ABSTRACT

TITLE:	Remote Use Incubator: Heating Components
AUTHOR(S):	Chapman, Micah
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ABSTRACT: Fort Lewis College's chapter of Engineers Without Borders (EWB) applies engineering practice and principles to improve the living conditions of individuals in the developing world. Testing water samples for Escherichia coli (E. coli) allows EWB to determine water contamination levels. This is an important part of identifying an adequate source for a water system. E. coli testing is performed by culturing water samples in a constant temperature incubator for twenty-four hours and then manually counting the E. coli cultures. This poster describes the development of a self-contained heating method for a portable incubator. Two methods for heating the incubator are evaluated. The first utilizes the heat energy released during the phase transition of a phase change material (PCM) and the second uses electronic heating elements. A phase change material that changes state at the desired incubation temperature combined with proper insulation is capable of heating an incubator for the twenty-four hour test period. The advantage of PCM is that it is not dependent on electricity. Electronic heating elements use a lithium polymer battery coupled with a micro-controller and temperature sensors to regulate the temperature in the incubator cavity. The electronic system provides a very uniform incubation temperature and is easier to use than the PCM method. A single battery can provide power for several testing cycles depending on the ambient temperature. Extensive testing is performed on both heating methods as well as a hybrid incubator that uses a combination of PCM and electronic heating.