



**CALIFORNIA STATE SCIENCE FAIR  
2016 PROJECT SUMMARY**

<b>Name(s)</b> Ella T. Lifset	<b>Project Number</b> <b>J1118</b>
<b>Project Title</b> <b>Efficacy of UVC Treatment Facility on Cottonwood Creek Water Quality</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Near where I live is a creek called Cottonwood Creek, which has been plagued with high nutrient and bacterial levels. This contamination has been addressed by two methods: a riparian zone and an Ultraviolet-C (UVC) germicidal facility. Last year, I tested if the creek riparian zone reduced nutrient levels. This year, I studied whether the UVC facility improved water quality by reducing bacterial growth. I tested 14 water samples multiple times from four sites on two days: Site 1) Before UVC Facility, Site 2) Inside Facility, Site 3) After UVC Treatment and Site 4) Moonlight Beach Effluent.</p> <p><b>Methods/Materials</b> I inoculated 74 plates using Coliscan Easygel to detect coliforms, E. coli, noncoliforms and mold growth. I also tested overall water quality and performed 114 tests. I measured nitrates, phosphates, ammonia, copper, chromium and iron.</p> <p><b>Results</b> Bacteria growth results supported my hypothesis that bacteria in the water would be elevated before UVC treatment and decrease after UVC treatment. However, my tests at the beach effluent showed that bacteria levels were approximately as high as before UVC treatment. I was surprised by this because I had not predicted bacteria levels would increase to such an extent. The nitrate levels detected were consistently high at each site. In fact, the nitrates were 70-80 times greater than state standards. Recommended levels for nitrates is less than or equal to 1 ppm. The phosphates were less consistent, however still exceeded state standards. The phosphate values were 40-85 times higher than recommended levels. The phosphate state standard is less than or equal to 0.1 ppm.</p> <p><b>Conclusions/Discussion</b> According to my findings, the UVC facility does eliminate creek bacteria, but 15% of the creek water is not directed through the facility. After the untreated water joins the treated water, the bacterial contamination rises to unsafe levels before it is discharged at Moonlight Beach. Phosphate and nitrate contamination was above state standards at all sites.</p>	
<b>Summary Statement</b> The purpose of this project was to test whether a UVC germicidal facility effectively decreases bacteria levels at the beach effluent of a local creek.	
<b>Help Received</b> I contacted the Senior Environmental Specialist of the City of Encinitas who allowed me access into the UVC germicidal facility. My science teacher supplied the water sampling equipment and the testing supplies. I collected all the water samples myself as well as performed all water quality tests.	