



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Brendan L. Walsh</b>	<b>Project Number</b> <b>J2229</b>
<b>Project Title</b> <b>Microwave Oven Leakage: A Radiation Hazard?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The purpose of this project was to determine whether older microwave ovens emit (leak) more radiation than newer microwave ovens. This is an important question because today microwave ovens are often used on a daily basis. I hypothesized that newer microwave models would have less microwave leakage than older models.</p> <p><b>Methods/Materials</b> For each test I placed a raw potato in the microwave, moved the setting to High and took readings after 30 seconds while the microwave was in use. I located 30 microwave ovens in different households in order to perform my tests. I used a Microwave Leakage Detector to measure 2.45 GHz radiation leakage at 3cm, 5cm, 15cm, and from 30cm. For each test unit, I had the owner complete a questionnaire regarding the make and model and approximate age of the microwave oven.</p> <p><b>Results</b> The federal government sets microwave emission limits at 5mW/cm<sup>2</sup> at 5.0cm. The highest intensity of 2.45GHz microwave radiation detected from a distance of 3cm in my experiment was 9.40 mW/cm<sup>2</sup> from a 6-year-old Kitchen Aid microwave oven. The lowest amount of microwave leakage at 3cm was 0.67mW/cm<sup>2</sup> from a 12-year-old Whirlpool microwave oven. The highest microwave leakage at 5.0cm was 4.33 mW/cm<sup>2</sup> and came from a 6 year old Panasonic microwave oven. The lowest microwave leakage from a distance of 5.0cm was 0.45 mW/cm<sup>2</sup> from a 2 year old Sharp microwave. The highest emission at 15.0 cm was 1.52 mW/cm<sup>2</sup> from the same 6 year old Panasonic, and the lowest was 0.24 mW/cm<sup>2</sup> from a 2 year old Sharp microwave oven. At 30.0cm, the highest microwave emission intensity was 2.31 mW/cm<sup>2</sup> from a 7.5 year old General Electric, and the lowest emission was 0.14 mW/cm<sup>2</sup> from a 2 year old Sharp Carousel.</p> <p><b>Conclusions/Discussion</b> According to my tests, there was no correlation between the age of the microwave and the amount of radiation emitted. Some newer microwaves had low leakage and some had higher leakage. Older microwaves also varied in their results. All microwave ovens tested fell within the federal guidelines for emissions set at 5mW/cm<sup>2</sup> or less from a distance of 5cm. The highest emissions from a distance of 30cm were 2.31mW/cm<sup>2</sup> or less, which suggests people would have little exposure if they remained one foot (30 cm) or more from a microwave oven while it is use.</p>	
<b>Summary Statement</b> The purpose of this project was to determine whether older microwave ovens emit (leak) more radiation than newer microwave ovens.	
<b>Help Received</b> Thanks to my parents and grandmother who supervised me during my testing. Thanks to all who allowed me to test their microwave ovens. Thanks to my science teacher who helped me find a 2.45 GHz detector.	