



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Kayane K. Dingilian	Project Number S1109
Project Title The Manipulation of Soil Type and Height in Soil-Aquifer Treatment to Remove Nitrate and Hypochlorite from Wastewater	
Abstract Objectives/Goals The objective of this experiment was to find the most efficient way of using Soil-Aquifer Treatment with different types of soils and different heights of soil columns to remove nitrate and hypochlorite from wastewater. Methods/Materials Materials used were NaOCl, KNO ₃ , centrifuge, test tubes, distilled water, and chlorine and nitrate test kits. In order to represent nitrogen and chlorine, solutions of 200 parts per million (ppm) were created of nitrate ions (NO ₃ ⁻) and hypochlorite ions (ClO ⁻), respectively. These solutions were mixed with the adsorption medium # either sand, semi, or soil, and the effluent concentration of pollutant was measured using an indicator testing kit. The medium was rinsed with distilled water until the concentration of the pollutant in the effluent water reached 0 ppm. Results For nitrate, the sand, semi, and soil at 5.000 g took the same number of rinses for the concentration of the pollutant to reach 0. The behavior of nitrate in 7.500 g and 10.000 g semi and soil was very similar. For 7.500 g and 10.000 g soil, nitrate was adsorbed and did not desorb when rinsed. The hypochlorite remained adsorbed to all mediums for one more rinse than the nitrate. For the soil, the hypochlorite was adsorbed and did not desorb from the soil with successive rinses. Conclusions/Discussion It was found that hypochlorite adsorbed better than nitrate to all media, and that it adsorbed the best to soil. Nitrate, however, showed an increase in adsorption with a change from sand to soil. Also, the increase of bed height resulted in increased adsorption of the pollutant, usually by requiring an additional rinse in order for the effluent pollutant concentration to reach 0 ppm. These data can be used by scientists and engineers to formulate ideal parameters in soil-aquifer treatment as another step in purifying wastewater into water society can reuse.	
Summary Statement My project analyzed modifying soil type and bed height in the process of soil-aquifer treatment on how effective it was in removing nitrate and hypochlorite from wastewater.	
Help Received Both Mr. Antrim and Father provided materials for the project.	