**Industrial Minerals**

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**INTRODUCTION**

Industrial minerals are naturally occurring, nonmetallic, nonfuel resources that are economically important and essential for industrial applications (Figure 17-1). Major industrial minerals that currently are mined in Illinois include limestone and dolomite, sand and gravel, clay, shale, industrial sand (silica sand), tripoli (microcrystalline quartz), and peat (Figure 17-2). Portland cement, lime, glass, and brick are closely related manufactured products. Fluorite, historically an important mineral resource in Illinois, is no longer mined in significant quantities in the state (see Chapter 16, Lead, Zinc, and Fluorite).

Over the last two centuries, industrial minerals have been the most important mineral resource produced in Illinois. The need for these resources is enormous. Much of the state’s infrastructure, including general construction, transportation networks, and sanitation systems, is built mainly with industrial minerals and related products. Nearly 400 tons (363 metric tonnes) of aggregate are needed to construct the average modern home, and over 38,000 tons (34,473 tonnes) are needed to build one mile (1.6 km) of interstate highway (Langer and Glanzman 1993; National Stone, Sand and Gravel Association undated). Aggregate is the major component in concrete (80%) and asphalt (90%) (Tepordei 1997; National Stone, Sand and Gravel Association undated). Millions of tons of limestone are used every year in agriculture to neutralize the acids in soil. Limestone is also used for environmental remediation in coal-burning power plants and in medical and hazardous waste incinerators to reduce the emissions of toxic gases and air pollutants such as mercury.

Illinois is both a major producer and a major consumer of industrial minerals. More than a billion dollars worth of stone, sand and gravel, cement, clay, shale, silica sand, tripoli, and lime are produced or manufactured in the state every year, and together these materials represent a major segment of the Illinois economy. Production and processing of industrial minerals create a large number of jobs in Illinois—about 6,400 in the mining sector alone—as does the use of these resources in building and road construction, manufacturing, and agriculture. Crushed stone (limestone and dolomite) and sand and gravel aggregates together constitute more than 60% of the value of Illinois industrial minerals (Lasemi et al. 2008). Each year, about 80 to 90 million tons (about 73 to 82 million tonnes) of crushed stone and about 35 million tons (about 32 million tonnes) of sand and gravel are produced in Illinois from more than 150 stone quarries, underground stone mines, and sand and gravel pits.

**INDUSTRIAL MINERALS BY TYPE**

**Limestone and Dolomite Resources**

Limestone and dolomite are among the most valuable and useful rocks extracted in Illinois and across the nation (Lamar 1965, Langer and Glanzman 1993). Limestone is often used as a general term to include both limestone and dolomite, but the two types of carbonate rocks are quite different and are not interchangeable in many applications. Limestone consists mainly of the mineral calcite, a compound of calcium, carbon, and oxygen, or calcium carbonate (CaCO$_3$). Dolomite, or more correctly dolostone, consists mostly of the mineral dolomite, a compound of magnesium, calcium, carbon, and oxygen; its chemical formula is CaMg(CO$_3$)$_2$. Limestone and dolomite generally exhibit a crystalline appearance showing shiny and sparkling faces; in some cases, though, the crystals are very fine, and the rock appears dull.

Almost all limestone in Illinois formed in the warm, shallow seas that millions of years ago covered part or all of Illinois. Most limestones resulted from the accumulation of the remains of calcareous plants and sea shells (Figure 17-3). Some limestones may have formed from calcium carbonate precipitation from seawater as lime mud, which later hardened to form very fine-grained limestones. Many dolostones were originally limestones in which the calcite was replaced by dolomite when magnesium-rich water percolated through the stone. Spectacular coral reefs similar to those in modern oceans formed in areas of northeastern Illinois. Reef development was especially prolific during the Silurian Period, about 440 million years ago. The reefs, now dolomite, have been quarried for the high-quality stone used in construction in northeastern Illinois.

**Limestone and Dolomite Distribution**

Limestone and dolomite quarries are located where thick stone deposits occur near the surface, mainly in the northern quarter, the western side, and the southern tip of Illinois (Lamar 1967; Goodwin 1979, 1983; Goodwin and