APPENDIX B

NEGATIVE BUOYANCY GENERATION AT THE SURFACE DUE TO EVAPORATION

Mass transfer per unit area between a flat gas-liquid interface is given by (Treyball, 1968)

$$N_A M_A = M_A F_G \left(\ln \frac{1 - P_{Ai}/p_t}{1 - P_{AG}/p_t}\right) \qquad (B1)$$

where

N_A = Molar flux

M_A = Molecular wt = 18 lb/lb mole

F_G = Mass transfer coefficient

P_{Ai} = Vapor pressure of the liquid (A) at the interface = 17.535 mm Hg

P_{AG} = Partial pressure of the liquid in the gas

p_t = Total pressure = 760 mm Hg.

The mass transfer coefficient is obtained by the heat-mass transfer analogy with the empirical relationship (Treyball, 1968)

$$h = 0.072\ G'^{0.6}$$

where h is the heat transfer coefficient between an air water interface and G' is a superficial air mass velocity. The heat transfer dimensionless group defined by