City of **Apple Valley** ®

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POLICE DEPARTMENT
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TO: Apple Valley City Council

FROM: Nick Francis, Police Captain

DATE: October 19, 2015

SUBJECT: ALCOHOL LEVEL ESTIMATIONS

The following information regarding alcohol consumption was requested by the City Council at its October 8, 2015, meeting.

Alcohol levels vary by drink type and manufacturer.

Beers (3-10%) 12 oz
Pilsner 3–6%
ESB (Bitter) 3-6%
Lager 4-5%
Porter 4-5%
Brown Ale 4-6%
IPA (India Pale Ale) 6-7%
Stout 5-10%

Wines (8-14%) 5 oz
Sparkling Wine 8–12%
Table Wine 9–14%
Retsina 10-11%
Dry White 10-12%
Cabernet 11-14%
Barley Wine 11–15%

Spirits (20-70%) 1.5oz
Light Liqueurs 15-25%
Vodka/Whiskey/Rum 40%
Cask Strength Whiskey 60%
Absinthe 55–90%
Neutral Grain Spirits 95%
Rectified Spirits 96%
Absolute Alcohol 96-98%

Alcohol levels can be roughly calculated in the body based on sex, weight, time, and alcohol concentration in the drink(s). One major factor is food consumption as that has a direct impact in how soon alcohol is processed into the blood stream. Humans constantly process alcohol out of the body at an average rate of .015/hour. Alcohol is calculated using the Widmark Formula. There are some conversions which can make the formula difficult to follow. Alcohol amounts as well as body weight has to be converted to grams in order for the formula to work.

Blood Alcohol Concentration = [Alcohol consumed in grams / (Body weight in grams x r)] x 100. In this formula, "r" is the gender constant: r = 0.66 for females and 0.73 for males.

Example 1:

A 170-pound man consumed seven 12-ounce bottles of regular beer between 8 PM and midnight. What was his BAC at 12:30 AM?
A = 7 beers x 12 oz. x 5% = 4.2 oz.
W = 170 lbs. H = 4.5 hours
BAC = 4.2 x 5.14 (conversion of alcohol to grams) /170 x .73 (constant for males) = .174 – .015 x 4.5 (or .068 for alcohol burned off) = .106 percent

Example 2:

A 115-pound woman consumed four 1 1/4-ounce shots of bourbon between 9 PM and 11 PM. What was her BAC at midnight?
A = 4 shots x 1.25 oz. x .40% = 2.0 oz.
W = 115 lbs. H = 3.0 hours
BAC = 2.0 x 5.14 (conversion of alcohol to grams)/115 x .66 (constant for females) = .135 – .015 x 3.0 (or .045 for alcohol burned off) = .09 percent

A general table comparing some alcohols also shows differences for alcohol consumed over a 2 hour period

100 lb female	wine	4.5% beer	10% beer	vodka
1 drink	0.019	0.01	0.04	0.017
2 drinks	0.072	0.05	0.118	0.067
3 drinks	0.125	0.103	0.194	0.11
4 drinks	0.177	0.14	0.27	0.16
200 lb male	wine	4.5% beer	10% beer	vodka
1 drink	0	0	0	0
2 drinks	0.011	0.005	0.03	0.009
3 drinks	0.033	0.024	0.062	0.03
4 drinks	0.055	0.043	0.09	0.052

The Apple Valley Police Department knows that alcohol affects each person differently. We recommend a designated driver any time someone plans to have more than 1-2 drinks. As someone consumes more drinks, they lose inhibitions and the ability to make good decisions like deciding whether or not to drive home. Civil liability can exist even when someone is under the limit of .08. Criminal law states drivers can be arrested for impaired driving any time their alcohol levels reach over .04.