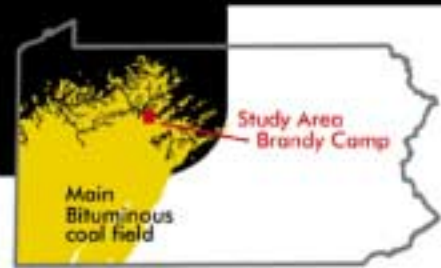


Pennsylvania



Geologic Maps Identify Coal Resources and Past Mining

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Defining the Problem

Despite Pennsylvania's long history as a major **coal** producer, information on the coal geology (Fig. 1), remaining resources, and extent of past **mining** is not available for many areas of the state. Such **information** is critical for present and future coal exploration and development, environmental protection, mine-hazard identification and mitigation, and land-use planning.

The Geologic Map

The geologic maps (Figs. 2 & 4) are from a set of 13 maps for the Brandy Camp quadrangle, Elk County, an area in Pennsylvania's Main Bituminous coal field. The bedrock geologic map (Fig. 2) shows the Allegheny Formation (green), which contains nearly all of the **minable** coals in the quadrangle, and the Glenshaw Formation (yellow), which rarely contains commercial coals. The small inset map (Fig. 3) indicates where the economically important Lower Kittanning coal is present or mined throughout the quadrangle and also shows the area of the two maps in Figs. 2 & 4 (green outline). The coal-resource geologic map (Fig. 4) shows where the coal occurs at land surface (coal crop lines) and depicts areas of known mining. Similar resource maps exist for the other 10 commercial coals in the quadrangle.

Applying the Geologic Map

The maps define the coal geology and coal mining. The locations and areas of past mining are used to estimate remaining coal resources and to **assess potential** or occurring environmental degradation and mine hazards. In particular, information on underground mines, adits, and shafts helps identify sources of acid mine drainage and causes of land subsidence. Locations of underground-mine boundaries are needed to design barriers to separate future operations from past ones. Such barriers help reduce the risk of cutting into older, abandoned workings. The elevation of the Lower Kittanning coal can be determined anywhere on the map from the structure contours. These coal elevations may be used to calculate overburden thicknesses for **resource estimates** and mine planning, to predict mine-pool locations, and to determine mine-water (and groundwater) flow directions. Geologic information from the maps has been used for coal exploration, resource estimation, mine permitting, landfill siting, and acid-mine-drainage abatement. Based in part on this information, the Pennsylvania Department of Environmental Protection issued a permit to a coal company in early 2003 to operate the first new underground mine in this area in more than four decades.

Conclusion

Geologic maps provide critical information for resource exploration and for planners, regulators, decision makers, and the general public.



Fig. 1. Exposure of sandstone capping an economic coal bed.

geologic map

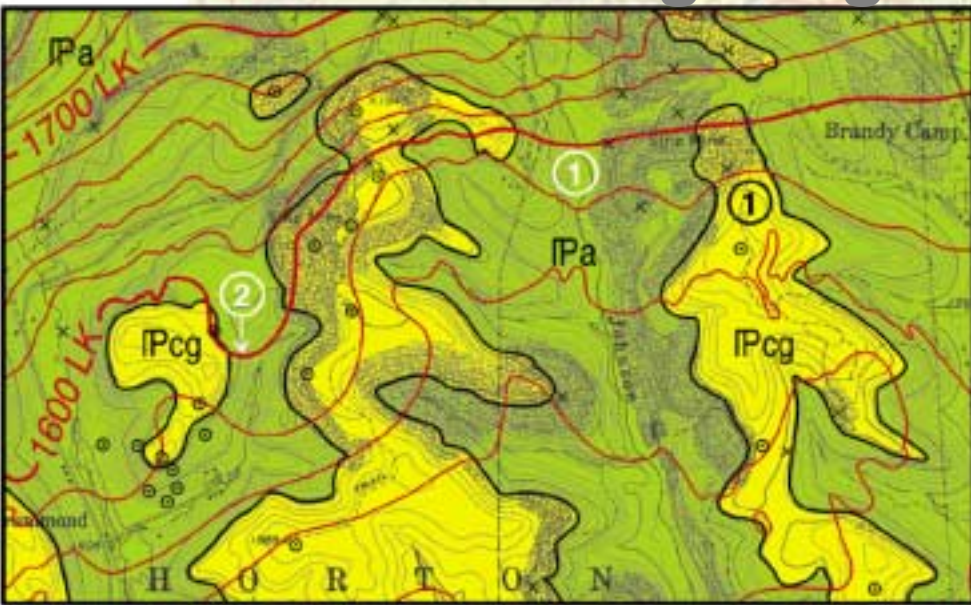


Fig. 2. ① The bedrock geologic map distinguishes between the surface areas underlain by economic coals (Allegheny Formation) and those that are not (Glenshaw Formation). ② Structure contours show the amount and direction the rocks are inclined.

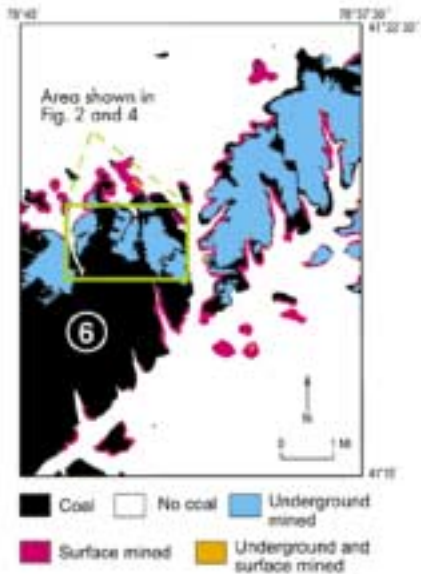
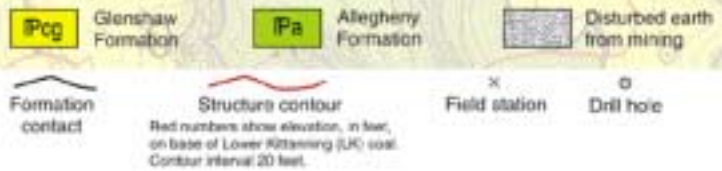


Fig. 3. ⑥ Areas of remaining Lower Kittanning coal.

coal resource map



Fig. 4. ③ Areas originally occupied by Lower Kittanning coal. ④ Known extent of surface (red) and underground (blue) mining. ⑤ Locations of mine openings (adits and shafts). Specimen of Pennsylvania bituminous coal.

