UNDER PRESSURE

**Coversheet for Instructors**

**Introduction**: The following material introduces students to computations involving percent and volume.

**Materials**:

Projector connected to a computer with internet to show video for the lesson

Copies of each of the following:

- Warm-up and Exit Ticket
- Under Pressure worksheet

**Prior Knowledge/Skills Needed: see details below**

Before this application lesson, students must be able to:

-Compute volume of a cylinder

-Apply percentage concepts

-Apply conversions

Water distribution operators must be able to view the level of water in their water tanks (commonly known as reservoirs) on their computer screens. The way water levels are determined, is by measuring the pressure at the bottom of the tank, and then converting that number (which is given in PSI, pounds per square inch) to a height.

Water levels are critically important for water management organizations because the utility is required to maintain a certain amount of water in reservoirs at all times. In case of a sudden large demand for water, greater than can be provided instantaneously, (as in the case of fire or even at times of day when consumers are using a lot of water simultaneously, like morning showers) the water district might need to provide additional volume beyond what is considered normal.

Instrument technicians are required to verify the accuracy of their measuring devices from time to time. The measurement readings must be reliable, in order for distribution operators to know exactly how much water is available.

Here are some terms and mathematical concepts that must be understood before a student can solve a problem involving water levels and instrumentation readings.

**Volume**: In this context we will be talking about the volume of a reservoir or water storage tank that is cylindrical in shape.

The volume of a cylinder is: $\pi r^2 h$ (where 'r' is the radius of the reservoir and 'h' is the height.) Make sure units are consistent. If radius is measured in feet, height should also be measured in feet.

**Percent**: General ability to apply percent concepts.

**Conversion**: 7.48 gallons of water = 1 cubic ft.

**PSI** (pounds per square inch)

1 PSI is defined as 27.7 inches of water. (the diameter of the container of water is not a factor) This is a reading of pressure exerted on the bottom of the tank by the water in it.