CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
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Project Number
J0219

Project Title
Power in Storm Drains?

Abstract

Objectives/Goals
The objective is to see if storm drain water can create electricity and to determine if the amount of energy created would increase at the same rate that pressure is increased. The hypothesis was that a storm drain system can generate hydroelectricity and that when pressure is increased by a certain percentage, the power will increase, but not by the same percentage of increase.

Methods/Materials
A pressure tank filled with 2 liters of water and was pumped up to the desired P.S.I. A voltage meter was then connected to ends of the wire attached to the generator/motor. While directing the clear tube towards the water wheel, the valve was opened releasing the water and pressure which turned the water wheel and electric motor/generator. The highest voltage indicated was recorded. Materials:Water pressure test gauge(10-200 P.S.I),pump/sprayer, ½" brass ball valve, ½" I.D.clear tubing, ½" x ½" x ½" pvc plastic tee, ½ x ¼ brass bushing, ½" poly tubing,pipe clamps,teflon tape, 1" pvc sch.40 pipe,plastic roof vent,electrical tape(white), 3/8" fiberglass pole,blue painters tape,misc.wood screws, 2x4 fir wood support, 4x4 fir wood support, 4x4 I.D.plastic post slips, 1-1/2" rubber plug, 8 plastic spoons,voltage meter,wood skewers,toothpicks, plastic straw,brass hoop, 2 metal axles w/plastic end(misc.plumbing drain), metal gear motor(1.5-3vdc),electrical wire(20 gauge),plastic bin/basin

Results
The data collected during the trial sets concluded that the average storm drain could be directed to generate electricity at various rates. There was an increase in electricity(voltage)generated from 15 P.S.I.(.02 volts)to 20 P.S.I.(.04 volts);however from 20 to 25 and from 25 to 30 P.S.I. there was no increase in voltage as the maximum voltage achieved was(.04 volts).

Conclusions/Discussion
The hypothesis did support that storm drain water can be used to generate electricity. The experiment also confirmed that additional pressure will result in additional electricity being generated, however the experiment only showed an increase in electricity from 15 to 20 P.S.I. and there was no change observed at 25 & 30 P.S.I. With the demand for electricity always increasing, this concept could be applied in areas that receive high amounts of rainfall and that have large amounts of slope, or elevation change. That combination would create the ideal conditions to generate substantial amounts of electricity from the common rain storm.

Summary Statement
Can a local storm drain system generate hydroelectricity and when the amount of pressure is increased by a certain rate, does the amount of power (voltage) generated, increase at the same rate?

Help Received
My dad helped me refine my design and construct the project, Grandpa provided the voltage tester, my science teacher, Michelle McDaniel was helpful in providing inspiration and advice as the project developed, and my Mom helped me with the presentation.