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Thermal Management of Low Enriched Uranium in the University of Missouri Research Reactor (MURR)

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Medical radioisotopes facilitate medical imaging. The University of Missouri Research Reactor (MURR) is exploring the potential of producing one such isotope, molybdenum-99, using a new process that utilizes low enriched uranium (LEU). The current process for producing molybdenum-99 uses high-enriched uranium material, which can be used to create nuclear weapons. The International Atomic Energy Agency and the National Academy of Sciences are interested to develop and distribute the LEU process to international partners to eliminate the risk of weapons grade uranium proliferation. In order to process the LEU material, MURR needs to establish that the reactor coolant flow rate is sufficient to ensure the LEU foil and the containment materials do not melt. To measure the water velocity, we are implementing two measurement strategies. The first is using a hot-wire anemometer, or HW. The HW must be calibrated before it can be used, so a calibration facility based on the weight tank/stopwatch method was built. The results from the calibration were used to estimate the flow velocity in the channel that will house the LEU during processing at MURR. The second measurement strategy will be to build an instrumented test wedge that can be placed in the reactor. The test wedge will provide more accurate flow measurements than the HW, in addition to LEU temperature measurements.