A multihole diverging photon collimator for megavoltage energies was constructed of Cerrobend. The collimator was built to enable primary beam measurements to be made across a megavoltage field size of 20x20 cm at one cm intervals at SAD of 100 cm. Using the collimator, primary beam transmission measurements through aluminum were made at 25 points in the 20x20 cm field at 5 cm spacing. These measurements reveal a spread in beam hardness across the field for the 6 MV x-rays. The exposure x-ray spectrum at each point was unfolded using a calculated pre-spectrum and a variational algorithm, which perturbed the energy spectrum at each energy interval, plus and minus, and calculated a transmission curve from the perturbed spectrum. The calculated transmission curves were compared to the measured transmission curves. A new value for the x-ray spectrum was selected based on the closest fit to the measured transmission curve.