Blasting Through the Taconic Unconformity:

History, Geology, and Engineering Problems of 19th- and Early 20th-century Railroad Cuts and Tunnels Through Shawangunk Mountain in Southeastern New York

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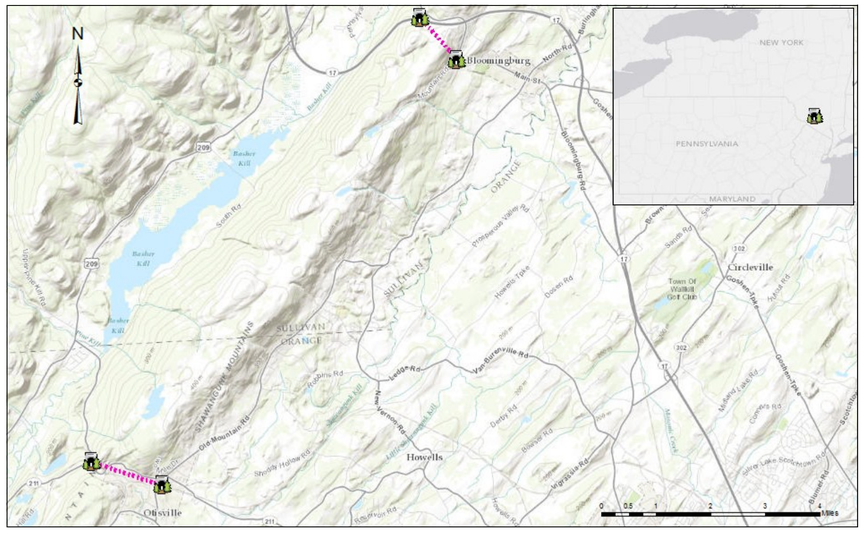
ABSTRACT

In SE New York Shawangunk Mountain forms a 44-mi-long barrier between the Neversink-Rondout Valley on the W and the Hudson Valley on the E. Although the promoters of the Delaware & Hudson Canal proposed a rock tunnel through the ridge as early as 1825 in order to shorten the route to New York City, it wasn't until 1847-48 that the New York & Erie RR (later the Erie) blasted a deep cut through the mountain at Otisville that the barrier was finally breached. In 1871 the Oswego Midland (later the Ontario & Western) RR completed a 3,857 ft-tunnel (now abandoned) through the mountain between High View and Wurtsboro, 8 mi to the NE. In 1908, the Erie abandoned the original route at Otisville for one of lower grade and completed a second Shawangunk tunnel (5,314 ft long and still active) just N of the old cut.

Shawangunk Mountain is underlain along its crest and NW slope by the Silurian Shawangunk quartzite and conglomerate (Ss, ~ 600 ft thick) and on the SE slope by the Ordovician Martinsburg shale and greywacke (Om, ~10,000 ft thick), the two formations being separated by the Taconic unconformity. The unconformity is well exposed at several localities along the mountain between Otisville and Wurtsboro, most notably in the Otisville RR cut and in a cut along NY 17 above the High View Tunnel. These two cuts provide clues to the nature of the unconformity in the tunnels. The dip discordance is 8° at Otisville—where a puzzling diamictite (colluvium?) occurs—and ranges up to 15° at NY 17. At the portals of the High View Tunnel, bedding in the Ss at the W portal is 213/26 and in the Om at the E portal 215-245/10-15. A more complex situation exists at the Otisville Tunnel where bedding in the Ss at the W portal is 227/45, and the Om at the east-portal cut is folded into a W-verging recumbent fold.

Both tunnels have been plagued with maintenance problems, particularly those related to water. Bearing testimony to those at High View are the large pool of water at the E portal and the water flowing from a similar pool at the W portal. Early in construction of the Otisville Tunnel, it was reported that it had large amounts of water seepage into it, causing farmers' wells to run dry.



On Left: Map showing the portal locations of the High View Tunnel near Bloomingburg and the Otisville Tunnel. The tunnel's route is marked with a pink dashed line.

The Blue Mountain-Kittatinny Mountain-Shawangunk Mountain Ridge

Shawangunk Mountain in New York constitutes the northern 44 mi of a remarkable topographic ridge that bounds the northwestern margin of the Appalachian Great Valley for 244 mi from Franklin County, PA, ~10 mi north of the Maryland State Line, to Rosendale, Ulster County, NY. The 144 mi long ridge in Pennsylvania, breached by numerous water gaps (see STOPS 1, 3, and 5 of this guidebook), is called Blue Mountain. The 34 mi-long ridge in New Jersey, known by the very appropriate Lenni Lenape Indian name of Kittatinny ("Endless") Mountain, extends northwest from Delaware Gap into New York State, deeply notched only at Culvers Gap, a prominent preglacial wind gap in Sussex County (see Witte, 2001). Shawangunk Mountain is an uninterrupted homoclinal ridge (with a few wind gaps) northeast from the New Jersey State Line for 30 mi to near Ellenville, Ulster County, but from there to its termination broadens out as a result of several Alleghanian folds. (Shawangunk is also apparently of Lenni Lenape derivation, meaning "there is smoky air" and perhaps referring to the Dutch burning of a Munsee Indian fort in 1663 [Wikipedia, 2012c; but see Fried, 2005].) Throughout its entire length, the Blue-Kittatinny-Shawangunk Mountain ridge is underlain by Silurian Tuscarora-Shawangunk Formation quartzite and conglomerate on its summit and northwest slope and Ordovician Martinsburg Formation shale and sandstone on its southeast slope. (The above statement must be modified slightly by pointing out that at one point at least, in the Town of Mount Hope, Orange County, NY, the Martinsburg lies at the crest of the mountain.)

HISTORICAL CHRONOLOGY

(Wakefield, 1970; Inners et al., 2002; Houck, 2006; Skye, 2009; Wikipedia, 2012d...etc.)

1828	Delaware and Hudson (D&H) Canal completed between Honesdale, PA, and Kingston, NY. (Construction of the canal was initiated in 1825.)
1832	(April 24) The New York and Erie Railroad is chartered in New York, the line to connect Piermont, NY, north of New York City and west of the Hudson, with Dunkirk, NY, on Lake Erie.
1836	Construction of the Erie Railroad begins.
1847	The New York and Erie Railroad cuts through Shawangunk Mountain at Otisville, NY. The line opens to Port Jervis in January 1848.
1861	The New York and Erie Railroad is reorganized as the Erie Railway.
1868	The New York and Oswego Midland Railroad is organized. The mainline runs from Weehawken, NJ, to Oswego, NY.
1871	The New York and Oswego Midland Railroad completes the High View Tunnel through Shawangunk Mountain between Wurtsboro on the west and Bloomingburg on the east.
1878	Brick tunnel-liner installed in parts of the High View Tunnel. Due to the machinations of Jay Gould and his cohorts, the Erie Railway goes bankrupt and is sold off, becoming the New York, Lake Erie and Western Railroad.
1880	New York, Ontario and Western (Ontario and Western, O&W) Railway takes over the mainline of the New York and Oswego Midland Railroad.
1895	The New York, Lake Erie and Western Railroad goes into bankruptcy, and then emerges as the Erie Railroad.
1906-08	The Erie Railroad bores the Otisville Tunnel through Shawangunk Mountain.
1947-48	Last passage of steam trains through the High View Tunnel.
1953	(September 10) Last O&W passenger train passes through the High View Tunnel, bound for Roscoe to the west.
1957	Last trains run through the High View Tunnel. The tunnel is abandoned. (Sometime later the tracks are removed.) (March 29) The O&W Railway is liquidated, and all assets are auctioned off.
1960	(October 17) The Erie Railroad merges with the Delaware, Lackawanna and Western Railroad to form the Erie-Lackawanna.
1976	The Erie-Lackawanna becomes part of Conrail.
1983	The Metro-North Railroad is formed to take over commuter operations of Conrail in New York State, operating the Port Jervis Line through the Otisville Tunnel.
1999	Conrail system is split up, with the Norfolk Southern (NS) Railroad taking over the old Erie line through Otisville. Metro-North leases the NS tracks for commuter operations down to the present day.
2003	Metro-North leases the NS tracks for commuter operations, with the possibility of outright purchase in the future.
2005-2006	New York Highway Department undertakes attempt to dewater the High View Tunnel because of concerns about subsidence beneath new NY Route 17 (proposed I-86) being constructed over the mountain above the tunnel.

Crest of Shawangunk Mountain (radio towers) just north of the intersection of Guynard Turnpike and Old Stage Road, about 3.3 mi southwest of Otisville, Town of Mount Hope.

Adit of Guynard Mine (zinc-lead) at Shawangunk/ Martinsburg contact along access to radio towers off Guynard Turnpike, about 3.5 mi southwest of Otisville, Town of Mount Hope (Gray, 1961). Adit is on the west limb of the Shawangunk anticline. Bedding attitude in the Shawangunk is N32E/25NW and in the Martinsburg, N26E/25NW.

Old shale pit in the Martinsburg Formation along Old Stage Road at intersection with GuynardTurnpike, about 3.5 mi southwest of Otisville, Town of Mount Hope (GPS 41° 25' 30.0"N/74° 34' 57.6"W). Bedding N22E/28NW on the west limb of the Shawangunk anticline.