



**CALIFORNIA STATE SCIENCE FAIR  
2012 PROJECT SUMMARY**

<b>Name(s)</b> <b>Zahra B. Masood</b>	<b>Project Number</b> <b>J1013</b>
<b>Project Title</b> <b>The Effectiveness of Bioremediation with Different and Varying Concentrations of Nutrients</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The purpose of this project is to investigate the effect of different essential nutrients and their concentrations on the rate of bioremediation. <b>Methods/Materials</b> Obtain 4 different types of garden fertilizer (each with a different N-P-K concentration (18-18-18, 16-16-21, 30-10-10 and 15-30-15)), Zinc and non-iodized table salt. Use five different amounts of each fertilizer (1, 2, 4, 6 and 8 grams) in 200ml sea water with 20ml of oil. Leave each sample for 1 week after which the remaining oil should be measured (Experiment 1). Repeat the process using the fertilizer which resulted in greatest amount of bioremediation and five different concentrations of Zinc (0.05, 0.10, 0.15, 0.20 and 0.25 grams) (Experiment 2). As a last step, the fertilizer and Zinc sample which resulted in most bioremediation was used with five different amounts of non-iodized table salt (0.2, 0.4, 0.6, 0.8, 1.0 grams)(Experiment3). <b>Results</b> In experiment 1, 8 grams of fertilizer sample 4 (N-P-K=15-30-15) showed the most oil reduction (21.17%). In experiment 2, 8 grams of fertilizer sample 4, and 0.15 grams of Zinc showed the greatest oil reduction (24.83%). In experiment 3, 8 grams of fertilizer 4, 0.15 grams of Zinc, and 0.4 grams of Sodium Chloride showed the highest amount of oil reduction (25.67%). <b>Conclusions/Discussion</b> The rate of bioremediation varied when using different nutrients in varying concentrations. Bioremediation is a natural process whereby the bacterial communities within the sea water metabolize the oil through enzymes into water and carbon dioxide. This process transforms hazardous compounds into harmless products and it is less expensive than other oil spill cleanup technologies.	
<b>Summary Statement</b> My project is about investigating various nutrients with varying concentrations, and I observed the rate of bioremediation.	
<b>Help Received</b> My father supervised me while I did the project.	