CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
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Project Number
J0511

Project Title
Are Nails the Culprit?

Abstract

Objectives/Goals
This project is a two-part sequel to last year#s project, which showed that copper levels in my mountain house water were unsafe. The first part#s purpose is to see if the utility had kept their promise to lower copper levels. The second part is to see if nails discovered pounded into the copper pipes are why the copper levels always peaked after running water for 60 seconds.

Methods/Materials
Part One: Measure pH and copper levels in water samples taken every 20 seconds for 5 minutes. Repeat the next month. Take peak copper level water samples (60 seconds) on following visits to measure acidity and copper levels until utility fixes problem.
Part Two: Test how nails affect copper corrosion by putting different types of nails into copper pipe segments with water from the mountain house. Take daily pH and copper level samples for 7 days. Also do calculations to see if nails are one minute away from faucet.

Results
Part One: Peak copper levels declined from 3 ppm in August to less than 0.5 ppm in October after the utility district began treating the water.
Part Two: The bronze nail increased the corrosion, but the aluminum, electroplated, steel, hot dipped, and house nail all decreased the copper levels inside the tubes

Conclusions/Discussion
Part One: The utility finally kept its promise and reduced copper levels.
Part Two: The discovered steel nails were not the copper corrosion culprits, but they did distort the copper tests with iron oxide. Only bronze nails increased copper corrosion.

Summary Statement
This project is about understanding what causes elevated copper levels in household tap water.

Help Received
My science teacher suggested I test several types of nails. My mother helped me figure out how to organize the project report and board. My dad helped solve technical problems that arose in creating my graphs. My brother taught me how to make the water flow calculations.