



# Shiloh Estate LLC

SHILOH VINES & WINES KNOWLEDGE BASE SERIES

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## A Winemaking Process

by

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Coordination Draft  
Comments Welcome

### Crop & Wine Yield Estimates

Assume an enterprise dedicated to producing a super-ultra-premium *Bordeaux Blend* from an integrated winegrowing and winemaking operation with the following parameters:

- A 50-acre vineyard with the potential to yield:

Variety	Acres	Yield in Tons
Cabernet Sauvignon	40	172.85 ± 34.57
Cabernet Franc	5	21.61 ± 4.32
Merlot	2.5	10.80 ± 2.16
Malbec	1.25	5.40 ± 1.08
Petit Verdot	1.25	5.40 ± 1.08

- The Cabernet Sauvignon is planted in four 10-acre blocks with the other four cultivars each in a single block—this yields 8 lots that will kept separate until pre-bottling blend decisions are made., Estimates for finished wine are about 14,000 cases @ 150 gallons/ton:

*Wine Estimates for this Block Scenario\**

	Gallons	Barrels	Bottles	Cases
BRC	38,910	648.50	196,381	16,365.1
MLC	32,426	540.43	163,654	13,637.8
WRC	25,941	432.35	130,926	10,910.5

\* 60-gallon barrels, 750 ml bottles, 12-bottle cases

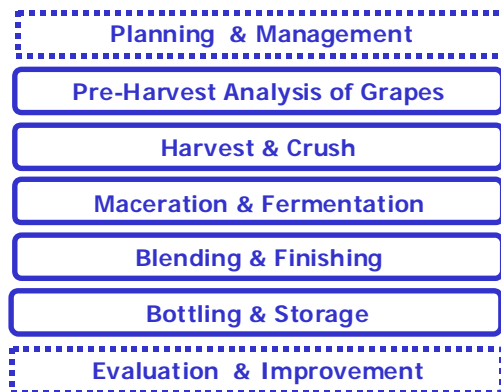
Best-Reasonable, Most-Likely, Worst-Reasonable Case Scenarios

### Top-Down Framework



Any winemaking process should be designed, developed, and operated within a top-down strategic framework that reflects the values and missions, goals and policies, and objectives and strategies of members of the enterprise. The framework is strategic in the sense that the final outcome—e.g., that \$100 bottle of wine—won't be known for several months or even years. *Tomorrow's* results are based on decisions and actions taken *today*.

The winemaking process includes:



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## Plans, Programs, Projects, Tasks

The winemaking process comprises numerous plans, programs, projects, and tasks as suggested by the process flow chart to the right and others on the next two pages. Actions that accomplish productive work are usually considered tasks—for example, *Harvest Grapes for Block i*—that are implemented bottom-up with a top-down framework defined by some sort of strategic management plan. Programs and plans, for example, may include:

- **Total quality control program** designed to help members of the enterprise implement tasks in a way that contributes to quality wine.
- **Continual process improvement program** designed to achieve better results vis-à-vis long-range goals and near-term objectives.
- **Clean-up & sanitation program** designed to minimize spoilage and other negatives at all stages of the entire winemaking process.
- **Protocol** articulated to specify requirements for the winemaking process (e.g., pre-harvest metrics, yeast, nutrients, post-fermentation maceration period, ML bacteria, oak regimen, racking, micro-oxygenation).

Plans and programs can be formal or informal, written or unwritten—so long as they are understood and practiced in day-to-day operations.

## Pre-Harvest Analysis of Grapes

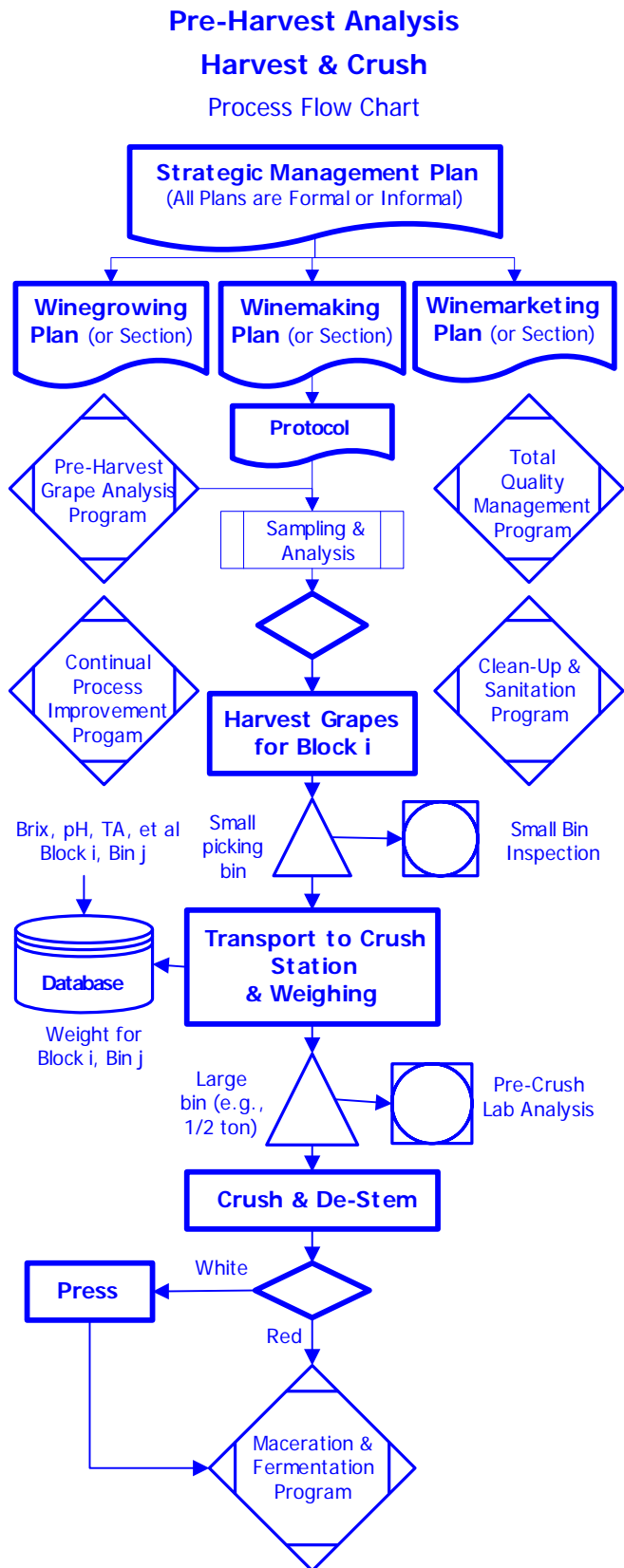
Quality wine derives from quality grapes picked at the right time as determined by the winemaker. The pick decision is influenced by the look and taste of the grapes, by °Brix, titratable acidity, and by other factors such as availability of the harvest crew, availability of the crusher/destemmer.

## Harvest & Crush

The various steps shown to the right are generally followed by many winemaking operations, although for very high quality wines, the grapes are hand-picked early in the morning and transported to the winery in small bins (35 lb lugs up to ¼ ton bins).

Records are usually kept and recorded in notebooks, computer-based databases, or both.

The must for red wine may enter a pre-fermentation maceration stage or enter the fermentation stage (native fermentation or inoculated).



## Maceration & Fermentation

**Inputs**—The Harvest & Crush Program provides eight lots of must that are stored in separate stainless steel storage tanks.

Note that before the actual harvest, there is some uncertainty regarding yields from each block and, therefore, the capacity requirements for the lots as they apply to the various stages of the winemaking process (e.g., fermentation, maceration, barrel storage, bottles).

**Maceration**—A special maceration period can occur before or after alcoholic fermentation or not at all.

**MLF**—Malolactic fermentation can occur during fermentation, immediately following fermentation during maceration, in the barrel, some combination of these three, or not at all.

**Protocol**—The process flow chart to the right, in a highly simplified manner, reflects the following protocol (it applies to each of the eight lots):

1. Approximately 40 ppm SO<sub>2</sub> are applied to the must at crush as soon as the must is pumped (gravity feed is better) into eight tanks (that must be large enough to accommodate fermentation).
2. The must is inoculated 24 hours later with dry Pasteur Red yeast (1 lb/1,000 gallons).
3. Nutrients are added 24 hour later (2 lbs/1,000 gallons Superfood, 2 lbs/1,000 gallons DAP)
4. The fermentation is “hot” but is not allowed to exceed 87 °F.
5. The juice-cum-wine is pumped over twice a day.
6. When the wine is dry, it is cooled, and macerates in closed tanks that that are oxygen free (perhaps a CO<sub>2</sub> or Nitrogen blanket) for 20 days.
7. Viniflora Oenos malolactic bacteria is added at the start of the maceration period (about 25 grams/1,000 gallons).
8. The wine is pumped over once per day.
9. When reducing sugar approaches zero and the malic acid has been replaced by lactic acid, the wine is pressed off of the skins and moved to ¼ new, ¼ one-year, ¼ two-year, ¼ three-year French oak barrels (again, gravity feed is good).

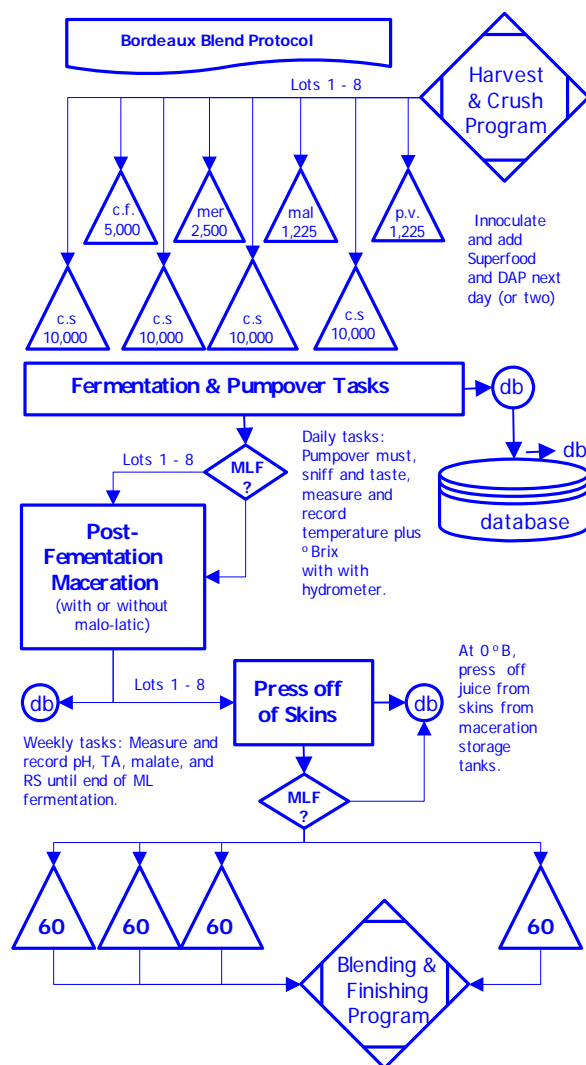
Sanitary conditions are carefully observed during this process. Analytical measurements are taken daily or weekly as appropriate.

## Inputs to and Outputs from Crusher/Destemmer

Cultivated Variety	Crop Yield in Tons	Must Yield in Gallons
Cabernet Sauvignon	172.85± 34.57 (from 40 acres)	9,722± 1,944 (for each of 4 lots)
Cabernet Franc	21.61± 4.32	4,865± 972
Merlot	10.80± 2.16	2,432± 486
Malbec	5.40± 1.08	1,217± 243
Petit Verdot	5.40± 1.08	1,217± 243

## Fermentation & Maceration

### Process Flow Chart



## Blending & Finishing

**Barrel Aging**—As previously noted, from 432 to 648 barrels are required:

	Gallons	Barrels	Bottles	Cases
BRC	38,910	648.50	196,381	16,365.1
MLC	32,426	540.43	163,654	13,637.8
WRC	25,941	432.35	130,926	10,910.5

\* 60-gallon barrels, 750 ml bottles, 12-bottle cases

If it is 600, then 150 new barrels will be required along with 150 one-year-old, 150 two-year-old, and 150 three-year-old barrels. 150 four-year-old barrels would be phased out.

**Racking & Topping**—As MLF has completed, the barrels must be kept topped to avoid oxidation. In addition, the barrels should be racked from time-to-time, say every three months.

**Chemical Adjustments**—SO<sub>2</sub>, say 20-30 ppm of free sulfur, should be maintained. Other chemical adjustments could be needed, for example, addition of tartaric acid to reduce pH or addition of copper to eliminate H<sub>2</sub>S.

**Blending**—For a *Bordeaux Blend*, sensory evaluation, blending trials, and the finalization of the blend are all particularly critical activities.

## Bottling & Storage

**Bottling**—After sufficient aging in barrels, the blended wine is bottled, probably using a fairly high-speed bottling line. Although some producers of high-quality wine use a portable bottling line (e.g., Dominus).

**Storage**—Wine can be stored in the bottle at the winery, at a distribution center, or on consumers' premises so long as it is a temperature-controlled environment.

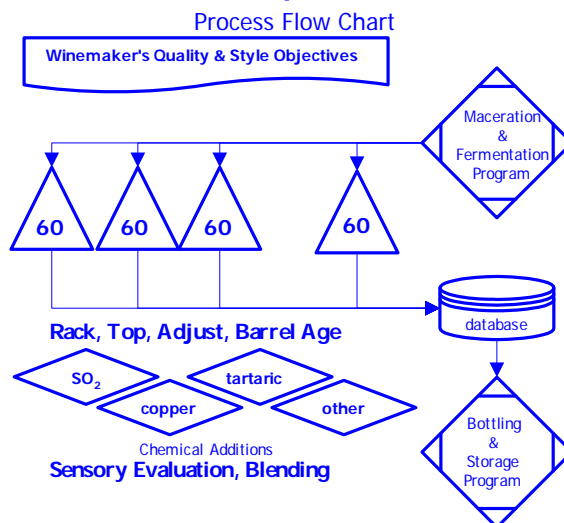
## Closing Remarks

This has been a highly simplified overview of a winemaking process. Possible variations in the winemaking process are endless.

The reader is referred to an excellent article that describes the process used at Robert Mondavi's new winery in Oakville:

Carol Caldwell-Ewart, "Creating a Winery to Match a Vineyard," *Practical Winery & Vineyard* (January/ February 2001)

## Cellar Operations



Cultivated Variety	60-Gallon Barrels	750 mL Bottles	12-Bottle Cases
Cabernet Sauvignon	490 ± 98	148,324 ± 29,678	12,364 ± 2,473
Cabernet Franc	61 ± 12	18,550 ± 3,707	1,545 ± 308
Merlot	30 ± 6	9,275 ± 1,853	772 ± 154
Malbec	15 ± 3	4,642 ± 927	386 ± 77
Petit Verdot	15 ± 3	4,642 ± 927	386 ± 77

## Bottling

