

The average daily packaged water usage in Table 1 assumes all 4 lines run continuously and do not stop for breaks. This requires a relief operator who rotates through each line position to provide individual breaks. Packaging operations often employ this during peak production periods. Stopping a line for lunches and breaks may utilize personnel more efficiently when demand is reduced. Downtime for lunches and breaks would not typically be included in a packaging line's efficiency calculation. For this report I assumed only continuous line operations were used. Any production using scheduled stops for breaks would be included within the 85% efficiency used in Table 1.

**Yearly Water Usage:**

The potential daily production estimated in Table 1 should be considered the average to expect in one day when all lines are running, with no breaks. But no line runs 24 hours a day, seven days a week, 365 days a year. This value cannot be used for an annualized average water usage.

The averaged annual daily water usage will also include periods of no water use by one or more lines. These periods of no water use on the packaging lines include statutory holidays, capital installations / upgrades, major maintenance overhauls and seasonal variations in utilization.

To account for these periods of no water usage PET Systems calculated the expected daily water usage averaged annually by using a 77% line efficiency (Table 2 below). While I use a different approach in my calculations I am in agreement with the final values presented by PET Systems. My calculations are shown later.

Table 2 – Water used by packaging lines averaged annually.

Line	Product Water per Bottle (oz)	Speed (bph)	Flow (GPM)	Spring Water used per day (MGD)	Assumed Average Line Efficiency	Avg. Spring Water used per day (MGD)
1	17.24	81,000	182	0.262	77%	0.202
2	17.24	90,000	202	0.291	77%	0.224
3	17.24	90,000	202	0.291	77%	0.224
4	17.24	90,000	202	0.291	77%	0.224
<b>Total</b>				<b>1.134</b>		<b>0.874</b>
<b>Process Water Added (11.2% of total)</b>						<b>0.984</b>