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SOLUTION MINING STUDIES

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IV. SUMMARY

A two-fluid concept was used to develop the differential equations of continuity, momentum, and diffusion that govern the motion of brine and the dissolving of salt in a solution mine. As an initial step in the development of the solution mine model these equations were also expressed in an integral form to show the gross flow of solution, momentum, and salt in the boundary layer flowing down the salt surface. By using the two-fluid concept the precise definition of the diffusion coefficient required in the model was determined.

The technique and the data reduction procedure used in the experimental determination of diffusion coefficients were also analyzed. Because it was found that published measurements are based on a different definition than the one used in the solution mine model, the relationship between the measurements and the values required in the model was determined.

Criteria for the development of turbulence in a free-convection boundary layer were applied to the layer of brine flowing down the cavity surface of a solution mine. It was found that only a short length of salt surface was required for the development of turbulence and that, as a consequence, turbulence should be expected in most of the boundary layer in a solution mine.

V. FUTURE WORK

Because turbulent motion is very likely to occur in solution mines, the steps required to include the effects of

turbulence in the solution mine model will be carried out during the next quarter. The work will include the evaluation of the expressions for flow of momentum, solution, and salt in a turbulent boundary layer over the salt surface.

Respectfully submitted,

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