OHIO GEOLOGY

GeoFacts No. 11

OHIO DEPARTMENT OF NATURAL RESOURCES • DIVISION OF GEOLOGICAL SURVEY

ROCKS & MINERALS MINED IN OHIO AND THEIR USES

Rocks and minerals are crucial to modern society. Many Ohioans may be unaware that each of us will use over 2 million pounds (1,000 tons) of minerals in our lifetime. The ODNR Division of Geological Survey publishes the *Report on Ohio Mineral Industries—An Annual Summary of the State's Economic Geology*. This comprehensive report includes directories of reporting coal and industrial-mineral operators and details the economic impact of the mining industry for that year. The report can be found at **http://geosurvey.ohiodnr.gov/mineral-resources/minerals-home**.

Ohio has been an important producer of mineral resources for more than 200 years. These geologic resources were vital to the state's growth and contribute greatly to the economy of Ohio. Surface deposits of coal, limestone, sandstone, clay, and iron ore were used during the early nineteenth century to help build Ohio's cities and sustain the state's nationally important steel, glass, ceramic, and rubber industries, along with rail, water, and highway transportation systems. Salt springs, brine wells, and underground salt mines were developed to produce the salt essential to human life, ice control, and the chemical industry. Other rocks and minerals that historically have been mined in Ohio and used for various purposes include gypsum, peat, flint, marl/travertine, and pyrite. In addition to being world renowned for its fossils, Ohio is also known to mineral collectors for beautiful specimens of celestine, fluorite, sphalerite, marcasite, and calcite.

Ohio produces six nonfuel minerals (also called *industrial minerals*) and coal. The industrial minerals are primarily construction materials: limestone and dolomite, sand and gravel, sandstone and conglomerate, clay, shale, and salt. Gypsum has been mined in the past but is not currently produced. Peat production is sporadic and generally insignificant. At least one of these mineral commodities has been mined in 87 of the 88 counties in Ohio. In 2012, 238 companies mined these mineral resources from 389 active mines or quarries.

The economic value of Ohio's coal and industrial minerals in 2012 totaled nearly $2 billion. The total value of the manufactured products made from these raw materials far exceeds this number. Direct employment in Ohio's mineral industries totaled over 6,200 people, who earned total wages of $380 million. Most of this money is recycled into Ohio's economy, along with the money paid by mining companies in the form of city, county, state, severance, and property taxes. Many more people are employed indirectly by trucking companies, blasting companies, drilling crews, electricians, plumbers, fuel suppliers, road maintenance crews, masonry companies, architectural firms, and sign makers. Mining employers and employees also help support businesses in their communities, such as office-supply companies, restaurants, grocery stores, clothing stores and of course, the school system and teachers who teach the children of the mine employees.

Ohio mining companies are nationally renowned for excellence in reclamation of mined-out areas. Mined-out areas can be transformed into popular recreational areas, such as parks and fishing, boating, and swimming areas, as well as attractive residential and commercial developments. Ohio's strict reclamation laws were enacted even before the federal reclamation laws.

The following paragraphs describe the mineral commodities produced in Ohio and list their various uses.

COAL

Nationally, Ohio ranks 10th in production and 3rd in consumption of coal

Coal is a black sedimentary rock that formed from the consolidation of fossil plant materials. It is rich in carbon and burns readily.

Coal in Ohio is used primarily for the generation of electricity. Coal can also be coked for the smelting of ores and the manufacture of steel. Various components of coal are included in some medicines, dandruff shampoo, insecticides, dyes, perfumes, explosives, paints, insulation, varnish, mothballs, roofing shingles, and fuel gas.

In Ohio in 2012, 61 mines produced 26.3 million tons of coal from 13 counties in the eastern portion of the state. The total value of coal sold in 2012 was $1.1 billion.

An Eimco 2810-3 continuous miner in operation at the Buckingham Coal Co., Inc., underground coal mine in Athens County, Ohio.

LIMESTONE AND DOLOMITE

Ohio ranks 4th nationally in the production of lime and 4th nationally in the production of crushed stone

Limestone and dolomite are sedimentary rocks. Limestone is composed mostly of the mineral calcite (calcium carbonate, $CaCO_3$). Dolomite is composed mostly of the mineral dolomite (calcium magnesium carbonate, $CaMg(CO_3)_2$).

Limestone and dolomite have a wide variety of uses. Burned limestone (lime) is used in the steel industry as a fluxing agent (to get rid of impurities in iron) and as a refractory product (to line steel furnaces) and is used in the chemical industry to manufacture such products as rubber. Limestone is used to produce cement, in sugar refining, agriculture (fertilizers, acidity control), water purification, construction (building stone, riprap, cement additive, and aggregate in concrete and asphalt), railroad ballast, soil stabilization, in toothpaste (except gels), lipstick, carpeting, chalk, china, vinyl flooring, paper (filler and whitener), ink, hair mousse, cleansers, caulking compounds,

plastics (filler), tires, mag wheels, fiberglass, paint (filler and whitener), antacid medications, porcelain, and microwaveable containers. Most of the limestone and dolomite mined in Ohio is used as construction aggregate.

In 2012, 103 mines produced 58.3 million tons of limestone and dolomite from 50 Ohio counties. The total value of limestone and dolomite sold in 2012 was $494.6 million.

SAND AND GRAVEL

Ohio ranks 6th nationally in the production of construction sand and gravel

Sand-and-gravel deposits in Ohio consist of sand-size and gravel-size grains of rock that were broken up, transported, and deposited by rivers and/or glaciers. Ohio's sand and gravel can be made up of any of the three major rock types: igneous, metamorphic, or sedimentary.

Sand and gravel are used mostly for construction purposes as aggregate in concrete, asphalt, road-base material, and fill. Gravel is used for driveways and sand is used for ice control, in sand blasting, as molding sands for casting iron and aluminum, in plaster, and in roofing shingles.

In 2012, 213 operations produced 30.5 million tons of sand and gravel from 57 Ohio counties. The total value of sand and gravel sold in 2012 was $192.2 million.

SALT

Ohio ranks 4th nationally in the production of salt

Salt is an evaporite mineral, as well as a sedimentary rock, and is composed of sodium chloride (NaCl). Salt is used as a food additive and water-softening agent, for ice control, as a glaze for ceramics, and in ice cream making, animal feed and cattle blocks, well-drilling muds, baking, paper manufacture, meatpacking, and hide tanning. Most salt mined in Ohio is used for ice control.

In 2012, Ohio produced 4.3 million tons of salt—3.6 million tons of rock salt and 660,000 tons of evaporated salt. Total value of salt sold in 2012 was $127.7 million. Rock salt is mined from two mines in northern Ohio about 2,000 feet under Lake Erie. Two brining operations in northeastern Ohio produce salt by dissolving underground beds of rock salt, pumping the brine to the surface, and evaporating out the salt.

Salt stockpiled at Cargill Salt Mine in Cleveland, Ohio.

SANDSTONE AND CONGLOMERATE

Ohio ranks 3rd nationally in the production of sandstone dimension stone

Sandstone is a medium-grained sedimentary rock formed by the cementation of mostly quartz sand grains. A conglomerate is a coarse-grained sedimentary rock formed by the cementation of sand and gravel.

Sandstone, including conglomerate, is used in construction as dimension stone (building stone). Many sandstones have beautiful coloring, making them valuable as decorative dimension stone. Some sandstones are composed of very pure silica or quartz that is used for making glass bottles, drinking glasses, light bulbs, and TV screens. Sandstone is also used to make pool-table tops, laboratory countertops, as a glaze for ceramics, grindstones, lubricants, filtration, golf-course trap sand, aggregate, riprap, molding sand, and in fiberglass, plastics (filler), paint, gel toothpaste, and cosmetics (to help the flow and fragrance).

In 2012, 27 quarries produced 1.7 million tons of sandstone and conglomerate from 18 Ohio counties. The total value of sandstone and conglomerate sold in 2012 was $47.6 million

CLAY AND SHALE

Ohio ranks 5th nationally in the production of common clay and shale

Clay is composed mostly of extremely fine-grained minerals known as *clay minerals*. Shale is a fine-grained, laminated (layered) sedimentary rock composed mostly of clay with minor amounts of silt.

Clay and shale have many uses. In Ohio, they are used to produce building bricks, ceramics, tiles, landfill covers and linings (to keep fluids from seeping in or out), pond linings, and the production of cement. Clay and shale are used in the manufacture of paper (to improve printability and water resistance and to keep ink from bleeding), tires, plastics, paint, pencils, and cosmetics. They are also used in antiperspirants, as lightweight aggregate (after firing), as shampoo and toothpaste thickener, for filtering vegetable oils, and in antacid medications.

In 2012, 26 mines produced 710,000 tons of clay and/or shale from 32 Ohio counties. The total value of clay and shale sold in 2012 was $9.2 million.

FURTHER READING

Wolfe, M.E., 2013, 2012 Report on Ohio Mineral Industries—An Annual Summary of the State's Economic Geology: Ohio Department of Natural Resources, Division of Geological Survey, 29 p., accessible at <http://geosurvey.ohiodnr.gov/mineral-resources/minerals-home>.

• This GeoFacts compiled by Mark E. Wolfe • Revised July 2014 •
The Division of Geological Survey GeoFacts Series is available online at **www.OhioGeology.com.**