



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Joshua B. Miko	Project Number S0807
Project Title The Bioremediation of Hydrocarbon Contaminated Soil	
Abstract Objectives/Goals The goal of this study is to determine if horse manure can effectively be used in the active, ex-situ bioremediation of soil contaminated with diesel hydrocarbons. Methods/Materials This study contained a control and two experimental groups each consisting of three treatments (replications). All treatments consisted of 150 ml of diesel fuel and one litre of soil (115,890 ppm). Experimental group I was also treated with 200 ml of horse manure. Experimental group II receive 400 ml of horse manure. Water was applied to all groups (Control, Experimental group I, and Experimental group II) over a period of two weeks to maintain soil moisture. An 8015 modified test, to determine the hydrocarbon content in ppm, was conducted by a soil lab before and at the end of the experimental period. Results The Experimental group II, which received 400 ml of manure, had the greatest bioremediation rate of diesel hydrocarbons, with an average of 15,979 ppm (mg/kg) at the end of the trial. The Experimental group I, which received 200 ml of manure, averaged 35,381 ppm, and the Control, which received no manure, averaged 77,254 ppm. Conclusions/Discussion Differences in treatments were significant with a P-value of .0029, as found with ANOVA in Microsoft Excel. This has led to the conclusion that the use of horse manure may be an effective way to bioremediate diesel- contaminated soil. The next step in this study is to extend the test period, while using the same treatments, to research the long-term effectiveness of this method of hydrocarbon bioremediation. Another step to be taken is to determine the effect of this process on soil nutrients and future application.	
Summary Statement The ex-situ bioremediation of diesel hydrocarbon contaminated soil via horse manure	
Help Received Lab work processed at Demenno- Kerdoon State Certified Laboratory , overseen by Lab manager Cyrus Pourhassanian; deisel fuel provided by FFA advisor Sharon Tavaglione; Instructed on use of chemical conversions by RHS chemistry instructor Mr. Thorpe.	