Aggregates

Valentin V. Tepordei, the U.S. Geological Survey natural aggregates commodity specialist, has prepared the following information on aggregates, a major resource used in the construction of buildings and roads.

Natural aggregates, consisting of crushed stone, and sand and gravel, are a major contributor to economic health, and have an amazing variety of uses. Aggregates are among the most abundant mineral resources and are major basic raw materials used by construction, agriculture and other industries that employ complex chemical and metallurgical processes.

Most natural aggregates are used by the construction industry. More than 90 percent of asphalt pavements and 80 percent of concrete used in buildings and roads are composed of aggregates. Paint, paper, plastics and glass also use crushed stone as a constituent. When ground into powder, limestone is used as a mineral supplement in household products, agriculture and medicine. Aggregates also are being used in soil erosion control, water purification, processes to reduce sulfur dioxide emissions generated by electric power plants, and other applications that protect the environment.

Natural aggregates are widely distributed throughout the United States and occur in a variety of geologic environments. According to 2003 data, the major aggregate-producing states were Texas, Pennsylvania, Florida, Illinois and Georgia, and the United States per-capita consumption was 9.3 metric tons.

One way to understand and appreciate the importance of the aggregates industries is to look at their production in the context of all mining. On the basis of either weight or volume, aggregates accounted for more than two-thirds of about 2.7 billion metric tons of non-fuel minerals produced in the United States in 2003. When coal mining is included, the amount of crushed stone, sand and gravel produced still accounts for more than one-half of the quantity of all mining and more than twice the quantity of coal produced. The U.S. production of aggregates increased from a modest 58 million tons in 1900, when the collection of production statistics was begun by the U.S. Geological Survey, to 2.7 billion tons in 2003. The annual production of crushed stone and construction sand and gravel that year was one of the highest ever recorded in the United States.

The production of recycled aggregates, mostly from concrete and asphalt pavements, has been increasing in recent years. Replaced and reconstructed old roads and buildings have become major sources of recyclable materials. In some applications, recycled aggregate can compete with natural aggregates on price and quality. The increasing limitations and high costs imposed on the use of landfills are making the recycling of aggregates economically viable.

Despite these trends, many areas face challenges in developing their aggregates resource. Economic factors, for example, require that pits or quarries be located near the population centers, but residential communities usually require that mining be conducted far from their boundaries. Thus, competing land-use plans, zoning requirements and various regulations frequently prohibit extraction of aggregates near populated areas. Because the demand for

aggregates will continue and, most probably, consumption will grow in the future, provisions to assure adequate supplies are essential.

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Field gradation analysis of aggregate samples. Image from USGS.