**Colorado Science and Engineering Fair**

**2024 Individual Project Abstract Form**

**Please print 2 copies of the completed form. Sign both copies, keep 1 for your notebook and submit 1 copy to your Regional Fair Director with your other paperwork.**

Title of Project: Effects of Mooring Systems on Submerged Point Absorber Wave Energy Converters

Finalist's Name: Natalie Muro

School and City: Palmer High School, Colorado Springs

Sponsor's Name: Nathaniel Lohmann

Category: Energy (ERGY)

Division: Senior (9th - 12th grades)

Abstract (250 words or less):

The purpose of this project was to test if there was a correlation between mooring configurations and the amount of consistent electricity a submerged wave energy converter can produce. I hypothesized if the submerged point absorber wave energy converter had three points of mooring, then the device would be most effective at consistently producing electricity.

The experiment involved mooring a model point absorber wave energy converter in a wave tank in different mooring configurations and generating waves of different states. Four mooring points were used as the control variable. The mooring configuration (1-3 lines) was the independent variable. A data acquisition system was used to record the electricity generated.

The data collection did not support the original hypothesis. The findings lead to the conclusion that the most consistent electricity was produced when there was one mooring line. Statistical analysis suggested that one mooring was statistically significant compared to the control variable and it produced 206% more electricity than the control. In mooring configurations two, three, and four (control), the device was too restricted and could not move to capitalize on the necessary vertical and horizontal motion. When there was one mooring point, the device was able to move with each wave and maximize movement leading to the generation of the most consistent electricity production over all of the 24 tests (8 wave states with 3 trials per state).

*I hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. I also attest that the above properly reflects my own work.*

Finalist's Signature: Natalie Muro Date: 3/4/24

In addition, all students must complete the ISEF Student Checklist (1A), Research Plan, Approval Form (1B), and Checklist for Adult Sponsor (1), and any other ISEF forms required for this type of project. See the International Rules and Guidelines for form requirements. Return COPIES o all of these forms to your Regional Fair Director with you Finalist Verification/Permission Form. A signed copy of this form must be included in your notebook.