



# CALIFORNIA STATE SCIENCE FAIR 2016 PROJECT SUMMARY

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<b>Project Title</b> <b>Out with the Oil-d, In with the New: Magnetizing Oil</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of this experiment is to find the most efficient ratio of magnetite to oil that will remove oil from saltwater.</p> <p><b>Methods/Materials</b> We tested magnetite to oil ratios of 1:1, 3:1, 4:1, and 6:1, with three repetitions of the process for each ratio. For each repetition, we added 4 liters of saltwater to a plastic container then turned a fan on high for one minute to create typical ocean wind and current conditions. We then poured 5 milliliters oil into the water and waited another minute before sprinkling the current ratio of magnetite on the oil slicks to allow the magnetite and oil to bond. After another minute, we glided a hand-held magnet across the container above the water five times to collect the oil out of the water. If no oil remained visible in the container, the test was considered successful. The constants in the experiment were the size of the container; the amount of oil; the time between turning on the fan, pouring in the oil, sprinkling the magnetite, and removing the oil; the magnet used to remove the oil; the wind speed; and the motion of the magnet. The materials used were saltwater, oil, and magnetite. Equipment used included a desktop fan, a stopwatch, measuring spoons, cardboard, and a handheld bar magnet.</p> <p><b>Results</b> The 1:1 ratio failed to remove 100% of the oil on all three tests. The 3:1 ratio and 4:1 ratio succeeded in removing 100% of the oil on the second and third repetitions with even sprinkling of the magnetite using a piece of cardboard, but failed on the first repetition due to uneven sprinkling of the magnetite using a spoon. Using the 6:1 ratio, all of the tests were successful.</p> <p><b>Conclusions/Discussion</b> The conclusions of the experiment are that the 6:1 ratio, 4:1 ratio, and 3:1 ratio all worked while the 1:1 ratio did not succeed. The 6:1 ratio worked the best because it used the most magnetite. The 1:1 ratio did not succeed because it used the least amount of magnetite. As hypothesized, the 3:1 ratio proved to be the best because it worked consistently, with even sprinkling, while using less magnetite than the 4:1 and 6:1 ratios. Knowing that a 3:1 ratio of magnetite to oil works to remove oil from saltwater in simulated ocean conditions will allow future researchers to focus on other important variables such as efficient sprinkling of the magnetite, calculating the amount of oil spilled, and larger-scale testing.</p>	
<b>Summary Statement</b> We added various ratios of magnetite to oil in simulated ocean conditions and found that a 3:1 ratio achieves 100% removal of oil from saltwater while using the smallest amount of magnetite that works.	
<b>Help Received</b> Former Coast Guard Captain Rich Harbert helped identify ways currently used to clean oil spills. We developed our testing setup and procedures ourselves.	