# ABSTRACT

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| **TITLE:** | Remote Use Incubator: Heat Transfer Analysis And Construction |
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**ABSTRACT:** This project involves the design and fabrication of a compact, portable incubator for use by Fort Lewis College's chapter of Engineers Without Borders, a humanitarian organization, that performs water quality testing in remote areas of the developing world as part of their water system development projects. The incubator design is initially evaluated using one dimensional heat transfer analysis and subsequently with a three dimensional finite element model. Conduction, convection, and radiation are considered. The overall heat output is estimated and used to determine the approximate thermal energy generation needed to heat the incubator. This analysis shows that the main impact of heat transfer from an enclosed space to the environment is through conduction, which is influenced by the type of insulation used in the incubator walls. Two forms of insulation were evaluated. Vacuum insulation panels (VIPs) have excellent thermal resistance properties but are fragile and difficult to fabricate. Closed cell polystyrene foam is very easy to fabricate but is not as good a thermal insulator as the VIP. The performance of both materials is tested. These test results, as well as numerous other factors, are considered in selecting the final design.