

**15.24. Model:** Treat the oil as an ideal fluid obeying Bernoulli's equation. Consider the path connecting point 1 in the lower pipe with point 2 in the upper pipe a streamline.

**Visualize:** Please refer to Figure Ex15.24.

**Solve:** Bernoulli's equation is

$$p_2 + \frac{1}{2}\rho v_2^2 + \rho g y_2 = p_1 + \frac{1}{2}\rho v_1^2 + \rho g y_1 \Rightarrow p_2 = p_1 + \frac{1}{2}\rho(v_1^2 - v_2^2) + \rho g(y_1 - y_2)$$

Using  $p_1 = 200 \text{ kPa} = 2.00 \times 10^5 \text{ Pa}$ ,  $\rho = 900 \text{ kg/m}^3$ ,  $y_2 - y_1 = 10.0 \text{ m}$ ,  $v_1 = 2.0 \text{ m/s}$ , and  $v_2 = 3.0 \text{ m/s}$ , we get  $p_2 = 1.096 \times 10^5 \text{ Pa} = 110 \text{ kPa}$ .