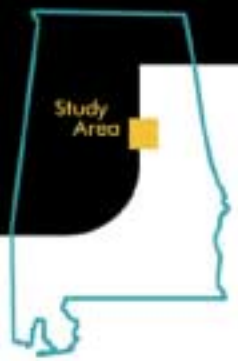
Alabama



Geologic Map Helps to Protect Groundwater

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Example

Defining the Problem

In central Alabama, the Mississippian-age Fort Payne Chert is an important **aquifer** for domestic and municipal water supplies. Rainfall recharges groundwater where the chert is exposed at the land surface. Where the chert has been quarried, many of the abandoned pits have become trash dumps (Fig. 1) containing potentially toxic material that can contaminate the water supply. Planning for protection of the groundwater recharge from **pollution** requires information about the precise location of the chert at the land surface.

The Geologic Map

The Fort Payne **Chert**, a fossiliferous cherty limestone, is resistant to erosion. The geologic map (Fig. 2) shows the extent of the chert (medium blue, Mfpm) and provides the basis for construction of a cross section to show the **location** and depth of the aquifer below the land surface (Fig. 3).

Fig. 1. Abandoned quarries in the Fort Payne Chert often become trash dumps containing materials that can contaminate the water supply.

Applying the Geologic Map

The porous, fractured, thin-bedded chert is highly permeable and allows the free passage of **groundwater**. Water from rainfall percolates into the chert where it is exposed at the land surface (Fig. 4). In contrast, the overlying Floyd Shale is impermeable, and where the beds dip below the land surface, water in the Fort Payne Chert is confined beneath the Floyd Shale. Wells drilled through the shale into the chert find **excellent** supplies of water at relatively shallow depths.

The Fort Payne Chert is also an economically attractive source of road material. Quarries or pits in the chert can be opened easily, and production generally can begin using only a backhoe or bulldozer. Quarrying sites shift as road construction advances, and numerous pits are **abandoned**. Because of dumping of trash, water entering abandoned chert **pits** and reacting with waste can contaminate groundwater in the aquifer.

Conclusion

Geologic mapping shows the extent of Fort Payne Chert exposure at the ground surface — this is the **recharge** area for this important aquifer. The recharge area is a relatively small proportion of the total ground surface; however, it is precisely the area that must be protected from pollution if **groundwater** resources are to be safeguarded. Information from the geologic map enables careful planning for land uses that will protect critical aquifer recharge areas and avoid pollution of groundwater resources (Fig. 5).

geologic map

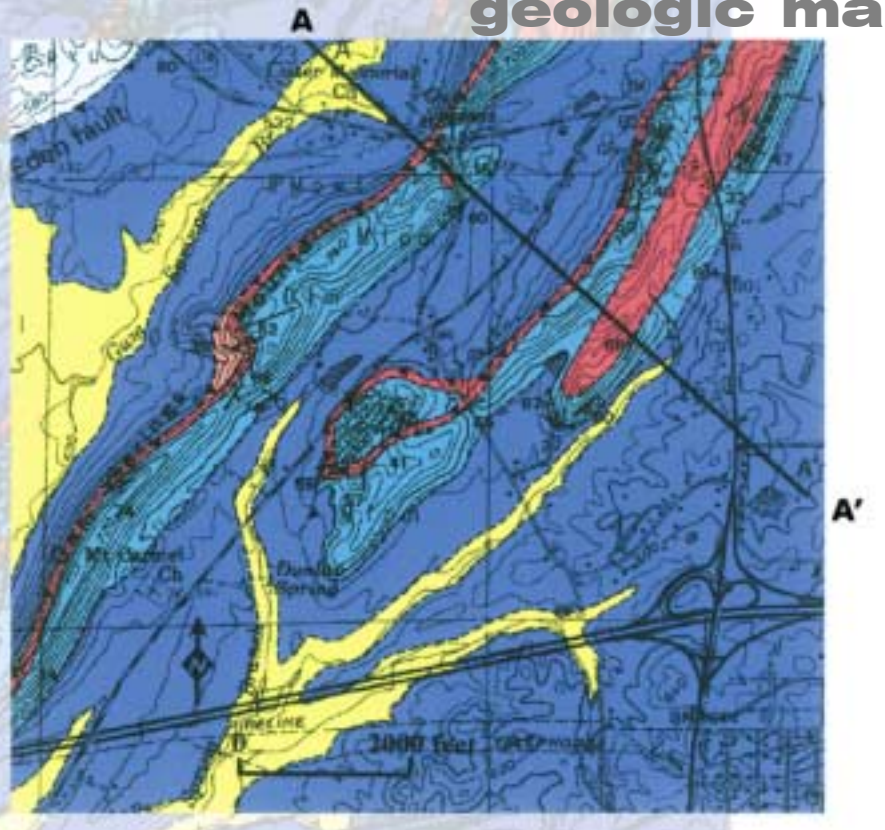

Fig. 2. The geologic map of part of the Pell City quadrangle, AL, accurately identifies the recharge area of the Fort Payne Chert aquifer (medium blue) that must be protected from pollution.

Map Explanation

cross section

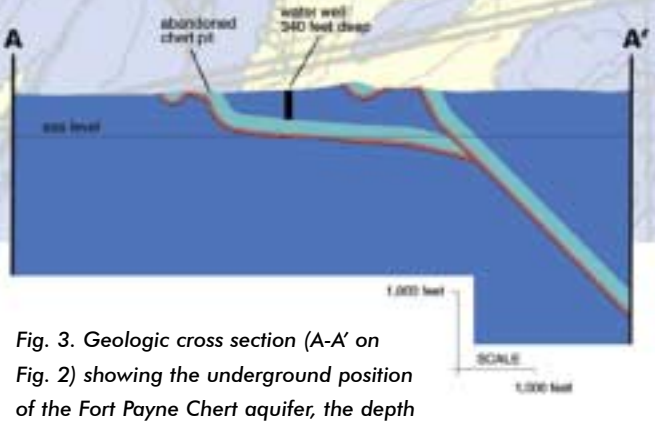

Fig. 3. Geologic cross section (A-A′ on Fig. 2) showing the underground position of the Fort Payne Chert aquifer, the depth required for drilling water wells, and the location of abandoned chert pits.

Fig. 4. Where the fractured Fort Payne Chert is exposed, water entering cracks and moving along fractures recharges the aquifer. When this water becomes contaminated, the aquifer and its water resources are at risk.

Fig. 5. On the wooded ridge behind the farmhouse, the Fort Payne Chert aquifer lies just beneath the soil, making this an ideal recharge area for clean water.