Maar volcanoes are generally understood to be the result of highly energetic, explosive interaction between magma and water (groundwater or surface water). Two end-member conceptual models have been proposed to explain the dimensions (diameter, depth) of maar craters: (1) an incremental growth model, where a crater grows due to subsidence and ejection of debris over the course of many explosions, and the final size is an integrated result of multiple explosive events; (2) a model in which the dimensions of a maar crater are the result of the largest single explosion during the lifetime of the maar (major-explosion dominated model). In the latter case, the maar size can be used to estimate the energy and depth of the largest explosion, which in turn allows estimation of the magma mass involved. This paper describes Lunar Crater maar (Nevada, USA) and tests the two models as explanations for the characteristics of the volcano, in particular the major-explosion dominated model. This model implies magma mass and supply rates that are unrealistic, and the tephra at the maar do not contain key features observed in the ejecta at large single-explosion craters. The incremental growth model seems most suitable based upon geological evidence.