DEC photo

BLUESTONE

From Ancient Sea to American Architecture

DEC photo

By Steven Potter

DEC photo

Val Washington, deputy commissioner of DEC's Office of Remediation and Materials Management that regulates bluestone, observes mining at Simply Stone quarry, LLC in Deposit (Broome County).

The future for one of New York's oldest industries has never looked brighter, thanks to a cooperative effort between bluestone miners and the Department of Environmental Conservation's (DEC) Division of Mineral Resources.

Almost everyone who lives in and around the Catskill Mountain region has heard of the bluestone industry, but not many people know much about bluestone. The word dates back to the origins of the Catskill quarry industry which began in Ulster County in the mid 1800s. Back then, the majority of the stone quarried was actually blue or bluish-gray. Today, the term "bluestone" is used to describe stone that consists of evenly layered sandstones that split easily into thin, smooth slabs. They are found in a variety of colors besides blue: green, brown, pink, purple, and red, to name a few. The bluestone of this region is exclusive to south-central New York and north east Pennsylvania and cannot be found commercially anywhere else in the United States or Canada.

The sand-size grains that make up bluestone were deposited during the Middle to Upper Devonian Period of the Paleozoic Era, roughly 345 to 370 million years ago. The Devonian Period is often referred to as the "Age of Fishes," when sharks and early amphibians inhabited the waters. The bluestone found in New York State was deposited as part of the Catskill Delta, which placed mineral grains and rocky deposits into an ancient sea that covered the majority of present-day New York. The deposits were formed as a result of the erosion of the Acadian Mountains, the ancestral name for the present-day Appalachian Mountains.

This origin has influenced bluestone's mineral composition, making it very durable. It is resistant to wear, changes in temperature, and shifts in pressure. It also splits easily into manageable layers with relative ease, making it ideal for use as architectural and building stone.

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Susan L. Shafer

New York bluestone can be seen at universities (Cornell), museums (Fenimore House in Cooperstown), hospitals (Bellevue in New York City), performing arts centers (Bethel Center for the Arts and Opus 40), and cemeteries (Grant's Tomb restoration). Even England's Stonehenge is constructed of rocks called bluestone, although their sandstone has a different origin from those in the Catskills. Bluestone has been used for sidewalks, curbing, patios, fireplaces and a host of other structural and decorative uses.

While the bluestone industry has been around for more than 200 years, the advent of heavy excavation machinery, better transportation, and stone removal techniques have changed the way bluestone quarries are operated today. However, much remains the same. Bluestone miners typically explore for, and mine, the product at sites that are high in elevation and on steep slopes. Sites are often remote with difficult access. Mining is usually seasonal, avoiding the winter months. The majority of quarries are less than three acres of affected land and are operated by one to four people, far smaller than most mines.

Unlike most types of stone quarries, which remove large masses of stone, bluestone quarries are "vein mining" operations. The most economical and saleable bluestone is found in thin veins of about 3 to 20 feet. The veins are typically inter-bedded with layers of shales and mudstone which have no commercial value. The life of a quarry can range from less than a year to more than a hundred years.

Miners still quarry bluestone using the same manual, labor-intensive methods employed for hundreds of years. After they remove large amounts of overburden (shale and mudstone), miners quarry the bluestone using small machinery (bobcats, tractors, diamond-blade gasoline saws), hammers, crowbars, chisels, wedges and drills. The rate of waste to actual product is approximately 10:1. This amount of excess is far more than typical open quarries because of the need to mine from narrow veins. Once the stone is removed, the majority of it is sold by independent quarrymen to regional dealers. After the miners transport the bluestone by pick-up truck, the dealer separates the stone by size and thickness. The quarrymen refer to the locations where this transaction takes place as "docks," a vague reference to longshoremen, despite their distance from the ocean.

The growing bluestone industry is important to construction and architecture nationwide. New York's industry is valued between $40 and $100 million annually

Tad Richards

Opus 40, a massive sculpture garden built using the rock from an abandoned bluestone quarry, showcases the stone's natural beauty.

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and it employs more than 700 full- and part-time employees. Most bluestone is quarried within a 90-mile radius of Deposit (Delaware County) and is sold for $3-10 per square foot. Many miners travel daily from Pennsylvania to New York to mine. This resource is so valuable that one company from Utah ships stone by truck to Salt Lake City on a regular basis.

Although bluestone is quite financially valuable, one of the biggest issues for miners is the unpredictability of locating good quality stone. Consequently, even small mines create and move large quantities of materials in the process of exploring. Historically, miners cast the excess stone over the edge of adjacent slopes to minimize cost and create space in which to work. The sites were generally abandoned, creating substantial environmental impacts, increasing erosion and visual effects, and making true reclamation difficult or impossible.

Because of these practices, the bluestone industry presented a unique regulatory challenge to DEC. The miners were worried about regulation's financial impacts, and DEC was concerned about the stability of an industry so important to the Catskill area. But by all accounts, these challenges have been met, with new regulations balancing the need for environmental conservation and the use of the unique methods necessary for the industry's survival.

DEC's Division of Mineral Resources has the primary responsibility for ensuring that miners conduct operations using sound environmental management practices and reclaim areas affected by mining. These activities are regulated under the Mined Land Reclamation Law (MLRL). Until the early 1990s, bluestone mines were largely unregulated, mainly because the excavations were not large enough to fall under DEC's jurisdiction.

Amendments to the MLRL resulted in changes that brought the bluestone industry into the regulatory net. Enforcement became very time consuming and costly for the agency, while compliance threatened the livelihood of small mining companies. Mining and reclamation plans were difficult and expensive to produce and implement. However, in an effort to encourage an economically sound niche industry while promoting responsible mining, DEC developed innovative management and conservation techniques.

The Bluestone Exploration Authorization is a key component of DEC's efforts to ensure compliance with state laws and regulations. The authorization allows individuals and small businesses to explore for a limited time within small areas without a full mining permit. The miner saves the expense of time and effort needed to secure approval of a permit and payment of annual fees. Simultaneously, DEC can limit the scope and duration of mining. As a result of this new framework, enforcement activity has decreased, compliance has increased and environmental impacts are being addressed. In fact, a new report released by DEC shows that the number of bluestone mine permits increased from 15 in 1998 to 85 at the end of 2007.

The outlook for New York State's bluestone industry has never been better, and the efforts undertaken by both the industry and DEC show the positive results that can come when government and business work together.

Steven Potter is the director of the Bureau of Resource Management & Development in DEC's Division of Mineral Resources, which is responsible for regulation of the mining industry in New York.

A.H. Morscher

The stone that saved the Erie Railroad

By Christine Reed

The New York and Erie Railroad had agreed to complete the line from the Hudson River to Binghamton by December 31, 1848 or lose its charter. But as they built a line linking New York City to the Lake Erie ships in the 1840s, the quarter-mile wide chasm of the Starrucca Creek in Pennsylvania stood right in their path. How to cross the deep valley was a major problem for engineer Julius Adams. Move thousands of tons of rock and dirt and fill the valley? Build a wooden trestle which would require constant maintenance? Or engineer a multiple-arch rock bridge that might last forever?

Adams chose the rock bridge and the Starrucca Viaduct was born. Two quarries a few miles from the valley furnished the bluestone for the bridge's 17 arches. The hard work of 800 immigrants ensured the stone masonry work was completed in early November, 1848. In May 1851, a special inaugural train carried Daniel Webster and President Millard Fillmore over what is now a National Civil Engineering Landmark. One of the oldest bluestone structures in the country, the viaduct is 1,000 feet long and 100 feet high, and to this day, carries heavier and faster trains to markets across the country.

Bluestone helped build the railroad, and the railroad helped build the bluestone industry. After the viaduct was built, numerous quarries sprouted up. Bluestone was shipped across the northeast on the railroad to build sidewalks, curbing, windowsills, and buildings.

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