Compliance Assessment and Feasibility Analysis

Based on the simulation results, the available water quality data are used in this section to assess NPDES permit compliance—the Yountville WWRF's ability to meet water quality-based effluent limits. Compliance with SIP conditions is then assessed with respect to that information and other knowledge of the mixing zone in the Napa River.

DILUTION CREDIT AND RESULTING WQBELS

Yountville proposes to set effluent limits based on dilution credits for Outfall E-1. Discharges would be limited to minimum actual river-to-effluent flow ratio of 40:1, higher than the 25:1 minimum required by the current permit. A dilution credit of D=12 will provide compliance with final WQBELs for all pollutants.

CUMMULATIVE EFFECTS OF ALL NPDES DISCHARGERS

Upstream of Yountville's Outfall E-1, St. Helena and Calistoga wastewater treatment plants also have NPDES permits to discharge effluent into the Napa River. Relevant discharge conditions are the following:

- St. Helena is allowed a 10:1 dilution credit but must achieve an actual river-to-effluent flow ratio of 25:1. From 1997 – 2004 the volume of effluent actually discharged to the Napa River ranged from 46 to 181 million gallons per year.
- Calistoga is allowed to discharge effluent to the Napa River only when the river-to-effluent flow ratio is at least 10:1 for Outfall 001 and 50:1 for Outfall 002. Discharges in water years 2001-2006 averaged 142 million gallons per year.

Table 7 provides river-to-effluent flow ratio (X:1 means river:effluent) scenarios for all three upper Napa River dischargers, based on the discharge volume of river water downstream of Yountville and at the City of Napa. A reasonable approach for determining the proportional flow at each outfall location is by computing a flow based on the watershed area tributary to each outfall. Based on the location of each plant, the areas of land draining to each outfall and to the City of Napa are approximately:

- Calistoga: 30.3 miles^2
- St. Helena: 78.6 miles^2
- Yountville: 105 miles^2
- City of Napa: 291 miles^2 (upstream City boundary)

The discharges at each of the three outfalls were proportioned by their respective watershed areas relative to (1) the downstream-most discharger, Yountville, and (2) the City of Napa at the approximate extent of salt water in the Napa River. For example, 10:1 dilution at Calistoga gets diluted approximately 3.5-fold (=105/30.3) to Yountville and 10-fold (291/30.3) at Napa, at which points it would be 35:1 and 96:1, respectively.

The tabulated results indicate that if Calistoga and St. Helena discharged *continuously* at their minimum river-to-effluent flow ratios of 10:1 and 25:1, respectively, the resulting minimum river-to-effluent flow ratio would be 12:1 at Yountville and 33:1 at Napa. Average river-to-effluent flow ratios during the discharge season are actually much higher because of the

extremely improbable assumption that the three independent seasonal dischargers would concurrently discharge their maximum allowable volumes at their concentration limits. Average dilutions based on total seasonal discharge volumes are 95:1 at Yountville and 264:1 at Napa.

Table 7. Combined municipal wastewater river-to-effluent flow ratios in the Napa River at Yountville and at Napa. X:1 means the ratio of river to effluent flow.

Scenario	Flow Ratios (X:1) at Each Outfall			Net Flow Ratios (X:1) Downstream of		Net Flow Ratios (X:1) to Saltwater[1]	
	Calistoga	St. Helena	Yountville				
Areas (mi²)=	*30.3*	*78.6*	*105*	Minimum[2]	Average[3]	Minimum[2]	Average[3]
Current: 10:1 for Calistoga, 25:1 for St. Helena and Yountville	10	25	25	10.1	95	28.1	264
Future: 40:1 for Yountville	10	25	40	11.9		33.1	

[1] Assuming saltwater can extend above the City of Napa during the discharge season.
[2] Assuming all dischargers are discharging concurrently and at minimum dilution.
[3] Assuming average discharge conditions.

The Basin Plan states that discharger must demonstrate compliance with saltwater objectives at the nearest point in the receiving waters where salinity reaches 5 parts per thousand. The demonstration shall be based on "ambient monitoring at a frequency equal to that typically required for effluent monitoring for a period of time defined in the study plan." Estimated saltwater objectives for the saltwater portion of the Napa River are shown along with monitoring data downstream of Yountville's Outfall E-1 in **Table 8**. All downstream monitoring are below applicable objectives.

Table 8. Saltwater objectives for the Napa River compared to monitoring data.

Constituent	Chronic Saltwater WQO	Downstream Data (Average)	Downstream Data Notes
Dissolved Copper	6.0 ug/L (SSO)	2.92 ug/L	56 samples collected at different downstream locations during 2003-2004
Zinc	86 ug/L	9.0 ug/L	3 samples collected during 2002
Dichlorobromo-methane	46 ug/L	0.57 ug/L	3 samples collected during 2002
Cyanide	2.9 ug/L (SSO)	0.22 ug/L	3 samples collected during 2002
Total Ammonia	1.7 mg/L[1]	0.19 mg/L (maximum)	Maximum value recorded at RMP station located at the mouth of the Napa River

[1] Basin Plan criteria, adjusted with RMP pH, temp, salinity data.

COMPLIANCE WITH SIP CONDITIONS

Compliance with the SIP's mixing zone conditions (stated above in section "Conditions for Allowing a Mixing Zone") is summarized in **Table 9**. This summary indicates that the proposed regulatory mixing zone complies with all SIP conditions.

Table 9. SIP compliance assessment for allowing mixing zones for Calistoga WWTP effluent discharged to the Napa River.

SIP Mixing Zone Conditions		
Section	**Condition**	**Response Summary**
A(1)	A mixing zone shall not compromise the integrity of the entire water body	The plume's shape as it spreads across the channel delineates the mixing zone. The mixing zone extends less than 200 ft downstream of the outfall for all critical-condition scenarios.
A(2)	A mixing zone shall not cause acutely toxic conditions to aquatic life passing through the mixing zone	The acute criteria were developed based on one-hour exposure times. Exposure time to drifting organisms (plankton) passing through the effluent plume is on the order of 5 minutes (<<1 hr) at the velocity of the mean current. Acute toxicity tests conducted from 2005 through 2008 all had 100% survival with 100% effluent. Yountville has been discharging treated municipal wastewater for 70 years with no record of adverse impacts in the River.
A(3)	A mixing zone shall not restrict the passage of aquatic life	The side-bank outfall provides a wider portion of the river for passage. In the worst-case scenario of 40:1 minimum river-to-effluent flow ratio, all aquatic life criteria would be met within one-third of the river cross-section.
A(4)	A mixing zone shall not adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws	Aquatic species of concern in the Napa River include steelhead and western pond turtles. The mixing zone encompasses non-ideal habitat over a small distance downstream.
A(5)	A mixing zone shall not produce undesirable or nuisance aquatic life	There is no indication of enriched conditions in the vicinity of the outfall currently. Continuing the dilution credit at increased minimum dilution would not change nutrient *loads* to the Napa River but rather would lower nutrient *concentrations* downstream of the mixing zone.
A(6)	A mixing zone shall not result in floating debris, oil, or scum	Yountville WWRF effluent does not contain these by-products. Continuing the dilution credit would not increase discharges of such materials to the Napa River.
A(7)	A mixing zone shall not produce objectionable color, odor, taste, or turbidity	Yountville WWRF monitors on-site for these sensory effects. Continuing the dilution credit would not increase discharges or such effects to the Napa River.
A(8)	A mixing zone shall not cause objectionable bottom deposits	There is no indication of accumulation of material in the vicinity of the outfall. Seasonal river discharges erode and scour material in this reach of the Napa River. Continuing the dilution credit would not increase settleable material loads to the Napa River.
A(9)	A mixing zone shall not cause nuisance	Addressed for conditions A(5)-A(8).
A(10)	A mixing zone shall not dominate the receiving water body or overlap a mixing zone from different outfalls	The spatial extent of the mixing zone relative to the entire water body is extremely small and does not overlap with other permitted discharges, which are several miles upstream.
A(11)	… be allowed at or near any drinking water intake. A mixing zone is not a	The Napa River downstream of the Yountville WWRF does not have any drinking water intakes.

SIP Mixing Zone Conditions		Response Summary
Section	Condition	
	source of drinking water…	
B(part 1)	The mixing zone shall…protect beneficial uses…consider the presence of pollutants in the discharge that are carcinogenic, mutagenic, teratogenic, persistent, bioaccumulative, or attractive to aquatic organisms.	These effects are associated with long-term exposure. The minimum 40:1 river-to-effluent flow ratio requirement (typically >100:1), dilutes all pollutants of concern well below criteria levels.
B(part 2)	…consider…the level of flushing in water bodies such as lakes, reservoirs, enclosed bays, estuaries, or other water body types where pollutants may not be readily flushed through the system	Average dilution is much higher than the critical conditions simulated. Seasonally high river flows during the discharge season provide on average 95:1 dilution downstream of Yountville for all NPDES discharges combined.
B(part 3)	In the case of multiple mixing zones, proximity to other outfalls shall be carefully considered to protect the beneficial uses…	As noted in A.(10), the spatial extent of this mixing zone relative to the entire water body is small and does not overlap with any other NPDES permitted discharger's current or proposed mixing zones.