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Enclosure 3

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INVESTIGATION OF POST-CHF HEAT TRANSFER FOR WATER-COOLED REACTOR APPLICATION AND DEVELOPMENT OF TWO-PHASE FLOW INSTRUMENTATION

1. Post-CHF Heat Transfer

Repair of the boilers for the two-phase flow loop were completed in this report period. Various other minor improvements were also made on the loop, including rerouting of the aspiration lines from the vapor superheat probe. With completion of these modifications, data runs for post-CHF heat transfer were resumed.

To date, some 60 experimental runs have been obtained with measurements of heat transfer and vapor superheats in post-CHF boiling flow. The attached Figure 1 shows a plot of the parametric conditions for vapor quality and mass flow rate for these tests. Additional tests currently are still in progress.

2. Two-Phase Flow Instrumentation

Tests of the liquid film thickness probes in the newly completed counter-flow air-water rig were continued in this report period. A diagram of this rig was included in the July 1979 Progress Report. The current experiments involve the measurement of liquid film thicknesses for various liquid flow rates down the surface of the inner tube, with variable air flow rates upward through the annulus. Figure 2 shows some typical data obtained with the probe at a distance of 36 in. below the leading edge of the film. It is seen that the measured film flow thicknesses remain essentially constant for a given liquid mass flow rate over a range of air flow rate, up to the critical air flow rate at which film disruption due to interfacial shear occurred. These data are being compared to various theoretical predictions.

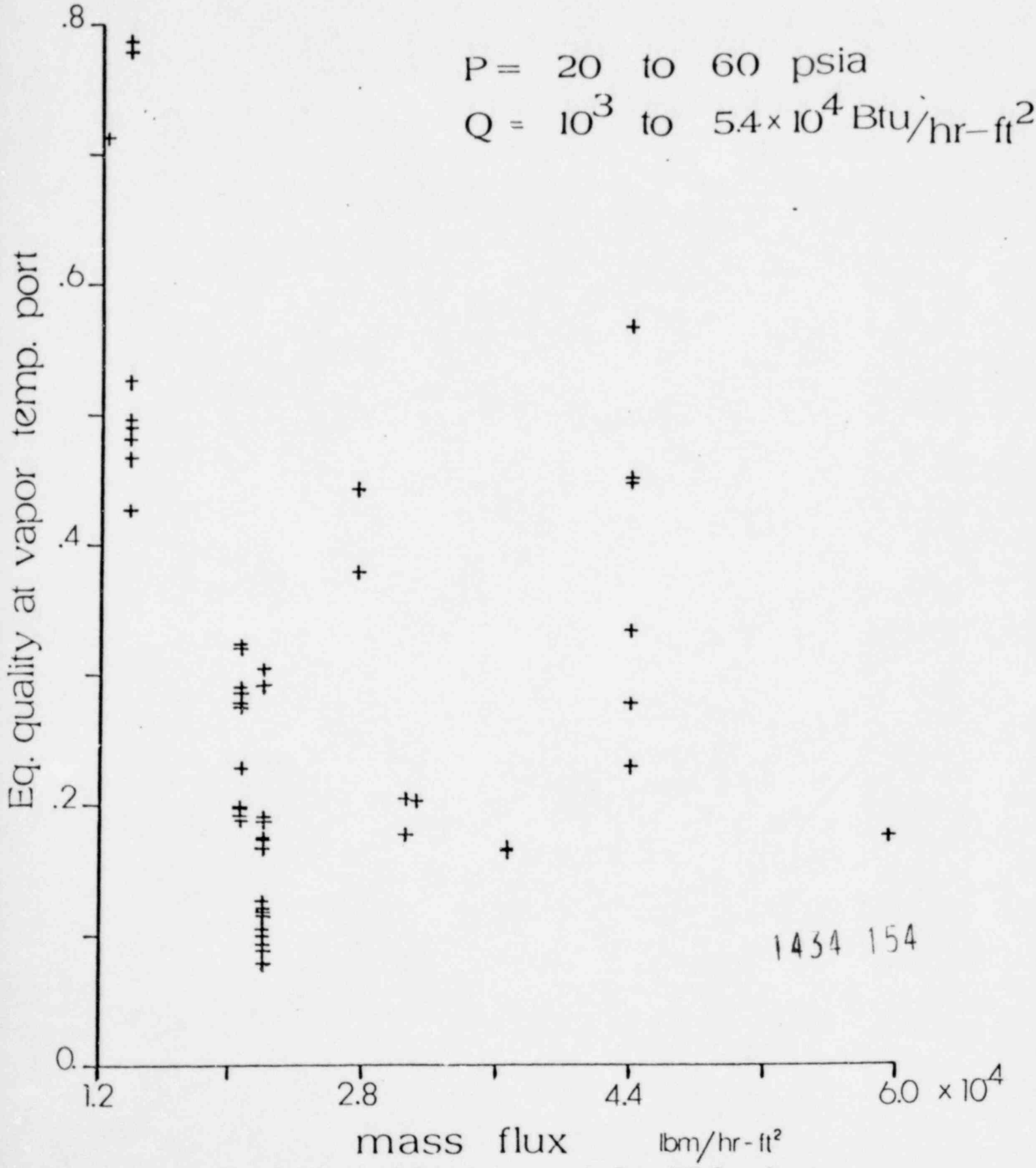

Fig. 1: Range of Test Parameters in Post-CHF Experiments (as of November 1, 1979)

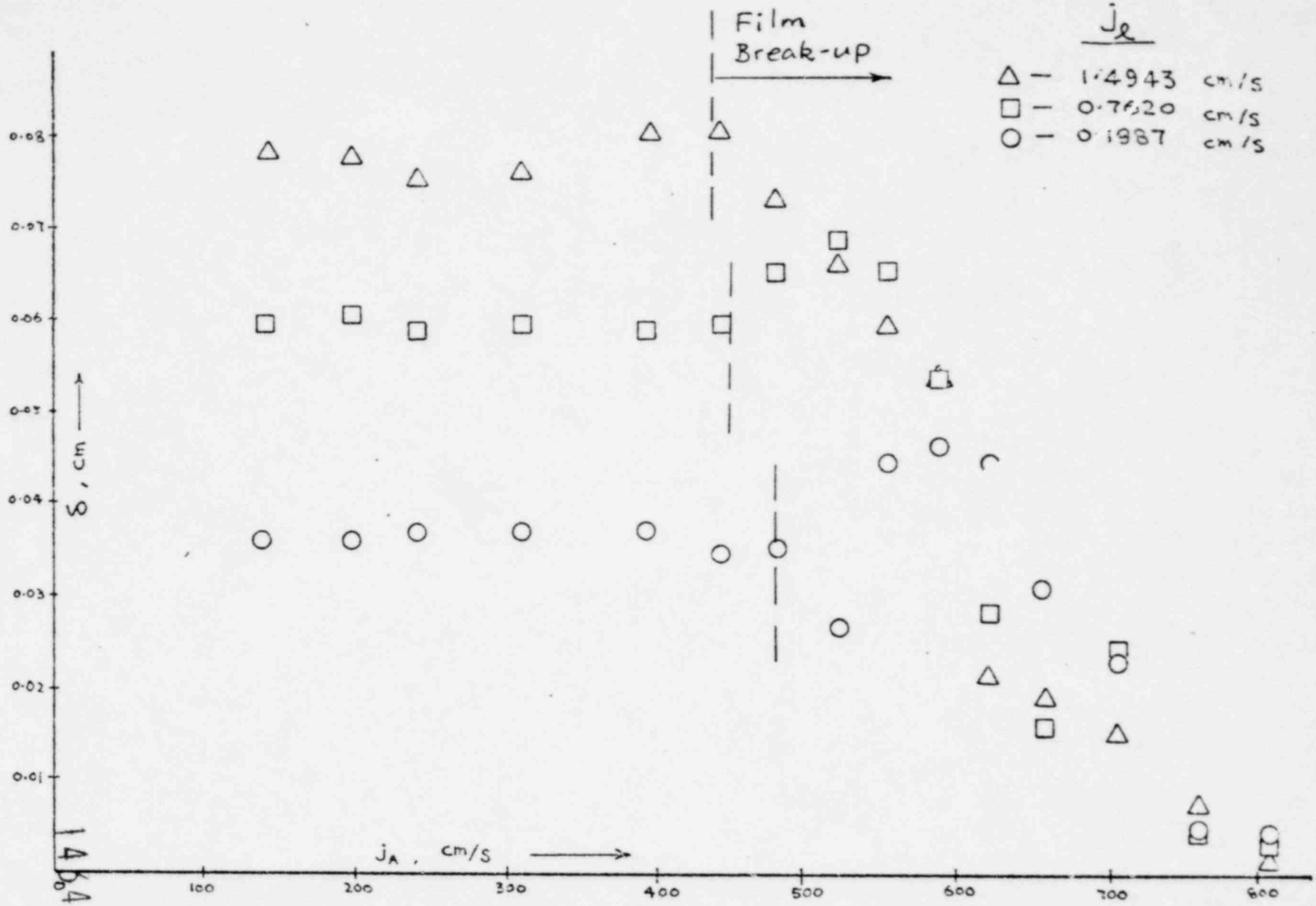

Fig. 2 Liquid Film Thicknesses with Counter-Current Air Flow