



# CALIFORNIA STATE SCIENCE FAIR 2014 PROJECT SUMMARY

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<b>Project Title</b> <b>The Potential Impact of Hyperion Treatment Plant's Effluent on the Coastal Environment: Science Influencing Management</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> In 2015, Hyperion Treatment Plant (HTP) will divert its effluent from the 5-mile outfall to the 1-mile outfall, resulting in a significant nutrient input into coastal waters, a potential phytoplankton bloom, and increase in bacterial levels at local beaches. Our study tests whether HTP should divert in the spring or fall to minimize the probability of harmful algal blooms. It also determines the amount of chlorine needed to effectively kill bacteria in the effluent and the effect of both non-chlorinated and chlorinated effluent on larval abalone development.</p> <p><b>Methods/Materials</b> In our June, October, and April phytoplankton experiments, seawater was collected from the 1-mile outfall terminus and different seawater-effluent dilutions were tested. After 6 days, phytoplankton identification and abundances were determined and samples were analyzed for chlorophyll and domoic acid. Our chlorine test involved dosing effluent with 2, 3, and 4ppm of Cl<sub>2</sub> and using the chromogenic substrate method to determine bacterial levels. Our abalone tests involved exposing red abalone embryos to effluent and effluent dosed with Cl<sub>2</sub> and counting normally and abnormally developed larvae.</p> <p><b>Results</b> Our results indicated that harmful algal species <i>Pseudo-nitzschia seriata</i> was most abundant in April and June; therefore, we recommend that HTP divert in October. In the chlorine test, 3ppm Cl<sub>2</sub> with a 25-minute contact time was most effective in killing bacteria, while statistical tests on the abalone data showed non-chlorinated effluent had an effect on the larval development and chlorinated effluent had no effect.</p> <p><b>Conclusions/Discussion</b> Results from University of Southern California's parallel in-harbor experiment match these in-lab results, further emphasizing the importance of diverting in October. Based on USC's and our results, HTP engineers have decided to reschedule the diversion for October and use 3ppm Cl<sub>2</sub> to dose the effluent. Lastly, because red abalone is an indicator species and was unaffected by chlorinated effluent, we hope that other, less sensitive marine species will also be unaffected.</p>	
<b>Summary Statement</b> Our project aims to minimize the potential negative effects, including harmful algal blooms, bacterial level increases, and harm to marine organisms that may occur during Hyperion Treatment Plant's effluent diversion in 2015.	
<b>Help Received</b> Hyperion Treatment Plant provided environmental chamber and other lab materials; Dr. Caron and Dr. Seubert of USC provided USC's results and helped with phytoplankton training and counting; Hyperion Treatment Plant staff helped with water quality measurements and boat usage for seawater collection.	