CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

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Project Number

33894

Project Title

To Surge or Not to Surge: Solutions to Coachella Valley Water Districts Canal System Water Loss (Year 3)

Abstract

Objectives/Goals

Model USBR Monograph 17 describes the surge issues causing water loss in the Coachella Valley Water Districts (CVWD) gravity fed canal system. I tested to see if the surging problem could be reduced or eliminated by adding a permanent cover to create a sealed system or by allowing water to remain in the line.

During a prior year#s project, I was traveling in Alaska and observed the Alaska Pipeline and was fascinated by how oil was transported from the Arctic Ocean to the ports of Alaska. Upon my return to California, I saw the canal system that brings water from the Colorado River to Los Angeles. That sparked my interest in this subject. Last year I designed and built a model and was able to recreate the surging effects experienced. This year I attempted to create solutions within my model to minimize the water loss.

Methods/Materials

I designed a series of clear baffles and tubing, ranging from 6-10 inches in height to model the Coachella Valley Water District's gravity fed water canal system. I connected the baffles in series and then allowed 8 liters of water to flow through the system and observe location & timing of any surge/water flow issues. I ran series of tests based on (1)my control (unsealed, lines left dry), (2) sealed system with lines left dry, (3) sealed system with water left in lines, and (4) unsealed with water left in the lines.

Results

I ran four series of tests (of four tests each) using my baffle models. My control series had a dry line and the baffles were not capped; the average length of water surging in the first baffle was 5:24. In my second series of tests, I added water to the upstream line; the water surges decreased to 3:47. The third series sealed the system; the average length of surge was 3:55. When water was added to the upstream line (with sealed baffles), the surging lengthened to 5:37. The surging in the second and third baffles replicated these results.

Conclusions/Discussion

By observing my model, I can extrapolate to CVWDs gravity fed system. Surging in an open system (where it is not sealed) can be minimized by leaving water standing in the system. If the system is sealed, surging will be increased when water is left in the system. This is caused by the difference in water to air pressure.

Summary Statement

Can the water loss experienced in the Coachella Valley Water District's gravity fed canal system be minimized by either sealing the system or allowing water to remain in the lines?

Help Received

Preliminary