



**CALIFORNIA STATE SCIENCE FAIR  
2012 PROJECT SUMMARY**

<b>Name(s)</b> Ahsan A. Bari	<b>Project Number</b> <b>J1002</b>
<b>Project Title</b> <b>Bioremediation, A Solution To Pollution: Bioremediation of Petroleum Oil Lubricant Spills by Adding Inert Nutrients</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My objective is to find if the Bioremediation (Natural Attenuation) of Petroleum Oil Lubricant (POL) Contaminated Soils can be enhanced by adding Inert Nutrients like Agricultural Fertilizer. I believe that the remediation process can be enhanced, that can result in saving time and money.</p> <p><b>Methods/Materials</b> In order to measure the rate of bioremediation scientifically, four cells (2#x4#x1#) were built. A plastic liner in three cells was placed to keep contamination from POL contaminated soil entering to the ground water. First cell- inert soil as control, second cell- POL contaminated soil treated through natural attenuation, third cell-POL contaminated soil treated by adding moisture and aeration by tilling and the fourth cell # POL contaminated soil treated by adding moisture, aeration by tilling and added agricultural fertilizer (Urea- CO(NH<sub>2</sub>)<sub>2</sub> ). Water was sprinkled (to keep soil moist) and the dirt was tilled to add aeration (oxygen) weekly. The three cells were physically examined for color, smell, moisture once a week. The contamination levels of total petroleum hydrocarbon (TPH) were measured by using Hanby Soil Test Kit. The first, control cell, TPH measurements were taken only to ensure the dirt is clean and inert.</p> <p><b>Results</b> Cell One - The control cell had no change. Cell Two- soil treated through Natural attenuation- TPH decreased from 2550 ppm -1125 ppm in 15 weeks. Cell Three- treatment by adding moisture and aeration through tilling- TPH decreased from 2550 ppm-570 ppm in 15 weeks and Cell Four- treatment with moisture, aeration and added nutrients, agricultural fertilizer (Urea) # TPH decreased from 2550 ppm -275 ppm in 15 week.</p> <p><b>Conclusions/Discussion</b> By adding agricultural fertilizer, the bioremediation levels were enhanced significantly. The treatment level was increased to 94% by adding agricultural fertilizer compared to 37 % decreased by natural attenuation. Water and tilling only achieved 81% treatment in the same 15 weeks. My conclusion is that 50% of cost and time can be saved by adding nutrients. I plan to add on to this project by comparing different nutrients to check if the treatment can be further enhanced to utilize this process at the commercial levels to treat major spills. Also I would like to study if any naturally occurring nutrients (nonhazardous and biodegradable) can be added in-situ, onshore or off shore that will enhance the bioremediation and not harm the ecosystem.</p>	
<b>Summary Statement</b> Enhance the Bioremediation of POL Contaminated Soil by adding Inert Nutrients like Agricultural Fertilizer (Urea).	
<b>Help Received</b> My father and sister helped me during the construction of cells and data collection. Professional staff from Environmental Division, DPW at Fort Irwin, CA provided technical and equipment assistance.	