



Napa Sanitation District

Winery Waste Management – Technical Memorandum

October 23, 2009



Prepared by:



Executive Summary

The Napa Sanitation District (NSD) has determined that there are a number of wineries or winery-related businesses within NSD's service area which may have on-site activities that are (1) not compatible with NSD's Pretreatment Program requirements, and/or (2) not within the limits of discharge placed on the property by the quantity of connection units purchased. Additionally, there are a number of wineries that have opted to haul wastes up to sixty miles to out-of-area wastewater treatment facilities.

This Technical Memorandum includes an evaluation of the current and future winery waste activities within the NSD service area and provides some potential management concepts to address increased flows and loads from winery operations.

Wineries, and the production of winery waste generally, have two distinct seasons: vintage and non-vintage. The vintage season is associated with harvesting and pressing grapes and handling grape juice. The non-vintage season is associated with management of the fermentation process. In the Napa Valley, the vintage season generally starts in mid- to late August and ends in late October. The non-vintage season comprises the remainder of the year. Well over half of all winery waste is generated in the two to three month long vintage season. This is the period when on-site treatment systems and local wastewater treatment facilities are most likely to experience overloading and resulting upsets.

Of the 43 identified active wineries or winery-related businesses in NSD's service area, 33 facilities are wineries that crush grapes and ferment the juice; 14 residential (home-based) wineries and nineteen commercial wineries of varying size. Of the remaining ten facilities, seven are tasting rooms or barrel/tank storage facilities that produce varying amounts of wine production wastewater, and three are dry storage facilities which have no wine production wastewater. The forty-three businesses were surveyed either by telephone or by site visits. Eight of the facilities did not respond.

Based on the information collected, eight management concepts were proposed for addressing winery waste management for NSD.

Concept 1, Manage Discharges Through the Existing Industrial Pretreatment Program, is recommended for near term winery discharge management to effectively characterize wastes and appropriately control the wastes discharged from winery operation.

Once all wineries within the NSD service area are regulated, addressing wastes hauled to out-of-County treatment facilities should be given consideration. If sufficient digester capacity is available, Concept 4 (Accepting Trucked Winery Waste for Injection into the Digester) potentially offers the least expensive treatment option for the winery industry. The potential for implementing this concept should be analyzed as an alternative in the ongoing Wastewater Treatment Plant Master Plan.

Introduction and Purpose

The Napa Sanitation District (NSD) has determined that there are a number of wineries or winery-related businesses within the NSD's service area, some of which may have on-site activities that are not compatible with the NSD's Pretreatment Program requirements and/or limits of discharge placed on the property by the quantity of connection units purchased. Additionally, there are a number of wineries that have chosen as their least expensive treatment alternative hauling wastes up to sixty miles to out-of-area wastewater treatment facilities.

As a result, NSD desires to quantify waste loads from winery-related activities located in NSD's service area and to develop treatment and/or disposal alternatives for these wastes. It is desired that these alternatives are beneficial and cost-effective for both NSD and the wineries.

The purpose of this technical memorandum is to describe the current and future winery waste situation in NSD's service area to the extent currently known, to estimate the volume and load of winery waste generated within the service area, and to estimate the potential winery waste-related treatment plant influent flow and loads by month. In addition, potential management options to address these additional flows and loads are presented and their respective advantages and disadvantages are listed in this document.

Seasonality of Winery Waste

The production of wine from grapes is a multi-step process that uses significant amounts of water, about 1,100 gallons per ton of grapes, on average. Actual winery water usage can vary based on the water conservation practices in place at the production facility. In general, newer water conserving cleaning equipment developed in the 1980's and 1990's has reduced water consumption by about 20%. The result is a more concentrated waste stream.

The wine production year has two seasons, vintage and non-vintage. The vintage season is characterized by grape harvesting and grape juice handling and management. Its length varies from 42 to 140 days depending on the variety of grapes and styles of wines produced by the winery. More than half of the annual wastewater flow and load is generated during this period. Activities during the non-vintage season are primarily associated with handling fermented wine and cleaning of winery facilities. In reality, the vintage and non-vintage seasons overlap, and in general, non-vintage season activities increase as vintage season activities taper off. During the non-vintage season, winery wastewater flows are greatest during the late fall and winter months with wastewater flows continuing to decrease during the late spring and early summer months. Activities then increase in late July and August as cleaning and other preparations begin for the upcoming vintage season.

For the purposes of this analysis, the month-by-month percentages of the annual flow and load were estimated and are shown in **Figure 1** on the following page. (*Winery Waste Handbook*, Chapman, et al.) It should be noted that this distribution of wastewater flows is only an approximation. Activities and corresponding flows and loads may vary based on grape sources and production schedules of specific wineries.

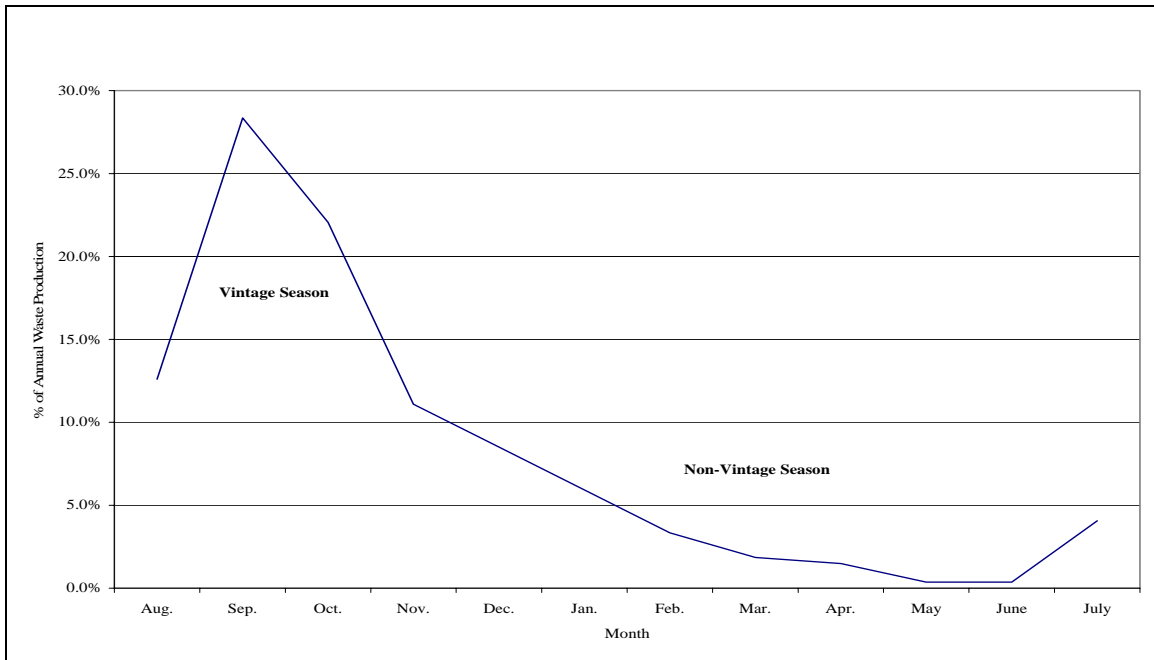


Figure 1. Theoretical Annual Winery Waste Production Percentage by Month

For purposes of this analysis, the vintage season was taken to be 75 days long starting in mid- to late August and constituting 63% of the annual winery wastewater flow and load. The non-vintage season was taken to constitute the remainder of the year. For the purposes of this analysis, 37% of the annual flow and load from wineries was estimated to occur during this 290 day period.

Pollutant Characterization

The biochemical oxygen demand (BOD) and total suspended solids (TSS) of winery wastewater can vary from day-to-day and from winery to winery based on specific activities and equipment in use. For example, if a still is used at the winery to distill alcohol from wines and wine production wastes, stillage (still waste), BOD and TSS can contribute to a doubling or tripling of daily values. Lees, the solids remaining after clarifying wine via settling or centrifugation (consisting of yeast, sediment, bacteria, grape pulp, etc.), can have BOD and TSS concentrations in excess of 100,000 mg/l. (*Survey of Methods of Treating Wine and Grape Wastewater*, Tofflemire)

Winery wastewaters may have relatively small amounts of phosphorous and nitrogen compared to the available BOD. For effective biological treatment of wastes, the desired ratio of organic carbon in the form of BOD (C) to nitrogen (N) to phosphorous (P) for effective wastewater treatment is 100:5:1, C:N:P. Winery wastewater C:N:P ratios as low as 100:1:0.4 have been encountered. (*Long-Term Activated Sludge Treatment of Winery Waste*, Rice) Supplemental sources of nitrogen and phosphorous should be considered when designing and evaluating winery waste only treatment systems.

The pH of winery waste can also vary based on activities occurring at the winery. Generally, the waste is slightly acidic, with a pH of 6.5 to 6.9, but can vary from mildly acidic (5.0 pH) to significantly basic (10.0 pH) during cleaning operations (*Winery Waste Handbook*, Chapman, et al). A summary of winery waste pollutant characteristics is provided in **Table 1**.

Table 1. Winery Wastewater Pollutant Characteristics

Parameter	Units	Winery Waste Characteristics Range During Vintage			Winery Waste Characteristics Range During Non-Vintage		
		Minimum	Average	Maximum	Minimum	Average	Maximum
Flow	% of Total	-	63%	-	-	37%	-
Load Duration	Days	-	75	-	-	290	-
Wastewater Produced	gallons/ton of grapes	1100					
Chlorides	mg/l	10	20	60	20	600	5000
Total Solids	mg/l	146	756	1,250	347	600	1,127
Suspended Solids	mg/l	5	300	660	5	260	720
Volatile Suspended Solids	%	-	38%	-	-	49%	-
Settleable Solids	ml/l	1	4	8	0	1	6
COD	mg/l	386	810	1,412	285	825	2,880
BOD	mg/l	131	1,560	7,200	128	1,440	4,200
pH	s.u.	5.0	-	7.1	5.0	-	10.0
Total Kjeldahl Nitrogen	mg/l	1.0	2.4	5.7	1.2	4.7	12.4
Ammonia as N	mg/l as N	1.5	1.8	4.8	0.8	1.0	3.3
Nitrates	mg/l as N	0.9	1.5	2.3	0.1	0.3	0.5
Total Phosphorous	mg/l as P	0.5	1.2	2.5	0.3	1.0	1.3

Treatment Considerations

In addition to the possibility of nitrogen and/or phosphorus deficiencies and significant variability in pH, BOD, and TSS, winery waste contains some compounds that may provide individual treatment challenges. Tannic acids (substances found in the skin of grapes) and the colloids they form have been implicated in the fouling of ultra filtration membranes. (*Membrane Fouling, Surface Characterization, and Transport Models in Water Treatment Applications*, Shih-Chieh, et al) The ultra-fine bubble diffusers in the Napa Sanitation District activated sludge system experienced fouling and required early replacement at a cost of approximately \$400,000. The diffuser manufacturer estimated the useful life at 12 years; the diffusers were replaced at seven years. While there is no direct proof that tannic acids caused the early replacement, ultra filtration membranes and the ultra fine bubble diffusers are constructed using similar plastics and could be subject to similar chemical fouling.

Chlorides in the wastewater can be relatively high during heavy cleaning cycles. This could impact the agricultural reuse of the treated effluent.

Current and Future Wineries in the NSD Service Area

Information on operating wineries and wineries in the planning/approval stages was compiled from the NSD Pretreatment Program, City of Napa business licenses, and the County of Napa Department of Planning. Future growth projections for the Napa Airport Industrial Area and the Napa Valley Corporate Park were derived from a May 2006 land use study prepared for the Napa County General Plan Update (*Industrial Land Use Study, Keyser Marston Associates, Inc.*).

Operating Wineries in the NSD Service Area

Of the 43 identified active wineries or winery-related businesses in NSD's service area, 33 facilities are wineries that crush grapes and ferment the juice; 14 residential (home-based) wineries and nineteen commercial wineries of varying size. Of the remaining ten facilities, seven are tasting rooms or barrel/tank storage facilities that produce varying amounts of wine production wastewater, and three are dry storage facilities which have no wine production wastewater. The 43 businesses were surveyed either by telephone or by site visits. Eight of the facilities did not respond. The production information obtained from this data collection process is displayed in **Table 2**, starting on the following page.

Future Wineries in the NSD Service Area

Table 3 displays information on wineries that are in the planning approval process as of September 2008 and **Table 4** provides information on future land use projections for the Napa Airport Industrial Area and the Napa Valley Corporate Park.

Table 2. Winery Related Businesses that Produce Winery Wastewaters in the Napa Sanitation District Service Area

Facility	Address	Facility Classification Code*	Pretreatment Permit?	Facility Activity	Discharge to Sanitary Sewer**	Winery Waste Management Practices	Grapes Processed, Tons/Year
Biagi Bros.	660 Airpark Road	1	No	Case Storage Only		Not required	0
Cameron Wine Storage	305 Technology Way	1	Yes	Storage and Trucking Facility	Yes	Pretreatment	0
Dariouish	831 Latour Court	1	No	Dry Storage Only	No	Barrel storage (dry)	0
Folio Wine Company, LLC	610 First St., Suite 9	2	Yes	Tasting Room-Demonstration Winery	Yes	Zero Discharge Permit	0
Fosters Wine Estates	655 Airpark Rd.	2	No	Winery-Bottling Facility	No	Off-hauls waste, investigating future discharge to sanitary sewer	0
Herrera Vineyard Management (Mi Sueno)	910 Enterprise Way, Suite M	2	No	Barrel to Bottling	Yes	No pretreatment	119
Napa Barrel Care	1075 Golden Gate Dr.	2	No	Storage, Racking, Barrel Washing	Yes	No pretreatment	0
Patz and Hall Wine Co./Retail	851 Napa Valley Corporate Way	2	No	Tasting Room-Demonstration Winery	Yes	None	0
Stags Leap Wine Cellars	904 Enterprise Way	2	No	Barrel Storage & Tanks (38,000 gal total)	Yes	No pretreatment	0
Wine Tech	2511 Napa Valley Corporate Drive	2	No	Lees press	No	Off-haul wastes	0
29-12 Winery & Brewery (Napa Smith)	One Executive Way	3	Yes	Winery & Brewery	Yes	Metered, sampled	110

* Facility Classification Codes: 0 = Unknown; 1 = Storage Only; 2 = Wine Handling/Processing; 3 = Commercial Winery; 4 = Home-Based Residential Winery
 ** “Discharge to Sanitary Sewer”, means process wastewater generated from wine production discharged from the facility to the sanitary sewer – wastewater from domestic sources may or may not be discharged from the facility to the sanitary sewer

Facility	Address	Facility Classification Code*	Pretreatment Permit?	Facility Activity	Discharge to Sanitary Sewer**	Winery Waste Management Practices	Grapes Processed, Tons/Year
Barrel Stop or Schutz Winery	210 Camino Oruga	3	Yes	Winery, Barrel to Tank	Yes	Barrel wash, not metered, uses tanks for treatment	143
Bin to Bottle	110 Camino Oruga	3	Yes	Winery, Custom Crush	Yes	Advantex treatment system	2,200
Bourassa Winery	190 Camino Aruga	3	Yes	Winery	No	Off Haul - Zero Discharge Permit	120
Buccella (Kimberton Wines)	860 Kaiser Rd., Apt I	3	No	Winery	Yes	1200 Gallon Interceptor	75
Defectus Winery	908 Enterprise Way	3	No	Winery	Yes	No pretreatment	65
Domaine Napa	33 Harlow Ct.	3	No	Winery	No	Off hauls wastes	30,714
Don Sebastiani & Sons	520 Airpark Road	3	Yes	Winery	Yes	Off haul high strength wastes, a portion is discharged to sanitary sewer	36,697
Falcor Wine Cellar	2511 Napa Valley Corporate Dr.	3	No	Winery	No	Off-hauls waste	110
Global Custom Wine Co. LLC (formerly Black Stallion)	626 California Blvd.	3	No	Winery	No	Wastewater off hauled to 2-3 timer/year	14
Groth Vineyards and Winery	908 Enterprise Way	3	No	Winery, Tank and Barrel Storage and Cleaning	Yes	No pretreatment	917
Gustavo Thrace and Thrace Bromberger	902 Enterprise Way	3	No	Winery	Yes	No pretreatment	40
Jessup Cellars	25 Enterprise Ct.	3	Yes	Winery	Yes	Unknown	214

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Facility	Address	Facility Classification Code*	Pretreatment Permit?	Facility Activity	Discharge to Sanitary Sewer**	Winery Waste Management Practices	Grapes Processed, Tons/Year
Page Wine Cellars	520 California Blvd., Suites 18 and 20	3	No	Winery	Yes	No pretreatment	14
Peju	200 Camino Oruga	3	No	Winery	Yes	Unknown	734
Punk Dog	918 G Enterprise Way	3	No	Winery	No	Off haul wastes when crushing, lees go to Wine Tech	30
Robert Mondavi Barrel / Robert Craig Wine Cellars	880 Vallejo Street	3	No	Winery	Yes	2 septic tanks on site	183
Robert Mondavi Barrel Warehouse	901 Kaiser Road	3	Yes	Crush, Ferment, Barrel	Yes	No treatment, 27,000 to 29,000 barrels	60
Spelleitich Cellars	880 Vallejo Street	3	No	Winery	Yes	No pretreatment	39
Adams Ridge	3181 Kingston Ave.	4	No	Winery	Unknown	Use Stag Leap's facilities	4
Amazon Ranch Winery	3738 Linda Vista Ave.	4	No	Winery	Unknown	8 tons produced off-site	8
Autumn Moon Cellars	3310 Scenic Dr.	4	No	Winery (<480 Gallons/Year)	Unknown	Unknown	3
Bouncristiani Wine Co.	3346 Kensington Circle	4	No	Winery	Unknown	Unknown	Unknown
Brovelli-Bettini	3211 Twin Oaks Drive	4	No	Winery	Unknown	Grapes are handled off site	2
Fotinos Brothers Winery	2762 Pine St.	4	No	Winery	Unknown	Unknown	8
Galleron Signature Wines	759 La Homa Dr.	4	No	Winery	Unknown	Unknown	Unknown
Michael-Scott Wines	2993 Brookwood Dr.	4	No	Winery	Unknown	Unknown	Unknown
Nord Estate Wines	1016 Broadmoor Dr.	4	No	Winery - On site fermentation only. Send out for barrel and bottling	Unknown	Unknown	18

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Facility	Address	Facility Classification Code*	Pretreatment Permit?	Facility Activity	Discharge to Sanitary Sewer**	Winery Waste Management Practices	Grapes Processed, Tons/Year
Portfolio Limited Edition	86 El Nido Drive	4	No	Winery	Unknown	Unknown	2
Sage Way Cellars	49 Sage Way	4	No	Winery	Unknown	Unknown	Unknown
Shining Moon Cellars	553 Patchett St.	4	No	Winery	Unknown	Unknown	Unknown
Tortuga Vineyards	15 Hahnemann Lane	4	No	Winery	Unknown	Unknown	Unknown
Wharton Wines	4435 Solano Avenue	4	No	Winery	Unknown	Unknown	Unknown
Total							72,645

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Table 3. Approved or Pending Approval of Winery-Related Businesses that Produce Winery Wastewaters in the Napa Sanitation District Service Area

Facility	Street Address	Facility Classification Code *	Pretreatment Permit?	Facility Activity	Discharge to Sanitary Sewer**	Winery Waste Management Practices	Grapes Pressed, Tons/Yr
Beringer Wine Estates	Devlin Road	3	No	Winery	Not at this Time	Not Specified	25,714
Bin to Bottle Expansion	S. Kelly Road @ Devlin Road & Hwy 29	2	Yes	Additional bottle/barrel storage	Yes	Advantex Treatment	2,200
Gateway Winery	Technology Way @ Morris Court	3	No	Winery/Distillery	Not at this Time	Not Specified	4,286
Larkin	45 Enterprise Court, Suites 4 & 5	3	No	Winery	Not at this Time	Plans to off-haul wastes	Plan to off-haul waste
Napa Bottling Center	655 Airpark Road	2	No	Wine Bottling	Not at this Time	Not Specified	Not Applicable
Rombauer Vineyards	N. Kelly Road @ Camino Dorado	3	No	Winery	Yes	Aussie Pretreatment	7,143
Safe Harbor Partners	303 Gateway Road	2	No	Wine Storage, 3.2 million gallons of tankage	Yes	pH Control and 2 Settling Tanks	0
Soscol Creek Winery	Soscol Ferry Road	3	No	Winery	Not at this Time	Not Specified	1,429
Wilkinson Winery	110 Camino Oruga	3	No	Winery (Conversion from Brewery)	Not at this Time	Not Specified	2,214
Zapolski Rudd Winery	Devlin Road @ Sheehy Court	3	No	Winery	Not at this Time	Not Specified	857
Total							43,843

* Facility Classification Codes: 0 = Unknown; 1 = Storage Only; 2 = Wine Handling/Processing; 3 = Commercial Winery; 4 = Home-Based Residential Winery
 ** "Discharge to Sanitary Sewer" means process wastewater generated from wine production discharged from the facility to the sanitary sewer – wastewater from domestic sources may or may not be discharged from the facility to the sanitary sewer

Table 4. Winery Related Growth Projections (through 2030) for the Napa Airport Industrial Area and the Napa Valley Corporate Park

	Napa Airport Industrial Area	Napa Valley Corporate Park
Total Available, Acres	2,118	465
Total Built (thru 2005), Acres	1,242	371
Total Remaining, Acres	876	94
Winery or Winery Related Development (1985-2005), Percent	49%	28%
Estimated New Winery or Winery Related Developments (Thru 2030), Acres	429	26
Increase in Winery Related Development Over Existing, Percent	70%	25%

Calculation of Winery Waste Flows and Loads

All basic winery production data were converted into tons of grapes processed using the following conversion factors. Some rounding occurred in these conversions:

One Ton of Red Grapes = 150 Gallons of Red Wine = 62 Cases of Red Wine
One Ton of White Grapes = 115 Gallons of White Wine = 47 Cases of White Wine
One Ton of Generic Grapes = 140 Gallons of Wine = 54.5 Cases of Wine

Using the estimated wastewater production of 1,100 gallons per ton of grapes, wastewater flows from winery facilities were calculated for each month of the year based on the monthly wastewater generation percentages from **Figure 1**. Average wastewater BOD and TSS concentrations, for both the vintage and non-vintage production cycles from **Table 1**, were used to calculate monthly BOD and TSS loading for each reporting winery.

Estimates developed using this approach provide a tool for evaluating possible impacts. Varying harvest schedules, differing water and waste management practices, and different wine production steps performed on and off-site may result in significant variation from the estimated values for individual wineries.

No estimates were made for non-reporting wineries or barrel storage facilities that discharge wine production wastewater.

Active Wineries

Using the approach described above, estimated flows and loads from the 24 reporting wineries were 79.9 million gallons of wine production wastewater per year containing 1 million pounds of BOD and 190,000 pounds of TSS. These values are equivalent to an annual average daily flow of 0.2 million gallons per day (MGD), 2,700 pounds per day of BOD, and 500 pounds per day of TSS, which is equivalent to 3,150 EDUs¹. During peak vintage season, average daily flows could approach 0.8 MGD and daily BOD and TSS loads could be as high as 9,800 pounds per day and 1,900 pounds per day, respectively. Based on these assumptions, the potential peak loading would be approximately 11,250 EDUs.

The actual amount of this estimated flow and load discharged to the NSD sewer system cannot be readily verified at this time. An extensive inspection and sampling program would be required to ascertain the magnitude of the contribution. However, a plot of monthly influent flows and loads to the treatment plant for 2003 through 2007 was compared to the theoretical winery waste production curve, as shown in **Figure 2**. No correlation was observed. The lack of correlation may indicate that much of the flow and load is not currently discharged to NSD.

¹ One EDU (“Equivalent Dwelling Unit”) is the wastewater discharged from a single-family residence, and is assumed to be 210 gallons per day with a BOD of 175 mg/L and TSS of 200 mg/L.

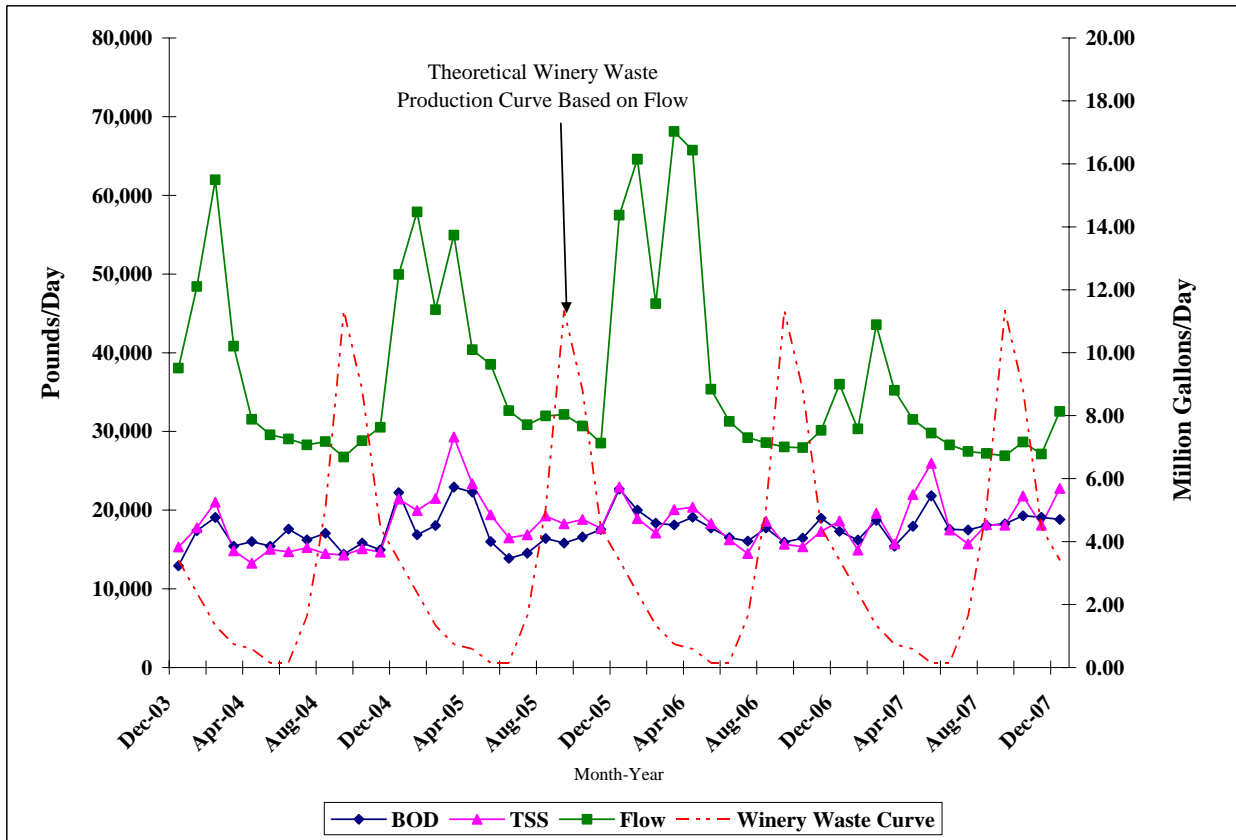


Figure 2. NSD 2003-2007 Monthly Average Headworks Flow and Load Compared to Theoretical Winery Waste Flow Based Production Curve

Future Wineries

Estimated production data from ten approved or proposed winery facilities within the NSD service area were also analyzed. When operating, these facilities will increase the total potential winery wastewater loading by about 25%, which will annually add about 46 million gallons of wastewater (average of 0.12 mgd), 580,000 pounds of BOD (average of 1,560 lbs/day), and 100,000 pounds of TSS (average of 294 lbs/day), which is equivalent to 1,768 EDUs.

Estimates of existing flows and loads for winery waste are shown in **Table 5**. Estimates of future flows and loads are shown in **Table 6**.

Table 5a. Existing Wineries -- Estimated Production-Based Winery Waste – Flow*

Reporting Wineries	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Total
	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons
29-12 Winery & Brewery	7,163	4,029	2,239	1,791	448	448	4,925	15,246	34,304	26,681	13,431	10,297	121,000
Adams Ridge	239	134	75	60	15	15	164	509	1,144	890	448	344	4,037
Amazon Ranch Winery	521	293	163	130	33	33	358	1,109	2,495	1,940	977	749	8,800
Autumn Moon Cellars	223	126	70	56	14	14	154	475	1,069	832	419	321	3,772
Barrel Stop-Schutz Winery	9,312	5,238	2,910	2,328	582	582	6,402	19,820	44,595	34,685	17,460	13,386	157,300
Bin to Bottle	143,264	80,586	44,770	35,816	8,954	8,954	98,494	304,920	686,070	533,610	268,620	205,942	2,420,000
Bourassa Winery	7,814	4,396	2,442	1,954	488	488	5,372	16,632	37,422	29,106	14,652	11,233	132,000
Brovelli-Bettini	130	73	41	33	8	8	90	277	624	485	244	187	2,200
Buccella (Kimberton Wines)	4,884	2,747	1,526	1,221	305	305	3,358	10,395	23,389	18,191	9,158	7,021	82,500
Delectus Winery	4,233	2,381	1,323	1,058	265	265	2,910	9,009	20,270	15,766	7,937	6,085	71,500
Domaine Napa	2,000,114	1,125,064	625,036	500,029	125,007	125,007	1,375,079	4,257,000	9,578,250	7,449,750	3,750,214	2,875,164	33,785,715
Don Sebastiani & Sons	2,389,725	1,344,220	746,789	597,431	149,358	149,358	1,642,936	5,086,239	11,444,037	8,900,918	4,480,734	3,435,229	40,366,973
Falcor Wine Cellars	7,169	4,033	2,240	1,792	448	448	4,929	15,259	34,332	26,703	13,442	10,306	121,101
Fotino Brothers	521	293	163	130	33	33	358	1,109	2,495	1,940	977	749	8,800
Global Custom Wine	888	499	277	222	55	55	610	1,890	4,252	3,307	1,665	1,276	15,000
Groth Vineyards and Winery	59,743	33,605	18,670	14,936	3,734	3,734	41,073	127,156	286,101	222,523	112,018	85,881	1,009,174

* Varying harvest schedules, differing water and waste management practices, and different wine production steps performed on and off-site may result in significant variation from the estimated values for individual wineries. Values less than 1 are reported as “—”.

Table 5a. Existing Wineries -- Estimated Production-Based Winery Waste – Flow*

Reporting Wineries	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Total
	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons
Gustavo Thrace-Bromberger	2,605	1,465	814	651	163	163	1,791	5,544	12,474	9,702	4,884	3,744	44,000
Herrera Vineyard Mgmt	7,767	4,369	2,427	1,942	485	485	5,340	16,530	37,193	28,928	14,562	11,164	131,193
Jessup Cellars	13,954	7,849	4,361	3,489	872	872	9,594	29,700	66,825	51,975	26,164	20,059	235,715
Nord Estate Wines	1,195	672	373	299	75	75	821	2,543	5,722	4,451	2,240	1,718	20,184
Page Wine Cellars	930	523	291	233	58	58	640	1,980	4,455	3,465	1,744	1,337	15,715
Peju Portfolio Limited Edition	47,794	26,884	14,936	11,949	2,987	2,987	32,859	101,725	228,881	178,018	89,615	68,705	807,340
Punk Dog	117	66	37	29	7	7	81	249	561	437	220	168	1,980
Robert Craig Wine Cellars	1,954	1,099	611	488	122	122	1,343	4,158	9,356	7,277	3,663	2,808	33,000
Robert Mondavi Barrel	11,949	6,721	3,734	2,987	747	747	8,215	25,431	57,220	44,505	22,404	17,176	201,835
Robert Mondavi Barrel	3,907	2,198	1,221	977	244	244	2,686	8,316	18,711	14,553	7,326	5,617	66,000
Spelletich Cellars	2,540	1,429	794	635	159	159	1,746	5,405	12,162	9,459	4,762	3,651	42,900
Total	4,730,656	2,660,994	1,478,330	1,182,664	295,666	295,666	3,252,326	10,068,626	22,654,409	17,620,096	8,869,980	6,800,318	79,909,731

* Varying harvest schedules, differing water and waste management practices, and different wine production steps performed on and off-site may result in significant variation from the estimated values for individual wineries. Values less than 1 are reported as “—”.

Table 5b. Existing Wineries -- Estimated Production-Based Winery Waste – Biochemical Oxygen Demand (BOD)*

Reporting Wineries	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Total
	lbs of BOD	lbs of BOD	lbs of BOD	lbs of BOD	lbs of BOD	lbs of BOD	lbs of BOD	lbs of BOD	lbs of BOD	lbs of BOD	lbs of BOD	lbs of BOD	lbs of BOD
29-12 Winery & Brewery	86	48	27	22	5	5	59	198	446	347	161	124	1,529
Adams Ridge	3	2	1	1	--	--	2	7	15	12	5	4	51
Amazon Ranch Winery	6	4	2	2	--	--	4	14	32	25	12	9	111
Autumn Moon Cellars	3	2	1	1	--	--	2	6	14	11	5	4	48
Barrel Stop-Schutz Winery	112	63	35	28	7	7	77	258	580	451	210	161	1,988
Bin to Bottle	1,721	968	538	430	108	108	1,183	3,967	8,926	6,942	3,226	2,473	30,589
Bourassa Winery	94	53	29	23	6	6	65	216	487	379	176	135	1,668
Brovelli-Bettini	2	1	--	--	--	--	1	4	8	6	3	2	28
Buccella (Kimberton Wines)	59	33	18	15	4	4	40	135	304	237	110	84	1,043
Delectus Winery	51	29	16	13	3	3	35	117	264	205	95	73	904
Domaine Napa	24,021	13,512	7,506	6,005	1,501	1,501	16,514	55,385	124,617	96,924	45,039	34,530	427,055
Don Sebastiani & Sons	28,700	16,144	8,969	7,175	1,794	1,794	19,731	66,174	148,891	115,804	53,812	41,256	510,243
Falcor Wine Cellars	86	48	27	22	5	5	59	199	447	347	161	124	1,531
Fotino Brothers	6	4	2	2	--	--	--	14	32	25	12	9	111
Global Custom Wine Co.	11	6	3	3	1	1	7	25	55	43	20	15	190
Groth Vineyards and Winery	717	404	224	179	45	45	493	1,654	3,722	2,895	1,345	1,031	12,756
Gustavo Thrace-Bromberger	31	18	10	8	2	2	22	72	162	126	59	45	556
Herrera Vineyard Mgmt	93	52	29	23	6	6	64	215	484	376	175	134	1,658
Jessup Cellars	168	94	52	42	10	10	115	386	869	676	314	241	2,979
Nord Estate Wines	14	8	4	4	1	1	10	33	74	58	27	21	255
Page Wine Cellars	11	6	3	3	1	1	8	26	58	45	21	16	199
Peju	574	323	179	143	36	36	395	1,323	2,978	2,316	1,076	825	10,205
Portfolio Limited Edition	1	1	--	--	--	--	1	3	7	6	3	2	25
Punk Dog	23	13	7	6	1	1	16	54	122	95	44	34	417
Robert Craig Wine Cellars	143	81	45	36	9	9	99	331	744	579	269	206	2,551
Robert Mondavi Barrel	47	26	15	12	3	3	32	108	243	189	88	67	834
Spelletich Cellars	31	17	10	8	2	2	21	70	158	123	57	44	542
Total	56,813	31,957	17,754	14,203	3,551	3,551	39,059	130,997	294,743	229,244	106,525	81,669	1,010,067

* Varying harvest schedules, differing water and waste management practices, and different wine production steps performed on and off-site may result in significant variation from the estimated values for individual wineries. Values less than 1 are reported as "--".

Table 5c. Existing Wineries -- Estimated Production-Based Winery Waste – Total Suspended Solids (TSS)*

Reporting Wineries	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Total
	lbs of TSS	lbs of TSS	lbs of TSS	lbs of TSS	lbs of TSS	lbs of TSS	lbs of TSS	lbs of TSS	lbs of TSS	lbs of TSS	lbs of TSS	lbs of TSS	lbs of TSS
29-12 Winery & Brewery	16	9	5	4	1	1	11	38	86	67	29	22	288
Adams Ridge	1	--	--	--	--	--	--	1	3	2	1	1	10
Amazon Ranch Winery	1	1	--	--	--	--	1	3	6	5	2	2	21
Autumn Moon Cellars	--	--	--	--	--	--	--	1	3	2	1	1	9
Barrel Stop-Schutz Winery	20	11	6	5	1	1	14	50	112	87	38	29	374
Bin to Bottle	311	175	97	78	19	19	214	763	1,717	1,335	582	447	5,756
Bourassa Winery	17	10	5	4	1	1	12	42	94	73	32	24	314
Brovelli-Bettini	--	--	--	--	--	--	--	1	2	1	1	--	5
Buccella (Kimberton Wines)	11	6	3	3	1	1	7	26	59	46	20	15	196
Delectus Winery	9	5	3	2	1	1	6	23	51	39	17	13	170
Domaine Napa	4,337	2,440	1,355	1,084	271	271	2,982	10,651	23,965	18,639	8,132	6,235	80,362
Don Sebastiani & Sons	5,182	2,915	1,619	1,295	324	324	3,563	12,726	28,633	22,270	9,716	7,449	96,016
Falcor Wine Cellars	16	9	5	4	1	1	11	38	86	67	29	22	288
Fotino Brothers	1	1	--	--	--	--	1	3	6	5	2	2	21
Global Custom Wine Co.	2	1	1	--	--	--	1	5	11	8	4	3	36
Groth Vineyards and Winery	130	73	40	32	8	8	89	318	716	557	243	186	2,400
Gustavo Thrace-Bromberger	6	3	2	1	--	--	4	14	31	24	11	8	105
Herrera Vineyard Mgmt	17	9	5	4	1	1	12	41	93	72	32	24	312
Jessup Cellars	30	17	9	8	2	2	21	74	167	130	57	43	561
Nord Estate Wines	3	1	1	1	--	--	2	6	14	11	5	4	48
Page Wine Cellars	2	1	1	1	--	--	1	5	11	9	4	3	37
Peju	104	58	32	26	6	6	71	255	573	445	194	149	1,920
Portfolio Limited Edition	--	--	--	--	--	--	--	1	1	1	--	--	5
Punk Dog	4	2	1	1	--	--	3	10	23	18	8	6	78
Robert Craig Wine Cellars	26	15	8	6	2	2	18	64	143	111	49	37	480
Robert Mondavi Barrel	8	5	3	2	1	1	6	21	47	36	16	12	157
Spelletich Cellars	6	3	2	1	--	--	4	14	30	24	10	8	102
Reporting Total	10,258	5,770	3,206	2,564	641	641	7,052	25,192	56,681	44,085	19,234	14,746	190,071

* Varying harvest schedules, differing water and waste management practices, and different wine production steps performed on and off-site may result in significant variation from the estimated values for individual wineries. Values less than 1 are reported as "--".

Table 6a. Future Wineries (as of Sept. 2008) -- Estimated Production-Based Winery Waste – Flow

FLOW	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Total
Winery	Gal. (X000)	Gal. (X000)	Gal. (X000)	Gal. (X000)	Gal. (X000)	Gal. (X000)	Gal. (X000)	Gal. (X000)	Gal. (X000)	Gal. (X000)	Gal. (X000)	Gal. (X000)	Gal. (X000)
Beringer Wine Estates	1,674	942	523	419	105	105	1,151	3,564	8,019	6,237	3,140	2,407	28,285
Bin to Bottle Expansion	143	81	45	36	9	9	98	305	686	534	269	206	2,420
Gateway Winery	279	157	87	70	17	17	192	594	1,337	1,040	523	401	4,715
Rombauer Vineyards	465	262	145	116	29	29	320	990	2,228	1,733	872	669	7,857
Soscol Creek Winery	93	52	29	23	6	6	64	198	446	347	174	134	1,572
Wilkinson Winery	144	81	45	36	9	9	99	307	690	537	270	207	2,435
Zapolski Rudd Winery	56	31	17	14	3	3	38	119	267	208	105	80	943
Total	2,855	1,606	892	714	178	178	1,963	6,077	13,672	10,634	5,353	4,104	48,227

Table 6b. Future Wineries (as of Sept. 2008) -- Estimated Production-Based Winery Waste – BOD

BOD	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Total
Winery	lbs of BOD	lbs of BOD	lbs of BOD	lbs of BOD	lbs of BOD	lbs of BOD	lbs of BOD	lbs of BOD	lbs of BOD	lbs of BOD	lbs of BOD	lbs of BOD	lbs of BOD
Beringer Wine Estates	20,110	11,312	6,284	5,028	1,257	1,257	13,826	46,369	104,329	81,145	37,706	28,908	357,530
Bin to Bottle Expansion	1,721	968	538	430	108	108	1,183	3,967	8,926	6,942	3,226	2,473	59,593
Gateway Winery	3,352	1,885	1,047	838	209	209	2,304	7,729	17,390	13,525	6,285	4,818	1,988
Rombauer Vineyards	5,586	3,142	1,746	1,397	349	349	3,841	12,881	28,981	22,541	10,474	8,030	19,869
Soscol Creek Winery	1,118	629	349	279	70	70	768	2,577	5,798	4,509	2,095	1,607	30,784
Wilkinson Winery	1,731	974	541	433	108	108	1,190	3,992	8,983	6,987	3,247	2,489	11,916
Zapolski Rudd Winery	670	377	209	168	42	42	461	1,545	3,477	2,704	1,257	963	99,317
Total	34,288	19,287	10,715	8,572	2,143	2,143	23,573	79,060	177,884	138,354	64,290	49,289	580,997

Table 6c. Future Wineries (as of Sept. 2008) -- Estimated Production-Based Winery Waste – TSS

TSS Winery	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Total
	lbs of TSS	lbs of TSS	lbs of TSS	lbs of TSS	lbs of TSS	lbs of TSS	lbs of TSS	lbs of TSS	lbs of TSS	lbs of TSS	lbs of TSS	lbs of TSS	lbs of TSS
Beringer Wine Estates	3,631	2,042	1,135	908	227	227	2,496	8,917	20,063	15,605	6,808	5,220	67,279
Bin to Bottle Expansion	311	175	97	78	19	19	214	763	1,717	1,335	582	447	5,756
Gateway Winery	605	340	189	151	38	38	416	1,486	3,344	2,601	1,135	870	11,214
Rombauer Vineyards	1,009	567	315	252	63	63	693	2,477	5,573	4,335	1,891	1,450	18,689
Soscol Creek Winery	202	114	63	50	13	13	139	496	1,115	867	378	290	3,739
Wilkinson Winery	313	176	98	78	20	20	215	768	1,727	1,344	586	449	5,793
Zapolski Rudd Winery	121	68	38	30	8	8	83	297	669	520	227	174	2,242
Total	6,191	3,482	1,935	1,548	387	387	4,256	15,204	34,208	26,607	11,608	8,899	114,712

Management Concepts

In addition to addressing financial and engineering constraints, effective management options for treatment of winery wastewater must address three waste characteristics:

- Seasonal and daily flow/load variability
- Potential nutrient deficiencies
- Variable pH and dissolved ion concentrations

Management concepts were developed to elicit thought and discussion, and are described and discussed on the following pages. Following the narrative, the various impacts associated with each concept are summarized in **Table 7**.

Concept 1 – Manage Discharges through the Existing Industrial Pretreatment Program (Status Quo Option)

A portion of the existing wineries is regulated by the NSD Industrial Pretreatment Program (IPP). The remaining wineries are not fully regulated. Wineries that discharge to NSD should be brought under IPP regulation at a level commensurate with the size and potential risk to the NSD treatment facilities. Continuing this approach and including additional wineries may require increasing the monitoring and inspections by the Industrial Pretreatment Program to ensure the proper regulation of those wineries that discharge a minimum volume of winery wastes, to ensure that discharging wineries are not exceeding their purchased capacity, and, when exceedances occur, to ensure that wineries pay appropriate surcharges. “Residential wineries” whose volume is below the level that could significantly impact District facilities would be required to adopt Best Management Practices in lieu of being issued industrial discharge permits.

Pros:

- Responsibility for compliance with discharge limitations would rest with the winery. The installation of capital facilities would not be based on an NSD mandate.
- Monies from wineries required to purchase additional capacity would fund any treatment plant improvements necessary to treat winery waste.

Cons:

- Wineries would be held more accountable for their discharges. This level of regulation may create dissatisfaction among some wineries.
- Some level of capital investment by some wineries may be necessary to meet discharge limitations.
- The NSD IPP may require expansion to effectively regulate all wineries that are connected to the NSD sewer system.

Concept 2 – Segregate Winery Wastewater and Treat Separately in Oxidation Pond(s)

NSD has a total of about 650 million gallons of storage capacity in the four oxidation ponds. If about 25% of this capacity (160 million gallons at maximum pond depth) were available to treat segregated winery wastewater, effective treatment could be achieved although supplementary oxygen sources would probably be required during the peak vintage season.

Pros:

- The separation of winery wastewater would protect the activated sludge process from possible winery wastewater impacts.

Cons:

- The segregated winery wastewater treatment pond would require careful management and control during peak vintage season to avoid nuisance impacts to the surrounding lands.
- Dividing the oxidation ponds would result in a permanent loss of oxidation pond treatment and storage capacity for non-winery wastewaters.
- Segregating the winery wastewater would require a substantial investment either in a separate winery wastewater collection system or in waste hauling equipment and receiving facilities.
- Sewer system nuisance odors would be possible if the wastewater is discharged to a segregated collection system. This approach may require special consideration during system design.
- The treatment plant and pond system would require a moderate amount of new equipment and modifications to segregate and treat the wastewater.

Concept 3 – Segregate Winery Wastewater, Treat Lower Strength Wastewater in Oxidation Pond and Treat High Strength Wastewater in Anaerobic Digester

As in Concept 2, about 25% of the oxidation pond capacity would be used to treat segregated winery wastewater. Lower strength wastewaters would be treated in the oxidation pond. Higher strength wastewaters (no less than 20,000 mg/l BOD) would be injected into the anaerobic digester. Since the plant currently has only one digester, a complete understanding of available digester capacity would be required to ensure the avoidance of digester upsets as a result of sudden loading increases.

Pros:

- Separation of high strength wastes and discharge of these wastes to the anaerobic digester would reduce organic loading to the segregated oxidation pond.
- Increased organic loading to the anaerobic digester would enhance methane gas production and energy generation.

Cons:

- Seasonal increases (vintage season) in organic loading to the anaerobic digester would increase the chance of digester upset.
- Dividing the oxidation ponds would result in a permanent loss of oxidation pond treatment and storage capacity for non-winery wastewaters.
- Segregating the winery wastewater would require a substantial investment either in a separate winery wastewater collection system or in waste hauling equipment and receiving facilities.
- Sewer system nuisance odors would be possible if the wastewater is discharged to a segregated collection system. This may require special consideration during system design.
- The treatment plant and pond system would require a moderate amount of new equipment and modifications to segregate and treat the wastewater.

- There would be moderate capital costs associated with installation of storage tanks and pumping facilities for digester injection of trucked high strength wastes.

Concept 4 – Segregate and Truck High Strength Waste for Direct Injection into the Anaerobic Digester – Lower Strength Wastes Discharged to the Sanitary Sewer System

Discharge low strength winery wastewaters to the sanitary sewer system. Collect and truck all winery wastes with BOD concentrations in excess of 20,000 mg/l to NSD’s water recycling plant to be mixed with grease and directly injected into the anaerobic digester.

Pros:

- Increased organic loading to the anaerobic digester would enhance methane gas production and energy generation.
- The high strength wastes would not directly impact the activated sludge system reducing the possibility of organic overload.
- The lower strength winery wastewaters would be managed as any other industrial wastewater received through the headworks.
- Blending the high strength winery wastewater with grease would resolve issues with winery waste nutrient deficiencies.
- Accepting high strength wastes at the NSD facility would provide an alternative local treatment option to wineries hauling wastes to out-of-county treatment facilities.

Cons:

- Seasonal increases (vintage season) in organic loading to the anaerobic digester would increase the chance of digester upset due to organic overload.
- The additional high strength winery wastes during the vintage season may seasonally change the anaerobic digester microorganism mix resulting in impacts to process performance and stability.
- Some wineries may incur significant costs to segregate and haul high strength wastes to the Soscol facility.
- There would be moderate capital costs associated with installation of storage tanks and pumping facilities for digester injection of trucked high strength wastes.
- The wineries would require special monitoring by NSD’s Industrial Pretreatment Program during the vintage season to ensure that high strength wastes are properly segregated to avoid organic overload in the activated sludge system and/or excess low strength waste pumped into the anaerobic digester.
- The change in anaerobic digester feed sludge may impact sludge dewaterability.

Concept 5 – Require Individual On-Site Treatment Systems as a Condition of Sanitary Sewer Discharge.

As part of regulation by NSD’s Industrial Pretreatment Program (IPP), require all wineries to install and properly operate individual on-site treatment systems as a condition of discharge to the NSD sanitary sewer system.

Pros:

- Pretreatment would reduce overall BOD and TSS loading from winery production operations to the NSD facility.
- Regulation by the IPP would result in the identification and control of all winery related connections to the NSD sanitary sewer system. It also ensures that the appropriate sewer system connection fees and sewer service charges are paid to NSD.

Cons:

- Wineries would be held more accountable for their discharges. This level of regulation would likely create dissatisfaction among some wineries.
- To purchase, install, and operate a pretreatment system would require significant capital investment and long term operation and maintenance expenditure by many affected wineries (some already have these systems in place).
- The NSD IPP may require expansion to effectively regulate all wineries that are connected to the NSD sewer system. This expansion would likely be at least partially self-funding based on collection of sewer service fees not currently being paid.
- Requiring on-site treatment systems for all wineries connected to NSD's sanitary sewer system may require revisions to the NSD sewer discharge ordinance.

Concept 6 – Encourage/Require Localized Group Treatment Systems.

Encourage wineries within close proximity to construct and operate a cooperative pretreatment system. This would likely be an adjunct to Concept 6 by requiring either an individual treatment system or a group treatment system as a condition of discharge to the NSD sanitary sewer system. Pros and cons are essentially identical to Concept 5.

Concept 7 – On-site Treatment or Group Treatment Systems with Hauled Seasonal High Strength Waste Injected into the Anaerobic Digester.

Require installation of on-site treatment systems and/or localized group pretreatment systems (Concepts 6 and/or 7), regulate the discharges through the NSD IPP, and provide for blending of hauled high strength wastes with grease and direct injection into the anaerobic digester. Since the plant currently has only one digester, a complete understanding of available digester capacity would be required to ensure the avoidance of digester upsets as a result of sudden loading increases.

Pros:

- Hauling the seasonal high strength wastes would reduce costs associated with over-sizing treatment systems to address peak loading periods.
- Pretreatment would reduce overall BOD and TSS loading from winery production operations to the NSD facility.
- Regulation by the IPP would result in the identification and control of all winery related connections to the NSD sanitary sewer system. It would also ensure that the appropriate sewer system connection fees and sewer service charges are paid to NSD.

- Increased digester gas production would result in a corresponding increase in energy production.
- Blending the high strength winery wastewater with grease would resolve issues with winery waste nutrient deficiencies.
- Accepting high strength wastes at the NSD facility would provide an alternative local treatment option to wineries hauling wastes to out-of-county treatment facilities.

Cons:

- Wineries would be held more accountable for their discharges. This level of regulation would likely to create dissatisfaction among some wineries.
- To purchase, install, and operate a pretreatment system would require significant capital investment and long term operation and maintenance expenditure by many affected wineries (some already have these systems in place).
- The NSD IPP may require expansion to effectively regulate all wineries that are connected to the NSD sewer system. This expansion would likely be at least partially self-funding based on collection of sewer service fees not currently being paid.
- Requiring on-site treatment systems for all wineries connected to NSD's sanitary sewer system may require revisions to the NSD sewer discharge ordinance.
- There would be moderate capital costs associated with installation of storage tanks and pumping facilities for digester injection of trucked high strength wastes.
- The wineries would require special monitoring by NSD's Industrial Pretreatment Program during the vintage season to ensure that high strength wastes are properly segregated to avoid organic overload in the activated sludge system or excess low strength waste pumped into the anaerobic digester.
- The change in anaerobic digester feed sludge may impact sludge dewaterability.
- Seasonal increases (vintage season) in organic loading to the anaerobic digester would increase the chance of digester upset due to organic overload.
- The additional high strength winery wastes during the vintage season may seasonally change the anaerobic digester microorganism mix resulting in impacts to process performance and stability.

Concept 8 – Charge Wineries by the Truck Load Based on Volume and Loading

Trucked winery wastewater would be discharged at the NSD treatment facility and the winery would be charged based on the volume of the discharge and the calculated BOD and TSS loading.

Pros:

- NSD would directly control the quantity of waste discharged to the treatment facility.
- NSD would collect revenue on all winery waste discharged.

Cons:

- The wineries would incur expense and inconvenience hauling all wastes to the treatment facility.
- Sampling, monitoring, and analyzing each truck load would require additional staff time.
- Controls would be required to ensure that treatment capacity is not overwhelmed by the high volume of waste during seasonal peaks. Alternative disposal options and/or sites are required for times when treatment facility capacity limits are reached to ensure continued smooth wine production operations.
- Truck-based waste delivery would increase the risk of illegal dumping to NSD's sanitary sewer system.

Table 7. Management Concept Evaluation Summary

Management Concepts	Capital Cost to NSD	O & M Cost to NSD	Nuisance Risk to NSD	Regulatory Risks or Limitations	NSD Space Requirements	Cost/Impact to Winery Customers
Concept 1 – Manage Discharges through the Existing Industrial Pretreatment Program (Status Quo Option)	Low	Low	Low	Low	Low	Medium
Concept 2 – Segregate Winery Wastewater and Treat Separately in Oxidation Pond(s)	High (2)	Medium	High (1)	Medium	Medium	Low
Concept 3 – Segregate Winery Wastewater, Treat Lower Strength Wastewater in Oxidation Pond and Treat High Strength Wastewater in Anaerobic Digester	High (2)	Medium	Medium	Medium	Medium	Medium
Concept 4 – Segregate and Truck High Strength Waste for Direct Injection into the Anaerobic Digester – Lower Strength Wastes Discharged to the Sanitary Sewer System	Medium	Medium	Medium	Medium	Medium	Medium
Concept 5 – Require Individual On-Site Treatment Systems as a Condition of Sanitary Sewer Discharge.	Low	Medium	Low	Low	Low	High (3)
Concept 6 – Encourage/Require Localized Group Treatment Systems.	Low	Medium	Low	Low	Low	High (3)
Concept 7 – On-site Treatment or Group Treatment Systems with Hauled Seasonal High Strength Waste Injected into the Anaerobic Digester.	Medium	Medium	Low	Low	Medium	High (3)
Concept 8 – Charge Wineries by the Truck Load Based on Volume and Loading	Low	High (4)	Medium	Medium	Low	High (5)

Table 7 Footnotes:

- (1) Risk of odors from oxidation ponds.
- (2) High cost of installing a segregated collection system for winery waste.
- (3) High cost of installing and operating a pretreatment system.
- (4) High cost of managing truck waste program including sampling, analysis, billing, inspection, and enforcement.
- (5) High cost of trucking all wastes and managing production to ensure waste volume does not outstrip hauling and disposal capacity.

Recommendations

Treatment of winery wastewater provides both opportunities and risks. Serving the local wineries with treatment services supports Napa County's major industry in a positive, proactive manner. It also provides an opportunity for NSD to increase its revenue stream through collection of service fees for these treatment services. However, treating additional winery wastes carries with it the inherent risks of process upsets, nuisance odors, and NPDES permit violations.

Concept 1 – Manage Discharges through the Existing Industrial Pretreatment Program – is a logical first step in identifying the magnitude of the current winery wastewater load to the NSD treatment facility. An effective pretreatment program to closely monitor winery activities, ensure treatment plant protection, and mandate appropriate management of wastes is key to a successful winery waste management program.

Once the current wineries are regulated and their discharges characterized, the logical second step is to address trucked wastes currently off-hauled to out-of-County treatment facilities. If sufficient treatment capacity is available, direct injection of high strength wastes into the anaerobic digester (i.e. Concept 4) would benefit local wineries, increase NSD's energy production through increased methane production, and provide an additional revenue stream to NSD that is currently lost to out-of-County facilities.

Implementation of an expanded winery waste treatment concept (i.e. Concepts 2, 3, 4, 7 and 8) beyond the existing practices (i.e. Concept 1) should be analyzed and validated as part of the Wastewater Treatment Plant Master Plan.

References

- Chapman, J., P. Baker, S. Wills, *Winery Wastewater Handbook*, Winetitles, Adelaide, SA (2001)
- Keyser Marston Associates, Inc., Industrial Land Use Study – Napa County General Plan Update – Draft, May 2006
- Rice, A. C., Long-Term Activated Sludge Treatment of Winery Waste Waters, *American Journal of Enology and Viticulture*, 29(3):177-180 (1978).
- Shih-Chieh, T., V. Ravindran, S Wonho, M. Pirbazari, Membrane Fouling, Surface Characterization, and Transport Models in Water Treatment Applications, Paper Presented at the 2007 Annual Meeting of the American Institute of Chemical Engineers
- Tofflemire, T.J., Survey of Methods of Treating Wine and Grape Wastewater, *American Journal of Enology and Viticulture*, 23(11):165-172 (1972).
- Web Source: <http://stason.org/TULARC/crafts/wine-making-tips/48-What-Amount-Of-Grapes-Should-Be-Used.html>