Technetium-99m (Tc-99m) is widely used for medical imaging applications around the world. This useful isotope can be produced by creating molybdenum-99 (Mo-99) and letting it decay via beta particle emission to the wanted Tc-99m. Today most major producers use High Enriched Uranium (HEU) to create the Mo-99. In an attempt to demonstrate a method that does not use weapons-grade uranium, the University of Missouri Research Reactor (MURR) is trying to produce Mo-99 isotopes by irradiating Low Enriched Uranium (LEU) foils instead of the normally used HEU. Because the target (LEU) is still 19.75% enriched, approximately 0.75kW/g of heat will be released during the process and because we do not want it to overheat or melt we need to know how much cooling water is passing by the target and how much heat is taken away from it. There are a lot of ways to measure water flow velocity. In this case, the goal is to get accurate measurement in a small non-uniform tube 30 feet underwater on a research nuclear reactor. The bulk flow over the desired positions is available, and with this some calculations can be made to get the velocity on the irradiation positions. These calculations then can be compared with an actual measurement in pressure drop from where a flow velocity then can be derivate. To further increase the precision of the results a Constant Temperature Anemometer (CTA) will be used to measure the actual velocity of the flow in certain areas of the irradiation points. The CTA has to be calibrated before it can be implemented. This project is an engineering review of the various flow measurement methods and a calibration of the device chosen to make local fluid velocity measurements in the irradiation positions.