



**CALIFORNIA STATE SCIENCE FAIR  
2002 PROJECT SUMMARY**

<b>Name(s)</b> <b>Jan Nick C. Marfori</b>	<b>Project Number</b> <b>S0804</b>
<b>Project Title</b> <b>Factors that Affect the Speed and Efficiency of Biodegradation in Oil Spills</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The purpose of this experiment is to determine the factors or conditions that would affect the speed and efficiency of biodegradation in cleaning up an oil spill.</p> <p><b>Methods/Materials</b> Oil spill was simulated using 5 pairs of 1-pint mason jars, containing equal quantities of machine oil(2 g) and water (150 ml). The first set of jars with oil and water, was the control. The second pair, bacteria/soil was added to the oil and water; third set, bacteria and oxygen supply; the fourth pair, bacteria and inorganic nutrients; and the fifth set, bacteria, inorganic nutrients and oxygen supply. Measurements of oil degraded by bacteria were recorded at intervals of 3-5 days for 31 days using the "greasy spot" test. To perform the "greasy spot" test, oil/water samples were taken from the jars with a dropper, and then three drops were applied to the center of pre-cut 2" x 2" squares of brown paper bag. After being allowed to dry, the diameter of the "greasy spot" was measured in centimeters.</p> <p><b>Results</b> Based on the measurements taken, the first set of jars showed stable oil presence. The second set showed 9% decrease from the initial measurement. The third set showed considerable oil degradation by 51%. The fourth set showed a moderate decrease of 21%, and the fifth set showed a significant decrease of oil presence by 66%. The third and fifth set of jars, which had oxygen supply, showed the most noteworthy decrease in size of the greasy spot as well as significant decrease in the water/oil levels at the end of the experiment.</p> <p><b>Conclusions/Discussion</b> The process of oil biodegradation by bacteria was fast and efficient if all the factors presented in this experiment, were involved. The oil-contaminated water containing bacteria, inorganic nutrients, and source of oxygen demonstrated the environment in which biodegradation proceeded most efficiently. The inorganic nutrients and oxygen helped the oil-degrading bacteria to grow and multiply at a much faster rate, thus speeding up the process of biodegradation. Another conclusion, formulated from this experiment, was that the increased water movement in the jars with oxygen, dispersed the oil and hastened its evaporation and degradation.</p>	
<b>Summary Statement</b> This experiment, thru the use of simple scientific methodology, demonstrates the process of oil biodegradation by bacteria and the factors that would speed up and increase its efficiency in cleaning up an oil spill.	
<b>Help Received</b> My mom provided the brainstorming that helped me understand my results and my experiment better. My dad provided transportation and the logistics for my materials. My cousin supplied the laboratory balance. Ms. Arnold, my biology teacher for affirming drawbacks and flaws in my research paper.	