



CALIFORNIA STATE SCIENCE FAIR 2003 PROJECT SUMMARY

Name(s) Allison G. Suarez	Project Number S0612
Project Title Solving the Mystery of the Penn Mine Wetland	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The goal of this project was to find out what caused the low pH (as low as 3.4) in the Penn Mine wetland during and after the rainy season in 2002. I also wanted to find out why the wetland removed dissolved iron during the rainy season when almost all other dissolved metals actually increased. This project is a follow-up to my science project in 2002. I studied metals removal by the Penn Mine wetland at the former Penn Mine site, which was restored to a natural condition in 1999. Seepages that contain high levels of metals still flow at the site.</p> <p>Methods/Materials I conducted a simple experiment to determine the change in pH that occurs when dissolved iron changes state to insoluble iron. Samples were taken at a seepage, wetland inlet and wetland outlet. I continued the monthly samples at the wetland inlet and wetland outlet for the following analytes: pH, turbidity, and dissolved iron. I also added a total iron sample to the monthly samples. I used a Hydrolab multi-probe unit and Hach Turbidimeter for my experiment and field readings. Iron samples were analyzed at the East Bay Municipal Utility District (EBMUD) Lab in Oakland.</p> <p>Results The experiment data for the wetland inlet showed what happens in the wetland when dissolved iron changes state to insoluble iron. The pH dropped from 5.4 on day one to 3.6 on day four. Turbidity increased from 162 NTU 316 NTU on day eight (the last day of the experiment). The pH remained at 3.6. Total dissolved solids decreased during the experiment. The dissolved iron in the sample was 37,000 ug/l on day one. It dropped to 832 ug/l on day eight.</p> <p>Conclusions/Discussion Dissolved iron increases at the Penn Mine site during the rainy season. The limestone drains, which were designed to increase the pH of acid mine drainage at the site are less effective during this time. The flow of water slows down in the wetland (detention time during January and February was approximately 1.5 days). The pH in the wetland drops when dissolved iron changes to insoluble iron. The insoluble iron is retained in the wetland.</p>	
Summary Statement This project solved the pH mystery in the Penn Mine wetland.	
Help Received My advisors Laura Lazzelle, EBMUD and Lorraine Angel, Calaveras High School helped me define the problem, hypothesis, and procedure. I used field equipment from EBMUD. Eileen Fanelli, Penn Mine Restoration Project Manager provided the resources necessary to do the study such as sample analysis at	