CENTRIFUGE MODELING OF SOIL LIQUEFACTION DUE TO AIRBLAST

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Previous subscale blast-induced liquefaction experiments (1) have not correctly modeled the results of a full-scale liquefaction experiment in the field (2). Among the possible reasons for this discrepancy was the difference in the blast pressure sources and the failure to perform the subscale test at elevated gravity as is required for complete similarity (3). Both of these limitations are overcome by performing explosive experiments on a centrifuge as has been done successfully for cratering (4). Feasibility experiments to test for liquefaction mechanisms will be discussed. To complement the centrifuge experiments, a series of laboratory high-pressure triaxial tests are being conducted to quantify the liquefaction mechanism proposed by Prater (5) and Rischbieter et al. (6) for the particular sands to be used in the model tests. Samples are saturated in the triaxial cell and initially subjected to typical in-situ effective stress states (effective horizontal stress equal to Ko times effective vertical stress.)

Horizontal and vertical stress are then increased, maintaining a constant effective stress ratio, Ko. The increase in stress and the subsequent return to the initial total stress approximates, under some conditions, a passing P-wave. Both a fine and a coarse Ottawa sand are being used in the prototype study to determine the influence of grain size on the centrifuge scaling. The influence of initial stress state and relative density on liquefaction potential is also being investigated.