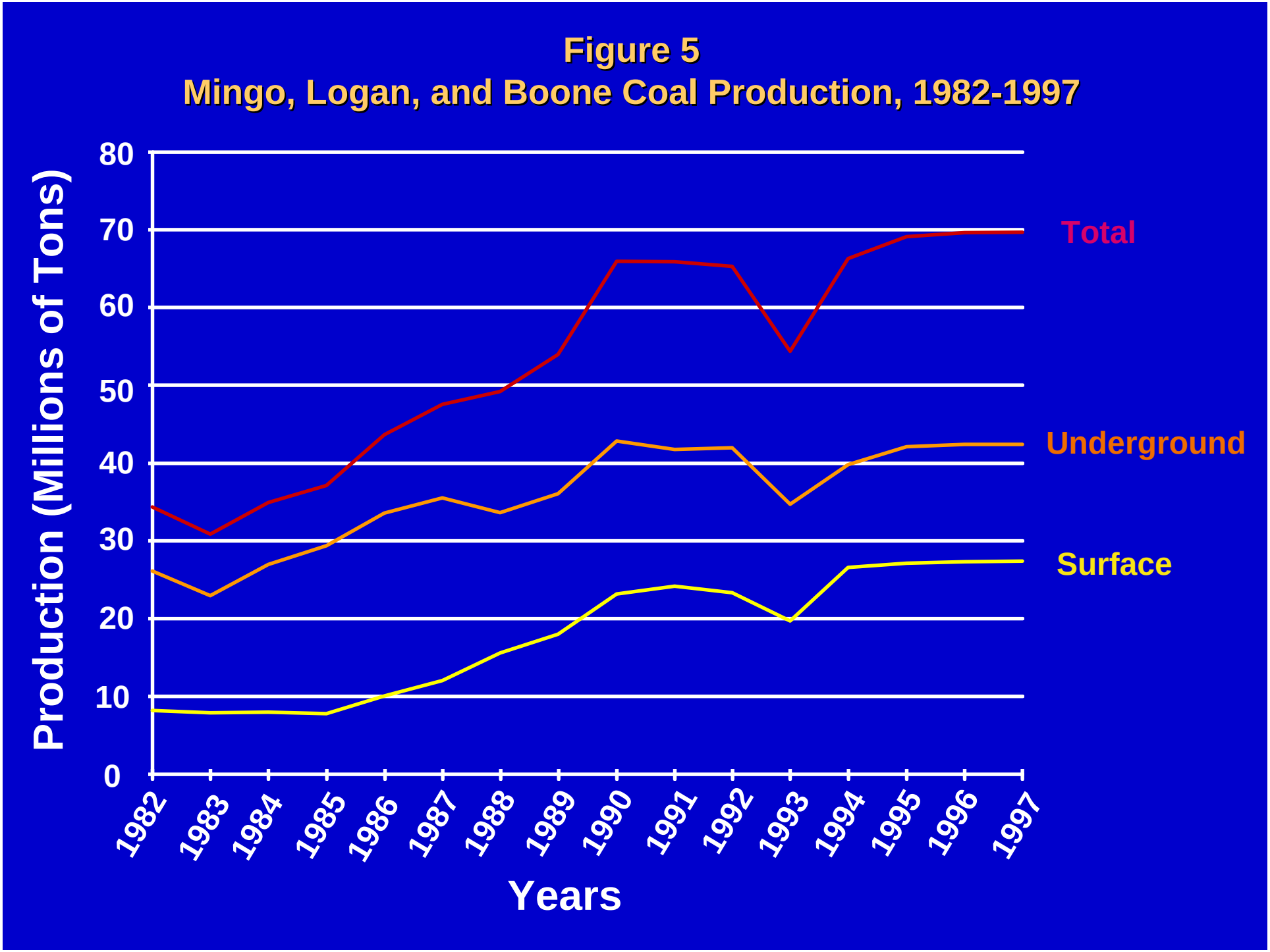


Figure 5
Mingo, Logan, and Boone Coal Production, 1982-1997



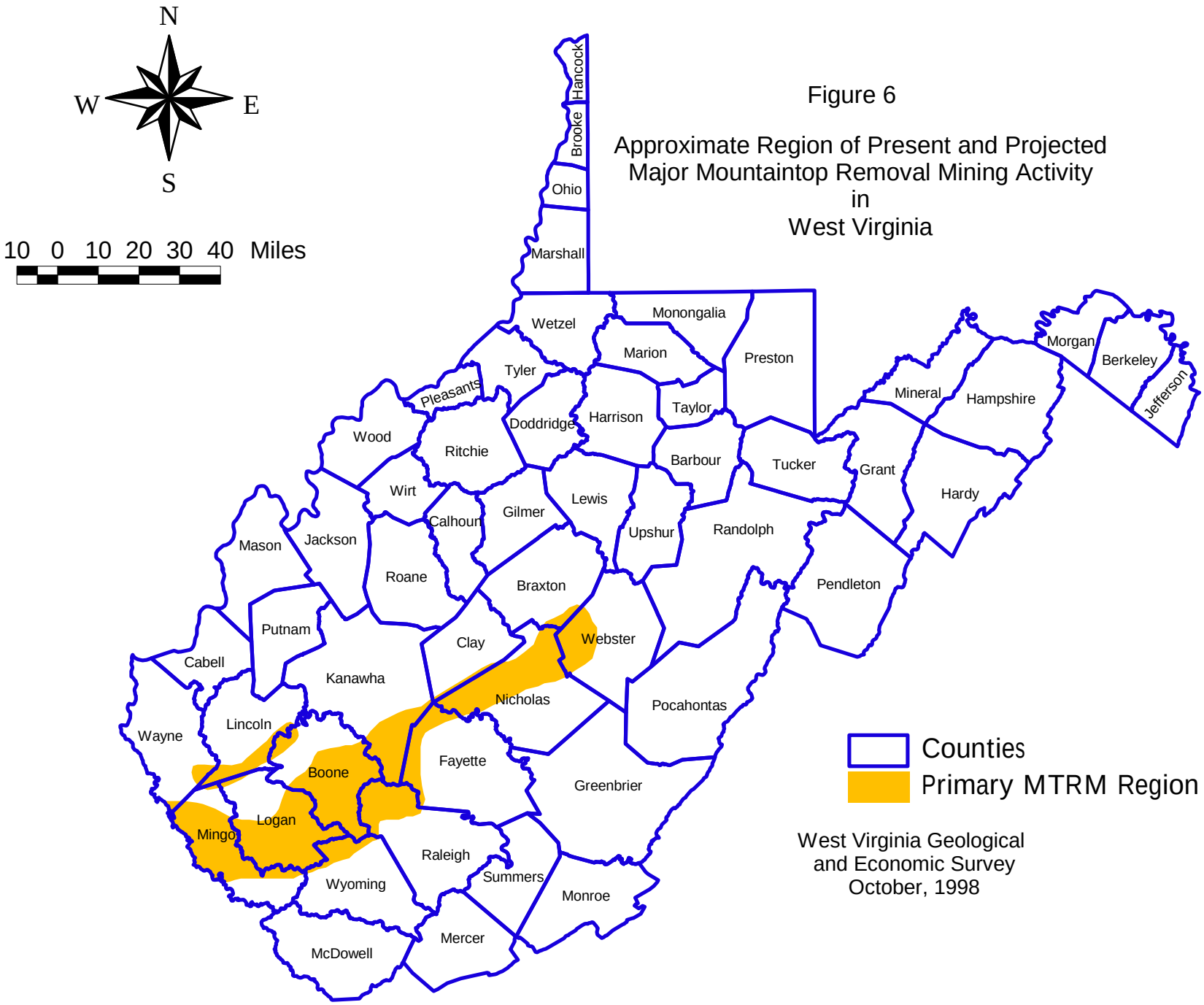


Figure 6

Approximate Region of Present and Projected
Major Mountaintop Removal Mining Activity
in
West Virginia

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October, 1998

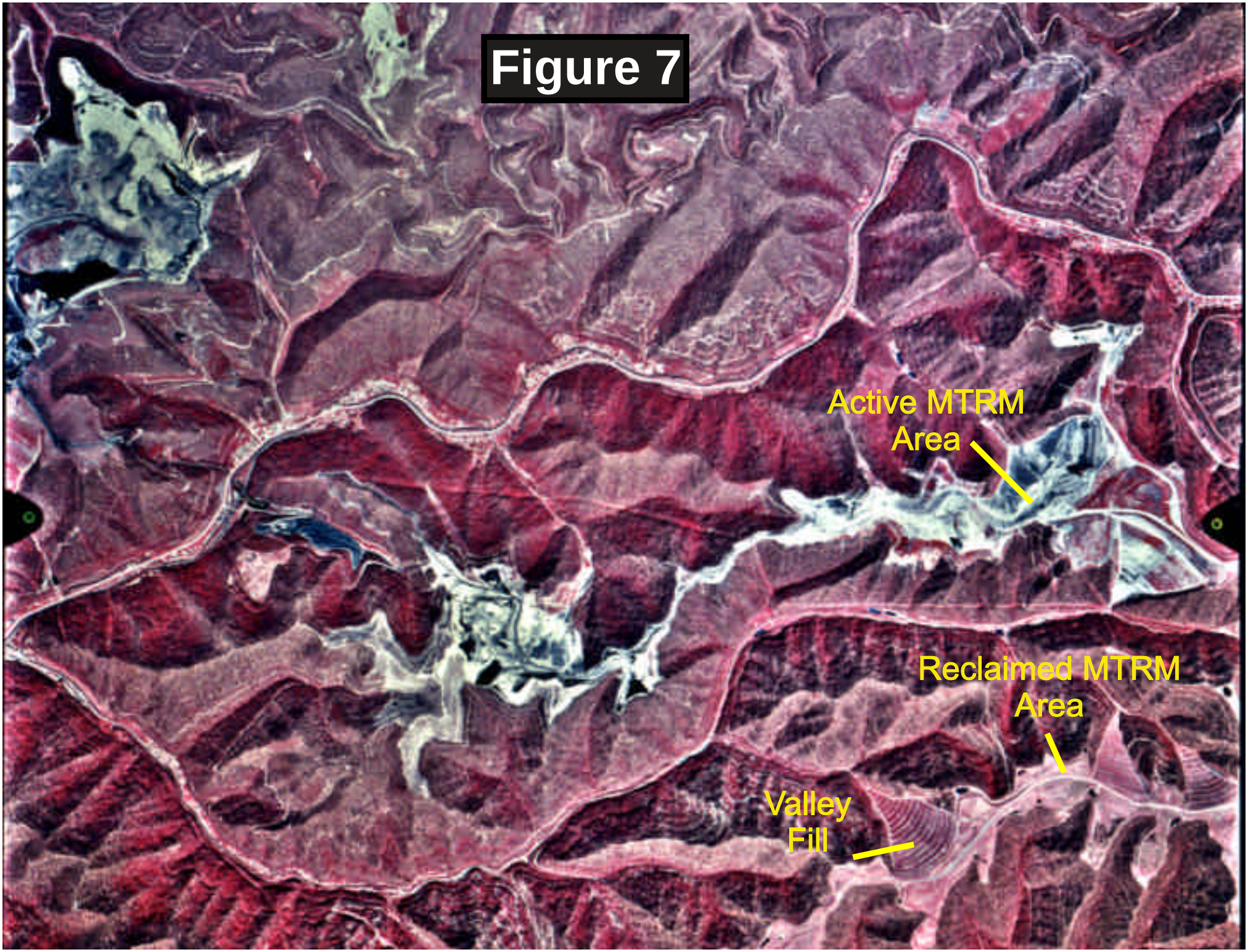
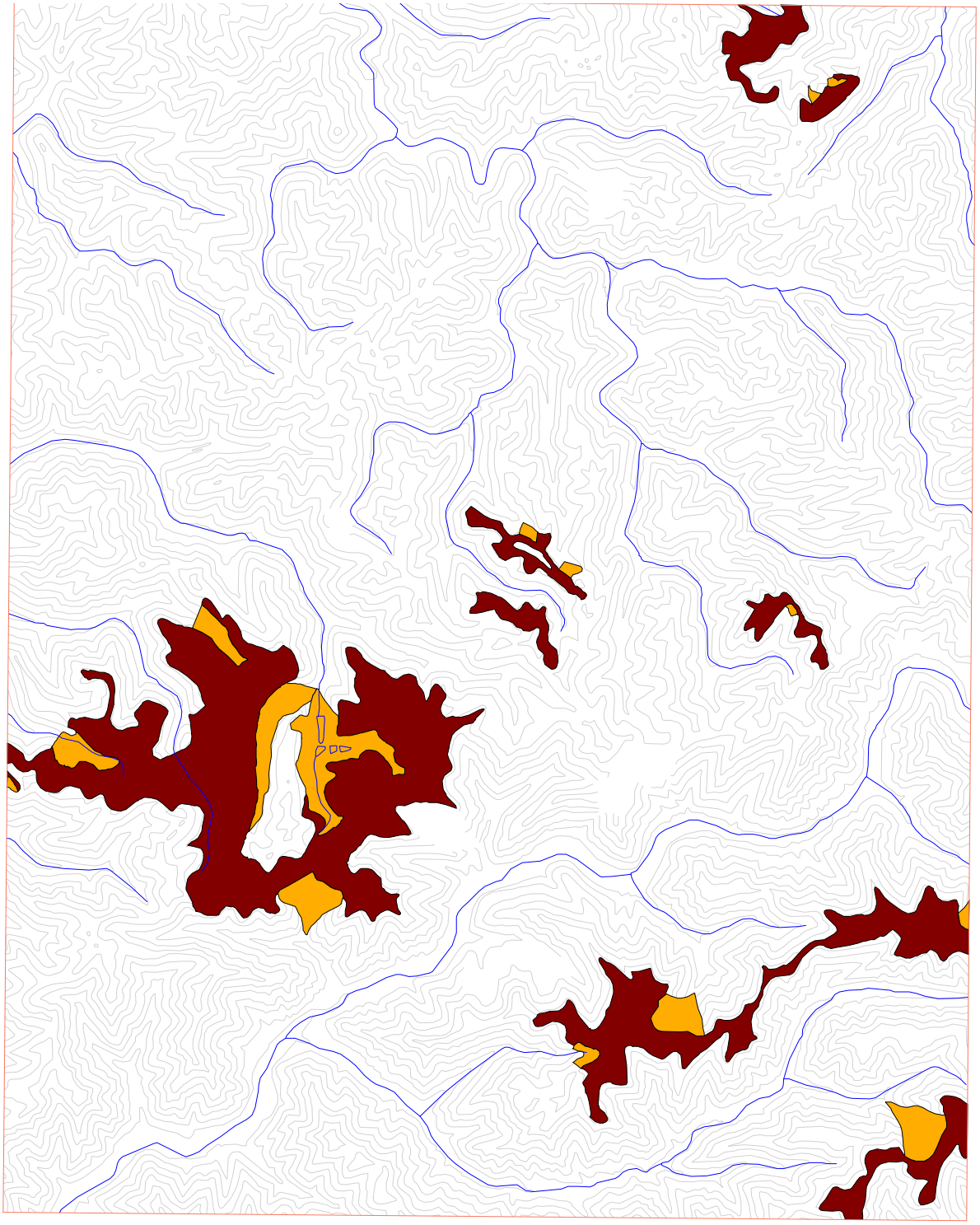
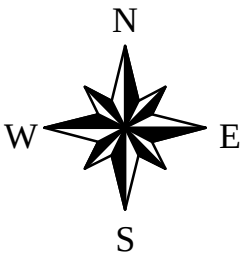


Figure 7
Active MTRM Area
Reclaimed MTRM Area
Valley Fill





Legend

- Quad Boundary
- Streams
- MTRM Area
- Valley Fills
- Topographic Contours

Figure 8

Compilation of Mountaintop Removal Mining Areas from the 1996 NAPP Imagery, Amherstdale 7.5' Quadrangle

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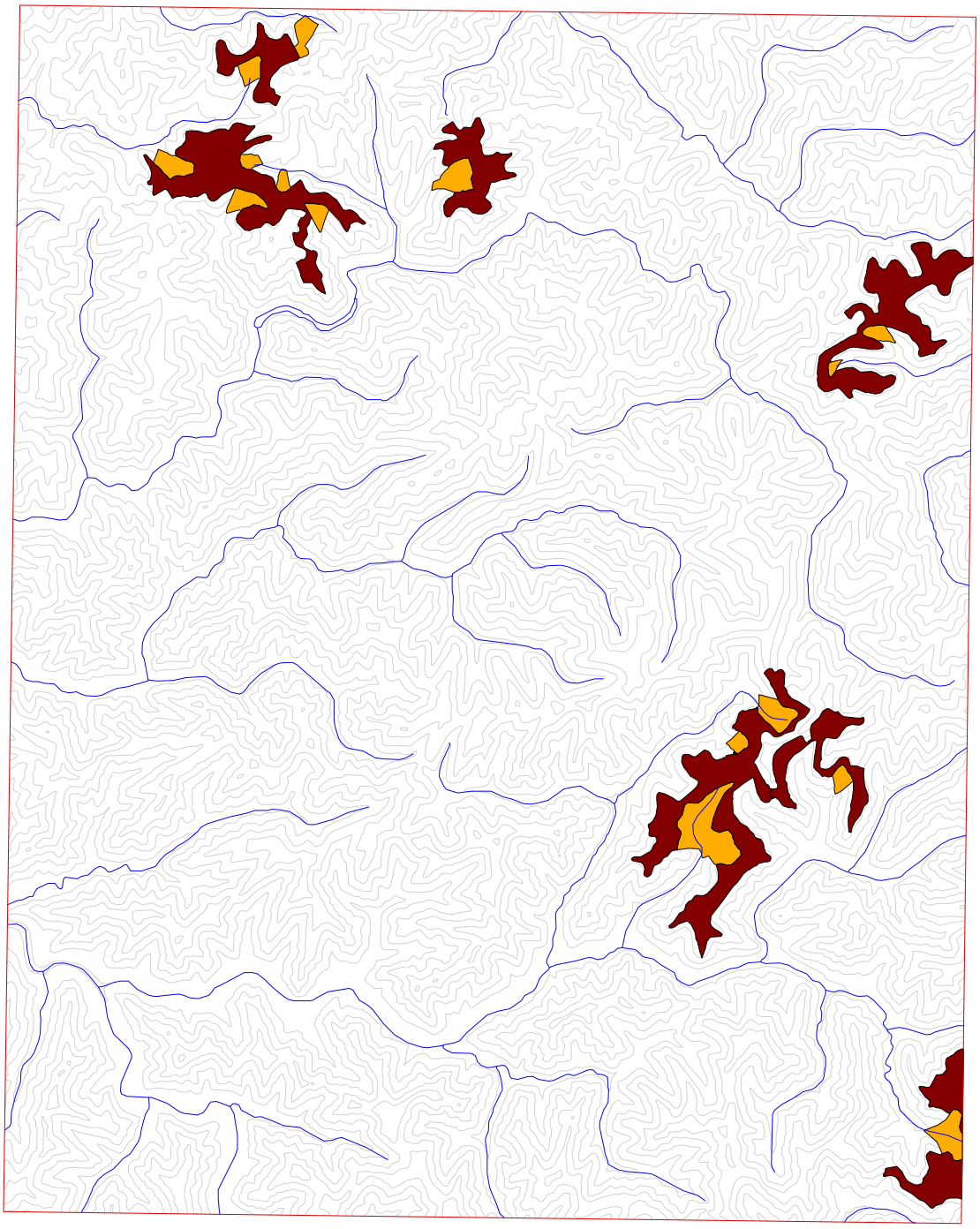
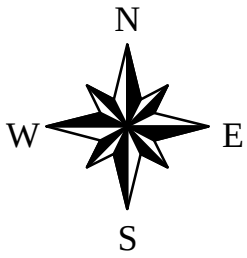
1 0 1 2 Miles





Legend

- Quad Boundary
- Streams
- MTRM Areas
- Valley Fills
- Topographic Contours

Figure 9

Compilation of Mountaintop Removal Mining Areas from the 1996 NAPP Imagery, Myrtle 7.5' Quadrangle

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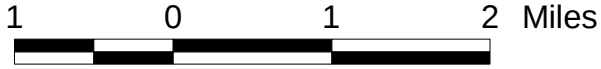

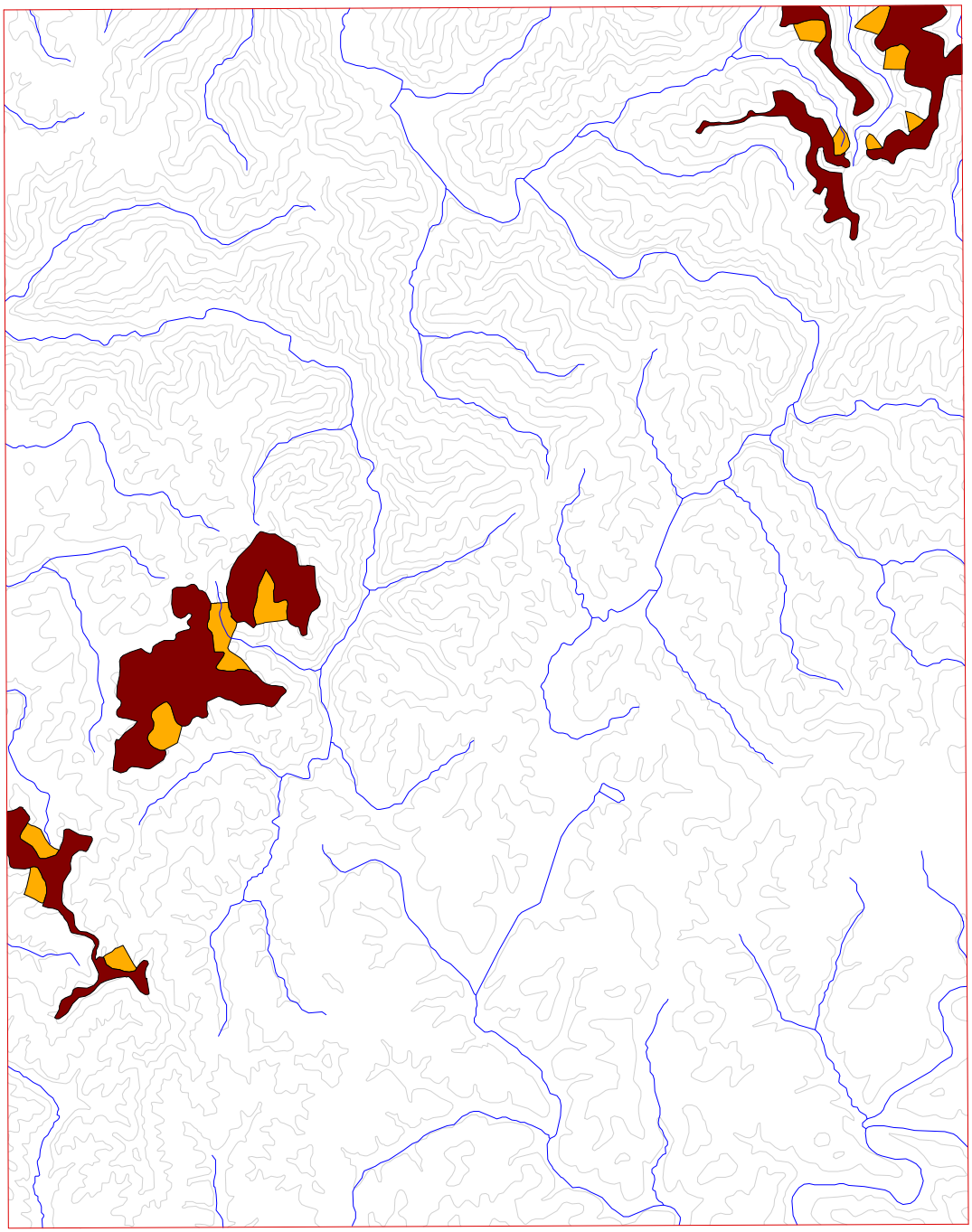

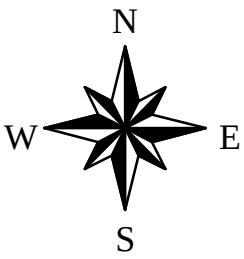

Figure 10

Legend

- Quad Boundary
- Streams
- MTRM Area
- Valley Fills
- Topographic Contours

Compilation of Mountaintop Removal Mining Areas from the 1997 NAPP Imagery, Cowen 7.5' Quadrangle

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1 0 1 2 Miles

Figure 11

Coal Bed Mapping Project Mapping Status

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