

AMMONIA PERMITTING OPTION
Proposed NPDES Permit Renewal
Bell Carter Olive Co., Inc. and City of Corning
Bell-Carter Industrial Wastewater Treatment Plant

PERMIT OPTION: The Permit before the Board regulates total ammonia nitrogen (as N) using the 1999 USEPA national recommended water quality criteria for the protection of aquatic life from the toxic effects of ammonia in freshwater (“1999 Criteria”).

The Board has the option of regulating total ammonia nitrogen (as N) using the 2013 USEPA national recommended water quality criteria (the “2013 Criteria”).

If the Central Valley Water Board chooses the ammonia permitting option based on the 2013 criteria, the changes shown in underline/strikeout format in this document would be implemented and the effluent limitations for ammonia in the adopted NPDES permit would be established using the 2013 Criteria.

1. Attachment – F. Section IV.C.3.c. Determining the Need for WQBEL’s – Constituents With Reasonable Potential.

1. Ammonia

- a. ~~WQO. The 1999 USEPA National Ambient Water Quality Criteria (NAWQC) for the protection of freshwater aquatic life for total ammonia (the “1999 Criteria”), recommends acute (1-hour average; criteria maximum concentration or CMC) standards based on pH and chronic (30-day average; criteria continuous concentration or CCC) standards based on pH and temperature. USEPA also recommends that no 4-day average concentration should exceed 2.5 times the 30-day CCC. USEPA found that as pH increased, both the acute and chronic toxicity of ammonia increased. Salmonids were more sensitive to acute toxicity effects than other species. However, while the acute toxicity of ammonia was not influenced by temperature, it was found that invertebrates and young fish experienced increasing chronic toxicity effects with increasing temperature.~~

~~The USEPA recently published national recommended water quality criteria for the protection of aquatic life from the toxic effects of ammonia in freshwater (the “2013 Criteria”)¹. The 2013 criteria is an update to USEPA’s 1999 Criteria, and varies based on pH and temperature. Although the 2013 Criteria reflects the latest scientific knowledge on the toxicity of ammonia to certain freshwater aquatic life, including new toxicity data on sensitive freshwater mussels in the Family Unionidae, the species tested for development of the 2013 Criteria may not be present in some Central Valley waterways. The 2013 Criteria document therefore states that, “unionid mussel species are not prevalent in some waters, such as the arid west ...” and provides that, “In the case of ammonia, where a state demonstrates that mussels are not present on a site-specific basis, the recalculation procedure may~~

¹ Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater, published August 2013 [EPA 822-R-13-001]

be used to remove the mussel species from the national criteria dataset to better represent the species present at the site. In August 2013, U.S. EPA updated its National Ambient Water Quality Criteria (NAWQC)¹ for the protection of freshwater aquatic life for total ammonia. The 2013 NAWQC for ammonia recommends acute (1-hour average; criteria maximum concentration or CMC) and chronic (30-day average; criteria continuous concentration or CCC) standards that vary based on pH and temperature. U.S. EPA also recommends that no 4-day average concentration should exceed 2.5 times the 30-day CCC. The 2013 NAWQC for ammonia takes into account data for several sensitive freshwater mussel species and non-pulmonate snails that had not previously been tested.

U.S. EPA found that as pH and temperature increased, both the acute and chronic toxicity of ammonia increased for invertebrates. However, U.S. EPA found that only pH significantly influenced acute and chronic ammonia toxicity for fish. Therefore, the 2013 acute NAWQC for ammonia is primarily based on the ammonia effects on species in the genus *Oncorhynchus* (salmonids) at lower temperatures and invertebrates at higher temperatures. However, due to the significant sensitivity unionid mussels have to the chronic toxicity effects of ammonia, the 2013 chronic NAWQC for ammonia is determined primarily by the effects on mussels.

The 2013 ammonia NAWQC document states that "*unionid mussel species are not prevalent in some waters, such as the arid west.*" The 2013 ammonia NAWQC also states that, "*In the case of ammonia, where a state demonstrates that mussels are not present on a site-specific basis, the recalculation procedure may be used to remove the mussel species from the national criteria dataset to better represent the species present at the site.*" The 2013 ammonia NAWQC document, therefore, includes a recalculation procedure for acute and chronic criteria for waters where mussels are not present. The 2013 ammonia NAWQC also provides criteria for waters where *Oncorhynchus* species are not present and where protection of early life stages of fish genera is unnecessary.

A report prepared by The Nature Conservancy, *Sensitive Freshwater Mussel Surveys in the Pacific Southwest Region: Assessment of Conservation Status* (published August 2010), demonstrates the results of a strategic mussel study and survey conducted during 2008-2009. The report contains survey information for the Sacramento River approximately 79 river miles upstream of the Facility in Redding, where mussels were historically present but were not present during a 2008 sampling event, and approximately 35 river miles downstream of the Facility in Ord Bend, where mussels were present during a 2009 sampling event. There is limited information whether mussels are present at

the discharge location and the report did not provide any additional surveys for mussels within 35 river miles downstream of the discharge. Therefore, the site-specific ammonia criteria for waters where mussels are not present were used. The Sacramento River has a beneficial use of cold freshwater habitat (COLD) and the salmonids and early fish life stages in the Sacramento River is well-documented, therefore, the recommended ammonia criteria for waters where salmonids and early life stages are present were used.

The Central Valley Water Board issued a 3 April 2014 *California Water Code Section 13267 Order for Information: 2013 Final Ammonia Criteria for Protection of Freshwater Aquatic Life* (13267 Order) requiring the Discharger to either participate in an individual or group study to determine the presence of mussels or submit a method of compliance for complying with effluent limitations calculated assuming mussels present using the 2013 Criteria. The Discharger has chosen to participate in the Central Valley Clean Water Association (CVCWA) Freshwater Collaborative Mussel Study. ~~Studies are currently underway to determine how the latest scientific knowledge on the toxicity of ammonia reflected in the 2013 Criteria can be implemented in the Central Valley Region as part of a Basin Planning effort to adopt nutrient and ammonia objectives. Until the Basin Planning process is completed, the Central Valley Water Board will continue to implement the 1999 Criteria to interpret the Basin Plan's narrative toxicity objective. In this case, effluent limitations for ammonia remain the same whether using the 1999 or the 2013 criteria.~~ The Central Valley Water Board may require additional information from the Discharger in the future to evaluate whether more restrictive ammonia criteria for other species (i.e., unionid mussels) is applicable for the Sacramento River. However, at this time, ammonia criteria have been calculated with the assumption that mussels are not present.

~~The 1999 NAWQC for the protection of freshwater aquatic life for total ammonia, recommends acute (1-hour average; criteria maximum concentration or CMC) standards based on pH and chronic (30-day average; criteria continuous concentration or CCC) standards based on pH and temperature. USEPA also recommends that no 4-day average concentration should exceed 2.5 times the 30-day CCC. USEPA found that as pH increased, both the acute and chronic toxicity of ammonia increased. Salmonids were more sensitive to acute toxicity effects than other species. However, while the acute toxicity of ammonia was not influenced by temperature, it was found that invertebrates and young fish experienced increasing chronic toxicity effects with increasing temperature. Because the Sacramento River has a beneficial use of cold freshwater habitat and the presence of salmonids and early fish life stages in the Sacramento River is~~

~~well-documented, the recommended criteria for waters where salmonids and early life stages are present were used.~~

This Order includes an instantaneous maximum effluent limitation pH of 9.5 based on a pH mixing zone of 65 feet, and a maximum receiving water limitation of 8.5 based on the Basin Plan objective. Based on downstream receiving water monitoring conducted 50 feet downstream of the discharge, the maximum observed downstream receiving water pH was 8.46 and the maximum observed downstream receiving water temperature was 18.3°C. In order to protect against the worst-case short-term exposure of an organism, a pH value of 8.5 and a maximum observed downstream receiving water temperature of 18.3°C was used to derive the acute criterion. The resulting acute criterion is 2.14 mg/L.

Downstream receiving water monitoring for pH and temperature was conducted once per month, resulting in 66 sets of paired pH and temperature data. The maximum observed downstream receiving water temperature and pH were 18.3°C and 8.46 standard units, respectively. The maximum ammonia effluent concentration was 14.4 mg/L. ~~In accordance with U.S. EPA's 2013 Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater, the 30-day CCC was determined by calculating the CCC for each paired pH and temperature set and taking the 95th percentile CCC (with criterion ranked from high (less stringent) to low (more stringent)). The resulting 30-day CCC is 4.982.08 mg/L. The 4-day average concentration is derived in accordance with the U.S. EPA criterion as 2.5 times the 30-day CCC. Based on the 30-day CCC of 4.982.08 mg/L (as N), the 4-day average concentration that should not be exceeded is 4.955.19 mg/L (as N).~~

- b. **RPA Results.** The maximum effluent ammonia concentration was 14.4 mg/L, based on 309 samples collected between January 2008 and February 2014. The maximum observed upstream receiving water ammonia concentration was 0.06 mg/L, based on three samples collected between January 2008 and February 2014. Therefore the effluent has a reasonable potential to cause or contribute to an in-stream excursion above the Basin Plan's narrative toxicity objective.
- c. **WQBEL's.** The Central Valley Water Board calculates WQBEL's in accordance with SIP procedures for non-CTR constituents, and ammonia is a non-CTR constituent. The SIP procedure assumes a 4-day averaging period for calculating the long-term average discharge condition (LTA). However, U.S. EPA recommends modifying the procedure for calculating permit limits for ammonia using a 30-day averaging period for the calculation of the LTA corresponding to the 30-day CCC. Therefore, while the LTA's corresponding to the acute and 4-day chronic criteria were calculated according to SIP procedures, the LTA corresponding to the 30-day CCC was calculated assuming a 30-day averaging period. The lowest LTA representing the acute, 4-day CCC, and

30-day CCC is then selected for deriving the AMEL and the MDEL. The remainder of the WQBEL calculation for ammonia was performed according to the SIP procedures.

The maximum observed upstream receiving water ammonia concentration was 0.06 mg/L based on three samples collected between January 2008 and February 2014; therefore, the receiving water contains assimilative capacity for ammonia. Thus, as discussed further in section IV.C.2.c, acute and chronic dilution credits of 20:1 were allowed in the development of WQBELs for ammonia. This Order contains an AMEL and MDEL of 15 mg/L and 44 mg/L, respectively, based on the NAWQC.

- d. **Plant Performance and Attainability.** Analysis of the effluent data shows that the maximum effluent ammonia concentration of 14.4 mg/L is less than the applicable WQBEL's. The Central Valley Water Board concludes, therefore, that immediate compliance with these effluent limitations is feasible.

6. Attachment G – Summary of Reasonable Potential Analysis.

Constituent	Units	MEC	B	C	CMC	CCC	Water & Org	Org. Only	Basin Plan	MCL	Reasonable Potential
Ammonia Nitrogen, Total (as N)	mg/L	14.4	0.06	1.98 2.08	2.14 ¹	1.98 2.08 ²	--	--	--	--	Yes (MEC>C)
Benzo(a)pyrene	µg/L	0.2 DNQ	<0.1	0.0044	--	--	0.0044	0.049	--	0.2	Inconclusive ³
Bis (2-Ethylhexyl) Phthalate	µg/L	2 DNQ	1 DNQ	1.8	--	--	1.8	5.9	--	4	Inconclusive ³
Chloride	mg/L	3,820	62	230	860 ¹	230 ⁴	--	--	--	250 ⁵	No ⁶
Copper, Total Recoverable	µg/L	89.4	2.2	5.8 ⁷	8.2 ⁷	5.8 ⁷	1,300	--	8.1 ⁷	1,000 ⁵	Yes (MEC>C)
Electrical Conductivity @ 25°C	µmhos/cm	8,520 ⁹	204 ⁹	230	--	--	--	--	230	900 ⁵	No ⁶
Iron, Total Recoverable	µg/L	2,345 ¹⁰	120 ¹¹	300	--	1,000	--	--	300	300 ⁵	Yes (MEC>C)
Pentachlorophenol	µg/L	1.2 DNQ	<0.2	0.28	5.3	4.0	0.28	8.2	--	1	Inconclusive ³
Sulfate	mg/L	787 ¹⁰	--	250	--	--	--	--	--	250 ⁵	No ⁶
Total Dissolved Solids	mg/L	5,766 ¹⁰	139 ¹⁰	500	--	--	--	--	--	500 ⁵	No ⁶
Zinc, Total Recoverable	µg/L	41.5	16.3	22 ⁷	74 ⁷	74 ⁷	7,400	26,000	22 ⁷	5,000 ⁵	Yes (MEC>C)

AMMONIA PERMITTING OPTION
 BELL-CARTER OLIVE CO., INC. AND CITY OF CORNING
 PROPOSED NPDES PERMIT RENEWAL

Constituent	Units	MEC	B	C	CMC	CCC	Water & Org	Org. Only	Basin Plan	MCL	Reasonable Potential
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General Note: All inorganic concentrations are given as a total recoverable.
 Data Range: January 2008 through February 2014
 MEC = Maximum Effluent Concentration
 B = Maximum Receiving Water Concentration or lowest detection level, if non-detect
 C = Criterion used for Reasonable Potential Analysis
 CMC = Criterion Maximum Concentration (CTR or NTR)
 CCC = Criterion Continuous Concentration (CTR or NTR)
 Water & Org = Human Health Criterion for Consumption of Water & Organisms (CTR or NTR)
 Org. Only = Human Health Criterion for Consumption of Organisms Only (CTR or NTR)
 Basin Plan = Numeric Site-specific Basin Plan Water Quality Objective
 MCL = Drinking Water Standards Maximum Contaminant Level
 NA = Not Available
 ND = Non-detect
 DNQ = Detected by laboratory, but not quantified.

Footnotes:
 (1) U.S. EPA National Recommended Ambient Water Quality Criteria, Freshwater Aquatic Life Protection, 1-hour average.
 (2) U.S. EPA National Recommended Ambient Water Quality Criteria, Freshwater Aquatic Life Protection, 30-day average.
 (3) See section IV.C.3.b of the Fact Sheet (Attachment F) for a discussion of the RPA results.
 (4) U.S. EPA National Recommended Ambient Water Quality Criteria, Freshwater Aquatic Life Protection, 4-day average.
 (5) Secondary MCL.
 (6) See section IV.C.3.a of the Fact Sheet (Attachment F) for a discussion of the RPA results.
 (7) Criterion based on design ambient water hardness of 57 mg/L as CaCO₃.
 (8) Represents the maximum observed annual average concentration for comparison with the Basin Plan objective for electrical conductivity.
 (9) Represents the maximum observed annual average concentration or comparison with the Secondary MCL.
 (10) Represents monitoring data from the DWR gaging station at Sacramento River at Vina.

7. Attachment H – Calculation of WQBEL's.

Parameter	Units	Most Stringent Criteria			Dilution Factors			HH Calculations			Aquatic Life Calculations							Final Effluent Limitations			
		HH	CMC	CCC	HH	CMC	CCC	ECA _{HH} = AMEL _{HH}	AMEL/MDEL Multiplier _{HH}	MDEL _{HH}	ECA Multiplier _{acute}	LTA _{acute}	ECA Multiplier _{chronic}	LTA _{chronic}	Lowest LTA	AMEL Multiplier ₉₅	AMEL _{AL}	MDEL Multiplier ₉₉	MDEL _{AL}	Lowest AMEL	Lowest MDEL
Ammonia Nitrogen, Total (as N)	mg/L	--	2.14	1.98 2.08 ¹	--	20	20	--	--	--	0.15	6.5	0.57	24	6.5	2.35	15	6.7	44	15	44
Copper, Total Recoverable	µg/L	1,000	8.1 ²	5.8 ³	--	20	20	1,000	2.01	2,010	0.32	40	0.53	41	40	1.55	63	3.11	125	63	125
Zinc, Total Recoverable	µg/L	5,000	22 ²	74 ³	--	20	20	5,000	2.01	10,050	0.32	43	0.53	652	43	1.55	67	3.11	135	67	135

¹ 30-day ammonia criteria.

² Basin Plan water quality objective evaluated using a design ambient hardness of 57 mg/L (as CaCO₃) and default U.S. EPA acute conversion factor.

³ Water quality criteria evaluated using a design ambient hardness of 57 mg/L (as CaCO₃) and default U.S. EPA chronic conversion factor.