ABSTRACT

EJECTA-BEARING DEPOSITS AT THE CRETACEOUS-TERTIARY BOUNDARY AND THEIR IMPLICATIONS FOR TIMING OF HIDALGOAN (LARAMIDE) FOLDING, LA POPA BASIN, NUEVO LEON, MEXICO

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Ejecta-rich strata located at or near the K/T boundary in La Popa basin, NE Mexico, were deposited by tsunami-induced subaqueous debris flows and offshore-directed supercritical flow. An ejecta-bearing event deposit occupies a stratigraphic position within the upper 5-15m of the Delgado Sandstone Member of the Potrerillos Formation (late Maastrichtian), on a sharp contact above delta-front and lower shoreface deposits. The depositional system of the Delgado Sandstone Member consists of wave-dominated deltaic facies that prograded into the basin from the northwest to the southeast. The most abundant facies recognized in this depositional system include hummocky cross-stratified sandstone, sandstone with abundant soft-sediment deformation, and finer

grained siltstones and shales. The Delgado Sandstone Member thickens in the hinge of a northwest-trending detachment fold (the La Popa syncline) indicating that foreland deformation took place during deposition. The event deposit is continuous throughout the basin, but varies laterally and stratigraphically in lithology and thickness (0.25-6.1 m). The deposit contains interbedded crudely laminated sandstone, matrix-supported polymictic boulder to cobble conglomerate, and graded coarse-grained sandstone. Conglomeratic units locally occupy three paleovalleys that are approximately 300 m, 400 m and 500 m wide with axial azimuths between ~180˚-200˚. The valley-fill succession is as much as 6.1 m thick and contains basal, subangular very-fine sandstone blocks (1.5 m length) overlain by multiple graded pebbly sandstone beds. Conglomerate and sandstone onlap valley walls, whereas a younger hummocky-stratified sandstone succession overlaps the entire event deposit. Conglomerate matrix and sandstones contain a distinctive grain assemblage that includes: (1) bubbly calcite spherules; (2) silicate spherules; (3) silicate fragments; (4) micrite-coated silicate and sparry carbonate grains interpreted as ooids; (5) abundant bioclasts derived from shallow marine and onshore lagoonal settings, commonly filled with micrite, but generally lacking micrite coats. Bubbly spherules and silicate spherules and fragments are interpreted as impact ejecta. Spherules are present at the very base of the deposit, indicating that ejecta were deposited at or near the site prior to reworking by traction-flow processes. Ejecta are concentrated near the bases of individual sandstone beds and comprise approximately 10%-36% (locally) of framework grains. Matrix-supported boulder conglomerate was deposited by one or more subaqueous debris flows within the southward-trending paleovalleys. Overlying ejecta-bearing sandstones were likely deposited by offshore-directed, upper

flow regime processes that included antidune collapse and upper plane bed deposition. The abundant ejecta link both depositional processes with the impact at Chicxulub 800 km to the southeast, on a bearing of 115˚. Early arrival of ejecta may have taken place as base surge(s) created by the gravitational collapse of the ejecta cloud or by ballistic trajectories from the impact site.