SUPPORTING INDUSTRIAL DEVELOPMENT: GEOLOGIC MAP OF THE COALING, ALABAMA 7.5-MINUTE QUADRANGLE

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Figure 1:Index map showing location of the Mercedez-Benz plant

Problem: In 1993, Daimler-Benz AG announced the construction of its first passenger vehicle manufacturing facility in the United States. After an extensive search, they chose a site in Tuscaloosa County in central Alabama as the location for the $300 million Mercedes-Benz U.S. International, Inc. plant (fig. 1). Located midway between Tuscaloosa and Birmingham, the plant site has direct access to Interstate Highway 59/20 and an adjacent railroad system. Construction of the plant began in 1994 and was completed in 1996 (fig. 2). Although no published 7.5-minute-scale geologic maps were available for the plant site, Geological Survey of Alabama geologists had recently completed reconnaissance geologic mapping of the area in support of smaller-scale geologic maps of Alabama (1:250,000 and 1:500,000, published in 1988 and 1989, respectively). These preliminary geologic maps were widely used in the initial land-use planning and in the search for readily accessible, high-quality construction aggregate resources needed to support the growing infrastructure (fig. 3). Recognizing the potential for future industrial and urban growth, the Mercedes-Benz plant area was designated the highest geologic mapping priority by the Geological Survey of Alabama's Geologic Mapping Advisory Committee for 1996. Geologic maps of the area were published at the 7.5-minute scale in 2000.

Figure2: View of Mercedez-Benz plant from I-59

Figure 3: Vulcan Materials Company Tuscaloosa Quarry near the Mercedes-Benz plant.

The Geologic Map: The geologic map of the Coaling 7.5-minute quadrangle encompasses the western part of the Mercedes-Benz plant and illustrates the complexity of the geology in the area (fig. 4). The plant is located where structurally complex Paleozoic sedimentary rocks of the Appalachian thrust belt (Valley and Ridge physiographic province) plunge southwestward beneath unconsolidated clastic sediments of the Upper Cretaceous Coker Formation of the Tuscaloosa Group (Ktc) in the Coastal Plain province. The plant is located within the Coal Creek anticline, and is underlain by shale and minor sandstone of the Mississippian and Pennsylvanian Floyd Shale and Parkwood Formation (PMpwf). Site planners took advantage of the natural topographic slope developed on the Floyd-Parkwood strata within the core of the anticline to facilitate good visibility of the plant from Interstate 59. The shale-dominated Mississippian-Pennsylvanian succession also provided a stable, geologic-hazard-free substrate for the plant.

Using the Geologic Map: A wealth of mineral resources occurs within the quadrangle, including iron ore in the Silurian Red Mountain Formation (Srm; fig. 4), road gravel in the Fort Payne Chert (Mfpm; fig. 4), and coal and coalbed methane in the Pennsylvanian Pottsville Formation (Ppv; fig. 4). In particular, carbonate rocks suitable for construction aggregate are in great demand near the Mercedes-Benz plant. Potential aggregate resources occur within the Cambrian and Ordovician Knox Group (OCk) and Middle Ordovician Chickamauga Limestone (Oc) (fig. 5). These units occur on the flanks of a syncline southwest of the plant. Structural attitude and outcrop width are important considerations in evaluating the potential of the aggregate resources, and are shown on the map (A, fig. 4). Their accessibility and economic viability is further complicated by locally overlapping Cretaceous sediments. The geologic map provides a means for estimating the amount of overburden removal that is necessary for aggregate resource extraction (B, fig. 4). In addition, geologic mapping of the unconformable boundary between consolidated Paleozoic rocks and unconsolidated Cretaceous sediments (C, fig. 4) has important implications for the evaluation of building foundations in other parts of the quadrangle (fig. 6). Furthermore, the Cambrian and Ordovician carbonates rocks forming the aggregate resource are prone to the development of sinkholes (D, fig. 4). Consequently, the geologic map also aids in the planning for and mitigation of geologic hazards in the area.

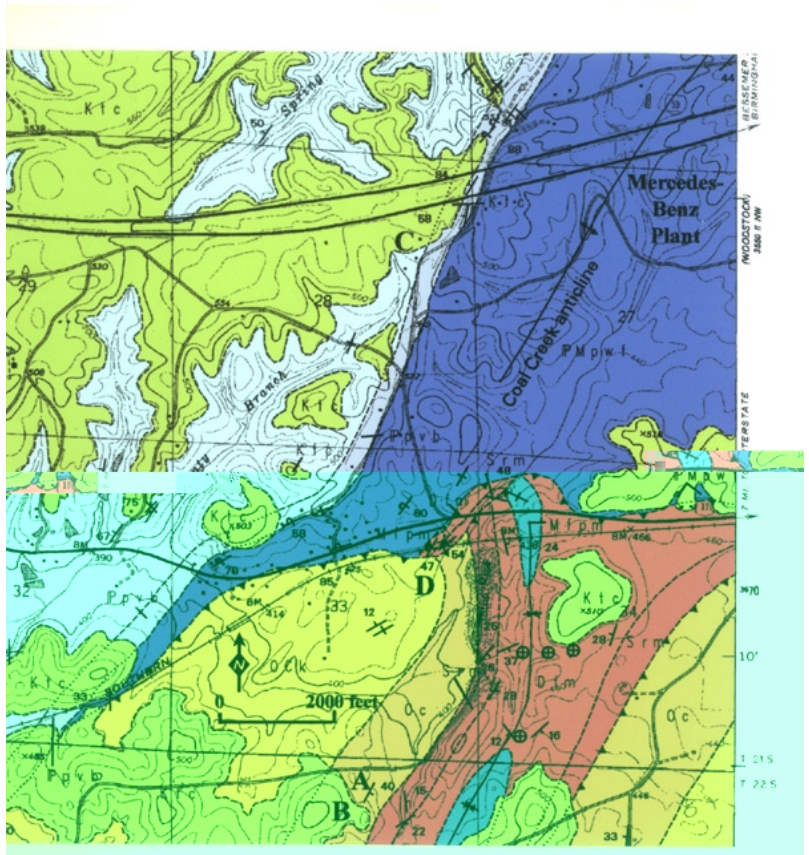

Figure 4:Part of the geologic map of the Coaling, Alabama 7.5-minute quadrangle showing the location of the Mercedes-Benz plant.

Figure 5:Vulcan Materials Company geologist pointing out bedding in the Chickamauga Limestone.

Figure 6: Geologist standing at the angular unconformity between the Pennsylvanian Pottsville Formation (Ppv) and the overlying Cretaceous Coker Formation (Ktc).

Conclusion: A $600 million expansion is currently underway at the Tuscaloosa Mercedes-Benz plant that will double the work force and the size of the plant. Construction of the expanded facility should be completed by early 2004. Recently published geologic maps will greatly enhance land-use planning and development in the area as industrial and associated urban growth associated with the Mercedes-Benz plant continues. As in Alabama, geologic maps can be expected to be a useful tool for facilitating and guiding development wherever it occurs.