Let $\eta = \sqrt{\frac{B^2}{\rho^2 T}} = \frac{B}{\rho\sqrt{T}}$

$$\leq \frac{\epsilon\sqrt{T}}{2B}B^2 + \frac{B}{2T\epsilon\sqrt{T}}T\epsilon^2$$

$$\frac{\epsilon B}{2\sqrt{T}} + \frac{\epsilon B}{2\sqrt{T}} = \frac{\epsilon B}{\sqrt{T}}$$

$$f(\bar{x}) - f(x^*) \leq \frac{\epsilon B}{\sqrt{T}}$$