Femtosecond lasers, fired in short pulses, can induce bubble cavitation in single-phase liquid fluid inclusions at temperatures near the inclusion homogenization temperature. By coupling femtosecond laser-induced cavitation with microthermometry, paleotemperatures can be extracted from fluid inclusions in primary halite crystals. This technique minimizes plastic deformation of halite by not subjecting samples to extreme temperatures during vapor bubble nucleation. The resultant homogenization temperatures are precise and reproducible. We applied this technique to Eocene Green River Formation primary bottom-growth halites from the Piceance Creek Basin in Colorado. Samples from the basin-center Savage 24-1 core yield average bottom water temperatures of 27.0 ± 1.3 ºC and 20.1 ± 1.2 ºC for the Upper and Lower Salt intervals, respectively. Average bottom water temperatures from modern perennial hypersaline lakes have been shown to reflect the local mean annual air temperature. Therefore, homogenization temperatures from primary bottom-growth halite fluid inclusions are a proxy for mean annual air temperature. These results agree with regional Early Eocene mean annual air temperature estimate ranges from other mineralogical and biochemical proxies, bolstering the reliability of temperature estimates obtained using this technique. Additionally, the highly selective nature of laser induced cavitation microthermometry allows for a higher degree of quality control compared to standard microthermometry, yielding more reproducible and precise results.