UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Oct 08, 2004

In Reply Refer To: WTR-7

Steve Struckan, Maintenance Supervisor
Sierra Nevada Brewery
1075 East 20th Street
Chico, California 95928

Dear Mr. Struckan:

Enclosed is the report for EPA's June 11, 2004, compliance sampling inspection of the Sierra Nevada Brewery. We request that you submit a short response to each specific finding in the numbered items 2.0 - 5.0 of this report by November 30, 2004.

This inspection was one of many that we conducted as part of our evaluation of the City's program to control non-domestic discharges into its sewers. EPA will issue an overall report to the City later this month. The main findings regarding Sierra Nevada are summarized below:

1 The Chico permit has for the most part applied the applicable local limits correctly to Sierra Nevada. The permit needs to specifically prohibit bypassing of the treatment unit.

2 The source(s) of cyanide in the wastewater discharge must be determined.

3 The discharge should be continuously monitored for organic strength. Indicator measurements such as opacity can be used.

4 The permit should limit the self-monitoring requirements to the pollutants of concern, which are flow, pH, temperature, organic strength, cyanide, BOD, TSS, aluminum, chromium, copper, iron, zinc, ammonia, nitrates, phosphorus, hardness, and TDS.

We thank you for your cooperation during our inspection. Please send copies of any submittal to the City of Chico as well as to us. If you have any questions, please feel free to contact me at (415) 972-3504 or by e-mail at arthur.greg@epa.gov.

Sincerely yours,

Original signed by:
Greg V. Arthur

Greg V. Arthur, Envr. Engr.
CWA Compliance Office

Enclosure

cc: Ron Manwill, City of Chico
Nolan Randall, RWQCB-Redding

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION 9

CLEAN WATER ACT COMPLIANCE OFFICE

NPDES COMPLIANCE EVALUATION INSPECTION REPORT

Industrial User:	Sierra Nevada Brewing Company 1075 East 20th Street, Chico, California 95928 Non-Categorical Significant Industrial User
Treatment Works:	Chico Water Pollution Control Plant (NPDES Permit CA0079081)
Dates of Inspection:	June 11, 2004

Inspection Participants:

US EPA:	Greg V. Arthur, CWA Compliance Office, (415) 972-3504
RWQCB:	No Representative
City of Chico:	Ron Manwill, Industrial Waste Inspector, (530) 895-4967
Sierra Nevada:	Steve Struckan, Maintenance Supervisor, (530) 893-3520

Report Prepared By:	Greg V. Arthur, Environmental Engineer September 30, 2004

Section 1

Introduction and Background

1.0 Scope and Purpose

On June 11, 2004, EPA conducted a compliance sampling inspection of the Sierra Nevada Brewing Company in Chico. The purpose was to ensure compliance with the Federal regulations covering the discharge of non-domestic wastewaters into the sewers, in particular:

- Classification in the proper Federal categories;
- Application of the correct standards at the correct points;
- Consistent compliance with the standards; and
- Fulfillment of Federal self-monitoring requirements.

Sierra Nevada is one of three significant industrial users and three other industries in Chico whose compliance was assessed as part of EPA's 2004 evaluation of the Chico pretreatment program. Chico and Sierra Nevada received individual reports. The inspection participants are listed on the title page. Arthur conducted the inspection and sampling on June 11.

1.1 Process Description

Sierra Nevada brews and bottles beer at 1075 East 20th Street in Chico. Brewery operations comprise grain milling and hydrating to make mash, centrifuge separation of the lauter from spent grain, yeast fermentation for 14 days, yeast harvesting, centrifuge separation, sheet filtering, and cold storage. The bottling operations comprise ozonated-water bottle disinfection, chain lubrication, and filling. Grain, hops, minerals, boxes, labels, and bottles are from off-site suppliers. Kegs are recleaned on-site.

Support operations include eight clean-in-place systems, water supply preconditioning, five cooling water towers serving seven chillers, and an anaerobic wastewater treatment plant. The clean-in-place systems cycle chemical cleaners and rinses through the facility equipment. Water supply preconditioning involves activated carbon filtration, dechlorination by ultraviolet oxidation, ozonation, phosphoric acidification, and CO_2 stripping of oxygen, to produce ozonated filler water, dechlorinated make-up water, and dechlorinated and deaerated make-up water. Reverse osmosis is maintained on standby. Cooling towers cool the chillers which circulate glycol/water to non-contact cool plant and equipment. See Appendix 1.

Section 1 – Introduction and Background

1.2 Waste Streams

Brewery - The washdown and cleaning of the plant and equipment is generally set to the brewing schedule which means beer-related organics residues and cleaning chemical spents are expected to be discharged to the in-plant sewers throughout the day. The clean-in-place systems discharge spent caustic, phosphoric acid, peroxide, and peroxyacetic acid cleaning solutions, as well as their rinses. There are other wastewaters generated on set schedules. The lauter centrifuges are cleaned around 4:00p which results in a spike of organics-laden washdown discharged to the in-plant sewers in the mid afternoon and evening. The plant-wide shutdown followed by hot sanitizing of the lines in the early mornings results in no flows to the in-plant sewers from 2:00a to 4:00a followed by a spike in flow rate and chemical cleaning spents from 4:00a to 6:00a. Finally, the mash line is cleaned once per week.

Bottling - Conveyor chain lubrication drainage and ozonated disinfection tailwaters drain to the in-plant sewers. An alkaline soapy water mixture is used for chain lube.

Cooling Towers – The five cooling towers discharge blowdown to the in-plant sewer. The biocide, descaler, and corrosion inhibitor additives are potassium dimethyldithiocarbamate, bleach, hydroxyethylidene and diphosphonic acid. The blowdown would be expected to entrain the additives as well as a concentrated mineral content from the water supply.

1.3 Wastewater and Waste Handling

Process wastewaters collect in three underground sumps which are pumped across a street to a second building housing an anaerobic wastewater treatment unit. The treatment consists of rotary drum screening, 160,000-gallon equalization ($\theta \approx 16$ hours), a 130,000-gpd low-rate bulk volume fermentation ("BVF") anaerobic bioreactor ($\theta \approx 8.5$ hours), and reaeration. The complete-mixed, suspended-biomass, BVF bioreactor operates at 30-40°C. BVF sludge recirculates into the bioreactor influent and eventually wastes with the discharge. EPA did not determine the mean cell residence time (θc). The bioreactor contents are reaerated in a final tank and discharged to the sewers through a single compliance sample point, which is designated in this report as IWD-1. The chemical oxygen demand into the bulk volume fermenter averages 5,000 to 6,000 mg/l. Its removal rates average 90%.

The anaerobic stabilization process involves two steps. First, facultative bacteria ("acid formers") enzymatically breakdown and ferment long-chained and often insoluble organics into simpler volatile organic acids. Second, anaerobes ("methanogens") digest the volatile organic acids. Anaerobic treatment requires alkaline additions because the methanogens stabilize volatile organic acids only within a narrow neutral pH range. As a result, caustic is added so that the BVF bioreactor operates at pH's of 6.5 to 8.0 in order to prevent the inhibition of methanogen growth. Rotary drum screenings are hauled off-site to a non-hazardous landfill. The bioreactor vents the produced off-gases. Centrifuged solids like spent grain and excess yeast are off-hauling as cattle feed. Finished beer solids are reclaimed to spent yeast.

Section 1 – Introduction and Background

1.4 Wastewater Discharge Permitting

Chico issued issued permit No. 004 to Sierra Nevada authorizing the discharge of process wastewaters to the sewers. The permit establishes limits and self-monitoring requirements for IWD-1, specifies sampling protocols, and includes the general provisions of the Chico municipal code (§15.40.020) that apply to all non-domestic discharges to the Chico sewers. See Appendix 2 for a list of the permit limits.

Section 2

Sewer Discharge Standards and Limits

Federal categorical pretreatment standards (where they exist), national prohibitions, and the local limits (where they exist) must be applied to the sewered discharges from industrial users. 40 CFR 403.5 and 403.6.

2.0 Summary

No Federal categorical pretreatment standards apply to the process wastewater discharges from Sierra Nevada. The Chico permit applies local limits and self-monitoring for pH, oil & grease and many toxic pollutants. It also applies self-monitoring for BOD, TSS, and flow, and requires 90-day prior notification of expected changes in the wastewater discharge quality. The permit also states the general discharge prohibitions from §15.40.020 of the Chico municipal code, which include the prohibitions against causing pass-through or interferences, or against slugs of more than 5-times the average lasting for more than 15 minutes. The application of Federal categorical standards, national prohibitions and local limits was determined through visual inspection. See Appendix 2 for the discharge requirements.

Requirements

- None.

Recommendations

- The permit should specifically prohibit the bypassing of the on-site treatment or require prior notice and approval by the City of Chico.

2.1 Classification by Federal Point Source Category

Sierra Nevada is a significant industrial user discharging over 25,000 gpd to the sewers. It does not qualify as a categorical industrial user subject to any of the Federal categorical pretreatment standards in 40 CFR 407-471.

2.2 Local Limits and National Prohibitions

Local limits and the national prohibitions are meant to express the limitations on non-domestic discharges necessary to protect the sewers, treatment plants and their receiving waters from adverse impacts. In particular, they prohibit discharges that can cause the pass-through of pollutants into the receiving waters or into reuse, the operational interference of the sewerage works, the contamination of the sewage sludge, sewer worker health and safety

Section 2 – Sewer Discharge Standards and Limits

risks, fire or explosive risks, and corrosive damage to the sewers. The national prohibitions in 40 CFR 403.5(a)(b) apply nationwide to all non-domestic sewer discharges. The Chico local limits, which apply to non-domestic discharges in its service area, are meant to translate the predominantly narrative national prohibitions into numeric limits specific to the sewer service area.

The local limits and national prohibitions applied to Sierra Nevada also are meant to address any site-specific risks posed by Sierra Pacific to the operations of the Chico sewage treatment works. At Sierra Nevada, the bypassing of the on-site treatment could result in fluctuations in the strength and flow of its discharges to the sewers large enough to adversely impact the Chico treatment works. Without treatment, Sierra Nevada would increase the organics loadings into the Chico treatment works by ~130%, an increase sufficiently large enough to result in operational interferences related to oxygen transfer, alkalinity demand, and nutrient dosing. Toward this risk, the Chico permit for Sierra Nevada should either specifically prohibit bypassing of the on-site treatment, or require prior notice and approval of the expected bypassing methods by the City of Chico.

2.3 Point(s) of Compliance

The compliance sample point for the local limits and national prohibitions is the sewer manhole located immediately outside of the wastewater treatment building, designed in this report as IWD-1.

2.4 Compliance Sampling

Local limits and the national prohibitions are instantaneous-maximums that are comparable to samples of any length including single grab samples.

2.5 Pollutants of Concern

The permit appropriately advances local limits and self-monitoring requirements for chromium, copper, cyanide, and zinc, since the discharge includes these pollutants and Chico is regulated for them by the NPDES permit or the Federal sludge standards. The Chico permit also appropriately advances local limits for pH since anaerobic wastewaters drift acidic. There other identified pollutants of concern are related to the organic strength of the discharge but are not locally regulated (*aluminum, ammonia, BOD, hardness, iron, nitrates, phosphorus, TDS, and TSS*).

Section 3

Compliance with Federal Standards

Industrial users must comply with the Federal categorical pretreatment standards that apply to their process wastewater discharges. 40 CFR 403.6(b).

Categorical industrial users must comply with the prohibition against dilution of the Federally-regulated waste streams as a substitute for treatment. 40 CFR 403.6(d).

Industrial users must comply with the provision restricting the bypass of treatment necessary to comply with any pretreatment standard or requirement. 40 CFR 403.17(d).

3.0 Summary

No Federal categorical pretreatment standards apply to Sierra Nevada because none of the Federally-regulated processes are performed on-site. It follows that there can be no dilution as a substitute for treatment nor any bypass of treatment necessary to comply with Federal standards.

Requirements

- None.

Recommendations

- None.

Section 4

Compliance with Local Limits and National Prohibitions

All non-domestic wastewater discharges to the sewers must comply with local limits and the national prohibitions. 40 CFR 403.5(a,b,d).

Industrial users must comply with the provision restricting the bypass of treatment necessary to comply with any pretreatment standard or requirement. 40 CFR 403.17(d).

4.0 Summary

The organic strength of the treated discharge from Sierra Nevada poses no operational risk to the Chico treatment works. However, bypassing or failing treatment could form septic conditions in the sewers or cause operational interferences at the City's treatment plant related to oxygen transfer, alkalinity demand, and nutrient dosing. Although toxics are not expected from food processing in general, cyanide was found in the discharge at levels over the local limit. There were the expected low levels of toxic metals, oil & grease, and toxic organics.

Requirements

- The source(s) of cyanide in the wastewater discharges must be determined.
- All process wastewaters must be thoroughly treated in the BVF bioreactor prior to discharge to the sewer.

Recommendations

- The discharge should be continuous monitored for organic strength. Possibly specific conductivity or opacity could be used as indicator measurement of BOD or TSS levels.

4.1 National Objectives

The general pretreatment regulations were promulgated in order to fulfill the national objectives to prevent the introduction of pollutants that:

(1) cause operational interference with sewage treatment or sludge disposal,
(2) pass-through sewage treatment into the receiving waters or sludge,
(3) are in any way incompatible with the sewerage works, or
(4) do not improve the opportunities to recycle municipal wastewaters and sludge.

Section 4 – Compliance with Local Limits and National Prohibitions

This evaluation did not include an evaluation of whether achievement of the national objectives in 40 CFR 403.2 have been demonstrated by consistent compliance with the sludge and discharge limits at the Chico wastewater treatment plant. That analysis will be available later as part of the EPA evaluation report for Chico expected for release in late October 2004.

4.2 Local Limits for Toxic Metals, Cyanide, and Other Pollutants

Toxic Metals – All ten samples (100%) complied with the local limits for toxic metals. Like most food producers, Sierra Nevada would not be expected to generate significant levels of toxic metals. The discharge through IWD-1 does contain levels of certain metals well above detection with averages and calculated 99th% peaks of 0.08 and 0.21 mg/l copper, 0.09 and 0.27 mg/l zinc, and a single sample of 8.50 mg/l iron. The copper and zinc are likely from the descaling of piping and equipment. Iron, which is not locally regulated, is from the dosing of ferric chloride as part of the anaerobic treatment of organics in the BVF bioreactor.

Cyanide – Only seven of ten samples (70%) complied with the local limit for cyanide with the last violation recorded in August 2003. The source of the cyanide is unknown and there were no follow-up samples required or obtained by the City of Chico. A small cyanide source could be off-hauled or batch treated if it is primarily free cyanide amenable to alkaline chlorination. The average and calculated 99th% peak are 0.13 and 0.49 mg/l cyanide, which results in a ~15% statistical chance of violating the 0.29 mg/l local limit.

Other Pollutants – All ten samples (100%) complied with the local limit for oil & grease and for various toxic organics. The only locally-regulated toxic organics detected in at least one sample were dichloromethane, and bis(2-ethylhexyl)phthalate.

4.3 Local Limits for Oxygen Demanding Pollutants and The National Prohibition Against Interference

The treated discharge is not strong enough in organics to pose a risk of interference. However, bypassing the treatment could increase the organics loadings into the Chico treatment works by ~130%, an increase large enough to result in interferences. See item 2.2.

4.4 Local Limits for Solvents and The National Prohibition Against Flammability

Flammability is a risk because of an expected lack of organic solvents in the discharge.

Section 4 – Compliance with Local Limits and National Prohibitions

4.5 Local Limits for pH and
The National Prohibition Against Corrosive Structural Damage

The discharges do not involve acidic wastewaters. The discharges are also not strong enough in organics to pose a risk of going septic in the sewers. As a result, the discharges are not expected to pose a risk of causing corrosive structure damage to the Chico sewers.

Section 5

Compliance with Federal Monitoring Requirements

Significant industrial users must self-monitor for all regulated parameters at least twice per year unless the sewerage agency monitors in place of self-monitoring. 40 CFR 403.12(e) & 403.12(g).

Each sample must be representative of the sampling day's operations. Sampling must be representative of the conditions occurring during the reporting period. 40 CFR 403.12(g) & 403.12(h).

5.0 Summary

The samples are representative over the sampling day and the reporting period. The sample record satisfies the Federal minimum requirement for Sierra Nevada to self-monitor all process wastewaters for non-conventional pollutants twice per year. In fact, many of the pollutants are not of concern and do not have to be sampled. Conventional pollutants should be self-monitored continuously since the failure or bypass of the BVF bioreactor could pose a risk of operational interference of the Chico treatment works. The only parameter of concern not evident in the sample record is pH.

Requirements

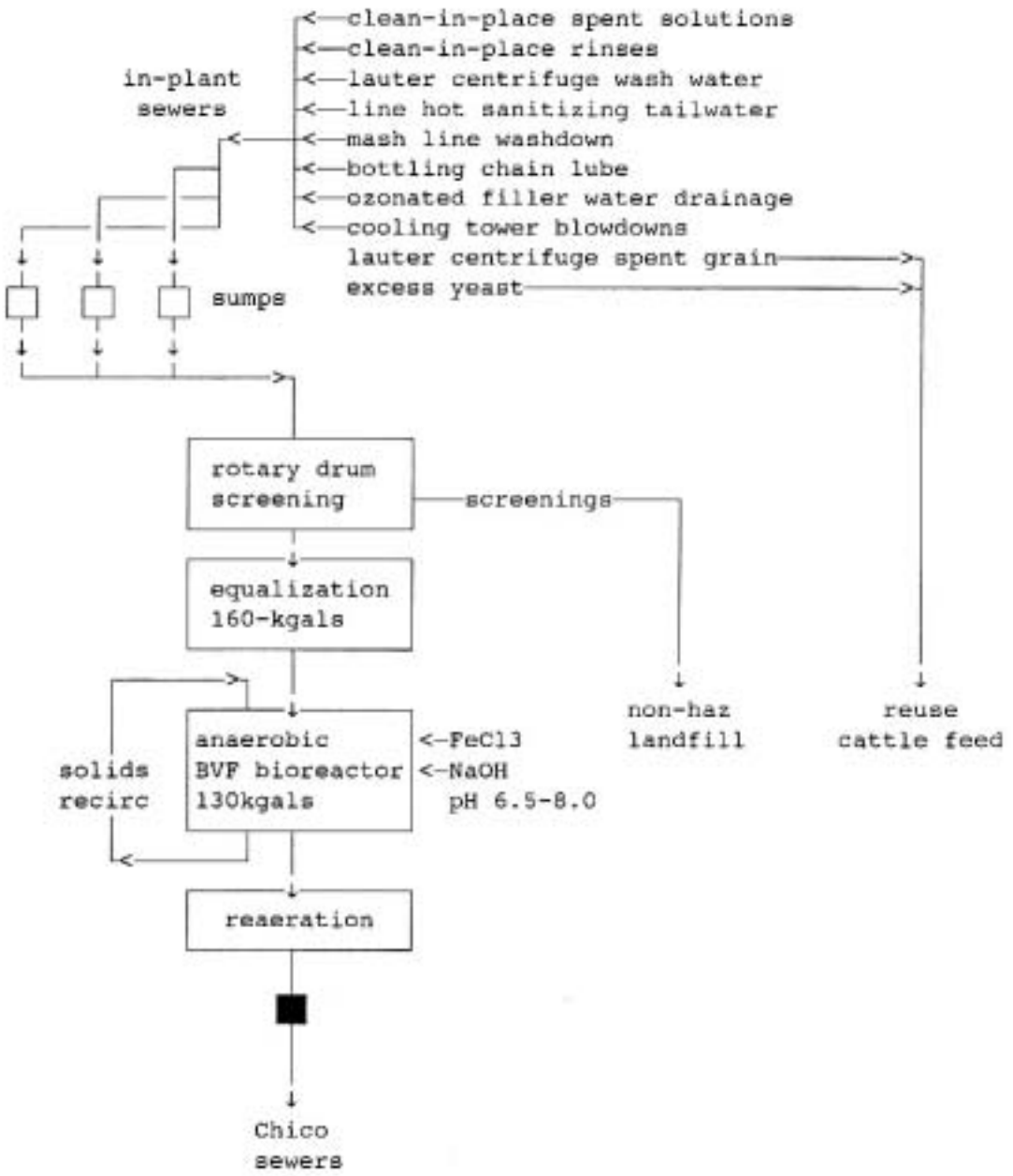
- None.

Recommendations

- The permit should delist from self-monitoring toxic organics, oil & grease, antimony, arsenic, beryllium, cadmium, lead, mercury, nickel, selenium, and silver.
- The permit should require the continuous self-monitoring for flow, pH, temperature, and organic strength (as measured by an indicator such as opacity or EC).
- The permit should require the monthly self-monitoring for cyanide, BOD, and TSS.
- The permit should require the twice per year monitoring of aluminum, chromium, copper, iron, zinc, total ammonia, total nitrates, phosphorus, hardness, and total dissolved solids.

Appendix 1

Sierra Nevada Brewing Company, Chico, California
Schematic of the Wastewater Collection and Treatment



Appendix 2

Clean Water Act Requirements - Sierra Nevada Brewing Company, Chico Anaerobic Treatment Plant @ IWD-1

Specific Numeric Limits (mg/l)	**Nat'l a/ Prohib** inst	**Local Limits** inst	
arsenic	-	0.266	
chromium	-	1.71	
copper	-	2.6	
lead	-	1.55	
mercury	-	0.017	
nickel	-	1.19	
selenium	-	0.05	
zinc	-	3.03	
cyanide-total	-	0.29	
oil+grease	-	300.	
dichloromethane	-	4.15	
pH min (s.u.)	5.0	5.0	
pH max (s.u.)	-	11.5	
Regulations	Muni Code b/ Chapt 15.40.060		

a/ National prohibitions and Chico local limits also include narrative prohibitions against pass-through, interference, sludge contamination, obstruction, toxic gases/fumes, fire/explosion hazard, causing heat >104°F at the municipal wastewater treatment plant, or slug loads greater than 5-times average loads lasting longer than 15 minutes

b/ Additional Chico local limits for the following pollutants not present in the discharge -- antimony, benzene, beryllium, cadmium, carbon disulfide, chloroethane, chloroform, chloromethane, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, ethylbenzene, hexachloroethane, silver, tetrachloroethylene, toluene

Appendix 3

Discharge Quality at IWD-1
Sierra Nevada Brewing Company, Chico

Pollutants (µg/l)	Jan-2001 to Aug-2004 mean	99%*	max	Fed-Violations-Local d-max	mo-av	inst	sampl count
aluminum			119	ns	ns	ns	1
antimony	<1.0	<1.0	<1.0	ns	ns	0/10	10
arsenic	0.3	1.3	1.6	ns	ns	0/10	10
barium			31.	ns	ns	ns	1
beryllium	<1.0	<1.0	<1.0	ns	ns	0/10	10
cadmium	<1.0	<1.0	<1.0	ns	ns	0/10	10
chromium	12.2	35.2	34.	ns	ns	0/10	10
cobalt			<2.0	ns	ns	ns	1
copper	76.9	213	210	ns	ns	0/10	10
cyanide	130	492	344	ns	ns	→3/10	10
iron			8500	ns	ns	ns	1
lead	0.3	1.9	2.3	ns	ns	0/10	10
manganese			62.	ns	ns	ns	1
mercury	<0.02	<0.02	<0.02	ns	ns	0/10	10
molybdenum			8.8	ns	ns	ns	1
nickel	3.2	10.3	10.	ns	ns	0/10	10
selenium	1.1	6.2	7.0	ns	ns	0/10	10
silver	0.9	3.3	3.0	ns	ns	0/10	10
TTO (tox organics)	87.3	670	760	ns	ns	0/9	9
zinc	87.4	268	260	ns	ns	0/10	10
(mg/l)	mean	99th%	max	d-max	mo-av	inst	count
ammonia as N			52.	ns	ns	ns	1
biochem oxy demand			170	ns	ns	ns	1
boron			0.08	ns	ns	ns	1
chloride			-	ns	ns	ns	1
hardness			140	ns	ns	ns	1
nitrate as N			<0.03	ns	ns	ns	1
oil & grease	2.1	7.4	7.9	ns	ns	0/10	10
phosphorus			37.	ns	ns	ns	1
sodium			900	ns	ns	ns	1
sulfates			-	ns	ns	ns	1
TDS (dsslvd solids)			2400	ns	ns	ns	1
total susp solids			810	ns	ns	ns	1

ns no standard
* Computed statistics

→ Computed Statistical Probability of Violation

limits	mean	std dev	probability	percent
Loc-CN (inst)	μ = 130.2	σ = 156.6	$\alpha(290)$ = 0.1539	15%

Appendix 4

Sampling Results - Sierra Nevada Brewing Company, Chico
June 11, 2004

Sample Results (mg/l)	Sierra Nevada @ IWD-1	Sierra Nevada @ IWD-1	Chico WWC Influent @ IWD-CH1	Chico WCP Influent @ IWD-CH1
aluminum	0.097	0.140	0.810	0.880
antimony	<0.0010	<0.0010	<0.0010	<0.0010
arsenic	0.0016	0.0016	0.00068	0.00080
barium	0.030	0.032	0.0310	0.0330
beryllium	<0.0005	<0.0005	<0.0005	<0.0005
cadmium	<0.0010	<0.0010	<0.0010	<0.0010
chromium	0.0066	0.0062	0.0021	0.0022
cobalt	0.00037	<0.0020	<0.002	<0.002
copper	0.100	0.100	0.0082	0.0110
iron	8.50	8.50	0.820	0.880
lead	0.0022	0.0023	0.0025	0.0028
manganese	0.061	0.063	0.0200	0.0210
mercury	0.00002	0.00002	0.00026	0.00037
molybdenum	0.0089	0.0087	0.0016	0.0020
nickel	0.0046	0.0051	0.0031	0.0029
selenium	0.0025	0.0022	0.00093	0.00089
silver	<0.0005	<0.0005	0.0008	0.0010
vanadium	0.029	0.029	0.020	0.020
zinc	0.150	0.160	0.086	0.092
cyanide-total	-	-	-	-
hardness	140	140	140	140
boron	0.084	0.075	0.200	0.200
sodium	890	910	82.0	82.0
chloride	-	-	-	-
ammonia as N	47.	57.	-	-
nitrate as N	<0.030	<0.030	-	-
oil & grease	8.15	7.72	-	-
phosphorus-total	37.	37.	-	-
sulfate	-	-	-	-
total dissolved solids	2400	2400	520	490
pH (s.u.)	-	-	-	-
EC (µmohs/cm)	-	-	-	-
closed cup flashpoint (°F)	-	-	-	-
Sample Number	CH005	CH008	CH009	CH011
Date	06/11/04	06/11/04	07/06/04	07/06/04
Type	grab	grab	4-h comp	dupe 009

All samples collected, kept in custody, and delivered to the laboratory by Greg V. Arthur. Samples analyzed by EPA Richmond Lab. Sampling documentation including chain of custody and quality control results are part of the April 2004 pretreatment program evaluation report for Yuba City.