We present a new thermal model for the North American lithosphere obtained from inversion of the most recent tomography models. Temperature estimates for the deeper horizons of the lithosphere, based on surface heat flow measurements, require a precise knowledge of many crustal parameters which are extremely uncertain. Therefore, indirect approaches are needed to determine temperature distribution within the lithosphere. Seismic tomography is commonly used for this purpose. The 1D reference global models, normally used in the tomography models, represent an average of the laterally heterogeneous Earth structure. However, on account of the non-linear relationship of seismic velocities and temperatures, the average seismic velocity profile does not necessarily correspond to the average temperature distribution. Therefore, we define a possible range of reference velocity models according to the specific tectonic settings of the study area. We also consider the influence of composition on seismic velocity, assigning different mantle composition to the tectonic units of North American continent. The estimated temperatures are extrapolated to the surface using typical crustal isotherms for different tectonic provinces. The lithosphere-asthenosphere boundary is traced along the 1200°C isotherm, in agreement with the definition of the thermal lithosphere. The new results are compared with previous thermal models obtained using different methods (e.g. interpretation of xenolith data).