



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Paul A. Westhart	Project Number S0819
Project Title The Effect of Eisenia fetida (Compost Worm) in Enhancing the Bioremediation of Oil-Contaminated Soil	
Objectives/Goals The objective of my experiment is to test and analyze the effect of Eisenia fetida (compost worm) in enhancing and promoting the natural bioremediation of hydrocarbons by increasing the metabolic activity of degrading microorganisms in oil contaminated soil.	
Abstract Methods/Materials Prepare 18 pots each containing 1 kg of soil, plant fertilizer and dead leaves. Add Eisenia fetida earthworms to select samples to promote the bioremediation of hydrocarbons. Add Pseudomonas putida bacteria to select samples because of its known efficiency in degrading hydrocarbons. The test substrate is oil-contaminated soil (4000 mg/kg oil concentration). Separate the containers in six sets as follows: Set -1: uncontaminated soil (control) Set -2: oil contaminated soil (control) Set- 3: oil contaminated soil + 15 earthworms Set- 4: oil contaminated soil + Pseudomonas putida bacteria Set- 5: oil contaminated soil + 15 earthworms + Pseudomonas putida bacteria Set- 6: oil contaminated soil + 15 earthworms + Pseudomonas putida + alfalfa plants. Measure the pH of the soil and perform bacterial population counts at distinct intervals during the experiment. Determine the final hydrocarbon concentration of the samples using analysis method EPA 413.2. Conduct a seed development test during week 6 to assess the presence of hydrocarbons (some seeds are sensitive to hydrocarbons in soil).	
Results The results show a difference in oil degradation. The best results were found in Sets 5 and 6. Evidence of oil degradation was a decrease in pH, increases in the bacterial count, higher rates of seed development and lower levels of oil concentration as measured by chemical analysis method (EPA- 413.2). No significant degradation of hydrocarbons was found in the control samples.	
Conclusions/Discussion The data supports my hypothesis that the presence of earthworms enhances oil bioremediation in soil by increasing the metabolic activity of microorganisms. After 60 days of experimentation, there was a greater reduction in oil concentration in the samples containing Pseudomonas bacteria, plants and earthworms compared to samples without earthworms. The greater reduction of oil concentration can be explained by the burrowing activity of the earthworms which increases the level of oxygen and disburse the nutrients available for degrading microorganisms.	
Summary Statement My project tests the effect of Eisenia fetida (compost worm) on promoting the bioremediation of oil-contaminated soil.	
Help Received My parents helped me to obtain the materials needed for my project. Mr. Richard Fosyth of Sierra Analytical tested the oil concentration of my samples without charge.	