WORK-ENERGY-POWER

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National Park in Paterson, N.J.,Ponders 2 Paths: Natural Wonder or History Site?

Darren Boch, superintendent of Paterson Great Falls National Historical Park, in Paterson, N.J. Officials are considering options for fixing up the park, which was established in 2011.

PATERSON, N.J. — The young national park in this **once-booming industrial city** is unusual for its twin features — one natural, the other historical. A **mighty waterfall, one of the largest by volume east of the Mississippi River, tumbles nearly (((80 feet over basalt cliffs))), where the Passaic River flows through a narrow chasm. It is the river that spawned the country's first planned industrial city, founded by Alexander Hamilton in 1792 to end the reliance on Britain for manufactured goods.** The two attributes of Paterson Great Falls National Historical Park — natural wonder and machine-age crucible — are at the center of differing visions for the 52-acre site. The National Park Service is now weighing alternative plans for Paterson Great Falls, which was established as a national park in 2011 after decades of lobbying by local politicians and advocates. For the national park, the connection to Hamilton, the first secretary of the Treasury, is serendipitous. Hamilton is enjoying a resurgence of interest — largely thanks to the flattering depiction of the founding father in the stunningly popular Broadway show "Hamilton."

On July 10, 1778, a young Hamilton picnicked on cold ham, tongue and biscuits here with General George Washington and the French general the Marquis de Lafayette. It was then that Hamilton became acquainted with the setting of his future industrial city, one that would be powered by water and churn out everything from textiles and paper to locomotives and guns. At the heart of his plan was a canal system, which was created not for transporting goods, but for powering the water wheels that turned the cam shafts that drove the industrial equipment inside scores of mills. One option would pour more resources into the natural landscape, creating opportunities for recreation along the river and educational programs about the waterfall, the habitat and the city's past. The other would give visitors a more in-depth immersion in the city's industrial history. "It's really a matter of emphasis," said Darren Boch, the superintendent of the park, as he strode along the rim of the falls, where (((two billion gallons of water cascade each day.)))

INTRODUCTION: **Our goal is to show these falls were able to provide over 2000 HP to the mills. Power = Work/time, the work comes from the loss in potential energy (U) of water. Thus, W = U = m g h., P = m g h/t m g/t = weight of water falling over falls per unit of time.**

QUESTIONS: **(a) Convert 2 billion Gal water/day to lb./day? (b) Convert lb./day to lb./s.? (c) Find power of falls in units of ft. lb./s., (d) Find P in HP?**

HINTS: **[For water: 8.3616 lb./Gal.] , 24 hrs/day , 3600 s./hr. , 550 ft. lb./s. = 1 HP**

ANSWERS: **(a) 16.72 X 10^9 lb./day, (b) 1.935 X 10^5 lb./s., (c) 154.8 X 10^5 ft. lb./s., (d) 28145 HP**

COMMENT: **PatersonGreatFalls.org : States the falls in the 19th century produce > 2000 HP**