



**CALIFORNIA STATE SCIENCE FAIR  
2013 PROJECT SUMMARY**

<b>Name(s)</b> <b>Katherine B. Adelman</b>	<b>Project Number</b> <b>J1501</b>
<b>Project Title</b> <b>The Effects of Nutrients on the Microbial Biodegradation of Petroleum Hydrocarbons</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective was to test the effects of varying levels of added nutrients on the growth of Pseudomonas bacteria, an oil-eating microbe, and the corresponding rates of microbial biodegradation of petroleum hydrocarbons.</p> <p><b>Methods/Materials</b> Freeze dried Pseudomonas microbes were rehydrated, incubated and placed in 30 of 42 beakers containing 100 ml distilled water and 6 ml refined motor oil. The beakers were organized into six sets of seven beakers. Each of the six sets of seven beakers included five trial beakers (inoculated with Pseudomonas microbes) and two controls (without Pseudomonas microbes). The six sets differed by the amount of added nutrients (0g, 0.5g, 1.0g, 2.0g, 4.0g, 8.0g); within a set, each beaker, including the controls, contained the same amount of nutrient mix. The nutrients were a mixture of sodium chloride, ammonium phosphate, potassium phosphate and magnesium sulfate. Changes in microbial growth were observed daily for 14 days and were interpreted using a visual scale of 11 categories with 10 stages each. Oil degradation was assessed daily by measuring the amount of remaining oil using a millimeter ruler.</p> <p><b>Results</b> Over the 14-day period, the beakers with higher nutrient levels were characterized by greater evidence of microbial growth and oil biodegradation. However, the set of beakers that contained the highest level of nutrients experienced a period of noticeably slower microbial growth through day 8 followed by a resumption in microbial growth and oil biodegradation.</p> <p><b>Conclusions/Discussion</b> Oil-eating microbes are known to be an effective means of bioremediating oil spills. This project suggests that the addition of nutrients to a site of oil contamination is a means of improving the rate of biodegradation and bioremediation. However, the results also suggest that an excess amount of nutrients could have a detrimental effect on microbial growth and corresponding biodegradation.</p>	
<b>Summary Statement</b> This project is an investigation of the effects of increased nutrient levels on the growth of oil-eating microbes and the corresponding changes in the rate of oil biodegradation.	
<b>Help Received</b> Project mentor, Dr. Jennifer Ross Viola, answered questions	