



**CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY**

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Project Title
Toxic Boatyards: Are Newport Bay Boatyards a Point Source for Heavy Metal Pollution?

Abstract

Objectives/Goals
 My objective was to determine whether Newport Bay boatyards were a point source for the heavy metal copper.

Methods/Materials
 Materials:

15 bottles (small)	Filter	2 Large Ziploc bags
30 small plastic bags	5% HNO ₃	Sharpie Marker
30 sets of clean plastic disposable gloves	30 pipettes	Plastic Cup
HF acid	2N HCl	7 clean plastic spatulas
	Centrifuge	

Procedures:

- Using "clean" procedures, two sets of seven water samples were taken at various locations in Newport Bay, and each location was recorded using a Global Positioning System.
- Ocean water taken at a location off of Dana Point was used as a control for the experiment.
- Unwanted particles and organic matter were removed through filtration.
- The concentrations of copper were measured using an Argon Plasma Mass Spectrometer, and were calculated using the "Isotope Dilution" method.
- 6 sediment samples were taken using a clean plastic cup at various locations around the bay. Each location was recorded using a Global Positioning System.
- Sediment taken off of a relatively pristine sandy beach was used as a control.
- The sediment was dissolved in acid, and the concentration measured using an Argon Plasma Mass Spectrometer. The concentration was then calculated using the "Isotope Dilution" method.

Results
 The concentrations of copper in the water are two to three times higher around boatyards than they are in other areas of Newport Bay, and roughly 20 times that of the control. The concentrations of copper in the sediment are as much as 27 times higher in the areas adjacent to the boatyards than off of the relatively pristine sandy beach. The concentrations of copper in samples taken at the boatyards are also roughly 10 times as much as those taken near the marina.

Conclusions/Discussion
 Boatyards are a point source for copper in Newport Bay. The concentrations of copper in both the sediments and in the water are significantly higher in the areas surrounding the boatyards than in other parts of Newport Bay or in the nearby ocean.

Summary Statement
 I determined whether boatyards are a significant point source for copper in Newport Bay by taking water and sediment samples; I found that the concentrations of copper were significantly higher around boatyards than elsewhere in the bay.

Help Received
 Used Argon Plasma Mass Spectrometer at Caltech under the supervision of graduate student Jeff Mendez in the Division of Geology and Planetary Science. Lab work for trace metal analysis was done in the laboratories of Dr. Jess Adkins, the research advisor to Jeff Mendez.