5.24 $\vec{A} = k\hat{\phi}$. Clearly, $\vec{\nabla}\cdot\vec{A} = 0$.

So, from eq. (62),

$\vec{J} = -\dfrac{\nabla^2\vec{A}}{\mu_0}$ and by the 11th vector identity,

$-\nabla^2 A = \vec{\nabla}\times(\vec{\nabla}\times\vec{A}) - \vec{\nabla}(\vec{\nabla}\cdot A) = \vec{\nabla}\times(\vec{\nabla}\times\vec{A})$ since $\vec{\nabla}\cdot\vec{A} = 0$ in this problem.

$$\vec{\nabla}\times\vec{A} = \left[\frac{1}{s}\frac{\partial A_z}{\partial\phi} - \frac{\partial A_\phi}{\partial z}\right]\hat{s} + \left[\frac{\partial A_s}{\partial z} - \frac{\partial A_z}{\partial s}\right]\hat{\phi} + \frac{1}{s}\left[\frac{\partial}{\partial s}\left[sA_\phi\right] - \frac{\partial A_s}{\partial\phi}\right]\hat{z}$$

All terms vanish except for $\frac{1}{s}\left[\frac{\partial}{\partial s}\left[sA_\phi\right]\right]\hat{z} = \frac{1}{s}\left[\frac{\partial}{\partial s}\left[sk\right]\right]\hat{z} = \frac{k}{s}\hat{z}$.

Then

$$\vec{\nabla}\times(\vec{\nabla}\times\vec{A}) = -\frac{\partial}{\partial s}\left[(\vec{\nabla}\times\vec{A})_z\right]\hat{\phi} = \frac{k}{s^2}\hat{\phi}$$

So $\vec{J} = \dfrac{\vec{\nabla}\times(\vec{\nabla}\times\vec{A})}{\mu_0} = \dfrac{k}{\mu_0 s^2}\hat{\phi}$