BUOYANT HEAT TRANSPORT CAN PRODUCE UNRELIABLE ESTIMATES OF HEAT GENERATION

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Many aspects of flow calorimeters used to detect putative CF/LANR reactions [l-6] have been discussed. Issues include thermometry, electrical grounding, crosstalk, thermal mixing, sensor positioning problems, and recombination. The potential impact of a buoyancy error is usually not considered despite its demonstrated significance [7-12] and relevance to heat and mass flow [13] and Bernard instability [14]. In the absence of thermal (ohmic) controls, derived flow equations cannot always be trusted, especially when the input and output temperatures are taken without consideration of possible thermal stratification which only increases at higher input powers. Therefore, the derived indicated output from calculations, in the absence of ohmic controls, should be suspect if the temperatures are not taken at the same elevation. Such cold calculations, even if thermometry is correct, deviate from the actual Navier-Stokes heat and mass flow calculations which demonstrate significant problems when there is thermal-created buoyancy inversion of water or air [“Bernard instability”], especially at low flow rates. Figure 1 demonstrates the impact of misunderstanding the falsity of indicated data, which increases significantly at higher values of η_B. The non-dimensional number η_B is the ratio of heat transported by the buoyant forces to the heat transported by the applied air or solution convection. Thus, an improved estimate of the incremental power gain in an experiment then becomes:

$$\pi_{corrected} = \pi_{observed} * (1 - \eta_B)$$

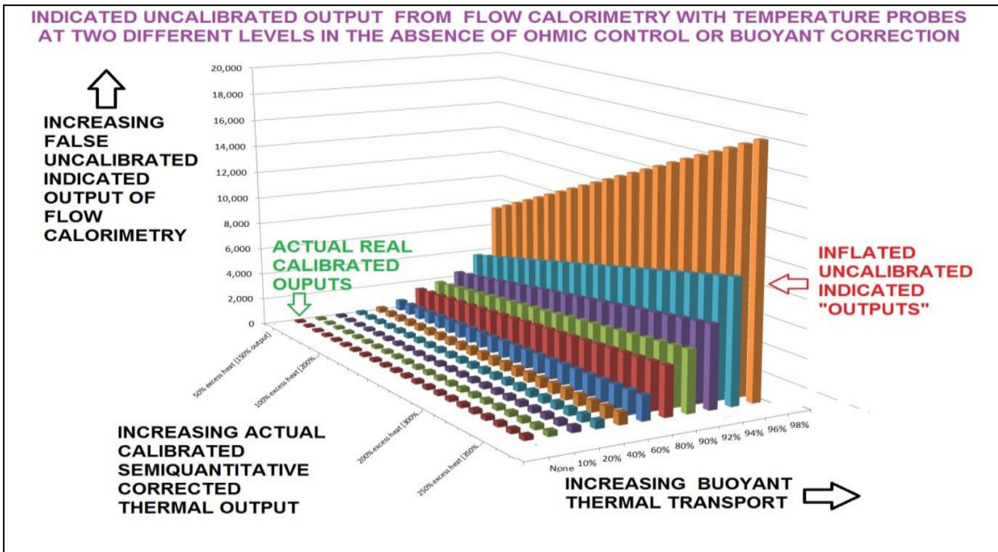

Figure 1 – The indicated uncalibrated outputs from flow calorimetry can be magnified in an unwarranted fashion if temperature probes of the “input” and “output” area (deliberately) taken at two different elevations (“levels”, “heights”) in the absence of ohmic controls and/or buoyant correction.

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