GEOPHYSICAL SIGNATURES OF LACUSTRINE FACIES: EXPERIENCES FROM HYDROGEOLOGIC STUDIES OF TEMPERATE NEOGENE LAKE IDAHO SEDIMENTS AND AQUIFERS, U.S.A.

1WOOD, S. H., LIBERTY, L., and 2SQUIRES, E. 1Boise State University, Boise,ID 83725; 2Hydro-Logic, Inc., 1530 Knights Dr. Boise, ID 83712, U. S. A.

Understanding depositional facies and continuity of sand aquifers in mud-dominated sediments of lacustrine basins is important in delineation of groundwater resources. Borehole geophysics, seismic reflection, and careful analysis of drill cuttings (sieve and binocular microscope examination) have been essential to identifying facies in Neogene Lake Idaho sediments. High-resolution seismic reflectio is an aid to dtermining large-scale shape of depositional units and tracing continuity of dipping and faulted aquifers. Useful gamma-ray and electric log signatures include: 1) Funnel-shaped logs, over 20 to 100 m vertical extent, overlain by abruptly more resistive sands, and correlative over 10's of km are interpreted as prodelta coarsening-upward mud sequences overlain by distributary-channel sands. 2) Funnel-shaped logs of 5-to-20-m vertical extent, and repeated in the section. Several to many units are repeated over intervals of 30 to 100 m. Units are rarely correlative beyond a few km. Sands are generally medium-grained and are interpreted as stacked distributary-mouth bars, or as beach sands. 3) Monotonous low-resistivity coupled with irregular medium-gamma activity, over thick vertical extents of 30 to 400 or more meters are interpreted as muds deposited in the quiet-water lake environment, and are correlative over 10's of kms. 4) Thin (3 m) bell-shaped units enclosed by thick muds and composed of fine sand are interpreted as fining upward density-flow sands. 4) Bell-shaped logs, with abrupt bases, 7 to 40 m in vertical extent. Sands are typically coarse, and some have gravel at the base. These are interpreted as fluvial channels rarely correlative over a few km. 5) Spikey logs, with resistive units 3 to7 m thick separated by low-resistance units typically 3 m in vertical extent and 7 m units with abrupt bases and high gamma are interpreted as alluvial-fan deposits. High-gamma units are high-potassium felsite gravels. The alternating resisitivity units are silt and muddy sand layers none of which are correlative over a km. A surprising finding is the identification of a 250 square-km area of shallow low formation water resistivity (Rw 30 ohm-m) and quality, in which the sand aquifers above 150 m are barely distinguishable from muds on account of low resistivity, whereas those waters below are of higher Rw and good quality.